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Heavy Metal Testing and Treatment, Thyroid and Adrenal Evaluation

Obtaining Absolute Levels of Heavy Metals Is Difficult

- Unfortunately, there is NO TEST that gives us the absolute level of heavy metals stored in the body.
- *INSTEAD: You can get an idea about the presence of heavy metals through various tests.*

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Different Types of Testing

- Hair Analysis:
  - *Good for chronic long-term exposure*
  - *Analogy to Hemoglobin A1c for diabetes control vs measuring blood glucose.*
- Blood and urine good for toxic emergency exposure to toxic metals:
  - *Red Blood Cell Analysis – does identify what has been stored for at least the past 120 days.*
- Baseline urine almost always is normal unless a recent exposure:
  - *Urine challenge is comparable to hair testing*
- Antibody testing for heavy metals

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Comparison of 3 Different Test Samples From Same Individual

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Same child - *hair*

TOXIC ELEMENTS	VALORE µg/g	INTERVALLO DI RIFERIMENTO	Percentuale 68th 95th
Aluminum	8,9	< 8,0	
Antimony	0,074	< 0,066	
Arsenic	0,046	< 0,080	
Beryllium	< 0,01	< 0,020	
Bismuth	0,018	< 0,13	
Cadmium	0,11	< 0,10	
Lead	0,57	< 1,0	
Mercury	4,7	< 0,40	
Platinum	< 0,003	< 0,005	
Thallium	< 0,001	< 0,010	
Thorium	< 0,001	< 0,005	
Uranium	0,009	< 0,060	
Nickel	0,08	< 0,40	
Silver	0,09	< 0,20	
Tin	0,23	< 0,30	
Titanium	0,64	< 1,0	
Total Toxic Representa	plessiva		

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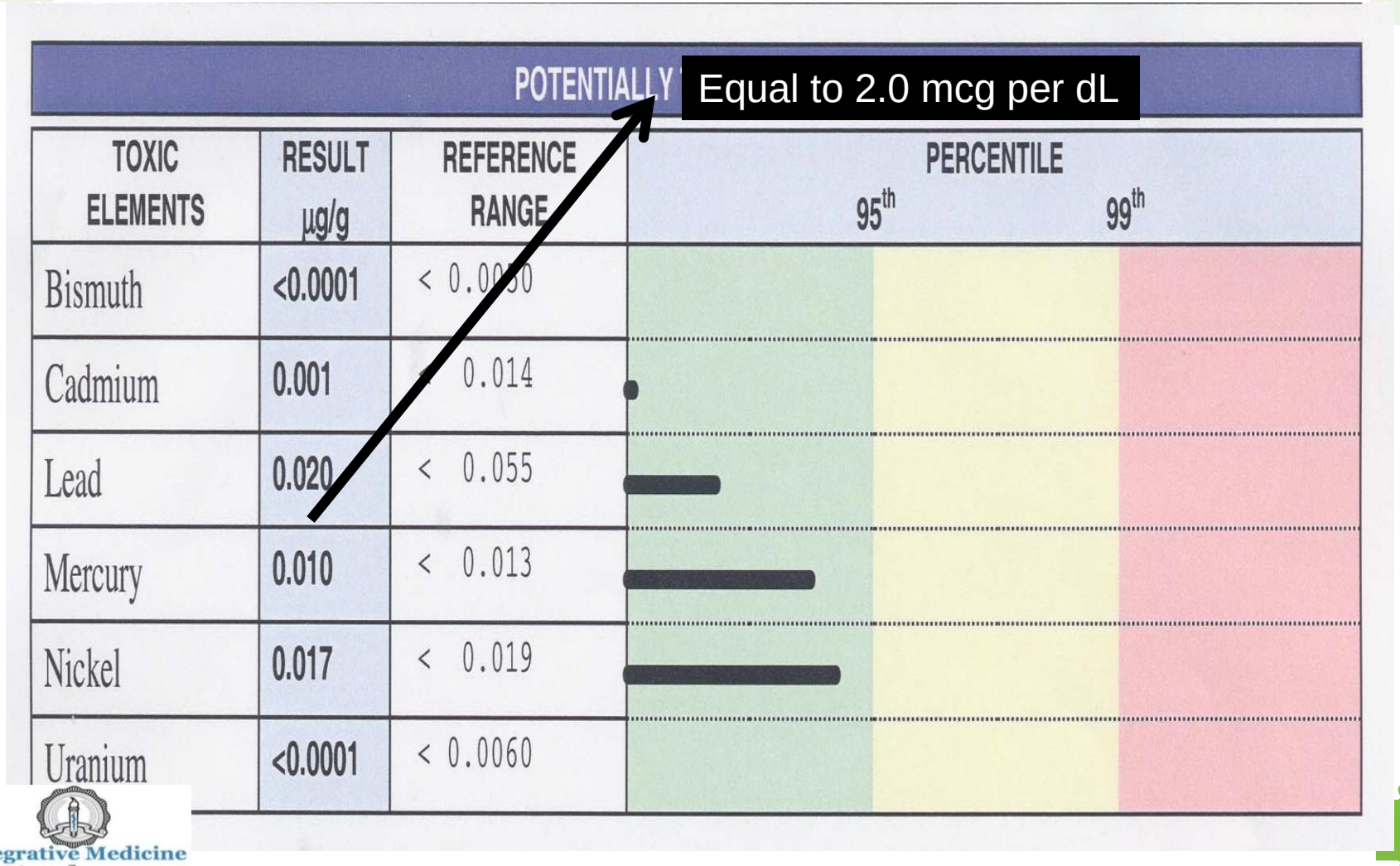
Same child - *whole blood*



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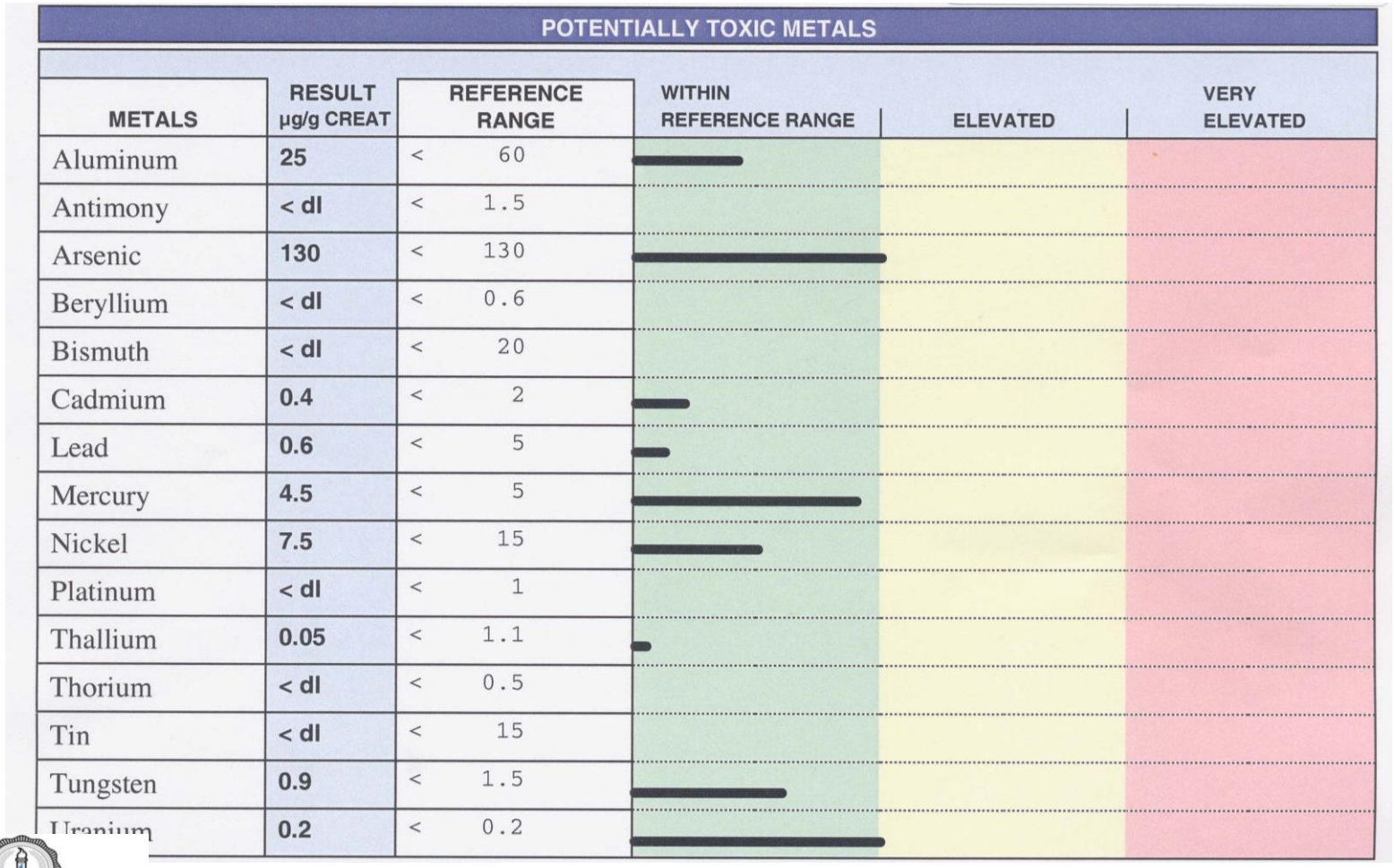
Same child (urine) - *no chelator*



POTENTIALLY TOXIC METALS

METALS	RESULT µg/g CREAT	REFERENCE RANGE	WITHIN REFERENCE RANGE	ELEVATED	VERY ELEVATED
Aluminum	25	< 60			
Antimony	< dl	< 1.5			
Arsenic	130	< 130			
Beryllium	< dl	< 0.6			
Bismuth	< dl	< 20			
Cadmium	0.4	< 2			
Lead	0.6	< 5			
Mercury	4.5	< 5			
Nickel	7.5	< 15			
Platinum	< dl	< 1			
Thallium	0.05	< 1.1			
Thorium	< dl	< 0.5			
Tin	< dl	< 15			
Tungsten	0.9	< 1.5			
Uranium	0.2	< 0.2			

