Natural Dentistry Hygiene Book

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GENERAL DENTAL MERCURY REMOVAL CONSIDERATION

1) The quadrant containing the highest single reading should be removed first ,and further quadrants in descending order, as indicated on the chart. This sequential removal may be crucial in mercury toxic patients.

2) Where possible a rubber dam should be used, in conjunction with an efficient high volume evacuation, and high speed cutting tool with water coolant spray, to protect the patient from the aerosol .

3) When the patient is extremely hypersensitive to mercury, they may react during treatment . If there are signs of an adverse reaction, give six grams of sodium absorbate, (Vit.C) in a glass of water. Charcoal, Bentonite, Adrenal + Liver treatment can also assist.

4) Negative current excites nerves. When fillings are removed from teeth with high negatives, the tooth may become hypersensitive, which may be avoided by inserting a temporary dressing for about two months.

5) If any other metal is used as a restorative material, all amalgams should be removed first.

WHEN DRILLING OUT AMALGAM:-

6) Cover the patient's eyes with a damp cotton wool, or use wrap around goggles.

7) Use R.A. nosepiece with tubing attached, to extend out of operating area, or work using oxygen flow or charcoal filter.

8) Confirm that the patient has been advised on pre-treatment detoxification procedures.

9) use comfortable music The QX VRI or other comforting distraction. The QXCI can relieve pain and other tension as well.

DENTAL PRE and POST-TREATMENT PLAN

HOMEOPATHIC DENTAL AMALGAM (NV)
Six drops twice a day, either under the tongue, or in a little water.
Separate from food by one hour either side. Start seven days before treatment and include day of treatment.. Continue same dose for three weeks, if dental treatment scheduled, take it on that day.

HOMEOPATHIC DENTAL INJURY (NV)
Six drops twice a day, either under the tongue, or in a little water. For stimulation of healing.
Separate from food by one hour either side. Start seven days before treatment and include day of treatment.. Continue same dose for three weeks, if dental treatment scheduled, take it on that day

CHARCOAL
Take three charcoal tablets half an hour before any dental treatment involving amalgam removal and three in morning and three at bed for two weeks after.

BENTONITE CLAY
Take three bentonite tablets half an hour before any dental treatment involving amalgam removal and one in the morning and three at bed for two weeks after.
GLUTATHIONE PEROXIDASE
Dose:- one with water half an hour before breakfast. Start two days before treatment involving amalgam removal. Continue for two days after treatment, that is five days in all.

ORGANIC CHELATED SELENIUM ZINC and VITAMIN E
No more than 50 mcg of organically bound selenium, 25 mg of zinc, and 400 iu of Vitamin E, a day at bed with 10 oz. of water. Use for five days after. This will prevent kidney toxicity of the selenium.

FATTY ACID LIQUESCENCE
30 drops a day for on week before and for one month after.

VITAMIN C POWDER
Start right away, Dosage :- 1/4 teaspoon (=1 gram.) Once a day. Or use 1000mg chewable.
On treatment days :- 1/4 teaspoon before and 1/4 teaspoon after treatment.

Magnesium Succinate:
Start: - on each day of treatment
Dose: - 2 capsules 2 hours before treatment
- 2 capsules within 2 hours after treatment, then drink one pint of water over the following two hours

Support adrenal, liver, kidney and lymph when needed.

Good Natural multivitamin & mineral:
Start : - 8 days before treatment
Dose: - 1 per day in the morning(with food)
Continue : - for 6 weeks after treatment

CORIANDER (Cilantro)

-this must be fresh and preferably organic if you can get it. (It is very easy to grow at home in a sunny position) - dried coriander does NOT work well Fresh is better.
Research published late in 1996 has shown that Coriander has a wonderful capacity to remove heavy metals and especially mercury from the body. This is a revolutionary discovery and makes Cilantro the first known substance that mobilizes mercury from the CNS. The active principle is unknown. But the sepulative idea contains the high organically bound selenium and the quantum quadrapole found in the remedy.

RECIPE For Cilantro-Pesto:

Buy fresh organic Cilantro. Use equal parts black olives.
Wash.

Put in blender with small amount of water, dash of sea salt
(Celtic salt is good) and olive oil and Fatty Acid Liq NV 20 drops,
Blend until creamy.Take 1 tablespoon 3 times a day with meals.
Do not heat, spread on bread or crackers, use on salad.
More often, if brain severely compromised;
depression, Alzheimer's disease, "fogginess", etc.)

Alternate Pesto Recipe

Coriander - 1 bunch
Black Olives 10.
Garlic - to taste
Black pepper to taste
Coconut desiccated ½ cup
Lime ½ juiced
Olive Oil - cold pressed
Fatty Acid Liq, 20 drops

(Any black vegetable such as black pepper and black olives are black from excess selenium and chromium, the organic bounding will not stress the kidney but assist detox of heavy metals, Guiness beer also will help no more than two pints a day)

Blend all together and keep refrigerated for one week

PLEASE NOTE: It is important to continue with detoxification after removal of fillings in order to remove mercury which has built up over the years.

CONCEPTS IN ENERGETIC DENTISTRY

FOREWORD

Our digestive process starts with the separation and initial enzymatic effects of some of our salivary enzymes, and the release of saliva in the mouth. If the mouth does not do its job properly, the entire set of nutrition, as well as the health of the body, is affected. We also know that the large amount of nerve fibers running around the mouth to the brain affects every process in the body. Many people have found that the mouth is integral to the treatment of all the different processes of life.

With teeth playing such an important role in the oral cavity it is not surprising that an entire separate science of dentistry had to be developed to handle the complexity of this part of the body. As teeth started to decay and have other problems, dentists started to look for different developed materials that they could use to put into these holes in the teeth. Many substances were experimented with, until finally, certain amalgams were developed which had a soft nature, were pliable enough to put into a hole, and then the surface was ground. many of these materials used toxic substances such as mercury, formaldehyde, cements, etc. These substances, toxic in large quantities, were believed to be not so toxic when put into the small amounts and locked into the metal cavities of the teeth.

Originally "quacks" were termed so because mercury was used for many other ailments, including sinus problems, in which mercury vapors would kill bacteria, worms and other different diseases. However, they also produced softening of the brain tisr-,-ie and other vast problems. Thus doctors that believed in the use of mercury were termed "quacks", because mercury was known as quicksilver. Originally quacks were termed so because mercury was used for many other ailments, including sinus problems, in which mercury vapors would kill bacteria, worms and other different diseases. However, they also produced softening of the brain tisr-,-ie and other vast problems. Thus doctors that believed in the use of mercury were termed quacks, because mercury was known as quicksilver.

Today a raging debate envelopes us as to whether this mercury in the amalgam is safe or not. This book includes over 400 different treatises outlining a very scientific view that these metals are toxic, and as such need to be dealt with to correct various health problems. The larger part of the scientific community has not settled on a firm decision as to the toxicity of mercury, but we live America, where there is freedom of choice. If a patient believes that the mercury amalgam fillings in his mouth are detrimental to his health, and chooses to have them removed by a licensed, qualified practitioner, this is his choice. The freedom of choice in this country also extends to the insurance companies, who need to make a decision as to whether they will pay for this procedure.

Many scientists are now turning to an electrical description of the body; even extending to other energetic phenomena, such as magnetism, capacitance, inductance, resistance, voltage, amperage, temperature, as well as different oscillations.

In understanding the dynamics of acupuncture as it applies to dentistry we will need to use an energetic philosophy, and study the energetic factors of the mouth. In the "Quantum Biology of Dr. Nelson" we will find an in-depth treatise on the analysis of the energetic

factors of biology. This book is a description and an overview of different mechanisms that can be used by the practicing dentist to analyze teeth energetically.
It is to two factors that this book is dedicated: one, to development of an energetic medicine; and two, to the factors of freedom of choice, as more and more dentists, doctors, and people in general believe that only nature knows biology, and that different toxic elements, regardless of their mechanical availability or metallic pliability, do not belong in biology.

Practitioner’s Guideto Dental MaterialsTest Kit Manual

Practitioner's Guide to Dental Materials

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Chapter 1 1

Practitioner's Guide to Dental Materials

Introduction

The prevalence of dental disease and dental treatment make the oral condition a nearly universal modifier of our patients' health, but it is the rare practitioner who takes this into account. Dentists, too, do not often choose restorative materials on the basis of any individualized biocompatibility testing. They typically rely on materials that are considered safe for "most people,' and pay much more attention to the mechanical properties of the materials they use.

It is clear, though, that any given individual is not "most people." The principles of biological individuality that govern tolerance or intolerance to foods and other substances also apply to dental materials, which are surgically implanted in people's mouths. It would be wonderful if these materials could always be evaluated on an individual basis. After all, you can rotate your diet at will, but you can't rotate your fillings!

An appreciation of how teeth are treated and what materials are used would be especially helpful to practitioners of applied kinesiology and electro-biofeedback, or others who have tools to rapidly evaluate the body's bility to tolerate foods, medicines, and other ubstances. This manual will give non-dentist eaders enough of an overview of dental materials and how they are used to be able to alk productively with the dentists who treat their patients.

Our ability to restore and replace broken down teeth has enabled people to be much more comfortable, attractive. healthy and well nourished than they could be otherwise. Still, the materials used to accomplish these worthy goals can impact a person's health in a variety of ways. Metallic materials release ions by corrosion, abrasion or dissolution. Resins outgas, dissolve or abrade. All materials undergo changes in the harsh conditions of the mouth and release their constituents for absorbtion into the body. Some of these released products have toxic effects, most notoriously the mercury released from 'silver' amalgam. Others can be antigenic, such as nickel from stainless steel or other non-precious metals, or acrylic resins from composite fillings or denture bases. A frequently cited source of antigenicity is the

tendency of metal ions and small molecular .weight chemicals to act as "haptens," binding to normal body proteins and changing slightly their three dimensional shape. This can make the normal protein appear foreign, and immunologic sensitization can occur, which may then cross react with other, undamaged proteins. It is strongly suspected that mercury is involved in the origin of autoimmune diseases by just this mechanism.

Metals in a salt bath, such as saliva, generate electricity, just as in a battery. An array of metallic restorations in a person's mouth sets up an artificial electromagnetic structure within the head and meridian system. Individual fillings can be measured for electrical current output using a standard meter. Such currents can be found to transmit through meridians, often preferentially through some more than others, with obvious implications for the acupuncturist.

The more electricity there is generated between metals, the greater are the "corrosion currents.' and the faster the release of ions from them. You can see the results othis phenomenon most often around gol(crowns in the presence of amalgam fillings, ir the form of an "amalgam tattoo," a grayblue discoloration on the adjacent gum tissue. This is actually a collection of silver, tin, copper and mercury sulfides that have electroplated out of the metal restorations into the adjacent tissues. Sufficient electrical current can cause outright pain, and chronic exposure can contribute to muscle tension, headache and TMJ complaints. The ideal situation, where metals are required, is to have just one highly biocompatible metal used for all the indicated purposes in a patient's mouth.

The purpose of compatibility testing for dental materials is to ensure that these permanently implanted foreign substances will be the least injurious to a given patient. Those who suffer from allergic diseases, environmental illness, chemical sensitivity, and autoimmune diseases are the most obvious candidates for this service, in order to help reduce their body burden of toxins and allergens. But we should not neglect the great mass of people who may not be overtly iil, yet are exposed to the toxins and allergens imposed by our industrialized environment. We can lighten everyone's load by helping to choose their dental materials wisely.

How to Use This Manualto Use This Manual

Chapter 2 is a graphic summary of restorative dentistry. The pictures illustrate typical fillings, crowns, removable dentures, root canal fiiiings, and implants, with descriptions of the categories of materials used in each.

Chapter 3 tabulates a representative sample of commercially available, brand name materials for each of the categories noted in chapter 2. Please understand that there are hundreds, if not thousahds, of proprietary dental materials on the market, with many more added each year. A selection such as this can only scratch the surface. I have made an effort to pick some of the most commonly used brands, along with others that have unique biocompatibility features. There are certainly many other worthy materials that could have been included in every category, but the number of choices would rapidly grow unwieldy, not unlike the problem facing conscientious dentists today! For the same reason, I have deliberately left out all the materials that are not left in a patient's mouth, such as impression materials, toothpastes, topical anesthetics, etc.

Finally, there is a summary page that can be photocopied and used as a report form.

To narrow down the range of materials to test for a given patient, it helps to know what kind of dentistry is indicated. A person with all teeth present is likely to need fillings or crowns, but not dentures. One with missing teeth may need to consider removable dentures, fixed bridgework, or implant bridges. Obviously, consulting with the dentist is extremely helpful. Dentists you work with may have their own favorite materials, which should be added to your kit, if not already present.

Once you have decided what kind of dental work to test materials for, the diagrams in Chapter 2 will indicate the categories you should consider. Look for the bulk material first. For example, in testing for filling materials, first test for amalgams or composites. Then look for cavity liners and bonding agents. Each diagram will also indicate what the bare minimum requirements are for that type of application, so that a highly sensitive patient may be treated with as few materials as possible.

Other RescourcesRescources

It is not the author's intention to advocate one method of compatibility testing over another. Whether you use kinesiology or electro-biofeedback, or any other means, you can make a significant contribution to a patient's care. On the other hand, there will be times when a more medically based testing method is indicated, either for insurance purposes, or to corroborate findings from the more "subtle body" approaches.

The're are a few clinical laboratories, listed below, that offer blood tests for sensitivity to dental materials. Clifford Consultinci and Hu(3gins DiagnQstic examine blood serum for antibodies to specific breakdown products of dental materials. in their reports, if a particular metal or chemical produces an immune reaction, all the brand name products that contain it will be reported as "may not be suitable.' Products whose components do not cause a reaction are reported as "may be suitable" for that patient. Huggins Diagnostic also offers a nutritional blood chemistry analysis service and has a comprehensive dental detoxification clinic for severe cases. Immunotech Laborato[y uses a method that derives from tissue typing and cross-matching. Lymphocytes gathered from a blood sample are cultured, and exposed to samples of intact dental materials. The number of cells that survive the encounter indicate the level of immune acceptance of that material. The degree of cell survival is reported. This is similar in many ways to cytotoxic allergy testing for foods.

Clifford Consulting 719-599-8883

Huggins Diagnostic 719-473-4703

Immunotech Laboratory 303-798-4751

Table OneOne

Frequency of positive immune response to components of dental materials, in an unselected sample of 300 blood tests, based on precipitin reaction titers. From W. J. Clifford, Materials Reactivily Testing, 1990.

Metals		**Organics**	
Aluminum	86%	Acrylates	2%
Antimony	16	Butyrates	1
Barium	<1	Carboxylates	4
Beryllium	39	Cellulose	6
Bismuth	24	Hexanes	3
Chromium	37	Polyethimines	35
Cobalt	36	Polyvinyis	3
Copper	62	Styrenes	1
Gallium	20	Tannins	49
Gold	3	Toluenes	18
Indium	56	Urethanes	<1
Iridium	19	Xylenes	7
Mercury	68		
Nickel	46		
Palladium	16		
Platinum	<1		
Silver	8	8	
Strontium	<1		
Tin	61		
Titanium	<1		
Vanadium	4		
Zinc	52		

Chapter 2

A Graphic Summary of Restorative Dentistry

The illustrations in this chapter show the many ways that dentists restore teeth, and the types of materials used. The various layers are labelled with the category of material indicated, and the labels refer to the following list:

A. Amalgams
B. Composites -
C. Bonding resins
D. Dentin bonders
E. Cavity liners
F. Metals
G. Ceramics
H. Cements
1. Temporary restoratives
J. Root Canal materials
K. Anesthetics ,
L. Denture materials
M. Fluorides

In Chapter 3, these groups are described in greater detail, and a brand-name selection is presented.

Chapter 3

Dental Materials Reference

Contents

Amalgams

Silver - mercury amalgam has been the standard filling material for the last 170 years, des lingering suspicion that the mercury included in it cannot be good for the health. The dental establishı has always contended that the mercury is
stabilized in the alloy, that it doesn't leach out, and anyway, if it did, it would be in amounts too small to anyone. Modern research has shown that it does, in fact, come out of the fillings, and is absorbed by body. Toxicologists say that there is no safe threshold for mercury. The question of what specific ailm can be linked to accumulations of small quantities of mercury is just beginning to be researched seriou

A typical amalgam composition is 50% mercury, 35% silver, with the rest being copper, tin and zinc. Other metals are added on a proprietary - basis. All of these metals can be allergenic, and contribute to a person's body burden. Virtually all amalgams in use today are the "high copper" for- mulations, which have improved physical properties. However, it has been reported that high copper amalgam releases both mercury and copper at greater rates than "standard' formulas.

A 1 Dispersalloy High Copper Amalgam (Johnson & Johnson)

-

B. Composites. Composites

Cormposite resin filling materials consist of micron sized glass particles, coated with a silane adhesive, suspended in a matrix of acrylic plastic resin. Colorants, which are mostly iron oxides, UV scavengers, water scavengers, etc, are added, along with either

chemical setting activators (tertiary amines) or photo activators (camphor quinones). They were introduced in the 1960's, and gained rapid acceptance for esthetic restorations in front teeth. Unfortunately, the earlier composites would wear away too quickly to perform well as fillings for back teeth. By the 1980's, composites were so improved that the latest versions compare favorably to amalgam in wear resistance. Of course, we don't have enough decades of experience to be certain, but it looks as though the composite fillings we are using today will prove to be very durable. Even more strength can be achieved by composite materials that are oven cured outside the mouth, and bonded into the tooth later (B 9, 10).

Composites are tooth colored, so they are a big improvement over amalgam from an esthetic . nt of view. In addition, they adhesively bond to the tooth, thereby providing a degree of structural reinforcement that amalgam cannot. Earlier techniques of placing composite fillings in back teeth resulted in a distressingly high rate of post operative sensitivity, to hot, cold, or pressure. Happily, advances in bonding technique have reduced this problem to the point where there is no apparent difference in sensitivity between composite and amalgam fillings. One potential problem, which is currently not well researched, is the presence of aluminum in the filler particle glass of many composites. No one has documented aluminum release, but it is thought that aluminum silicates are very stable, while aluminum oxides or oxalates, present in some composites, may not be.

Bonding a composite filling to a tooth requires adhesion to both enamel and dentin, two rather different tissues which present different problems for adhesives. Enamel is crystalline, 96% mineral hydroxyapatite. A few seconds exposure to an acid gel etches microscopic pits in the surface. An unfilled resin,' or liquid bonding agent, is painted on, penetrating the pits, gripping tightly. This forms a plastic film that adheres to the 'filled resin,' or composite filling.

Bonding to dentin is much trickier, and though great progress has been made, it is not yet considered a perfected art. Dentin is only 70% mineral.

The mineral phase is perfused by microscopic tubules radiating out from the pulp of the tooth, which contain watery organic matter. A variety of mechanisms have been introduced to gain adhesion to this slippery surface, but the result of all of them is to deposit a film of some type of acrylic to which the bonding resin will adhere.

It is usually recommended that a given brand of composite be used with the bonding resin and dentin bonder manufactured for it, to assure the best adhesion. In practice, though, there is a lot of cross-compatibility among them, so you may look first for biocompatibility of the various materials, and worry about adhesive properties later. A cross brand combination can be field tested by the dentist, by seeing if two buttons of the chosen composite can be glued together by the chosen bonding resin. Manufacturers are occasionally helpful in this regard.

Listed on the next page are some of the most popular and successful brands, chosen from among the many high performance composites available. All the samples in the test kit are of the manufacturer's universal' color.

Composite Glossary:

Bis-GMA: Bisphenol A - glicidyl methacrylate resin

TEGMA: Triethylene glycol dimethacrylate resin

UDMA: Urethane dimethacrylate resin

PDMA: Polycarbonate dimethacrylate resin

HEMA: Hydroxy ethyl dimethacrylate

FILLER: the glass particles embedded in resin

FSil: Fumed silica, also called colloidal silica, “microfiller” particles, .04 micron sized SiO2.

YF3: Yterbium trifluoride, added for radio-opacity in some microfills. The fluoride leaches out, considered an advantage by most dentists.

A: for use in anterior teeth.

P: for use in posterior teeth.

Name	A	P	Resin	Filler	Set	Bonding Resim
B 1 glass	Prisma APH (L D Caulk) photo	Universal Bond	A	P	UDMA "modified”	Ba Al B Si
B 2 DMA's	Heliomolar Radio-opaque (Vivadent) F Sil YF3	photo	Heliobond	A	P	UDMA Bis-GMA other
B 3 glass F Sil	Herculite XR (Kerr) photo	XR Bond	A	P	Bis-GMA TEGMA	Ba Al B Si
B 4	P-10 (3 M)		P	Bis-GMA	Quartz	chem ScotchBond II
	An old tech product, holds up well, included for the quartz filler and chemical activator.					
B 5	P-50 (3 M) ScotchBond II	A	P	Bis-GMA TEGMA		Zirconia F Sil photo
B 6	Silux Plus (3 M) ScotchBond II		A		Bis-GMA	FSil photo
	Very popular microfilled composite for anterior use only.					
B 7 glass F Sil	Occlusin (ICI-Coe) photo	Coe Bond		P	UDMA TEGMA	Ba Al B Si

Another old standby, wears slightly more than later posterior composites, often better tolerated by very sensitive patients.

B 8	Post-Com II (Jeneric-Pentron) photo Optec bond		P	Bis-GMA	Ba B Si glass

Little known, but has exellent physical properties, and no aluminum or other leachable metal ions.

B 9	Conquest (Jeneric-Pentron) A Optec bond		P	PDMA	Ba B Si glass photo heat

No aluminum, novel resin system, excellent physical properties, may be especially biocompatible. Available from specialty dental labs as fully polymerized inlays, onlays or crowns. Very low polymerization shrinkage.

B 10	Concept (Williams) Photo heat MirageBond		P	UDMA Bis-GMA	F Sil YF3

A lab-processed, fully polymerized version of Heliomolar for inlays and onlays.

B 11	Pertac Hybrid (Espe-Premier) A photo		P	Bifunctional methacrylate	Quartz

Very low polymerization shrinkage.

B 12	Profile (Mission) chem.	Bulk filler		Bis GMA	Ba Al B Si glass

Similar to a great number of 'buildup" composites.

C. Bonding Resins

C 1 Prisma Universal Bond 3
(L D Caulk)

C 2 Helioband
(Vivadent)

C 3 XR BondC 3 XR Bond
(Kerr)

C 4 Scotchbond II
(3 M)

C 5 Optec Universal Bond

(Jeneric-Pentron)

Contains PDMA, has some adhesion to metals.

C 6 Compspan Resin
(L D Caulk)

Chemical cured resin, used where light cure is not possible, similar to many Bis-GMA resins.

D. Dentin Bonders

D 1 Prisma Universal Bond 3 Dentin Primer
(L D Caulk)

D 2 GLUMA part 3 Dentin Primer
(Columbus)

D 3 XR Bond Dentin Primer
(Kerr)

D 4 Scotchprep Dentin Primer
(3 M)

D 5 Optec Dentin Primer
(Jeneric-Pentron) Contains an amino acid polymer, rather than acrylic.

E. Cavity Liners and Bases

Since the dentin of a tooth is porous via the dentinal tubules, materials placed in a cavity can affect the pulp tissue that lies within. Medicating the pulp and insulating the pulp from restorative materials can be accomplished with cavity liners. Such liners can also help reduce leakage between the filling and cavity walls. Dental cements can be used in a similar fashion, as 'base' buildups, to take up space in a cavity under the surface restoration. These are classic concepts in dentistry, and some of the materials used have their origins in the distant past.

Calcium hydroxide is one such substance. When it is placed on the floor of a cavity, it promotes a protective reaction within the pulp cells. They respond by depositing "secondary dentin," which thickens the dentinal substance between the cavity and the pulp. It is used mostly on very deep spots in a cavity preparation, as a 'pulp protection.'

Cavity varnishes are also of antique origin, and are mostly used with amalgam fillings to reduce leakage, or with the highly acidic zinc phosphate cement, to keep acid from penetrating to the pulp.

In the early days of using composites to fill back teeth, we were plagued with a high incidence of post operative sensitivity. The material that finally allowed us to do posterior composites without fear of excess sensitivity was the **glass ionomer lining cement.** Glass ionomers appeared in the mid 1970's, and exploded into wide use in the mid 1980's. Chemically, they consist of a mixture of poiymeric acids with micron size glass particles, similar to the glass particles in composites. The acids react with the surface of the glass particles, creating a plastic mass which hardens. The polymeric acids provide a substantial adhesion to calcium ions, thus to dentin. The glass used is typically aluminum-fluoro-silicate. Fluoride ions are known to leach out, which may be an advantage in terms of reducing recurrent tooth decay, or a disadvantage if fluoride is as hazardous as some people claim. Aluminum may also leach out, although that is not documented, and most glass ionomers have aluminum in the silicate form. Despite these possible toxicities, the author's experience has been that some of the most sensitive patients seem to do well with glass ionomer materials. Listed in this section are some glass lonomer cements formulated especially for cavity lining. Those more appropriate for cementing crowns are listed in section H, although this is not a rigid division.

CALCIUM HYDROXIDE LINERSHYDROXIDE LINERS

E 1 **Dycal** resin reinforced CAOH liner
(L D Caulk)

E 2 **Hydroxyline** CAOH powder in an acetone carrier
(George Taub)

E 3 **Life** resin reinforced CAOH liner, no free aluminum.
(Kerr)

CAVITY VARNISHES

E 4 **Copalite**
(Bosworth) natural copal varnish in volatile solvent. This is not compatible with composite resins!

E 5 **Barrier**

(Teledyne-Getz) May be used with composites, and is sometimes used as the only pulp protection for highly senstitive patients.

GLASS IONOMER LINING CEMENTS

E 6 G C Dentin Cement
(G C)

E 7 Vitra Bond
(3 M) Glass ionomer crossed with light cured resin. High strength and adhesion.

F. Metals. Metals

Non-metallic dentistry is not yet a reality. It may never be completely possible or even entirely desirable, since, as we saw in the discussion of composites and glass ionomers, many of the best glasses and ceramics contain aluminum and/or fluoride. Resins and ceramics have not yet been able to equal metals for strength in crowns and bridges. Valiant attempts have been made to use all ceramic formulations for crowns, but they have been breaking at a dismayingly high rate. New materials are being introduced at this writing, (G 5.7) but time will have to tell how effective such high tech ceramics will be.

In this author's experience, sensitive patients tend to divide roughly into those who prefer nonmetallic dentistry, and do well with ceramics and composites, and those who prefer gold with non polymeric cements. Patients in the second group will often have a history of toxic exposure to petrochemicals, gas leaks, lab accidents, and the like, and react to the chemicals in resin restoratives. But even those for whom non metals are preferable may have situations that require the use of metals, such as fixed bridgework, implants, or some removable partial dentures. Then the challenge is to find the most biocompatible metal to use for that purpose.

Most of the metals in list below are "casting" metals, which are formed by a lost wax casting technique into inlays, crowns, partial denture frameworks, etc. The selection below was chosen to present a variety of chemical compositions, tabulated with their intended uses. People can be reactive to one element and not another, so a choice of compositions for any given purpose is helpful. There is plenty of choice, too, since there are hundreds of commercial alloys on the market. The selection is also heavily weighted toward "high noble,' gold containing metals, since, when blocompatibility is at issue, gold is the best starting point.

Key

C&B: used for crowns and bridges

RPD: can be used for removable partial dentures.

P: bonds to porcelain.

G. Ceramics This category includes porcelains, high strength ceramics for supporting porcelain, and crystalline hydroxyapatite. Porcelain has been used for many years for durable, naturally colored restorations. The most common, and most reliable, application is the porcelain-fused-to-metal system (PFM), in which the hard, but brittle porcelain is bonded to a substructure of metal, for toughness and fracture resistance. This system can be used to restore single teeth, or to make extensive dental reconstructions, with very good appearance. The metal core, however, lends a certain opacity to the resulting tooth that is sometimes an esthetic detriment. Also, there are patients who have a hard time tolerating metals.

Therefore, there has been a drive in dentistry to develop high strength ceramic cores to support porcelain with greater translucency, and without the potential biological difficulty with metals. To date, there has been moderate success with this goal, as the all-ceramic crowns available to date have been pretty good esthetically, but not as strong as needed. An uncomfortably high degree of breakage has caused many dentists to back away from their use unless the biological advantages greatly outweigh the mechanical disadvantages. Yet there is continuing progress. The recently introduced In-Ceram material is claimed to have three times the strength of other ceramic cores, and may yet prove to be the breakthrough we've needed. Optec and In-Ceram may have enough strength to allow fabrication of some anterior bridges.

The negative side of porcelains and ceramics from a biological point of view may be the fact that, with the exception of Dicor, they are all highly aluminous. The basic chemical composition of porcelain is a mixture of potassium, aluminum and silicon oxides, along with oxides of many othler metais. An increased amount of aluminum oxide is added to some of the higher strength materials.

It Is not likely that very much aluminum is released, especially from the aluminum silicate forms, but some dentists have restricted their use of ceramics because of it.

Please beware some confusing terminology. There is a difference between 'veneer' porcelains that form the surface of porcelain crowns, and porcelain for 'bonded veneers,' cosmetic restoratlons bonded to front teeth.

G 1 **Vita VMK 68** (Vident) — Veneer porcelain for PFM restorations.

G 2 **Vitadur N** (Vident) — Aluminous porcelain for the 'porcelain jacket crown,'and veneer for other ceramic core materials.

G 3 **Coramco II** (Johnson & Johnson) — Veneer porcelain for PFM restorations.

G 4 **Ceramco G** (Johnson & Johnson) — Formulated especially for cosmetic bonded veneers

G 5 **Optec HSP** (Jeneric-Pentron) — High strength porcelain introduced for all-porcelain inlays, onla crowns and cosmetic bonded veneers.

G 6 **Dicor** (Dentsply) — Castable zirconia glass for inlays, onlays, crowns and cosm veneers. Cast glass is very translucent, must have porcelain baked the surface for coloring, thus reintroducing the aluminum questi Where esthetics is not a great problem, Dicor can be used with surface porcelain.

G 7 **In-Ceram** (Vident) — Newly introduced aluminous core material, translucent. Very go esthetics, may have the greatest strength of all ceramics.

G 8 **Hydroxyapatite** — Crystalline calcium phosphate salt identical to the mineral phase of bone and tooth. it is used in many forms as implant material, to restore lost bone in periodontal disease. a bonded to the surface of titanium for tooth bearing implants.

H. Cements. Cements

Something must be used to glue a prefabricated restoration, like a crown, or bridge, or veneer to prepared tooth. Some restorations, such as porcelain or lab-processed composite veneers and onla can be 'bonded,' in the same manner as composite fillings. The prepared tooth is etched, a der bonder and unfilled bonding resin is applied, followed by a resin cement to glue in the restoration. Re cements are just low viscosity composites, and several brands are nothing more than diluted versions the manufacturer's composite filling material. One example is Kerr's Porcelite, which has the sar composition as Herculite. A patient who can tolerate composites will tolerate similar resin cements.

Most crowns and bridges are cast metal, or porcelain fused to metal, and are placed with more traditional cements, called 'luting cements.' There are four general types. The first, and one of the old classics, is **zinc phosphate.** This is simply zinc oxide powder mixed with liquid phosphoric acid, to create a creamy paste that sets very hard. In its unset condition, it Is very acidic. The low viscosity liquid can penetrate dentinal tubules and injure the pulp, so it is usually necessary to coat the prepared tooth with cavity varnish prior to cementing the restoration.

Another nineteenth century classic cement is **zinc oxide and eugenol,** or ZOE. Eugenol is clove oil, made synthetically, now. Clove oil has been known from ancient times as a topical anesthetic, used in herbal medicine for toothaches, teething pain , etc. It has the same soothing effect on the dentin of a tooth, when used either as a base under a filling, or to cement a crown. ZOE is frequently used by itself for temporary, sedative fillings in hypersensitive teeth, and may be. favored as a cement for crowns on teeth that have been too sensitive. Unfortunately, eugenol is a relatively frequent allergen, and, thus, is not for everybody. Also, ZOE is not strong enough by itself to be used as a good permanent cement, so a variety of resins are added for reinforcement. One very successful formula adds ortho-ethoxybenzoic acid (EBA) to the basic formula, to gain strength and decrease solubility.

A modern improvement on the old zinc oxide system replaces the diffusable phosphoric acid with a polymeric acid that does not get into the pulp. These are known as **polycarboxylate** cements, and they tend to be very well accepted by chemically sensitive patients. They don't desensitize teeth as eugenol containing materials can, but they are non-irritating. The polymeric acids also give a good deal of adhesion to the tooth, just as in the glass ionomers.

Finally, there are the **glass ionomer** cements, whose chemistry was discussed in section E. They have high strength and excellent adhesion. They release fluoride. They tend to reduce post operative sensitivity under composite fillings, but there is a certain rate of sensitivity that occurs when they are used to cement crowns, due to residual acidity that sometimes remains after the cement has set.

H 1 **Parcelite Dual Cure**
(Kerr) Resin cement, same chemis" as Herculite, with both light and chemical activators.

H 2 Compspan Opaque (L D Caulk) Chemically set resin cement for bonded bridges or other applications where light can't reach.**H 3 Fleck's Cement** Zinc phosphate (Mizzy)**H 4 Opotow EBA** (Teledyne-Getz) Zinc oxide - eugenol, reinforced with EBA

H 5 Durelon Zinc polycarboxylate (Espe-Premier)

H 6 Ketac-Cem Glass ionomer luting cement. (Espe-Premier)

H 7 C & B Metabond (Parkell) One of several dentin bonding resin adhesives that bond strongly to metals, used for adhering metals to tooth structure, repairing broken porcelain, veneering metals with composite, etc. The main component is '4-META,' a hydrophilic substance that apparently can be made to stick to every-thing.**1. Temporary Restoratives**There are several good reasons for using temporary materials. Many of the restorations we have been discussing, such as crowns, bridges and dentures, are made by technicians in dental laboratories, and there can be as much as a few weeks lapse between the time impressions are taken, and the restoration is delivered. Some restorative procedures start off with surgery, such as extraction of teeth, or placement of implants, and time is needed for healin g. In the meantime, the patient needs to look and function relatively normally, so temporary restorations are used. Temporary fillings of ZOE can sometimes be used to sedate a sensitive tooth. Or they can just be used to enable us to get caries (or amalgam!) out of the tooth quickly, get something into the hole, and reschedule for a permanent filling.

11 Jet Acrylic Rapid setting acrylic for temporary crowns and bridges. (Langi Very smelly for the first few minutes.

12 Protemp Temporary crown and bridge material of composite (Espe-Premier) type chemistry. Not smelly. **13 ZOE 2200** Temporary cement, also useful for temporary fillings. (L D Caulk)**14 ZONE** "Zinc Oxide, No Eugenol" temporary cement.

(Cadco) It is essential to avoid eugenol when a resin cement will be used for the final restoration.**15 TERM** A soft, light cured composite for temporary fillings.

(L D Caulk)

16 Cavit-G Premixed paste temporary filling.

(Espe-Premier)

J. Root Canal Materials

Endodontic therapy, or root canal therapy, is the act of cleaning the pulp chamber and canal of a tooth of tissue or necrotic or infected material, and filling it back up with supposedly inert material. This procedure can eliminate pain and hypersensitivity, and can allow abscessed teeth to recover.**J 1 Gufta Percha** Natural gutta percha rubber mixed with wax. (many mfg's) Semi-plastic rods placed and condensed into the root canal, but requires a sealer paste with it.There are allegations of heavy metal impurities in some samples.**J 2 Sealapox** Calcium hydroxide paste sealer. (Kerr)**J 3 Pulp Canal Sealer** ZOE type paste sealer. (Kerr)**J 4 Pulpdent Paste** Calcium hydroxide paste that can be used to fill (Pulpdent) canals in patients who won't tolerate gutta percha.

K. Local Anesthetics. Local Anesthetics

There are a few heroes in the world, but most people prefer their dentistry with anesthetic. The original 'Novocaine' was a brand name of procaine, which was rather allergenic, and is rarely used these days. The currently used local anesthetics have somewhat different chemistry, and are very rarely allergenic. Still, people seem to vary in their ability to tolerate them. Most formulations include preservatives, and many have a vasoconstrictor, to shrink the local blood vessels, and keep the anesthetic from dissipating too soon. The vasoconstrictor sometimes causes a "beta-adrenergic' response, characterized especially by rapid heartbeat, which can be uncomfortable, or dangerous to some patients. On the other hand, an anesthetic without the vasoconstrictor may wear off too soon, and larger quantities are needed.**K 1 Carbocaine 2%** Brand of mepivicaine, with 'neo-cobefrin' (Cooke-Waite) vasoconstrictor, less heart racing than epinephrine.**K 2 Carbocaino 3%** Mepivicaine, without vasoconstrictor. (Cooke-Waite)**K 3 Xylocaine 2%** Brand of lidocaine. with epinephrine (Astra) vasoconstrictor.

K 4 Mamaine Brand of bupivicaine, with vasoconstrictor,

(Cooke-Waite) very long lasting anesthetic effect.

L. Denture Materials In removable prosthetic dentistry, teeth made of porcelain or plastic are mounted on a "base", which is formed to fit the contour of the ridge that remains after the teeth are extracted. The base is most typically a plastic resin, such as those listed here, though under some circumstances cast metal may be used. Porcelain teeth are mechanically locked into the base resin, while plastic teeth will adhere

L 1 Lucitone 199 Very popular, high impact, rubberized acrylic. (Dentsply)

L 2 Astron 1180 99% vinyl, (Astron) acrylic. often used for people allergic -to

L 3 Triad VLC Bis-GMA, light cured composite denture

(Dentsply) material.

M. Flourides. Flourides

Although fluoride is not a restorative material, it is a medication used almost exclusively in dentistry. It is the only medication we have that reduces a person's tendency to develop tooth decay, and it has been used for nearly fifty years in toothpaste, mouthwash and drinking water. Along with the well known Injunction to brush, floss, and limit consumption of sugar, fluoride use has been the dentists' main tool for prevention. Fluoride has been controversial for the entire time it has been used, with critics claiming that it is toxic, carcinogenic, and allergenic; that its use in public water supplies represents medicating the population without regard to individual choice, that there are less invasive, more nutritionally oriented ways of controlling tooth decay. The prevailing theory is that the fluoride ion lodges in the crystalline structure of hydroxyapatite, making the dental enamel less soluble in acid, and, therefore, less vulnerable to destruction by the acidic plaque formed by decay-forming bacteria. Others have postulated a systemic, perhaps hormonal, effect to account for fluoride's action.

The following are two prescription type fluoride. gels that are in common use in dental offices for topical application. They are used for caries prevention, topical desensitization of teeth, and a mild antibacterial effect in areas of gum disease. Also included is the chemical, Sodium Fluoride, which is the form used to fluoridate drinking water.

M 1 Nupro Neutral 2% NaF neutral pH gel, with mint flavor**M 1**

Nupro Neutral 2% NaF neutral pH gel, with mint flavor

(Johnson & Johnson)

M 2 Gel-Kam *OA%* SnF gel, with mint flavor
(Scherer)

M 3 Sodium fluoride chemical salt

Manufacturer's DirectoryManufacturers noted in this manual. with telephone numbers:

ASTRA	800-225-2787	MISSION	800-323-5087
ASTRON	800-323-4144	MIZZY 609-663-4700	BOSWORTH
312-679-3400	NOBILIUM	800-833-2343	CADCO 800-833-8267
PARKELL	800-243-7446	L D. CAULK	800-532-2855
PULPDENT	800-343-4342		
COLUMBUS (MILES)	800-325-7357	PUREALLOY	303-443-1399
COOKE-WAITE	800-551-7880	SCHERER LABORATORIES	800-527-0222
DEGUSSA	800-221-0168	A. P. M. STERNGOLD	800-243-9942
DENTSPLY	800-4@0019	GEORGETAUS	201-798-5353
ESPE-PREMIER	800-344-8235	TELEDYNE-GETZ	800-323-6650
GC	800-548-9272	TICONIUM	800-833-2343
JELENKO	800-431-1785	3-M	800-634-2249
JENERIC-PENTRON	800-243-3969	VIDENT	800-828-3839
JOHNSON & JOHNSON	800-526-3967	VIVADENT	800-533-6825
ICI - COE	800-323-7063	WILLIAMS	800-533-6825
KERR	800-521-2854		
LANG	800-222-5264		

ENERGETIC MEDICINE AND MERIDIAN THEORYMEDICINE AND MERIDIAN THEORY

Over five thousand years ago, when the rest of civilization was hiding in caves, still largely dependent on Shamanism for medicine, the Chinese developed a system of medicine known as acupuncture. They had medical schools when other societies of the world did not have cities.

Acupuncture has definitely withstood the test of time. The Chinese found that there were certain energy bands that ran through the body and these bands had points. When these points were disturbed, it would have certain effects on the physiology of the body. it is rumored that a group of golden-clad beings gave the study of acupuncture to the Chinese approximately 7000 years ago. Other rumors pronounce the effect that people with certain illnesses seemed to recover when they stabbed their fingers with needles, or if an arrow pierced them in a certain spot. The development of the acupuncture meridian therapy thus had its infancy, and these early physicians were working on an energetic form of medicine. Their emphasis was not on the chemistry, but more or less the energetic pathway. Without the technological skills to understand electrical phenomena or physics, these earliest practitioners were working on an energetic medicine model.

Modern medicine with the advent of physiology and anatomy from autopsies, etcetera, developed a chemical philosophy, dependent on the chemistry of the body, and how it changed in disease. Now with the coming of modern technology and electronic theory, we have more insights as to the possibility of developing an energetic medicine model. The acupuncturists had the right idea. Medicine should include energetic measures and therapies.

In 1953 Dr. Rheinhold Voll and Dr. Werner observed that the acupuncture meridian has a different energetic component (resistance and impedance factors), in sick people than in healthy people. Dr. Voll led them to be able to measure quantifiably the condition of an acupuncture meridian. A skin-resistance device was developed, called the *Dermatron,* which was used to diagnose the variant resistance changes of the meridian points. In 1955 Voll and-his co-workers found that changes could be provoked in meridian points when a patient held a homeopathic medication which helped the meridian. Thus, was the founding of medication testing and the Voll Technique was born.

Later, other practitioners developed different techniques of analyzing these conditions, and the technique spread around the world.

In 1977 Dr. Schimmel found, with his Vega test method, that by electrically challenging a point with a larger dose of voltage, he could condense his testing to a mini-scan (down to one point) and challenge the body through filters and medications.

In 1982 Dr. Nelson found that skin resistance was not enough; that other variables needed to be researched and developed in the field of energetic medicine. These variables included: voltage, amperage, electrolyte potential, brain wave, EKG, gastric motility, and other variant methods. Voltammetry techniques of analyzing body voltage and amperage could be used easily with patients to evaluate many different conditions.

In 1985 Roy Curtin established the holo-linguistic effect in the testing of meridians. In 1987 Dr. Nelson also found the Xrroid effect, or using the indeterminacy principle of the morphic resonance of the universe as a meaningful modality of testing.

And in 1989 this was all brought together, along with standard medical blood testing, urine testing, personal health history, etcetera, to marry the best of modern medical diagnostic techniques with the new energetic medicine. This new trend in medicine offers ways of understanding biology to answer the questions that have gone centuries without solution.

In biology there are many dif f erent ef f ects which need to be considered, including the ions in the electrolyte of the body, dipoles (sic), including Vanderwall's forces and other paramagnetic forces within the body; boundary layers, ions and dipoles in viscus liquids, Electromotive force (EMF), circadian rhythms, the rhythm of oscillatory functions, be it the heart wave, brain wave, muscle tonus; and the resonant fr equency of the electromagnetic radiation of the body, that is, the mitogenic radiation effect.

These and others will lead to the formation of a new medicine, capable of explaining biological phenomena better, as well as outlining new methods and diagnosis in treatment of the human condition.

Ions and the electrolyte of the body. In electrically neutral solutions the ions of both type are approximately equally distributed. Under influence of a voltage, the ions start to transport their charge to the poie with the opposite sign. See Figure 1. The resistance to this flow depends on the of the ions and the kind of the solutions. To be more precise, the formula of the resistance is supplied by the equation R L / A Q N u. L equals the distance traveled by the current; A crluals the area of the cross section in the solution through which the current flows; Q equals the charge of the ions; N equals the number of ions; and u is the measure of the mobility of the ions. u itself depends on interactions between the ions in the watpr, so chat R becomes a function of the concentration C of the solution, as well as the kind of solution expressed in terms of interactions. Thus, every ionic solution has a

concentration with minimal resistance. Voll found from his work that to challenge the meridian with more than 1-1/2 volts was to disrupt this ion potential and cause ion cascade. This would disrupt capacitance, inductance and electronic stability. Thus, to measure the body natural, we would need less than one volt.

Voll, in development of his equipment, chose to use a machine that would have an electrical potential of one volt, so as not to disturb the natural ion flow. The Vega test method developed by Schimmel uses 4-1/2 volts to purposely challenge the system as an evoked potential to determine the body's reaction. Nelson, in developing his equipment, uses .1 volt, so as to minimally disturb the natural function of the meridian. One tenth of a volt was found to be the most optimum test potential that did not disrupt the 10 NIC solution of the body.

Dipoles. Particles within which charge has been displaced are called dipoles. They have polar movements of positive, one side; negative, the other, making a paramagnetic substances. Examples are: methanol, water and practically all macro molecules. We now find that an electrically neutral isolating medium is occurring. Within this medium, the directions of the dipoles are uniformly distributed, from a statistical point of view. If a direct voltage is now applied to the medium, the dipoles tip over in the direction of the generated electrical field. Furthermore, the field itself induces dipoles.
Both types of dipoles, permanent and induced, transport charge for a short amount of time, namely when they are changing their direction. After this process has been completed, charge transport is no longer possible. The displacement of the charge, D, is proportional to the electric field, E; the formula being: D Sigma x E, where Sigma is the dielectric strength constant.

Behaviour of Dipolesof Dipoles

As in Figure 1, the situation of the dipoles is shown in Figure 2. In this case we ha-,- ri a capacitor which is impermeable (sic) to direct volriges. When the voltage is switched off, the capacitor discharges and the current with the opposite sign becomes measurable. This current, for instance, is used in diagnosis with the SEG machine, the IDG machine, and the E.P.F.X. machine. **Boundary layers.** Boundary layers are normally found in the organism as cell membranes or as strata of different tissue. Normally, potential differences are found at these boundary layers, which can be traced back to differences in permeability for various types of ions. A well-known example of such an effect is the membrane potential of cells. The potential of differences in boundary layers can be imagined as small batteries whose voltage depends on the strength of the current, which is used for the measurement. This dependence comes from the fact that the more rapidly ions diffuse through boundary layers, the higher becomes the strength of the outer electric field.

Another important boundary layer is formed by the skin and the applied electrodes of an biofeedback machine. In addition to potential differences with electrochemical genesis, as in the above case, electrolysis can be recognized here. The skin and the electrode exchange ions. This causes a change in the biochemical balance. The boundary layers of the cell membrane must maintain an electro potential of 40 to 90 millivolts, as well as the boundary layer between the nuclear membrane and the rest of the cell. This maintaining of

balance across boundary layers, where there is a difference in charge, requires energy to fight the entropic factors that would produce electrochemical balancing. These are factors such as potassium pumps, sodium pumps, etcetera, which allow for life, by the maintenance of electrical charge across boundaries. These boundaries include capacitance, inductance, and electrochemical regulation. This electric process allows for life's fight against thermodynamic entropy.

Ions and dipoles in viscus liquids and jells are both components of tissue. Additional phenomena must also be recognized. It is possible, for instance, that a local mobility of ions varies in a significant way. The time which is taken to reach a stable electric situation can sometimes be very considerable. This time could be the cause of a disease. Some diseases can result from too fast or too slow response time.

In a living system there are also variations of time and space. These variations of the ion concentration and variations of the interaction of ions and dipoles with their surroundings come from regulation processes in the organism. Therefore, it is likely that the resistance R additionally will depend on space and time. But if all these components are not complete through the dielectric constant, Sigma will no longer remain constant, but will also become a function of Sigma x Time, that of the space and time. Furthermore, the regulation generates a polarization voltage which has opposite direction to one of the measurement current. This leads one to the conclusion that an analytic treatment of such a complex system is nearly impossible. It is necessary to revert to simple models.

Figure 4 shows the principle behind the arrangement for measuring the resistance. Inside the biofeedback machine there is a power source which provides a constant current within a broad resistance band. This is done electronically. The body of the patient is used to measure resistance R. Between input and output of the biofeedback machine a voltage is measured and then represented in a scale from zero to one-hundred. In Ohm's Law it is known that in a constant current the voltage is directly proportional to resistance. In a constant voltage, amperage is inversely proportional to resistance. In practice a lot of difficulties are presented. For example, the reciprocal of resistance has to be measured because of the small amount of current. In addition to this, the organism is by no means a resistance, obeying linear laws. This is i'n part due to the behavior of dipoles and ions in viscus liquids, in the regulation process, in the organism itself, which tends to set a voltage opposite to the outer field. This type of phenomenon is little understood up until now. For purposes of demonstrating its effects, one reverts to a simplified model shown in Figure 5. These vessels have relatively low resistance, which is negligible in practice. So principally, the distance between these vessels and the skin surface, the density of the vessels, and the state of the liquids in the outer capillaries are responsible for the electric behavior of the acupuncture point, which is about three to four square millimeters in size, roughly the size of the end of an eraser head on a pencil. Figure 6 presents the typical behavior of these different components of a resistance measurement. The measured resistance of the acupuncture point is between ten and 100 times lower than in the surrounding tissue. However, the voltage of the. inner battery is much higher if current is stable. As body current drops as in chronic, terminal sickness, then resistance rises to stabilize the energetics to make a last ditch effort to save itself. Typical skin resistance might be in the neighborhood of 50K, that is 50,000 ohms, whereas the typical resistance of an

acupuncture point which is healthy is somewhere between 28K and 33K. Effects which come from pure polarization measurement with alternating current are excluded. This should also take into consideration the part which is due to the capacitance, and therefore does not appear in measurements with direct current.

As we have shown in our diagram, the relationship of capacitance,'resistance and impedance is essential for further research in the biophysical behavior of the acupuncture points. Different frequencies and capacities can be determined and controlled as the techniques improve.

Electrolyte Potential.

The presence of an electrode of dissimilar metals placed across an electrolyte will cause electrical potential or electromotive force to be developed between hese two, which can be used to align different dipoles and produce cascading electron effects.

Two equal charges, Q, of opposite sine, separated by a distance, 2A, constitutes an electric dipole. The moment of the electric dipole, P, has the magnitude 2A Q, and the moment will point from negative charge to positive charge. Here we derive an expression for the electric potential, V, at any point of space due to a dipole, provided only that the point is not too close to the diploe.

