

The Effects Of Tobacco On The Brain and Body

Warning

This
presentation
contains the
truth



**Nicotine dependency
complicates every
disease, condition or
illness treated at BMC.**

Entire Body Impact

Cancer

Voice box

Throat

Breast

Lung

Blood

Stomach

Pancreas

Kidney

Chronic Disease

Stroke

Blindness, cataracts

Aneurysm

Heart disease; Asthma

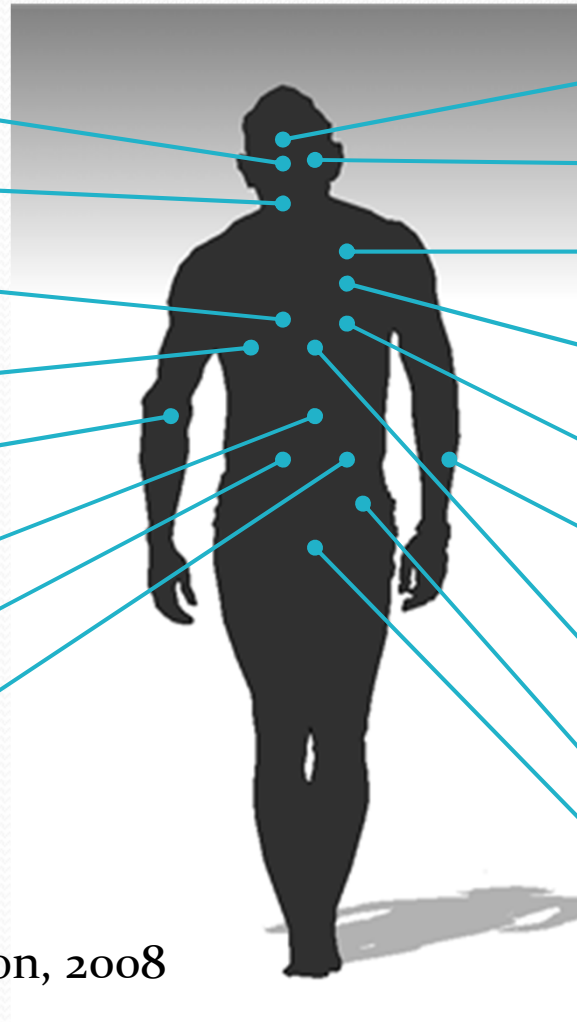
Pneumonia

Blocked blood flow to legs and arms

Lung airway blockage

Hip fracture

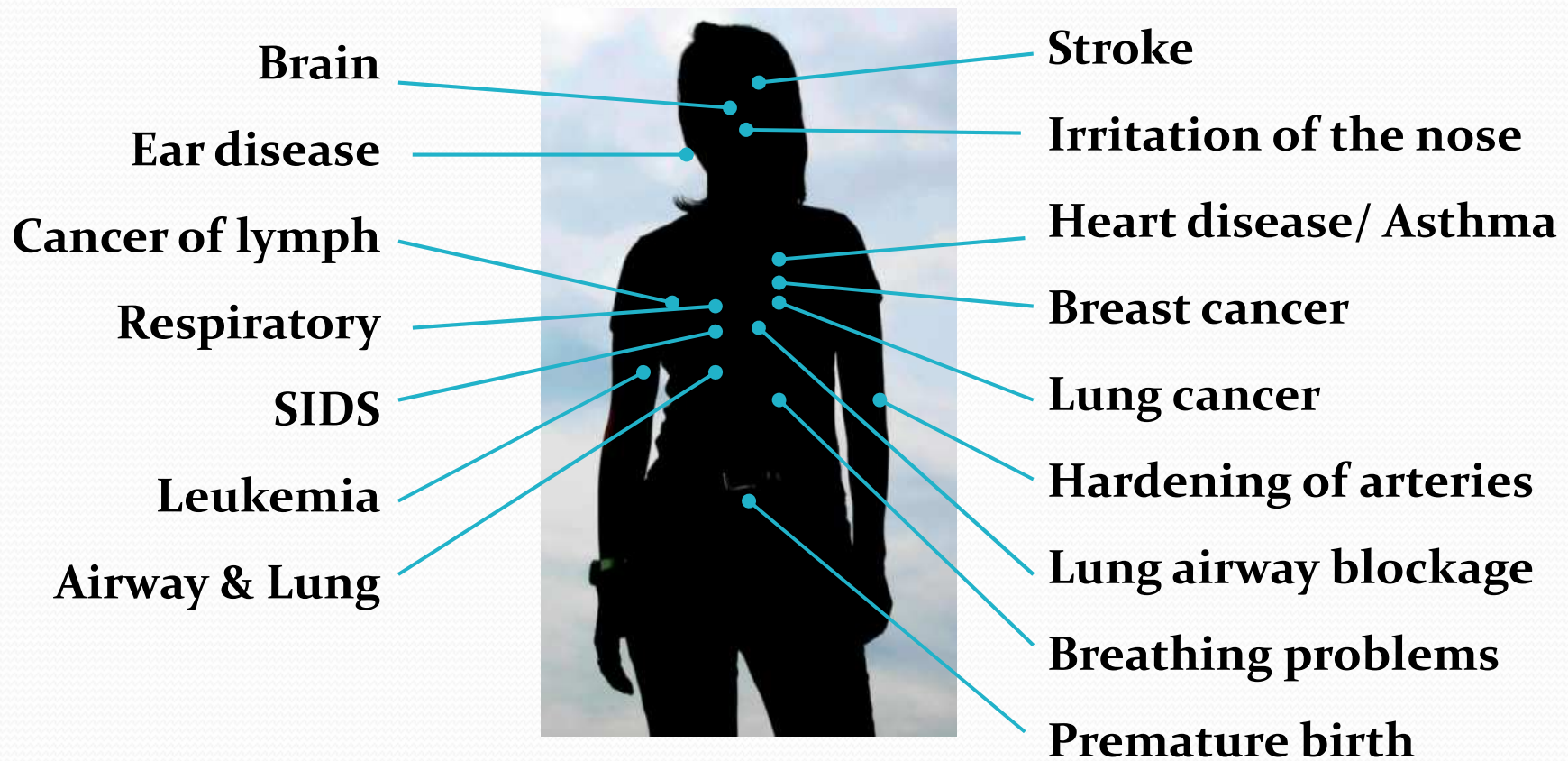
Reproductive disorders



Second Hand Smoke

Children

Adults



Nicotine Overview



Nicotine Overview - 1

- Nicotine is by far the most powerful and addictive drug known to humanity.



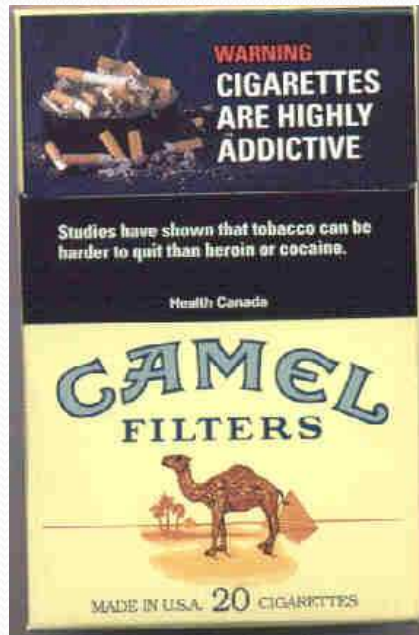
- Smoking represents the most extensively documented cause of disease ever investigated in the history of biomedical research.

Nicotine Overview - 2

- A couple of drops of pure nicotine on the tongue of a 160 lb person would kill them.
- Nicotine is deadlier than **snake venom**, **strychnine** and is three times deadlier than **arsenic**.
- Every puff on a cigarette delivers a small dose of “**super toxin**” via the lungs more rapidly than a dose of heroin injected directly into a vein.

Nicotine Overview - 3

- **Chemical dependency** on nicotine is more powerful than alcoholism, crystal meth or heroin addiction.
- Dependency researchers report that nicotine may be the most perfectly designed drug of addiction.