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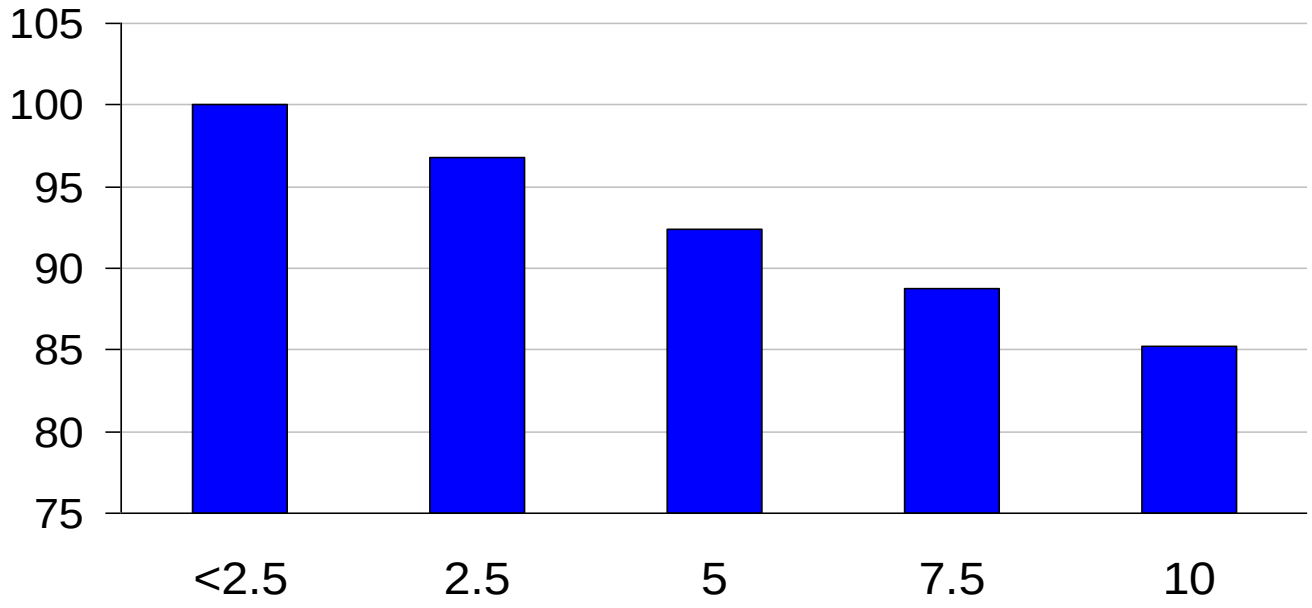
Heavy Metals

- **Mercury** - *vaccines, fish (salmon, tuna), dental fillings*
- **Lead** - *paint, gas additive, solder in plumbing*
- **Cadmium** - *shellfish, cigarette smoke, tire steel-belts*
- **Arsenic** - *seafood, herbicide, chicken*
- **Copper** - *copper utensils, drinking water, copper pipes-copper/zinc profile blood.*
- **Aluminum** - *water purifier, antacids, dialysis, aluminum utensils, foods (anti-caking agent).*
- **Antimony** - *flame-retardant pajamas, alloys*

Lead - *Associated Reading Deficits in U.S. Children*



Lanphear BP, et al. Public Health Reports 2000;115:521-529.

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SEX: Male
AGE: 3

Toxic & Essential Elements; Hair

TOXIC METALS		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 68th 95th
Aluminum	(Al)	8.0	< 8.0	
Antimony	(Sb)	0.20	< 0.066	
Arsenic	(As)	0.50	< 0.080	
Barium	(Ba)	0.42	< 0.50	
Beryllium	(Be)	< 0.01	< 0.020	
Bismuth	(Bi)	0.020	< 2.0	
Cadmium	(Cd)	0.092	< 0.070	
Lead	(Pb)	10	< 1.0	
Mercury	(Hg)	2.1	< 0.40	
Platinum	(Pt)	0.003	< 0.005	
Thallium	(Tl)	0.001	< 0.002	
Thorium	(Th)	0.001	< 0.002	
Uranium	(U)	0.014	< 0.060	
Nickel	(Ni)	0.28	< 0.20	
Silver	(Ag)	0.40	< 0.20	
Tin	(Sn)	0.58	< 0.30	
Titanium	(Ti)	0.30	< 1.0	
Total Toxic Representation				

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Attention deficit hyperactivity disorder, infantile autism, and elevated blood-lead: a possible relationship.

Eppright TD, et al. Mo Med 1996 Mar;93(3):136-8

- The child was treated for the elevated blood lead with the chelating agent succimer (DMSA).
- Decrease in repetitive behaviors while on DMSA with regression when medication was stopped.
- Decrease of hyperactive behavior while being treated with DMSA.

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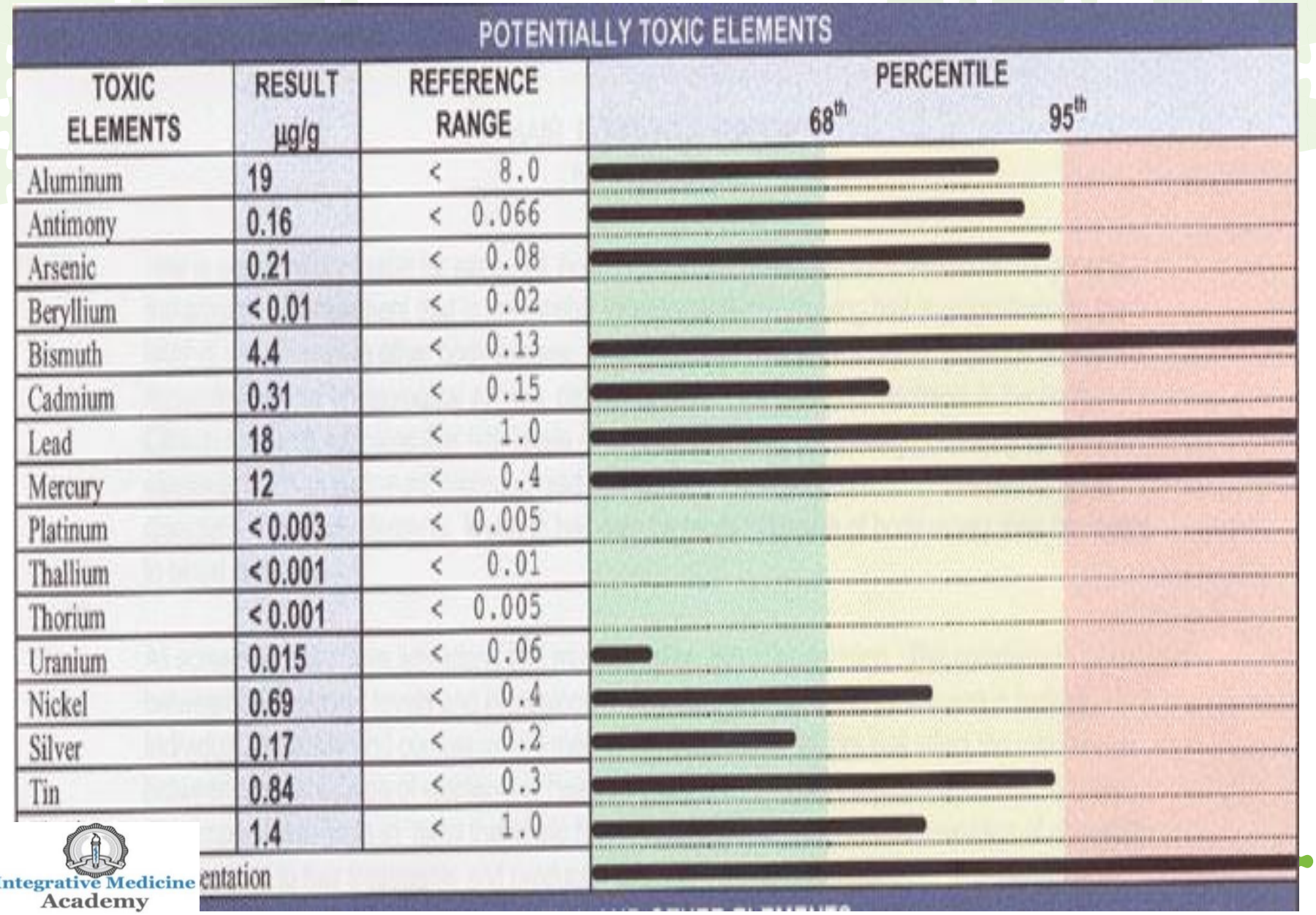
Toxic metals in hair of a 5 year old with autism



POTENTIALLY TOXIC ELEMENTS

TOXIC ELEMENTS	RESULT µg/g	REFERENCE RANGE	PERCENTILE 68th 95th
Aluminum	19	< 8.0	
Antimony	0.16	< 0.066	
Arsenic	0.21	< 0.08	
Beryllium	< 0.01	< 0.02	
Bismuth	4.4	< 0.13	
Cadmium	0.31	< 0.15	
Lead	18	< 1.0	
Mercury	12	< 0.4	
Platinum	< 0.003	< 0.005	
Thallium	< 0.001	< 0.01	
Thorium	< 0.001	< 0.005	
Uranium	0.015	< 0.06	
Nickel	0.69	< 0.4	
Silver	0.17	< 0.2	
Tin	0.84	< 0.3	
	1.4	< 1.0	

entation

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SEX: Female
AGE: 4

Toxic & Essential Elements; Hair

TOXIC METALS		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 68th 95th
Aluminum	(Al)	3.5	< 8.0	
Antimony	(Sb)	0.022	< 0.066	
Arsenic	(As)	0.29	< 0.080	
Barium	(Ba)	0.35	< 0.75	
Beryllium	(Be)	< 0.01	< 0.020	
Bismuth	(Bi)	0.037	< 2.0	
Cadmium	(Cd)	0.024	< 0.070	
Lead	(Pb)	0.71	< 1.0	
Mercury	(Hg)	4.2	< 0.40	
Platinum	(Pt)	< 0.003	< 0.005	
Thallium	(Tl)	0.001	< 0.002	
Thorium	(Th)	< 0.001	< 0.002	
Uranium	(U)	0.003	< 0.060	
Nickel	(Ni)	0.10	< 0.30	
Silver	(Ag)	0.09	< 0.20	
Tin	(Sn)	0.24	< 0.30	
Titanium	(Ti)	0.23	< 0.90	
Total Toxic Representation				