The electric potential for the dipole gives us the equation V = IP cosine of Theta over 4 pi x R squared. P; as we said, is the dipole moment, R is the given radius through which the dipole works. The electric dipole moment of water is 6.1 x 10-30 coulombs x meter.

Many compounds in biology can also have quadruple moments, such as those involving iodine. The potential volts, as indicated in the formula, can tell us the capacitance potential. By varying the system mathematically, not shown here, we can calculate that c,-oacitance is Q divided by V, where V is the potential difference and Q the magnitude of charge. Capacitance measured in farads (sic), where one farad equals one coulomb per .....

...apac rs are used to control fields and energy in living systems; life could not exist without the capacitance factor to reduce voltage fluctuations, transmit pulse signals, generate and detect electromagnetic oscillations, control and calculate the signal and pulsed information of the body.

The capacitance of a capacitor increases if the dielectric is placed between the plates. The ratio of the capacitance with the dielectric to that without it is called the *dielectric constant* of the material.

The dielectric constant of some key materials are as follows: air, 1.00054; paper, 3.5; porcelain, 6.5; quartz, 3.8; polyethylene, 2.3; polystyrene, 2.6; and water, 78. Hence, the need for the dipole action of water, as it enhances the capacitant's effect of the cellular activity in the body. If the dielectric is placed in an electrical field, induced surface charges appear, -which tend to weaken the original field within the dielectric.

Thus, as we increase the charge with the biofeedback machine, going beyond a volt, we disrupt the dielectric effect of water, and get unnatural measures in the body's electrical field.

Another key use of water within the system of biology is its refraction capabilities and its ability to focus light. This is very important for the exchange of virtual photons and

the interplay of the mitogenic radiation. Thus, water's ability to refract light in mitogenic radiation can be deterred by large energy fields running through the different systems of the body.
The body consists of many free electrons as well as free protons in the cascading principle of the alkaline/acid tide, as the body shifts from alkaline states into acid states. These free electrical charges are free to produce the electro-physical effects found with the biofeedback machine. Thus the electromotive force potential of an electrolyte can tell us about the freedom of movement, as well as the oxygenation potential and the hydration index, which can be calculated from these measures. The modern study of vottammetry shows the determination of different body hormones (bioactive peptides) such as catecholamine and indolamines with voltage and amperage capacity.
In biology much is made of the effects of PH, which is actually the inverse log of the proton coefficient. This proton coefficient, or proton pressure, can be calculated in the body very easil7, electrically, to find out the proton pressure versus electron pressure of a meridian or neurolymphatic reflex point, or neuro-muscular reflex. Thus, the voltage potential of the body from two spots has deep insight into the electrical nature of the proton and electron pressure. This polarity of electrostatic push and pull accounts for the phenomena of nutrition, circulation and other molecular motion in the body. It's measure and comparison with the norm will be integrated in the study of disease.

Resonant frequency. The resonant frequency of an electrical circuit can be found via the formula: Resonant Frequency = ... Inductance can be calculated from variant resistances known in a circuit. Inductance can add to or detract from an electron effect and is part of our circuit in measuring impedance, which is a correlate of inductance, capacitance and resistance. Taking the formula of impedance, which is the vector of the right angles of inductance and capacitance versus resistance, we can go back and solve the inductance of an equation via the changing pattern of resistances in the circuit.

Change of voltage in the circuit, knowing the distance factors and the dielectric constants of the probes, can give us factors that will lead to the calculation of other capacitance of a meridian or the overall body system.

So the calculation of inductance and capacitance can lead us to the resonant frequency or the most imposing resonant frequency in the body, which from the work of the Gerwitzes and Dr. James Isaacs, would be intriguingly revealing of different medical conditions.

Oscillatory functions of the body are also indeed important. As the Forier analysis of brain wave and heart rate can lead us to finding healthy or unhealthy frequency paths through curve fit analysis, finding out if there are patterns of obsession, compulsion, addiction, ailergy, etc.

Quantic Indeterminacy. Because of the Heisenberg Indeterminacy Principle the more we know about one factor the less we know about another. In biology indeterminacy seems to be more of a hallmark, because biology itself seems to be dependent on indeterminacy for its activity inside the cell membrane.

Dr. Isaacs, in his book on "Complimentarity of Biology", a breakthrough research book, makes the proposition that living process will be shown to be non-thermodynamic and thus quantic in their interchange of energy.

The laws of thermodynamics are the laws governing gasses and inanimate objects. The first law of thermodynamics is that energy is not created or destroyed. The second law of thermodynamics is that heat must pass from a hot body to a cold body. This is basically the law of entropy, things will normalize in temperature.

The living process in any cell works against the laws of thermodynamics unless the object dies. Then the temperature of the organism gravitates to room temperature. The very process of life is fighting against the entropic functions of the laws of thermodynamics. In the book "Quantum Biology" the treatise of quantum interaction in biology is treated more thoroughly. Needless to say, for the purpose of this discussion, biology is dependent on other processes, more quantic than thermodynamic. More in vivo than in vitro.

Chemical philosophy is dependent on a thermodynamic system of analysis, and if Dr. Isaacs's proposition is correct that life is actually quantic, not thermodynamic, than a whole other philosophical paradigm must be implanted into the study of biology and medicine.

Electro-Acupuncture. Four factors will come into play in developing a theory to account for the acupuncture meridian: one, quantic energy exchange; two, the electronic stability of large macro molecules and their atomic structure; three, the long-range forces effect known in quantum biology; and four, the virtual photon effect of a bioquantum energy field.

As we have outlined before, any organ, ceil, or organ structure will need a certain amount of energy to perform its actions. This energy has several components, known as life force, which tend to correlate with the electrical force. But yet, it must be dramatically underlined and brought up here that life force is not just electricity. Electricity might be one of the foremost components, but there are other components to this life force that are beyond our ability to understand in the scientific theories of today. But with today's technology we have the electrical means of analyzing this life force correlate. The study of life must include and emphasize the electrical magnetic, electromagnetic, chemical, electrochemical, structural, psychological and spiritual factors, among others. And after these, there will still be other unknown factors of life to learn.

Copernicus was branded a heretic when he developed the idea of the cyclic nature of the heavenly bodies, and the idea that the Earth revolved around the sun. Harvey was branded a heretic when he first came up with the idea that blood circulated through the body in an endless cycle. Perhaps we now will be branded heretics as we propose the cyclic interchange of energies through the meridian system of the body.

Each organ, cell, and organism must have flowing through it some kind of series of cycles that allow for Interchange; the cyclic flow of oxygen and carbon dioxide allowing for oxidation and reduction and the cyclic flow of metabolites and excretories, which allow the body to intake and expel.

There also is an electrical cycle of the body as the cells refurbish their electrical strength to fight against thermodynamics, to maintain order and control within the cells, the organs and the organ systems.

The Chinese acupuncturists thousands of years ago found this flow of energy to be detectable. In fact, they palpated and tested and found the channels through which this energy flowed and it became the meridian system of acupuncture. Thousands of years of empirical validation has established this form of energetic medicine as the worlds oldest and most popular medicine.

The circadian rhythms, or daily flow of energy was found by the acupuncturist to flow through what was called a horary clock, as the different energies flowed through the meridians in circadian surges.

Let us now explore in quantic terms the hypothesis for this cyclic flow. In quantic theory we sometimes refer to the electronic stability of an atom or molecule. In the Figure below we explore the quantic nature of an atom.

Inside the heart of an atom is the nucleus, consisting of neutrons, protons, and other subatomic particles. Revolving around the nucleus, in what could be termed a cloud, are the electrons. In the outermost shell of any atom or molecule there are electrons that are furthest away from the nucleus. These electrons occupy different quantic shell states within their orbital. To provoke changes in the quantic states an impartation of energy is needed. Electromagnetic photon radiation, be it- heat, ultraviolet, etcetera, can provoke an electron to change its orbital to a higher state. These jumps in higher or lower states are achieved in *quantic full-steps,* not in half-steps. A quanta of energy is what is taken to allow the electron to go to the next quantic state; hence the name quantum theory. This is a discontinuous indeterminate leap of matter.

The electrons in this last valance state, furthest from the nucleus, have thousands of different shells that they can occupy. The shell furthest from the nucleus within this valance, is called the ionization orbitals. If any more energy is given to the electron, it will jump away from the atom or the molecule, leaving behind an ion; hence the name ionization state.

The lowest of this valance level, closest to the nucleus, is called the ground state. No more energy can be taken out of these electrons. Any attempts to take more energy from the electron orbiting this atom would be futile. This is called the ground state of their outer electron.

Between the ground state and the ionization state are thousands or millions of different quantic shells where this outer electron can occupy.

As we can see, the further out the electron the closer to the ionization state, the easier the electron can be separated from the atom or molecule and the easier the electron can take place, or contribute to conduction of energy. The range through which the electron in this outer state exists is called the *electronic stabilit7,* as it ranges from ground state through ionization state. Changes in the valance state of this outer electron are induced largely through photon absorption or radiation. Thus, conductance and resistance reflect the electronic stability of these molecules.

Cashmere and Poider, 1948, and Lifschitz, 1956, have propositioned that this electronic stability state can be influenced by virtual photons, as well as actual photons. It is the virtual photon that is accountable in the mitogenic radiation factors. (See Mitogenic Radiation.)

Isaacs accounts ror the long-range forces of quantic theory, which can arise from dipoleinduced interactions of fluctuating electronic charge in a molecular oscillator.

Meaning that in a coherent process a molecule or atom, in a certain electronic stability range, could communicate this range via virtual photons to another atom at a long-range distance, unaccountable by Newtonian physics; and that the long-range forces in this change can take place within a biological system through the virtual photons of mitogenic radiation. Simplified, an energy system such as the liver will share its energy through the liver meridian, which will cause changes in the electronic stability of the molecules through the meridian, especially at the meridian acupuncture points which allow this liver energy to palpate through the meridian to complete its cycle to other spots and other organ systems of the body.

The cycle of energy through the body is happening all around the clock at every moment of the day, but there are certain surges that happen on a circadian daily rhythm that account for slight increases in the meridian electrical strength at certain hours of the day. Thus, the effects of long-range forces influencing the electronic stability can be detected by a resistance or conductance meter applied to the acupuncture points. If the organ system has too much energy, as in the case of an inflamed or irritated liver, this excess electrical energy could flow down the meridian into the acupuncture points,.increasing the electronic stability of the points, allowing for a heightened conductance, and thereby a high reading on the electro-acupuncture device. A weakened or degenerate organ system such as a necrotic liver would rob energy from the meridian system beneath it has low electronic stability at the acupuncture points, an increased resistance, a decreased conductance, and a low reading on the biofeedback device.

Thereby the flow of energy through these meridian systems is not via electrons, but via the life force that the electrons try to follow. The virtual photon flow along a precise coherent pattern could account for this meridian transfer.

One point must be expounded upon here: mitogenic energy, that we discovered from the Gerwitzes, is a coherent energy. It must be directed. The flow of energy through the meridian is directed through the meridian and does not flow equipotential in all directions. Biology must have the skill to coherently direct this force in just the right way, hence the Field Theory of biology.

The Field Theory of Biology, which we will develop in brief form in this treatise, is as follows: the field of biology must have two components: one, a coherent, directed process that allows for the specific interchange of life energy; and two, a unified field theory, so to speak, of the body, so that we realize that the body has one field of energy circulating the whole body. When we encounter another human being, we encounter his total (sic) holistic field, and inside his body the energy will flow, and there will be a difference in the flow of energy in the liver meridian from the spleen meridian or any other meridians.

Our second part of the theory, the holistic field, allows for many different phenomena within biology. In electro-acupuncture it allows for the phenomenon of Vega testing. The Vega practitioner will test one point and filter and challenge that one p6int, and interpret the results throughout the whole body. This is possible because of stage two in the body f ield theory.

Voll and other practitioners did not use one point, but went to every meridian for readings of the activity at each and every point. Because the field theory of the body has coherent and incoherent parts, Vega testers can achieve the'vast majority of information that they need;

however, they will meet certain levels of performance at about eighty-five percent that will limit their ability to know all of the factors of the body. Most Vega practitioners will get the information they need, and it is a time factor, the Vega test being easier to perform, requiring less time. Other electro-acupuncture practitioners will want more time to look at more meridians and achieve more data. By testing all meridians for resistance, voltage, or amperage, temperature and oscillation.

Over the last forty years since the advent of electro-acupuncture, there have been close to a 100,000 practitioners of electro-acupuncture to variant degrees, each of which have found a major degree of accuracy in the process. This practitioner, having tested thousands,of patients, have found unerring accuracy in correlating the different bodily conditions patients present with the readings on the biofeedback machine.

Many educational institutions have attempted to investigate electro-acupuncture without attaining good practiced electro-acupuncturists. They have taken medical staff and with less than one day of instructions, had them testing meridian points. This-would be like testing the effectiveness of a helicopter by judging the ability of someon'e who had never flown a helicopter before. The conclusions would be quick and simple: helicopters don't work. In f act, they are a risk.

Many studies have been conducted at the University of Hawaii which have found electroacupuncture to be effective as a diagnostic tool, using qualified electro-acupuncturists as the criteria.

Acupuncture is listed by the World Health Organization (WHO) as effective therapy in over 300 different diseases. Electro-acupuncture is simply the process of letting the qualified acupuncturists measure the electrical phenomena on the meridians.

The analogy of electricity to water has been used for centuries in the description to the uninitiated on how electricity behaves. Ohm developed the law that Volts = Amps x Resistance, known as Ohm's Law. As we have seen, the electronic stability of an acupuncture point is measured by the resistance. But the voltage and amperage potential are also very important. There is electron force and movement through the body, but it is wrong to think of these meridians as actual wires or circuits, because they conduct photons not electrons. At the different points of the body the knowledge of voltage, amperage and resistance offers more to the skilled practitioner than just resistance measures alone.

In water, as in electricity, the amount of flow, or the molecules of flow, is known as the *current,* or the amount of electrons or ions passing a certain point. The' pressure behind this flow is known as the voltage. The blockage to the flow is known as *resistance.*

Measuring the electronic stability of an acupuncture point can tell us the resistance, just as one might have a faucet on a pipe, and whether the faucet is open or closed or to what degree in the middle, that would be the resistance. The actual flow would be the current or amperage, and the pressure behind the flow would be the voltage.

When this practitioner first developed the art of measuring acupuncture point voltage and amperage, as well as resistance, we found several correlates over the thousands of patients who were tested. Amperage correlates very strongly to life force. We have watched certain people dying of different diseases and as their life force weakened, the amperage dropped signif icantly. Voll found that sometimes towards the end, his resistance readings would normalize in patients who were losing their life force. We have observed the same phenomenon of resistance, because the amperage drops so much, the

body is forced to try to stabilize resistance, and surge voltage. This amperage or life force component also has a correlate in the indolamines. The indolamines, such as serotonin, dopamine, or melatonin, etcetera, help to supply the amperage or life force in the body. Patients,with weak amperage can be brought back to normal with indolamine phenolics. Voltage components correlate to pressure and to willpower. Patients losing willpower in a meridian can start to have low voltage readings. The voltage correlates to catecholamine. These catecholamines, such as adrenaline, norepinephrine, thyroxine etcetera, control the voltage of the body, with the pressure behind the electrical motive force. Patients with too high or too low voltage can be stabilized by proper catecholamine phenolics.
Volts times amps is power, measured in watts. The actual power of the body can be correlated from the volts times the amps. This has correlates in oxygenation, in hydration and in mineral balance, which tells us about the electrolytic strength of the body in its mineral and ion bath.
Another factor in our energetic medicine is tem perature. As the mitogenic radiation occurs mostly in the infrared area, changes in temperature throughout the body are also insightful and can relate to metabolic or electronic over-activity.
Development of machinery that can measure voltage, amperage, temperature, resistance, oscillation are all extremely important in the development of an energetic medicine.

The master equation for life is:

$$6\,(CO2) + 6\,(H20) + \text{Light Incoming} = C6H12O6, + 6O2 + \text{Light Outgoing.}$$

This master equation of life accounts for the process of photosynthesis in the utilization of carbon dioxide and water by plants in the presence of light to develop the carbohydrate fuels and produce oxygen. Light is integral as an incoming process by the plants to utilize the photon energy of light to stimulate the photosynthesis process. As Dr. Isaacs has pointed out in his book, the entire electron transport chain in plants or animals is a photodynamic process.

The animal process is one of taking in the carbohydrate structures, taking in oxygen, producing light as a byproduct, and producing carbon dioxide and water as the chemical byproducts.

The electro-dynamic process of life depends on the photo-dynamics of the light from the sun as well as the light, the mitogenic radiation, within the cells of the body.

The energy of an oscillator, or photon, is given by:

$$E = (N + 1/2)\, H \times V,$$

where E is the energy, N is the quantum number, H is Plank's Constant, which is 6.625 x lo-34 jewel seconds, and V is the oscillator frequency. Thus, in the realm of the mitogenic radiation, we can see that the maximum energy in the range of the mitogenic radiation at 10' hertz of that photon, to exchange one quantum leap would be approximately 9 x 10-19th jewels.

This energy can be accounted for in the mitochondria of the cells from the conversion process of the eighteen hot electrons of glucose through the creb cycle.

In 1965 the Nobel Prize for Physics was awarded to three theorists: Tomonaga, Schwinger and Richard Feynman. The prize was given for the creation of the modern theory of quantum electro-dynamics.

Quantum electro-dynamics is a relativistic theory of quantum mechanics concerned with electromagnetic interactions. The Feynman Propagator Approach describes the scattering of electrons and photons in terms of an integral that sums up contributions to the interactions from all possible ways in which the.particle can interact by the exchange which we call *virtual photons and electron positron pairs.*

The existence of these virtual photons is made possible by the Heisenberg Uncertainty Principle's allowance for brief violations of the Law of Conservation of Mass and Energy, during which, for short periods of time, particles may be created that would otherwise be forbidden.

Quantum electro-dynamics combines the electromagnetic field with the particle manifestation of electromagnetic waves. We quote Feynam, "Since photons are also electromagnetic,waves, and since these waves are vibrating fields, the photons must be manifestations of electromagnetic fields. Hence, the concept of a quantum field, that is, of a field that takes the form of quanta or particles. This is indeed an entirely new concept which has been extended to describe all subatomic particles and their interactions, each type of particle corresponding to a different field. In these quantum field theories the classical contrast between the solid particle and the space surrounding them is completely overcome. The quantum field is seen as a fundamental, physical entity, a continuous medium which is present everywhere in space. Particles are merely local condensations of the field, concentrations of energy which come and go, thereby losing their individual character and dissolving into their underlying field."

We quote Werner Heisenberg, "When new groups of phenomena compel changes in the patterns of thought, even the most eminent of physicists find immense difficulties. For the demand for change in the thought pattern may engender the feeling that the ground is to be pulled out from under one's feet. Once one has experienced the desperation with which clever and conciliatory men of science react to the demand for change in the thought pattern, one can only be amazed that such revolutions in science have actually been possible at all."

For now we must challenge the very tenets of medicine with a brand new phenomenon that demands attention and research. This is the phenomenon of medication testing. Over the last thirty years a strange phenomenon of medication testing, of homeopathics, vitamins, glandulars, and other natural substances, has swept the world, so that millions have experienced, ancr thousands practice, a form of medication testing. There is a phenomenon that can be detected through various means, that the body shows reaction to different medications, such as homeopathics, vitamins, minerals, etcetera. This reaction can show whether the patient needs these items, or rejects these items.
Muscle testers can test muscles of the body for their strength and degree of stability. Certain medications can provoke strengthening of a weak muscle and weakening of a strong muscle in the science of kinesiology. There are thousands 'of kinesiologists practicing around the world who depend on this phenomenon for livelihood. They use such

techniques as therapy localization, medication testing, and the like, to treat patients who have strong or weak muscles. In fact, some of the simple techniques of muscle testing are taught to patients so that they can test themselves in response to their needs of different nutrition and foods on a daily level.

Electro-acupuncturists use electrical devices to measure the resistance at different acupuncture points and the body's reaction in response to different medications brought into the patient's quantic energy field.

The sheer number of people experiencing and practicing this phenomenon demands the research and scientific community to investigate more thoroughly this procedure. If this procedure is correct, the very tenets of medicine can be challenged, as perhaps the body is capable of making response to different items. One of the problems of this technology is that rarely do synthetic compounds identify "good" for the body. The body has a tendency to accept natural healing modalities, which offer the full energetic picture, rather than the synthetic ones that make much more profit for the chemical cartel and interfering with true healing.

To scientifically investigate this phenomenon this experimenter did the following study. Ten qualified and practicing muscle testers were chosen to muscle test ten individual patients. Once these muscle testers had found a successful homeopathic item that would work on a specific muscle for the patient, this experimenter would take that homeopathic, put it into a bottle, mix it up with nine other bottles of water and alcohol placebos, have a third party number the bottles, so that it was a double-blind, and neither the muscle testers nor myself would know which bottle was actually the correct substance. The muscle testers were then told to test the muscles of the patient as they had done before, and to try to find out which of the ten bottles was the actual substance. They were then given the ten bottles to choose as their first or second choice. Six of the practitioners were correct on the first choice, two of the practitioners were correct on the second choice.

<u>Muscle Testing</u>

	Test #1		Test #2	
	Chance	10%	Chance	6%
	1st Choice	60%	1st Choice	8 of 15 correct
	2nd Choice	10%	2nd Choice	4 of 15 correct
	Overall	70% Accuracy	Overall	65% Accuracy

Another study was conducted where three trained muscle testers, were given fifteen bottles of differing compounds; ten of which were placebo and five of which were combination homeopathics for different common ailments. These practitioners were skilled with using these compounds, so they were familiar with their activity. The three practitioners worked with themselves, muscle testing these items, to try to guess which of the items were the homeopathics, which were the placebos, and which of the homeopathics had specific action. In this study the three trained muscle testers produced sixty-five percent results, which is similar to the statistics that the muscle

testers achieved in the first study. Considering that chance in the first study was about ten percent, and chance in the second study even lower, we can see that muscle testing has a reality, and must be dealt with. I can heartily suggest that anybody in the scientific of intellectual community reading this article would be intrigued at the prospect of muscle testing, if they could see a proficient, experienced muscle tester.

Two more studies were done to duplicate this phenomenon using electro-acupuncturists. Ten moderately trained electro-acupuncturists were chosen to work with a specific patient, find a homeopathic that worked, and then, as in the procedure with the muscle testers, given nine other placebos in a double-blind technique, and asked to choose out which one was the valid mixture. Eight of the electro-acupuncturists-were able to find the right mixture on the first try. When three trained electro-acupuncturists were given the fifteen bottles and asked to find which one was which, they made eighty-five percent correct choices in the test. Electro-acupuncture does not involve muscle testing; the patient sits back and has little intervention. The qualified technician then measures the electrical resistance activity at different points to calculate the reacti6n. Thus, as we can see, electro-acupuncture seems to be a better performance tool, although it does require an investment in machinery and some training.

Electro-Biofeedback

Test # 1		Test #2	
Chance	10%	Chance	10%
1st Choice	80%	1st Choice	12 out of 15
2nd Choice	10%	2nd Choice	1 out of 15
Overall	85% Accuracy	Overall	85% Accuracy

The possibilities for explanation of this phenomenon are: one, the existence of some psychic ability not yet known to science; two, the fact of mitogenic virtual photons, produced by the quantic field of the cells themselves, to be able to produce a cascading change in long-range forces, which produce changes in the electronic stability, and thus, the resistance of acupuncture points, as well as changing the electronic stability in different acupuncture points could promote strengthening of weak muscles or weakening of strong; also, there could be an electromagnetic change by the fields of such products, which provoke a change in the field of the human test subject. Another possibility might be the existence of a polymorphic magnetic field and its fit or non-fit with the magnetic field of the patient. Many other possible explanations, including other-dimensional activity, could account for this phenomenon. It must also be pointed out that neither muscle testing or biofeedback performed at the 95% needed for significance. So it must be pointed out that to act as if either is foolproof is the proof of the fool.

Let us account some of the rules and regulations that have been found by medication testers in their operation, and how this might contribute to a philosophical understanding.

Medication testers, be it muscle or machinery electro-acupuncture, have found the following criteria to affect their testing.
Too many synthetic drugs, especially cortisone-type derivatives, interrupt the test. The existence of strong electromagnetic fields, such as fluorescent lighting, etc., within three to five feet of the patient, disturb the results. States of extreme emotional disarray disturb the results. Poor alignment of the spine produces poor results. Excess electromagnetic radiation from x-ray, heat, etcetera can produce unstable readings.
From this observation we can see that all of these things destroy the mitogenic radiation or the photon transferability of the human body, leading us to the idea that the virtual photon effect is the most likely explanation for this phenomenon.
It must be pointed out by this researcher that this phenomenon is real, and this phenomenon of medication testing and changes in the body energy demands the attention of the scientific community. Once again I apologize for the small nature of the studies, due to the limited funding and resources of this author.

If there is anything I can do to help further this line of thought and reasoning, please call me so that we may discuss this. A further detailed look at the factors of quantum biology and the molecular interchanges of life can be found in the book, "Quantum Biology", or on the quantum biology videos offered by the Academy of Applied Quantum Bio-Technologies.

To this end I greet you, and entreat you to challenge the tenets of biology, and to look into the factors of energetic medicine and energetic biology. It is the purpose of this article to offer a quantic scientific basis for the possibility of electro-acupuncture diagnosis. If there are any questions, please relay them to this author, so that this discussion might continue. (Contact the Academy of Applied Quantum Bio-Technologies).

The Frequent Involvement of "Vital" Teeth In Focal Disturbances

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Abstract:

By means of X-rays and accepted clinical examination methods it is extremely difficult to ascertain changes in the dentin and pulp when severe morphological signs are not yet presented. An histological examination always requires an extraction. Bacterial presence in the dentin shows the close relationship of the teeth with the entire organism Although conventional methods give no picture of the energetic situation, its presence cannot be denied. Since energetic processes precede the detectable morphological changes, an EAV test (Electroacupuncmrc According to Voll), can be of great assistance, revealing within minutes whether focal disturbances are the reason for the patient's

resistance to therapy. This EAV test can give us a clear picture of the situation in the pulp and dentin.

When dealing with therapy-resistant cases the physician and dentist are daily confronted with the problem of having to search for hidden causes ordisturbances which block a specialized therapy. In this context the question of focal points or fields of disturbance arises again and again. 'ne dentist is tom between two extremes: the denial of the focus problem and the demand for radical removal of every even'sfightly suspicious, tooth

In the tooth, mouth and jaw area the search ror focal points by means of the traditional methods (Inspection of the oral cavity, periodontal pocket measurement, vitality check Xray Film, etc.) gives appropriate information and offers a basis for specific treatment. And yet, sufficient cases remain where after the odontogenic focal restoration (elimination of devitalized teetil apical ostitis, cysts, malpositioned teeth, parodontal treatment), the final results are unsatisfactory. The distant disturbances-considered to be caused by a focus when making the diagnosis-are only improved in part or not at all. If, after examination by a specialist, there is continued suspicion of a focal area. the search for it has to be extended to previously unknown stress factor-s. So far as the dental specialty is concemed, the dentist faces the task of dealing with teeth which, by previously accepted standards, may all be Intact Every healthy tissue is in a state of flowing balance wblich is documented in different ways. Tle answer is dependent on the kind of examination method used by the dentist. All methods have in common values for the normal physiological condition (health) and deviating pathophysiological values which are recognized as being characteristic for certain diseases.

EAV Measurement Points In EAV (Electroacupuncture According to Voll) energetic values are measured. namely at measurement points which are specific ror each organ, respectively organ system. When an organ is irritated (premorbid phase with disease disposition and lowered resistance), one will obtain measurement values which differ in a typical fashion from the value of the normal physiological condition.

There are six specific measurement points (MP) for the tooth, mouth and jaw area, each of which represents the energetic situation in a precisely derined area (for more details see papers by Dr. Voll listed at the end of this paper). By means of specific medications it is possible to bring a jaw measurement point which -is showing an irritation or inflammation value down to the normal value. The examiner can form his diagnostic opinion on the kind of disturbance in the particular jaw section. Details on EAV, its technical procedures and integration into general medicine are not the subject of this paper, but can be learned at EAV seminars).

In as much as the jaw measurement points represent 4, reactively 8 odontons, further differentiation is required. This is done by means of the electrical stimulation test which makes it possible to test one odonton-with or without tooth-out of the closed row of teeth and thus obtain a picture of its energetic situation. A precisely measured electrical stimulus will have a different response from a healthy odonton than from a diseased odonton. The

response - in an energetic sense - is measured. The EAV physician and the EAV dentist can reach a diagnostic conclusion from this response.

The EAV Sdmulation Test By means of the electrical stimulation test, teeth were round whose energetic condition was recognized as divergent from the normal. Once again it has to be pointed out that teeth are involved which are considered vital according to the vitality checks customary in dentistry (temperature sensitivity measurements, drill pain, etc.). The teeth were either crowned, filled or completely untouched. Decayed teeth were not included in this line of tests. Teeth with secondary caries below fillings were also excluded. The energetic disturbances noticed at these teeth appeared so unfavorable in relation to the illness of the patient and his energetic overall situation that an extraction was performed. Since. apart from the above mentioned changes (crowns. fillings), no externally noticeable hints were apparent for a pathological or premorbid process, clinical and energetic findings were in obvious contrast Therefore, these teeth were examined pathologically. It has to be emphasized that not the oral surface of the teeth which were in contact with the mouth flora were examined but the bacterial growth from the layer close to the pulp, the dentin. For details see "Lodenkaempfer, *Phys. Med. und Rehab.,* 7/1972.On examination of 60 teeth the following results were obtained:

mixed culture (anaerobic & aerobic growth) 42
predominantly anaerobic growth (anaerobic
and microaerophile streptococci) 2
exclusively anaerobic growth 5exclusively aerobic growth
6sterile 5 60In particular, the following were foundwith subgroups:Aerobacter aerogenes
Bacteroides
FusobacteriumStaphylococcus
Peptococcus
Peptococcus (gangrenous)
Veillonella
Streptococcus viridans
anhaemolytic Streptococci
Enterococcus
microaerophile Streptococcus
Lactobacillus
aerobic Corynebacteriumanaerobic CorynebacteriumEight pure cultures were found:

1.Anaerobic growth:	3 teeth
Corynebacteria	2teeth Lactobacillus 1 tooth
2. Aerobic growth:	5 teeth
Acrobacter aerogenes	1 tooth

aerobic Corynebacteria 1tooth Enterococci 2teeth Streptococcus viridians 1toothThe pure culture is a relatively rare finding.

It is all the more striking that a pure culture of Enterococci was found in two cases. Mostly two or more types of bacteria were accounted for in one tooth. Eleven teeth alone were in the culture media where five different types of bacteria were found. One tooth had seven difterent types of bacteria.

In view of these findings regarding "vital" teeth the question arises of how they can be integrated into the dental and general medicine's mainstream of thought?This can best be explained by an example from the daily practice of an EAV-dentist: A 50-year-old female patient suffered from severe circulation problem and was under constant care of an internist. Due to therapy resistance the internist suspected odontogenic foci. AU previously conducted dental treatments were of excellent quality (inlays, crowns, bridges). As teeth and jaw sections appeared within normal limits on the X-ray films and the vitality check revealed only vital teeth, the EAV test was performed. The measurement values definitely showed a right-sided focal process of the head which could be traced to the tooth, mouth and jaw area. For differentiation, the electrical stimulation test was made. Three ampoules of the nosode Gangrenous Pulpa 3x had to be utilized for tooth 47, in order to balance the energetic disturbances. After balancing the appropriate jaw measurement point, the values hypothalamus on the right decreased by 4 and measurement point circulation right, by 18 graduation on the measuring scale toward the direction of normalcy. By this, the distant effect of this tooth could be demonstrated and at the same time proof for the strain which a beginning gangrene of the pulp exerts on the organism. No morphological diagnosis was made, rather an energetic one. Following surgical removal of tooth 47, the circulation problem disappeared without further treatment by the internist. The bacteriological examination result showed a pure culture of Enterococci from the dentin of the tooth. This suggests the presence of a severe infection according to general bacteriological experience, according to Lodenkaempfer. This example was only to demonstrate the necessity for an extended search for foci in therapy-resistant cases, as well as, in brief, explaining the procedure by means of EAV. The demonstrated procedure can be. regarded as an example for the complete series of tests (nomsen, *Phys. Med. und Rehab.,* 8/1972).

The bacteriological Finding "Enterococci" is not specific for the EAV diagnosis of the nosode Gangrenous Pulpa. By properly tested utilization of this nosode the EAV dentist obtains an idea of the energetic situation of the tooth-if existing-in relation to other organs, whereas no statement can be made as to bacterial growth.Few Reaction Forms As is generally known, the organism is deficient in reaction forms in order to respond to specific stimuli in a specific way. It is therefore not surprising that for various bacterological findings in the dentin adjacent to the pulp the same nosodes have to be used in the EAV test. The nosodes utilized most often for changes in the teeth which are not noticeable clinically and radiologically are "gangrenous pulpa" and "chronic pulpitis." One can gather from the aforesaid that nosodes are more complex than can be conjectured from the name alone. There is the danger of identification with the clinical diagnosis of gangrenous pulp, i.e., chronic pulpitis. Further possibilities for differentiation

consist in utilizing, according to the severity of the disturbance, various concentrations (potencies) of the matching nosode, until the scale of the Dermatron shows a normal value. Thus a tooth can be excluded from the suspicion of a focus even in a positive sense. In borderline cases the dentist will use his conventional methods. In order to utilize all treatment possibilities. biological and antihomotoxic medications can be used which will be more effective when tested by means of EAV. This has been pointed out by several authors. An EAV followup examination has to be made in intervals of weeks and months. By comparison of two or more tests the course direction becomes noticeable.

It is known that the dentin is supplied with substances from the blood via the pulp as well as the parodontal tissue. Penicillin G, administered intramuscularly, reaches the dentin liquor and is also eliminated again. In this context, the five sterile teeth from the testing material of sixty teeth should be mentioned. The following case history can be used for the purpose of illustration: An electrical stimulation test was performed on a 55-year old female patient in mid-June 1969, for differentiation of focus testing of suspicious odontoas. Within the scope of this paper, only the following results out of the total results are of interest. In order to achieve a balance for 14, four ampoules of Gangrenous Pulpa 3x nosode were used. 45, four ampoules of Root Granuloma 3x. 46 was not further differentiated in the EAV test, since the pulp had died under a filling with secondary caries and had become gangrenous. Two ampoules of the nosode Chronic Pulpitis 3x were required for tooth 36. The removal of the teeth was done on these dates: June 13, 1969 - Extraction of 14, tested follow-up treatment with standard biological medications. On July 29, 1969, extraction of 46 and 45; follow-up treatment was tested postoperatively and the following remedies were indicated: Arnica 8c. the nosodes Jaw Ostitis 6x, Gangrenous Granuloma 10x, Tooth Root Granuloma 10x. Tonsilla Palatina 8x and Chronic Tonsillitis 6x. Further follow-up treatment included the testing and oral dissension of Symphytum 10x and Phytolacca 4x. Follow-up treatment extended to August 20, 1969. One week later, extraction of 36 was performed.

The bacteriological test results showed: 14, pure culture of anaerobic Corynebacteria. Tooth 45 and 46 were not examined, as they did not correspond to the requirements mentioned at the beginning of this paper. 36 was sterile. According to my experience one has to expect bacterial invasion when two ampoules of the nosode Chronic Pulpitis 3x are indicated. If the culture result is still sterile, processes have to be looked for which may have developed in the period between test and extraction. In as much as the patient was not receiving other therapy during the period of her dental treatments, the interest was aimed at the above-mentioned follow-up treatment, which was tested for the right mandible. It can be assumed that the therapeutic effect extended to a greater area, since the test results for 46, 45 and 36 were similar and therefore similar energetic changes were present.Treatment with Antibiotics The bacterial invasion of vital teeth described in this paper may suggest treatment with antibiotics. Two cases will illustrate the problems of such a treatment. As to the already mentioned 50-year-old female patient, while on vacation, tooth 47 caused vague discomfort, radiating into the whole area. The physician prescribed penicillin which the patient refused since a definite allergy to penicillin had been previously canfirmed. The dentist who was then consulted by the patient was not able to find a pathological process and prescribed a widely used antibiotic. After oral ingestion, most severe allergic reactions occurred and the localized condition deteriorated. The

above-mentioned test took place after her vacation, following which the tooth was extracted. As said earlier. the tooth showed a pure culture of Enterococci. These typical intestinal bacteria do not respond to Baycillin and similar antibiotics. The routine prescription of this medication could not have an effect on the tooth. Another 40-year-old patient was hospitalized because of a fever of undetermined origin which did not respond to treatment. Various antibiotics had been given unsuccessfully until by way of experimentation, Binotal had its turn. The temperature decreased. In order to determine the focus, the tooth, mouth and jaw were examined. 38 was displaced and impacted, was removed surgically and examined bacteriologically. Culture results (from the dentin) - pure culture of Aerobacter aerogenes. These gram-negative rods which are typical intestinal bacteria only responded to Binotal and not to the other previously admiristered antibiotics. It can be assumed that the intestinal bacteria, by way of absorption permeated the intestinal wall and reached the susceptible pulp of the tooth through the blood stream. The oral way had to be excluded as the tooth was malpositioned and impacted and had no connection with the oral cavity. From both cases just described it can be seen how easy it is within a certain scheme , of thought to prescribe antibiotics without assurance that these drugs would bring about the desired success. Without a preceding sensitivity test or bacteriological examination the dentist has to grope in the dark. When in one test series 55 out of 60 teeth have bacteriological findings, with one tooth showing a pure culture of Aerobacter aerogenes, and two teeth with a pure culture of Enterococci within a mixted culture, it becomes evident what kind of problems a dentist may have to face, and the responsibility he has when prescribing the appropriate medication. Although a reversible exchange of substances takes place via the dentin liquor, there is in each case no indication as to the condition of the pulp, its capacity for resistance, the possible protein decomposition products and the bacterial toxins. Here again the EAV test gives a clear picture of the situation in pulp and dentin. The following case histories may illustrate this in brief. (For a detailed description see: Thomsen, *Phys. Med. und.Rehab..* 8, 1972). A 25-year-old female patient, traffic accidentin 1958,41 situated in the fracture, shortly thereafter coccygeal fistula. From 1961 to 1968 several unsuccessful surgeries. The EAV test was performed in August 1969. For balancing of tooth 41, two ampoules of the nosode Gangrenous Pulpa 3x, one ampoule of the nosode Chronic Pulpitis 5x, one ampule of the nosode Jaw Otitis 5 x were required. The tooth showed no suspicious radiological reading. During trepanation it turned out that the pulp had disintegrated. Long-term treatment with antibiotics was without effect on the fistula. After removal of tooth 41, the coccygeal fistula healed without further medical treatment. Results of the culture: sterile. Since the energetic processes precede the detectable morphological changes (aftereffects). an earlier EAV test would have shown the changed energetic situation of the pulp of this tooth (independent of the fact that the reaction to the faradic vitality check could have been positive), and would have justified an extraction. By assuming an observant attitude, a second and third test at regular intervals could have fortified the course of this energetic change even more and made the patient's decision easier.Conclusion Bacterial disposition in the dentin shows the intimate relationship of the teeth with the entire organism, and which interrelations can exist. This is especially made clear by bacteria which, under normal physiological conditions, are not commonsals of the oral cavity. It also proves how much the dentist is

committed to a holistic way of thought, if he desires to give his profession the proper esteem and value.

A distinction has to be made between bacterial invasion and infection. A bacterial invasion can take place in the organism at any time and therefore also in the pulp and dentin. A number of factors determine whether the bacterial invasion turns into an infection which could possibly lead to an irreversible damage of the affected organ and may have possible remote effects on other organs. It is known that various factors lead to a low resistance of the pulp, such as caries, preparation trauma, accident trauma, displacement, parodontal damages, geriatric changes, possible virus infections. In addition, there are the energetic interrelations between teeth and organs, familiar to EAV. A diseased organ can affect the odonton which is connected energetically according to EAV, in a negative manner (Voll).

With the help of X-ray film and the general clinical examination methods it is extremely difticult to give a clear statement on changes of the pulp and dentin when severe morphological signs are not yet present. The histological examination always requires an extraction. Proof for bacteria alone is also not suitable whether to decide on the presence of a focus.

Although the conventional methods give no picture of the energetic situation, its presence cannot be denied. It can only be detected with an appropriate examination method. Here the EAV test can be of great assistance. It is an instantaneous test, but it is advisable in case of doubt, to do several tests in timed intervals, in order to be able to judge the course of processes. It is the more important, as the energetic situation has to be judged rather than an irrversible after-affect in the morphological area. The patient- cannot know where the pendulum will swing. This is especially true for patients who are undergoing biological treatment and a nutritional change, whereby the general resistance of the body can be restored or strengthened. It is part of the dentist's task to observe such processes. The definition of a normergic reacting odonton reaches beyond the old concept of the "vital" tooth Now we can add a method to our conventional examination procedures which gives us an immediate picture of the energetic situation EAV. makes this possible for the physician as well as for the dentist.

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USING THE ECLOSION MACHINE FOR ENERGETIC MEDICINE DIAGNOSIS OF DENTAL PHOSI AND DENTION DISTURBANCES

The term "Xrroid" is a term used primarily by the *Eclosion* Corporation to describe a super-fast energetic test, checking voltage, amperage, resistance, and oscillation factors of a person that is exposed energetically to over five thousand different nosodes, isodes, sarcodes, allersodes, and other homeopathic compounds.

To perform the Xrroid we must check the system. We will need to input the demographics from the "Demographics" page. Once we are sure that they are correct, from the Main Menu, we now press **B,** which takes us to Data Entry; **G,** for biofeedback; I for Xrroid test. Then, when the menu appears, we will press **A,** to tell the computer to start the xrroid function. If there are any problems during the test, and the patient should start to move excessively, or the test should be terminated, **Pause** may be accessed by pressing the space bar, and this will last ten seconds. The patient, at this time, should remain quiet and sit back, have relaxed breathing, while the machine scans his biological responses to S,000 different items.

After the *Eclosion* machine has performed this three-minute xrroid test, a series of names will appear on the screen. Simply use the cursor arrows to move the cursor to the name of the patient, press **Enter,** and answer "yes" to the following question by pressing **y.** If the machine stops and shows a number beside the patient's name, insert this number, and press Enter. If the machine continues to ask for the name, press **Enter** again. The machine will now calculate the mathematical results of the patient's energetic response to these various compounds.

This mathematic calculation will take approximately two minutes. At the end of this time the scores will be revealed under the product index. To check biological evaluations of dental toxins, nosodes, and dental compounds even further, one may go from the main Data Entry program to **G,** Biofeedback, B, Biofeedback Date, and then **A,** *Eclosion* Test. In this test we can now do Vol testing of different points, whether they be at the andantins in the mouth area, or on the meridian points of the toes and fingers.

From the *Eclosion* testing screen we can now do our different tests. We must turn the rotary switch to "Point Probes", and the bottom switch C to "GSR" (Skin Resistance). Here, readings of 50 indicate a normal point. High readings will indicate inflammation or toxicity, irritation, or infection. Low readings show weakness, degeneration, and severe acid/alkaline imbalances. If we press **Alt G,** we can access different compounds from the test kit, brought into connection with the patient's body by bringing them into the ground circuit of the patient.

We will find Dental Toxins under "Dental Nosodes", number **2** in the system. This grid will appear. We can now test by pressing the row and column letter which will turn the intersection yellow. When we press 1 for yellow, and **Esc** to exit, just the yellow compounds will be brought into connection with the patient via whole linguistics, and also from the test

kit included in the box. If we press **Alt G** and **Enter,** we are given the chance to press **6** and add fifteen more points to the program. This is our way of telling the computer that when the Xrroid was done, the information was not quite right. The Xrroid is only a **70%** accurate test due to its high speed. We can increase its accuracy by doing a slower scan. This can be found in the *Eclosion* Manual.

A slow scan of the dental toxins can be accomplished by going from the Main Menu to **B,** Data Entry; **G,** Biofeedback Data; and **A,** Provocative Testing, which is our slow allergy screening. From here we go into **C,** Automatic Testing. The patient will need to be hooked up to the harness. The rotary switch needs to be on "Harness" position, switches **A** and **B** need to be on "GSR", and switch **C** needs to be on "DC millivolts".

Now the computer will give us a choice. If we choose Dental Toxins, it will now go through these dental toxins at a slow-scan speed of 11 seconds per item. This will allow the body greater reliability, and will increase our results from 70% to approximately 80%. Because 80% means that one out of five factors is incorrect, we will still need to go to our Vol points, do point testing, and challenge the items that we further suspect.

As we have mentioned, this may be accomplished from the Biofeedback screen in the *Eclosion* system, allowing us to check the different results, independent on different points. Alt **G** allows us to add to the matrix. From **Alt G** we can also go into Dental Nosodes, and pressing **5** to sort, we can then go ... (?) With **F2** we can shade different factors in red, which will allow us to test just those factors. By pressing the **Space** Bar, just those factors will be brought into the test grid. When we press Alt **G** and come back, we now have the choice of pressing **Fl** and erasing those from the program, the test kit, and returning back to straight testing. Or we can press **F4** and bring those items into a program to be tested. All items that have been stored in the program can be recalled at any time by pressing PRO while on *the Eclosion* screen. While **PRO** is written on the program screen, all of the items stored in the program can be recalled at any time for testing. Thus we can check a collector (?) program with the machine, and develop a homeopathic, nutritional, or glandular regime of therapy.

To execute the Dental Program specifically, we must do the following.

DENTAL TESTINGTESTING

Voll found that the skin resistance on the acupuncture point proximal to the different teeth would give an indication of their energetic disturbance. Readings below 50 would tell us that there was a weakness, or possibly a problem with neoplasm or degeneration. High readings would tell us that there was an irritation, inflammation or infection.

To allow the computer to calculate the results mathematically, the doctor needs to input the demographics into the program, go to the Main Menu, press B for Data Entry, G for Biofeedback Data Entry, **H** for Dental Program, and go into the program and let the computer tell him which point to do, point by point. A picture of the mouth will appear, with a

number of what is to be tested. While the number is on the screen, he prepares for testing, presses the **Space Bar**, and he is given two seconds to do the test on that point.Now the picture will return. There will be a "K" (Keep the Reading), because he did the reading adequately; "R" (Redo the Reading), because he did not do the point the way he thought he should have; or an "N" (Next Point), to allow him to go down the line and choose the points he wishes.

The computer, in doing this program, will keep in its memory the resistance reading that it gets at each point. Now, at the end, it can draw us a picture and show us the relative problems, and possibilities of problems, by showing us the different numbers it accumulates. These numbers can also be stored in the computer by going into B, Data Entry; G, Biofeedback Data Entry; B, Biofeedback Testing; A, *Eclosion* Test, Alt G; 0, Point Probe Testing; and finally Dental Program. This allows us to go in and manually input the scores from any one point. This is a shortcut if we find that most of the points we test are accurate, within the 50 to 70 range. Only readings below 45 and above 70 need to be reported, as these will indicate pathologies.

Once we have isolated disturbance at a phosi, or focus of disturbance in a dental area, we can now call different homeopathics, dental toxins, nosodes, isodes, sarcodes, allersodes, or other compounds, and try to correct it. These can be done by doing the point testing protocol that we have outlined through Alt G and PRO development.

Once a dental program is resolved and established, the practitioner can now press Alt R, which gives him the Report, A for homeopathic Regime, and the cursor arrows to move the cursor to the patient's name to head up the list. By hitting F4 and then 4 we can allow the program to be printed for the patient to take home, or to put into the doctor records.

To store this material in the computer's hard data memory, we have only to leave the Point Testing program by pressing Alt X, pressing Z to get to the Main Menu. The Main Menu will allow us a choice of D for Data Storage and Retrieval. From Data Storage and Retrieval we now upload this to the D drive by pressing D, then Enter; X (to store data on disk). D is the drive that we recommend for data storage. The computer will flash "Storing Files", the files will be stored, and then the computer will return us to the Data Storage menu. To recall this data, we have only to go to Data Storage and Retrieval from the Main Menu, press **D,** Enter, and **Y** to retrieve data. We will be given a chance to pick the client of our choice, and be able to see any one, two, or three visits that the patient has made

CONCEPTS IN ENERGETIC DENTISTRYIN ENERGETIC DENTISTRY

AMALGAM TESTINGTESTING

To test the voltage level of different amalgams we take the dental probes and put them into the red and black banana pins in the front of the machine. We now turn the rotary

switch to "Point Probes", and flip switch **C** to "DC millivolts". From the Main Menu we go to **D,** Data Entry; **G,** biofeedback; **B,** Biofeedback Entry, and **A,** *Eclosion Test.*

Now we have set up the system to test voltage, and the system will show us millivolts by drawing a blue line. By picking the largest of the different amalgams, and by contacting the black ground probe to it, we are now capable of checking the potential difference between this amalgam and other amalgams. we contact the red probe to the other amalgams. The computer will show us on the lower right corner of the screen the voltage value for the potential between these two amalgams. wherever we have two pieces of metal with an electrolyte such as body fluid or oral mucosa as the intermediary, we now have the potential of a galvanic cell. or two metals and an electrolyte will make a battery. The electrical force of this battery can have negative effects on the different acupuncture meridians and other energetic factors of the body. They can disturb immune system function, and create allergies and a host of other types of disturbances.

Aside from finding out just what types of toxins and infections there are, we can use this system to help to find out if mercury fillings indeed need to be removed. If we get a reading of over 25 on the lower right hand scale, this tells us that one of those different fillings will need to be removed. To find out which one we will have to change our ground and check other potentials. We will usually find that one mercury amalgam is the main culprit, and can activate the largest amount of electrical potential between the other types of amalgams tested.

Dr. Huggins, in Denver, Colorado, has a much more detailed protocol, which should be reviewed at this point.

It must be pointed out that the *Eclosion* machine is a registered instrument that can allow for this type of potential.

DENTAL PROGRAM

TMJ MANAGEMENTMANAGEMENT

The measurement of the muscular tension of the TMJ can also be measured with the *Eclosion* device. By placing two skin electrodes (obtained from *Eclosion)* onto the insertion points at the extremities of the masseter muscles, or any other muscle for which we wish to measure the electrical potential, we can now find out the electrical potential between those two muscles. This can be done from the auxiliary harness, which can be plugged into the "AUX" input in the front of the *Eclosion* machine. The rotary switch must now be turned to "AUX". Switch C must be turned to "DC millivolts", and the computer can go to *Eclosion* Testing by doing B from the Main Menu, which takes us to Data Entry; G, Biofeedback Testing; B, Biofeedback, **A,** *Eclosion* Testing, and now the muscle tension will appear as a blue line, because it is reflected in the millivoltage coming from the active muscle. By pressing Alt **M** twice we can get to application menus, and under 8 we have different stress reduction techniques to allow us to help to train the patient in a thirty- to fortyminute session on how to desensitize the muscle tension. A lot of patients can now

learn how to relax their masseter muscles, and relieve tension on the TMJ that is caused by their daily activity.