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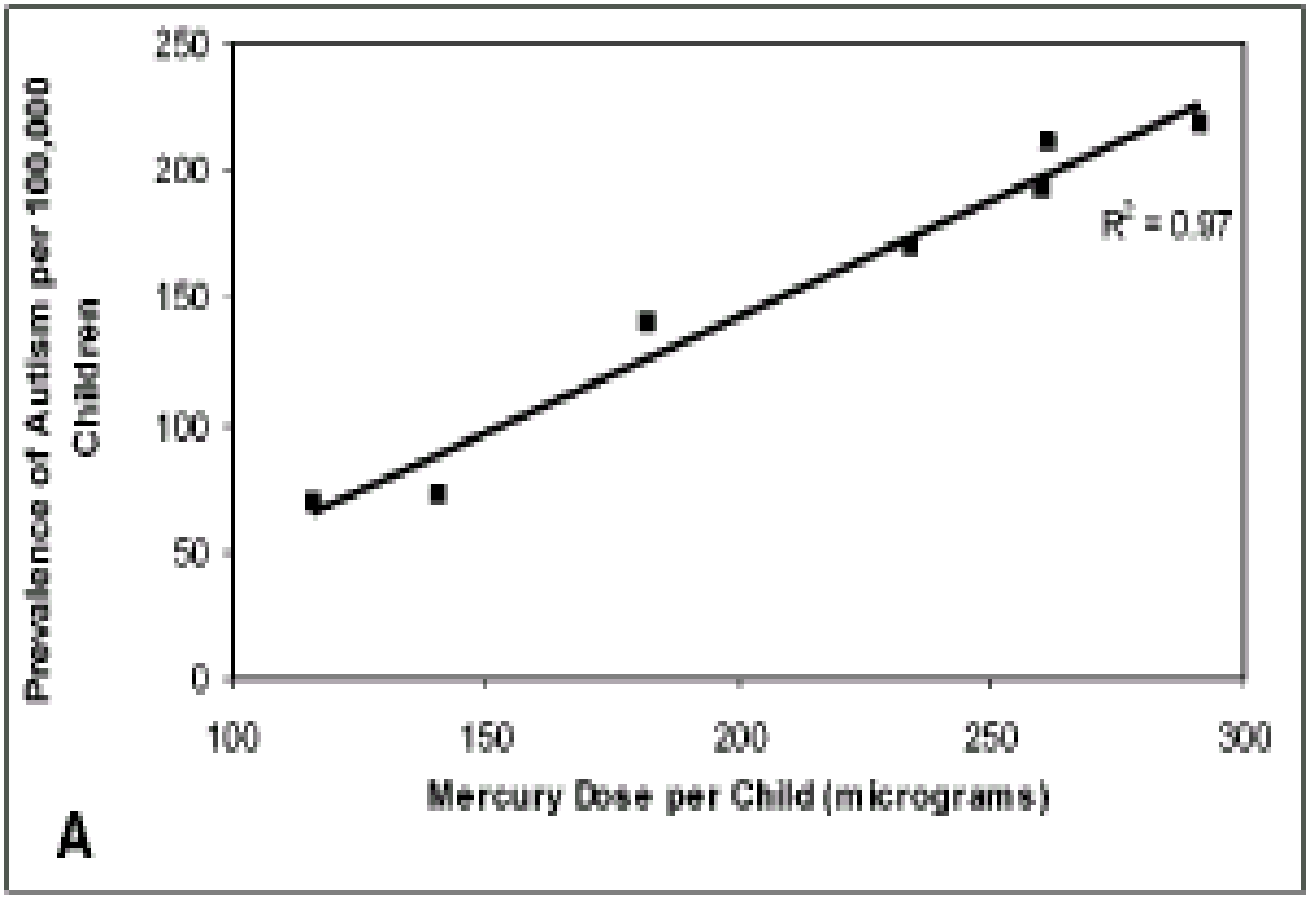
Effect of Mercury Dose on Autism Incidence in the USA



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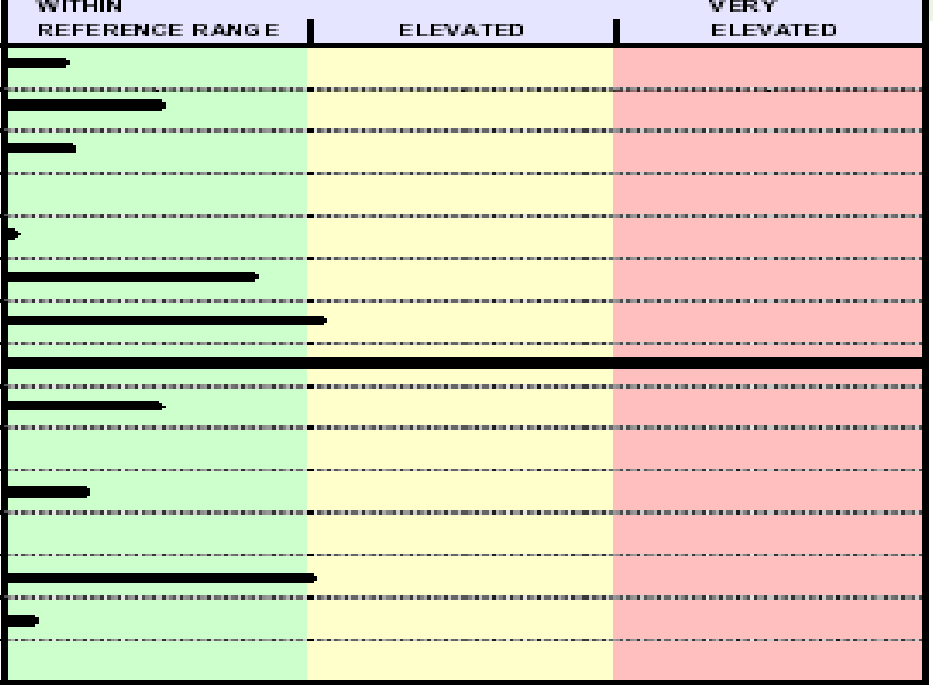
Mother of Child With Autism

POTENTIALLY TOXIC METALS

METALS	RESULT µg/g CREAT	REFERENCE RANGE
Aluminum	6.2	< 35
Antimony	0.5	< 1
Arsenic	27	< 130
Beryllium	< dl	< 0.5
Bismuth	0.3	< 15
Cadmium	1.6	< 2
Lead	5.4	< 5
Mercury	69	< 4
Nickel	5.9	< 12
Platinum	< dl	< 1
Thallium	0.2	< 0.8
Thorium	< dl	< 0.3
Tin	9.9	< 10
Tungsten	0.08	< 1
Uranium	< dl	< 0.2



CREATININE

	RESULT mg/dL	REFERENCE RANGE
Creatinine	130	35 - 225

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Environmental Health Perspectives 112 (2004):18

- Government researchers found that the amount of arsenic in chicken greatly exceeded the Environmental Protection Agency's new upper safety limit of arsenic allowed in drinking water.
- In fact, the amount of arsenic found in chicken was 6 to 9 times that allowed by the EPA.
- A "bucket" of KFC fried chicken would be expected to have up to almost 50 times the amount of arsenic allowed in a glass of water.
- How did the arsenic get into the chickens? The poultry industry fed it to them.

Smith AH, et al., "Cancer Risks from Arsenic in Drinking Water," Environmental Health Perspectives 97 (1992), 259-67.

- Arsenic is a human carcinogen linked to liver, lung, skin, kidney, bladder, and prostate cancers.
- It can also cause neurological, cardiovascular, gastrointestinal, and immune system abnormalities.
- Diabetes has also been linked to arsenic exposure.

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[redacted]

SEX: Male
AGE: 2

[redacted]

Toxic & Essential Elements; Hair

TOXIC METALS				
		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 68th 95th
Aluminum	(Al)	8.2	< 8.0	
Antimony	(Sb)	0.13	< 0.066	
Arsenic	(As)	0.87	< 0.080	
Barium	(Ba)	0.46	< 0.50	
Beryllium	(Be)	< 0.01	< 0.020	
Bismuth	(Bi)	0.11	< 2.0	
Cadmium	(Cd)	0.11	< 0.070	
Lead	(Pb)	18	< 1.0	
Mercury	(Hg)	0.86	< 0.40	
Platinum	(Pt)	< 0.003	< 0.005	
Thallium	(Tl)	0.002	< 0.002	
Thorium	(Th)	0.001	< 0.002	
Uranium	(U)	0.011	< 0.060	
Nickel	(Ni)	0.24	< 0.20	
Silver	(Ag)	0.72	< 0.20	
Tin	(Sn)	0.39	< 0.30	
Titanium	(Ti)	0.54	< 1.0	
Total Toxic Representation				

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[redacted]

SEX: Female
AGE: 4

[redacted]

Toxic & Essential Elements; Hair

TOXIC METALS		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 68th 95th
Aluminum	(Al)	28	< 8.0	
Antimony	(Sb)	0.057	< 0.066	
Arsenic	(As)	0.11	< 0.080	
Barium	(Ba)	1.3	< 0.75	
Beryllium	(Be)	< 0.01	< 0.020	
Bismuth	(Bi)	0.006	< 2.0	
Cadmium	(Cd)	0.019	< 0.070	
Lead	(Pb)	0.47	< 1.0	
Mercury	(Hg)	0.06	< 0.40	
Platinum	(Pt)	< 0.003	< 0.005	
Thallium	(Tl)	0.006	< 0.002	
Thorium	(Th)	0.010	< 0.002	
Uranium	(U)	0.078	< 0.060	
Nickel	(Ni)	0.11	< 0.30	
Silver	(Ag)	0.02	< 0.20	
Tin	(Sn)	0.05	< 0.30	
Titanium	(Ti)	0.48	< 0.90	
Total Toxic Representation				

Thallium High

Thallium (Tl) is a highly toxic element which, like lead and mercury, accumulates in many body tissues. Hair levels reflect exposure to Tl.