Thus biofeedback can become a strong treatment mode, as well as diagnostic. In the *Eclosion* system we can now chart the intensity of the reaction from the system, and values above 75 and below -50 will show high electrical potential that is diagnostic of TMJ muscular involvement.

The therapeutic aspects of the biofeedback can help the patients to see the muscle tension. By talking to them about different social stressors we can find out just which daily stressors prompt excessive muscle tension. Then, by having them relax those tensions, and desensitizing themselves to the flow, they can improve their reactivity and learn to control their TMJ difficulties.

Many other aspects of TMJ management can be creatively found through use of the sensitivity of the *Eclosion* device. For advice on how to tailor the Biofeedback menu for color, tone, style, shape, or different games, one should read the red manual on Biofeedback, which can be obtained from the *Eclosion* Corporation. This will allow one to be able to tailor the different types of biofeedback programs for desensitization and muscle training.

This type of neuro-muscular re-education has a CPT code: *97112. This will allow certain doctors reimbursement for their biofeedback time done in the office. Suggested biofeedback time is usually thirty to forty minutes, with a five-minute briefing program as to what to expect, and a five- to ten-minute debriefing program as to how they might be able to do further relaxation training at home, after they have tried it in the office.

We welcome you to the world of energetic medicine and biofeedback testing. If you have any questions, please direct them to us at the Academy of Applied Bio Quantum Technologies in Rio Rancho, New Mexico.

THE LEGALITY OF MEDICAL DEVICES -IN THE UNITED STATES

In 1976 President Gerald Ford signed into existence the Medical Device Act that allowed the Food & Drug Administration (FDA) to control not only food and drugs, but also all types of medical devices. The law had two basic parts: one, that any device used in a medical doctor's office had to be registered; and two, that once a registered device was purchased by a doctor, he could use said device in any way that he deemed applicable. So if a doctor were to buy a tongue depressor and use it in his office, it must be registered with the FDA. If, after purchase of the registered tongue depressor, the doctor decided that the tongue depressor might have some other function, such as a splint for a finger; though the FDA law mandates registration of all devices, it does not intrude on the practice of medicine. Thus a doctor can buy any type of registered equipment, alter its function in any way he sees fit, open up said device, remove or add parts at the doctor's discretion, and not violate any FDA law. The use of said equipment and the practice of medicine is under the guidance of the individual license that the practitioner has, and this would depend on his local governing board, and how they would approve of the use of said equipment. Thus a chiropractor could use a device in an altered way if it is within the scope of practice. Most chiropractic boards insist on the following: one, that the device be registered; two, that the

device be taught at some chiropractic school, and three, that the chiropractor himself attained some kind of certification or training course.

The way to get a device registered could be one of two pathways: one, a device can be grandfathered in through a 510 K application made to the FDA, which means that the device is equivalent to a device already registered, or a device that was in Commerce before 1976, provided said device was not a banned or prohibited device at any time of sale.

The second way to get a device registered is through an experimental process known as a "pre-market approval", or an IDE, which is an Investigational Device Exemption. This necessitates formation of an institutional review board, which must consist of five people, not all the same sex. This institutional review board will overview and supervise the statistical accumulation of data that is needed to validate to the FDA the claims made by the manufacturer to be safe and effective.

It is important to point out that the FDA's primary function is to control registration and claims made both on the device or in any other way by the manufacturer.

An I.D.E. is not a registration; it is an exemption from registration to validate a study and has certain provisos that go along with it. One is that the corporation doing the study should not make any profit by means of sale of said device; they can accumulate and repay debts, etc., but they cannot make one bit of profit off of an experimental device. The second most important is that anybody who is going to be in contact with such device via doctor must have a consent form, and also have informed consent of their participation in a scientific study. Such consent forms must be signed by the guardian or the patient himself. Third, all data accumulated on every patient must be evaluated for the statistical proof of the validity of the device to the FDA. Four, that said company will not market said device, but only seek to do an experimental study to prove the validity of the safety and effectiveness of the device.

It must be pointed out here that the risk involved is that, if for any reason the IDE is revoked, meaning that the company should go bankrupt, be unable to finish its statistical approach, be found fraudulent by not doing the proper statistics, or if the statistical results are rejected by the FDA at the end of the I.D.E. term, then said company will be asked by the FDA to refund all money to the purchasers of the device. What usually happens is that said company cannot make such a financial obligation and will go bankrupt, putting several devices in the field which are not legal within the eyes of the FDA. Such devices will then be termed for seizure, and impoundment, and will be collected by the FDA, as these will become banned devices. Thus any I.D.E. machine has the following disadvantages: one, it makes the researcher an experimental researcher in the eyes of the FDA and insurance companies; two, third-party payment will not be made on any experimental device; three, if the device is not accepted by the FDA, it will be a banned device, repossessed from the doctor without any financial reimbursement.

So we must be wary when dealing with any I.D.E. company or device, and fully cognizant of the risk involved. Before we purchase any type of experimental equipment, we should ask if the company has a quality institutional review board that is not associated with it internally. Contact- should be made to the institutional review board, and we should review the statistical proposal that the institutional review board is using to evaluate the safety and effectiveness of the machine. If the statistical package is not within scientific quality

standards, then a doctor must think long and hard before he would be involved with any type of expenditure of funds which might not be recoverable.

Once a device is registered by either means, it can be placed into commerce within the United States, crossing state lines, the registration mandates that the FDA inspect the premises and is sure that the device remains safe, and within the guidelines set up within the standard and operating practice of the manufacturer, within the eyes of good manufacturing practices, set up within the industry itself. The guidelines of the Food & Drug Administration are rigid and assure the safety and quality of the manufacture of products and devices.

There is legal framework for the utilization of energetic medicine and homeopathy and nutrition within the FDA. All of these different factors can be developed within the guidelines of the law of the United States. The Food & Drug Administration is not an enemy, but merely a supervisor to make assurances of quality and safety.

FDA DEVICE ACT OF 1976DEVICE ACT OF 1976

1. All devices must be registered

2. All production must be to industry standards

3. How any device is used is up to the doctor. The FDA is not to control medicine, just registration.

4. FDA is to control manufacturing claims and procedures.

510 K

1. Claim equivalency

2. Restrict and qualify company claims

3. Comply to U. L. 544

4. Comply to G.M.P. (Good Manufacturing Practices)

5. Comply to S.O.P. (Standards of Practice)

6. Be inspected once per year

P.M.A. (PRE MARKET AMENDMENT)
I. D. E. (INVESTIGATIONAL DEVICE EXEMPTION)

1. IRB - (Institutional Review Board) 5 people not same sex

2. No profit allowed

3. No marketing no sales

4. No third party payment

5. Informed consent from all participants

6. All patients must be entered into statistics

7. Must keep good statistics (if not fraud charges are possible)

8. 2 to 6 years

9. If statistics are rejected device is banned and seized by F. D. A.

10. If I. D. E. is dropped etc. Device is banned and seized

INTRODUCTION TO NOSODESTO NOSODES

Nosodes are known in homeopathy as diseased tissue.
The Homeopathic Pharmacopoeia of the United States (the HPUS), in its Supplement A, 1982, refers to nosodes in the following way:

"Class L Nosodes: Nosodes are homeopathic attenuation of pathological organs or tissues, causative agents such as bacteria, fungi, ova, parasites, virus particles, yeast, or diseased products or excretions. Nosodes are to be prepared according to homeopathic specifications, provided the basic substance is not altered, and the final product is not adulterated by pathogen or other deleterious substances. Nosodes may not be dispensed in attenuations below 6x, or 3c."

Hypothesis: Using diseased causing tissue in homeopathic dilution can cause the human body to recognize the disorder and dismiss it naturally.

By combining various combinations in dissimilar nosode families, such as bacteria, fungi, virus, yeast, etceteras, we can achieve a more blanket, safe and effective formula. It was the purpose of finding these safe and effective combinations that has led us to the studies in this monogram.

Enclosed in this article is a description of experimental procedures completed on nosode therapy for fungus and yeast, bacteria and a small study on ova, or intestinal parasites. It is the purpose of this article to validate this concept in homeopathic preparation to the medical community, and to open the door for further study and experimentation.

Working through nosodes we are stimulating white blood cells or immune system reaction, rather than direct infiltration, or direct attack on the bacteria, etcetera. Antibiotic therapy, which has dominated the medical community for years, is based on a direct attack

on the bacteria, the virus, the fungi, and the parasite. In homeopathy and natural medicine, it is believed that these pathogenic organisms, might be regarded as our friends on certain occasions. They might be doing something *for* us. They might be helping the body to detox, to cleanse, and to deal with other metabolic differences. It is when the immune system fails or a misplaced pathogen over runs the body, that infection becomes disease. These opportunistic infections need natural treatment.

The philosophy of microorganisms, which was given to us by Louis Pasteur, has spread into the germ theory. But Louis Pasteur realized, on his deathbed, that "It is the flora, not the fauna." He realized that it was the chemistry and energy *around* the organism that caused the difficulty. It was the environment that allowed for the microorganism, the so-called pathogen, to proliferate -- not the organism itself. E-coli bacteria, staph and strep are throughout the entire body, which can be substantiated through cultures. Yet, something in the body does not allow these pathogens to proliferate. For example: Tuberculinum, a tuberculosis type of bacteria, is found in the body, yet it does not proliferate. In order to culture tuberculinum we have to have a specific type of culture, in a specific type of chemical environment, that will allow the tuberculinum to grow. Only in diseased conditions does the bacteria or the pathogen, the virus, or the fungus proliferate, to help the body in whatever mechanism it can. It is wrong to think that the flies cause the garbage. If we look behind a restaurant and find garbage, we'll find flies. Nature's purpose of the fly is apparent, because one fly and all of its offsprings, over a three-day period, can carry away a hundred pounds or more of dead diseased meat. Thus, it is wrong to think that the pathogen, or the bacteria, virus or fungus, causes the diseased tissue. These opportunistic infections must be reduced to get to the cause of the disease.

The best way to defend the body from these possible pathogenic intruders is through the immune system. The immune system is designed to detox the body of these pathogens and to keep the growth of these microorganisms under control. It is the immune system that must be 'regulated and strengthened. Not to excess, but in a balanced procedure to stabilize its regulatory control.

The body cannot take a prolific or over-abundance of these different microorganisms. Due to this fact, we owe our thanks to modern sewage and modern public health facilities, which keep the exposure to microorganisms at a minimum. In this century, proper handling of sewage materials and human and industrial waste products, has helped to lessen the exposure to these pathogens. Much of the credit given to modern medicine should go to sewage treatment instead. Now it is the task of medicine to possibly turn to and fortify the immune system.

A new understanding in the treatment of pathogenic disease, should be further discussed and researched to help recreate a new modality of medicine with homeopathy.

INTRODUCTION TO ALLERSODESTO ALLERSODES

"Allersode" is the homeopathic word for antigenic therapy. A compound that might induce the allergy, in a weakened or dilute manner, can be used as an allersode to desensitize patients. This is very similar to antigenic therapy. Although, in homeopathy, the

usual mode of administration is in the oral cavity, through absorption in the nasal pharynx. Traditional antigenic therapy usually involves intramuscular shots.

The Homeopathic Pharmacopoeia of the United States (the HPUS), in its Supplement A, 1982, refers to allersodes in the following way:

"Class M Allersodes: Allersodes are homeopathic attenuation of antigens, that is, substances which under suitable conditions can induce the formation of antibodies. Antigens include toxins, ferments, precipitogens, agglutinogens, opsonogens, lysogenes, venins, agglutinins, complements, opsonins, amboceptors, precipitins, and most native proteins. Allersodes are prepared according to homeopathic specifications, provided the basic substance is not altered, and the final product is not adulterated by any pathogen or other deleterious substance."

This is allersode therapy as indicated by the HPUS.

Hypothesis: Mixtures of allersode potencies utilized homeopathically can desensitize allergic reactivity.

Patients with allergies, in an ever-allergic world, could benefit from this allersode therapy. It is known that the hyper-immune system, the immediate immune system, or the humoral immune system, consists mostly of the B (white) cell, and this immediate immune system, if out of balance, can produce allergies. The antibodies from the B cell or other blood antibodies can, in an over-intense way, induce histamine response, and thereby cause tissue swelling and other allergic conditions. This can result in rhinitis, asthma, intestinal blockage, hives, and the like. For a long time it has been speculated that the B cell general, or the governor of the B cell army, might be the lymphatic connection of lymphoid tissue between the adenoids, tonsils and appendix.

The rampant, thoughtless destruction of these lymphoid tissues might offer a possible understanding as to the ever-increasing allergy picture in America. This also helps to explain the increase in viral diseases, because the B cell network is key to viral defense. Hypoadrenia and malfunction of the liver can also aggravate allergies. Both the adrenal gland and the liver produce our natural antihistamines.

Other complications can weaken or upset the balance of the immune system to produce tendencies toward allergies. These include: processed sugars, stress, and toxic exposure which further entice the body into a more allergic or hyper-immune response. Any allergy therapy must also include adrenal, hepatic and digestive balancing to be effective.

Allersode therapy offers us a possibility of desensitization. In the work of the French doctor, Benveniste, who studied homeopathy and antigenic response, it was found that the cells of the body could respond and have reactions to even high-potency homeopathics, beyond 30x (quoted in Nature magazine). This allows for the understanding of how homeopathy could be a much safer course of allersode treatment. The following case studies are experimental studies on allersode therapy and how it can be used to desensitize allergic patients.

In homeopathy we start with a 16x or higher, which is very dilute. A 6x, which is one part per million, is equivalent to one drop of original substance in fourteen gallons of water and alcohol. A 12x, thereby, is equivalent to one drop in over 14,500,000 gallons of water and alcohol. These dilute substances, potentized through succession at each tenth increment, imparts an energy to the compound that is not experienced in stirred

compounds, or other types of antigenic therapy. Homeopathy is a very good way to produce desensitization of the allergic response.

Use of Homeopathic Allersodes to Desensitize Allergic Reactivityof Homeopathic Allersodes to Desensitize Allergic Reactivity

This is a two-part study in which the intervention in each part was identical and consisted of homeopathic combination allersodes. The testing in each part was slightly different. Study one, for its test of allergic reactivity, used the RAST, or blood study test; and in study two, the reactivity was determined by provocative allergy means. This included biofeedback measurement of energetic changes such as voltage, brain wave, cardiac, gastric motility, skin resistance, impedance and temperature changes.

In study one, eleven patients from an alternative medical practice were chosen because of their multiple food allergies. Reactivity was determined via RAST tests (the reaction of the blood removed from the patient). In this study the reactions were rated zero through f ive, five being the most intense reaction. Five is where the blood of the patient was highly reactive to the substance that was put into the vial with the blood. All eleven patients were rated a five at the time of testing. After I week of no therapy, scores were taken again for post-test #1, for control reasons. The patients were then given the intervention of "Course One" homeopathic combination allersodes, which were made up of a 16x, 30x and 30c combination of the reactive food. Patients were then directed to take this formula (ten drops, three times a day). Two weeks later the patients were reevaluated with the RAST test to determine the new reactivity as indicated in Post-test #2. Results of the study are posted on the following page.

STUDY ONEONE

Patient #	Pre-test Score #1	Substance Tested		Post-test
Score #1	Post-test Score #2			
One	5	Garlic	5	1
Two	5	Wheat	4	4
Three	5	Lettuce	5	1
Four	5	Wheat	5	3
Five	5	Oat	5	2
Six	5	Yeast	5	1
Seven	5	Milk	4	2
Eight	5	Milk	5	3
Nine	5	Tomato	5	4
Ten	5	Corn	5	5

Eleven	5	Corn	4	3
Average	5		4,9	2,6

The second part of this study involved new patients, from a different practice, which were found to be reactive to certain food substances as found in their diet reactivity. This was further expounded by showing the physiological changes produced by electrical measurement of their body functioning, as the foods were sublingually placed under their tongue, and then determining the reaction. Fifteen patients were chosen using a one through five system. The reactivity was obtained from the biofeedback analysis.

The biofeedback analysis included voltage, resistance, amperage, oscillation, or electromuscular tension that increased after the introduction of the sublingual substance. Also, cardiac changes (increases in heartbeat and in blood pressure, and decreases in peripheral temperature from vaso-constriction) resulted after the allergic substance was introduced. This electrical measure is known as "provocative allergy testing", where we see the actual patient response to the allergic components.

The electrical response of the body, which induces these physiological changes, can provoke the patient into an anxiety reaction, which could further intensify the allergic response. Through provocative testing, we are showing the patient how he/she responds physiologically to the allergin. The response of constriction of the bronchial tubes producing asthma and depleting oxygen can significantly cause the patient to react more adversely to the substance. The adrenergic nervous system, via the sympathetic nerves, works with the adrenaline gland to supply our natural antihistamines and natural antiinflammatories. When we are under severe emotional stress, we are less likely to perform well in the production of these compounds. Stress can further complicate the allergic response. Patients can thus be re-educated to minimize their nerval reaction and allow the body to deal with the allergin more comfortably. Biofeedback can provide this reeducation.

So our intervention at this part of the study was twofold: not only were homeopathic allersodes used, but the awareness provided by the provocative test must also be considered as an intervention. The fifteen patients tested in'this study were shown to have greater results from the allers odes. This could possibly be explained by the increased awareness from the measurement tool itself.

Provocative allergy tests were performed on biofeedback equipment (E.P.F.X system manufactured by Eclosion Corp.) The rating was based on changes in base readings of heart rate, skin resistance, EMG, brain wave, and peripheral temperature. Readings were taken for 10 minutes after exposure. Change of readings were converted to scores.

5 = Intense, immediate and prolonged intense change
4 = Intense, but building over first 3 min. then prolonged for 7 min.
3 = Intense over first 3 min. reduced to norms in next 7 min.
2• = Moderate then subsiding, fair change prolonged
1• = Fair change, but subsiding
0• = No change

Tests were taken for pre-test scores then re-taken after one week of no therapy for posttest #1. After 3 sessions of biofeedback and homeopathic therapy, post-test #2 was taken.

STUDY TWO: Three week therapy consisted of three biofeedback sessions plus Course One desensitization.

Patient #	Pre-test Score	Substance Tested	Post-test Score #1	3 wk. Post-test Score #2
One	5	Dust	5	4
Two	5	Pollen	5	3
Three	5	Wheat	4	2
Four	5	Wheat	5	4
Five	5	Corn	5	5
Six	5	Corn	4	3
Seven	5	Milk	5	2
Eight	5	Milk	5	1
Nine	5	Dust	5	5
Ten	5	Cat Hair	5	4
Eleven	5	Cat Hair	5	3
Twelve	5	Yeast	5	3
Thirteen	5	Yeast	4	2
Fourteen	5	Dust	5	3
Fif teen	5	Pollen	5	3
Average	5.0		4.9	3.1

Case Study #1:

A six-year-old girl with an extreme milk allergy was taken to a naturopathic practice for evaluation and possible treatment. The child had no other medical complications, but was found to be extremely reactive to any type of dairy substance. The girl was put on Course One therapy for one month. Course Two therapy, with a stronger desensitizing agent (added to the 16x, 30x, 30c combination was a 12x) this was given to the patient for one month also. One additional month followed with Course Three, where the patient was now given a combination that included 8x, 12x, 16x, 30x, and 30c combination of the dairy substances.

During this three-months, all dairy substances were taken out of the diet. At the end of this time, the patient was checked again sublingually, via the provocative allergy test, and was found to have minimal reactivity to dairy substances. The patient was then given a milk substance and had minimal reactivity. It was suggested by the naturopathic physician that the patient still remove all milk and dairy products from the diet (because they were not needed for growth or dietary needs). It was also never assuredly possible that the child, in an emotional state, might not have some reactivity and go into an anxiety response. Adequate calcium intake was assured via fresh and raw vegetables and supplementation.

Case Study #2:

A thirty-six-year-old woman came to a naturopathic practice with extreme reactivity to strawberries. The course of therapy involved three months of Course One, Two, and Three, during which time the patient was asked to totally remove any strawberry exposure. At the end of the three months, strawberries were given to the patient. No provocative allergic reactions were shown. The patient could now have strawberries without any type of difficulty.

This small study on allergy reactivity shows the possibilities of homeopathic allersodes as a powerful intervention in allergy treatment. When coupled with the biofeedback provocative testing, we have even a more powerful modality. By increasing the awareness of the reactivity process, it allows the patient to break the chain of allergic response. The patient can calmly reduce the response by relaxing the cascading sympathetic nerval depletion that stress and anxiety can provoke.

Polymorphic reactivity seems to be provoked by the shape receptors on the white blood cells and other cellular parts of the body. Hyper-immune response results from an excess reactivity of cells, or an inability of the body to stop a reaction cascade. This hyperimmune response disorder thereby is known as an allergy. By using progressively greater concentrations, starting with homeopathic dose concentrations beyond 30x, we find a very powerful desensitizing process. This process seems to induce the body to acclimate and moderate its immune reaction to these once hyperreactive substances. Malfunction of adrenal, hepatic and other metabolic processes must also be corrected to stop the cascade of normal immune response.

Progressive desensitization of allergens may be achieved by using the Course One through Four as indicated in the studies. Two bottles per month is the usual usage. Most minor allergies will be controlled after 1 or 2 courses. Stubborn or violent allergies may need Course Three or Four. Abstinence from the allergen improves treatment.

Dosage:

Begin with with 10 drops, 3 times a day, on Course One for one month. After a month of Course one, begin Course two' for one month (10 drops, 3 times a day). After completing Course Two, proceed to Course Three for one month (10 drops, 3 times a day). Af ter f inishing with Course Three, continue on with Course Four f or one month (I 0 drops, 3 times a day).

These monthly programs bring the allergen into the body slowly with progressively more potencies. This procedure (guarantees) safe and effective desensitization of the allergen. If any of the Courses produce an allergic response, repeat the last Course that was tolerated. Then proceed to the next progressive Course.

PotenciesPotencies

Course One: 16x, 30x, 30c
Course Two: 12x, 16x, 30x, 30c
Course Three: 8x, 12x, 16x, 30x, 30c
Course Four: 4x, 8x, 12x, 16x, 30x, 30c

Materials Reactivity TestingReactivity Testing

Background, Basis And Procedures For The Immunological Evaluation Of Systemic Sensitization To Components Which Emanate From BiomaterialsBy Walter Jess Clifford, MS, RM (AAM) Background, Basis And Procedures For The Immunological Evaluation Of Systemic Sensitization

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ADVERSE IMMUNE ACTIONS FROM DENTAL RESTORATIVE MATERIALS

Susceptibility factors to toxicity from either metals or organic moieties found in dental materials vary with the individual nature peculiar to each patient. Individual host reactivity will strongly influence both dose-effect and dose-response relationships (272), and the issue of biological thresholds which differ from patient to patient will be examined below. The general immune responses which may interfere with normal functions of body tissue or which may be destructive to the organization and structure of tissue have been classified into four major groups by Coombs and Gell (135). These are as follows: (a) anaphylactic or imme'd3'.at-e hypersensitivity, (b) cytotoxic sensitization, (c) immune complexing agents sensitization and (d) cell-mediated actions by sensitized white cells. Of these, the cytotoxic and immune complexing agents are of primary concern with biomaterials. They are mainly of general systemic nature. Cell-mediated actions and immediate hypersensitivities are of lesser importance in most patients, but may still play a role in health problems. All of these systems of sensitization and hypersensitization are dependent upon an initial contact with an offending substance, followed at a later time by secondary and tertiary exposures. It is also readily acknowledged that most original systemic immune sensitization contacts are from sources other that dental or medical. Most are the results of contaminants and dissolved or suspended materials in food, water, air, chemicals, which are used in the home and workplace, personal care materials and other environmental exposures (81, 223). However, the mechanism by which dental or medical materials enter the problem as part of secondary and tertiary exposures and exacerbate existing immune reactions is quite well demonstrated. Occasionally the dental and medical products can also be the primary source of the problem. There is sufficient problem of direct skin absorption of mercury with subsequent toxic reactions that dentists and ancillary operatory personnel are advised to stop and immediately wash hands or other sites of direct skin contact with soap and water (1, 275, 472). Protocols to reduce exposure to vapor, increase ventilation in the operatory and provide for tightly closed storage of new and scrap mercury have also been promolgated (1, 472). Storage of waste

napkins and used tools is also noted to be a source of risk to dental office personnel. Eating and drinking where mercury has been used is expressly forbidden.

For most chemicals and many drugs, it is not the native molecule that is toxic to the body. Studies have shown that the native molecule needs to be broken down and/or have remaining unreacted components and/or be bound with tissue component sites to reach maximum interference or toxicity (102, 153, 224, 393, 495, 533). This is demonstrated by the nature of the antibodies which form against the byproducts (148, 200, 534). In the case of either prosthetic or dental materials, the antigen which stimulates the immune system begins as a chemically bound constituent (organic or inorganic) of the restorative material. Some of the material may simply be physically broken off from the mass in either micro or macro proportions and swallowed during placement, mastication or phonation (74, 76, 236, 431, 507, 510, 511). Some antigens may be converted to organically active form by the metabolic actions of certain indigenous oral flora (151, 230, 241, 391, 394, 426, 458). Some of the restorative mass is expected to be removed and swallowed during brushing, professional polishing or the prophylactic care or alteration of amalgam fillings (74, 134, 291, 348, 400). Vapors produced during such prophylaxis may even constitute a hazard to operatory personnel as well as to the patient (145). Other products may enter the body by direct osmotic migratory penetration of the dermal surroundings or gingival by ionized forms of the components (459). This may lead to local conditions such as inflammation, hyperkeratinization, desquamation and general oral lesions (12, 38, 51, 79, 170, 179, 172, 195, 227, 264, 359, 448, 507). It is obvious that neither oral and muscle tissues nor bone and cartilage are impermeable to the breakdown products of materials placed in the mouth or other areas of the body. When the byproducts of these materials are brought into the tissues, they may react producing either a local immunologic challenge or systemically as part of a general challenge
(38. 51, 75, 112, 172, 195, 470, 507, 554).
In the case of mercury from the common silver mercury filling, conventional wisdom has assumed that a passivation layer forms over the filling and that the mercury in the filling essentially remains intact (427). However, it is increasingly apparent that such wisdom is faulty. The mercury may exit the amalgam mass as a vapor at physiological temperature, pH and osmotic conditions by free kinetic action and surface tension property as described by physical law. It may also be vaporized by local stress and mechanical vectoring acting on surface tensions during mastication, phonation and routine oral movement without the need for any complex chemistry to take place whatsoever (3, 61, 64, 65, 76, 79, 107, 122, 126, 141, 174, 195, 201, 228, 236, 400, 481, 482, 483, 501, 510, 511, 512, 513, 514). Brushing and other prophylactic care remove any passivated layers of corrosion and bring the new mercury underneath to fresh exposures from all sources mentioned above on a cyclic basis (79, 126, 348). Contrary to accepted tradition, the surface layer on a silver-mercury amalgam does not completely repair and recover its passivated layer for several hours after stress has been applied (126). If additional stress is placed on the surface in the interim, the passivated layer may not completely heal at all during daytime and evening hours. Bruxing and other oral movements may maintain the condition through the night for some patients. It has been estimated that for patients with an average number of amalgam filling surfaces, the offloading of mercury by these simple mechanisms approximates 3ug per square centimeter of surface or more. The total mercury released into the body from

the fillings each day may equal or even exceed the daily sum received from all food and drink sources combined (3, 79, 81, 126, 201, 400, 510, 511, 512, 513). Mercury is not the only corrosion byproduct which follows certain of these pathways.

Various body fluids including saliva, blood, mucosal secretions, sweat, pancreatic fluid, bile, gastrointestinal contents and interstitial liquids, by virtue of their dissolved solids, pH, oxidation-reduction potential, organic components and the temperature of the body environment, induce and/or complete a variety of biologically closed electrical circuits. These circuits promote the ionization, dissolution and migration of the components of virtually any restorative material or prosthetic devices in contact with those fluids, whether in the mouth as intact masses or elsewhere in the body as broken bits or abrasions from the original oral mass
(3, 5, 8, 13, 16, 30, 38, 61, 70, 71, 72, 73, 74, 76, 78, 79, 103, 106, 116, 117, 118, 124, 137, 138, 142, 143, 146, 151, 156, 162, 171, 177, 179, 183, 184, 185, 186, 190, 191, 202, 217, 219, 235, 237, 238, 239, 241, 244, 248, 253, 255, 263, 290, 294, 297, 307, 308, 312, 313, 319, 323, 324, 336, 345, 349, 356, 357, 358, 359, 362, 379, 388, 395, 407, 413, 415, 420, 425, 428, 438, 439, 440, 458, 460, 461, 462, 463, 470, 471, 475, 479, 480, 492, 493, 498, 502, 507, 519, 537, 538, 542, 546, 547, 550, 552, 553).

The resulting corrosion of the intact masses le ads to pitting, loss of strength and discoloration of the restorative material. This further releases the corrosion byproduct components from the masses as metallic salts, organometallic complexes or organic molecules to join with the bits already broken physically from the restorations. Many of the released substances will evidence strong electrical mobility. Their presence may lead to further deterioration of the surrounding restorative substrates as is seen in the case of mercury, nickel, chromium, copper, tin, composite resins and fluoride compounds coming into contact with gold, silver and palladium structures in the mouth (38, 79, 196, 204, 240, 284, 330, 406, 519). Gold surfaces may discolor and dirty residue may become evident on the amalgam surfaces. Such changes observed in artificial saliva in the laboratory show grossly observable changes within an hour or so (330). The corrosion mentioned has been reported to occur acrossed the entire surface of any metallic mass involved in the process, and is not confined to any special site nor to a minimal area (241). Thus, the rate of breakdown is substantially affected by total surface area of all metallic or conducting masses which have continuity of contact either physically or via fluid conducting bridge within the oral cavity. The electroactivity is not restricted to the metallic components, either (252).

The potentially harmful effects of corrosion or release of unreacted or intermediary byproducts relate immediately to the cytotoxicity and immunogenicity of the byproducts released. These effects may portend a greater hazard in the latter roles than to the actual slow loss of strength of the restorative mass (61, 74, 94, 102, 111, 118, 187, 224, 247, 288, 365, 470, 489, 495, 499, 506, 524). The formation of protective metallothioneins and the rapid influx of competitive essential trace metals to the tissues invaded by corrosion forms attests to the powerful stimulus they present (111, 122, 252, 489). Studies have shown that chemical constituents similar to those found in the corrosion process proceed to disrupt microtubules from which mitotic spindles are formed, distort cellular organelles and instigate powerful cytolytic/cytotoxic influences on various types of mammalian cells (247).

Inhibition of proper growth was also noted, and complete cellular destruction could be observed with some forms.

Typically, these byproducts of corrosion may take the form of acetates, acrylamides, carbonates, chlorides, chromates, iodides, malates, methylates, nitrates, nitrites, oxides, oxylates, phosphates, silicates, sulphates, sulfides, tartrates, and metallic ions complexed into binding sites on various proteins, amino acids, peptides, carbohydrates, lipids, unpolymerized organic precursors and various monomers
(8, 13, 16, 50, 53, 56, 61, 72, 74, 75, 78, 79, 102, 103, 104, 116, 117, 119, 122, 142, 143, 146, 151, 156, 176, 177, 179, 180, 184, 186, 194, 195, 202, 217, 224, 231, 232, 239, 241, 253, 281, 283, 290, 295, 310, 313, 318, 319, 325, 326, 335, 342, 347, 356, 359, 363, 375, 376, 388, 391, 394, 395, 396, 397, 409, 412, 425, 429, 430, 431, 432, 433, 434, 439, 458, 470, 471, 484, 495, 499, 500, 507, 517, 518, 519, 525, 539, 549, 550, 554).

The chemistry and energy exchange by which these reactions take place have been studied or reviewed by several researchers (17, 61, 74, 79, 125, 142, 240, 252, 379, 498). A reaction set showing the expected electrical exchanges has been worked out and published by Dr. Krister Nilner (377) and is approximated as follows in Figure 1.

Figure 1. ORAL GALVANIC CHEMISTRY1. ORAL GALVANIC CHEMISTRY

A summary of the primary electrochemistry involved in oral galvanism and the degradation of restorative materials (after Dr. Nilner).

Anodic Reaction:

$Me \rightarrow Me^{n+} + ne^-$ (Metal Dissolution)

Cathodic Reactions:

$2H^+ + 2e^- \rightarrow H_2$ (Hydrogen Evolution)

$O_2^{\bullet} + 2H_2O + 4e^- \rightarrow 4OH^-$ (Oxygen Reduction)

$O_2 + 2H^+ + 4e^- \rightarrow H_2O_2$ (Oxygen Reduction)

$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$ (Oxygen Reduction)

Me n+ + ze -	Me (n-2) 4	(Metal Ion Reduction)
Me n+ + ne -	Me	(Metal Deposition)

The vapors, salts and complexes which exit the restorative or prosthetic mass enter the blood, cells and interstitial spaces by a diversity of means. As noted above, some complexes will simply be swallowed as part of the dissolved solids in the saliva or as part of a food bolus. Action by hydrochloric acid and other components of the stomach may accelerate the dissolving and conversion of these solids to bioavailable forms (173, 415). Dietary intake and plaque found on the teeth can enter into the breakdown process (517, 518). Absorption into the bodv may occur from various locations along the alimentary canal with special emphasis on the mucosal surfaces of the digestive tract (76, 157, 289, 378, 449). These surfaces are rich in both complex chemistries and bindable moieties as well as many broken nutrients which are also being prepared for absorption. The salts and corrosion products may easily attach to some of these nutrients and gain accelerated entry. The microbial flora and even the sterile humic content of the bowel also contribute significantly to facilitating bioconversion and absorption. These organisms and substances have been demonstrated to have the capability to transform virtually all of the metals and many of the organics used in biomaterials into forms with very high biological availability and marked assimilation characteristics (166, 173, 252).

Other vapors, salts or complexes may be inhaled into the lungs, with absorption occuring through the mucosae of the trachea, bronchial tree and the alveoli of the lungs (61, 86, 100, 122, 165, 206, 215, 328, 331, 349, 367, 374, 399, 418, 491, 510, 511, 512). Such actions may leave partial residues behind at mucosal surfaces which are radiopaque, and actual depositions of elements such as mercury, nickel, and chromium may accumulate in the lungs to levels which are grossly manifest either at surgery, autopsy or upon radiological examination (100, 165, 254, 276, 356). Some further suggest that mercury which first entered the blood can also deposit as metallic mercury in the lung or be exhaled as mercury vapor after lung conversion (10. 105, 120, 276). Mercury which embolizes in the body may have concomitant sterile abscesses, necrotizing bronchitis or perfusion abnormalities associated with it (9 0, 91, 100, 133, 278, 282, 441, 505). Inhaled mercury vapor has been reported to lead to pneumonitis in acute exposure, with concomitant tachypnea, cough, fever, gastrointestinal disturbance and central nervous system manifestations (331). Accumulation of white blood cells to the source of the irritation, the induction of fever and their subsequent activities is an important immunological means of protection from further insult and in preparing the irritant for removal.

Some moieties are absorbed directly into adjacent hard and soft tissues via migration and electroosmosis (8, 14, 15, 38, 40, 47, 50, 51, 52, 68, 69, 99, 101, 122, 124, 143, 164, 179, 191, 202, 220, 222, 225, 257, 264, 279, 296, 316, 329, 332, 334, 339, 352, 356, 361, 372, 377, 408, 425, 448, 453, 460, 461, 465, 468, 469, 470, 484, 485, 499, 507, 525, 555, 556). Discolorations, polypous hyperplasias, loss of tissue strength and integrity, impairment of blood, release of histamines with allergic indications, nutrient and waste flow as well as altered pH and redox conditions mav result, with concomitant changes in surrounding microflora and dissolved solids. Localized edema and erythema may occur as these moieties infiltrate the tissue with pain sensations which may be nondescript and

difficult to identify with a single focus. Tremor and motor interference may also be a factor. Small brownish-black irregularities may be seen in affected connective tissue in the oral region, sometimes accompanied by granulomatous and chronic inflammatory lesions as well as influxes of macrocytic cells (80, 82, 101). Collagen, elastic fiber, vascular walls, epithelium, basement membranes, nerve sheaths and the sarcolemmav of muscle bundles have shown these same effects. The immunological stimuli and responses are classical. Human studies have shown the characteristic inflammations and drawing of phagocytic and immune cells (82). In animal model, it has been shown that potassium and albumin levels increase markedly with concomitant elevation of general serum osmolality as these ionized and bound products enter surrounding tissues (68, 194). Ligand binding and accumulation with direct bearing on albumin levels is expected (252). Some of these effects may also be directly attributed to the adverse action of metals such as mercury on various binding sites in hemoglobin and the destruction of both form and function of the heme unit (41, 68, 110, 122, 157, 181, 199, 221, 378, 488).

Though route of entry may differ, the corrosion chemical groups are electroactive, migratory in varied degrees and highly antigenic (53, 132, 138, 146, 179, 187, 200, 218, 229, 250, 272, 289, 307, 317, 340, 362, 363, 372, 373, 428, 470, 496, 499, 506, 534, 535, 539). Their activity and reactivity is believed to be due in part to the following group of interactive factors. These include (a) the intermolecular forces which develop at the interface between tissue and these chemicals, (b) the presence of various hydrogen and sulphur bonds, (c) certain dipole-dipole interactions which are known to occur with some of the reactants, (d) electrostatic forces and energy field orientations found especially in the organometallic complexes and amino acid bound metals, (e) donor-acceptor bonds, (f) acid-base relationships, (g) physical morphology and (h) actual tertiary structure (131, 445). The greatest level of activity is associated with a high surface free energy on the surfaces of the tooth or bone and the surfaces of restorative masses which may also be tied to galvanic activity in the region. The application of certain surfactants such as aminfluoride reduces both the electrical activity and the adhesion rate of pellicle and proteins to tooth surfaces, perhaps through the formation of an electrically polarized or insulated layer of calcium fluorapatite (87).

The chemical entities that become attached to macromolecular proteins. nucleoproteins, metallothioneins or other organic structures are considered to be the most antigenic and most toxic (21, 44, 45, 46, 49, 53, 58, 59, 72. 74, 83, 116, 108, 117, 122, 136, 143, 146, 169, 179, 188, 195, 200, 203, 208, 211, 230, 252, 266, 267, 292, 299, 341, 347, 359, 363, 397, 470, 489, 496, 499, 523, 539, 548). The noble metals and those of the so-called transition bridge region of the periodic table seem especially prone to congregate with available protein and to become incorporated with it as organically active entities (252, 435). Other metals such as cobalt and chromium show a 30 to 40 times greater corrosion rate in the presence of protein and saline, with intense binding of the metallic ion to the protein to form organometallic structures (118). Copper has been implicated for interference in mitichondrial and nuclear structures (169) and may have adverse impact on the general immune response and tissue division activities (51). Zinc and copper acting together have been implicated in the induction of multiple polypous hyperplasias (51). Silver and mercury acting together were implicated in eliciting various low grade foriegn body responses from oral tissues adjacent to their placement (309).

Nickel has been shown to be involved in the customary contact dermatitis familiar to allergists as well as inducing precipitating antibodies which are systemic in nature and which are associated with widespread erythema and possible internal and external vesicular eruptions following oral challenge with nickel (187, 506). Gold and mercury have also been demonstrated to induce IgG and IgM antibodies which may combine with the antigenic metals and deposit in layers in various tissues (200, 272, 274, 287, 298, 315, 451, 478).

Aluminum found in some ceramics, porcelains and composites exits many of these restorative masses at accelerated rates of 30 times greater than normal or more in the presence of fluoride ions. It also has special affinity for the proteins and structures found in brain and nervous tissue (436). Aluminum ion entering the blood is expected to interact with silicic acid to form aluminosilicate species solublized by citrates, which in turn have been associated with core materials in senile plaques found in Alzheimer's patients (56, 92, 93). Aluminum ion deposition has also been found in neurofibrillary tangles within the neurons in many of these same patients as well as some with certain forms of Parkinson's disease (56, 403, 402). The metabolic etiology and biology of aluminum may suggest other pathways in which this ion has an adverse impact in many disease processes including renal failure, osteomalacia, interference with membranes and DNA, alteration of ATP actions and various types of dementia (150, 268, 327, 333, 497, 508, 535, 541, 545).

With mercury, the suggested impact is not limited to structural cellular proteins in the membranes and organelles, but the capacity of virtually any protein to participate as a mercury ligand opens a broad avenue of involvement with bound, mobile or soluble protein (52, 66, 195, 363, 499). The qualities of the bound mercury assume those of the host to which it binds much more closely than of native mercury itself (446). Severe damage to the gastrointestinal tract, proximal tubules of the kidney, cortical and cerebral tissue, nerve structures in the sensory system. cardiovascular homeostasis and to certain structures in the liver has been seen (52, 55, 88, 97, 108, 121, 124, 125, 172, 198, 226, 267, 272, 311, 346, 387, 404, 559). Patients' who have ingested organically-bound mercury over a long period have shown symptoms resembling amyotrophic lateral sclerosis and muscular dystrophy, with gingival swelling and a bluish line at the gum margins or erythematous rash in some (267). Other patients who have had exposure to mercury vapor have had similar ALS symptoms, some of which remeliorated after three months in a mercury-free environment (4, 39). This suggests great affinity for a wide variety of binding sites. One other exceptionally disturbing aspect of this broad spectrum protein association and mobility lies in the concentrations of mercury which may show up in mammary glands, lactational secretions and in the fetus (85, 220, 514, 557, 558). One group of researchers has shown substantial interference in various placential enzyme activities and fetal development patterns by mercury and its compounds at very low exposure levels in human and animal model (269, 270). Another team' has shown that transfer of radio-labeled dental mercury from mother's teeth to fetus in sheep model can accumulate fetal mercury to very substantial levels within 29 days or less from time of dental placement (220).

The organic moieties may have affinity for binding which is at least equal to the metallic byproducts. Ligands characterized by low polarizability, high electronegativity, fairly large electric charge, small physical size with inaccessable empty orbitals of high energy (carboxylic groups, hydroxlic, phosphate, and amino groups (oxygen and nitrogen])

preferentially complex small, highly electropositive metal ions that have a large positive charge/oxidation state and low polarizability with few outer electrons. Such metallic ions are not easily excited with ionic and electrostatic bonds. Examples of the metals include magnesium, calcium, manganese, aluminum, selenium, galium, indium, lanthanum, chromium, cobalt, iron, titanium. zinc, tin, and arsenic. Ligands of high polarizability, relatively low electronegativity, small negative charge, and large physical size, with accessable, low-lying empty orbitals such as sulfhydryl groups, preferentially form covalent and covalent-type bonds with large metal ions. These metallic ions are characterized by low electropositivity and high polarizability, small positive charge, and low oxidation number, with several easily excited outer electrons. Such metals are copper, silver, gold, thallium, mercury, palladium, platinum, tellurium, lead, bismuth. antimony, and vanadium (252). Both anodic and cathodic constituents mentioned in the lists above are found in biomaterials breakdown products as well as in various tissues and secretions. The ability to affiliate is contributory to materials breakdown, tissue binding and various transport mechanisms.

Both organic and metallic products accumulate in fatty tissue to substantial levels (446). They interfere with general lipid metabolism. When the body is placed under stress and fatty deposits are mobilized to meet metabolic and energy needs, these entities are freshly released in substantial quantities to circulate in the blood stream. The mechanism by which these actions take place is quite similar to that which is encountered with the lipid binding of pesticides, herbicides, antifungal agents and various environmental pollutants which enter the body. Some of the agents will find new deposition sites to attach to around the body which are non-fatty in nature. Others will actually enter back into adipose tissue after the crisis to repeat the mass release at a later stress point (192, 412, 421). This phenomenon must be considered with patients who do not exhibit a high response rate in symptom aleviation after the sources of toxic substances have been removed. Failure to ameliorate observed clinical problems may continue for a period into postintervention treatment modalities. The stress factors which can initiate the release of fatty substances from storage (along with any bound toxic products therein) are not only the physical stimuli of exercise, but also include heat exposure, emotional and mental stress, illness, food deprivation and even the overnight fast during sleep (127, 437, 540, 544).

The stress of the overnight fast has been suggested as a possible reason for the exacerbation and 'intensification of toxic symptoms experienced by some patients when they first arise in the morning from sleep (412). Nocturnal release of fat-bound toxic moieties may be involved in some patients who have difficulty sleeping or have irregular sleep patterns. It may also explain why urine concentrations of mercury and other toxic materials are concentrated in first morning urine when there has been no noticeable increase in current system intake. Another consideration in symptomology is the sweating which often occurs at night during sleep when there is no particular temperature load to account for the activity. Sweating is an excellent means of voiding metallic and some organic toxics which may be present in increased levels during lipid mobilization. Some health professionals have used this mechanism as a means of reducing body burden by purposely placing patients in a modest ventilated heat environment for controlled periods (130, 144, 412, 520). For some patients, toxicity and pathology may result as much from

failure to excrete toxic materials such as mercury as from the gross exposure to the material (206),

Perhaps most disturbing of all recent research delving into the consequences of toxic distribution to body sites is an animal study using pregnant sheep model (220, 514). While it has been previously known that mercury from various sources can cross placental barrier (108, 109, 123), the current study raises immediate alarm as to the contribution of dental amalgam to in-utero exposures. Using radiolabeled mercury in twelve fresh occulusal amalgam fillings per ewe, the study was able to demonstrate a direct passage of mercury from those fillings to both maternal and fetal blood, amniotic fluid and various body tissues of each. Placental concentration of radiolabeled mercury over passage of gestation was recorded. After partum, radiolabeled mercury concentration from the fillings began to show in mammary secretions with great potential to provide a high risk exposure to mercury for the suckling newborn. Methods used in this important research virtually assure that mercury under study had to originate from the dental fillings and from no other source, indigenous or exogenous. Questions regarding possible impeded tissue and system development in endocrine, nervous and immune systems must be raised in light of demonstrated exposure to mercury from mother's dental placements during embryonic development and early developmental stages postpartum.

Continuing chronic exposure to low-dose mercury levels manifests with changes in agglutinin titers, alteration of the overall leucocyte count, specific alterations of phagocytic cells and changes in complement levels in the peripheral blood (496). When the ingested corrosion products remain primarily intact or their ions attach to certain prominent binding sites of circulating serum proteins other that the immunoglobulins, the first form of contact with the immune system will probably be a direct physical encounter with a phagocyte from the polymorphonuclear neutrophils, or PMN's (34, 320, 457, 476, 535). These cells are relatively short-lived, highly specialized and frequently last no more than 3 or 4 weeks after origination in the bone marrow (34, 35). At maturation, the PMN contains azural granules with peroxidase and other enzymes, and secondary or specific granules which do not contain readily stained materials (32, 33, 536). The PMN activates several systems in the presence of antigenic surfaces or in the presence of certain immune complexes composed of reacted antigen and antibody (34) and prepares to attack the offending material (5, 28, 443). Engulfment by phagocytosis brings the material or complex into the interior of the PMN with a membrane partially wrapped around it, forming a small packet called a phagosome (36, 515). Special reactive oxygen metabolites are produced for action against the ingested products within the phagosome (19, 20, 29, 242, 249, 423, 527). Lysosomal granules resident within the cytoplasm of the PMN move to the phagosome and discharge their contents into the capsule with the ingested material, usually just before the phagosome seals itself off from general contact with the balance of the PMN's cytoplasmic contents (36, 205, 234, 442, 532). Unfortunately, some of the corrosion product material may actually be able to diffuse out into the cytoplasm of the PMN along with some of the lysozymes prior to phagosome sealing, and may set the stage for inactivating and killing the PMN. The gross appearance of increased ghost or smudge cells in a stained blood smear or at detected levels greater than 50 per microliter actual count in whole blood may be a strong indication of such activity. The observation is in keeping with depressions in total available phagocyte counts mentioned above (496).

When the digestive and catabolic activities within the phagosome have been completed as far as they can proceed, most of the residue will be encapsuled and voided (31) or excreted as a soluble system (152) with eventual exit through the lymphatic system, the kidney and the bowel (476). Some of the generated loose molecules from the phagosomal residue may adhere to the surface of the phagocyte and can cause various problems with the further function or integrity of the PMN's membrane and detection system (34). This will render the PMN useless for further action and readv for discard by the body. It may create a depletion condition and place stress on the immune mechanism and hemopoietic tissue to generate additional replacement granulocytic cells.

However, if the phagosomal residue is complexed into an organic form and elaborated by the intact PMN, or if it induces inactivation or killing of the phagocyte and the uncontrolled residue escapes into the bod-v fluids, both the bound fragments of the PMN and the residue may become very active antigens (314, 337, 405). The residue may also become very active as a spoiler by substituting onto various tissue binding sites throughout the body in place of normally occurring enzymes, metabolites or substructures which have related identity (125). This latter action can effectively stop or severely impair body function in sites quite remote from the oral cavity and seldom, if ever, related to dentistry. If the combined moieties enter the bowel, they may be further complexed within the gut by normally occurring fecal flora or by fecal materials themselves. These new complexes can be processed as an organically active antigen by other immune cells resident in or around the intestinal mucosa with autoimmune implications (53, 54, 113, 161, 181, 205, 233, 293, 528).

When the phagocytic cell actions are complete or have been impaired past the point of recovery, the resulting antigenic structures present to the second line of immune defense. This process is responsible for the generation of immune globulins and the humoral aspect of protective factors. Most of the antigens will pass through a multiphasic process with several cells becoming involved in an afferent entry limb of analyzing and preparatory actions. After processing, this is followed by an efferent limb of productive and defensive actions as specific proteins are synthesized against the antigen.

The first site of contact in the afferent limb of routine antigen processing is expected to be the mononuclear phagocyte. usually in the form of a macrophage (83, 208, 251, 503). Approximately 60% of the monocytic cell population resides in the marginal blood pool (imterstitial spaces) under normal circumstances (504) where they may have ready contact with antigenic substances which have infiltrates the tissue. First attraction of the macrophage to the antigenic matter is thought to be a combination of both electrical and chemotactic cascaded steps which follow a logical progression (5, 37, 113, 114, 385, 370, 535). The ability of the macrophage to respond to these stimuli is believed to reside in the minute regional variations of geometry, charge, polarity and spatial energy fields along the surface structures of its outer membrane, although the predominant expected electrical charge overall on all white blood cells is negative. The metallic cations which have been introduced as corrosion byproducts from restorative materials, which can readily be phagocitized or pinocytized by the macrophage (504), as well as those cations which have become actively bound up with large organic molecules during an absorption process or in a phagosome are expected to exert a relatively positive charge in the region of the molecule where they have become bound. This helps to create electrical as well as spatial

alterations in the surfaces of these organometallic complexes. The macrophage assimilates the offending materials into itself by process of phagocytosis, rhopheocytosis or pinocytosis, depending on the nature, size and type of any macromolecules involved. If the phagocytized material is sufficiently toxic unto itself or if it is organically modified to a configuration which will bind in certain sites within the substructures of the macrophage or to certain secreted factors which control mononuclear cell proliferation, it may at this early stage shut down some macrophage function and elicit a compensatory reaction by other immune cells in response to a detected deficiency or immune crisis (60, 168, 300, 302, 322, 335, 467). Otherwise, the macrophage processes the antigenic material into a suitable binding configuration and then displays the processed surface structure of the ingested substance out on its own membrane surface (147, 208, 251, 317, 457, 551). Simultaneous with this membrane surface display comes the active secretion of various lymphokines of the interlukin group by the macrophage. They serve in turn to attract various programmed helper T-cells (2, 155, 197, 369, 389, 474). The T-cells actively bind to the macrophage in the region of the display and undergo changes to activate and initiate the reading and replication of the surface template of the displayed antigenic substance (210, 212). Certain additional lymphokines secreted by the lymphocytes, in turn, further activate new steps in the macrophage's response in a coordinated exchange between macrophage and lymphocyte (364, 370).