Common sources of Tl are: foods (marine organisms concentrate Tl up to 700 times), rodenticides/ pesticides tobacco, contaminated water, electronics components, fly ash, cement dust, and some fertilizers. Tl is rapidly and completely absorbed when ingested, inhaled or brought into contact with skin.

Symptoms of Tl excess include: sleep disturbances, cardiac, optical, dermatatological, liver, GI, and kidney dysfunctions. Albuminuria and alopecia are consistent with Tl excess. Potassium, selenium and sulfhydryl compounds (e.g. glutathione) diminish Tl retention and toxicity. Tl toxicity can have a long latency period before clinical symptoms become apparent.

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Urine Challenge Testing

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Do You Absolutely Need To Do Provocative Testing?

- ??? – It is useful to track excretion overtime, and is considered by many to be the standard for assessing total body burden to heavy metals.

HOWEVER…

- Approximately, 15% to 20% of people who do provocative, aka. “challenge” testing (*usually with intravenous or an oral chelator*) show no significant amount of metal on urine testing.

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Do You Absolutely Need To Do Provocative Testing

- Repeat hair testing may have some value to track metal excretion overtime – *checking hair every 3 to 4 months as an example.*
- **If doing urine challenge testing it is very important to first obtain a baseline urine test without the chelator to best compare the before and after tests.**

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URINE TOXIC METALS

Oral DMPS challenge using 7.5mg/Kg.

SEX: Male
AGE: 5

CLIENT#: 24898
DOCTOR: Kurt Woeller, DO
Stillpoint Center For Integrative Medicine
32605 Hwy 79 South Ste 201
Temecula, CA 92592

POTENTIALLY TOXIC METALS

METALS	RESULT µg/g CREAT	REFERENCE RANGE	WITHIN REFERENCE RANGE / ELEVATED / VERY ELEVATED
Aluminum	< dl	< 60	
Antimony	< dl	< 1.5	
Arsenic	37	< 130	
Beryllium	< dl	< 0.6	
Bismuth	< dl	< 20	
Cadmium	0.4	< 2	
Lead	< dl	< 5	
Mercury	42	< 5	
Nickel	7.6	< 15	
Platinum	< dl	< 1	
Thallium	< dl	< 1.1	
Thorium	< dl	< 0.5	
Tin	1.6	< 15	
Tungsten	< dl	< 1.5	
Uranium	< dl	< 0.2	

CREATININE

	RESULT mg/dL	REFERENCE RANGE	2SD LOW 1SD LOW MEAN 1SD HIGH 2SD HIGH
Creatinine	23	25- 180	

SPECIMEN DATA

Comments:
Date Collected: 2/8/2006
Date Received: 2/9/2006
Date Completed: 2/11/2006

Method: ICP-MS
<dl: less than detection limit
Provoking Agent:

Collection Period: Random
Volume:
Provocation:

Toxic metals are reported as µg/g creatinine to account for urine dilution variations. **Reference ranges are representative of a healthy population under non-challenge or non-provoked conditions.** No safe reference levels for toxic metals have been established.

V10.00

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URINE TOXIC METALS

Oral DMSA challenge
at 30mg/kg

CLIENT#: 24898
DOCTOR: Kurt Woeller, DO
Biohealth Centers
11770 Bernardo Plaza Court Suite 206
San Diego, CA 92128

ITIALLY TOXIC METALS

METALS	RESULT µg/g CREAT	REFERENCE RANGE	WITHIN REFERENCE RANGE / ELEVATED / VERY ELEVATED
Aluminum	< dl	< 100	
Antimony	< dl	< 2	
Arsenic	47	< 200	
Beryllium	< dl	< 0.6	
Bismuth	< dl	< 20	
Cadmium	< dl	< 3	
Lead	55	< 5	
Mercury	11	< 5	
Nickel	12	< 20	
Platinum	< dl	< 1	
Thallium	< dl	< 1.1	
Thorium	< dl	< 1	
Tin	2.2	< 20	
Tungsten	< dl	< 2	
Uranium	< dl	< 0.3	

CREATININE

	RESULT mg/dL	REFERENCE RANGE	2SD LOW 1SD LOW MEAN 1SD HIGH 2SD HIGH
Creatinine	18	15- 120	

SPECIMEN DATA

Comments:
Date Collected: 7/5/2004
Date Received: 7/8/2004
Date Completed: 7/15/2004

Method: ICP-MS
<dl: less than detection limit
Provoking Agent: DMSA

Collection Period: timed: 8 hours
Volume:
Provocation: POST

Toxic metals are reported as µg/g creatinine to account for urine dilution variations. **Reference ranges are representative of a healthy population under non-challenge or non-provoked conditions.** No safe reference levels for toxic metals have been established.

V10.00

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Heavy Metal Detoxification Therapy Options

- Oral vs Transdermal vs Intravenous vs Suppository.
- Combination of different forms
- Provocative testing versus just starting therapy.

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Heavy Metal Oral Challenge Testing

Oral Provocative Challenge (example):

- **DMPS** - 5mg to 10 mg/kg (average 7.5 mg). On the morning of the challenge empty bladder. Then administer all capsules of oral DMPS as single dose (bolus).
- **DMSA** - 20mg to 30mg/kg (average 25mg) – Do the same way as DMPS.
- Take on empty stomach (45 to 60 minutes) before breakfast or 2 hours after breakfast – *mixed with dilute juice okay*.
- Then collect all urine for next 6 hours.

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Heavy Metal Oral Challenge Testing

- No minerals 24 hours before or during the 6 hour urine collection.
- Generally, ½ to 1 liter of fluid on day of challenge.

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Challenge Testing with "Natural" Remedies

- Some have advocated to do challenge testing with supplement remedies, aka. "natural"
- <u>For Example:</u>
  - *NDF-Plus*
  - *Cilantro*
  - *Zeolite*
  - *Homeopathic Sprays*
  - *Transdermal*
- Personally, I have never seen significant metal excretion show up on urine challenge tests using these items.

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Testing Options

- **Standard Blood Tests** (CBC, Liver/Kidney, etc.)
  - *Before and every 2 months*
- **Blood Minerals** (***Red Blood Cell or Whole Blood***)
  - Before and every 2 to 4 months
- **Urine Essential Elements** and **Toxic Metals:**
  - Via challenge – *initially and after every challenge (done every 2 to 3 months).*
- Repeat Hair Test every 3 to 4 months
- Consider Organic Acid Test throughout detoxification process – *every 6 months.*

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Heavy Metal Therapy Options

- **DMPS** is available via prescription from some compounding pharmacies. Usually more expensive than DMSA.
- **DMSA** is available as prescription (i.e. Chemet 100mg), but some sources online still exist as supplement.
  - DMSA can also be obtained from compounding pharmacies.
  - **Living Supplements** – www.livingsupplements.com

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DMPS

DMPS (Dimercapto-propane sulfonate)

Is not Food and Drug Administration (FDA) approved in US. Listed with the FDA as a *"Bulk Chemical That May Be Used in Pharmacy Compounding."*

- Effective against a wide variety of metals such as mercury, arsenic, and lead. Also, removes cadmium (EDTA reported to be better for cadmium).

Oral:

- 1mg-3mg/kg/dose every 8 hours - *3 days "on" and 11 days "off."* Therapy can continue for months.
- Better oral absorption, approximately 45 to 50% compared to DMSA.

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DMSA

DMSA (dimercaptosuccinic acid) – FDA approved for lead removal in children.

Oral: Succimer (chemet):

- Available via prescription or online from certain supplement distributors

PDR (physician's desk reference) – 10mg/kg/dose every 8 hours for 5 days, then reduce to every 12 hour dosing for 2 weeks – <u>This recommendation is for acute lead poisoning.</u>

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DMSA

- ***"Traditional" (older) Biomedical Therapy Example*** – 10mg/kg/dose not to exceed 30mg/kg – every 8 hours - *3 days "on" 11 days "off."*
- General rule is to not exceed 2000mg/dose.

NOTE: many individuals develop digestive bloating and yeast exacerbation from high dose oral DMSA.

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Low Dose DMSA (example)

- Can dose more frequently at smaller dosages.
- For example:
  - Oral DMSA at 0.625mg to 1.25mg/kg every 3 to 4 hours for 3 days “on” and 11 day “off” for a few months to see how patients responds.
  - *NOTE: 0.625mg to 1.25mg = approximately 0.25mg (1/4mg) to 0.50mg (1/2mg) per pound (lbs) body weight.*
  - After a few months consider switching to 3 days “on” and 4 days “off.”

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Low Dose DMSA (example)

- This approach is well tolerated and easy to implement.
- After 2 to 4 months consider the implementation of Alpha Lipoic Acid, i.e. at 1/8mg to ¼ mg/lbs. body weight with each dose of DMSA.
- Then gradually increase to ½ to 1mg/lbs. body weight after 4 to 8 weeks – *as tolerated*.
- Take your time with this program. There is no need to rush and use higher dosages for most individuals.