Some of the activated T-cells (also referred to as T4 cells) will secrete a lymphokine called B-cell Growth Factor (BCGF) which is intended to stimulate the hemopoietic tissues into new B-lymphoid cell production. BCGF calls certain lymphocyte maturation sites into activity in the maturation sequences of B-cells capable of manufacturing immune globulins (11, 182, 350, 390, 516). At some point another lymphokine known as B-cell Differentiation Factor (BCDF) is released by the helper T-cells which actually instructs the B-cells to begin production of globulins specifically keyed to the template and pattern of the offending chemical moieties. These globulins are also referred to as the systemic antibodies (95, 140, 160, 197, 243, 419, 474, 521).

Some of the lymphocytes may not have the capacity to respond to the secreted lymphokines or may respond in an aberrant manner under stimulation due to the chemical and electrical nature of some of the antigenic metallo-groups which are present. These metallo-groups are toxic. pharmacologically and physiologically active, and are found in the various secretions of the lymphocytes from earlier steps in the antigen processing. Some of the metallo products may have been picked up directly by the lymphocyte from the blood plasma and interstitial fluids after absorption through the tissues or escape from the PMN's or macrophages (98, 161, 163, 245, 285, 383, 380). The actual impairment of response within these lymphocytes may be due to interference with DNA activity and strand breakage, genetic alteration, mitochondrial interactions or membrane interference (42, 79, 94, 115, 161, 167, 193, 345, 368, 380, 381, 382, 384, 386, 401, 424, 452, 454, 455, 496). In any case, immune competence is compromised, some viability of existing cells is lost and compensation mechanisms for more lymphocyte production may be activated. It is for this reason that clinical personnel are advised to perform lymphocyte function and viability testing even when actual lymphocyte numbers appear to be adequate. Some of the lymphocytes present may not be capable of full function, and some may be completely nullified. This also points to another method of approaching reactivity testing. When

lymphocytes are exposed to challenge materials such as expected corrosion byproducts and they lose viability in vitro, adverse impact against proper function might well be expected if these same products are encountered by this patient in vivo. The author has examined this phenomenon in the laboratory using both corrosion byproducts and various local anesthetics as the challenge materials. Viability loss is predictable and replicateable (unpublished data).

Reactivity testing relies on the immune globulins produced by the B-lymphocytes. The overall function of these glycoproteins (a) is to inactivate soluble toxic products, (b) facilitate phagocytosis of offending materials, (c) interact with serum complement in certain binding actions and (d) help to reduce proliferation of some etiological agents (47, 129). Attention in testing is primarily focused on those globulins which result from systemic reactions rather than those which are commonly associated with hypersensitive and allergic-type phenomena.

Some of these systemic globulins, or antibodies, will appear early in the sensitization process and are referred to as IgM antibodies (212, 466). Comprising approximately 10% of the immune globulin present in the body, IgM is associated with increased complement fixation and implementation of the complement cascade. The IgM level rapidly gives way to IgG as the dominant immunoglobulin. IgG comprises approximately 75% of the immune globulin present in the adult. It is recognized that IgG is itself actually comprised of a number of subspecies and that the expected levels of each are under both genetic and challenges control (212, 266, 466). A third type of immune globulin is I&A, which may be found in secretions such as saliva, tears, bronchial secretions, nasal fluids, prostatic fluid, vaginal fluids and intestinal mucosa fluids. Its purpose is centered in local prevention of infection and possibly in preventing access of massive amounts of exogenous antigen to the general immunologic system (147, 273, 466).

Once an antigen has been introduced, processed and an antibody produced against it, a small body of memory lymphocytes with proper coding and imprinting for that antigen are also produced (371). These memory lymphs provide anamnesis, or make it possible for the body to recall and initiate mainline immunoglobulin production on a much quicker and more intense basis if the antigen is found in the body a second time. These memory lymphs have been suggested to have a lifespan lasting for years and are thought to reside in the tissue interstitial spaces rather than in general circulation.

Antibody is produced and contributed into blood plasma for circulation throughout the body's vascular and interstitial spaces. Some of this antibody will bind to various cellular sites among the blood and other cells or may continue to circulate until it either chemically reacts with the antigen for which it has been programmed or until it is lost from the body gradually through bowel, nephric and lymphatic activity (96, 129, 147, 212, 466). If there is little or no further contact or challenge with the antigen, then the immunoglobulin levels of the specific antibody may drop to undetectable levels over a period of time ranging from weeks to months (83, 216, 259). If additional antigen is presented in the future, however, the memory lymphs can quickly elevate titers to levels well above the initial response (216).

LONG-TEM CONSEQUENCES FROM CONTINUING IMMUNE CHALLENGE

Long-term consequences from repeated immune challenge will be dependent upon the type and amount of globulins produced and ready availability of the stimulating antigens to interact '. In the case of globulins formed against the corrosion byproducts of restorative materials or prosthetic devices and appliances, some antigens may elicit only IgM, IgA and IgG forms without the presence of IgE globulin as expected in a classical Type I allergy (216, 507). In other cases, IgE will be present along with the other systemic globulin types (175, 187, 272, 506, 509, 534). Thus, an allergic-type reaction may or may not be associated with an immune sensitization and responses The absence of the allergic symptoms does not rule out an ongoing immune challenge and does not constitute a particularly desirable means of demonstrating the safety of a restorative material for a particular patient.

It was noted in at least one, study that when amalgam materials were implanted into the subcutaneous muscles of rats, a necrotic process could be demonstrated in the tissue just adjacent to the foreign bodies by the 16th day after implanting. Strong hyperemia and infiltration were evident in only some of the sites examined. By the 25th day, the formation of poorly defined fibrous walls had begun to appear around the sites with concomitant fibroblasts pointing into the foreign bodies and a few giant cells. Most of the gross pathological signs began to remeliorate into subsequent weeks. Examination at day 75 showed well-defined fibrous walls surrounding the bodies which varied in thickness and blended into surrounding tissues. Of special note, lymphocytes could be found resident in the tissues adjacent to these walled areas. Continuing necrotic zones ad acent to the foreign bodies but inside the walls continued to progress throughout the test period (63). There is good suggestion of antigenicity and immune action within these tissue sites. progressed.

Some of the antibodies produced by the various actions may react with the offending antigenic materials which are the corrosion byproducts from restorative masses. This reaction results in the formation of an immune complex of antigen and antibody in-vivo. This is especially true when the antigen has bound with or become associated with normal body tissue. Such complexes are often recognized as a key part of autoimmune disease, or those diseases in which the immune system has begun a fight against the body itself (209, 213, 477, 494). Once formed, these complexes attract certain immune cells, complement and cytolytic factors to the sites where they may be bound. Resultant tissue destruction, lesions and dysfunction are seen in a variety of diseases, including systemic lupus erythematosis, collagen disease, scleroderma, polymyositis, rheumatoid arthritis, pemphius, asthma, primary billiary cirrhosis, Goodpasture's syndrome, Gravels disease, idiopathic neutropenia, idiopathic thrombocytopenia purpura, nephrotic syndrome, ulcerative colitis, chronic active hepatitis, autoimmune hemolytic anemia, pernicious anemia and several diseases of the pancreatic and cardiac tissues (272, 274, 287, 298, 315, 451, 478, 494, 543). When the autoimmune reaction involves key binding sites which

are cell surface receptors, diseases such as myasthenia gravis and insulin-related problems such as the acanthosis nigricans syndrome and ataxia-telangiectasia result.
It is useful to note the symptoms and conditions which often accompany these diseases. They might include weakness, fatigue of voluntary muscles depression, neurologic impairment and transmission disorders, decreased outputs of endocrines (adrenaline pituitary secretions, sex hormones, insulin and thvroid), anemias and hemoglobin dysfunction, skin irritation. internal ulcerations, digestive disruption, interference with the clotting mechanism, irritation of border membranes in the kidneys and creation of fibrous formations therein, irritation and inflammation of the bladder and related structures, defective nutrient uptake, dysfunction in vitamin and mineral mediations, aches in the joints and connective tissue, impairment of lymphatic operation and voiding, inflammation and fluid accumulation in various tissues, interference in oxygen/carbon-dioxide exchange, impairment of exchanges at the blood-brain barrier, triggering of cardiac disease, possible malignant development, and accumulation of macromolecules at various sites which simply stop the supply of nutrients to cells and the outflow of wastes (44, 45, 46, 88, 108, 246, 344, 417, 444, 487, 494, 523). Many symptoms continue in some patients for weeks and months even after the offending antigens have been removed from the body. This portends long-term immunogenic effects and antigens bound to key target sites in tissue (53, 88, 274, 298, 315). There is little wonder that. many of these patients experience loss of energy, appetite and vigor. Many will present with persistent headaches, insomnia, depression, suicidal behavior, anger, fear, paranoia, clouded thinking and judgement, detachment and inability to cope with even gentle stresses. It is noted that these very symptoms have all been reported as occurring with increased frequency among dentists and their operatory personnel who have second-handed exposure to toxics from materials they are working with on a daily basis (360, 444). The conditions in patients and professionals are closely related to those expected with general toxicity from various sources (18, 246, 301, 344, 355, 353, 360, 414, 417, 450, 531). The cross-correlation between continuing toxicity and immune-based reactions has been made (18, 246, 301, 353, 360, 450).
Because the appearance of such symptoms can be subtle and interlaced with other problems, a broad analysis of clinical questionnaires and histories was undertaken by the author while serving as Director of Research at the Toxic Element Research Foundation. The results were published as part of a seminar presented to dentists, physicians and other health care professionals by TEU in 1986. This sampling of patient responses was drawn from a database of 1320 patients for which clinical, laboratory and historical data had been obtained as part of their ongoing treatment regimes in connection with toxic conditions of various types. Patients were qualified for inclusion by having high levels of toxic metals in keratinized tissue, blood cell counts and hemoglobin levels in compensatory ranges, and by blood serum chemistry values and urine excretion values deemed to reflect toxic conditions by the treating professionals. These data are synopsized in Figure 2. The percentages of patients with symptoms related to those listed in the preceding paragraph is of at least casual interest.

FIGURE 2. SUMMARY OF SYMPTOM FREQUENCY2. SUMMARY OF SYMPTOM FREQUENCY

(Data based on 1320 respondents indicating presence of symptom)

EXPERIENCED BY 70% OF PATIENTS OR MORE:
Unexplained irritability
Constant or very frequent periods of depression

EXPERIENCED BY 60% OF PATIENTS OR MORE:
Numbness and tingling in extremities
Frequent urination during the night
Urgent urination onset
Unexplained chronic fatigue
Cold hands and feet, even in moderate/warm weather
Bloated feeling most of the time

EXPERIENCED BY 50% OF PATIENTS OR MORE:
Difficulty remembering or use of memory
Sudden, unexplained or unsolicited anger
Constipation on a regular basis
Uncontrolled twitching of facial and other muscles
Difficulty in making even simple decisions

EXPERIENCED BY 40% OF PATIENTS OR MORE:
Experience frequent leg cramps
Constant or frequent ringing or noise in ears
Get out of breath easily
Frequent or recurring heartburn
Excessive itching
Otherwise unexplained rashes, skin irritations

EXPERIENCED BY 30% OF PATIENTS OR MORE:
Constant or frequent metallic taste in mouth
Jumpy, jittery, nervous
Constant death wish or suicidal intent
Frequent insomnia
Unexplained chest pains
Constant or frequent pain in joints
Tachycardia
Tremors or shakes of hands, feet, head, etc.

EXPERIENCED BY 20% OF PATIENTS OR MORE:
Unexplained fluid retention
Burning sensation on the tongue

Get headaches just after eating
Frequent diarrhea or alternating diarrhea and constipation

(This table is synopsized from data developed and published by the author at the Toxic Element Research Foundation, Colorado Springs, CO.

Symptoms such are listed in Figure 2 can result from conditions other than immunologic challenges. Also, immune sensitizations and complex formations can result from a wide variety of stimuli in food, water, air, personal care products, chemicals used in the home and workplace, general environment, and in the personal lifestyle of the individual. Health care professionals will recognize that not all of the problems listed can be laid at the feet of dental restoratives and medical devices. Additional research is certainly indicated. However, restorative materials, prosthetic appliances and implantation devices have a unique opportunity to input challenge to the immune system in a very close proximity to body reactive sites (220, 514). Further, these placements are subjected to numerous fluids and environments which create corrosion products that are extremely immunoactive. The very nature of these fluids and environments encourages the formation of organically bound metals and the rapid conversion of inorganic ions to organic in intermediary steps (8, 43, 71, 75, 76, 115, 118, 125, 162, 170, 181, 183, 203, 227, 230, 250, 264, 300, 317, 338, 339, 341, 345, 383, 384, 396, 398, 413, 424, 428, 432, 433, 448, 452, 456, 464, 465, 475, 479, 480, 546, 537, 538, 548, 549). From the information in Table I and an examination of the symptoms found in diseases which are caused by or are related to the formation of immune complexes, it may be suggested that the problem of patient tolerance of their environment and especially some of the restorative materials placed in their bodies may not be quite as good as has been assumed by the various elements of the professional community. Although great concern is placed upon physical strength of the restorative or prosthetic material and upon its longevity, professional attitudes towards biological tolerance of materials extends little further than answering complaints when a filling or joint replacement causes rapid and extreme irritation of the immediate region about the placement. Even with irritation to the pulp, gingival, tongue or buccal tissue, the prevailing professional attitude is generally to encourage the patient to sit out the irritation in the hopes that tolerance can be induced with time. Should the immune system be coaxed into tolerance, the issue of long-term effects of immune complexes in other areas of the body is largely ignored. For the patient who did present with regional irritation, few if any professionals will bother to check on the patient for other systemic symptoms which might be related to restorative materials in three, six or twelve months. Ironically, at least 75% of the 1320 analyzed patients who were seen in consultation were able to correlate the onset of their symptoms within a timeframe ranging from several days to a month or so from the time they had had dental intervention and restorative treatments.

An understanding of the timing of immune responses, both primary and secondary, and of the concept of individual biological thresholds may be helpful. When an antigenic stimulus is presented to the immune mechanism for the first time, the production of antibody and the differentiation of specialized cells is not immediate. Phagocytosis by the PTIN population

may proceed as soon as contact between the white cell and the antigenic material takes place. Macrophages may enter the process upon first contact. However, the first completion of the immune activation cascade and programming of B-lymphocytes to secrete globulin requires between 4 and 5 days for the appearance of IgM antibodies and 5 to 7 days from initial presentation of antigen for the appearance of IgG antibodies (83, 89, 128, 259, 371). This suggests that the first significant formation of immune complexes may not be seen for a week or more after the initial presentation of new antigenic corrosion products. .4ore rapid response will be seen only if the patient has had prior sensitization with the development of memory lymdhocytes. In many cases, levels of corrosion products may not rise to significant levels for several weeks. Thus, first onset of symptoms of a given pathology related to immune complexes could be delayed for as long as 4 to 8 weeks after initial placement of restorative materials. If there has been no patient education as to the potential for a problem, and if the professional does not actively enquire -after the welfare of the patient within a month or two, who will expect that dentistry or medicine has been involved with new problems just beginning to manifest in the patient?
The professional handling the patient may wish, in addition to taking some time to advise the patient of symptoms and conditions to watch for, to schedule a brief check up for the patient in-office in 3 to 4 weeks for the purpose of verifying physical tolerance of materials and completion of a brief questionnaire which inquires into changes noted in factors mentioned in Figure 2. Office auxiliaries can be very helpful with this activity, and the patient might be provided with the questionnaire in advance so as to minimize the time factor with staff members for those patients who are doing well with their materials. It may even be possible to handle this requirement via phone if the patient-professional relationship is sufficiently developed, especially after several professional sessions in the office.

THE NATURE AND PROBLEMS OF THRESHOLD PHENOMENANATURE AND PROBLEMS OF THRESHOLD PHENOMENA

Patients are unique in that each person has various thresholds set within the body that will vary from one individual to the next. An accurate model of biological thresholds in relation to functional performance and sense of well-being has been well -reviewed in a recent presentation by Aldridge (9). Conceptually, no two patients will react in the same manner as each other to the presentation of the same antigenic stimulus due to differing compensation and tolerance abilities in their physiological makeup. The condition or occupancy of crucial binding sites within the structure or spatial orientation of a macromolecule and the total number of such binding sites available within the given tissue becomes the criteria for whether or not a clinical or other response will take place. This has been shown in connection with inhaled pollutants as well as in several active enzyme studies involving acetylcholine and organophosphorus compounds in various settings (6, 7, 67, 277, 411). If capacity exists during a stress or crisis for a toxin or competitive foreign chemical agent to inactivate, occupy or cover a binding site, the body may be able to adjust and either produce more substrate/binding sites, or alternatively redirect the appropriate

chemistry along an alternate pathway. In some cases, the alternate pathway may completely bypass the expected chemical metabolites routinely used.

A common misunderstanding of toxic interference, reactivity and impairment suggests the existence of a linear response relationship between loss of physiologic function, sense of health and well being decreasing in direct proportion to the degree of stress or challenge levied against a system. This misunderstanding is graphically portrayed to the left in Figure 3, and reflects an inaccurate correlation. A more accurate graphic model portraying actual degradation of physiologic function and sense of well-being is shown to the right in Figure 3.

On the right, the upper horizontal line represents the actual threshold level of the patient at which loss of function or of well being is rapidly and dramatically lost. At this point, the body has no further mechanism by which to increase ability to counter a toxic effect nor any further alternate metabolic pathways which can be substituted for a poisoned function. As the stress against function increases below the challenge level of the threshold limit, the body is able to increase capacity or select alternate pathways in such a manner that performance is compensated. The patient may not, even be aware that there has been any difficulty whatsoever by the criteria of general sense of well-being. When the challenge or toxic phenomenon reaches the threshold level, the patient may suddenly and unexpectedly present with onset of symptoms or pathologies which are a complete surprise to himself and to attending professionals. No two patients present in an identical manner, and no two patients have threshold limits which are at the same concentration or degree. It has been suggested that such great variability exists in humans in their response to mercury alone that an entire new investigation may be required to analyze host factors and their entire role in patient variability (207).

Although variations of symptoms and pathologies are substantial, the progression towards threshold aquisition can be broken into four prime phases, with acute and chronic toxicities or challenges differing only in timespan and duration (9). These four phases might be defines as follows.

FOUR PHASES OF THRESHOLD LEVEL ACQUISITIONPHASES OF THRESHOLD LEVEL ACQUISITION

(After Aldridge (9)]

a. DELIVERY OF CHALLENGE - This phase involves the acquisition, absorption, physical movement and chemical binding or modification of the challenge. It may also be interlinked with certain secretary and excretionary functions such as has been previously mentioned with the PMN's and macrophages.

b. FIRST REACTIONS WITH TARGETS - This phase is the setting for either covalent-, or dissociable interactions with macromolecules, membranes, biosynthetic machinery and feedback binding sites. It may also involve the generation of aberrant chemical substrates and moieties.

c. BIOCHEMICAL AND PHYSIOLOGICAL CHANGES - At this phase, there may be generation of additional substrates, capacity, and binding sites, as well as secondary changes in composition, function and morphology. Most toxicities are not readily apparent externally at this juncture, and the patient is seldom aware of the altered activity.

d. CONSEQUENCE TO THE INDIVIDUAL - When the fourth phase is reached, either a complete shift is made into alternate pathways which avoid the targets affected in 2nd phase, or the individual reaches threshold and has immediate and severe manifestation of pathology, clinical signs, symptoms or syndromes. Please note that symptoms and syndromes may cover several body systems so that confusion may result as to the exact causative etiology.

The question of patient response can be summarized by asking whether a challenge load leads to a reaction with target tissue in a manner that further leads to clinical signs or whether the loading simply induces chemical and physiological changes which compensate for that level. At some point, the chemical and physiological changes may also lead to a variety of secondary clinical signs. Unfortunately, some symptoms may abate with suggestion of clinical improvement only to be replaced in the long term with other symptoms which are slow to appear. This has been acutely observed with various neurotoxic materials (303, 304, 305). An interesting early study of sensitization with mercury was reported in which the patient did not show overt symptoms with silver amalgam fillings in the mouth for a number of years, but suddenly had adverse immune activity with urticaria after a new filling was placed (321). This leaves the suggestion that challenges to any of the body systems may proceed through a variety of functional variations and stages which cloud the issue of causation and effect with the issues of secondary effects and side effects resulting from the alteration of primary physiological chemistry. It may not be appropriate to set absolute exposure standards for any given foreign substance based solely on appearance or cessation of the primary effect expected, but rather on the additive and cumulative burden of all effects and contributions to loss or compromise of functions placed upon the body as well.

Medicine and dentistry cannot formulate exposure standards for the body based solely upon the contribution of corrosion products from restorative and prosthetic materials. The body burden of adverse compounds and foreign challenges from age, dietary, environmental and lifestyle sources must also be taken into factor. Genetic and teratologic predisposition based upon geographic, anthropologic and ancestoral background must also be factored (9, 67, 412). Finally, a system of individual challenge assessment must be available for each person who is to be subjected to restorative or reconstructive work prior to any application of materials. Threshold for the individual is the ultimate problem to be addressed. General qualification of restoratives cannot be made for an entire populace when some of the corrosion products shown to be generated in references previously cited in this monograph have the potential for inducing massive destruction of health and well being in systemically sensitized individuals. Lifelong exposure to adverse materials from restoratives and prosthetics may not preclude physiologic function at an acceptable level if total body burden of similar acting materials is held in check. Complete loss of function and

compensation may result from even minute temporary exposure if body burden and environmental wounding are already at or near threshold. This means that even a nanogram of adverse materials exposure mav be excessive and unsafe for many patients.

Complication of the issue results from the understanding that clinical circumstances are seldom, if ever, mediated solely by a single threshold or compensatory pathway. Multiple thresholds, interactions, interwoven pathways and metabolite concentrations are the rule (9). The unfortunate aspect of thresholds is that physical function may appear normal in both man and animals while memory, problem solving and any cognitive resources may be diminished (189, 416, 425, 486, 522). The tragic aspect is that such losses may be slow to appear and may be judged to be associated with subsequent events or even with unrelated stimuli. Gradual loss or impairment of thinking or rationality are generally postulated to be the result of advancing age or genetic makeup of the individual. If, on some days, the patient has lucidity and on others seems lost, it must be considered that such cyclic presentation may represent an effort to cope with multiple interactive thresholds. When deficiencies in vitamins and trace minerals are borderline and the patient is already coping with marginal buffer zone in physiologic, psychologic and pharmacologic factors. even a simple change in eating habits or schedule can be enough to push the individual through a critical threshold with resulting impairment of judgement, rationality or lucidity. Gradual increases in severity of impairment may also be seen as compensation routes become inundated, saturated and less resurgent.

It would be unfair not to mention at this point that chemistry and chemicals are not the only factors to be considered. Osmotic tension in the lungs varies as barometric pressure changes, with oxygen-carbon dioxide exchange rates and volumes being affected accordingly. Electrical generation via galvanic action within the oral cavity, the gut and certain other tissues dramatically alters ionizations throughout the body and hence, the availability of binding sites, catalysts, trace minerals in useable form, metabolic substrates and membrane viability. These must also be considered as part of the regulation and activation of threshold phenomena and the ultimate control of body physiology, function and form.

Control of thresholds and the buffer zone between the threshold levels of the individual and current challenge levels can be mediated by several mechanisms. These include the reduction of total body burden of challenge, and fortification or optimization of body systems and compensations. If reduction can be made in certain heavy metals contributed from the environment or lifestyle, this action may make it possible to accept and tolerate a certain level of input from restorative and prosthetic materials without achieving threshold and loss of function. If body systems can be brought to high potential and the supply of nutrients and trace minerals can be brought to optimum levels, this will reduce the total number of thresholds likely to interact with the restorative materials problem. Compromised systems have numerous thresholds ready to acquire.

A brief revisit to the periodic table of elements studied during high school and college chemistry days may be helpful. (A copy of the table may be found in Appendix A of this monograph). You may recall that the elements have -been organized into the periodic table in certain columns and rows for a purpose. The elements differ from each other basically by virtue of the number of protons, neutrons and electrons which their atoms contain. The elements which share a common column in the table have the same number of electrons

expected to be found in the outermost level of the electron cloud where chemical reactivity is usually determined. The elements which share a row in the table have a common quality in that their outermost electrons all occupy a common region in the swarm levels. There is a major segment of elements, however, which bend the rules somewhat. These are referred to as the transition elements, and they occupy a special area which lies somewhat centered in the periodic table. They have some compliance with the column and row concepts of the table, but differ from other elements in that they do not continue to add electrons in sequence like building blocks from the lowest level up to the outermost levels. They have in' common a similar number of electrons in their outermost regions and add electrons by skipping around in the levels down in the inner regions of the swarm. Thus, these transition elements, with similar complements of electrons in their outermost levels, have some remarkable similarities in their chemical and electrical behavior.

This makes for an interesting academic study, but also makes for a disaster in health considerations. Because of the similarities in chemical behavior, these elements can and do cause many physiologic problems in common. For the patient this means that there is not one set of problems resulting due to lead contamination in the body, and another set of problems resulting from arsenic, and still another from cadmium and mercury. Rather, the adverse presence of these metals results in additive effects in which the problems caused by lead are exacerbated further by arsenic, and still further from cadmium and further by mercury. If the patient has a sensitivity to mercury and judiciously avoids contact with the metal, but has a lead exposure or a heavy cadmium intake, the amount of mercury needed to acquire the threshold for mercury may often be only a fraction of what is normally required because some of the systems which mercury poisons or interferes with have already been impaired by the lead and cadmium. Rather than needing an exposure of 50 micrograms of mercury to achieve threshold, it may only take 5 micrograms as long as the lead and cadmium are present. And this sample combination of three elements is certainly not the only potential collection for additive effects.

Herein lies the great struggle in establishing health limits of exposure to adverse materials. Not only do we deal with genetic and hereditary differences between individuals, but we must also examine total body burden of adverse elemental neighbors from the transition group as found in the environment, food, water and lifestyle occupied and practiced by each individual. Setting a practical limit for exposure must be ultra-conservative and must be interlinked with other elements that have similar reactivities and health impingements. Animal studies which examine only one toxic parameter at a time must be modified to consider multiple toxic impacts before they can be effectively extrapolated to the needs of humankind. When medicine and dentistry fail to take these factors into consideration, but simply set individual limits of exposure for each element which might cause offense to the body, the risk to patient mounts geometrically in real world terms. Patients may be left to suffer a substantial spectrum of maladies because the causative agent of their threshold acquisition may not be one of the primary focal factors usually suspected or examined in subsequent health-care diagnostic efforts by the attending professional. In the allopathic approach usually followed by orthodox western medicine, great effort will be expended to treat the symptoms and evidence of threshold acquisition, but seldom the root cause. Additive effects of heavy metals and various organic compounds are ignored because the patient has not exceeded the exposure limit values derived from studies for any single

element involved. Laboratory test findings for levels of individual toxic materials in blood, urine and keratinized tissue samples may never show sufficient elevation to account for clinical observation of malfunction or deficiency.
In this regard, there is an urgent need for collaborative team examination and diagnosis of patients by practitioners from various clinical disciplines. Terf war barriers between physicians, dentists, allopaths. osteopaths, etc., serve only to cloud and impede good patient care by all involved. The current artificial barriers between professional groups brings a philosophical reflection of the group of blind men who were trying to describe an elephant. Upon feeling the trunk of the elephant, one became convinced that elephants must be very much like snakes. Feeling the large round leg of the animal, another blind man became convinced that the elephant was undoubtedly like a tree. And so the story goes. Patients suffer. Tragically, the only benefit to come from the current political separation of territories is to the practitioners, insurance companies and pharmaceutical houses.
It is inappropriate not to mention the effects which may also accrue to healthcare practitioners and ancillaries in the operatory environment.

Acquisition of thresholds may be a significant occupational hazard for them from the slow but continuous exposures they receive from handling materials for patients. Murray and Butler noted in a remarkable recent study conducted with 51 operatory personnel that considerable dysfunction and impairment was present after a battery of psychological and performance tests were administered (360). The following is quoted from their findings.

".... a significant percentage of dental office personnel including dentists are exposed to chemicals common to the dental office (nitrous oxide, methyl mercury, formaldehyde, phenol, and acrylic) and this exposure may well contribute to the psychoneurological cognitive dysfunctioning found in a surprisingly high percentage (above 90%) of dental office workers.

"It was concluded that these individuals probably suffer adverse reactions to the chemicals in their work environment. These areas included perceptual motor difficulty (eg. 90 percent showed tremor), deficits in cognitive functioning, concern with bodily function, and despondency, as well as interpersonal problems.

“Assuming that this sample population was greater than 1 standard deviation above the normal population prior to exposure, the deficit seems even greater and the urgency of a solution to the problem of existence in the contaminated environment seems more pressing.
'Chemicals that alter psychopharmacology, psychoimmunology, and neurochemistry are becoming more suspect concerning their role in altering human behavior...." (Ref 360, pp. 64-65)

THE TESTING METHODS

To detect and differentiate antibodies against offensive materials, including the corrosion byproducts and components which are of interest herein, several methods are commonly recognized among immunologists. Some are rather costly and require

considerable investment in time and equipment. Others, especially those which were developed decades ago for differentiation of microbial infectious agents, are elegantly simple and have well-substantiated track records.

In the introduction chapter to the 3rd edition of Manual Of Clinical Laboratory Immunology, Robert Ritchie wrote, "The fixation of the laboratory and industry on the speed of analysis is often unwarranted. Manufacturers will at times exert tremendous efforts toward reducing the time for completion of an assay by a factor of 2 or shaving 5 to 10 minutes off the turnaround time, with the primary goal being to upstage the competition or at least satisfy the marketing department's distorted perception of user needs. The time required to complete an assay, particularly when automated devices are used, is of little consequence when most assays can be completed in an hour or less, with the remaining assays best managed by overnight processing" (421).

The methods examined experimentally by the author for detection of systemic antibodies included precipitin, Oucterlony diffusion, latex agglutination and hemaaglutination inhibition. All methods offered approximately similar results in preliminary trials. The precipitin and Oucterlony diffusion methods were as valid as the other two and were more easily set up and handled at the bench. The latex agglutination method gave comparable results for most parameters when conducted in microliter wells but could not easily make distinction between immunological reactions and certain interfering non-specific protein aggregations which can sometimes be seen with' challenges such as copper, mercury and nickel. The hemagglutination inhibition test, which utilizes sensitized sheep red cells, gave comparable results to the other methods but was deemed to be too expensive, cumbersome and time consuming at the bench without providing any real advantage over the simpler methods. For interested parties, the agglutination and hemagglutination inhibition methods have been well discussed and defined elsewhere (366, 473). The methods to be discussed here are the precipitin and Oucterlony diffusion procedures. These have been reported to have approximately equal limits of detection when compared with each other (149).

Precipitin reactions in liquid base were part of the process which gave birth to modern microbiology and immunology as we know them (27, 214, 256, 280). Early researchers previously alluded to used the technique to detect antigenic components from infectious agents to identify the nature of a disease. Technically, precipitin reactions are considered to be serological procedures rather than advanced immunological methods. The process is described as both a means for qualitative detection and for quantitation by end-point titration (27, 265, 366). In theory, when antigen and specific antibody are mixed in a tube, precipitation of a grossly observable immune complex will occur if they are in approximately equal quantities. If the reactants are not equally proportioned, precipitation may be poor or nonexistent. This condition is referred to as the prozone/postzone phenomenon (27, 366). In actual practice, the precipitin method is either set up on a serial dilution basis for quantitation purposes or with an optimized dilution for qualitative screening.

For serial dilution application, it is possible to titrate either antigen or antibody. The agent to be titered will be diluted through a standard scheme while the other agent will be used at fixed concentration in all tests. The following description would apply if the antibody were to be titered. For this example, the antigen will be a solution of 0.0001 molar HgCl in distilled water.

Ten glass culture tubes (lOx75mm, borosilicate glass, CMS 339-267 or equivalent) are arranged in a support rack and numbered I through 10 with an appropriate glass marker common to most laboratory benches. Tubes 2 through 10 will each receive 0.5 ml distilled water. Tube 1 will receive 1.0 ml fresh patient serum. Using a precision pipettor set to receive and dispense 0.5 ml volumes, 0.5 ml of the serum is withdrawn from Tube I and placed into Tube 2. After thorough mixing, 0.5 ml of the diluted serum in Tube 2 is withdrawn and placed into Tube 3. The steps of removing 0.5 ml of the diluted serum and introducing it into the next tube in line is repeated through Tube 10, when the final 0.5 ml is discarded. The tubes now represent 2-fold serial dilutions beginning with undilute serum, represented as 1:1, and preceding through a dilution of 1:512 in Tube 10.

To each tube is now added 0.5 ml of the mercury antigen solution. Tubes are mixed gently and observed for the formation of a cloudy precipitate. The last tube in the series showing precipitation is determined to be the end point. Depending -on the dilution factor in that tube, results might be reported as a titer of 1:32 or 1:64, etc. The higher the titer, the greater the quantity of antibody present in the original serum specimen. If the quantity of either mercury antigen or serum antibody was too far out of proportion when compared to the other, the first tube or two might not have had any precipitate, but precipitate might have been observed through several of the central tubes in the series. This would be an illustration of the prozone/postzone phenomenon (27, 366), and corrections in beginning concentrations could be made for a second run if deemed critical. Diluting the mercury solution rather than the serum would have permitted titering the mercury in reference to a standard serum.

Evaluation of test results in liquid precipitin reactions can be time sensitive and require attentive action on the part of the immunologist. Certain soluble combinations may precipitate out within a minute or so of mixing components and then dissolve past any point of observability. Other precipitating reactions require a longer period to form and are relatively stable. Caution is required in that substantially increasing either antigen or antibody after first reaction products form can cause reversal of immune complex formation. Continuous observation following mixing of reactants is recommended. Sensitivity for this method has been quoted as low as 0.1 ug of antibody per milliliter of serum (366).

It is not always necessary to reach an endpoint titer. The precipitin reaction can be used as a single tube qualitative screen for the large majority of serologies employing this method. In such cases,, it may only be necessary to know whether or not an antibody is present or not. This simple "yes-no" determination permits an easy and reliable method to determine exposure to toxic materials. Antibody titers are typically high with recent spot exposure, and low after the passage of time without recurrent exposure. Thus, the simple determination of antibody presence suggests that an adverse contact has occurred with immune response and-sufficient sensitization to induce protective systemic antibodies. It is only necessary to experimentally determine an approximate or optimized concentration of the antigen to be able to conduct effective screening.

The Oucterlony diffusion method is a modification of simple immunoprecipitation technology (27, 366, 392, 473). Melted agar (Difco Bacto Agar Purified 0560-01-1 or equivalent, pH 7.1-7.2) cooled to approximately 40 degrees C is poured into Petri dishes to a depth of approximately -3 millimeters and allowed to solidify into a gel-. Small holes. or wells, are then punched into the agar several millimeters apart. Approximately 50 lambda

of patient serum is placed into one well and 50 lambda of antigen challenge is placed into an adjoining well. The principle of the test is that the serum containing antibodies and the challenge containing antigen will diffuse through the gel towards each other and form bands of stable antigen-antibody complexes which can be grossly observed and evaluated. The bands can occur anywhere between the two wells, and are believed to correlate with diffusion rate characteristics of the soubles and to the zone of equivalence where the quantities of antigen and antibody are approximately equal. If more than one antibody type is present or there are more than one component in the antigen challenge, two or more distinct bands may appear in the gel. When antigen and antibody are of similar molecular weights, the band formed at their conjunction is linear in nature. If the reactants are of differing weight, the band will form a concavity in the direction of the lower weight component (27). Sensitivity for this method has been quoted as low as 0.1 - 0.3 ug antibody per milliliter of serum (366).

The gel diffusion method permits testing with greater economy of test materials. Required volumes are 10% of those needed for liquids in tubes. However, the procedure requires approximately 18-24 hours for reactions to move to completion. Results are usually reported as positive or negative in detecting a reaction band, although scoring of the test can also be semiquantified according to the size of the bands formed and in certain cases by the number of bands formed. Where needed for additional study, the bands of immune complexes can be physically cut and removed from the Petri dish and stored in a moist chamber.

Of the two preferred methods (liquid precipitin and Oucterlony diffusion) discussed above, the liquid precipitin method is perhaps easiest and simplest to carry out. Results of testing are quickly available and simple to read without the need for expensive and complex equipment. The method readily adapts to use in the field away from 'the normal laboratory bench. Some economy of reagents and serum can be obtained by utilizing microtiter assay trays (Falcon 3912 Microtset III Assay Plate or equivalent) rather than glass tubes.

TEST DATA AND OBSERVATIONSDATA AND OBSERVATIONS

Several examinations were made at the outset to determine whether or not reactions might be observed using either plasma or serum with challenges. These early tests were also used to define concentration parameters and dilution factors for the work which followed. The results of these first trials are not of sufficient importance to report herein, but were useful in setting guidelines for subsequent controlled studies. It was apparent from this phase of work that plasma could be used successfully. However. serum was deemed to be the ideal specimen due to familiarity in specimen collection by most laboratories and in its known working qualities in various other immunological testing. The antibody specimen was standardized to be separated serum taken from venous blood drawn with evacuated clot tubes. Bloods were centrifuged within 15 minutes of collection and serum removed from the formed elements and clot. Physiological saline (0.067N) and distilled water (resistivity 2.5+ mega-ohm) were compared as a diluent and showed no observable difference or influence in the outcome of testing. Distilled water was made the standard diluent of choice.

In initial controlled testing, donated specimens were examined from 24 subjects comprised of 10 males and 14 females. Neither special selection nor screening with regards to sex, age nor clinical history was made. Serum was tested fresh within 2 hours of collection. Agar plates for diffusion and serial dilution tube series with antigen being the variable were prepared as previously mentioned.

Initial antigen challenges used included mercury, copper, zinc, tin and aluminum. These challenges were formed using various salts and combined forms of the elements concerned in proprietary mixtures. Each was adjusted to a final concentration of 0.0001 to 0.0005 molar concentration, depending on the cat - ion involved. All tests were conducted in triplicate, and numbers reported are the average derived from triplicate tests.

The results observed are shown in Figures 4 and 5.

FIGURE 4. PRECIPITIN REACTION TITERS4. PRECIPITIN REACTION TITERS

Number of specimens out of 24 showing indicated titerof specimens out of 24 showing indicated titer

Test Material	1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256
Mercury	17	18	19	19	14	6	0	0
Copper	17	17	16	16	8	2	0	0
Tin	17	17	17	17	4	0	0	0
Zinc	13	14	14	13	6	2	0	0
Aluminum	21	20	20	19	19	11	0	0

FIGURE 5. IMMUNODIFFUSION REACTIONS Number of specimens out of 24 showing band formation

Test Material	1 band	2 bands	3 bands
Mercury	19	2	0
Copper	17	0	0
Tin	17	3	0
Zinc	14	0	0
Aluminum	21	7	2

As shown in these tables, correlation between liquid precipitin and diffusion methods was comparable, especially when qualitative detection was sufficient. There is some evidence in mercury and zinc reactions at the 1:2 and 1:4 levels of possible prozone phenomena. The aluminum reactions in diffusion testing presented with multiple banding in some patients, suggesting that more than one haptenic binding site or stereochemistry might be involved.

Flocculation of immunoglobulins on a non-specific basis by certain chemicals is familiar to most immunologiosts. By using a solution of ammonium sulfate, immunoglobulin may be taken out of solution non-specifically with no implication of immune sensitivity nor specificity (27). The question which immediately arises from the above data has to do with whether or not the observed reactions are truly specific for the metallic challenge component or whether they might simply be non-specific flocculations or agglutinations of serum protein by metals. To answer this question, 10 reactive samples from the above group of 24 which had shown reactivity with copper, aluminum and mercury were selected and further tested as follows. Samples of each serum specimen were placed into clean borosilicate glass test tubes and mixed with the indicated mercury challenge. After being permitted to react for 5 minutes, the specimens were centrifuged and the supernatant fluid removed into separate tubes. A small part of the supernatant fluid was set aside for other purposes, while the bulk of supernatant fluid received an additional challenge of mercury solution. This new mixture was allowed to form any additional precipitate possible for 5 minutes. Each tube was again centrifuged and the clear supernatant fluid removed to a clean tube. These steps were taken to permit the mercury challenge to precipitate whatever protein it could. All precipitates were saved for further analysis. No precipitates were observed to have formed from the second exposure to mercury challenge. The supernatant fluids from the above procedure were then mixed with the requisite amount of copper challenge for 5 minutes. Rrecipitates were observed in all tubes. The specimens were centrifuged as before and precipitates were separated from supernatant fluids and set aside. The harvested supernatant fluids were exposed to a second copper challenge in the same manner as with mercury. No precipitates were observed with second exposure. All tubes were centrifuged and clear supernatant fluids set aside.

A similar procedure was then carried out using aluminum challenge on the supernatants previously exposed to mercury and copper challenges. Precipitation was seen in all tubes. Precipitates were set aside for analysis and the supernatant fluids were held for repeat exposures to mercury, copper and aluminum challenges for a third time. No precipitates occurred at any stage on this last passage. This procedure was further applied by reversing the order of challenges on fresh serum alloquots. Each stage of the testing showed precipitation with each challenge in succession. This would suggest that the precipitation observed was specific to the challenge being presented, and that reaction with one challenge did not affect the ability of the serum to react with a different challenge second-handedly. The precipitation was specific to the challenge used in each case.

To further investigate the nature of each harvested precipitate taken from the experiments above, the residues were prepared for analysis by atomic absorption to determine the amount of each caution present in the precipitate. The quantitations were compared with the supernatant samples separated out at the time of residue harvest. A comparison of metals is as follows in Figure 6.

FIGURE 6. COMPARISON OF METAL CONTENTS BETWEEN RESIDUES AND SUPERNATANTS

Expressed as a ratio of residue content / supernatant content(Rounded to nearest tenth)

Sequence #1 (Hg-Cu-Al)	Hg	Cu	Al

Mercury Added	3.9/1	0/0	0/0	Copper Added	1/1	2.8/1	0/0
Aluminum Added		1.1/1	0.9/1	5.1/1			

Sequence #2 (Al-Cu-Hg)

Aluminum Added		0/0	0/0	5.3/1	
Copper Added		0/0	2.6/1	1.2/1	Mercury
Added	4.0/1	2.5/1	1.1/1		

These results suggest that the precipitated residues were binding the metals quite specifically and that the supernatants were uniformly losing the specified cation as it was being picked up in the precipitate.

To further examine the nature of the precipitates formed, each was observed in its native suspension prior to centrifugation. The nature of the precipitates showed a very fine granular appearance. When observed in transmitted light, each had a slight opalescence with small red, yellow and blue refractions showing. Conversely, when serum samples were mixed with ammonium sulfate solution, the residue which formed was grossly flocculent, had no refracions whatsoever when viewed in transmitted light, and showed no qualities of granularity.

In the next phase of investigation, fresh serum samples were treated with ammonium sulfate solution and permitted to flocculate. The flocculated residue was separated by centrifugation from each of the test serum samples, and each serum was then exposed to challenges with the mercury, copper and aluminum solutions mentioned previously. No precipitation was found with any challenge after the ammonium sulfate treatment took place. In that ammonium sulfate is expected to bring down only immune globulin and not other serum proteins (27), this suggests that the missing activity for mercury, copper and aluminum was present only in immune globulin and had been tied up or bound and removed in the ammonium sulfate flocculation.

At the next stage of development, serum samples from 300 donors were examined in both precipitin and gel diffusion methods for a broader spectrum of challenges. The 300 subjects studied were either drawn voluntarily for the project or were persons who had been drawn for other clinical laboratory testing and had unused excess serum remaining after primary work had been completed. All were coded by number without any indication of donor identity. Serum specimens were accepted randomly without regard to sex, age or specific clinical history. No preselection nor screening was performed to bias results for those thought to be presenting with any symptoms of toxicity, sensitivity or evidence of pathology. The results showed good correlation between liquid precipitin and gel diffusion detection of antibody. Only the liquid precipitin results are presented here in Figure 7.

FIGURE 7. PRECIPITIN REACTION TITERS7. PRECIPITIN REACTION TITERS

Number of specimens out of 300 showing indicated titer(Last column shows % positive for challenge on qualitative basis)Test Material 1:2 1:4 1:8 1:161:321:641:128 % Positive

Aluminum	240	242	259	258	125	29	0	86%
Antimony	48	48	19	2	0	0	0	16%
Barium	1	1	0	0	0	0	0	<1%
Beryllium	116	117	116	19	0	0	0	39%
Bismuth	72	72	72	64	38	1	0	24%
Chromium	111	106	101	23	0	0	0	37%
Cobalt	108	97	37	36	18	1	0	36%
Copper	167	187	169	144	119	43	2	62%
Gallium	60	54	18	2	0	0	0	20%
Gold	9	4	4	1	0	0	0	3%
Indium	164	167	168	82	9	0	0	56%
Iridium	57	56	31	29	9	0	0	19%
Mercury	200	204	193	118	87	11	0	68%
Nickel	139	133	138	79	64	17	1	46%
Palladium	48	49	7	1	0	0	0	16%
Platinum	2	2	0	0	0	0	0	<1%
Silver	25	24	25	3	0	0	0	8%
Strontium	1	1	0	0	0	0	0	<1%
Tin	183	183	99	16	1	0	0	61%
Titanium	2	1	1	0	0	0	0	<1%
Vanadium	12	9	2	0	0	0	0	4%
Zinc	148	157	156	112	14	1	0	52%

For the next phase of test development and evaluation, a variety of organic materials were examined in 187 subjects by liquid precipitin method. It may be noted from the following table that percentages of reactors are substantially lower in most challenges with the exception of entities such as the polyethimines, tannins and toluenes. Titers were never observed to exceed 1:32 in any challenge and most did not exceed 1:8. This may relate to the quality of haptenic structures and to the adjuvant effect of metallic cations which have been avoided as much as possible in composing challenge formulations. When metallic salts were absolutely required to form the challenge, sodium, potassium or calcium salts were chosen.

FIGURE 8. PRECIPITIN REACTION TITERS8. PRECIPITIN REACTION TITERS

Number of.specimens out of 187 showing indicated titerof.specimens out of 187 showing indicated titer

(Last column shows % positive for challenge on qualitative basis)

Test Material	1:2	1:4	1:8	1:16	1:32	% Positive
Acrylates	4	3	1	0	0	2%
Butyrates	2	1	0	0	0	1%
Carboxylates	7	4	3	0	0	4%
Cellulose	11	8	0	0	0	6%
Hexanes	5	5	2	0	0	3%

Polyethimines	63	65	31	10	4	35%
Polyvinyls	6	2	1	0	0	3%
Styrenes	2	1	0	0	0	1%
Tannins	91	91	84	19	11	49%
Toluenes	33	33	7	1	0	18%
Urethanes	1	1	0	0	0	<1%
Xylenes	13	2	1	0	0	7%

While the organic moieties do not demonstrate the intensity of action seen with some metallic components, it is likely that some of those reacting have done so due to association with metallics bound to them when initially presented to the immune surveilence mechanism. Current assessments of the data, however, have not shown any set pattern of association between any one organic reactant and any one metallic reactant in patient specimens.

To assess both precision and accuracy in detection by liquid precipitin method, specimens available in quantity were divided into aliquots and groups for multiple evaluations. Measurements were performed on serums from 10 selected donors found to be reactive to mercury and tin by precipitin and gel diffusion methods. Each donor's specimen was further divided into 20 aliquots for use in end-point titration determinations for mercury and for tin challenges. Challenge materials were prepared in the usual and customary manner for the author's laboratory bench and dispensed into microtiter trays. A two-fold dilution scheme was used for testing, with serum being the variable. The following tables show the endpoints determined for mercury and tin challenges.

FIGURE 9. Mercury Endpoint Determinations9. Mercury Endpoint Determinations

(Number out of 20 determinations ending at indicated titer)

Donor	1:2	1:4	1:8	1:16	1:32	1:64	1:128	Variance120
	20	18	2	0	0	0	9.OOOE-2220	2020
	19	1	0	0	4.749E-2320		20	20 20 0
	0	0	04	19	20	20	20	19 10
	4.749E-25	20	20	18	2	0	0	0
	9.OOOE-2							
6	20	20	19	1	0	0	0	4.750E-2
7	20	20	0	0	0	0	0	0
82020173000		0.127920202020000010202020201900					4.750E-2	

FIGURE 10. Tin Endpoint Determinations(Number out of 20 determinations ending at indicated titer)

Donor	1:2	1:4	1:8	1:16	1:32	1:64	1:128	Variance120
	20	0	0	0	0	0	02	20 1919
	0	0	0	0	0.1893	20	20	18 1 0
	0	0	0.100					

4 19 20 19 0 0 0 0 4.749E-2520
20 19 1 0 0 0 4.750E-2
6 20 20 0 0 0 0 0 07 2020
20 20 0 0 0 0
8 20 1 0 0 0 0 0 4.750E-2
9 20 20 20 0 0 0 0 010 20 20 19 0 0
0 0 4.749E-2

As may be seen, data are tightly packed for quantitative endpoint titration purposes. If datas are taken at optimal dilution for qualitative determinations only, antibody determination would score 100%. For purposes of determining variance, dilution positions were assigned increasing values in increments of 1. ie., 1:2 scored as 1, 1:4 scored as 2, 1:8 scored as 3, 1:16 scored as 4, etc.

It may be noted that donor #3 in the mercury table had one test which did not precipitate at 1:2 dilution factor. It is suspected that this may be due to a prozone effect, as precipitation of the remaining 19 trials for that donor at 1:2 dilution factor were weak and poorly characterized.