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Calcium EDTA (CaEDTA)

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Calcium EDTA

- Used since the 1940's for lead toxicity
- Over 50 years of use as intravenous therapy
- CaEDTA (more so than magnesium EDTA, or other forms of EDTA) is more effective for lead and mercury detoxification.
- CaEDTA assists in aluminum detoxification, as well as cadmium.
- Oral powder absorption is listed as fairly poor – *suppository is an option.*

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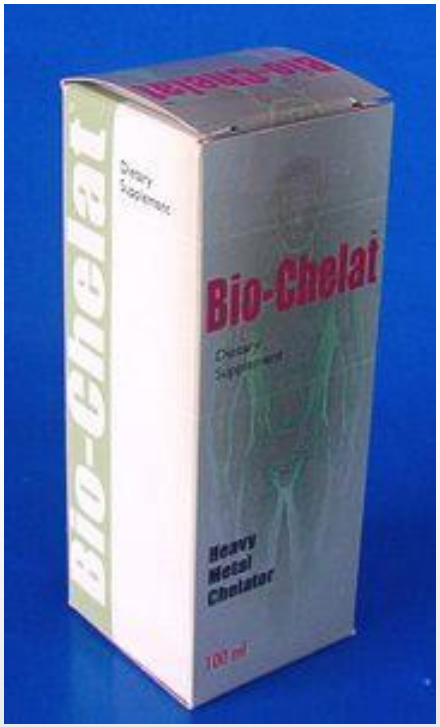
Calcium EDTA

- *Detoxamin (discontinued by FDA pressure)*
- **Kelatox** (900mg CaEDTA, 100mg B3, 100mcg selenium) in cocoa butter base.
- Dissolves in approximately 1-1/2 to 2 hours.
- Bypasses liver as it is absorbed from GI mucosa.
- Can also have compounding pharmacies make up CaEDTA suppositories at different strengths.

BioChelate



- Combination of Calcium EDTA, electrolytes, Sodium Bicarbonate.
- Alkalinity helps with cadmium detoxification.
- See www.nbnus.com **"Detoxification Support"** section for dosing specifics.

Low Dose CaEDTA

www.nbnus.com

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NDF-Plus

- **Children:** Start with 1 drop per day in 4 - 6 ounces of filtered water or juice once (1x) a day in the morning. Increase by 1 drop every 3 - 4 days, as tolerated. Work up to 26 drops twice (2x) a day.

- **Adults:** 3 - 6 drops in 6 - 8 ounces of filtered water twice (2x) a day. Increase intake by 6 drops every other day until intake is 52 drops twice (2x) a day. Stay hydrated with lemon and water. Ensure bowels are moving daily.

Clustered Cell Wall Chlorella

www.nbnus.com

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Intravenous (IV) Chelation

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Intravenous Chelation

- Most direct as it bypasses the gut and liver
- Primarily use DMPS and CaEDTA
- Can infuse along with Glutathione and/or Vitamin C for potential added benefit.
- Weekly, biweekly, monthly – *depends on tolerance level of individual.*
- If doing challenge – collect urine for 6 hours (minimum). Do baseline urine first like with oral.
- After IV infusion (ideally, 8 to 9 hour urine collection if using CaEDTA).

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Intravenous Chelation

Dosing Example *Only*:

- 1st IV – Glutathione 300mg to 900mg+

Infuse with approximately 15cc to 20cc normal saline (NS) or 15cc to 20cc of sterile water.

- 2nd IV – CaEDTA (10mg/kg) + 15cc to 20cc (NS) or sterile water.

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Intravenous Chelation

- 3rd IV – DMPS (1mg to 3mg/kg – avg. = 2mg/kg) + 15 to 20cc of NS or sterile water.

NOTE:

Glutathione: 300mg (less than 50lbs), 600mg (50 to 69lbs), 900mg (greater than 70lbs).

Vitamin C: 2000mg (less than 4 y/o), 3000mg (greater than 4 y/o).

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Comparing The Different Ways of 'Traditional' Heavy Metal Detoxification

- **I.V.** – *most direct*
- **Oral** – *readily available and easier to use.*
- **Suppository** – *not user friendly*
- **Transdermal** – *still an option, but not used to a significant degree anymore.*

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Various Alternative Options To Choose From

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Supportive Therapy

Additional Remedies

Lipoceutical Glutathione – ¼ teaspoon per 30lbs body weight BID (children) or 1.5 teaspoons BID for 10 days of adults – then to 1 teaspoon thereafter.

Epsom Salt Cream – 1 to 2 teaspoons QD to BID

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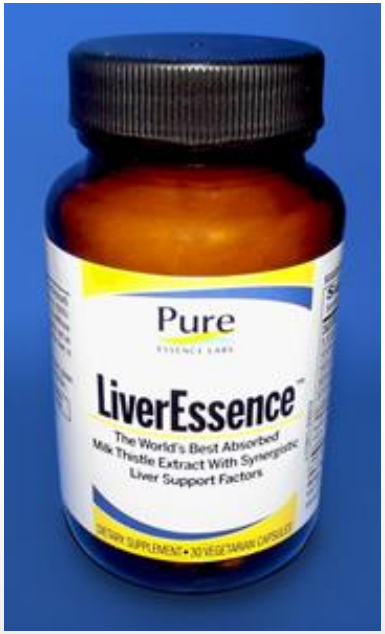
Liver Support



Liver Essence – contains Lipoic Acid, NAC, and Artichoke Extract – 1 to 2 capsules daily.

Milk Thistle – 1 to 2 BID

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Zinc

Zinc Picolinate – 1 capsule = 50mg

Liquid Zinc – 10 drops = 15mg Zinc Sulfate

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Minerals

- Multi-mineral combination, i.e. selenium, molybdenum, magnesium, potassium, zinc.
- Does not contain calcium.
- Hides well in juice – *a bit salty tasting.*

Chelate-Mate	**½ to 1 tablespoon daily**

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Thyroid

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Common Thyroid Disorders

- *Hypothyroidism* (underactive thyroid) – autoimmune cause = **Hashimoto's Thyroiditis**
- *Hyperthyroidism (overactive thyroid)* – most common cause is **Grave's Disease** (autoimmune)
- *Thyroid Nodules* – most are benign; approximately 4% are cancerous.
- *Sub-Clinical Hypothyroidism* – elevated TSH, normal T4.
- ***Stress , Toxicity, and Chronic Illness***

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How Does the Thyroid Work

- ***Hypothalamus –*** in response to low levels of circulating thyroid hormone, the hypothalamus will excrete TRH (thyroid releasing hormone) to stimulate the pituitary gland to produce TSH
- ***Pituitary Gland –*** in response to TRH, the pituitary will send TSH (thyroid stimulating hormone) to the thyroid gland.
- ***Thyroid Gland -*** in response to TSH, the thyroid will produce T4 and T3.
- ***Liver and Peripheral Tissues –*** Convert T4 to the more active hormone, T3.
- ***Problems with Conversion of T4 to T3 –*** stress, elevated cortisol, acute and chronic illness, fasting, formation of RT3, Selenium deficiency, heavy metals.

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Lab Testing - Thyroid Function

Laboratory Evaluation:

- ✓**TSH** – thyroid stimulating hormone
- ✓**T4** – thyroxine (free and total)
- ✓**T3** – triiodothyronine (free and total)

FREE = physiologically active (not protein bound)

- **Reverse T3 (RT3)**
- ✓**Anti-TPO** – thyroid peroxidase
- **Thyroglobulin Antibodies**
- ***Thyroid Releasing Hormone (TRH) Test (next slide)***

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Thyroid Releasing Hormone (TRH) Stimulation Test

- TRH stimulation test done most commonly with suspicion of Secondary Hypothyroidism – *damage to hypothalamus or pituitary gland*.
- Small amount of TRH given via injection (infusion)
- TSH levels then followed over a period of time with subsequent blood draws, i.e. 20 to 30 minutes.
- Normal HPA Axis – *increase TSH subsequent to TRH*
- Problem with HPA Axis – *delayed or absent TSH increase following TRH administration*.

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Deiodinases

- Deiodinase enzymes act as converting enzymes for thyroid function:
  - D1 (Type 1) & D2 (Type 2) – increase cellular thyroid activity: T4 to active T3 conversion.
  - D3 (Type 3) – decrease cell thyroid activity – increase reverse T3 levels (inactive).
- Respond differently to various environmental changes.
- Deiodinases influence cellular thyroid levels and not serum levels.

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Deiodinases

- General T4 to T3 conversion is controlled by D2 (Type 2).
- Peripheral cellular conversion is controlled by D1 (Type 1).
- PROBLEM = D1 negatively influenced by **STRESS:**
  - *Inflammation*
  - *Chronic infection*
  - *Emotional/Mental Stress*
  - *Toxins*