One other problem should be addressed in this writing, and that is the appearance of nondescript hazing or light clouding which periodically appears in test channels containing gold, silver, titanium, nickel, platinum and palladium, among others. The nature of this clouding does not meet the criteria set forth above in detecting a true antigen-antibody precipitate. To determine whether this clouding has to do with immune globulins, samples of patient serum which evidenced this peculiar type of reaction were briefly treated with a dilute solution of ammonium sulfate, previously cited as a means of removing globulins from serum but not other proteins (27). Products formed upon reacting samples in this manner were removed via centrifugation. Samples were then tested with the appropriate metal challenge. The clouding continued to form, and was deemed to represent a non-specific agglutination of general serum proteins having no relationship to antibodies.

Serum specimens which showed the characteristic precipitation believed to be associated with antigen-antibody precipitates (finely granular, slightly opalescelent and refractive) were also exposed to similar ammonium sulfate treatments. Upon challenge with the appropriate metals, no activity of any kind could be detected in the serum. It is expected that the Ammonium sulfate solution removed the immune globulins from the serum upon which antigen-antibody reactivity was dependent. This suggests that the nondescript hazing sometimes seen is essentially a "noise' and should not be considered when assessing reactivity results. In my hands, there is not much difficulty distinguishing between the noise and a true immune reaction when the test plate is read in transmitted light by trained eye.

The data presented herein suggest that there is a specificity of reactants when challenges are tested in very dilute ranges commensurate with serologic and immunologic testing. They also suggest that testing can be reproduced with good reliability. If quantitation were needed, it could be done using the methods defined. In acknowledgement of titer variations due to currency of exposure, etc., qualitative determination of reactivity is more than adequate to detect prior adverse exposure with sufficient sensitization to elicit systemic antibody production. No attempt to define

threshold acquisition nor defined pathology correlation has been attempted, nor is it likely that such determinations could be made from this kind of testing. What can be inferred from these data is that (a) patients have had adverse contact with toxic materials, (b) that they have had sufficient body burden to induce immune activity, and (c) probably retain memory cell-based immunity against the offending immunogen. In light of known problems due to invivo formed immune products, antigen-antibody complexes, etc., it would seem unwise to make any further challenge to the patient from any contributing source once reactivity has been detected.

REPORTING AND USE OF TEST FINDINGSAND USE OF TEST FINDINGS

When laboratory testing has been concluded, a reporting system with three sections is generated these sections include (a) a report of basic observations in terms of chemical groups and families, (b) a categorical section in which results are correlated to product tradenames of related application such as composites, cements, impression materials, etc., and (c) an alphabetical listing of all product tradenames with simple suited/not-suited indications for rapid reference in the operatory environment.

Basic reactivity results for each chemical group or family are reported with characterization as weakly, moderately, strongly or non-reactive. These determinations are made by correlation of opacity in the test well with a MacFarlane opacity standard. A reaction corresponding to a Mac-1 standard opacity is reported as weak, a Mac-2 standard as moderate, and Mac-3 or greater opacity as strong. Caution must be taken that intensity of opacity does not indicate degree of sensitization in the patient. Rather, indications as weak, moderate or strong are reported to suggest something about currency of exposure to the chemical group being tested, quality of antigenic stimulation or presentation and possible indication of antigenic tolerance when testing is examined in light of various other immune system function tests. Antibody titers may be reduced in the patient when exposure has not occurred within a period of time, even though memory lymphocytes with quick secondary response capability are present in interstitial spaces.

To assist practitioners, most of whom seem to know little or nothing about what is contained in the materials which they use, results are tied to product trade names. Correlation with product tradenames is performed by assembling computer database containing expected and known chemical group and family information for each product to be reported. Data as to ingredients, breakdown byproducts and corrosion forms have been obtained b y (a) physical testing of the product, (b) examination of the technical literature for reports of such testing, (c) manufacturer's Material Safety Data Sheets for the product, and (d) product insert sheets and contraindication lists from the manufacturers. If the appropriate chemical groups or families are tested in the serology tray, then correlation to any dental product can be made which contains or is expected to generate the tested forms.

Any single component, chemical group or family can cause a tradename product to be placed into a 'not well-suited' category. In a theoretical consideration, let us say that a patient was tested for reactivity with gold, silver, indium and tin groups. The patient may show reactivity with the tin group and no reactivity with any other components tested. If a

certain alloy product contained gold, silver, indium and tin, the patient's report would show this alloy by tradename as not well-suited for this patient solely due to the tin reactivity. If the patient had shown no reactivity with any of the four chemical groups under consideration, the tradename would have reported as a product which "may" be suited for his or her use. The word "may" is purposely used in that some reactivities with extremely low titers might not have been adequate to detect, etc. There is always the potential for developing new reactivities, although the author has noted in longitudinal testing that most persons who have passed out of their pubescent years seem to have relatively stable reactivity patterns (personal data which is not yet sufficient for statistical reliability).

The categorical section of the reporting system groups tradename products together by common application or intended use. such as composites. cements, etc. Each category contains the names of products which may not be well-suited for this patient and those for which there have been no contraindications and which may be suited for use. Selection of components which work well together, such as the proper composite, cement, liner and base must be made by the practitioner. The categorical listings provide choices and the dentist determines from the lists the products which meet strength, durability, esthetic and intra-product comparability requirements. A listing of presently reported categories may be found in Appendix B.

Finally, the alphabetical section permits rapid checking of suitability within test constraints for the tradename products. This eliminates time consuming searches through the categorical pages when the dentist knows the products intended for use and needs quick tradename verification in the operatory environment. If any contraindication is noted, reference to the categorical section might suggest an alternative product.

A sample page from each of the three sections of the report may be found in Appendix B, C and D. A complete report runs to approximately 35 pages.

BIOFEEDBACK ADVANCES FOR DENTISTRYADVANCES FOR DENTISTRY

Dr. Rheinhold Voll, in developing electro acupuncture according to Voll, found that the acupuncture meridians would change with resistance measures **in** response to different toxicity or other energetic substances. Vol's work led him into dentistry and finding ways to detect energetic problems of the teeth. Many dentists across the world have studied and found Vol's work to be highly applicable to their dental practices. Recently new techniques in energetic medicine have led to advances beyond just resistance measures into detection of voltage, amperage, and other energetic factors which have further assisted in the practice of dentistry.

One such device is the E.P.F.X. machine developed-by the *Eclosion* Corporation of Denver. This machine can detect resistance, voltage, amperage or temperature of the body of the patient being tested. Dentists can use this to check different meridians or teeth to find out if there are energetic disturbances. .

Certain software programs can be utilized to guide the practitioner in looking at the teeth and the amalgamated fillings of the mouth. Software systems can be used to scan the

outside of the teeth along the jaw to find out if there are foci or energetic disturbances around the dentin area. Many of these external disturbances will respond to biofeedback, as the patient can learn to help correct the energetic disturbances. Other disturbances or foci will need to have more avant-garde correction, such as nutrition, lifestyle change, behavioral medicine, homeopathy, etc. Other software programs can be utilized then, within the mouth, to check the voltage or amperage that is developed from one area to the other.

When we have two dissimilar metals separated by a wet liquid, we are likely to develop a battery. This can happen within the oral cavity, as one metal filling could have a different amalgamated mixture from the other; thereby these two metal fillings, with the electrolyte of saliva and the blood of the body, could become a battery, and emit electrons, thus disturbing the energetic pathways of the body.

Machines can be utilized to measure the voltage and amperage from these different amalgamated alloys, and the computer can assist us in determining which potential fillings might need to be removed because of their disturbances on the energetic meridian.

The E.P.F.X. box can also be used with its computer to assist in dental billing via the word processor, and can also allow for better record-keeping and patient compliance through biblio- or book therapy. The E.P.F.X. computer system has many different biblio-therapies which can be utilized to help educate patients in nutrition, stress reduction, lifestyle changes, etc. Thus the E.P.F.X. box is very compatible with the dentist's practice and with the scope of dentistry, allowing for the avant-garde dentist to detect and correct energy problems in the mouth. The measurement and treatment of the energetic conditions of the oral cavity is indeed within the scope of dentistry.

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ARTICLE XI

DENTAL HYGIENISTS FUNCTIONS

Definitions pertaining to Dental Hygiene Functions:

INDIRECT SUPERVISION: The dentist authorizes the procedures and remains in the treatment facility while the procedures are being performed.

OPERATIVE SUPERVISION: The dentist authorizes the procedures, remains in the operatory while the procedures are being performed, and evaluates the results prior to leaving the operatory.

GENERAL SUPERVISION: The dentist authorizes the procedures but is not required to be present in the treatment facility while the procedures are being performed by the dental hygienist.

I. EXCLUSIVE FUNCTIONS TO BE PERFORMED BY A DENTAL HYGIENIST WHEN DELEGATED BY A DENTIST

a.) Effective and safe delivery of certain services to the public is dependent upon making judgments and utilizing skills that require synthesis and application of knowledge acquired in accredited dental hygiene education programs and cannot be delegated to any dental staff member other than a licensed, registered dental hygienist.

b.) The following functions may only be delegated to a licensed dental hygienist:

1.) Oral examinations. Elements of these examinations include charting of carious lesions and other abnormalities, periodontal charting and assessment of periodontal conditions, treatment planning for dental hygiene services and oral cancer screening. The dental hygienist may dictate the examination findings to a dental assistant who may then record the data on the patient's dental record.

2.) Application of pit and fissure sealants.

3.) Oral prophylaxis, scaling, root planing, and curettage.

4.) Using air driven, electric, sonic, ultrasonic, or otherwise powered scalers or polishers (except for dental assistants possessing an expanded duties permit for polishing).

5.) Placing medicaments as prescribed by the supervising dentist into the sulcus or periodontal pockets, for periodontal diseases.

II. PROHIBITED ACTIVITY: The following functions and procedures may NOT be delegated to dental hygienists ***under any level of supervision*** because effective and safe performance is dependent upon making judgments that require synthesis and application of knowledge acquired in professional dental education. The functions include:

a.) Diagnosis and treatment planning

b.) Surgical or cutting procedures on hard or soft tissue,

c.) Prescription, injection, inhalation, and parenteral administration of drugs (except where permitted by Board)

d.) Placement, seating or removal of any final or permanent restorations.

e.) Final placement of orthodontic brackets

f.) Any procedure that contributes to or results in irreversible alteration of the oral anatomy.

g.) Performance of any of the following expanded duties without a permit:

1.) Administration of local anesthesia

2.) Administration of nitrous oxide/oxygen analgesia

III. SUPERVISION LEVELS FOR AUTHORIZED FUNCTIONS OF A DENTAL HYGIENIST

a.) Under INDIRECT SUPERVISION a hygienist may perform any dental task or procedure assigned by the supervising dentist to the hygienist that does not require the professional skills of a licensed dentist except for those functions prohibited in Section II of this Article or those tasks that require operative supervision.

b.) Under OPERATIVE SUPERVISION, a hygienist may perform the following procedures:

1.) Any procedure allowed under Indirect Supervision.

2.) Administer certain local anesthesia injections as provided in Article XVI of these Rules and Regulations.

c.) Under GENERAL SUPERVISION, the following restrictions apply:

1.) A hygienist may render services only with the expressed consent of the supervising dentist and only for brief intervals when the supervising dentist cannot be in the treatment facility not to exceed two consecutive days.

2.) The supervising dentist maintains full control as to whether general supervision will be utilized in his/her office or practice setting.

3.) General supervision is allowed only in dental clinics, community health centers or government sponsored dental facilities.

4.) Hygienists must comply with written protocols for emergencies as established by the supervising dentist.

5.) Hygienists must practice under the supervision of a licensed dentist and may not practice independently or establish an office devoted primarily to dental hygiene services.

6.) Hygienists must have one (1) full year of full-time service before being able to function under general supervision of a dentist.

7.) Patients must be notified in advance that the doctor may not be in the treatment facility.

8.) The supervising dentist must have examined the patient(s) not more than twelve (12) months prior.

9.) Hygienist may perform any procedure allowed under Indirect Supervision with the exception of root planing, subgingival curettage, local anesthesia, administration of nitrous oxide.

10.) The hygienist may place sealants if it has not been more than thirty days since the teeth to be sealed were examined by the dentist.

11.) A registered dental hygienist may not delegate functions to a registered dental assistant when the treating dentist is not in the facility.

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Dental Disease

The International Journals are a medical periodic peer reviewed journal, keeping pace with ever changing health care.

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Changing Times, Changing Environments...

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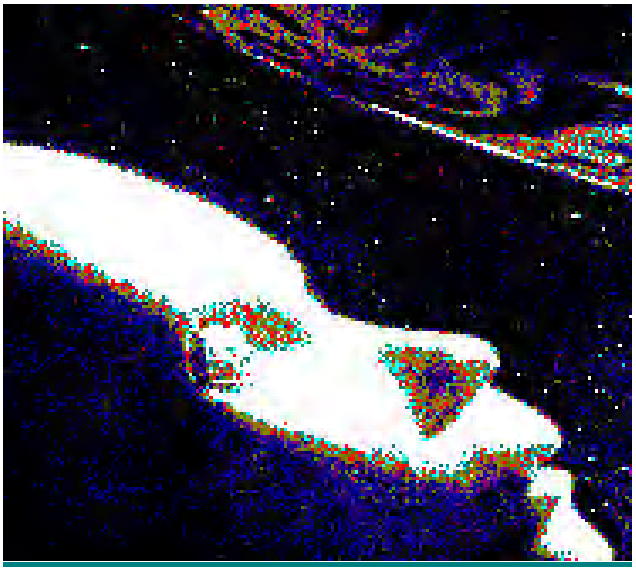
Natural + Energetic Medicine



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To the Interested Reader

The fields of natural medicine, homeopathy, and energetic medicine have received much attention in the last few years. The fear of synthetic chemicals, the ecological damage caused by the chemical industry, failure of antibiotics, realization of the chemical special interest groups ability to manipulate medicine, and an overall developing appreciation of nature, all have brought these forms of medicine into our awareness. Patent synthetic medicine dramatically profits from its synthetic patents, and then tries to get us to believe that the synthetic substance is the same as the natural. More and more people are doubting this.

The vast body of research included in this reference on quantum medicine is dedicated to offering evidence that synthetics are not the same. There are writings on physics, quantum biology, historical accounts and lots of clinical research.

The basic clinical hypothesis is:

Can a medical practitioner use natural products in his practice to substitute for the synthetic medications?

Can a doctor substitute behavioral and homeopathic medicines for synthetic drugs such as synthetic thyroid, NSAID, blood pressure medication, pain killers, antibiotics, antifungals, calmatives, and thousands of synthetic medications on the market today.

This is the basic inquiry we pose. The studies are centered around this hypothesis. The results will definitely point to the conclusion that much of modern medicine indeed can be accomplished with the homeopathics described in these research articles.

Each of these studies is constantly being challenged and retested by our revalidating staff. Each of these articles on its own is not enough for a drug trial yet, but at present there is enough data to conclude that our original hypothesis is correct. We use these techniques in our clinics on a daily basis with greater success than the old style synthetic medications. These studies represent only a smattering of the thousands of successful interventions we see with homeopathy and behavioral medicine.

The basic scientific premise is that nature has many subtle differences that synthetic chemicals do not. There is a measurable and dramatic difference in safety, with natural homeopathic medication having far less side effects.

With these ideas in mind we offer the medical and scientific community the volumes of evidence and research contained in this quantum medicine network.

Read, Enjoy, Learn, And Think.

Yours Truly

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Bio Compatible Dentistry

An approach to dentistry which acknowledges the intimate relationship of the teeth and the mouth to the rest of the body.

Robert Gammal BDS. FACNEM(dent)

This booklet is an attempt at providing the most up to date and relevant information with which to make informed deci-sions about your dental treatment. There is no attempt either direct or implied to offer in these pages any medical diagnosis or prognosis. For a variety of medical and legal reasons, there is no suggestion either direct or implied, that any treatment provided in our surgery will give you a health improvement: The information provided here is supported by published scientific literature.

All treatment plans will be discussed with you and fee quotations will be given. Note that this quotation is a close estimate of the fees. If changes must be made during the progress of your treatment, they will be discussed with you as they occur.

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Index

The information coutaiued is this boolklet is offered to help everyone. Please feel free to pass it on or copy the bits you feel may help someone else.

Amalgam Removal Protocols

Amalgam Removal Procedure
This is a brief outline of the procedures followed when removing and replacing amalgam restorations. It is intended as a guide only. There will be slight variation from patient to patient but the essential protocols will still be followed. These protocols are a compilation of the latest information from the International Academy of Oral medicine and Toxicology, The Australasian Society of Oral Medicine and Toxicology, Huggins Diagnostic Centre, Bio-Probe, Sam Ziff and a number of other independent researchers. The information is regularly updated.

Medical History Questionnaire
This provides us with clues to your health status both now and after treatment. It also helps us to target the most serious aspects of the treatment and helps to differentiate symptoms, which may be caused from mercury and those of other dental and non-dental origins. The information is of course strictly confidential and is an important part of the treatment protocol.

X-Rays
Although x-rays do present us with a degree of radiation, they supply us with diagnostic information, which could otherwise not be obtained. Radiation exposure is minimised by using accurate technique, modern low dosage short wave-length equipment, and using only the minimal number required for the individual patient. Taking about 3 grams Vitamin C at the time of the exposure may offset some of the effect of the radiation from these x-rays.

Bio Compatibility Testing
This is one of the most important of all the testing procedures. Mercury can severely compromise the immune system and as such you may be less able to handle other challenges to your immune system. Any substance implanted in the body may act as an immune challenge to which you may be reactive - this includes all tooth-filling materials.
Many materials can be used to restore a cavity in a tooth from plastics to gold and porcelain. Of the composites there is a great variety to choose from. It is therefore critical that we place only those materials, which are

compatible for the individual. There is no one material suitable for everyone.
Sophisticated blood testing techniques such as Immunodiffusion and Cytotoxicity testing are carried out at Australian Biologics (Pitt St. Sydney).

Dietary Supplements
It is important to prepare the body in advance and during treatment to reduce the burden of mercury detoxification. To this end a number of dietary supplements may be prescribed. These will depend on individual needs for the replacement of specific minerals and vitamins, to help expel mercury, and aid digestion. These supplements are usually taken at least two weeks prior to commencing treatment and for up to six months after the last amalgam are removed.

Chelation Therapy
This is a specialist medical procedure aimed, for our purposes, at rapidly removing heavy metals from the body. It must be carried out by a trained medical practitioner. Referral can be arranged for those patients who need it. Note that if organizing your own Chelation treatment you must insist that DMl'S/DIVISA be used. The more traditionally used EDTA has been shown to be Neurotoxic when combined with mercury.

Appointment Scheduling
To gain maximum benefit, amalgam removal is best completed in a four to six week period. The appointments must be organised in such a way as to avoid the 7th, 14th and 21 st days after the previous appointment. The reason is that when amalgam is removed, some mercury will vaporise. Although the protocols are designed to minimise this exposure, the absorbed mercury will still act as an immune challenge. The reason is unclear, but we do know that the immune function is reduced on the 7th, 14th, and 21 st days after a challenge. It is therefore unwise to repeat the same challenge on these days as it will increase the chance of illness. Ie if your first appointment is on a Monday you should not repeat a Monday appointment for at least four weeks.

Sequential Amalgam Removal
All amalgam fillings carry some electrical charge. This can be measured in micro-volts and micro-amps. It is of great importance that the amalgam be removed in the correct sequence, determined by the electrical currents. Those amalgams with the highest negative current must be removed first followed in sequence to removing the fillings with the lowest positive current last. The charges are recorded at each appointment. For people in reasonably good health it is acceptable to remove the fillings from a whole quadrant with the highest negative current. For some people it is important to remove the fillings one at a time in strict electrical sequence.

Rubber Dam
This is a sheet of rubber which is stretched around the teeth being treated. Holes are punched which allow only the teeth to be worked on to be exposed. It is an incredibly simple way to prevent either inhalation of vapour or ingestion of amalgam particles. The use of Rubber Dam is one of the most important parts of the amalgam removal protocol. It also allows for the more rapid removal of amalgam. Most patients are appreciative of the use of Rubber Dam as they do not end up with a mouth full of amalgam particles.If it is not possible to place a dam on particular teeth, a special suction apparatus will be used which is also very effective at removing mercury and amalgam particles.

Use of A Separate Air Supply
You will be provided with a separate air supply while the amalgam is being removed. This is through a nosepiece, which supplies sterile compressed air. This is to reduce the inhalation of mercury vapour, which is created when removing amalgam.

Follow Up Treatment
Removing amalgam is like turning off the bath taps. The bathtub still needs to be emptied. Removing mercury from the body may take several years. You may need to work with medical doctors, naturopaths and use additional dietary supplements. It is now known that amalgam removal allows the body to excrete its mercury burden.

A Bigger Approach To Health

The road to health can take many fomns and many healin aspects must be considered. It is no longer possible for one health practitioner to offer all services, and thus a number of specialists may be referred to. These may include medical practitioners, dieticians, naturopaths, homoeopaths, massage, counseling, etc. Health care professionals working together as a team can influence a more holistic approach to healing.

Staff Protection

The dentist and dental nurse will be wearing separate respiratory masks also to avoid inhaling the mercury vapour. The surgeries are equipped with negative ion generators and air filters to also reduce mercury vapour levels. Very powerful suction systems are standard and special burs are used to cut the amalgam quickly and produce minimum mercury vapour levels.

These Protocols represent our attempt at making amalgam removal as safe as possible. There is no one treatment or approach which is suitable for everyone and thus minor modifications may be made on an individual basis.

Dietary Supplements for Amalgam Removal

It is important to understand that removing your amalgam fillings is removing the greatest source of mercury from your body. All amalgam must be removed. This includes not only the fillings that you can see but also any amalgam that may be under crowns and/or bridges, amalgam that has been placed at the end of a root filled tooth (Retrograde Root filling) and any scraps of amalgam found in the bone or soft tissues. It is like turning off the taps to stop the flow into your body.

It is also important to empty the body (the bathtub) of heavy metals. There are a number of ways of achieving this and these supplements are a part of the protocol. The supplements listed below are designed not only to remove mercury from your body but to also help repair some of the damage caused by mercury.

Most are available from Newton's Pharmacy in York St Sydney, (or your local health food store) but some are `practitioner only'. The supplements, which are practitioner only, are usually available from the surgery. Marked PractitionerOnly on the list below)

1- Selenium - Sodium Selenite - 100 mcg to 200 mcg /day . This is 2 - 4 drops per day. Selenium is a trace element which is essential for a wide range of enzymatic processes in your body. Mercury binds strongly to Selenium and therefore diminishes the available levels. At the same time Selenium has been shown to reduce the toxicity of mercury. A number of studies have now been published which indicate that a daily supplement of Selenium will reduce the risk of cancer by about 60% - (Practitioner Only)

Note - Selenium must NOT be taken at the same time as Vitamin C as it tends to precipitate out and is thus lost from the body. Allow at least TWO Hours between the two. Perhaps take the Selenium at night.

2- Vitamin C - Important anti-oxidant.

3- Evening Primrose Oil

4- Toxicol from Eagle Pharmaceutical . Take one tablet, two to three times daily with meals. (Practitioner Only)

5- Blackmore's Bio Zinc. A well balanced formulation of Zinc, Magnesium and Manganese, all of which are essential to help repair cell wall integrity.

6- Vitamin B6 - a formulation called "MNB 287" from MacroMolecular Systems which includes Folic Acid - dosage is for adults l Oml twice daily morning and lunch time. Taking this at night may keep you awake. For children take Sml / day in the morning. (Practitioner Only)

7- Vitamin B - basic vitamin supplement. eg. Tresos B

8- Vitamin E - in combination with Selenium it acts as a major antioxidant Oil soluble forms require a dosage of about 5OOi.u. per day. Water miscible Vit E is absorbed more readily and the dosage should be reduced to 250i.u. per day.

10- Chlorella - (Practitioner Only) this is an algae which has been shown to be highly effective in removing large amounts of mercury from the body. Chlorella acts like an organic sponge for heavy metals and is one of the most important supplements needed to remove mercury from your body. Various forms of Chlorella are available. Spirulina is not an alternative to chlorella.
Chlorella appears to have 2 significant mechanisms of action that make it an ideal agent to be used in a toxic-metal diagnostic and treatment protocol.
(a) The algal cell wall absorbs rather large amounts of toxic metals (similar to an ion exchange resin).
(b) mobilization of some mercury from within the cell, but mostly mobilization of mercury compartmentalized in non-neurologic structures (muscles, ligaments, connective tissue, bone).

11- Mercury Detox Herbal Mix. - designed to support and tonify liver and kidney function. (Practitioner Only)

12- Coriander (Cilantro) - this must be fresh and preferably organic if you can get it - dried coriander does not work. Research published late in 1996 has shown that Coriander has a wonderful capacity to remove heavy metals and especially mercury from the brain. This is a revolutionary discovery and makes Cilantro the first known substance that mobilizes mercury from the Central Nervous System. The active principle is unknown.

Cilantro-Pesto: Buy fresh organic. Wash. Put in blender with small amount of water, good amount of sea salt (Celtic salt is good) and olive oil. Blend until creamy. Take 1 tablespoon 3 tirrtes/day with meals. More often, if the Central Nervous System is severely compromised.

Supplement Dosages and Instructions
Important Information

Selenium Sodium Selenite Drops (Practitioner Only) 200-400 mcg / day = 2 - 4 drops / day Not with Vitamin C - Separate by 2-3 hours

Vitamin B - Tresos B, (SF88, 33SE, Mineral Matrix are alternative brands) 1 tabs 2 x daily These are all general mineral and trace elements supplements and need to be taken with meals.

Vitamin B6 - "MNB 287" includes Folic Acid (Practitioner Only) Adults l Oml per day For children take 5ml / day in the morning.Taking this at night may keep you awake.

Vitamin C 1-3 gms/day. If you have sensitive gastro intestinal tract best to take with Slippery Elm Powder. With meals, clean teeth after TAKING. When coming off Vitamin C reduce slowly by 250mg/day.Caution Vitamin C in some sensitive people can cause gastric upset.

Vitamin E Water Miscible 250 i.u / day. Side benefit is that it increases the antioxidant effect of both Vit E and Selenium by about 4 times.

Blackmore's Bio Zinc Take 1 Tab per Day A well balanced formulation of Zinc, Magnesium and Manganese

Evening Primrose Oil 1 cap / day

LMl orToxicol Tablets (Practitioner Only) 1 Tablet 2 times / day with meals May cause a sense of overheating of your body. Reduce the intake.

Sun Chlorella (Practitioner Only) 3 Tablets taken two to three times per day

Herb Mix (Practitioner Only) 5-10 ml 2x daily with food. Put dosage in small amount of boiling water, let cool and take with food. The Mix supports the Liver and Kidneys while promoting detoxification.
Not during pregnancy or lactation.
Not for children under 12 years

Coriander (Cilantro) this must be fresh and organic if you can get it.- dried coriander does not work.
Take I tablespoon 3 times/day

Silica 500 mg tabs 2 Tabs / day. Can also use Homeopathic Silica

Charcoal Tabs 1-2 with meals Charcoal binds and absorbs endotoxins in the gut . Helps to treat flatulence - reduces wind.

DMPS l DMSA / Medical referral only

Homeopathic Amalgam - Warning Take only under strict supervision as it may mobilise to much mercury too quickly

Liver Cleansing Oil / lemon / Lime Drink One whole lemon or lime, +1.5 cups water, +1 Tablespoon oil [linseed, cod liver, olive,] + lgm Evening Primrose Oil, + 500i.u.Vitamin E Blend, strain and drink on an empty stomach. This mix promotes Oil absorption and promotes Liver cleansing.To gain weight eat breakfast. Otherwise skip breakfast. It should keep you going till lunch. NB. If you experience Body Heat reduce the amount of oil to 1/4 amount and build up slowly.

Some Methods Which May Test If You Have Mercury In Your Body.

The age and number of amalgams in your mouth-the more Amalgams the more Mercury you probably have bound in your tissue.

DMPS Challenge Test Medical Referral Only. DMPS is an injection done under Medical supervision. Urine levels of mercury are taken before and after the injection.

Hair Analysis Measures the presence of heavy metals laid down in the hair shaft Organise this test through your Practitioner.

Electro Acupuncture / Listen System This can detect the effects of mercury in different systems of the body.

What Does the Australian Dental Association say about Dental Amalgam

The Australian Dental Association has continually advocated the safety of dental amalgam. Since 1982 there has been a steady shift in the policy, always side stepping the main issues. They continually advocate that amalgam removal is unethical quackery.

1989 STATEMENT

Is amalgam a safe filling material and is the mercury present in amalgam toxic?

These questions have been raised in the media and popular press. The possibility of toxicity of amalgam, in particular one of its principal components Mercury, has been widely explored and reported in the scientific literature. Allegations of toxicity form excess mercury in the body arising from dental amalgam fillings and allergy to mercury in these fillings have been made. These questions and answers have been prepared to help understand these issues.

Are there independent or consumer evaluation reports?

The Consumers Union in the United States of America have given their verdict that amalgam restorations are safe.

Should I have My Amalgam Restorations Replaced? Amalgam restorations should be replaced only if they are defective, if their is recurrent dental caries, or if it is necessary to gain access to the pulpal or periapical areas of the tooth. Delegates at the American Dental Association in 1986 resolved that it was unethical to replace amalgam fillings on the grounds of toxicity. If allergy to amalgam is suspected it should be demonstrated by established scientific methods.

What Scientific Statements are there on Amalgam Safety?

Both national and international statements are available. There are also results of continuing reviews and trials published in the contemporary scientific literature.
The National Health and Medical Research Council of Australia, has published statements in 1984 and in 1989. In 1988 the Federation Dentaire Internationale endorsed a statement on the safety of dental amalgam.
(NOTE BY ROBERT GAMMAL The NH&MRC withdrew this policy statement in August 1997)

How Long Has Amalgam Been Used to Restore Teeth?
Amalgams (mercury metal compounds) were first used in China about 600ad.when mercury was combined with tin. Mercury combined with tin and silver has been used in Europe and North America since about 1830

Are the opponents of amalgam engaged in scientific or clinical research? The Australian Standards Laboratory and the National Biological Standards laboratory - both Commonwealth Government organisations have without success tried to initiate toxicity trials with the cooperation of a few dentists who oppose the use of amalgam restorations. Evidence so far against amalgam is purely anecdotal and unsupported by any scientific study.

Are Heavy Metals including Mercury present in the body?
Yes. Some metals are necessary for the normal metabolism and function of the body. Other metals including mercury are present in trace amounts and are usually present in our food. The normal daily intake of mercury ranges from 10 to
60 micrograms daily depending on dietary sources. Fish from polluted waters may contain highly toxic concentrations of mercury. Scientific tests have shown that people with no amalgam restorations expire nearly as much mercury as those with amalgam fillings.
Nearly all mercury in the body comes from foods.
Certain occupations may be exposed to high levels of mercury from chemicals, pesticides and agricultural poisons. Special precautions are needed to protect these workers from exposure to mercury. About 60 industries are involved.

How are mercury levels in the body measured?
The most accurate method is to measure the mercury concentration of urine or blood. The normal range of mercury in these fluids is well established.

Is mercury really locked into amalgam fillings?
After the amalgam mixture is set, there is no free mercury available in the metal; mercury is combined as part of an intermetalic compound . Traces of mercury can be released from the set amalgam by temperature or pressure changes.

How Can I tell If I have an Allergy to mercury?
Your dentist can refer you to an allergist who will perform appropriate tests to determine any allergy to mercury and also other dental filling materials which might be used to replace amalgam fillings if this were necessary. Allergy testing by a specialist allergist, using standard methods, is the only way to test whether or not you have an allergy.
How can I decrease the amount of mercury in my body?
Removing the amalgam fillings will lower the concentration of mercury in your body only very slightly if at all.
To reduce mercury concentration significantly it is necessary to give up smoking and eating fish and other foods high in mercury. Two ounces of Tuna may provide as much mercury as having ten amalgam fillings over a lifetime.
Occupational sources of mercury may have to be considered also.
What fillings can my dentist use instead of amalgam fillings? Plastic and porcelain fillings are available. Plastic fillings usually have a shorter useful life(3-Syears) than amalgam fillings (7-10) Inlays ,crowns and bridges all need cements to attach them to the teeth, these cements are also a possible source of allergy or irritation.

1997 STATEMENT
What are amalgam fillings made of?
Dental amalgam is an alloy of a number of metals, mainly silver, tin and mercury.

Is it true that mercury leaks out of fillings? Advances in testing equipment over the past few years have enabled us to detect very small amounts of mercury released from fillings, especially when fillings are polished or removed.

Is this mercury harmful? Medical research organisations including the American Food and Drug Administration, the Swedish Medical Research Council and our own National Health and Medical Research Council say that there is no scientific evidence that these tiny amounts of mercury released from dental fillings are a danger to health, apart from those rare cases where some individuals are unusually sensitive to this material. A number of overseas studies indicate there is no increased health risk or shortening of

life between groups of people with amalgam fillings and those with none.

Is it true that mercury is in our diet? Yes. A normal balanced diet contains amount of mercury and we also come into contact with it in our environment and in a number of other products. Sources of mercury in the environment include: industrial processes, batteries, deodorants, nasal sprays and even some vaccines such as flu vaccine.

Can you be allergic to the mercury in amalgam? This is extremely rare. Only 46 cases have been reported throughout the world since 1905. If you are worried, ask your doctor to refer you to a specialist for tests to check if you are allergic. If so, your dentist can use another type of filling for you. Alternatives exist but some can be rather expensive.

Is it true that Sweden has banned amalgam? The Swedish Medical Research Council has confirmed the safety of dental amalgam fillings. Sweden has not "banned" amalgam but, because of concerns about a number of chemicals, including mercury, in the environment from a number of sources - not just fillings, they have recommended the phasing out of amalgam over the next few years, provided suitably alternatives can be used.

Should I have my dental amalgam fillings removed? Unless you are one of those rare individuals who is particularly sensitive to dental amalgam, you will not improve your dental health by having these fillings replaced. Australia's specialist doctors and Health authorities have warned the public that there is no justification for believing that this will cure a range of serious illnesses.

1999 STATEMENT

Italicised comments are by Robert Gammal

What are amalgam fillings made of?

Dental amalgam is an alloy of a number of metals, mainly silver, tin and mercury.

The set dental amalgam is not an alloy. It is a mixture of an alloy with mercury. The alloy is composed of silver, tin zinc and copper The alloy is powdered and then mixed in the dental surgery with an egual amount of mercury Mercury constitutes about 50% of set amalgam.

Is it true that mercury leaks out of fillings?
Advances in testing equipment over the past few years have enabled us to detect very small amounts of mercury released from fillings, especially when fillings are polished or removed.

Although small amounts of mercury are released from amalgam, it is misleading to suggest that this is only at times of polishing and removal of amalgam. Mercury is released all of the time. Mercury release is increased by increasing friction (eg chewing gum), temperature (hot food and drinks) and increased electrical currents (combining amalgam and other metals such as gold in the same mouth creates a battery) This increased elevation in the release of mercury after stimulation will remain for about 90 minutes.

The continued reliance on the use of the term "small amounts" implies no danger. This is quite deceptive a. the toxicity of the material determines the danger level' According to the US Govt. mercury is the third most toxic substance known to mankind after arsenic and lead. In fact all over the counter medicaments which contain far less than S0~ mercury have now been taken off the market by instruction from the US FDA.

It is also not mentioned that mercury although released in small amounts is in fact stored in the tissues and is cumulative neurotoxin. It is well known that one of the prime sites of storage is the brain.

Is this mercury harmful?
Medical research organisations including the American Food and Drug Administration, the Swedish Medical Research Council and our own National Health and Medical Research Council say that there is no scientific evidence that these tiny amounts of mercury released from dental fillings are a danger to health, apart from those rare cases where some individuals are unusually sensitive to this material. A number of overseas studies indicate there is no increased health risk or shortening of life between groups of people with amalgam fillings and those with none.

This statement is misleading and inaccurate:

1. The Australian National Health and Medical Research Council have since August 1997 withdrawn their policy statement on amalgam. They no longer state that it is safe or unsafe. They do not at present have a policy statement.

2. Again the reference to tiny amounts of mercury are deceptive as mentioned above.

3. Although these organisations may have said that there is no scientific evidence of danger to health all one need do is search Medline to find that mercury in any concentration is a danger to health. It is Neurotoxic, embryotoxic, mutagenic, and cytotoxic in minute amounts. Research is now available that minute amounts of mercury in the brain will cause neurofibrilar tangles which are identical to those found in the brains of Alzheimer's Disease patients.

4. The studies that the Australian Dental Association quote to demonstrate similar morbidity and mortality have in the past been dubbed as "statistically insignificant" by Prof Lars Frieberg, who at the time was the head of toxicology for the World Health Organisation.

5. The statement "rare cases where some individuals are unusually sensitive to this material" is again misleading and inaccurate. See below

Is it true that mercury is in our diet?
Yes. A normal balanced diet contains amount of mercury and we also come into contact with it in our environment and in a number of other products. Sources of mercury in the environment include: industrial processes, batteries, deodorants, nasal sprays and even some vaccines such as flu vaccine.

The Australian Dental Association 's statement is blatantly mischievous. This must surely be a poor advertisement for vaccination! Dental is the greatest source of mercury to the general population. In fact up to ten times greater than all other sources combined, including sea food. This was the conclusion of the World Health Organisation in 1991 (Criteria 118). They also stated that for mercury vapour; there is NO level at which it does not do harm!

Can you be allergic to the mercury in amalgam?
This is extremely rare. Only 46 cases have been reported throughout the world since 1905. If you are worried, ask your doctor to refer you to a specialist for tests to check if you are allergic. If so, your dentist can use another type of filling for you. Alternatives exist but some can be rather expensive.

In the past the Australian Dental Association have said that less than 1 % of the population are allergic to mercury. After being unable to produce a single scientific paper to support this claim, they are now saying that "those rare cases where some individuals are unusually sensitive to this material ". Unfortunately the scientific research does not agree. The latest research found that 13% of the population show true allergy to mercury and dental amalgam. Assuming that in Australia only half of the population have amalgam in their mouths, this equates to 700, 000 people who are sick as a direct influence of an allergic reaction to amalgam. This does not include other devastating effects on the immune system, nor effects on health which are independent of the immune system.

Is it true that Sweden has banned amalgam?
The Swedish Medical Research Council has confirmed the safety of dental amalgam fillings. Sweden has not "banned" amalgam but, because of concerns about a number of chemicals, including mercury, in the environment from a number of sources - not just fillings, they have recommended the phasing out of amalgam over the next few years, provided suitable alternatives can be used.

What Sweden did in fact was to remove the social security payments to dentists for any new amalgam fillings. This has effectively stopped the use of amalgam in that country.

Should I have my dental amalgam fillings removed? Unless you are one of those rare individuals who is particularly sensitive to dental amalgam, you will not improve your dental health by having these fillings replaced. Australia's specialist doctors and Health authorities have warned the public that there is no justification for believing that this will cure a range of serious illnesses.

There is now and was then ample evidence that the removal of amalgam fillings will allow for a reduction of the body burden of mercury to a level found in people who had never been exposed to amalgam

AUGUST 2001

What are amalgam fillings made of? Dental amalgam is an alloy of a number of metals, mainly silver, tin and mercury.

Is it true that mercury leaks out of fillings? Advances in testing equipment have enabled us to detect very small amounts of mercury released from fillings, especially when fillings are polished or removed.

Is this mercury harmful? Medical research organisations say that there is no scientific evidence that these tiny amounts of mercury released from dental fillings are a danger to health, apart from those rare cases where some individuals are unusually sensitive to this material. A number of overseas studies indicate there is no increased health risk or shortening of life between groups of people with amalgam fillings and those with none.

Is it true that mercury is in our diet? Yes. A normal balanced diet contains amounts of mercury and we also come into contact with it in our environment and in a number of other products. You get much more mercury from these sources than from your amalgam fillings.

Can you be allergic to the mercury in amalgam? This is extremely rare. Only 46 cases have been reported throughout the world since 1905. If you are worried, ask your doctor to refer you to a specialist for tests to check if you are allergic. If so, your dentist can use another type of filling for you. Alternatives exist but some can be rather expensive.

Is it true that some countries have banned amalgam? No. A few European parliaments have tried to phase it out, largely for environmental reasons, but their health authorities have not "banned" it. The World Health Organisation says that it is safe to use.

Should I have my dental amalgam fillings removed? Unless you are one of those rare individuals who is particularly sensitive to dental amalgam, you will not improve your dental health by having these fillings replaced. Australia's specialist doctors and Health authorities have warned the public that there is no justification for believing that this will cure a range of serious illnesses.

Are amalgam fillings dangerous for pregnant women? It is always sound practice to avoid any unnecessary dental treatment during pregnancy including any dental fillings. Your dentist may be able to put off your treatment to a more suitable time. If you already have amalgam fillings, there is no evidence that they can harm either you or your baby, if you are pregnant.

Should amalgams be used for children's teeth? Modern dentistry has largely eliminated amalgam as the treatment of choice for new fillings. The tooth--coloured materials usually used for children's fillings need much smaller cavities. Some health authorities have suggested that amalgam fillings should be avoided in favour of these newer fillings.

In August 1997
the National Health & Medical Research Council
withdrew their policy statement on1 the safety of amalgam.
Comment by Robert Gammal
This policy was writen wholy on one sheet of A4 paper and did not come from any larger document. No authors have ever been found! Only one reference was used to support this position. Unfortunately the position of the NH&MRC did not even reflect the position taken in the paper with which they referenced it. Action by Dr Roman Lohyn and Dr Robert Gammal forced the NH&MRC to create a new working party to re-evaluate the current research. At time of writing (Sept 2001 Australia still does not have an official policy regarding the danger or safety of amalgam from our leading health authority the NH&MRC!
This working party report was released in 1999.
It states clearly that "Dentists should acknowledge patient's autonomy and the exercising of informed consent for all dental treatment."

They also advised against the use of dental amalgam for pregnanat women, children and anyone with a kidney dysfunction.

Health Canada’s Recommendations Concerning the Use of Dental Amalgam - 1996

1. Non-mercury filling materials should be considered for restoring the primary teeth of children where the mechanical properties of the material are suitable.
2. Whenever possible, amalgam fillings should not be placed in or removed from the teeth of pregnant women.
3. Amalgam should not be placed in patients with impaired kidney function.
4. In placing and removing amalgam fillings, dentists should use techniques and equipment to minimize the exposure of the patient and; the dentist to mercury vapour, and to prevent amalgam waste from being flushed into municipal sewage systems.
5. Dentists should advise individuals who may have allergic hypersensitivity to mercury to avoid the use of amalgam. In patients who have developed hypersensitivity to amalgam, existing amalgam restorations should be replaced with another material where this is recommended by a physician.
6. New amalgam fillings should not be placed in contact with existing metal devices in the mouth, such as braces.
7. Dentists should provide their patients with sufficient information to make an informed choice regarding the material used to fill their teeth, including information on the risks and benefits of the material and suitable alternatives.
8. Dentists should acknowledge the patient's right to decline treatment with any dental material

This is a letter from Canada Health to the Canadian Dental Association instructing them to remove inaccurate and misleading comments from their statements about dental amalgam. The Canadian Dental Association made similar claims as the Australian Dental Association
February 27, 1996

In November 1995 the Canadian Dental Association circulated to its members a position statement on dental amalgam and a set of questions and answers on amalgam to be used by dentists in responding to inquiries from patients. At our recent amalgam meeting in Toronto, I mentioned some inaccuracies in that policy and you invited our comments. This letter is to provide you with comments on the policy statement and the Questions and Answers.

Firstly the use of the term "silver dental amalgam" may be misleading to lay readers It is technically correct that the word "amalgam" by definition means an alloy of metals with mercury, and therefore "silver amalgams" means an alloy of silver with mercury, however, many patients may not know this and may assume that the filling material is mostly silver. This is not true, since current dental amalgam contains no more than about 35% silver. Mercury is the principal ingredient, and so it might be more accurate to leave the word "silver" out of the title.

COMMENTS ON THE QUESTIONS AND ANSWERS

Q. Who is responsible for the safety of medical devices and dental materials?
A. In Canada, medical devices and materials require approval of the Health Protection Branch of Health Canada.

Not all devices and materials require approval by the Health Protection Branch. Only those listed in the table to Part V of the Medical Devices Regulations must obtain "approval" (more precisely a Notice of Compliance) before they may be sold. Dental filling materials are specifically exempted from this requirement.

Q. Is dental amalgam approved for use in Canada?
A. Yes, dental amalgam is approved for use in Canada by Health Protection Branch.
This statement is categorically false. Dental amalgam has never undergone pre-market review in Canada because it v in use before the Medical Devices Regulations were established. The CDA previously published this misinformation in a paper in the CDA Journal in May 1995. At that time, we informed the CDA of this error, but CDA has repeated it here.

Scientific literature on the topic, as a whole, supports the position that amounts released are generally less than mercury picked up from natural sources.

This may be a misleading over-simplification. The World Health Organization states that dental amalgam is the larges single source of mercury exposure for persons not occupationally exposed (reference World Health Organization. 1991. Inorganic Mercury. Environmental Health Criteria 1 18. International Program on Chemical Safety. (Geneva)) In some individuals the mercury exposure from amalgam may be as great as from all natural sources combined.

Q. Is the mercury which is released from fillings absorbed into the body?
A. Yes, but in extremely small amounts, i.e. in MILLIONTHS of a gram (this is very small amount, 0.000001 grams.)

This answer is rather condescending and insulting to the intelligence of readers. By emphasizing only how small a microgram is it implies that a microgram of toxic material could not be harmful. What is significant is not now many zeroes there are in a microgram, but how many micrograms of mercury are released by and compared to the number of micrograms required to cause illness. The fact is that a Level of only one hundred millionths of a gram (only 0.000 gm) of mercury per gram of Creatinine in urine is considered to indicate clinical mercury poisoning.

Some researchers claim to detect higher mercury in the blood of people with amalgams than in those without amalgams but other researchers could not detect mercury in the blood of patients even with new amalgam restorations.

Although I am not familiar with studies that could not detect mercury in the blood of patients even with new amalgam restorations, there are several reliable s tidies (one of them by Dr. Anders Berglund),which show higher levels of mercury in blood and urine of people with amalgam fillings than in these without There are also studies which show a strong correlation between the number of amalgam surfaces and mercury levels in the brain and kidney. These studies are discussed in the 1993 US Department of Health and Human Services report "Dental

Amalgam; A Scientific Review and Recommended Public Service Health Strategy for Research, Regulation and Education", Appendix 3, pp 10-15

Q. Is the dental profession suppressing information on the dangers of amalgams?

A. No, the dental profession believes in informed patient consent and recognises the patient interest above any other considerations.

You are in a better position than we are to determine the degree to which this statement is correct. The CDA policy states that "Dentists want patients to be aware of conclusions from the range of scientific studies on dental amalgam s that the appropriate choice can be made:' This statement is difficult to reconcile with the CDA's sweeping dismissal o research such as that discussed above, linking mercury levels with the number of amalgam fillings.

Thank you for providing us with the opportunity to comment on the CDA policy on dental amalgam, and the Question and Answers. I hope that the comments are helpful to you in revising these documents to present more accurate information on this subject.

Yours sincerely,
Richard S. Tobin, Ph.D
Director

THIS IS A VERBATIM TRANSCRIPTION OF A'FAX OF A FAX' AND WAS DONE TO ENHANCE READABILITY. THE ORIGINAL COPY IS AVAILABLE ON REQUEST

Amalgam Removal Does Lower Mercury Levels

The Australian and other dental associations in the world have consistently claimed that removing amalgam for the sake of health improvements is unethical as there is no relationship between mercury from dental amalgam and disease. They still hold this position. Much of their claims of late are based on a report called "Potential Biological Consequences of Mercury Released from Dental Amalgam. A State of the Art Document. [MFR-panel (Swedish Medical Research Council)]A State of the Art Conference in Stockholm 9-10 April 1992.

They make the following conclusions which are responded to by one of the leaders of the International Academy of Oral Medicine and Toxicology. Note Prof Vimy's credentials.

"- Mercury released from dental amalgam does not, according to available data, contribute to systemic disease or systemic toxicological effects.

- No significant effects on the immune system have been demonstrated with the amounts of mercury which may be released from dental amalgam fillings.

- Allergic reactions to mercury from amalgam have been demonstrated, but are extremely rare.

- In very few individuals local reactions such as lichenoid reactions of the mucosa, may occur adjacent to amalgam restorations as well as adjacent to dental restorations made of other materials.

- There are no data supporting that mercury released from dental amalgam give rise to teratological effects.

- The possible environmental consequences of mercury from handling dental amalgam can be controlled by proper waste management, including the installation of efficient amalgam separators in dental offices.

- Available data do not justify discontinuing the use of silver-containing dental amalgam fillings or recommending their replacement”

In the panel: Bergman B (chairman), Boström H, Larsson K S, Löe H

Response to the above
December 15, 1992

An open letter to Sekreterare Tore Schersten Medicinska Forskningsradet Swedish Medical Research Council Box 6713 5-113 85 Stockholm, Sweden

Re: Potential Biological Consequences of Mercury Released from Dental Amalgam. A Swedish state of the Art Conference, April 9, 1992.

Dear Secretary Scherstén:

By now you must have felt the pressure of a number of groups who have criticized your "conference". In fairness to you, it is apparent that trust was misplaced in an organizing committee, which had no intention of convening an objective academic scientific forum. Rather, these individuals had a predetermined agenda, as demonstrated by their public positions on the issue of amalgam safety taken on many occasions prior to this meeting.

Drs. Larsson, Loe and Bergman are all on the record as defenders of the staW s qll0. Dr. Bergman's objectivity is tainted by his wife's involvement in the issue; while Dr. Larsson is on the record as a strong supporter of amalgam. Indeed it was incredible to see this person act as both presenter and "judge", especially since he has no scientific experimental track record of his own to demonstrate his expertise in this area. Finally, Dr. Löe, politically, administratively and economically affiliated with the American dental establishment, is apparently more concerned with preventing litigation in the U.S.A. than he is with determining scientific truth. His opening biased remarks made it obvious why he was chosen as V moderator. Dr. Bostrom was red herring - a physician "yes"-man with absolutely no research expertise in this area.

The conference presenters showed a general lack of expertise. Most have poor research records and many had not published research papers on either mercury or dental amalgam. This is easily determined by reviewing the

bibliographies to their written presentations. They have few if any research papers of their own to cite! The penultimate example was Dr. Petr Skrabanek, a self anointed "quack catcher". This individual, who has no scientific expertise of amalgam, is one of a growing group of self appointed watch-dog "experts". In North America, we have an organization called the National Council Against Health Fraud which purports to be expert in everything. Dr. Skrabanek's mere presence at the meeting totally discredited the scientific purpose of the conference. Sweden, a country of many noted scientists, was better represented by the quality of the expertise in the audience than by the quality of many conference speakers.

Finally, I understand that my invitation to present a paper at this conference was extended reluctantly by the organizing committee, and only after political pressure for a more balanced meeting. If you review the list of speakers chosen it will be obvious that the intention of the organizers was to "white wash" the conclusions. The conclusions of the conference were drawn by the organizing committee and do not represent a consensus view of all the participants or the audience. Since the results were apparently preordained, as I have just described, they are not credible.