High Cortisol Downregulates D1

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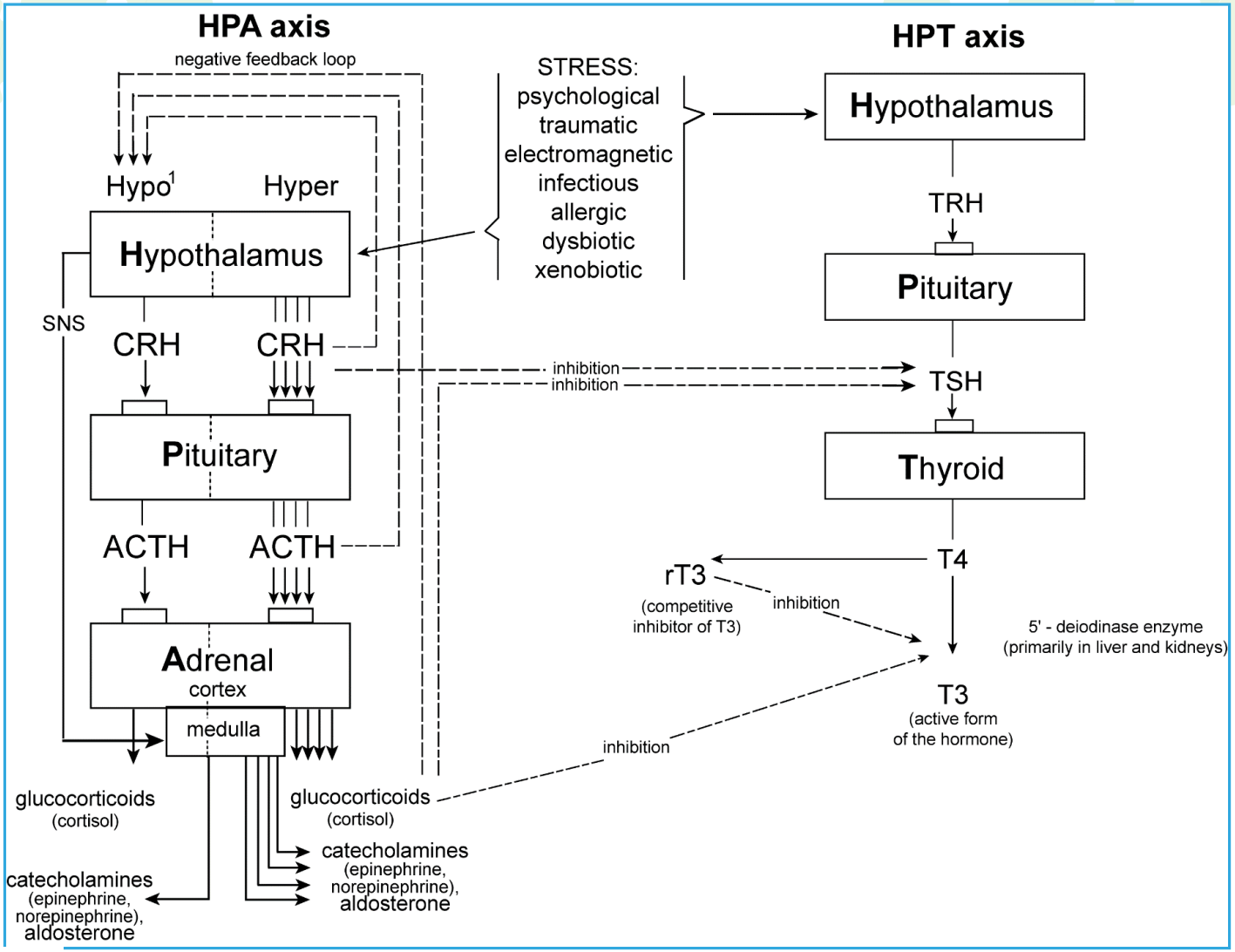
HPA and HPT Axes



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Thyroid Nutrients

Supplements:

- *Generally the same as for adrenal fatigue*
- *Mineral supplement* - should contain *Selenium* (at least 45-55 mcg) and *Iodine* (at least 200-500 mcg).
- *L-Tyrosine* – 500mg-1000mg per day
- ***Coconut Oil – 1 to 2 tablespoons per day***
- *Glandulars – bovine extracts of thyroid, pituitary and hypothalamus (optional).*

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Thyroid Hormone Replacement

Natural Thyroid:

- ***Dessicated Thyroid –*** porcine thyroid; contains T4 and T3 (and other cofactors) - Brand Names: ***Armour (most common),*** *Westhroid, Naturthroid.*

Ex: Armour is 20% T3 and 80% T4

Compounded Thyroid:

- T4 and T3 ratio can be formulated on desired amounts based on lab tests and patient
- Ex: Armour Thyroid at 30mg (1/2 grain) = 4.5mcg T3 and 19 mcg T4.

Synthetic – *Synthroid (T4), Cytomel (T3), Thyrolar (T3, T4)*

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Thyroid Herbs - examples

- ***Kelp (Bladderwrack, Fucus vesiculosis)*** – natural source of Iodine, activates thyroid function, can boost T4.
- ***Wild Oat (Aveena sativa)*** – restorative, nerve tonic, improves low libido and energy, supports thyroid.
- ***Coleus forskohli*** – stimulates the thyroid gland to release thyroid hormone.
- ***Licorice Root –*** balances the glandular system
- ***Nettles, Schisandra, Commifora mukur*** - endocrine tonic.

Common Improvements With Thyroid Therapy

- Improved focus and attention
- Less mood swings, decreased fatigue
- Increased mental energy and memory
- Accelerated growth
- Improved nail growth, skin color, warmth, and dryness
- Increased cardiovascular and muscular fitness
- Increased body temperature
- Better ability to handle stress

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Thyroid and Autism

- Early brain development dependent on proper thyroid function, i.e. migration of nerves cells, development of dopamine and cholinergic neurons.
- Helps with Methylation chemistry via support of MTHFR.
- Supports proper mitochondria function
- Gluten sensitivity – *can inhibit thyroid function.*

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Adrenals

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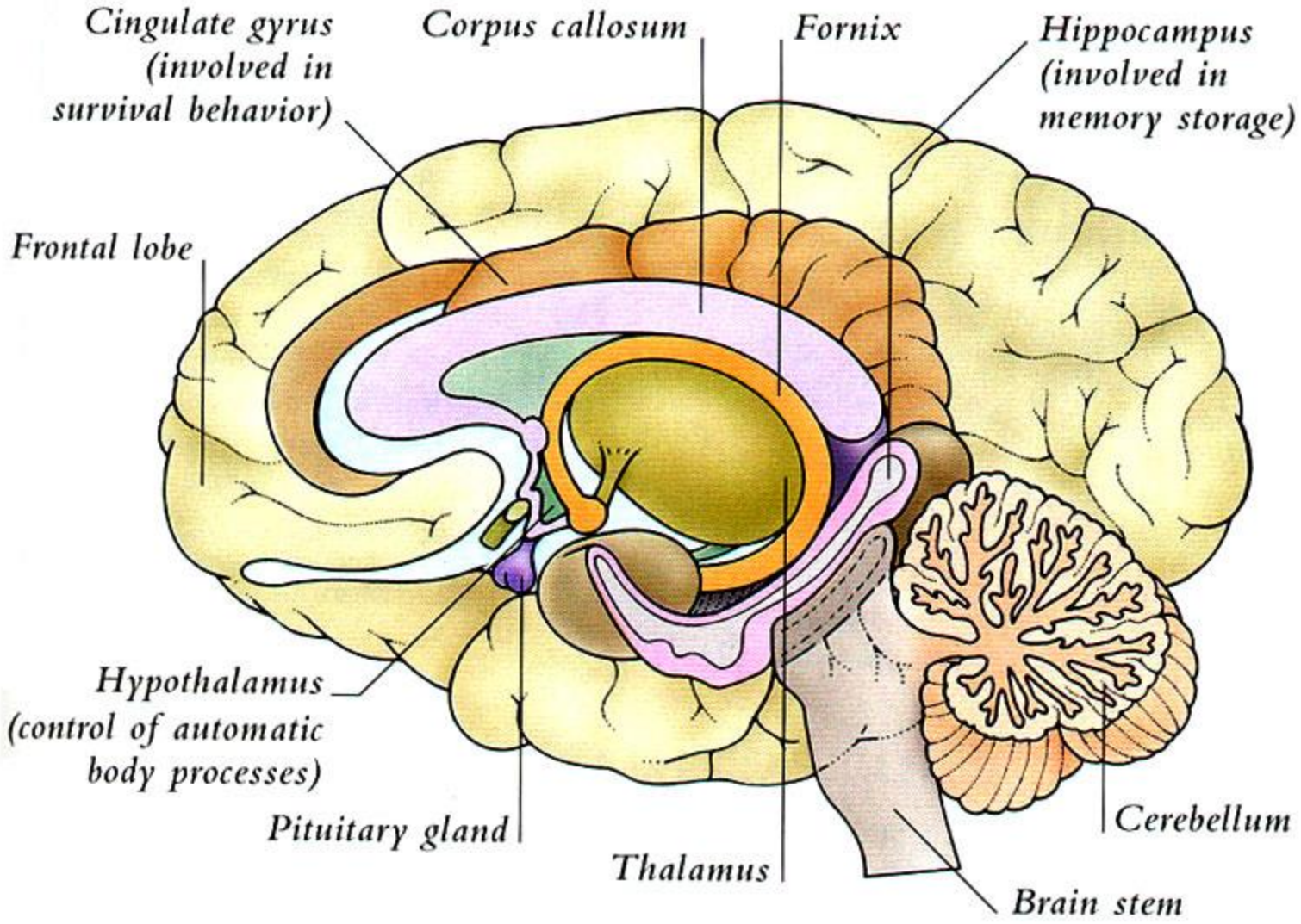
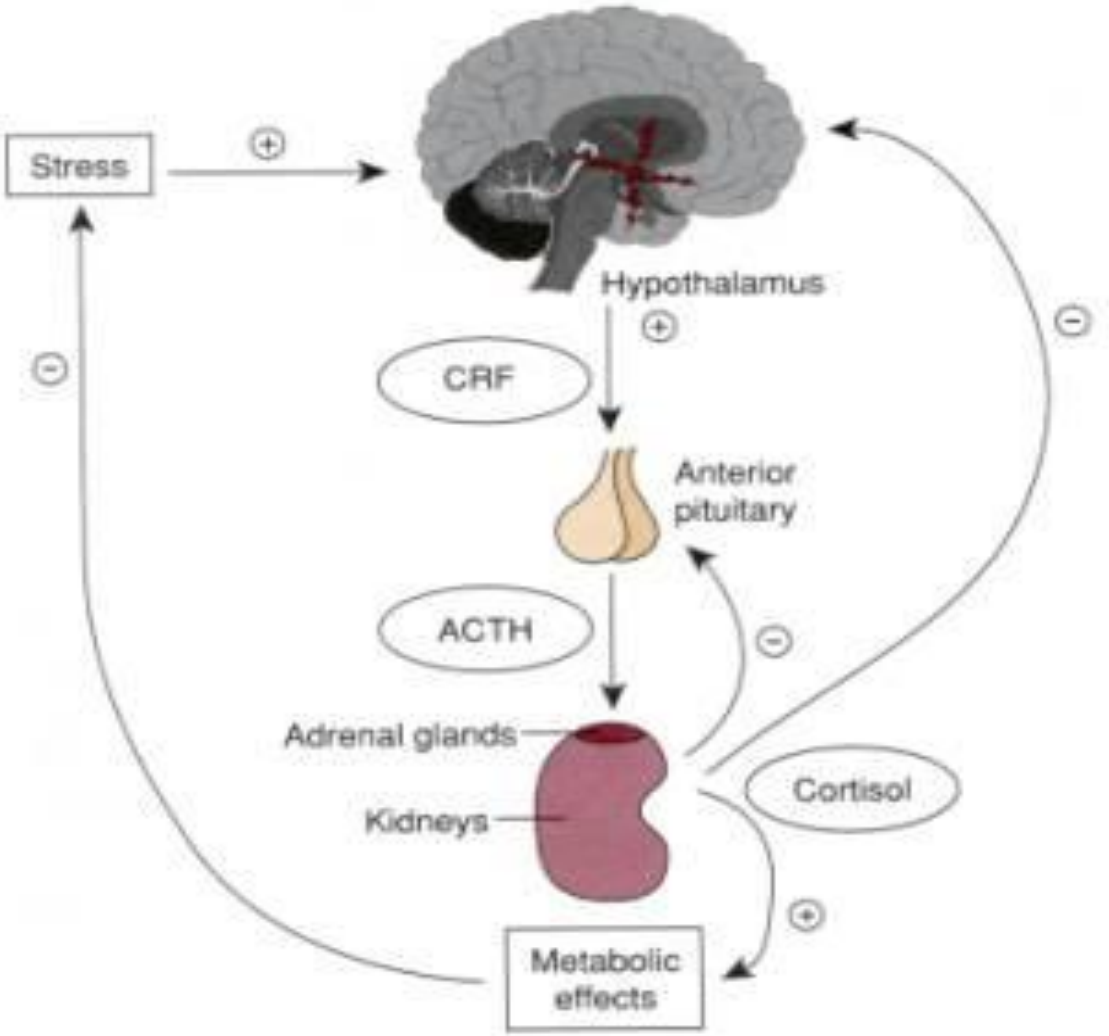