I have enclosed for your information a reprint of a recen medical scientific forum on the same issue (Goering et. al., 1992). As you can see, there is now international scientific concurrence on a number of points related to the amalgam mercury issue and its potential effects on human health; a concurrence which is in marked contras to the "massaged" conclusions of the Swedish Medical Research Council's biased organizing comnmittee.

Respectfully yours,
signed

Murray J. Vimy BA, DMD, FAGD, FIAOMT Clinical Associate Professor Deparhnent of Medicine (also Private Practice of Dental Medicine) The University of Calgary Health Sciences Centre 3330 Hospital Drive N.W., Calgary Alberta, Canada T2N 4N1 Faculty of Medicine Deparnnent of Medical Physiology Fax (403) 283-4740 Telephone (403) 220-6892

Australian Risk Assessment of Mercury Exposure from Dental Amalgam Published August 2000

Prepared by Chem Affairs Pty Ltd
PO Box 890
Lane Cove NSW 1595

Published August 2000

This risk assessment was commissioned by the National Health & Medical Research Council of Australia, as part of a series of recommendations put forward by a working party which was set up in 1998 to assess the literature about the dangers of mercury from dental amalgam. NH&MRC have not yet endorsed this document. Although most of the report claims safety for amalgam on the bases of a supposed "Normal Mercury Level" in the body it is important to know that therehas never been a level of mercury exposure which is considered safe. The Normal levels suggested in this report are far above the levels set by both the USEPA and the ATSDR.

In point 8 of the Executive Summary the following is stated:

"Amalgam removal has been shown to be effective in reducing mercury levels to the levels of those in people without amalgam fillings. Chelation treatment has reduced levels in the short-term ..... In one case report, amalgam removal has reduced a very high urine mercury level to a normal level. This change was accompanied by a decline in symptoms.....'

A case of high mercury exposure from dental amalgam.
Langworth S & Stromberg R.Eur J Oral Sci 104:320-3 (1996)
ABSTRACT: "This report describes a patient who suffered from several complaints, which by herself were attributed to her amalgam fillings. Analysis of mercury in plasma and urine showed unexpectedly high concentrations, 63 and 223nmo111, respectively. Follow removal of the amalgam fillings, the urinary excretion of mercury became gradually normalized and her symptoms declined."

Mercury in saliva and feces after removal of amalgam fillings. Bjorkman L, Sandborgh-England G, Ekstrand J.Toxicol Appl Pharmacol 144(1):156-162 (1997)

ABSTRACT: "The toxicological consequence of exposure to mercury (Hg) from dental amalgam fillings is a matter of debate in several countries. The purpose of this study was to obtain data on Hg concentrations in saliva and feces before and after removal of dental amalgam fillings. In addition Hg concentrations in urine blood, and plasma were determined. Ten subjects had al amalgam fillings removed at one dental session. Before removal, the median Hg concentration in feces was more than 10 times higher than in samples from an amalgam free reference group consisting of 10 individuals (2.7 vs 0.23 mumol Hg/lkg dry weight, $p < 0.001$). A considerable increase of the Hg concentration in feces 2 days after amalgam removal (median 280 mumol Hg/kg dry weight was followed by a significant decrease. Sixty days after removal the median Hg concentration was still slightly higher than in samples from the reference group. In plasma, the median Hg concentration was 4 nmol/liter at baseline. Two days after removal the median Hg concentration in plasma was increased to 5 nmol/liter and declined subsequently to 1.3 nmol/liter by Day 60. In saliva, there was an exponential decline in the Hg concentration during the first 2 weeks after amalgam removal ($t 1/2 = 1.8$ days). It was concluded that amalgam fillings are a significant source of Hg in saliva and feces. Hg levels in all media decrease considerably after amalgam removal. The uptake of amalgam mercury in the GI tract in conjunction with removal of amalgam fillings seems to be low." http://www.algonet.se/~leil yfbjo97a.html

There are many studies which demonstrate that mercury from amalgam is stored in the tissues of the body and that removing the amalgam will allow a dramatic reduction in the body burden of mercury. A small selection of the references follow and you will note that some of these papers are actually published in the journals of the organisations which deny them.

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Engelman M A J Amer Dent Assoc 66:122-123 (1963)
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1996 Dec 23:12 890-2
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Scientific Facts about Mercury & Dental Amalgam

What really is that `Silver` filling?
Dental amalgam is an alloy of silver, tin, zinc and copper, which is combined with an equal amount of elemental mercury. The `Silver Fillings' in your mouth are about 50% mercury.
As there is a continuous release of mercury from dental amalgam, dentists must dispose of scrap amalgam as toxic waste following strict guidelines. It is illegal to put it in the garbage, the sewer or the drain. In fact it seems that the only legal place to keep this material is in the mouth of a living person! (It is estimated that 1 lkg mercury per year is released from each crematorium chimney!) 1 ,2 ,3

How Much Mercury is Too Much?
Mercury escapes from amalgam in the forms of mercury vapour, elemental mercury and mercury ions. The rate of release of mercury is increased by an increase in temperature, friction and electrical currents. Elevated levels remain for about 90 minutes after such stimulation.4
The dental authorities claim that only a minute amount of mercury is released from amalgam fillings and although this is true, it is worth remembering that mercury is a cumulative poison. It stays in your body and the levels are topped up continuously. This type of poisoning is called micromercurialism. The earliest symptoms are usually sub-clinical and neurological, namely fatigue, headaches, forgetfulness, reduced short term memory, poor concentration, shyness and timidity, confusion, rapid mood swings, unprovoked anger, depression and suicidal tendencies.5,6,7
A variety of scientific studies8 ,9 ,10 ,11 ,12 ,13 ,14 indicates that 20mcg/m3 to 1 SOmcg/m3 of mercury vapour may be found in the mouth of a person with amalgam fillings. 1 mcg of mercury vapour is 5 times greater than the level quoted by the United States Environmental Protection Agency (USEPA) as safe.l5 It is 50 times greater than the level regarded as an acute exposure by the Agency for Toxic Substances and Disease Registry (ATSDR) in the USA.16 The ATSDR lists mercury as one of the top 20 most hazardous substances known to man!

There is NO know safe level of mercury vapour.

World Health Organization stated in 1991 that for mercury vapour, there is no known "no-observable-effect level (NOEL)".17 In other words all levels of mercury vapour are harmful. The WHO also demonstrated that dental amalgam is the single greatest source of mercury to the general population - up to 10 times more than from all other sources combined.

Latex paints, which contained mercury, had to be taken off the market after releasing only 2-3mcg/m3

The Richardson Report, a study completed for Health Canada in 1995, found that the tolerable daily intake of mercury was exceeded in different age groups with the following number of amalgam fillings: adults - 4, teenagers - 3, children and toddlers - 1.18

Retention of mercury in the body is estimated to be lmcg/ filling/day.l 1, 12 Up to 80% of inhaled mercury vapour is absorbed through the lungs 19 ,13 A percentage of mercury vapour adheres to the lining of the nose and mouth and is transported directly into the brain.6

Mercury from amalgam easily crosses the blood brain barrier and can damage any part of the central nervous system. 6, Some mercury is also transported along nerve fibres (retrograde axonal transport) back to the brain. 20 ,21 ,22 ,23 ,24 Mercury from amalgam has been found all the way down the spinal cord. 6 The levels of mercury in the brain are directly proportional to the number of fillings in the mouth.8~10,12 Minute amounts of mercury in the brain will cause the same type of damage as is found in the brains of patients with Alzheimer's Disease. 25 Low levels of mercury in the brain will severely disturb cellular function and reduce the growth of nerve fibres. 6

Dentists regularly implant amalgam fillings directly into the bone in the form of retrograde root fillings (a filling placed at the end of the root). Mercury can pass readily from such an implant into the brain. Would any other branch of medicine condone such an absurd practice? **One amalgam manufacturer, Caulk, states that amalgam is contraindicated for use as a retrograde filling, yet the Australian dental authorities teach and condone this practice!26**

Mercury from amalgam may be found in all cells of the body (highest concentrations are usually in the kidney, liver and brain).

There will also be a very high concentration of mercury in the jaw bones and the soft tissue lining the mouth. Blood and urine sampling are poor ways of estimating body burdens of mercury as most of the mercury is retained in the cells of the body (known as Retention Toxicity). DMPS is a chelating agent, which will remove some mercury from cells and bind it in such a way that it can be excreted. Changes in urine mercury levels can then be measured.27 ,28

Mercury from amalgam does not cause a specific disease- it causes mercury poisoning which, is characterized by a wide range of symptoms. Many organs and functions of the body may be affected.

The following are some basic facts from the published research:

• Mercury from amalgam fillings has been shown to cause a 50% reduction in kidney filtration after just two months in the mouth (animal studies) 29 Kidney damage from mercury has been reported often in the literature. 30 ,31 ,32 ,33 ,34
• The most common symptoms of long-term low-level mercury poisoning are headaches and psycho-emotional disturbances. Muscle twitches and body shakes are later symptoms and thus more severe.
• Research from 1993 onwards has shown that mercury from amalgam fillings will cause an increase in the number of antibiotic resistant bacteria in the gut and mouth. 35, 36, 37 The number of antibiotic resistant bacteria fall rapidly after the amalgams are removed.
• Mercury from amalgams can cause a weakening in the wall of the small blood vessels (micro-angiopathies) -this results in a reduction of blood supply to the tissues resulting in reduced function and/or cell death.6
• Heart function may be affected by mercury and electrical currents from amalgam.38 > 39
• Some reports 40 > 14 suggest that elevated cholesterol levels are related to mercury in the body. It has been noted that cholesterol levels drop after removal of amalgam fillings.
• Although the dental associations claim that less than 1% of the population show true allergy to amalgam, the latest research4l indicates that the real figure is closer to 13%. Assuming that only half the population in Australia has

amalgam fillings, this would mean that over 1,700,000 people might be sick due to an allergic reaction to these fillings. Since the medical profession as a whole do not acknowledge the dangers of amalgam, it is most likely that the majority of these people are misdiagnosed and therefore mistreated.

• True allergy is only one type of immune reaetion.42
• Mercury will always have a detrimental effect on the immune system. This creates an environment in the body for other diseases to develop. 43 ,44 , 45 ,46 ,47 ,48 ,49 ,50
• Mercury binds to proteins, and thus makes them look like foreign material to the cells of the immune system. 50,51 , Avert auto-immune diseases may then ensue.
• There are literally hundreds of peer reviewed scientific papers discussing the damaging effects that mercury has on the immune system.50
• Mercury from amalgam may cause an increase in allergies, skin rashes and itching. 52 ,53
• Mercury will bind strongly to selenium, a t element needed for a wide variety of enzyme functions. Latest research indicates a direct relationship beta R reduced blood selenium levels and an increase in rate of some types of cancer. 54 ,55 ,56 ,57 ,58 ,59
• Many studies indicate that selenium supplementation will help to protect from the damaging effect! mercury.60 ,61 ,62 ,63
• Mercury binds to haemoglobin in the blood reduces its capacity to transport oxygen40 This may be one of the causes of chronic fatigue.
• Mercury at levels as low as 1 part / ten million destroy the walls of red blood cells.64 ,65 ,43

In May 1998 the British Government recommends t that dentists not place or remove amalgam in pregnant women.

• Mercury from amalgam fillings will cross the placenta and concentrate in the foetus
66 ,67 ,68 ,69 ,70 ,71 ,72 ,73 ,74 ,75 ,76
• Mercury from amalgam can also be transported via the breast milk and concentrate in the body of the feeding infant.
• Breast milk increases the bioavailability of mercur to the infant.77 >78
• Prenatal exposure to mercury may cause developmental defects and may cause permanent neurological darn in the unborn child.69>70

• Tissue levels of mercury in the foetus, new-born and infant are directly proportional to the number amalgam fillings in the mother's mouth.79
• Mercury is mutagenic - it can cause single strand breaks in DNA..80 ,81 ,82 ,83 ,84
• Female dental personnel exposed to mercury, exhibit twice the rate of miscarriage, infertility and still births as compared to the rest of the population. 58,59,12

If you are pregnant, never allow amalgam fillings to be placed in your mouth.
Do not go into a dental surgery where amalgam is used, as the mercury vapour levels in the air may t harmful to the foetus.l6

Electric currents, generated by the interaction different metals in the mouth, can be measured in micro-amps. The central nervous system operates the range of nano-amps. This is about 1,000 times 1 than the currents generated in the mouth. This is in same order of magnitude as that induced in a per: standing under high-tension power cables.85 ,86 ,8
• Electrical currents, formed by placing gold into mouth with amalgam fillings, will create an increase in electrical currents in the fillings, resulting in increase in mercury released from all of the fillings
• Placing a gold crown over an amalgam filling may cause a four-fold increase in the amount of mercury being driven through the tooth.62, 44 Gold crowns, on top of amalgam, create a permanent galvanic cell. Amalgam is still the most commonly used material to build a core for a crown. This practice is contra-indicated by the manufacturers Caulk and Ivoclar.
• Dental fillings are an implant of materials into living tissues. Neither the United States Food and Drug Administration nor the Australian Therapeutic Goods Administration have approved mixed dental amalgam as an implant material.
• Although the dental authorities make claims about amalgam safety, they have not presented one scientific paper which indicates that this material is toxicologically safe.
• In dental surgeries where amalgam is used, the mercury vapour levels may be so high as to be hazardous to health. Dental associations have said that if mercury from amalgam is so dangerous for the patient, then why is it that the dentists, who are exposed to far greater levels of mercury,

are not sick? This claim is not substantiated by the scientific literature. In fact, dental personnel show a range of medical effects different from the rest of the population.
Twice the rate of glioblastomas than the rest of the population. 90
Reduced IQ levels have been demonstrated 91 ,92 ,93
Psycho-motor and psycho-emotional studies of dentists, demonstrate a severe drop in scores compared to the rest of the population. 94
Twice the rate of suicide of any professional group.
20% of Canadian dentists are on pernianent disability for psychological reasons 9 Detoxification and Amalgam Removal
Clinical experience has demonstrated that people affected by mercury from dental amalgams will often enhance the benefits of amalgam removal if removal is combined with a detoxification routine prior to, during and after the amalgam removal.

Removal of amalgam fillings has been shown to substantially lower the body burden of mercury.88,89 Protocols do exist for the safer removal of dental amalgam from your mouth. Failure to follow these guidelines may result in exposure to an unacceptable level of mercury. Removing old amalgam fillings must be performed with extreme care.

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Written for ASOMAT by Dr Robert Grammal The Australasian Society of Oral Medicine
And Toxicology was formed by a group of dedicated, dentists and doctors with the aim of educating the public and the profession about the Concepts of bio-cornpatible dentistry. ASOMAT is a non-profit organization

Manufacturer's Contraindications to the use of amalgam

A new age is dawning! Below is an abstract from the Internet home page of Caulk Company, the manufacturer of on of the most popular dental amalgams on the market. **We now have the ludicrous situation where the Australian Dental Association claims that there is no evidence of harm from amalgams and the manufacturer states that there are clear contraindications to its use..** They go on to list most of the symptoms caused by mercury poisoning from amalgam!

The information was taken off the website soon after it was placed there. hripa/www.caulk.com./ MSDSDFU/DispersalloyMSDS.html

Contraindication

The use of amalgam is contraindicated;

1. In proximal or occlusal contact to dissimilar metal restorations.
2. In patients with severe renal deficiency.
3. In patients with known allergies to amalgam.
4. For retrograde or endodontic filling.
5. As a filling material for cast crown.
6. In children 6 and under.
7. In expectant mothers.

Precautions

The number of amalgam restorations for one patient should be kept to a minimum.
Inhalation of mercury vapor by dental staff may be avoided by proper handling of the amalgam, the use of masks, along with adequate ventilation.
Avoid contact with skin and wear safety glasses and gloves.
Store amalgam scrap in well sealed containers. Regulations for disposal must be observed.
Health affects and first aid
Inhalation: Acute: Inhalation of a high concentration of mercury vapor can cause almost immediate dyspnea, cough, fever, nausea and vomiting, diarrhea, stomatitis, salivation, metallic taste, gingivitis, and cardiac abnormalities. Respiratory irritation may occur with chest pain and tightness. Symptoms may re solve or may progress

to necrotizing bronchiolitis, pneumonitis, pulmonary edema, pneumothorax, interstitial fibrosis, and death. Acidosis and renal damage may also occur. Allergic reactions that may occur in previously exposed persons include dermatitis, encephalitis, and death. Metal fume fever, an influenza-like illness, may occur due to the inhalation of freshly formed metal oxide particles sized below 1.5 microns and usually between 0.02-0.05 microns. Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic
or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse s~~eating, excessive urination, diarrhea and prostration may also occur. Tolerance to fumes develops rapidly,
but is quickly lost. All symptoms usually subside within 24-36 hours.

Inhalation: Chronic: Inhalation of mercury vapor over a long period may cause mercurialism which is characterized by fine tremors and erethism. Tremors may affect the hands first, but may also become evident in the face, arms, and legs. Erethism may
be manifested by abnormal shyness, blushing, self-con-sciousness, depression or despondency resentment of criticism, irritability or excitability, headache, fatigue, and insomnia. In severe cases, hallucinations, loss of memory, and mental deterioration may occur. Concentrations as low and 0.03 mg/m3 have induced psychiatric symptoms in humans. Renal involvement may be indicated by proteinuria, albuminuria, enzymuria, and anuria. Other effects may include salivation, gingivitis, stomatitis, loosening of the teeth, blue lines on the gums, diarrhea, chronic pneumonitis and mild anemia. Repeated exposure to mercury and its compounds may result in sensitization. Intrauterine exposure may result in tremors and involuntary movements in the infants. Mercury is excreted in breast milk. Paternal reproductive effects and effects on fertility have been reported in male rats following repeated inhalation exposures.

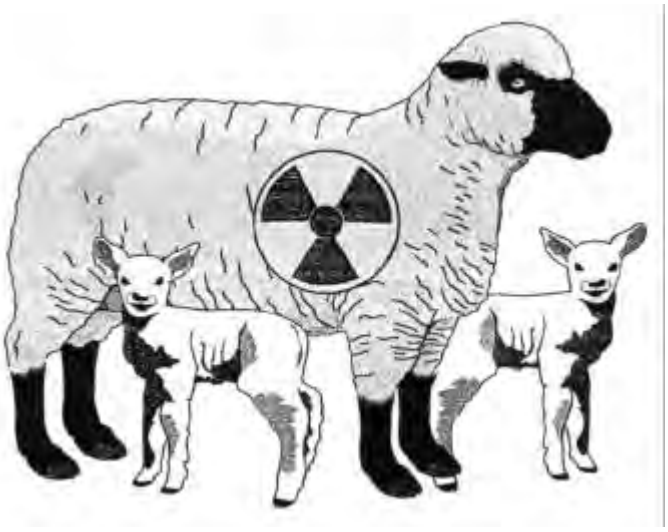
First Aid: Remove from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Maintain airway and blood pressure and

administer oxygen if available. Keep affected person warm and at rest. Treat symptomatically and supportively. Administration of oxygen should be performed by qualified personnel. Get medical attention immediately.
Skin contact: Acute : Direct contact with liquid may cause irritation and redness. Small amounts of mercury may be absorbed through intact skin. Allergic reactions that may occur in previously exposed persons include dermatitis, encephalitis, and death. Subcutaneous introcuction, from handling broken thermometers, may result in local inflammation, granulomatous skin reactions, and slight signs of mercury poisoning including digestive disorders, metallic taste in the mouth, and neuropsychic disorders.
Skin contact: Chronic: prolonged or repeated exposure may result in dermal sensitization and systemic effects as detailed in chronic inhalation exposure. Skin contact: First aid: Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (approximately 15-20 minutes). Get medical attention immediately.
Eye contact: Acute: Direct contact with liquid may cause irritation and redness. Animal studies indicate diffusion and
absorption of mercury into the tissues of the eye may occur. No clinical signs of conjunctivitis or inflammation occurred.
Eye contact: Chronic: Mercury exposure from inhalation ingestion, or skin contact may be indicated by mercurialentis, discoloration of the crystalline lens, on slit lamp examination of the eye. First aid: wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains (approximately 15-20 minutes). Get medical attention immediately.
Ingestion: May cause burning of the mouth and throat, thirst, nausea and vomiting. Metallic mercury is not usually absorbed sufficiently from the gastrointestinal tract to induce an acute toxic response. Rarely, a large single dose may result in sign and symptoms of chronic inhalation is sufficient amount of mercury are retained in the body.
Chronic: Repeated ingestion of small amount of mercury may result in the absorption of sufficient amounts to produce toxic effects as detailed in chronic inhalation exposure. First Aid: Remove by gastric lavage or emesis. Maintain

blood pressure and airway. Give oxygen if respiration is depressed. Do not perform gastric lavage or emesis if victim is unconscious. Get medical attention immediately (Dreisbach, Handbook of Poisoning, 11 th ed.). Administration of gastric lavage or oxygen should be performed by qualified medical personnel.

Antidote: The following antidote had been recommended. However, the decision as to whether
the severity of poisoning requires administration of any antidote and actual do required should be made by qualified medical personnel. Mercury poisoning: Give dimercaprol, 3mg/kg (or 0,3ml/10 kg) every 4 hours for the first 2 days and then 2mg/kg every 12 hours for a total of 10 days if necessary. Dimercaprol is available as a 10% solution in oil for intra muscular administration. Hemodialysis will speed the removal of the mercury-dimercaprol complex. Penicallamine is also effective. Give up to 100 mg/kg/day (maximum 1 gr/day) divided into 4 doses for no longer than 1 week. If a longer administration period is warranted, dosage should not exceed 40/mg/kg/day. Give the drug orally half an hour before meals. A chelating agent should be continued until the urine-mercury level falls below SOpg/24 hours (Dreisbach, Handbook of Poisoning 12th ed.).

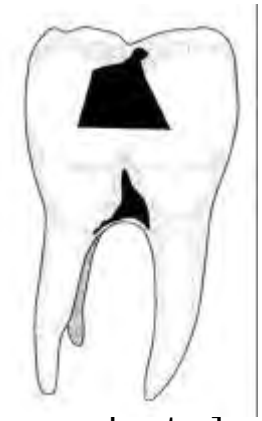
Incompatibility with Acetylene, acetylinic compounds, aluminum, amines, ammonia+moisture, boron diiodphosphide, bromine, 3-bromopropyne, calcium, chlorine, chlorine dioxide, copper and alloys, ethylene oxide + traces of acetylene, lithium, methyl azide, methylsilane + oxygen, nitric acid + alcohols, oxalic acid, oxidants, peroxyformic acid, rubidium, silver perchlorate + 3-hexyne, silver perchlorate + 2-pentyne, sodium, sodium carbide, sulphuric acid (hot) tetracarbonylnickel+ oxygen.



NEW RESEARCH CONNECTS MERCURY TO ALZHEIMER'S DISEASE!

Research conducted at the University of Calgary Faculty of Medicine has demonstrated that trace amounts of mercury can cause the type of damage to nerves that is characteristic of the damage found in Alzheimer's Disease. The level of mercury exposure is consistent with those levels found in humans with mercury/silver amalgam dental fillings. The exposure to mercury caused the formation of "neurofibrillar tangles," which are one of the two diagnostic markers for Alzheimer's Disease. The scientists found that other metals, including aluminum, did not cause the damage. Previous research has shown that mercury can cause the formation of the other Alzheimer's Disease diagnostic marker, "amyloid plaques."
The research, published in a peer-reviewed medical journal, is accompanied by a video visual presentation of the effect. Utilizing digital time-lapse photography, this video shows rapid damage to the nerve cells after introduction of minute amounts of mercury. Funding for this video was provided by the International Academy of Oral Medicine and Toxicology (IAOMT).

Title: "Retrograde Degeneration of Neurite Membrane Structural Integrity
of Nerve Growth Cones Following In Vitro Exposure To mercury."
Authors: Leong, CW; Syed, NI; Lorscheider, FL
Journal: NeuroReport, 12(4):733-737, 2001.



BIOPROBE COMMENT: This study should remove all doubt regarding the role that dental mercury from amalgam
fillings ` plays in the development of Alzheimer's Disease (AD). Although the American Dental Association would like to have
you believe otherwise, science has clearly demonstrated that there is a positive correlation between brain mercury levels and the number and surfaces of "mercury/silver" amalgam dental fillings The mercury levels that caused the devastating damage to nerve cells in the above referenced study were 100 to 1000 times below those found in the brains of peo-ple with "mercury/silver" amalgam dental
fillings.

In 1997, researchers at the University of Calgary Medical School and the College of Pharmacy at the University of Kentucky clearly demonstrated that exposing rats to the same levels of mercury vapor that can be released from "mercury/silver" amalgam dental fillings caused the mercury to interact with brain tubulin and disassemble microtubles that maintain neurite structure. The identical neurochemical lesion of similar or greater magnitude is evident in Alzheimer brain homogenates from approximately 80% of patients, when compared to human age-matched neurological controls. (Neurotoxicology 1997;18(2):315-324)

In 2000, researchers at the Neurobiology Laboratory, Psychiatric University Hospital in Basel, Switzerland using neuroblastoma cells exposed to mercury demonstrated an increase in production of amyloid protein that makes up the amyloid plaques as well as significantly increasing the phosphorylation of Tau protein. (J Neurochem 2000 Jan;74(1):231- 236)

Studies demonstrating a correlation between amalgam dental fillings and brain mercury levels

1. Lakartidningen 1986 Feb 12;83(7):519-522
2. Swedish Dental Journal 1987;11(5):179-187
3. Sci Total Environ 1987 Oct;66:263-268
4. J Prosthet Dent 1987 Dec:58(6):704-707
5. FASEB J 1989 Dec;3(14):2651-2646
6. Sci Total Environ 1990 Dec 1;99(1-2):1-22
7. Sci Total Environ 1993 Sep 30;138(1-3):101-115
8. J Trace Elem Med Biol 1995 Jul;9(2):82-87
9. Zentralbl Hyg U:mweltmed 1996 Feb;198(3):275-291
10. FASEB J 1998 Aug;12(11):971-980
11. Biometals 1999 Sep;12(3):227-231 This is the Editorial, which accompanied the publication of this study.

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IN FOCUS NEURO REPORT 0959-4965
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Mercury induced growth cone collapse:

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Cases where exposure to heavy metals in the domestic and work environment have contributed to human disease extend back to antiquity with the use of lead in water pipes and wine storage vessels. It has been proposed that pandemic lead poisoning, resulting in mental incompetence and declining birth rate, especially amongst the ruling class, contributed to the fall of Rome [1] (see [2] for another view). More recent lead poisoning in the general population has arisen from lead-based paints and lead- additives in petrol. A well-documented case of occupational poisoning arose in workers of the 19th century felt hat industry due to the use of mercury as a stiffener of rabbit fur. Increased irritability, mood swings, tremulous- ness, ataxia and impairment in intellectual capacity characterize Mad Hatter's disease [3]. Currently there is ongoing public health debate on whether low level chronic exposure to mercury due to dental repair work results in subclinical behavioral changes associated with CNS damage (see [4] for review). For example, in the USA the most common material used in dental fillings is a mercury/silver mixture (amalgam) in which an estimated 70 000 kg is used in 100 million fillings/year. Furthermore, evidence indicates that mercury vapor is continuously released from tooth fillings where it is breathed in by the lungs and converted into mercuric ions. Although there is no debate on the toxic effects of high concentrations of mercury (i.e. associated with urinary concentrations .50 mg/1), a challenge exists to demonstrate more subtle, preclinical effects associated with chronic low level mercury exposure in the general population with fillings. At least consistent with this notion is the study published in this issue [5] showing that exposure to mercury concentrations of 0.1 uM results in rapid (i.e. within 10 min) retraction of growth cones in snail neurons and is correlated with disruption of microtubules. Interestingly, the authors point out that similar disruption of microtubules is associated with Alzheimer's disease. These recent findings give added impetus for the development and implementation of alternative materials for fillings and may provide parents with added ammunition in teaching their children to floss.

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Mercury Affects the BLood

Dr Walter J Clifford MS, RM(AAM), BLD, FIAOMT Proceedings of the First World Con-gress on Cancer Sydney 1994

One of the areas that is always of extreme interest is that of mercury. There is good reason to have concern. Cells challenged with mercury show the marked and defined changes that even 1 part per 10 million in Locke's solution can have on red blood cells. The changes in the thick-ness of the membranes, changes in the metabolism rate, shifts in color, aniso and poikilocytosis, the dramatic drop in somatids in the black spaces, is of extreme interest. We find that mercury is one of the most directly toxic of all the materials.

Microbiology of Challenged Blood

When mercury has been added to the cells and they have incubated for about 30 minutes, it is not unusual to see both accelerated and unusual changes taking place in the microbiology. We see rods, and we see circular bodies that have developed appendages and are rapidly developing towards pleomorphic mycelial forms of bacteria. These changes are exacerbated by mercury, and can be forced to occur in even the most healthy of individuals.

In red blood cells, we see the formation of intracellular bacterial forms. Large circular bodies inside the red cells correspond to the yeast forms described by Naessens. When we watch the progress of these bodies, we see that they will seemingly connect and form a mycelial mat. This is a function that is exacerbated by mercury. It can also be induced by beryllium and tin. It is often found in cancer patients, and we have also seen it in certain arthritic patients.

Normally, it takes several hours for this to happen. But when mercury has been added to the specimen, we can accelerate the development of the microbiology so that these phenomena can be seen in perhaps 20 to 30 min-utes. We see the structure enclosing the smaller bodies, and additional development in the yeast form. This is not unusual in many of the red blood cells that have not become crenated, or in which the cell membrane has been damaged.

In mercury-challenged cells from an apparently healthy donor, we see the interior microbial content developing in less than one hour in virtually every red cell that is vis-ible. Some lymphocytes show a very peculiar lack of tex-ture, a1~d the differentiation of the nucleus diminish-es sub-stantially. There is splitting of the refractile bodies that Naessens characterises as the viral aggregation body. It is apparent that both structure and function have been severely altered in these lymphocytes.
One facet often observed in bloods that have been exposed to mercury, tin, beryllium, aluminium, cadmium and perhaps several others is the accelerated formation of the Naessens thallus stage. This stage is the end of the Naes-sens macro cycle. We notice many red cells with intracel-lular parasitism by bacterial forms, but the thalluses can become huge and differentiated, and some have lost most of their content. The thallus, which is long and fibrous, will often have a bulbous head at one end. There is often substantial activity and the somatids scatter as breakage occurs.

Remembering that metals can exacerbate this, normally the development of the thallus is seen only in the late stages of cancer, AIDS, and other extremely severe and debilitat-ing diseases.

Even in patients where the cells are not severely affected by mercury and other heavy metals, the microbiology still can be. Is the thought not suggested that those patients who may not have extreme mercury symptoms, but still have debilitated immune systems and still have the inabil-ity to fight off disease, may have the effects of mercury because of the microbiology that has been induced?
We expose cells to mercury for less than one hour, and notice the extent to which microbial growth has formed. In cells that have been exposed to nickel at dilute levels for approximately 30 minutes, we can see the effects of

bacterial growth inside each of these red cells. Nearly all the cells show the progress of microbiology. We see not only the development of bacterial forms in the cells, but also the so-called yeast forms. We see lymphocytes with bright, refractile bodies, described by Naessens as viral aggregations, and the extensive mat formation-the simplast, in the terminology of Enderlein.

We took blood from another "healthy" donor. No pecu-liar or unusual development was seen in the microbiology, after observing the untreated blood for 90 minutes. The same blood was mixed with aluminium at very dilute solu-tions. We noticed bacterial rod structures appended to red blood cells, and some early thecits forming. There was degrada-tion of some of the membranes. It is not unusual in alu-minium exposures for this to happen within 30 to 45 min-utes.

Blood from another healthy donor showed no propensity to develop unusual microbiology within the first 40 min-utes in normal organisation. We challenged the blood with cadmium at a very dilute level. We noted the formation of early rods inside some of the red cells, the unusual forma-tion of thecits, and some degradation of the platelets.

In these cadmium exposures, it is not unusual for us to seen the formation of the long, slender motile rods. These are frequently seen in cancer patients and in AIDS patients. `These were generated within 30 to 40 minutes after expo-sure to cadmium, and again these cells came from a donor where no unusual microbiology was seen within the first 90 minutes under normal observation techniques. We challenged blood cells with dilute beryllium. Some of the membranes began to deteriorate, with some lipid stripping along a couple of the red cells, and the devel-opment of rod-like bacteria in a number of cells. Some of these changes take longer with beryllium, perhaps as long as 45 minutes to an hour. However, after watching the same blood, unchallenged, for up to 2 hours, we did not see any of these phenomena - only when beryllium exposure is induced.

When healthy blood is mixed with a dilute aluminium solution, one observation we frequently see is that many of the PMNs prematurely age and begin to undergo their death phase. The color shifts dramatically and there is

for-mation of thecits. We also see enhancement of the centri-ole centrosome network in the PMNs.

A peculiar kind of microbial cellular stack is often seen when we mix blood of normal patients with dilute iron salt solution. Iron seems to have a peculiarity in forming these little chains of cells. These cells are especially fragile and very, very heat sensitive when we try to fix and stain them. There is some indication of mycelial formation as well.

One aspect frequently seen when dilute mercury solu-tions are used is that many of the lymphocytes will sud-denly develop an expanded envelope of cytoplasm, with a number of developing microbial forms inside the cyto-plasm of the lymphocyte. These protuberances are, again, typical of what we see in malignancy patients. These can be induced within 30 to 40 minutes after mercury expo-sure.

When we have lymphocytes that have been so expanded and enlarged after mercury exposure, it is also not unusual that we will see PMNs begin to move in and attach them-selves, or begin a phagocytic action against many of these infected limbs. This is peculiar to mercury, and we believe we can induce this over longer periods of time with nickel and beryllium. It raises the question that we may be look-ing at some of the initiation and onset of auto-immune dis-ease problems when this type of action takes place.

Finally, there is a form referred to as a medusae or medusal head. It is a microbial form which has mycelial and fun-gal-like qualities. It is frequently seen in AIDS patients, and occasionally may be found in cancer patients. We have induced the medusal form by mercury exposure for about one hour in the blood of a patient who has no diag-nosed disease and appears completely healthy.

Mercury may reach into a number of disease processes that are far removed from anything that is yet recognised, even by the Academy and other scientific bodies recognise that the microbiology must be dealt with, and 1 would also add that these are forms that are not classically recognised by hospital-based microbiologists. If the medusal form can be metal-induced, then can metals be a contributive factor in degenerative disease?

Dr. Waiter Jess Clifford

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World Congress on Cancer-April 1994-Sydney, Australia

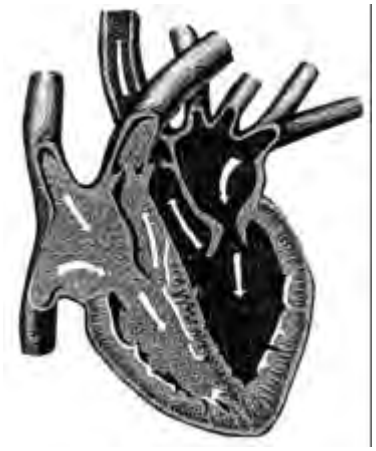
Mercury and Heart Disease

Following is a sampling of abstracted references which clearly demonstrate that mercury may be a major contributor to the development of heart disease.

Marked Elevation of Myocardial Trace Elements in Idiopathic Dilated Cardiomyopathy Compared With Secondary Dysfunction

Frustaci, A., Magnavita, N., Chimenti, C., Caldarulo, M., Sabbioni, E., Pietra, R., Cellini, C., Possati, G.F. and Maseri, A. Journal of the American College of Cardiology Uol. 33, No. 6, 1999, pp. 1578-1583

Objectives: We sought to investigate the possible pathogenic role of myocardial trace elements (TE) in patients with various forms of cardiac failure.
Background: Both myocardial TE accumulation and deficiency have been -associated with the development of heart failure indistinguishable from an idiopathic dilated cardiomyopathy.



Methods: Myocardial and muscular content of 32 TE has been assessed in biopsy samples of 13 patients (pts) with clinical, hemodynamic and histologic diagnosis of idiopathic dilated cardiomyopathy (IDCM), all without past or current exposure to TE. One muscular and one left ventricular (LU) endomyocardial specimen from each patient, drawn with metal contamination-free technique, were analyzed by neutron activation analysis and compared with 1) similar surgical samples from patients with valvular (12 pts) and ischemic (13 pts) heart disease comparable for age and degree of LU dysfunction; 2) papillary and skeletal muscle surgical biopsies from 10 pts with mural stenosis and normal LU function, and 3) LU endomyocardial biopsies from four normal subjects.

Results: A large increase (>10,000 times for mercury and antimony) of TE concentration has been observed in myocardial but not in muscular samples in all pts with IDCM. Patients with secondary cardiac dysfunction had mild increase (<5 times) of myocardial TE and normal muscular TE. In particular, in pts with IDCM mean mercury concentration was 22,000 times (178,400 ng/g vs. 8 ng/g), antimony 12,000 times (19,260 ng/g vs. 1.5 ng/g), gold 11 times (26 nglg vs. 2.3 ng/g), chromium 13 times (2,300 ng/g vs. 177 ng/g) and cobalt 4 times (86.5 ng/g vs. 20 ng/g) higher than in control subjects.

Conclusions: A large, significant increase of myocardial TE is present in IDCM but not in secondary cardiac dysfunction. The increased concentration of TE in pts with IDCM may adversely affect mitochondrial activity and myocardial metabolism and worsen cellular function.

Effects of mercury on the isolated heart muscle are prevented by DTT and cysteine.
Toxicol Appl Pharmacol 1999 Apr 15;156(2):113-8 Vassallo DV, Moreira CM, Oliveira EM, Bertollo DM, Veloso TC

The protective effects of dithiothreitol (DTT, 50 &mgr;M) and cysteine (CYS, 100 &mgr;M) against toxic effects ofHgCl2 (1, 2.5, 5, and 10 &mgr;M) were studied in isolated, isometrically contracting rat papillary muscles. Force reduction promoted by Hg2+ was prevented by both DTT and CYS. Also, after both treatments, no significant changes in dF/dt were observed. A progressive reduction in the time to peak tension was observed when increased concentrations of HgCl2 were used after CYS and DTT treatment. This was an indication that the enhancement of calcium release from the sarcoplasmic reticulum produced by mercury was not affected by DTT and CYS. Tetanic contractions were also studied. After treatment with DTT or CYS tetanic
tension did not change. No significant reduction of tetanic tension was observed during treatment with 1 &mgr;M Hg2+ but its
reduction was observed after 5 &mgr;M Hg2+. Myosin ATPase activity was also affect by Hg2+, being completely blocked by 1 &mgr;M Hg2+ and reduced by 50% with 0.15 &mgr;M Hg2+, Full activity was restored by using 500 nM DTT. These findings suggest that several but not all toxic effects of Hg2+ on the mechanical activity of the heart muscle are prevented by protectors of SH groups such as DTT and CYS. The enhancement of the Ca2+ release from the sarcoplasmic reticulum by Hg2+ during activation was not affected by prior treatment with DTT and CYS, suggesting that interactions with SH groups may not be important for the activation of the Ca2+ channel of the sarcoplasmic reticulum. Copyright 1999 Academic Press.

The chamber exposure of laboratory rats to metal oxides originating from metal producing industry. Physiol Res 1997;46(1):41-5 Kovacikova Z, Chorvatovicova D

Laboratory rats were exposed to the inhalation of dust from an agglomeration unit which is the greatest contributor to dust pollution in the vicinity of a mercury producing plant. The exposure lasted for 6 months (4 hours daily, 5 days per week), the concentration of aerosol in the chamber was 10 mg x m(-3). After finishing the exposure, the animals were examined and compared with the controls which were held under standard laboratory conditions. The number of alveolar macrophages was highly elevated (P< 0.001) in the exposed animals, Mg2+ ATPase activity in the heart muscle was decreased.The alanine aminotransferase activity in the serum was not changed, the aspartate

aminotransferase was slightly enhanced. No differences in the
frequency of abnormal sperm and in the frequency of polychromatic erythrocytes in bone marrow were detected.

Mercury effects on the contractile activity of isolated heart muscle. Toxicol Appl Pharmacol 1994 Sep;128(1):86-91
Oliveira EM, Vassallo DV, Sarkis JJ, Mill JG
The toxic effects ofHgCl2 (1, 2.5, 5, and 10 microM) were studied in isolated, isometrically contracting rat papillary muscles and frog ventricular strips. In rat papillary muscles 1 microM Hg2+ produced a small increase in the force of contraction. Higher concentrations of HgCl2 produced a dose-dependent decrease in contractile force. The rate of force development was affected differently, increasing at 1 and 2.5 microM Hg2+ and decreasing to control levels at 5 and 10 microM Hg2+, This was the result of a progressive reduction in the time to peak tension observed when HgCl2 concentrations increased. This effect probably reflects the binding of Hg2+ to SH groups inducing Ca2+ release from the sarcoplasmic reticulum. The relative potentiation of postrest contractions was used as an index of sarcoplasmic reticulum activity. It was measured after pauses of increasing duration and was reduced at concentrations of 1 microM Hg2+ when compared to that of the control. A further decrement in the relative potentiation was observed with higher Hg2+ concentrations, indicating that the activity of the sarcoplasmic reticulum was depressed by mercury in a dose-dependent manner. Tetanic contractions were also studied in the rat myocardium. The tetanic tension did not change during treatment with 1 microM Hg2+ but decreased with 5 microM Hg2+ suggesting a toxic effect on the contractile proteins only at high Hg2+ concentrations. Frog ventricular strips were studied using the same HgC12 concentrations and no effects on either force or relative potentiation were observed. These findings suggest that Hg2+ promotes dose-dependent toxic effects on heart muscle via actions on the sarcolemma, the sarcoplasmic reticulum, and contractile proteins.

Mercury compounds: lipophilicity and toxic effects isolated myocardial tissue. Arch Toxicol 1990;64(4): Halbach S

Lipophilicity is suggested to modulate the diffusion and the cytotoxic effects of mercury compounds. To investigate this, the positive inotropic effect of four Hg compounds (HgC12, CH3HgCl, chlormerodi bromomercurihydroxypropane) was studied in catecholamine-depleted isolated heart muscle preparations. The rate of development of the positive effect was inversely correlated to the concentration ii the case of HgC12 and chlormerodrin, i.e. the product of concentration (c) and time to half-maximal effect (t50) remained constant. This was in accordance wits the assumption of a permeation-controlled rate of action, as was shown earlier for p-chloromercuriphenyl-sulfonic acid. In addition, the c X t50 values of the individual mercurials decreased hyperbolically with the increase in lipophilicity as measured by the octanol water partition. The results support the view that the toxicity of mercurials increases with their lipid solubility. In conjunction with the previously reported negative inotropic effect of Hg compounds, a model is propose allocating thiol groups responsible for the negative isotropic action to lipid compartments within the cell membrane, while SH groups conveying the increase in contraction force are thought to be situated at the rote surface of the sarcolemma.

The relationship between mercury from do amalgam and the cardiovascular system. Sci " Environ 1990 Dec 1;99(1-2):23-35 Siblerud RL

The findings presented here suggest that mercury poiso from dental amalgam may play a role in the etiolog cardiovascular disorders. Comparisons between subj with and without amalgam showed amalgam-bea subjects had significantly higher blood pressure, lowed rate, lower hemoglobin, and lower hematocrit. Hemoglc hematocrit, and red blood cells were significantly Lc when correlated to increased levels of urine merc The amalgam subjects had a greater incidence of c pains, tachycardia, anerriia, fatigue, tiring easily, andb tired in the morning. The data suggest that inorg mercury poisoning from dental amalgam does affecl cardiovascular system.
Hemodynamic and electrophysiological effects of mercury in intact anesthetized rabbits and in isolated perfused hearts. Exp Mol Pathol 1989 Jun;50(3):281-90 Rhee HM, Choi BH

Using intact anesthetized rabbits and isolated perfused hearts, the hemodynamic and electrophysiological effects of mercury (Hg) were examined in order to assess the role of cardiovascular dysfunction in Hg intoxication. The most consistent and prominent cardiovascular effect was a significant reduction in blood pressure. This cardiodepressive action was probably brought about by the primary action of Hg on the heart rather than by altered sympathetic activity, as evidenced by normal renal nerve activity at times when the hemodynamic actions of Hg were clearly manifest. Although the principal target organ for the toxic actions of inorganic Hg is the kidney, chronic exposure to both inorganic and organic Hg frequently results in signs and symptoms of CNS dysfunction. The profound hemodynamic effects of Hg that we have observed emphasize the potential importance of Hg cardiotoxicity and indicate the need to differentiate between the primary and the secondary effects of Hg intoxication on CNS tissues for evaluation of the toxic effects of Hg compounds.

Cardiovascular homeostasis in rats chronically exposed to mercuric chloride. Arch Toxicol Suppl 1984;7:383-8 Carmignani M, Boscolo P

Two groups of male Sprague-Dawley rats received from weaning SO micrograms/ml of mercury as mercuric chloride (HgC12) in drinking water for 320 and 350 days. Hg exposure increased cardiac inotropism, without chronotropic changes, in both groups, and induced arterial hypertension in the rats exposed for 350 days. In the exposed rats, cardiovascular responses to the stimulation of peripheral alpha and beta adrenoceptors were decreased and increased, respectively, possibly through a reduced intracellular availability of calcium ions for contractile mechanisms. Hg exposure did not affect either vagal or sympathetic activity or cardiovascular reactivity to several physiological agonists. On the other hand, Hg exposure induced baroreflex hyposensitivity and produced a drastic alteration of the levels of copper and zinc in brain and kidney.

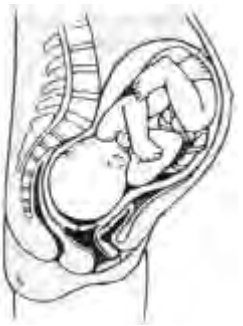
Mechanisms in cardiovascular regulation following chronic exposure of male rats to inorganic mercury. Toxicol Appl Pharmacol 1983 Ju1;69(3):442-50 Carmignani M, Finelli VN, Boscolo P

In this study we verified the possibility that chronic exposure to inorganic mercury may induce hemodynamic changes in the rat by affecting some neurogenic and/or humoral mechanisms regulating cardiovascular function. For this reason, aortic blood pressure, maximum rate of rise of the left ventricular pressure, heart rate, and electrocardiogram were monitored under pentothal anesthesia in rats which received 50 micrograms/ml of mercury (as HgCL2) in drinking water for 320 days and in control rats. No pressor or electrocardiographic changes were found in mercury-treated animals, which showed increase of cardiac inotropism and decrease of the pressor and inotropic responses to bilateral carotid occlusion. Cardiovascular responses to bilateral vagotomy and iv hexamethonium under vagotomy were unchanged in the mercury-exposed rats. In these animals both pressor and inotropic responses to iv norepinephrine and to higher doses of epinephrine were reduced, while the vascular beta-adrenergic response to 0.125 micrograms/kg of iv epinephrine was potentiated. Cardiovascular responses to acetylcholine, angiotensin I, angiotensin II, bradykinin, histamine, and serotonin did not differ in the two groups of rats. These results indicated that chronic mercury exposure affects cardiovascular function by interfering with the baroreflex mechanisms and/or the reactivity to catecholamines. Higher amounts of mercury were found in kidney, but the metal was significantly accumulated also in urine, blood, and brain. Mercury exposure greatly increased the levels of copper and zinc, but not that of iron, in brain and kidney. The increased accumulation of copper and zinc in tissues may be related in part to the mercury-induced synthesis of metallothionein, a protein able to bind these essential metals. It may be suggested that zinc and copper interact with mercury in inducing cardiovascular changes.

MERCURY IN MOTHERS' MILK RISK TO INFANTS!

A newly published study has firmly established the presence of mercury from dental amalgam in the milk of nursing females! [Vimy, MJ; et al, 1997] Since this is a matter of the utmost importance, BioProbe has reviewed the existing literature on the subject, with the pertinent studies abstracted below in the Science section.

Several studies have already established the transfer of dental amalgam mercury into the tissues of unborn babies, in both animals and humans. [Vimy, MJ; 1990; Drasch, G; et al, 1994] The study on humans by Drasch and associates concluded: "Future discussion on the pros and cons of dental amalgam should not be limited to adults or children with their own amalgam fillings, but also include fetal exposure. The unrestricted application of amalgam for dental restorations in women before and during the child bearing age should be reconsidered" The publication of these studies has already resulted in the issuing of government advisories against the use of mercury amalgam dental fillings in pregnant females (Germany, Sweden and Canada). In Germany, public opinion is encouraging a ban on the use of dental amalgam in all fertile women. The current research on amalgam mercury in breast milk adds further evidence to the wisdom of such an action.



The ability of metal ions to concentrate in mothers' milk has been scientifically established for years, as has the ability for methyl mercury to transfer to breast milk and cause neurologic damage to infants. [AminZaki, L; et al, 1981] The investigation of the possible transfer of mercury specifically from amalgam dental fillings to mothers' milk began in 1990. A study by Vimy and associates implanted amalgam fillings, seeded with radioactively labeled mercury, into pregnant ewes. [Vimy, MJ; et al, 1990] Since radioactively labeled mercury does not occur naturally, it was possible to detect mercury in tissues that was specifically derived from the amalgam dental fillings. The amalgam mercury was found to quickly accumulate in tissues of mothers and fetuses. In the lactating ewes, the levels of labeled mercury in milk were as much as six times higher than the levels of labeled mercury in their blood.

The current study [Vimy, MJ; et al, 1997) evaluates mercury related to amalgam dental fillings transferring to breast milk in both animals and humans. In the animal study, lactating ewes with amalgam fillings nursed foster lambs from ewes without amalgam fillings. The amalgam fillings contained a portion of radioactive labeled mercury, which was found in the tissues of foster lambs. This confirmed the transfer of mercury from the amalgam fillings of the mothers, into the breast then into the tissues of the foster lambs. The human study examined mercury levels in breast milk of 33 lactating women. The mercury levels correlated with the nun of amalgam fillings or mercury vapor concentration in mouth air. The infant exposure levels were comp to the United States Public Health Service Minimal Risk Level (MRL) standard for adults, and caution' urged. The combination of prenatal mercury exposure and lactating exposure to maternal amalgam mercury was addressed. Other important factors addressed were mercury exposures related to the differences in body mass between infants and adults and the particular sensitivity of infants to heavy metal toxic effects. This latter cc has also been pointed out by other authors. [Sehuma 1990]

By 1995, the comparison of activity of different forms of mercury had been investigated. [Schumann, K, I! Yoshida, M; et al, 1994; Oskarsson, A; et al, 1995] 1 has been found that any form of mercury can transfer to breast milk and, from there, into the tissues of infants, although the fat soluble forms of mercury (methyl mercury and mercury vapor) will concentrate more brain tissue of infants. The Schumann study pointed out that milk increases the bioavailability of Hg++ as the ionic mercury is bound to a greater extent in the red blood cells of the suckling infants. In an evaluation of lactating human females, the study by Oskarsson and associates found that dental amalgam mercury transferred to mothers' milk, but that methyl mercury from consumption of fish correlated to mercury levels in blood but not to levels in milk. In the portion of the study on rats and mice, the mercury was found to ca pathologic effects in the offspring, including alteration of the thymocytes, increased lymphocyte activities, effects on noradrenaline and nerve growth factor in t developing brains. These effects occurred in the animals exposed to methyl mercury.