Hypothalamus-Pituitary-Adrenal Axis



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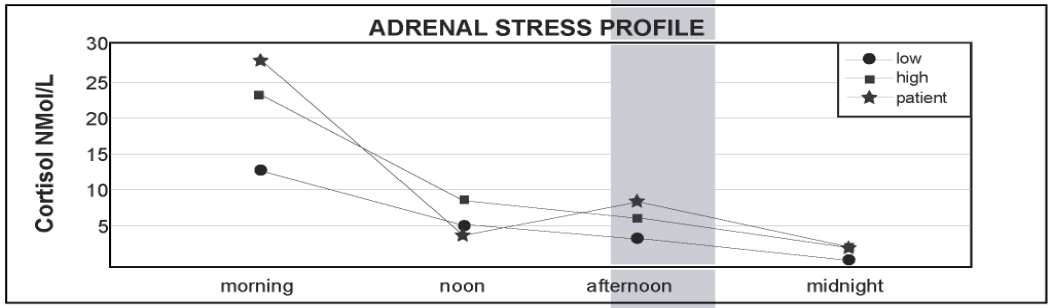
Functional Adrenal Stress Profile

* * * FUNCTIONAL ADRENAL STRESS PROFILE * * *

		NORMAL	ABNORMAL	UNITS	NORMAL RANGE
BHD #201					
MORNING	(6:00 - 8:00 AM)		27.0	nM	13.0 - 24.0
NOON	(12:00 - 1:00 PM)		3.0	nM	5.0 - 8.0
AFTERNOON	(4:00 - 5:00 PM)		12.0	nM	4.0 - 7.0
NIGHTTIME	(10:00 PM - 12:00 AM)		7.0	nM	1.0 - 3.0
CORTISOL SUM			49.0	nM	23.0 - 42.0
DHEA-S AVERAGE		3.0		ng/ml	2.0 - 10.0

BioHealth Diagnostics



	morning	noon	afternoon	midnight
low	13	5	4	1
high	24	8	7	3
patient	27	3	12	3

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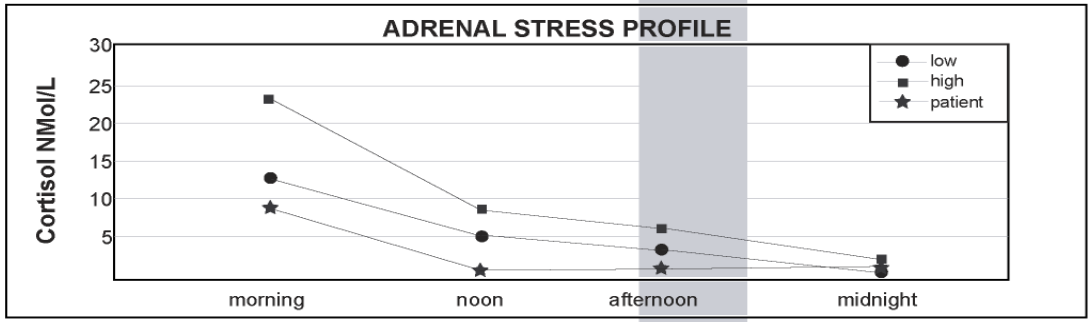
Functional Adrenal Stress Profile

* * * FUNCTIONAL ADRENAL STRESS PROFILE * * *

		NORMAL	ABNORMAL	UNITS	NORMAL RANGE
BHD #201					
MORNING	(6:00 - 8:00 AM)		9.0	nM	13.0 - 24.0
NOON	(12:00 - 1:00 PM)		0.9	nM	5.0 - 8.0
AFTERNOON	(4:00 - 5:00 PM)		1.2	nM	4.0 - 7.0
NIGHTTIME	(10:00 PM - 12:00 AM)		0.8	nM	1.0 - 3.0
CORTISOL SUM			11.9	nM	23.0 - 42.0
DHEA-S AVERAGE			0 .9	ng/ml	2.0 - 10.0

BioHealth Diagnostics



	morning	noon	afternoon	midnight
low	13	5	4	1
high	24	8	7	3
patient	9	0.9	1.2	0.8

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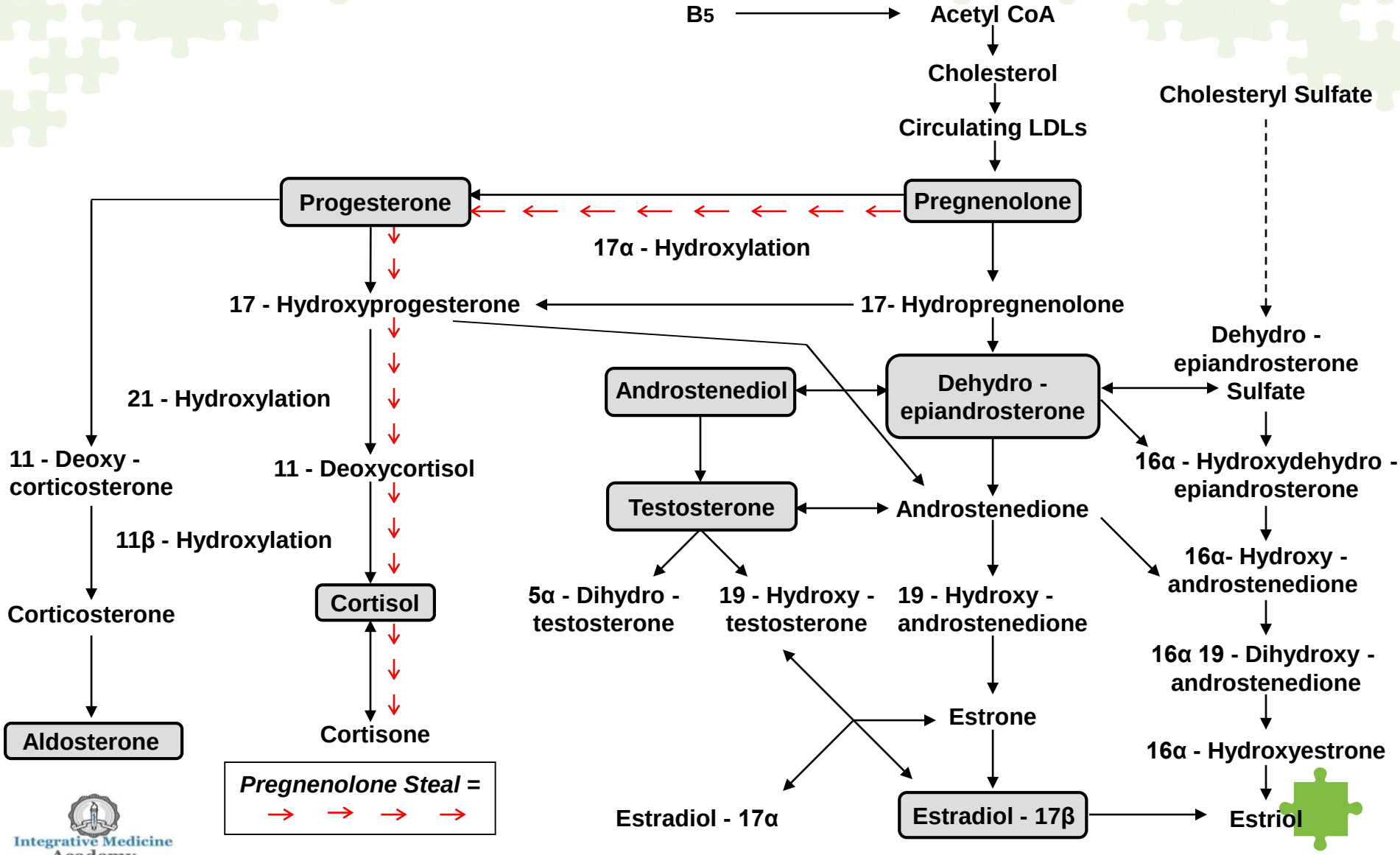
Steroidal Hormone Principle Pathways