It has been well established scientifically that mercury vapor, being lipid soluble, functions very similar to methyl mercury pathologically. There have been other studies confirming the harmful effect of mercury vapor on unborn babies and developing infants. [Danielsson, BR; et al, 1993; Warfinge, K; et al, 1994; Fredriksson, A; et al, 1996] It should be emphasized that the studies cited herein clearly show that mercury damage to unborn babies and infants is not readily observable early on. The neurologic damage is developmental in nature, primarily effecting learning, behavior and neurologic function. These effects can dramatically alter the functioning of the individual throughout life. Early exposure to inorganic or organic mercury can even result in mental retardation. [Schiimann, K, 1990]

In a subsequent study, Oskarsson and colleagues confirmed the accumulation of dental amalgam mercury in mothers' milk. [Oskarsson, A; et al, 1996] This study found that amalgam mercury dental fillings were the main source of mercury in the milk of lactating humans, related the exposure to the World Health Organization standard for daily intake for adults, and concluded it to be significant enough to be a risk to infants.

At this point, the scientific evidence clearly establishes that mercury transfers from amalgam dental fillings to the tissues of unborn babies and to mothers' milk, from the milk to body tissues of infants, and, according to existing standards, presents a health risk to the infants. The combination of prenatal exposure and neonatal exposure from nursing presents an undeniable concern. Oskarsson and associates [1996] stated: "We concluded that efforts should be made to decrease mercury burden in fertile women." Since amalgam dental fillings have now been identified as a significant, if not the major, contributor of mercury in mothers' milk, the formal regulatory limitation of amalgam fillings in fertile women is clearly indicated! BioProbe now calls upon all responsible public officials to immediately initiate action to protect unborn babies and infants from the scientifically proven fiealth risk of mercury exposure from the amalgam fillings of their mothers. The use of mercury amalgam fillings in all fertile women should be banned forthwith!

Mechanics is Not An Excuse To Disregard Systemic Effects

In arguing the case of whether amalgam is safe or not, the discussion has often been turned to compare the physical properties of various filling materials. The Australian Dental Association still claim that dental mercury amalgam is a far superior filling material and that composite fillings are not only inferior but that they only last a very short time. The types of scare tactics used by such organizations are intended to distract our attention from the fact that amalgam is in fact the greatest source of mercury to the general population and that the stuff simply is not safe. I do not believe that an argument about physical properties of any material can carry more weight than the responsibility of placing health care as our number one priority. It is like suggesting that because Thalidomide stops morning sickness for some women we should still be using it. Mechanics is not an excuse to disregard systemic effects.
To make matters worse the claim that amalgam is a far superior material to composite as a filling material simply does NOT reflect the scientific research, which is even published in the dental journals. As you read them it will become clear to you that in fact it is the composite materials which are superior to dental amalgam as a tooth restorative material from a purely mechanical perspective. They carry the added advantage that they also look like teeth and are generally almost non-toxic.
Quintessence International is one of the most respected international dental journals. In 1995 the editor-in-chief of Quintessence (Volume 26, Number 3,1995), Dr Richard Simonsen wrote:

"Amalgam should never be used as a restorative material in paediatric dentistry." Why? Because better alternatives are available.
"Amalgam should never be used as a first time restorative material:' Why? Because better alternatives are available.
"Move Over Amalgam - At Last"

To add to the inaccuracy of the Australian Dental Association comments are the statements made by Dr. Harold Löe, the Director of the National Institute of Dental Research (NIDR), who stated in the September, 1993 edition of "Dental Products Report":

"That first filling is a critical step in the life of a tooth. Using amalgam for the first filling requires removing a lot of the tooth substance, not only diseased tooth substance but healthy tooth substance as well. So, in making the undercut you sacrifice a lot, and this results in a weakened tooth. The next thing you know the tooth breaks off, and you need a crown. Then you need to repair the crown...and so it continues to the stage where there is no more to repair and you pull the tooth. V the first filling you should do something that can e restore the tooth or retain more healthy tooth substance Use new materials-composites or materials you ca bond to the surface without undercuts. You can do with little removal of the tooth substance so that the core of the tooth is still there."

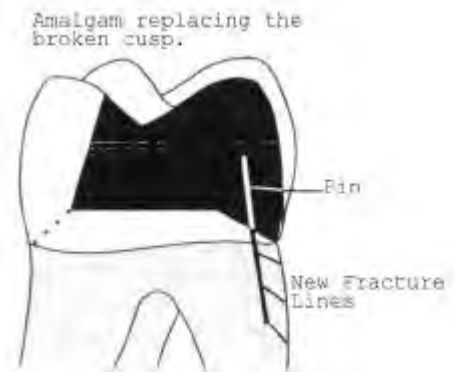
With these statements, made by such respectable authorities, it is amazing that the dental associations continue to spread misinformation.

Comparison of Filling Techniques And Their Consequences

Amalgam fillings do not stick to the tooth. To retain the filling in the tooth, the cavity must be prepared with `undercuts'. These undercuts not only lock in the amalgam filling but also cut off the nutrient supply to the dentine above the cut. Therefore the tooth structure above and the side of the filling becomes brittle.

All metals in the mouth will undergo some corrosion. Amalgam also corrodes at a reasonably fast rate. When amalgam corrodes it also expands and it does so in all directions. The force created by this expansion will often create minute fractures in the tooth that is already me brittle due to the shape of the cavity preparation. At I stage the patient returns to the dentist to report that al they were eating was some soft bread and the tooth broke!

To repair such a problem, the dentist will usually drill a small hole into the dentine and insert a self-tapping screw-called a pin.



The pin is reinforcement for the amalgam filling which will go back in. Even if this pin is made of titanium it will undergo corrosion when in contact with amalgam. Again the corrosion will cause an enlargement of the pin (sometimes up to five times its diameter) which will then crack the tooth further - but this time lower down the root surface. This tooth is now a candidate for a crown because the filling, which has to go back into the tooth, is now so large that it cannot sustain the forces of chewing for very long.

Composite fillings do stick to the tooth. They are bonded chemically and mechanically to the tooth. They do not require a cavity, which is undercut and therefore do not require such a large or damaging cavity. In fact a composite filling can be used to rebuild a broken cusp without the use of pins or other mechanical support. I personally have not used a pin for years and have had great success with such restorations.

Studies comparing the fracture resistance of the tooth when filled with amalgam or composite indicate that amalgam will weaken the tooth structure whereas bonded composite fillings will strengthen the tooth. There is absolutely NO reason to continue the use of mercury amalgam!

Secondary Decay Under Fillings

Another bit of misinformation, which is often touted about by the dental associations, is that secondary decay is much greater with composite fillings than amalgam. This is completely false. When amalgam corrodes it not only does so on the chewing or exposed surfaces, but also corrodes on the side, which is in contact with the tooth-the deep part of the cavity. The corrosion products react with the calcium and phosphorous in the tooth, with the formation of hydrochloric acid. This acid then dissolves the tooth structure which is called secondary decay. The newer term for this is Crevice Corrosion. This does not happen with composites.

Toxicity
Mercury is one of the most toxic substances known to man. Amalgam is made of 50% mercury which leaches From the set amalgam all of the time. Recent research is indicating that the breakdown products of composites rnd glass ionomer cements are between 300 times and 1.6 million times below the Tolerable Daily Intake levels. By comparison the mercury from amalgam is about 4 times ;reater than the Tolerable Daily Intake levels.

Although different people may show sensitivity to Iifferent composites, they are not subjected to the high evel of poisoning as with dental mercury amalgam.
As a cautionary note, there has been one study published, which shows that some composites (those based on BIS-GMA) may break down to two materials (Bisphenol-A and Bisphenol-A dimethacrylate) which have been shown to be estrogenic. It is therefore advisable, for patients who have a hormone-related cancer, to avoid such materials if possible. With this warning in mind it is still preferable to replace all amalgam fillings. Mercury from amalgam will reduce the body's level of Selenium. Several studies have shown that cancer rates increase as the body's selenium levels drop.

Referenced Abstracts - Composites

References which demonstrate the functional ability of plastic composite resin fillings

Replacement of missing cusps: an in vitro study. LC; Smith-BG J-Dent. 1994 Apr; 22(2): 118-20

One of the commonest methods of replacing a missing cusp, a pinned amalgam restoration, was compared with three adhesive restorative techniques, two of them with additional pin retention. All the teeth were subjected to occlusal / lateral forces and loaded to fracture in an Instron testing machine. A layered restoration of glass ionomer cement replacing the dentine, and resin composite replacing the enamel, without pins required more force to fracture than any of the other techniques including the pinned amalgam restoration. A composite restoration with dentine bonding agent and additional pin retention was second best and significantly better than the pinned amalgam restoration. A cermet restoration with additional

pin retention required slightly less force to fracture than pin-retained amalgam restorations, but not significantly so.

……

Clinical evaluation of a highly wear resistant composite. Dickinson-GL; Gerbo- R; Leinfelder-KF Am-J-Dent. 1993 Apr; 6(2): 85-7

The purpose of this clinical study was to determine the long-term potential of a resin composite restorative material.
The colour matching ability of the material never fell below 96%. The percent of restorations exhibiting a surface texture similar to enamel never fell below 90% Alfa.
At the end of 3 years, the total average loss of material was only 28 microns. No clinical evidence of bulk fracture was detected .... 79% of the restorations were Class II complex restorations with the replacement of at least one cusp!

Evaluation of occlusal marginal adaptation of Class II resin-composite restorations
ASDC-J-Dent-Child. Jul-Oct. 1993
describes the results of an evaluation of the occlusal marginal adaptation of Class II restorations in a clinical trial. The margins of 183 resin composite and 61 amalgam restorations, made by three dentists, were assessed.
Resin composite restorations showed more `excellent' margins than amalgam restorations (64.5 percent and 21.3 percent, respectively).

The variable mainly influencing the marginal adaptation of the composite restorations was the dentist.

Three-year follow-up of five posterior composites: in vivo wear. Willems-G; Lambrechts-P; Braem-M; Vanherle-G J-Dent. 1993 Apr; 21(2): 74-8

The wear of five posterior composites was evaluated in Class II cavities over a 3-year period with an accurate 3D-measuring technique. A clinical evaluation was also performed. The ultrafine compact-filled composites (Willems et al., 1992) showed acceptable wear rates ranging from 110 to 149 microns after 3 years. This is very similar to the wear rate of human enamel on molars, which is about 122 microns after 3 years. It can be concluded that the inves-

tigated composites can be considered as amalgam alternatives.

Directed Shrinkage Technique in Class V Composite Restorations: in Vivo Microscopic Evaluation and Clinical Procedure, Ferrari, M., Practical Periodontics and Aesthetic Dentistry, Vol. 5, No. 7, September 1993, pp. 29-36.

The study examined the leakage in vivo of Class V restorations with chemically-cured composite bases. Class V cavities were prepared at the CEJ in six periodontally hopeless teeth in six patients. The cavities were total etched, All-Bond 2 and Bisfil 2B (Bisco) were applied, and 2100 (3M) was used to complete the restorations. After 30 days, the teeth were extracted, dyed, sectioned, and scored for leakage. The results showed no enamel margins leaked, with only one cervical margin showing minimal leakage.

Longevity of dental restorations in selected patients from different practice environments. Mahmood-S; Smales-RJ Aust-Dent-J. 1994 Feb; 39(1): 15-7

The objective of the study was to evaluate the long-term survivals or longevity of dental restorations placed in selected patients from different practice environments in two countries. The case histories of 46 adult patient. with 622 restorations placed in three private practice Pakistan were followed for a minimum of 10 years, compared with similar assessments of 50 adult patio with 966 restorations placed in a dental hospital in Australia. Amalgam and composite resin restorations showed similar survivals in both countries, but ca gold restorations had much lower survivals in the Pakistan group of patients. In both countries, restoration survivals were significantly better in females, and when patients attended less frequently for treatment. For the Australian group, changes in dental operators also significantly better survivals, and there were signif restoration survival differences present between thel practices in Pakistan.

Evaluation of occlusal marginal adaptation of Cla resin composite inlays.
Kreulen-CM; van-Amerongen-WE; Bor gmeijer.l Gruythuysen-RJ ASDC-J-Dent-Child. 1994 Jan-Feb; 61(1): 29-34

In this paper, the results of a clinical study of the occ marginal adaptation of indirect Class II resin compos inlays are presented. The margins of 180 resin comp and 60 amalgam restorations, made by three dentists, were assessed, shortly following their placement. An indirect, photographic method has been applied to as marginal adaptations. The restorations were classifies into excellent and non-excellent marginal adaptation categories and on this basis influencing factors were determined. Resin composite inlays appeared to ha a greater percentage of `excellent' margins than amalgam restorations (46.1 percent and 6.7 percent respectively). The dentist was the variable that most influenced the marginal adaptation. Variabilit the period elapsing between applying the restoration a conducting the assessments is discussed as a factor th may impair a fair comparison with initial results for d composites.

Three-year follow-up of five posterior composites: in vivo wear. Willems-G; Lambrechts-P; Braem-M Vanherle-G J-Dent. 1993 Apr; 21(2): 74-8

The wear of five posterior composites at occlusal contact areas (OCA) and contact free occlusal areas (CFOA) was evaluated in Class II cavities over a 3-ye period with an accurate 3D-measuring technique. A clinical evaluation was also performed. The ultrafine compact-filled composites (Willems et al., 1992) shoe acceptable OCA-wear rates ranging from 110 to 149 microns after 3 years. This is very similar to the OCA wear rate of human enamel on molars, which is about microns after 3 years. The fine compact-filled compos had an unacceptable OCA-wear value of 242 microns after 3 years. The ultrafine midway-filled composite showed an exceptionally high CFOA-wear value of 151 microns after 3 years, which gave the impression of it being gradually washed out of the cavity. Clinically, 70% of the restorations made with the ultrafine midway-filled composite showed excellent colour match after 3 years. For most of the compact-filled composites slightly opaque fillings were noted and 63% of the restorations made with one of these materials were clearly opaque. It can be concluded that the investigated ultrafine compact-filled composites can be considered as amalgam alternatives as far as their wear resistance is concerned.

Posterior adhesive composite resin: a historic review Fusayama-T J-Prosthet-Dent. 1990 Nov; 64(5): 534-8

This landmark study by one of our great pioneers, graphs resin vs. amalgam failures and shows resin (Clearfill Posterior - a self-cured resin) far superior in the long term. This study is included in his text book published last year and makes fascinating reading. It is now relatively old, but Fusayama's team are (were - he's retired) world leaders in resin technology although his technique is clinically complex and I don't use it. In Japan this technique is taught at undergraduate level!

Recovery from Amyotrophic Lateral Sclerosis and from Allergy after Removal of Dental Amalgam Fillings. Redhe, O; Pleva, J. Int. J. Risk Safety Medicine. (1994): 4, 229-236.

An evaluation of 100 cases of poisoning and immunological effects in dental amalgam patients, documented in clinical practice.

The patient had suffered for a long period from neurological problems. In 1984, following a complete neurologic evaluation, a diagnosis of amyotrophic lateral sclerosis (ALS) was made at the department of neurology of the University Hospital in Umea, Sweden. It is of unknown etiology and considered to be 100% fatal. No further visit to the clinic was proposed, as the disease as pernicious and there is no known therapy for ALS.

A dentist recognised the symptoms as those familiar in the patient group with health problems attributable to dental amalgam fillings. Patient history revealed the onset or exacerbation of neurologic symptoms following placement of amalgam dental fillings. The patient had 34 tooth surfaces filled with amalgam, most of which were shallow and of moderate extent.

With the consent of the patient, all amalgams were removed and replaced with alternative material. Treatment was completed in March 1984. Removal of the amalgam in the first tooth that had originally given post-operative problems resulted in an exacerbation of symptoms, with a continued recurrence of exacerbation following each subsequent replacement.

Following the replacement of the last DA, the patient's entire condition rapidly improved. Six weeks following the final replacement, the patient was able to go up stairs

without experiencing back pain. Pains in the mouth also receded and the sore throat, present during the whole history of the disorder, recovered. Five months after completion of the DA removal, the patient returned to the same University Hospital at Umea for a week-long follow-up investigation, after which the following notation was placed in her record: "The neurologic status is completely without comment. Hence, the patient does not show any motor neuron disease
of type ALS. She has been informed that she is in neurological respect fully healthy."

Rubber Dam is Important When removing Amalgam
References Collated June 99

**Following are some abstracted references which support the use of rubber dam when removing amalgam. In some cases the rubber dam cannot for physical reasons be placed on a tooth. In such cases a specially designed suction tip is used to minimise
mercury exposure when removing amalgam.**

**Mercury levels in plasma and urine after removal of all amalgam restorations: the effect of using rubber dams.
Berglund A, Molin M Department of Dental Materials Science, Umea University, Sweden.
Dent Mater 1997 Sep;13(5):297-304**

OBJECTIVE: The aim of the present study was to determine whether removal of all amalgam restorations might significantly affect mercury levels in plasma and urine and whether the use of rubber dams might reduce patient exposure to mercury during amalgam removal.

METHODS: All amalgam restorations were removed from 18 subjects during a single treatment session in which a rubber dam was used and from 10 subjects when a rubber dam was not used. All amalgam restorations were removed by the same dentist using high-speed cutting, water coolant, and high-volume evacuation. The levels of mercury in plasma and urine were analyzed both before and during the subsequent twelve months after amalgam removal. In order to determine whether removal of all amalgam restorations might cause an exposure large enough to significantly increase the mercury

levels in two indicator media for mercury exposure, i.e., plasma and urine, and to determine if the removal might cause a significant decrease in the mercury levels found over time, the one-tailed, paired Students' t-test was used. For each individual, the pre-removal levels were compared with both the levels found in plasma on d 1 and in urine on d 10, and also with the levels found 1 y after removal. Furthermore, in order to examine whether the use of rubber dams had any effect on the mercury levels found after removal, the changes in the mercury levels found were compared between the groups using the Wilcoxon-Mann-Whitney rank sum test.

RESULTS: After removal of all amalgam restorations, only the non-rubber dam group showed significant increases in the mercury levels found in plasma ($p = 0.012$) and urine ($p = 0.037$). However, one year later, the mercury levels in plasma and urine had sunk significantly below the pre-removal levels for both groups. When the changes in the mercury levels found were compared between the groups, the non-rubber dam group show a significantly higher increase of mercury in plasma the rubber dam group the day after removal ($p = 0.00$ Compared to the pre-removal mercury levels in plash and urine, the levels found 1 y after removal of all amalgam restorations were on average 52 +/- 23% (r~ 4-89%) lower in plasma and 76 +/- 21 % (range 20-9~ lower in urine.

SIGNIFICANCE: The study showed that dental aural had a statistically significant impact on the mercury I found in plasma and urine in the patients tested, and that the use of a rubber dam during removal of all amalgam restorations significantly reduced the peaks mercury in plasma following removal. PMID: 98230. UI: 99040423

Systemic transfer of mercury from amalgam fillin~, before and after cessation of emission. Halbach S, Kremers L, Willruth H, Mehl A, Welzl G, Wack FX, Hickel R, Greim H Environ Res 1998 May;77(2):115-23

In 29 volunteers with a low amalgam load, the number of amalgam-covered tooth surfaces and the occlusal a of the fillings were determined. Concentrations of total. mercury were measured in plasma and erythrocytes a~ well as in urine together with the excretion rate. Absorbed daily doses were estimated from intraoral Hg emission by two

separate methods. The transfer of Hg from the fillings via the oral cavity and blood to urinary excretion was evaluated according to the most representative combination of parameters. This consisted of urinary excretion (1), Hg concentration in plasma (2), absorbs dose (3), and occlusal area (4). Pairwise correlation coefficients were 0.75 for parameters 1 vs 2 and 2 vs 3 and 0.49 for parameters 3 vs 4. Within 9 days after removal of the fillings, a transient increase was observed in plasma Hg levels only. This was reduced in those volunteers to whom a rubber dam had been applic during removal. Peak plasma Hg was 0.6 ng/ml on average and decreased with halftimes between 5 and 13 days. A significant decrease in Hg excretion was noted not before 100 days after removal. Being relatively insensitive to dietary mercury, the determination of to mercury in plasma and of its urinary excretion rate appears, under practical aspects, most suitable for the investigation of Hg uptake from amalgam. Copyright 1998 Academic Press. PMID: 9600804, UI: 9826319!

Nimmo A., Werley M.S., Tansy M.F, and Martin J.S . Profile of respirable particulate produced during amalgam removal. J Dent Res. 68:Abstract 334, page 223, Mar 1989.

ABSTRACT: Dentists frequently remove existing amalgam restorations with a high-speed handpiece utilizing water spray along with high-velocity evacuation. The purpose of this study was to evaluate the size and range of fully respirable (u) amalgam particles produced under the conditions listed above.

The patient model consisted of a manikin head and dentoform (Columbia Dentoform) connected to an Andersen Cascade Impactor particle sizer. The dentist model consisted of a particle sizer placed in the dentist's breathing zone. Nine MOD amalgam restorations were placed in maxillary premolar ivorine teeth with Tytin (Kerry amalgam. The restorations were removed using
a high-speed handpiece with water spray and high-velocity evacuation. The particle sizes were used to evaluate patient and dentist particulate inhalation for each restoration.

The patient model collected 4.00 + 2.60 mg of particulates ranging from <0.10 to 10 u, and having a mean particle size of 1.44 + 0.60 u. The dentist model collected 4.40 +

4.20 mg over a similar range with a mean particle size of 1.88 + 1.83 u.

These results suggest that both patient and dentist are subjected to similar particulate exposures during amalgam removal. Particle mass distribution was approximately equal across the range.

Particulate inhalation during the removal of amalgam restorations. Nimmo A, Werley MS, Martin JS, Tansy MF Department of Prosthodontics, Temple University, School of Dentistry, Philadelphia, Pa.
J Prosthet Dent 1990 Feb;63(2):228-33

An aerosol that contains amalgam particles is created when a high-speed hand-piece is used to remove an existing amalgam restoration. Those particles smaller than 10 microns are considered to be fully respirable. This means that a significant percentage of the particles have the potential to travel to the terminal alveoli, where they may become lodged. Long-term exposure to fully respirable particles may compromise a person's respiratory function. Amalgam restorations were placed in the typodont teeth of a mannequin designed to simulate the head and the respiratory tract of a patient. The amalgam restorations were removed under three experimental conditions: dry cut (control), wet cut (water spray) with high-velocity evacuation, and wet cut with high-velocity evacuation and a rubber dam. Particulate exposure was evaluated in the simulated respiratory tracts of the patient and the dentist that were equipped with ambient particle sizing samplers. Use of water spray and high-velocity evacuation significantly reduced patient exposure to particles. The use of a rubber dam, together with water spray and high-velocity evacuation, was responsible for a further significant reduction of exposure to particles when compared with water spray and high-velocity evacuation alone. The dentist, however, was exposed to moderate levels of fully respirable particles for all conditions tested. It is therefore recommended that all dental personnel wear face masks while removing existing amalgam restorations.
Nimmo A., Werley M.S., Tansy M.R and Martin J.S. Filtration efficiency of dental face masks during amalgam removal. J Dent Res. 68:Abstract 333, page 223, Mar 1989.

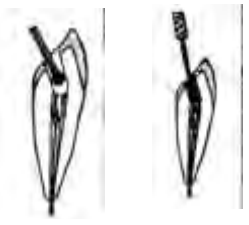
ABSTRACT: Dentists are exposed to moderate amounts of fully respirable particulates during amalgam removal (Nimmo et al. J Dent Res 67:335, 1988). The purpose of this study was to evaluate the in vitro filtration efficiency of two types of dental face masks during amalgam removal.

MOD amalgam restorations were placed in 40 ivorine premolar teeth using Tytin (Kerry amalgam. Restorations were removed from two teeth during a 14 min period using a high-speed handpiece without water spray. The aerosol produced was analyzed by two Anderson Cascade Impactor samplers; one served as the control (C), while the other was equipped with a dental face mask. The two face masks tested were a tie-on (TO) mask (3M Tie-on Surgical Mask, model 1818), and a molded cup type (CT) mask (3M Aseptex Face Mask, Model 1942). These procedures were repeated for a total of 10 samples of two amalgams removed for each mask type. Paired t-test analyses were done.

The TO mask reduced the amount of particulates collected from 4.10 + 3.62 mg (C) to 0.98 + 1.58 mg. The CT mask reduced the amount of particulates collected from 5.36 +7.05 mg (C) to 0.45 + 0.77 mg. The average size of particles collected was 3.76 + - 3.10 u (C) compared to 0.68 + 0.91 a (TO) and 3.71 + 3.91 a (C) compared to 0.47 + 0.82 a (CT). The TO mask demonstrated a significant reduction (p<O.OS) in the amount and size of fully respirable particulates produced during amalgam removal-.

Root Canal Therapy

The aim of Root Canal Therapy is to `save' a tooth which has become infected or dead, in an attempt to make it functional and pain free.



After scraping out the inside of the tooth the dentist will attempt to disinfect the tooth and the canals to eliminate any source of infection. The canal is then filled with a combination of cement and Gutta Percha in an attempt to completely occlude these canals. This is supposedly to prevent any microorganisms from entering the tooth either through the crown or the root.

If you consider pain control, mechanical function and aesthetics to be the limit of good dental treatment, then you will have "SAVED" the tooth.

If systemic effects are included in your concept of dentistry, than all that has happened, is that you have kept dead, infected tissue, buried in the bone, within a couple of inches from your brain.

For some obscure reason we are all conditioned to think that teeth are not a part of the body, but that they are inert calcified material, and that they are sort of dead anyway. Dentistry is the only one of all the medical & para-medical professions that thinks it is a good idea to keep dead, gangrenous tissue in the body.

One eminent Endodontist says:
"It is wrong to speak of (Root Canal Therapy) as a dead tooth; it is more correct to describe such a tooth as non-vital or, better, pulpless. Even though the central blood supply to the tooth has been lost, the tooth itself still retains its connection to the body via the periodontal membrane and the cementum."'1,2

The Oxford dictionary defines `non-vital' as "Fatal To Life". It defines `Dead' as "No longer Alive". It is like saying that even though the blood supply to your leg may be completely cut off, it would be wrong to suggest that the leg is dead, because it is still connected to your body by your hip joint!

Treatments Based In False Beliefs
Dr. Weston Price was the leading dental researcher at the turn of the 20'" century. He was the head ' the American Dental Association and wrote nun oumerous papers on subjects as diverse as the role c nutrition on dental health to the effects of dead teeth and root canal therapy on systemic health. He ' was able to correlate different disease states with the types of pathology seen around dead teeth. demonstrated thousands of times, the creation c ' diseases from non-vital teeth. He demonstrated every belief about Root Canal Therapy, held by the dental community at the time, was based on a c plete lack of scientific research. They were myth which developed and were then believed. The current dental communities have now set these beliefs as concrete truths and continue to teach them a

though the earth were really flat.

The dental authorities claim that;
Root Canal Therapy is SAFE & EFFECTIVE Dr Price's Research is out of date
Focal Infection Theory does not apply to dentistry

1 Dentistry teaches that you can see infection on an x-ray.!
FALSE! Only if the angle is correct you may see some bone loss on an x-ray. It is impossible to demonstrate infection with an x-ray as dental radiographs only `se hard tissue. They do not see soft tissue or infections. x-rays are not microscopes. Due to the shadow cast h the root it is often impossible to see the bone loss. 3

2 Dentistry teaches that you can gauge the extent infection by the amount of bone loss on an x-ray. FALSE! It is assumed in dentistry that the extent of bone loss is a direct indication of the amount of infect present. This is a false assumption because the bone loss may take time to develop. The extent of the bon loss about the end of the root is also a function of the body's immune system being able to isolate the infect process. It has little to do with the degree of infection

Sometimes there is no bone loss; but instead, a condensation of bone about the end of a dead tooth. We are taught in dentistry that this indicates a lack of infection. The reality is that teeth showing a `Condensing Osteitis' are demonstrating that the body immune system is incapable of quarantining the infection locally.1,9 These are often the teeth, which cause the greatest systemic effects. This very crucial issue is explained by Dr Josef Issels 1995

"If the body's local resistance is weakened to such an extent that the inflammatory process cannot be encapsu-lated by the granuloma cyst, the toxins will be able to advance unhindered into the marrow spaces, the tonsils, and into the body. In this case, it is proof that....the organ-ism has become largely incapable of reaction. Radio-graphs of these teeth as a rule show no transparencies, and are therefore called X-ray negative. In my cancer patients, I have found that such non-encapsulated foci, that is those who show X-ray

negative-were particularly common, as one would expect from people whose body resistance had been lowered.”

3 Dentistry teaches that you can determine the length of a tooth by x-ray.
FALSE!

Dentistry teaches that a root canal must be filled to within lmm of the root apex. The apex of a root canal is only rarely determinable by X-ray. Thus most root canals are worked too short, or so long that the root filling will protrude through the end of the tooth and into the bone. This is borne out by research published in the dental literature which demonstrates that approximately 17% of root canals, filled by specialist orthodontists, are in fact `overfilled'. In other words basic endodontic procedures done by specialists have a failure rate of 17%.

Is this significant?
"In the canals which were overfilled, the extruded materials were always associated with advanced destruction of the surrounding tissue and liquefication necrosis"5

It is not possible with an x-ray to see
the end of the root canal,
the angle of the root canal,
the number of canals or
the various branches of each canal

4 Dentistry teaches that it is possible to actually treat all of the hollow areas of the tooth.
False!
It is assumed that the only part of the tooth, which contains soft tissue, is the actual root canal. Even in the latest Australian Dental Association handout on root therapy they state, "All root canals in the effected tooth must be treated". 6

Unfortunately the root canal is the smallest area of the tooth, which contains nerves, blood vessels and connective tissue.

The root canals are really like the taproot of a tree -one main root with hundreds of branches coming off it and opening to the edge of the root all the way along its length. It is impossible to treat these accessory canals or

to remove the gangrenous products from them.
Most of the tooth is made from tissue called `dentine' - it is not a solid structure. It is made of tubules, which extend from the surface of the root canal to the enamel of the crown and to the root surface. Each tubule is estimated to be able to contain 8 bacteria across its diameter.

In a front tooth, which has only one root, there is over three kilometers of tubing. This equates to billions of microorganisms in just one tooth. Upper molars usually have three roots and lower molars two.

The volume of the root canal is actually quite small in comparison to the volume of the accessory canals and the dentine tubules.

When only the root canals are treated, a massive amount of gangrenous tissue, which is infected by anaerobic microorganisms will remain in the tooth.

One of the finest descriptions of this process is again presented by Dr Issels: 9
"In an understandable desire to preserve as many teeth as possible, to maintain the masticatory apparatus and its functions, attempts are often made to save teeth which are in fact lost. There is a widespread conviction that this can be done without risk by the sterile evacuation of the pulp, and then refilling the cavity. For decades, the erroneous belief was held that, after such treatment, the tooth is an isolated, lifeless thing, no longer involved in any of the body's processes. This assumption was originally based on the premise that the pulp cavity had only one orifice to the apex of the root below, and by filling, this opening was sealed. However, the dentinal canal does not end in just one opening; instead, it resembles a tree with many branches which penetrate the tooth's body in all directions.

The finer details of the entire dental structure have been exhaustively studied by Austrian researchers. They have established that there is a lively metabolic interchange between the interior and exterior milieu of the tooth, and that this two-way process takes place along many thousands of hyperfine, capillary canals joining the pulp cavity to the exterior surface of the tooth.

Very careful conservation measures may possibly seal off the vertical central-medial-tube of the dentinal canal, but it will never reach the lateral "twigs" branching off from this tube. Nor can it ever close offthe innumerable capillary canals. Some protein will always remain in these secondary spaces. If this protein becomes infected, toxic catabolic products will be produced, and conveyed into the organism.

It was established in 1960 by W. Meyer (Gottingen) that within devitalised teeth the dentinal canals and dental capillaries contain large microbial colonies. The toxins produced by these microbes in a tooth with a root filling can no longer be evacuated into the mouth, but must be drained away through the cross-connections and unsealed branches of the dentinal and capillary canals into the marrow of the jawbone. From there, they are conveyed to the tonsils, and thus the flowing systems of the body. In fact, the conservation treatment may literally convert a tooth into a toxin producing `factory'. It then may be left to develop its devastating effect on the organism for decades or even for a lifetime."'

Can Antibiotics or your immune system clean up the mess?
Most endodontic teaching, claims that the body's immune system will take care of whatever infected tissue remains. This is an assumption based in fantasy. If the blood supply of the tooth has been removed (which is what happens when the root canal is `cleaned out') the cells of the immune system cannot get there.

Often a dentist will administer antibiotics during or before root therapy is started. Pain relief which may follow is due to the control of the infection in the bone only. The antibiotics do not affect the organisms which reside within the tooth which are the original and continuing source of microorganisms and their toxins. As there is no blood supply to the tooth it is NOT possible to get the antibiotics in there either.8

" In the case of an acutely infected tooth there is no natural process of drainage and there is no mechanism by which the antibiotics which have been
administered can reach the bacteria inside the tooth" '

5 Dentistry teaches that it is possible to sterilize the canal by using medicaments placed inside the canal. FALSE!
It is impossible to sterilize the canals. The medicaments and antibiotics used do not penetrate the dentine tubules. Dr. Price was even able to culture bacteria from teeth through which he had poured fuming formaldehyde. Even the recent dental literature reflects this:
"It is now known that complete sterilization of an infected root canal is very difficult to achieve and complete removal of all pulp tissue remnants frequently is not possible:' 9

6 Dentistry teaches that when the canal is sealed and the oxygen supply cut of, these bacteria die.
FALSE!
It is now known that dead teeth are usually heavily infected with gram negative anaerobic bacteria. '° Sundqvist, in 1976 isolated 88 species of bacteria out of 32 root canals with periapical disease." "Only 5 of those bacteria could grow in air. ..long standing populations of infected root canals do contain a mixture of strict anaerobes. Low grade but chronic periapical inflammation is the result that may last for years.” Other organisms such as yeasts, funguses and `cell-wall-deficient forms' (Lida Mattman) also inhabit this tissue.

The dead teeth thus become a focus of infection, which Au can cause numerous disease states throughout the body. Anaerobic bacteria produce incredibly potent neurologic and hemolytic toxins. A true "Toxin Factory".

7 Dentistry teaches that if it does not hurt it must OK!
FALSE!
Weston Price's comments are most succinct;
"Local comfort..... may constitute both what is probably one of the greatest paradoxes and one of the costliest diagnostic mistakes through injury to he that exists in dental and medical practice ..... the absence of this local reaction and the consequent destruction by the infection products, permits them to pass through the body to irritate and break downs patient's most susceptible tissue".
Lack of pain around the tooth is usually taken to mean a successful root therapy. Unfortunately lack of pain around the tooth does not reflect the seriousness of associated systemic effects.

8 Systemic effects need not be thought of in relation to dental disease.
FALSE!
All researchers from Weston Price'3, Billings, Rosenow Stortebecker, Ratner and many others, have demonstrated the spread of systemic disease from infected teeth a gums. It is only the dental profession, who are not 1 in medicine that refuse to accept this basic concept. The research of Steinman '4 in the 70's conclusively demonstrates the relationship of metabolic dysfunction and dental disease.

Patrick Stortebecker and others have demonstrated transport of all materials, microorganisms and their directly from the tooth back to the brain via the blood and by transport along the nerve fibres.2,3,4,5 Many o research articles have shown that whatever you put tooth can be transported to the rest of the body.15,16,17,18

9 Dentistry claims that the materials used to fill tooth are safe
FALSE!
The dental literature is replete with research that demonstrates that all of the root filling cements and Gutta Percha itself are all CYTOTOXIC. There is NO safe material. In fact root filling cements have been shown to;
Induce calcification in various organs of the body
Cause neurological damage and interfere with nerve transmission, in some cases irreversibly 20,21 Be Mutagenic and Carcinogenic 22,23

Many of the root filling cements either contain or break-down to Formaldehyde - a substance known to cause cancer, breathing problems, damage to embryos, and a host of other disastrous effects. It is the substance which is used to mummify tissue.

One of the most commonly used root filling materials in Australia and throughout the world, is a material called AH26. Look at what the manufacturer says about its own material in its Material Safety Data Sheet:
Dangerous Components; Bismuth Oxide, Methanamine, Silver, Titanium Dioxide Dangerous Breakdown Products; Formaldehyde, Nitrogen Oxides, Ammonia

Warnings: Skin Irritant, Eye Irritant, Sensitization Inhalation and Skin contact. After Swallowing: Rinse i mouth thoroughly and then drink plenty of water. Call a doctor immediately.
Ecological Information: Do not allow product to reach ground water, water course or sewage. Do not allow to enter sewers/surface or ground water. Water Hazard class 2 (German regulation) (Self assessment) hazardous for water.

How would you like to have this material implanted into your body?

A full table of MSDSs is available upon request for the most common root filling cements. Also available at httn://www.bcd.com.au/RCTframeset.htm
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Focal Infection Theory

"A root canal treatment which does not plant a focus, does not exist" Schondorf .

The concept of focal infection has been around for well over 150 years. Since the time of Pasteur, the medical and dental authorities have claimed that the concept of focal infection firstly cannot exist and secondly does not hold relevance to dead teeth which have been root therapied. Lately the dental associations are stating that, to promote the theory of focal infection is to set dentistry back by 150 years. This unscientific lie is nothing short of "popularist dogma" as highlighted by the Journal Of Endodontics, as recently as 1976- -
"The concept of focal infection in relation to systemic disease is firmly established. The origin of many toxic or metastatic diseases may be traced to primary local or focal areas of infection".24

Many researches over the years have successfully demonstrated that dead, root therapied teeth can in fact release organisms and their toxins into the body. These can then initiate disease states in other parts of the body. Stortebecker has even demonstrated that these organisms and their toxins can be transported directly back to the brain via the blood and also by transport along the nerve fibers. Other researchers have demonstrated that the brain can be directly infected from dead teeth 25,26,27,28

` A Focus of infection has been defined as a circumscribed area infected with microorganisms which may or may not give rise to clinical manifestations.
A Focal Infection has been defined as sepsis arising from a focus of infection that initiates a secondary infection in a nearby or distant tissue or organ."

From yet another of the dental journals - none other than the Journal of the American Dental Association (1951) we read:

Two mechanisms can produce focal infection:
1- an actual metastasis of organisms from a focus,
2-the spread of toxins or toxic products from a remote focus to other tissues by the blood stream. 29

"If the bacteria pass the barrier (of the abscess wall) a number of things may happen;
(Appleton)
1- the bacteria may be discharged from the focus onto a free surface whence, conveyed by mechanical means, they determine an extension of the disease by re-inoculation.
2- the bacteria escaping from the focus may be conveyed to distant parts of the body by way of the lymphatics or blood. Once the bacteria leave the focus they may be arrested by the nearest lymph nodes. A lymphadonitis gong on to abscess formation may develop. If the bacteria pass this barrier three things may happen (a) they may multiply in the blood setting up an acute or chronic septicemia. (b) they may be carried live to a suitable nidus where they infect the surrounding tissue. (c) they may produce a slow but progressive atrophy with replacement fibrosis in various organs of the body.
3- Products of bacterial metabolism or of the interaction of bacteria and the cells . . . .may reach remote parts of the body.
4- the bacteria at the focus may undergo autolysis or dissolution. Some of the products of this dissolution, diffusing into the blood or lymph , may sensitize in an allergic sense various tissues of the body. A later diffusion of these products on reaching the sensitized tissue may call forth an allergic reaction"
There is a suggestion in dentistry that if the infection is `quarantined' it will not pose a danger to the rest of the body. The quarantining is regarded to be in the form

of a Dental Granuloma (an encapsulated abscess). Unfortunately this position is not supported by the dental literature;
"the capsule contains a meshwork of capillaries among its fibers and is penetrated abundantly by larger vessels; thus direct communication is established in the inner part, or seat of inflammation and the circulation....."

In 1931 Freeman reported " there is no question that bacteria or their toxins are not limited by the fibrous capsule:' 33

To ignore the reality of focal infection is to allow dentistry to operate in the dark ages.

Who may be affected by a focus of infection? We do not have to go far to find that the dental literature itself provides the answer, again demonstrating the falseness of the position upheld by dental authorities.
` A patient becomes susceptible to infection if any of these mechanisms (immune function and reticulöendothelial system) decrease in function, or if an organ is damaged to the extent that microorganisms can localize and produce an infection."
"Patients with rheumatic heart disease, congenital heart disease, heart valvular prosthesis, or patients with an inadequate defense mechanism are susceptible to severe consequences if they are subjected to a bacteremia. Inadequate defense mechanisms to resist bacteremias may result in cases of; debilitation or dehydration, exposure to radiation, diabetes, cancer, blood dyscrasias, malnutrition, vitamin deficiency, leukemia, multiple myeloma, diseases of the liver or kidney, and in patients undergoing prolonged therapy with antibiotic, corticosteroids, immunosuppresives, and antimetabolites."3o
This is just about everyone who undergoes any stress in their lives. Increase in the amount and variety of types of stress produces a severe drop in irrunune function.
Trigeminal Neuralgia-A special note!
Peripheral nerve damage (as far away as the teeth) in human beings can result in central nervous system damage or hyperexcitability in the trigeminal ganglion and nuclei with subsequent development of Trigeminal Neuralgia 31,32,33,34,35

Neural Focal Interference

Focal infection is just one of the problems associated with dead teeth. The other way that dead teeth can affect your health is by interfering with the control mechanisms of the body. This knowledge was first developed by two doctors called the Heuneke brothers, in Germany in the 1950's. What they found was that areas of dead tissue, scar tissue, foreign bodies, cystic tissue and infected tissue could interfere with the body's regulatory systems. They called these areas "Foci of Neural Interference."
A neural interference field will create an imbalance body's regulatory mechanisms, which include the tissue around all of the cells of the body. Dead and infected teeth fulfill all the criteria to become Prima Foci of Neural Interference. The imbalance in the regulatory system will then either create or potentiate disease states in other parts of the body, which are remote f the original focus. These disease states will often a coincide with areas of the body that are on the same acupuncture meridians as the primary focus. This has been fled by the work of Voll who was a German physician electro-acupuncturist. For example we often see disease states in the areas of reproductive system, kidney and knees in relation to non-vital front teeth. (See the E charts at the end of this section)

The mouth and teeth are a primary source of focal itfec-tion and neural interference fields. No other parts of body have dead tissue routinely left in place. The only thing, which seems to separate individual reactions, the state of that person's immune system and genetic factors. Consequently other factors, which may reds immune function, will allow a greater reaction to the vital teeth. (e.g. Mercury from dental amalgam fill will have a direct and deleterious effect on the immu system)

The German Medical Association for Focal Research and Control, defines focus as: "an abnormally localised alter-ation in the organism, with the capacity to induce distant actions out of its immediate proximity." Any circumscribed pathogenous organic alteration such a chronic inflammation, a degenerative alteration, or a (independent of its size and location), can be active focus or as an "interference field".

The "focus" is defined by Pichinger and Kellner as a "chronic devious localised alteration in the connective tissue, which can cause the most diversive reactions of its immediate environment and consequently is log in a permanent active relationship with the localised; general immune system."

Any chronic inflammation, any scar, any degenerative or other alteration can obviously satisfy this condition.' focus is embedded in the mesenchymal base tissue al that way has direct contact with the capillary system the blood and lymphatic vessels and the neuro-vegetative nerve fiber. This produces the connection to the whole organism. Through any of these conduction systems, will be able to cause distant actions in other organs. The focal nerve impulse will be first projected into the vegetative centers, where it can cause a vegetative dysregulation which likewise can become retroactive to the whole organism again. On the other hand, focal toxins and bacteria will be infiltrated by the vessel systems where d are able to spread their infectious, toxic and allergenic properties everywhere."9

Apicectomy & Retrograde Root Fillings

Sometimes, when an infection at the end of a root does not seem to heal, the dental surgeon will perform a surgi-cal technique to clean the abscessed area. This is called an Apicectomy. This surgery is based on the false belief that infected material escapes only through the end of the root. Therefore as part of this procedure, a filling is often placed at the end of the root. This is called a Retrograde Root Filling. The material of choice, which is most commonly advocated by the dental profession, is Mercury Amalgam!

There is not one area of medicine that would condone the implantation of amalgam or mercury into bone. This is in fact what is being done daily in dentistry. It is equiva-lent to an implant of mercury directly into the brain! This is not an exaggeration. Many researchers have demon-strated that mercury vapor released from dental amalgam will migrate through the palate and the nasal linings to pass directly into the brain. 36 If the mercury is already inside the bone it will migrate freely to the brain. If you have had this treatment it is vital to remove all bits of amalgam from the bone.

Pulpotomy

Due to the anatomy of the end of the root of a baby (deciduous) tooth it is not possible to do a root therapy. If a baby tooth is infected or dead, the treatment, which is still taught at Sydney University, is called a Pulpotomy. This involves the removal of only the crown section of the pulp while leaving the remainder of the infected pulp in the root of the tooth. This pulp stump is then covered with a material which `mummifies' the remaining tissue. The mummifying material is in fact a mixture of For-maldehyde and Cresol. The belief is that this material remains in the tooth. There is NO scientific foundation for this belief! In fact there is a large amount of pub-lished research which demonstrates that Formaldehyde placed in teeth will migrate easily to every tissue in the body". Formaldehyde is carcinogenic (cancer producing) in minute amounts.
Pulpotomies not only mummify the pulp but may also mummify the child

Symptoms

The types of disease states, which relate to dead teeth, are so numerous that it is impossible in an article of this size to discuss them all. They range from head and neck pain all the way through to rheumatism and cancer.

The most common symptom is in the form of head and neck pain. This may range from mild headaches to migraine to Trigeminal Neuralgia.

Sinusitis is very often associated with non-vital and Root Canal Therapied teeth especially if they are in the upper arch.

Price found that most patients with non-vital teeth had some thyroid dysfunction.

A number of researchers and physicians are finding a relationship between cancer and non vital teeth'38.

Reduced immune function is common.

Eye and Ear problems are common and rheumatic and arthritic changes are almost the norm amongst people with dead teeth

in their mouths.

Many heart problems and nervous disorders are asso-ciated with dead teeth.

Multiple Sclerosis has also been linked to the toxins and organisms from dead teeth.39,'40

The location of the tooth, the types of organisms inside it and the nature of the person's genetic make up will determine the areas of disease found clinically. The one thing that is certain is that if you are sick you should look very carefully at all non-vital teeth, whether root therapied or not.

Treatment

Dentistry is the only medical/paramedical profession that considers it O.K. to leave dead infected tissue in the body. (Not only is it OK but it is condoned and paid for by the health funds.) No medical practitioner would consider leaving gangrenous tissue in the body.

Unfortunately there are no good alternatives for this situation. The o nly treatment for dead tissue in the body is to remove it. Therefore the treatment of choice is to extract a dead tooth rather than root fill it. It is also important to remove any infected tissue from around the tooth. This usually requires a very easy surgical approach to access the end of the socket. Although this does not sound attractive, the results usually are, and the actual surgery is usually very easy.

NICO Lesions

As dentists we are taught to extract teeth with forceps and that any infected tissue left in the bony socket will be dealt with by the cells of the immune system. This does sometimes happen. Often, though, the bone will heal around the infected tissue, which remains indefinitely as an infected hole in the bone. These areas are usually colo-nized by gram negative bacteria.4' They are called areas of Osteitis or NICO Lesions (Neuralgia Inducing Cavitational Osteonecrosis). NICO lesions42,43 can act as Foci of Infection and also Neural Foci just as the Root Therapied

teeth can. This is the main reason that a surgical approach is used for most extraction.

The next obvious question is `How do you fill the space?' The solution depends on the location of the space and the condition of the adjacent teeth and or lack of teeth in the area. It will usually involve the creation of some sort of bridge or partial denture. Each person must be assessed individually.

I do not believe that Titanium implants are a suitable solution. The electric currents generated by these devices may also act as a neural interference field.44

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Questions you Deserve Answered When your Dentist Tells you That you need Root Canal Therapy

Here is a quick hit list of questions you should ask You deserve scientific answers.
The answers supplied here are all verifiable with published references.

How do you plan to remove all of the dead tissue from my tooth?
It is not possible to remove tissue from the dentine tubules or the accessory canals.'~~3 It is not even possible to remove all tissue from the inside of the canal.4 Thus infected gangrenous tissue will always remain in the tooth, the breakdown products of which have potentially serious consequences.

How do you plan to sterilize the tooth?
As long ago as 1925, Dr Weston price demonstrated the inability of dentistry to sterilize teeth. Note that materials used today are the same or similar to those used for the last 100 years. Current research supports these findings.5,6

Why do I need antibiotics?
Unless the infection has spread from the tooth to the surrounding tissue or systemically throughout the body, there is no relevance in the use of antibiotics. If the blood supply to the tooth does not exist (either because the tooth is dead or because it has been removed during the root treatment procedure), it is not possible for antibiotics to reach the depth of the tooth. Antibiotics cannot affect the organisms in the tooth.'

Are the materials you will use in any way toxic? Will they remain in the tooth?
All materials used to `sterilize' a tooth are toxic. Some are Neurotoxic and affect nerve tissue. They interfere or stop nerve transmission, in some cases irreversibly.8,9 Some are mutagenic and carcinogenic.'°~"'2,13,14 All can, and usually do leak out of the tooth. There is direct blood and neural transport of all materials from the tooth to the brain. "Virtually any irritation of the dental pulp or `amputation stump' has the potential of transporting alegesic toxins throughout the Trigeminal system whether

they be of chemical or bacterial origin" 15,16, 17,18,!9,20,21,22

What happens to the bacteria, which remain alive in the tooth?

Most organisms isolated from dead teeth are anaerobic.23 They live quite happily in an oxygen-depleted environment such as a tooth. These anaerobes will quite happily multiply and continue to produce serious toxins, which will leach out of the tooth.

Can the toxins from these organisms affect my health?

The dental profession at large claim that Focal Infection form dental causes does not exist, except in the case of patients with heart problems. This attitude flies in the face of the volumes of published research, which considers dental infections as a major source of focal infection processes throughout the body.24 Organisms and their toxins do escape from the tooth and may cause infections and disease processes in remote parts of the body as well as causing a more generalized allergic response.25

How do you know that the tooth is sterile before you fill it?