(Illustrating the chronic stress response/pregnenolone steal)



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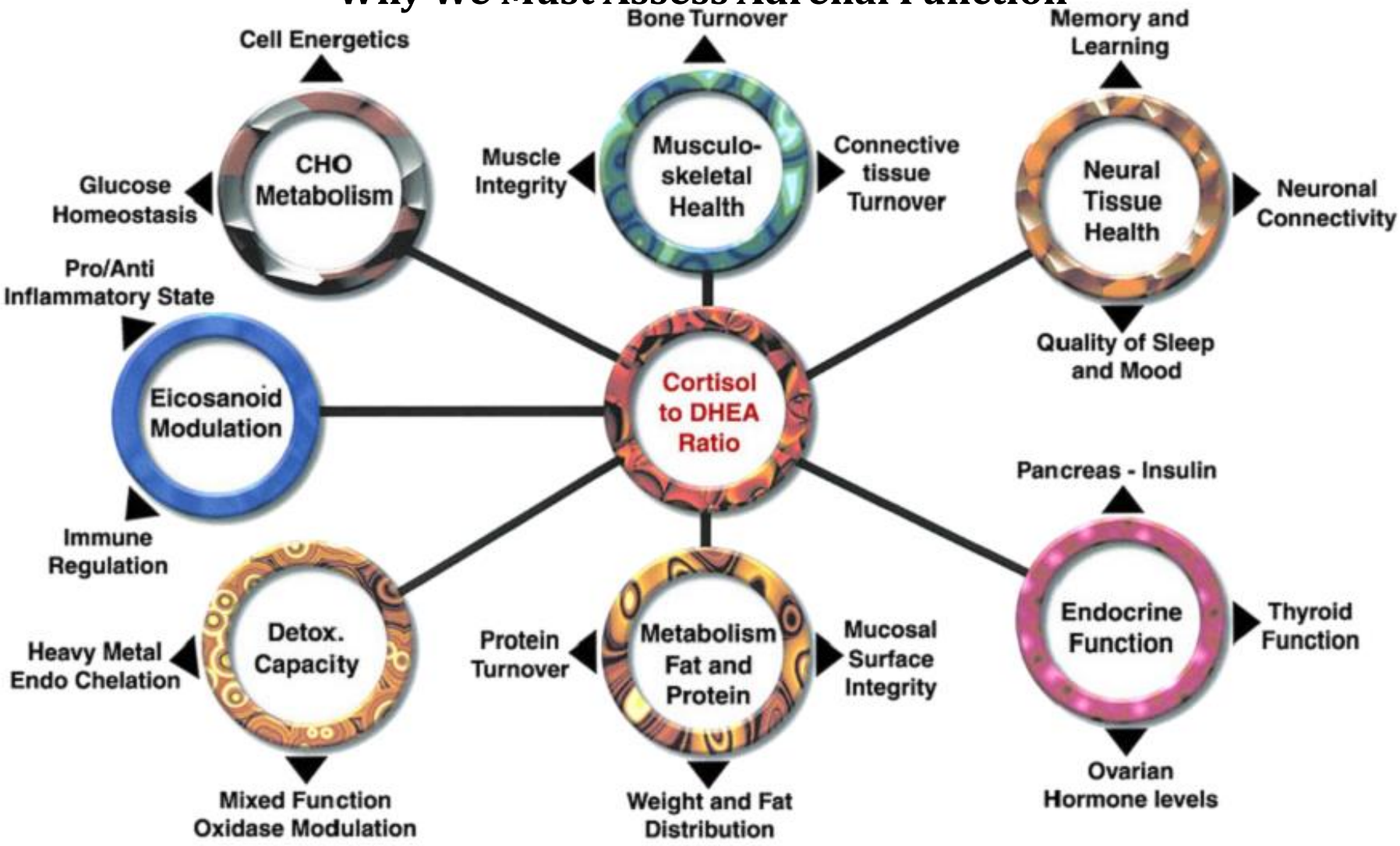
Physiological Aspects of Cortisol & DHEA

Why We Must Assess Adrenal Function



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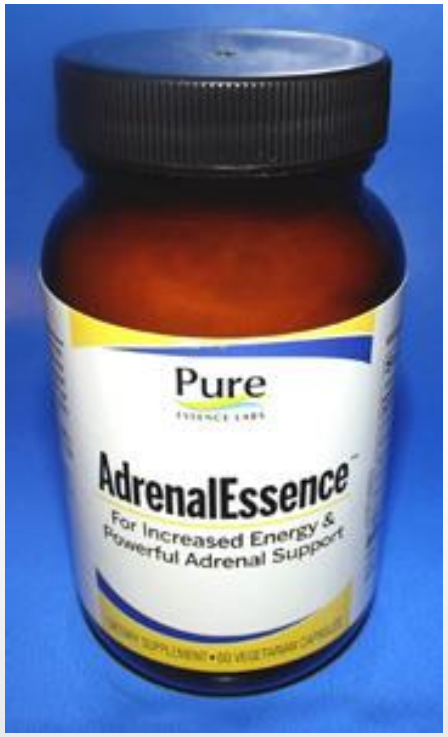
Herbal Adrenal Support



- Herbal combination:
  - Cordyceps
  - Ashwagandha
  - Eleuthro Root (siberian ginseng
  - Etc.
- 2 capsules daily

Adrenal Essence

www.nbnus.com

Adrenal Support Products

Bio-Identical Cortisol – Hydrocortisone

Bovine Cortex Glandular

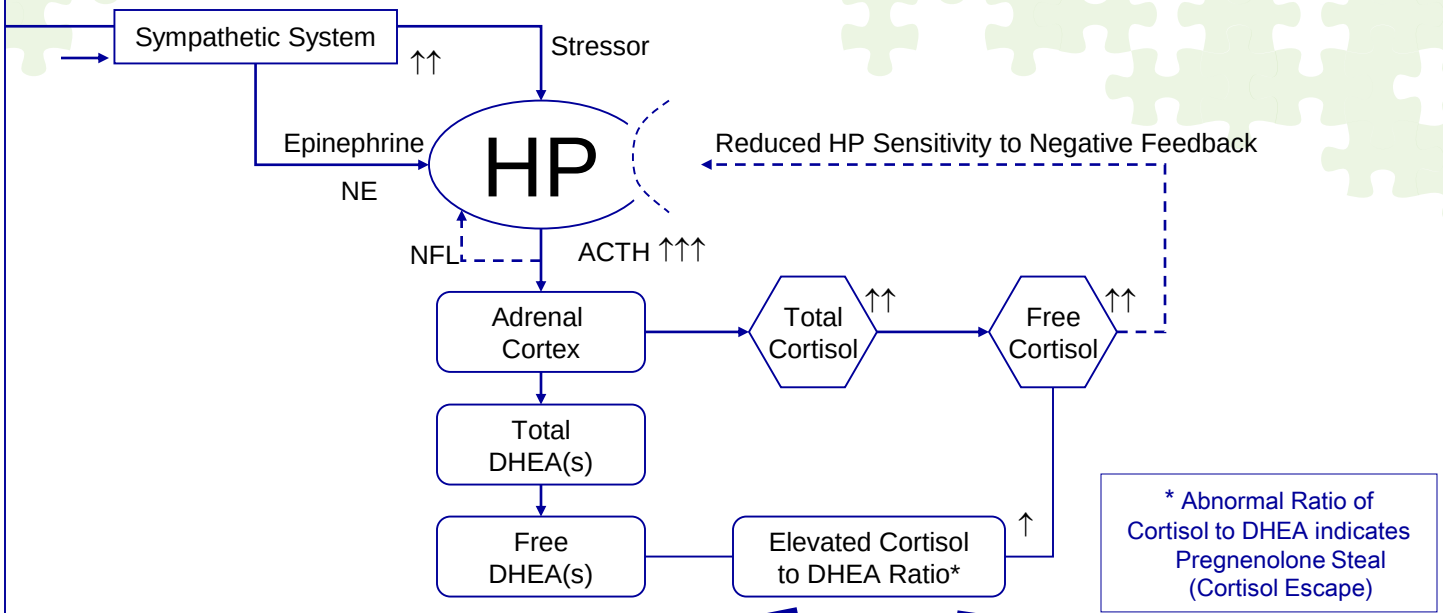
1 to 2 capsules daily

½ to 1 tablet QD to BID

Chronic Stress Response

Potential Sources of Stress

Anger - Fear
Worry/Anxiety
Depression
Guilt
Overwork
Physical and Mental strain
Excessive exercise
Sleep deprivation
Light-cycle disruption
Late hours
Surgery
Trauma/Injury
Whiplash – Head injury
Inflammation
Pain
Temperature extremes
Toxic exposure
Infections
Chemicals - Heavy metals
Electromagnetic fields
Radiation
Geophysical
Malabsorption
Maldigestion
Illness
Low blood sugar - Poor diet
Nutritional deficiencies
Allergies
Foods
Mold – Pollens



KEY

Association
Stimulus
Outcome
Inhibition

HP = Hypothalamus - Pituitary
NFL = Negative Feedback Loop
NE = Norepinephrine

Clinical Conditions

Chronic viral infections (EBV,CMV,Herpes I-II,etc.)
Increased infections
Yeast overgrowth
Allergies
Fatigue
Headaches
Autoimmune disease
Cancer
Cardiovascular disease
Insomnia
Hypoglycemia
Hunger
PMS
Depression
Irritable bowel
Digestive problems
ADD/ADHD

Thank You

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