Very occasionally you may find a dentist or endodontist who will take a culture swab from the inside of a tooth and test for the growth of organisms. Even if this is done they are only testing for aerobic organisms. Culturing anaerobes (the most common organisms in a dead tooth) is so difficult that it is usually only done for research purposes. Even if these approaches were routinely done they would still give false results, as they would only be taking a swab from the canal surface, which is doused with sodium hypochlorite or equivalent disinfectant, and not from the depths of the dentinal tubules where most of the organisms reside.

Most often the dentist will take a guess that the tooth is sterile. There is no other scientific test available.

What materials will be used to fill my tooth?

Usually the root filling material used by most dentists is Gutta Percha and some form of thin cement to `lock' the points in place and fill the gaps between them. Note that all materials used as root fillings (including Gutta Percha) are cytotoxic. Some contain formaldehyde and other toxic materials and some break down to formaldehyde or

ammonia or other dangerous substances. Be aware that whatever is placed inside the tooth will be transported throughout your body within a matter of minutes. 2ti,27,28,29,30,31,32,33,34,35

Do the materials you plan to use either contain or breakdown to Formaldehyde?
Formaldehyde is cytotoxic, mutagenic, carcinogenic, embryotoxic, and teratogenic. It is often used in children's teeth. NEVER allow this material to be placed in your body or that of your children. Formaldehyde is distributed throughout the body from a tooth within minutes.36,37,38,39,40,41

Can you guarantee to completely occlude the canal?
There is not one root filling technique, which will completely seal a root canal.4Z,43,aa,45,46,47,48 The blind faith demonstrated by the dental profession is sadly lacking in scientific support.

How do you measure the success of a Root Canal Therapy?
Lack of pain and supposed resolution of a dental abscess is not a guarantee that serious systemic consequences will not occur. Dentists do not include systemic diseases as a consequence of dead teeth. They will tell you that if it stops hurting or if the x-ray looks OK then they have done a good job. These parameters are far too limited to really assess the success of a root therapy.
Weston Price says that the belief that comfort is a sign of successful treatment "...constitutes one of the greatest paradoxes and one of the costliest diagnostic mistakes through injury to health."

What happens if the Root Therapy Fails?
You will usually be recommended to re-do the treatment and/or to have a procedure called an Apicectomy. This involves a surgical approach to cut off the end of the root and physically clean out the abscess. The whole procedure is untenable as it ignores that the tooth is the source of the infection, which will of course remain. It is NOT the bone. This procedure will often incorporate placing a filling material at the end of the root (Retrograde Root Filling) in an attempt to seal the canal further. All Retrograde fillings leak. The worst is amalgam.'9°SO,s~,s~,s3,s4,ss,s6,s~,sa Never allow amalgam to be implanted into your bone at the end of the root.

This is literally an implant of mercury directly into the brain.

Can you supply me with references to support the claims of safety of Root Canal Therapy?

Just as there is no reason to believe what is written here, there is also no reason to trust the opposing views if they cannot be substantiated with peer reviewed scientific papers. You do have a right to information, which can be verified.

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EMPIRICAL RELATIONSHIPS BETWEEN TEETH WITH RESPECT TO ORGANS & TISSUE SYSTEMS

SENSE ORGAN	Inner Ear, Maxillary Sinus	Maxillary Sinus Tongue	Nose	Ethmoid Cells Maxillary Sinus	Ethmoid Cells, eye, Maxillary Sinus	eye	Frontal Sinus	
MUSCULATURE	Trunk, upper and lower extremities	Trunk	Trunk	Trunk & extremeties	Trunk & extremeties	Trunk	Lower, Extremities	
JOINTS	Shoulder, elbow, ulnar hand, plantar foot, toes, sacro-iliac	Knee (ant), mandible, shoulder, hip	Knee (ant), mandible	Radial Hand, Foot big toe, shoulder, elbow		Foot, hip, knee	Foot, Sacrum, Coccyx, Knee (P)	
SPINAL SEGMENTS	C8, Th. 1, 5, 6, 7 S. 1, 2, 3	TH 11, 12 L1		C 5, 6, 7 TH 2, 3, 4 L 4, 5		Th. 8, 9, 10	L 2, 3 S 4, 5 Coccyx, Knee (P)	
SPINE	C7 Th1 S. 1, 2	TH 11, 12 L1		C 5, 6, 7 TH 2, 3, 4 L 4, 5		Th. 9, 10	L. 2, 3 S. 3, 4, 5 Coccyx	
ENDOCRINE	Pituiary anterior	Parathyroid, adrenal, Pituitary	Pituitary, thyroid	Thyroid, thymus	Pituitary Post, Thyroid	Pituitary Posterior	Pineal	Pineal, epididymus
YIN ORGANS	Heart	Pancreas	Liver, Kidneys, Pancreas	Liver, Lung	Lung, Liver, Pancrease	Liver, Heart	Kidney	
YANG ORGANS	Deuodenum Terminal Illium	Stomach, Bladder	Stomach	Sm & Lrg Intestine, Gall Bladder, Duodenum	Large Intestine, Stomach	Gall Bladder	Bladder, Urogenital	
OTHER RELATIONS	CNS, mind, weather sensitivity, hemicrania, vegetative dystonia, cerebral spasm, epilepsy, sensory and motor disorders, aphonia, sciatica, brain/spinal tumor, migraine, tintus, periarthritis, humeroscapularis, upper extremities, eczema hands, hand edema, trigeminal neuralgia facial neuralgia	Mammary Gland, periarthritis, urinary bladder, back of shoulder pain, rheumatic humeroulnar, often radiates to ear, waking sleep state, servo steering of osmosis, dialysis turbulence and thermal waking sleep state, communication	Mammary Gland, kidney and kidney stones, cerebellar irritation, nystagmus, hepatogenic cephalgia, suspension crystallization of body fluids, exretion of urates, phosphates, oxalates & citrates, rheumatism, hypothalamus, vocal chords	controls Gall meridian, cholinergic migraine, pyloric & duodenal stenosis, arterial constriction of all organs	Eye diseases, dystonia, schizophrenic aspects, cell respiration, fermentation, liver, stomach, pancreas, dyspepsia, ascending and transverse colon	Eye diseases, angina, cardial edema, blood density flow rate, stagnation, thrombosis, infarction, lack of concentration, dyscrasic states, anger, depression, moodiness, fear, sadness, instability, kidney functions	Lymphatic blood regulators, hematopoesis, prothrombin, hemophilia, ductos thoracicus, intestinal circulation, vascular tonus, lymphh tracts, sexual organs, lymph & white blood count, and canal, bowel, urogenital organs	conceptual connections, mental dynamics, hormonal capacity, emotional disturbances, impotence, sterility, fear, sadness, instability, kidney function, anger, depression, moodiness, anal canal, bowel, urogenital organs
MERIDIAN	Small Intestine	Stomach		Large Intestine		Gall Bladder/Liver	Bladder	Bladder / Kidney
UPPER								
TOOTH	8	7	6	5	4	3	2	1

TOOTH	8	7	6	5	4	3	2	1
LOWER								
MERIDIAN	Small Intestine	Lung / Large Intestine		Stomach		Gall Bladder/Liver	Bladder	Bladder / Kidney
OTHER RELATIONS	Energy Metab, Periph. Nn, Neuralgia in arms & legs, headach, migraine, vasospasms, epilepsy, sensory and moter disorders, brain & spinal tumors, cervial syndromes, dystonia, sciatica, myasthenia in legs, facial eczma, tonsilities, urticaria, subfebrile temp. hypogastric pains, Menier's, ilium. blood pressure	Ear, lumbago, bladder, pelvis, groin, inner knee, SI syndromes, pineal and arteries, ascending colin, servo steering of osmosis, dialysis turbulence and thermal waking sleep state.	Ear, myalgia in legs, SI Jt Deep lumago, suspension cystalisation of body fluids, excretion of urates, phosphates, oxalates and citrates, stone formation, rheumatism, hypothalamus, pituitary veins	Chologenic lateral athritis from hip jt to knee, cruciate ligament, hips, inguinal hernias, knee, foot, rhythmicity, motility nd peristalsis in large and small intestines, mammary glands, lymph vessels.	Spleen, pancreas, meteorism, vein marks on skin, connective tissue diseases, cell respiration, fermentation, dyspepsia, mammary glands.	Thromboses (legs, lungs) varicose disorders, pancrease, oesphagus, week peripheral vessels, lungs, connective tissue diseases, blood metabolism, infarction, blood density, flow rate, stagnation.	Mesenchyme abdominal connective tissue, testes, epididymus, connective tissue disease, lymph and white cell count, defense mechanisms	Urogenital tract, myomatoses, erosions, prostate, ovaries, bladder, uterus, hormone metabolism, mental behaviour.
YANG ORGANS	Ileum	Lrg. Intestine, Ileocecal Region, Pancreas		Stomach, Pyloris		Gall Bladder	Bladder, Urogenital	
YIN ORGANS	Heart	Lung		Pancreas	Pancreas, Liver	Pancreas, Liver, Lungs	Kidney	
ENDOCRINE GLANDS	N/A	Pineal	Pituitary	Thyroid	Gonads		Adrenals	Adrenals, Epididymus
SPINE	C7, Th. 1, 5, 6, 7 S. 1, 2	C5, 6, 7 Th 3, 4 L. 4, 5	C5, 6, 7 Th 3, 4 L. 4, 5	Th. 11, 12 L1		Th. 9, 10	L. 2, 3 S. 3, 4, 5 Coccyx	
SPINAL SEGMENTS	C7, Th. 1, 5, 6, 7 S. 1, 2, 3	C5, 6, 7 Th 3, 4 L. 4, 5	C5, 6, 7 Th 3, 4 L. 4, 5	Th. 11, 12 L1		Th. 3, 9, 10	L. 2, 3 S. 4, 5 Coccyx	
JOINTS	Shoulder, elbow, ulnar hand, plantar foot, scro-iliac	shoulder, elbow, big toe, radial hand, tood, inner knee sacroIliac, coccygodynia		knee, madibular, hips, knee, foot	knee, madibular	knee (post), hips, foot	knee (post), sacrum, coccyx, foot	
MUSCULATURE	Trunk, arms, legs	trunk, lower and upper extremeties		trunk		N/A	Legs	
SENSE ORGANS	Ear, Eye	Ethmoid Cells		Maxilary Sinus		Eye	Frontal Sinus	

Head and Neck Pain & the Temporomandibular Joint

Stress

One of the most common afflictions affecting people is head and neck pain. Most pains we either learn to live with, or take a mild analgesic to control. When no recognisable medical cause is identified, we are conditioned to accept our ailments as either stress or psycho-emotionally induced. We are told that the pains are "in our heads". We therefore do not search further for other causes.

In modern western societies, stress related syndromes are on the increase. For many years stress has been known to play a role in the production and maintenance of many dis-ease states.

When we talk of stress we are conditioned to bundle many stressors under one umbrella. The reality is that we can identify a number of major stressors, which can be grouped into some basic categories; Psychoemotional, Environmental, Heavy Metals, Electrical, Toxins, Diet, Biomechanical.

Whatever the source of the stress, most people will have a similar physiological reaction. This is what Hans Selye calls a `General Adaptation Syndrome'. It is the way we cope with stress at a cellular and biochemical level. Ifthe stress continues for long enough (which is different for each one of us), we will then start exhibiting clinical symptoms. The symptom pattern will manifest according to our individual make-up.

Temporomandibular joint (TMJ) dysfunction falls into the category of BIOMECHANICAL stress. If the jaw joint is mal-positioned it will act as a permanent, non-self-correcting stressor. Due to the complexity of this joint and its relationship to different body systems we see a great variety of symptoms. The most common is head and neck pain.

The Temporomandibular Joint

The Temporomandibular joint is the name of the joint formed between the base of the skull (temporal bone) and the lower jaw (mandible). Both the left and right joints must work in unison whenever we move our jaws. In effect these

two hinge joints are really one related unit. The Temporomandibular joint is the most complex joint in the body. It is able to move in a multitude of directions which includes moving completely out of the joint space when the mouth is fully open. The resting position of the joint is deterrnined by the condition of the bone, by the muscles which move the jaw and, in particular by the way the bottom and top teeth meet. This is called the occlu-sion. An or all of these may hold the joint in an abnormal position.

If the joint is located in this abnormal position it will create a pattern of chronic stress on the whole of tl body.

Traditionally, TMJ dysfunction was thought to cause only symptoms of pain in the joints and teeth and was sometimes associated with limited mouth opening. Mop up to date research shows us that due to the multiple relationships within the body, we must reassess the symptoms related to problems in the jaw joint. C interest to most people is the strong relationship of the joint to chronic head, neck and shoulder pain.

Skeletal Relationships

When the mouth is opened just a few millimeters, the center of rotation is roughly along the long axis of the joint. As the mouth opens further to a fully opened position the head of the jaw bone (condyle) translate forward. It actually moves out of the fossa at the bass of the skull. This then causes a centre of rotation to b located between the first and second vertebrae in the neck.

In practical terms what this means, is that if the joint is malpositioned, the first two vertebrae in the neck wil also undergo torsion and rotation to compensate Biomechanically the first three vertebrae in the necl move in the same direction as the last three vertebral in the lumbar
(lowest) part of the spine. If the first two vertebrae are malpositioned, it will force compensatory change all the way down the spine. I! severe enough this may cause a tilt in the pelvic girdle and thus produce a functional short leg. Posture i; directly affected. In the same way if you have a leg shorter on one side, this will also tilt the

pelvis and cause a compensatory shift up the spine to the base of the skull. Such a situation may then influence the way you close your mouth and produce a malpositioning of the TMJ. If the vertebrae are chronically malpositioned we can expect symptoms of pain but also symptoms created by an impairment of either the blood or nerve supply which emerges between the vertebrae.

Muscular Relationships

The first muscles which contract when the mouth is closed (e.g. chewing, clenching or grinding) are all of the muscles at the back of the neck. In fact, even muscles in the leg will contract synchronously when the mouth is closed. The next muscles which contract are those at the side of the temples (temporalis) and lastly those directly next to the mouth (the masseters and pterygoids).

Any situation which causes clenching or grinding of the teeth will therefore cause a contraction of the muscles of the head and neck.

Another cause of muscle spasm is damage at the point of attachment of the muscles to the bone. This type of damage is common in cases of whiplash-type injuries and causes tears where the muscle attaches to the bone (called soft tissue lesions). These lesions will, in themselves, cause head and neck pain which may be referred widely. Spasm in the muscles of the head and neck will influence the way we clamp our teeth.

Chronic muscle spasm of the neck will cause a compression between the vertebrae of the neck and will result in associated problems.

Central Nervous System Relationships

Temporomandibular joint problems will affect, in particular, that part ofthe central nervous system known as the Autonomic Nervous System. This is the part which controls all of the unconscious functions of the body. Ithas two functions similarto an accelerator in a car (sympathetic) and the brakes (parasympathetic). One ofthe typical physiological results of chronic stress of any sort is that the accelerator part of this system is activated. This is great in times of acute stress as it allows us to

escape from danger. In chronic stress however, we have a fight between the two halves of the system. A great deal of energy can be used just to maintain a state ofequilibrium in our bodies. Eventually the break pads wear out - clinical symptoms then become evident. These symptoms are those less commonly associated with TMJ problems such as hormonal disturbances, digestive problems, bright light sensitivity and sinusitis.

Some Symptoms

The most common dental symptoms are clicking or popping sounds in the joint, chewing difficulty, and pain when chewing, jaw locking in either open or closed position and pain in or in front of the ears.Often we see a wide variety of head and neck pain which may range from occasional headaches to chronic migraines. Pains may radiate down the arms and chest. Other symptoms may include dizziness, ringing in the ears, lethargy, depression, fatigue, cold hands and feet, kidney problems, PMT, and some learning disabilities.

Treatment

Treatment of TMJ dysfunctions must take a multi-disciplinary approach. Generally the dental part ofthe treatment is to adjust the way the top and bottom teeth meet so that the joint may be correctly relocated.

In some cases we may simply need to adjust the height of an individual filling which may be interfering. Sometimes we may include the provision of a dental splint which is usually worn over the lower teeth and so provide a temporary relocation of the joint. It may need to be used full time, but in most it may only be necessary to wear it at night. Another way of providing the extra support on the back teeth, is to bond plastic filling materials to the biting surfaces of the teeth. This will have the same effect as the splint. If teeth are missing it may be necessary to provide a partial denture or more permanent crowns and bridges. In some situations, orthodontic movement ofthe teeth may be the preferred option. The forms of treatment are as varied as the individual condition. Each person must be individually assessed. The bottom line is how to reposition the joint in the most effective and long term way.

Other health care providers may also be called on. Often the services of a podiatrist will be needed to correct leg length discrepancies. Massage is always a great help in treatment and maintenance phases. Osteopathic and chiropractic maintenance may also be helpful. Sometimes acupuncture may be needed. We rely on the help of many different people depending on the individual case.

As with most health conditions, a team effort by the appropriate specialists is the preferred approach to treatment. TMJ problems are the special melting pot of traditional dental and medical skills and those of the natural therapies.

Correspondence

The following are some letters to the Australian Dental Association and the Australian Society of Endodontology requesting information regarding the scientific verification ofstatements made in their literature. The replies are also published. Take the time to write and ask the same questions!

From Robert Gammal
May 21, 1997
Dr Robert Butler ChiefExecutive Officer Australian Dental Association Inc 75 Lithgow Street, St. Leonards. NSW 2065.

Dear Dr Butler
Recent publications ofthe Australian Dental Associa-tion seem to be producing confusion regarding the po-sition the Australian Dental Association holds about certain amalgam issues. I have read in one journal that some mercury comes out of amalgam and in other pub-lications ofthe Australian Dental Association that no mercury is released. I would appreciate an answer to some questions so that I might know the exact position that the Australian Dental Association holds in these matters.

1. Does the Australian Dental Association accept that mercury is released from set dental amalgam?
2. If the answer is yes, how much mercury is released in the opinion of the Australian Dental Association? Please give a specific quantity for release of mercury vapour in micrograms per cubic meter. Please cite the reference, which supports this view.

3. Does the Australian Dental Association consider dental amalgam to be a potential source of mercury?
4. Does the Australian Dental Association consider `dental amalgam' to be an amalgam of metals or a true alloy of metals?
5. Please let me know the position the Australian Dental Association takes in regard to the ethical considerations of amalgam replacement.
6. What is the position of the Australian Dental Association regarding the estimated percentage of people who show an allergy to mercur?. Please cite the references which support this position.
7. Does the Australian Dental Association accept that other immune reactions to mercury and (metals in the mouth) are possible?
8. Does the Australian Dental Association accept that mercury from amalgam crosses the placenta and is absorbed by the foetus, and also crosses via the breast milk to be absorbed by the feeding infant
9. What is the current Australian Dental Association position regarding a safe level of mercury vapour for people who are occupationally exposed and the rest of the population? Please cite the references on this position.
10. With regard to Root Canal Therapy issues would you please verify that the position the Australia Dental Association takes, is supported by the position and statements of the Australian Society Endodontology?

I look forward in anticipation to your reply.

From Australian Dental Association Inc
June 11, 1997
Dr Robert Gammal Suite 102
222 Pitt Street SYDNEYNSW 2000

Dear Dr Robert Gammal

The confusion concerning the position of the Australian Dental Association on amalgam issues is only i your mind. Read the world-wide research and make your own decision. Concerning root canal therapy, I would refer you to th Australian Society of Endodontology.
As a member of the ADA, you are entitled to all of the services and publications of the Association. It is m' personal decision that our busy Executive Director not spend an inordinate amount of time answering questions

which you can research yourself. The enclose. documentation may be of assistance to you.
This is the end of the correspondence, Dr Gamrnal.
Yours sincerely,

Herb Hammer
Federal President Australian Dental Association
From Dr Robert Gammal
July 14, 1997

Dr Herb Hammer
Federal President
Australian Dental Association

Dear Dr Hammer
Thank you for your letter and the vast quantity of informa-tion about the opinions of various committees, who have reviewed some of the literature, and then made conclusions regarding the safety of dental amalgam. Unfortunately this material has nothing to do with the questions asked in my previous letter. These questions relate exclusively to the opinion held by, or the position taken by, the Australian Dental Association, in regard to some specific issues re-garding the use of dental amalgam. I understand from your letter that neither you nor the Australian Dental Association may wish to continue this correspondence with me. I must make comment to this matter at the outset.
Dr Hammer, as President of the Australian Dental Association you must appreciate that many members would look to you for leadership. The issue of leadership becomes more difficult when controversial issues must be discussed. As you can see from a perusal of your records, I have been a fully paid member of the Australian Dental Association for the past twenty years. As such, I believe that I and any other member of the Australian Dental Association, have the right to know the position of the association concerning major issues of dentistry and public health. The Australian Dental Association is after all, supposed to provide leadership for the dental profession. A refusal to supply this information must be seen at worst as a breach of contract between the Australian Dental Association and myself, and at best an abuse of my rights as a member of the Australian Dental Association.
I am well aware that the official position of the Australian Dental Association regarding the safety of

amalgam, is that the material is perfectly safe. I also understand that you support this position on the advice of various committees such as the NH&MRC, the FDA, and the Swedish Medical Council. I am also aware that you understand the position that I take regarding the safety of dental amalgam. No matter what the beliefs of a particular member of the association, I hereby formally request, as a member of the Australian Dental Association, that the Australian Dental Association provide me with information concerning the following questions. If the Australian Dental Association does not have an opinion or a position in regard to these issues, would you be kind enough to let me know?

1- Does the Australian Dental Association believe that mercury is released from set dental amalgam in the oral cavity?

2- Does the Australian Dental Association believe that mercury is released from set dental amalgam which is regarded as `waste' amalgam?

3- Ifthe answer to question 1 is `yes', please specify the amount of mercury which the Australian Dental Association believes comes from amalgam in the mouth.

4- If the answers to questions 1 & 2 are `no', please specify the references used to support this position.

5- What level of mercury vapour does the Australian Dental Association believe is a safe level for the following situations? (Please supply an answer in micrograms per cubic meter.)

- Industrial exposure
- Dental Surgeries
- Oral Mercury Vapour in children
- Oral Mercury Vapour in adults

6- Does the Australian Dental Association support the conclusions ofthe World Health Organization Criteria 118, 1991?

7- Does the Australian Dental Association support the continued use of dental amalgam as a restorative material in school dental clinics?

8- Does the Australian Dental Association believe that there is a minimum age below which dental amalgam should not be used?

9- Does the Australian Dental Association consider `dental amalgam' to be an amalgam of metals or a true alloy of metals?

10- Please let me know the position the Australian Dental Association takes in regard to the ethical considerations

of amalgam replacement.
11- What is the position of the Australian Dental Association regarding the estimated percentage of people who show an allergy to mercury? Please cite the references which support this position.
12- Does the Australian Dental Association accept that other immune reactions to mercury (and metals in the mouth) are possible?

Yours truly,
Robert Gammal
This Letter has NEVER had a reply!

From Robert Gammal to Dr Ralph Reid -
Australian Society of Endodontology
Saturday, 12 April 1997

Dear Dr Reid
I am writing with a request for information which I hope you, as president of the Australian Society of Endodontology (Inc.), will be able to supply. I am a practising general dentist in Sydney and have a great interest in the area of Endodon-tics. My queries are in relation to the patient education pam-phlet "Relax- there is no need to lose your tooth...ENDODONTICS (Root Canal Therapy) can save it for you".

1) In paragraph 2 it is written "Once the tooth is fully formed the main source of nutrition for the tooth comes from the tissues surrounding the root."
Could you please supply the references for this statement? Would you also be kind enough to explain to me exactly how the tooth is nourished from its surrounding tissues. Is this via the blood supply, the lymph or by osmosis?

2) In the 3rd paragraph it is written;
"Therefore, a tooth can function normally without its pulp and can be kept indefinitely. After endodontic treat-ment the tooth is pulpless, but it is NOT a dead tooth."
Again I would appreciate references to support this statement. By suggesting that the tooth is not dead, one can only assume that it is alive. For this to be so it must have some vascular supply. If I am not mistaken the very procedure of Root Canal Therapy is to remove the blood supply.

3) The statement (7th paragraph) "During endodontic treatment, the infected or damaged pulp is removed from the inside (ie root canal) of your tooth."
Is it necessary to remove all infected dead pulp tissue from the tooth? If not please supply references which describe the fate and effect of remaining infected tissue. If so please supply the references which demonstrate that all necrotic and infected tissue can be removed from the tooth.
4) The 8th Paragraph states: "The root canals are then cleaned, sterilised and shaped to a form that can be completely sealed." Firstly I again request references to support this statement. Next would you be kind enough to explain to me;
• the procedure and medication recommended by the society which does sterilise a tooth?
• how is sterility of the tooth determined? Is it neces-sary to take a swab of the tooth for culturing? If so should this be aerobic or anaerobic?
• if anaerobic testing is required could you please inform me of the correct procedures?
• please supply references which demonstrate the compld sealing of a root canal.
5) The 11 th paragraph talks of the sedative dressings and temporary fillings which are used to settle the tooth "and destroy any remaining bacteria". References supporting this statement would be appreciated. Would you alb list for me the medicaments which are current) recommended to achive this outcome?

I appreciate that you may not be the author of this pamphlet and that this is indeed quite a large request. I believe though that if I am to pass this pamphlet on to my patients, I woe! like to be in a position to be able to verify each of the statements by published, peer reviewed scientific papers.

If you are unable to furnish the answers to this request would appreciate it if you could point me to the author this paper. I thank you in advance for your response.

Yours sincerely
Robert Gammal

This is the reply from Dr Reid

Dear Dr Gammal
Thank you for your original letter of the 12th April. f1 request was handed on to our committee which handle educational matters. I have just returned from three wee) away, hence the delay in replying.
The committee made the following recommendations which are passed on for your information:
- the pamphlet was written by a committee of specialist endodontists as a public service to dentists' patients.
- the pamphlet was then circulated to all speciali endodontists in Australia for their comment, addition etc before final printing.
- the material was based on the committee members' ger era) knowledge of endodontics and not on specific re erences.
- the statements are universally accepted by endodontisi worldwide and by the dental profession in general,
-there are no controversial issues raised in the parnphlei (this was intentionally avoided by the committee).
NO specific references were used to write the pain phlets. ANY text book on endodontics could be used to justify the statements made in the pamphlets.
I hope this information is of some help in showing where the pamphlets have come from.
Yours sincerely,
Ralph J Reid President, ASE Inc.

Italics & bold inserted by Robert Gammal

FLUORIDATION: A 50 YEAR OLD BLUNDER AND COVER-UP

A referenced review of the Fluoridation Issue by David C. Kennedy, DDS 07 Oct 98

This document is online at: http~//emporium turnpike net/P/PDHA/health.htm

Many other related articles are also available at this excelent site.

Seven Reasons
Why Fluoridated Water Is A Health Hazard

Uncontrolled random dosages.
It is impossible to consistently supply any medication through the drinking water. People are very unique in their sensitivity to drugs and resent being medicated without their consent. Adding fluoride to drinking water invariably leads to uncontrolled random dosages. Infants and adults who drink more beverages will be overdosed. There are many well documented scientifically verified negative side-effects from exposure to fluoride.
No margin for safety.
There is a negative margin of safety between the "therapeutic" dose and onset of adverse health effects. Increased hip fractures are found at levels 1/10th the "recommended" 1 ppm fluoride level.
We are getting too much already!
Excessive fluoride accumulates in the biosphere and results in ever increasing levels in soil, food and water. Beverages such as grape juice may have 6.8 ppm. This grossly exceeds the level of fluoride that has adverse health effects. Soft drinks and beers manufactured in fluoridated communities will contain fluoride as well.

Fluoride is a human carcinogen.
Fluoride has repeatedly been shown to be a carcinogen in cell cultures, animals and humans. In 1956 Dr. John Chaffey, a professor of clinical pediatrics at the College of Physicians and Surgeons, Columbia University, noted cortical defects in the bone x-rays of 13.5% of the children living in fluoridated Newburgh, compared to only 7.5% in the neighboring nonfluoridated Kingston. He also noted the lesions were strikingly similar to osteosarcoma. Studies have now confirmed a dramatic increase in osteosarcoma

(bone cancer) in young males exposed to fluoride during growth of the bones and a 5% increase in all types of cancers in fluoridated communities.

Fluoridation does not reduce tooth decay.
Adding fluoride to drinking water has not been shown to be effective in reducing tooth decay. In blinded animal studies there was no correlation to the amount of fluoride and tooth decay. In the human populations fluoridation was not effective in reducing tooth decay. In fact, tooth decay has decreased more in some nonfluoridated communities than in fluoridated ones.

Fluorosis is a disease (health effect) caused by fluoride.
According to the National Research Council fluorosis affects 8 to 51% and sometimes as many as 80% of the children growing up in areas where drinking water contains one part per million (1 ppm) fluoride. Fluoride also can have a deleterious effect on bone growth and cause premature joint and ligament aging. The visible damage to tooth surfaces results in mottled, brittle teeth that are prone to fracture and may cost many thousands of dollars to cosmetically repair.

Fluoridation is very expensive
There are enormous health care costs associated with injury from fluoridation. Adverse health affects include; hip fracture, joint and ligament calcification, bone cancers, other cancers, allergy, accidental poisonings and death. The cost of a hip replacement alone is over $35,000 in California. There is a 25% mortality associated with this adverse health effect of fluoridation.

SEVEN MAJOR PROBLEMS WITH FLUORIDATION
Uncontrolled Random Dosages
It is impossible to consistently supply any medication through the drinking water. People are very unique in their sensitivity to drugs and resent being medicated without their consent. Adding fluoride to drinking water invariably leads to uncontrolled random dosages. Infants and adults who drink more beverages will be overdosed. There are many well documented scientifically verified negative side-effects from exposure to fluoride.
The effect of any medication (poison or drug) is proportional to the weight of the individual. Since bottle fed babies are on an all liquid diet they will

be dosed the most fluoride. An infant drinking 32 ounces of liquid a day would receive a daily dose more than 1 mg. There is wide variation in the amount of water we consumed. It changes from individual to individual, winter to summer, hot to cool climates, lifestyles sedentary versus energetic and with age. 1% of the population consume over 5 liters of water per day.

There is also wide variation in the level of fluoride found in our food and in the water. The fluoride at the faucet may vary from .1 ppm to as high as 4 ppm according to the EPA mean contaminant levels. Excessive fluoride in the water from accidental overfeed has poisoned literally thousands of people and recently killed a Nativ American in Alaska. ' A disease known as diabetes insipidus causes the victim to drink massive amounts of water every day. Kidney dialysis patients have died from undergoing dialysis with fluor:~dated city water.2

Malnourished and minority children are most susceptible to dental fluorosis.3 The athlete or physical laborer who drink large quantities of water will obviously be dosed with far more fluoride than the elderly. Infants, due to their small body weight and total dependence on fluid nourishment, will receive a proportionately larger dose than the adult. The fact that human breast milk is relatively low in fluoride should be some indications of what our creator had in mind for the baby. Infants fed on formula prepared from tap water are at the greatest risk.

FDA scientist have reported that fluoride in the drinking water adversely affects fertility rates in women. They found a very close correlation between decreasing fertility rates in women between ages 10 to 49, and increasing fluoride levels. They also reported that a review of all of the animal studies done to date shows that fluoride affects fertility in most other animal species as well.4

No margin for safety

exists since increased hip fractures and osteosclerosis are scientifically associated with water fluoridation.
The proponents of $uoridation admit the relatively narrow range between the claimed "therapeutic" dental dose and the onset of toxicity. In several countries severe skeletal fluorosis has been documented from water containing 0.7 parts per million (ppm).5 In medicine we generally insist

on a therapeutic index (margin of safety) along the order of 100. A therapeutic index as low as zero is simply unacceptable. The latest research from France on the hip fracture issue found that, "The risk of hip fracture was significantly higher when water fluorine concentration was higher than 0.11 mg/L".6 (0.11 ppm)
Several studies have found that fluoride inhibits broken bone healing and contributes to damage from osteoporosis and abnormal collagen formation.' Dr. Jennifer Jowsey, one of the originators of the theory that fluoride might help osteoporosis, admitted that $uoride was producing osteoporosis in some bones and at the same time osteosclerosis in others.8 (abnormal and weak bone formation) Dr. J.C. Robins has also noted this deleterious efI'ect.9 Drs. Aksyuk and Bulychev found that the consumption of as little as 1.6 ppm water caused premature aging in the bones of 15-16 year old girls, as well as calcification of the inter osseous membranes and irregular bone formation.'° Remember earlier that I explained that fluoride caused the ameloblasts to lay down irregular enamel. It seems clear that at the same dose level where fluorosis occurs, the osteoblasts also produce abnormal bone growth. These effects may have

a delayed response which is not seen until the sixth or seventh decade of life.

In 1990 a large national survey of hip fracture rates published in the Journal of the American Medical Association found a dramatic link between fluoridated water and the frequency of hip fracture." This study closely followed a report in the New England Journal of Medicine which found that attempts to treat osteoporosis with fluoride actually increased the disease and resulted in increased bone fractures.'2

Fluoride intake is already excessive. . .

children fed "home cooked" foods and formula made with fluoridated water will grossly be overdosed.
In 1949 the United States Public Health Service researcher F. J. McClure reported that the dietary fluoride intake averaged only 0.2- 0.3 mg/day.'3 In 1969 a study by H. Spencer, M.D. found adults in the Chicago area consumed 3.57 to 5.37 mg/day.'° Everyone agrees that this amount is excessive. The FDA ruled in 1989 that Fluoride is not a required nutrient since deficiency diseases cannot be produced. Fluoride has been added
to the drinking water of 50% of this nation for almost

five decades. Every processed food product or beverage prepared in a fluoridated community contains fluoride. It is simply impossible to avoid this toxic waste substance

Few children eat an average amount of anything. It is not the average child that is at risk here. Those unfortunate infants subjected to home cooking are at the greatest risk. It is also the hypersensitive child who is the prime target of this toxic substance, as well as children who consume more than average amounts of water. Infants who consume water based formulas and processed chicken are clearly at risk as shown by the data from recent nutritional studies.'S Glen S. R.Walker wrote, "An average six month old baby weighing 16 to 20 pounds should consume 2 1/2 ounces of milk per pound body weight per day, making the weight of its daily milk between 40 to 50 ounces. If a powdered milk formula is used and prepared with fluoridated water, the infant will consume, from water alone, well over 1 milligram per day. this is four times the maximum recommended in 1977, by the U.S. Council on Dental Therapeutics."`6 1 milligram per day for an adult with an average weight of 160 LB is the "recommended level" and equates to 1/8 of a milligram per day for an infant weighing 20 pounds. It is irresponsible for dentists and public health officials to advocate the addition of a toxic substance to the community water supply without absolute proof of safety. Since voluminous data already exists indicating fluoride is not a benign substance, and is in fact one of the more toxic substances known to mankind the proof of safety must be able to withstand the most rigorous scientific inspection. The fact is that having a community water supply dispense a toxic substance will overdose many of the children

Fluoride is a carcinogen.
In 1977 Burk and Yiamouyiannis reported a higher rate of cancer in a broad ten year epidemiological study of fluoridated versus non- fluoridated communities. The National Cancer Institute (NCI) claimed to have found no significant increases. During L. H. Fountain's congressional investigations of fluoridation the NCI Director, Arthur Kraybill, admitted making false representations and numerical errors in their studies. When these US PHS studies were corrected for the NCI "math" errors, they too showed a 5% increase in cancer mortality in the fluoridated communities." There are numerous

laboratory and epidemiological studies which support our concern for the toxicity of this material.18

During the Fountain Congressional Hearings of 1977 the NCI admitted that they had relied upon no scientific data, whatsoever, when they claimed 25 years earlier that fluoride would be safe to add to the community water supplies. As a direct result of these hearings independent testing was ordered to begin immediately. Twelve years later they managed to produce a two year toxicological study of rats. They paid Battelle Research Institute of Columbus Ohio, an outside contractor, to run the study.

The Battelle Study

Battelle found a very positive correlation to the amount of fluoride consumed and the size, number and kind of cancer the mice developed.'9 The study ran for only two years or about the life span of the animals. The animals were awash with illness and abnornialities of all kinds including kidney disease, liver disease, blood diseases, tumors, and cancer. In particular the fluoride groups showed thyroid adenomas, dysplasias of the oral mucosa, liver cancer of a very rare type (hepatocholangiocarcinomas), and osteosarcomas of which one appeared in the mid-range male rat and four appeared in high-range male rats. Female rats exhibited dose-related osteosclerosis and all fluoridated rodents developed dental fluorosis.

It is significant that the bone $uoride levels of the high-range were approximately the same as found in humans who live 15-20 years in a fluoridated community. Thus, the tissue levels of the highest dose tested were, in fact, no different than what humans will experience. I can recall no other carcinogen test where short lived animals were exposed to exactly the same level as humans.

Political Manipulation of the Battelle Study

The findings of the Battelle study where in direct contradiction to the frequently published claims of absolute safety. In an attempt to defuse this politically embarrassing bomb shell the US PHS arranged a pro-fluoride committee to review the research. The peer review committee was given an incomplete and drastically modified summary of the data. In the report they received, every tumor was downgraded at least one level. One tumor, the largest osteosarcoma,

was eliminated entirely. The hepatocholangiocarcinomas which by itself was a significant finding was reduced to a hepatoma.

Dr. Mel Reuber Opposes The Manipulative Downgrading

Dr. Mel Reuber, the pathologist credited with first diagnosing this unusual lesion, reviewed the pathology slides and stated that he disagreed with the down grading. He stated that his independent review of the pathology slides from the Battelle study showed without a doubt that the lesions were in fact hepatocholangiocarcinomas. Others tumors were dismissed through what was termed "historical controls". This type of statistical manipulation is not considered by the scientific community as a valid scientific approach. The National Toxicological Program (NTP) committee used the tumor data from control animals in other unrelated studies where the intake of fluoride was not strictly controlled. The fact that some of the control rats also developed similar cancers, was used as justification for the elimination of many of the cancers from the Battelle study. This approach was not valid since the "historical controls" were animals from other studies where their feed contained significant quantities of fluoride. Their actual dose fell between the low and mid-range dose animals of the Battelle study. The tumor incidence they experienced agreed with the predicted incidence from the Battelle study. The committee was not informed that the "control animals", fed commercially processed rat chow, had received a higher dose of fluoride than the low dose animals in the Battelle study.

Dr. William Marcus Opposes The Manipulative Downgrading

Dr. William Marcus, senior scientist for the Environmental Protection Agency Water Quality Division, speaking before the Chemical and Engineering Society stated that in his 20 years at the EPA he had never seen a study where every finding had been significantly downgraded in this manner. His review of the data showed an unusually clear straight line correlating between the dose of fluoride and type and number of tumors developed, including the historical controls. Furthermore, he stated that it is unprecedented for an animal study of a potential carcinogen to be conducted at the same dosage level as humans. In his opinion the findings were grossly manipulated.20
Despite all of these manipulations the study was found to show evidence of carcinogenicity and fluoride was ruled an

equivocal carcinogen.

FLUORIDE HAS BEEN PROVEN INEFFECTIVE IN REDUCING TOOTH DECAY.

ITEM..... In the largest U.S. study on fluoridation and tooth decay, U.S. Public Health Service dental records of over 39,000 schoolchildren showed that the decay rate (decayed missing and filled teeth DMFT) of permanent teeth was virtually the same in fluoridated and nonfluoridated areas.21

ITEM..... In New Zealand, tooth decay statistics from 60,000 children showed that fluoridation has no significant effect on the decay rate of permanent teeth.22 23

ITEM..... Broad-scale studies from Canada show that tooth decay is actually lower in nonfluoridated areas.24

ITEM..... There is not one animal study which found fluoride in water at 1 ppm reduced tooth decay.

ITEM..... There are no blinded studies of humans which show a reduction in tooth decay from consuming 1 ppm artificial fluoride.25

ITEM..... When all published studies were examined by D. Ziegelbecker in 1981, no correlation was found between the level of fluoride in water and dental caries.26

ITEM.....
Mark Diesendorf studied the decayed, missing, and filled rate (DMFT) in fluoridated vs. non-fluoridated areas in 8 developed countries, over a period of 30 years, and found no correlation to the amount of fluoride consumed and DMFT.2' He did find a large drop in tooth decay over that period, whether or not the community was fluoridated. That is why it is so important for scientific studies to have matched controls. With tooth decay rates dropping, the mere fact that tooth decay dropped after the addition of tiuoride cannot be attributed to that single factor.

ITEM.....
When Dr. John Colquhoun, former Chief Dental Officer for the Deparhnent of Health for Auckland, New Zealand and head of the fluoridation program, confirmed Diesendorf's

fintlings, his unpopular finding was changed. He found no significant difference
between fluoridated and non-fluoridated areas (DMFT 2.7fluoridated vs. 2.4 non-fluoridated). Colquhoun contends his reported data was manipulated so that it did show a benefit for consuming fluoride which simply did not exist.~8 29 He further showed that decay was related to the educational and economic level of the parents.'° 3' Finally there is now a serious question of scientific integrity in the dental research community. The DMFT rate is very subjective. When is a sticky spot really a cavity of just a spot? There is now evidence that the subjectivity of the DMFT rate has been used to prejudice data from areas where fluoridation has been discontinued (Stranraer).

ITEM.....
Fluoride has been added to the municipal water supply of San Francisco since 1952. Fluoridationists claim that adding fluoride to the water will dramatically reduce tooth decay. Los Angeles is unfluoridated. Therefore, San Francisco should have less tooth decay than other unfluoridated California cities. The highest decay rates are seen in low income areas. Research clearly shows that many children of low income have no tooth brush.
Tooth decay is an infection of the tooth caused by the bacteria STREP MUTANS. The prevalence of tooth decay in the United States varies from one geographic area to another. It is dependent upon nutrition, parental education, oral bacteria, dental hygiene and several other factors. Consequently the DMFT rate will vary from one town to another. Comparison of decay rates must therefore take into consideration the other factors. Comparing one city to another is like a study of two rats. No meaningful results can be obtained from this kind of comparison.

Fluorosis affects more than teeth.
According to the National Research Council, 8 to 51% and sometimes as many as 80% of the children growing up in areas where drinking water contains one part per million (1 ppm) fluoride have dental fluorosis. Fluorosis is permanent damage to the enamel which consists of white or brown spots that appear on the children's teeth. The process whereby fluorosis is initiated is of interest, since we have a systemic poison which produces a visible effect on the enamel of teeth: When fluoride reaches the cells which

make enamel, ameloblasts, become poisoned. As they degenerate they lay down irregular enamel. Instead of the regular hydroxyapatite, they will produce mottled, porous and thin enamel. As the poisoning worsens the enamel may even be absent. At the same time the enamel is being mottled other hard and ligament tissues are being affected as well (See #8).

Political Pressure Qn Scientists
The scientists, for the office of drinking water, claim they were subjected to $at out political pressure to raise the permissible level of $uoride in drinking water from the old standard of 1 to 4 mg/l. In order to do this, they had to show that there were no adverse health effects. National Institute of Dental Research Representative warns that dental fluorosis should not be called a health effect. "I think we as a committee need to recognize that this is a departure from the conclusions reached through fifty years of Puhlic Health Service sponsored epidemiological and clinical investigations. I, too, feel that moderate and severe dental fluorosis are to be avoided, but am less certain that we should invert history to accomplish that end." (Memo from John Small, NIDR to Jay Shapiro, Chairman of Surgeon General's Expert Committee, June 1, 1983)

Political Pressure Contradicts HEW
The statements of Mr. Small are in direct contradiction to the statements of the Department of Health Education and Welfare made in 1970 by Frank McCIure when fluorosis was originally classified.

MODERATE FLUOROSIS:
`All erzarzzel surfaces of the teeth ar-e affected, and surfaces subject to attrition show marked wear. Brown stain is freguently a disfiguringfeature."

SEVERE FLUOROSIS:
`All enamel surfaces are affected and hypoplasia is so marked that the general form of the tooth may be affected. The major diagnostic sign of this classification is the discrete or confluent pitting. Brown stains are widespread and teeth often present a corroded-like appearance." 32

The EPA Rewrote History
In response to the pressure the EPA rewrote history and stated ". . .there is no adequate evidence of chipping,

cracking or loss of enamel associated with dental fluorosis:' 33 The administration then reclassified fluorosis to be a cosmetic defect rather than an adverse health effect.

Fluoridation is very expensive.
The health effects of $uorosis alone are estimated to cost Californian's $900 million a year. Hip fractures will add several million more dollars to the cost of health care while not even considering the pain, suffering and death. There are better methods of disposing of fluoride and there are better methods available today for preventing tooth decay.

Fluoride is a major world wide pollutant. It has poisoned livestock and humans as well as lakes and streams of this nation. Last year alone the municipalities around San Francisco Bay dumped more than 90,000 pounds of fluoride in the bay in tap water run off. Adding literally hundreds of tons of fluoride to the nations water ways has contaminated the entire ecology of our country and eventually the planet. It is simply a gross mistake.

CONCLUSION: THE MANIPULATION OF SCI-ENCE

Scientific Fraud
Throughout this paper I presented the evidence I believe clearly indicates that scientific fraud has been employed in order to support the disposal of this toxic substance in public water supplies. There is no question that fluoride is a toxic substance which readily enters the body and has a wide range of systemic effects. There are real questions of whether or not it has any benefit in reducing tooth decay.

Safety First
First and foremost is the issue of safety. Since some people drink excessive amounts of water the extreme example must be used in the calculation of drinking water safety. The average child cannot be used. Furthermore, it is known that tooth decay will not result unless the diet is rich in refined foods and carbohydrates.34 3s What is of even greater concern is the daily consumption of a known toxic substance for which there is no proof of safety.

Political Pressure From Manufacturers

On numerous occasions, those responsible for the safety of our water have bowed to political pressure and abdicated that responsibility. The majority of developed nations have chosen to not fluoridate their water supply. Fluoride is a toxic waste by-product of phosphate fertilizer production and aluminum manufacturing. Consequently, the United States is one of the major producers of this hazardous waste and, it would be more costly to dispose as a hazardous waste. These companies have found it far cheaper to support "scientific research" into the benefits of consuming hazardous waste and sell it to the cities as a health product than to dispose of this material properly.

Research Funds Are Diverted

When scientific research results that do not support the use of $uoride are reported, the research funds are immediately withdrawn and no further report is issue . For example, when Dr. Feltmans conducted a study of prenatal and postnatal $uoride consumption which was financed by a US PHS grant. His preliminary findings not only failed to confirm the $uoridation thesis but indicated probable ill effects to a significant percentage of the population because of allergy to fluorides.36 The funds to continue the study were immediately withdrawn. That is what I mean when I speak of the manipulation of science.

Fluoride Will Nnot Pass

Our research institutions have become prostituted by the huge financial grants furnished by companies with but one goal. Our political system is enslaved by their addiction to the PAC funds available from industries with excess hazardous waste. We owe ourselves more then to become the willing puppets of these industrial waste generators. We must scientifically research very carefully the unusual claim about any toxic material be added to everyone's daily diet. We must be certain not only of its benefits but also for its absolute safety for everyone. If a product fails to pass the minimum NTP specification for biocompatibility tests then I for one, will refuse to recommend that it be used. FLUORIDE WILL NOT PASS. It is,according to the U.S. NTP an equivocal carcinogen. Other research finds it clearly a carcinogen. "In point of fact, fluoride causes more human cancer death, and causes it faster, than any other chemical." 3' I urge you to consider carefully the effect our decision will have on future generations.

Tooth decay is preventable with current technology. Cancer, hip fracture, and osteoporosis are not.

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The hygienist's role in promoting dental treatment

A hygienist in a dental practice today has many roles. And there is a lot of time pressure on the hygienist. Many hygienists would like to spend more time educating patients but wonder when they can do this with a fixed allotment of time.

In a typical recare appointment, the hygienist has several types of issues that could be addressed with patients. Besides new issues discovered in the patient's mouth, there are often matters of previously diagnosed treatment that hasn't been completed. The hygienist could also explain to the patient how recent advances in dentistry, such as cosmetic dentistry or implants, could benefit the patient.

There is often a need to educate the patient about home care, especially with those patients who have periodontal disease. And the need for professional periodontal care can be ongoing.

Most dentists and their staff realize that there is more dentistry in their charts that has been diagnosed but not delivered than they will ever have time to do. Herein lies a great opportunity, and it's an opportunity for the hygienist.

According to dental practice consultant Cathy Jameson, dental patients have a very special relationship with their hygienist. They see the hygienist as a concerned third party who cares about their well-being and has earned their trust. And, especially with dentistry, treatment plan compliance relates very strongly to trust. While patients may trust the dentist and the other staff members, there is greater familiarity with the hygienist, hence a greater level of comfort and trust.

Cathy Jameson's husband, Dr. John Jameson, is a dentist. In his office, she says that they schedule an average of $3,000 to $5,000 worth of dental treatment from hygiene every day. This occurs in a small rural community in southern Oklahoma, with one hygienist. They give their hygienist time during the appointment to spend in education, so that they can accomplish this.

Are the systems in your dental practice conducive to patient education and optimum care? Systems in this situation would include not only allowing the hygienist enough time to interact with the patient, but also providing the necessary tools.

Cathy Jameson recommends that you analyze each hygiene appointment type and then determine what the ideal appointment length would be so that patient care and proper patient communication isn't compromised. You have adult and child prophylaxis appointments, various periodontal appointments, plus possibly sealants and bleaching appointments.

If you find that you aren't providing adequate time for education, then you need to seriously consider this question: Would the practice be better off trimming one patient a day from the hygiene schedule so that each patient could be encouraged to pursue treatment of their unmet dental needs? If you could generate $3000 to $5000 in treatment every hygiene day, would it be worth it to see one less hygiene patient per day? Think about it.

And it's not just a matter of increased revenue. The best reason for persuading patients to receive optimum dental care is that they have a need for that care. If a patient needs a crown and walks out your door without having that treatment done, and then later fractures that tooth to where it is unrestorable, part of the responsibility for that failure is on your shoulders, if you didn't do all you could to convince the patient to receive the needed care.

Presenting needed care

Learning occurs with hearing, but more with seeing. Thus, you need to provide the hygienist with the tools to adequately present the treatment. Intraoral cameras are invaluable in helping provide this. When a patient can see the problem, they are more likely to understand it.

However, be careful in the use of intraoral cameras. If you are using the intraoral camera *solely* to try to convince the patient of the need for treatment, you will turn them off. Dentistry is sold on the basis of trust, and any high-powered methods are going to be met with resistance. Use the intraoral camera primarily as a diagnostic tool, but allow the patient to see it.

Another very helpful tool is the multi-media patient education system. Caesy has an excellent program that will allow you or the patient to select a topic and then present it to the patient. You can combine the Caesy DVD system, a television monitor, and the intraoral camera on one compact cart and use this as your patient education center.

Provide your hygienist with the time and tools to properly educate your patients and not only will your patients benefit but your hygienist will feel like a more valued part of your team and your practice will reap financial rewards.