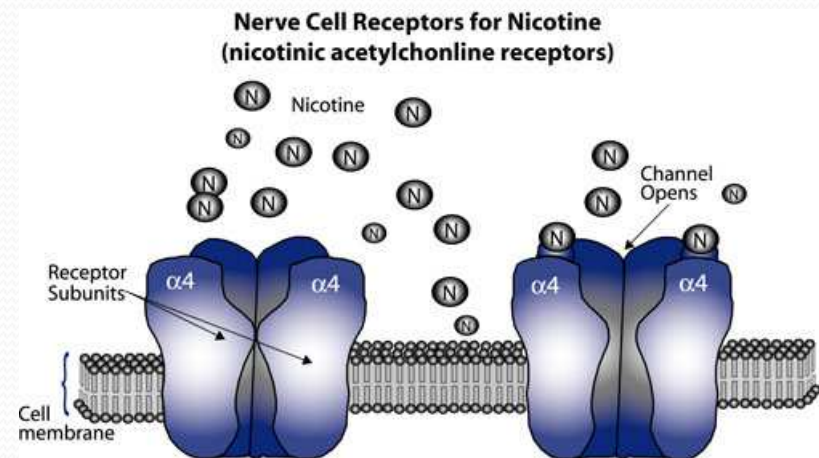
Nicotine Overview - 5

- **All** smokers show signs of physical and psychological nicotine dependency.
- MRIs show significantly less “grey matter” in the brains of smokers. (The loss of gray matter is proportional to the number of years smoked.)



Nicotine Overview - 6

- Long-term nicotine use:
 - Reduces the number of brain neurons
 - Increases the signs of cell death in brain tissue
 - Impairs working memory
 - Reduces the number of connections between neurons by 100 to 300%



Slaves To Tobacco

- Smokers learn to repress the basic human instinct to survive.
- Otherwise, they could and would not poison themselves 20-30 times a day.
- Nicotine craving competes with food, water and breathing.



Addiction – Monkey on your back

- Addiction research has clearly established that drugs with rapid onset are the most addictive.
- Nicotine's delivery time from lips to lungs and then to a major artery in the brain is 7-10 seconds.
- The clearance time is about the same.



Nicotine: The “Superman” of Addictive Substances

- More than 90% of people exposed to a single time cannot stop smoking.
- The addiction results in a *chemical tattoo* to the cortex which short-circuits free will.
- The need for nicotine chemically competes with the need for food, warmth or even breathing.



Nicotine: Powerful Addicter and Reinforcer

- Nicotine is a powerful reinforcer while the act of smoking offers what are initially experienced as positive reinforcements.
- The reinforcement becomes associated with multiple everyday cues and activities.



- So smoking becomes tied to many satisfactions each day.

Impacts of Use Early in Life

- The harmful effects of smoking begin at an early age and are cumulative.
- Some farm workers get nicotine poisoning after just one day of handling the leaves.
- Children on farms who are around the plants are taught never to touch them.
- Any nicotine exposure can set off mechanisms that lead to **tolerance**.

Impact on Immune System

- Nicotine impacts muscles, joints, tendons/ligaments, mental acuity and the **immune system**.
- Not only is the immune system by far the most powerful and effective healing force, it is so sophisticated that it builds a partial immunity to the continuous introduction of poison to the body.
- When someone teaches themselves to smoke tobacco, they build an immunity or **tolerance** to the bad taste and poisonous effects of the drug itself.

Nicotine Tolerance – The Trap

- Smokers develop **tolerance** to uncomfortable symptoms of smoking:
 - nausea
 - dizziness
 - headaches
 - stomach distress
 - coughing
- Tolerance: Nicotine use results in a decreased effect so you need more to obtain the effect of the original dose.
- Withdrawal symptoms begin almost as soon as a cigarette is put out.



Nicotine Tolerance – A Recipe For Disaster

- Immediately after lighting the next cigarette, the nicotine is replaced and the uncomfortable feelings go away. This creates the pleasant “ah ha” moments that smokers describe as enjoyable, relaxing or satisfying.
- Very few nicotine dependents know that the only reason they are lighting up is to try to feed the insatiable appetite for nicotine.
- One ingenuity of the nicotine trap is that it is **designed to keep smokers hooked for life** and that the more adversely it affects their health and pocketbook, the more securely they appear to be hooked.

The Nicotine “Buzz”

- The perceived pleasure (or “**buzz effect**”) of nicotine is actually the body overcoming nicotine's constricting effect on the blood vessels (**overcoming oxygen loss.**)
- **Tolerance** to the unpleasant physiological effects of smoking can take as little as a week to develop.



The Chain Effect

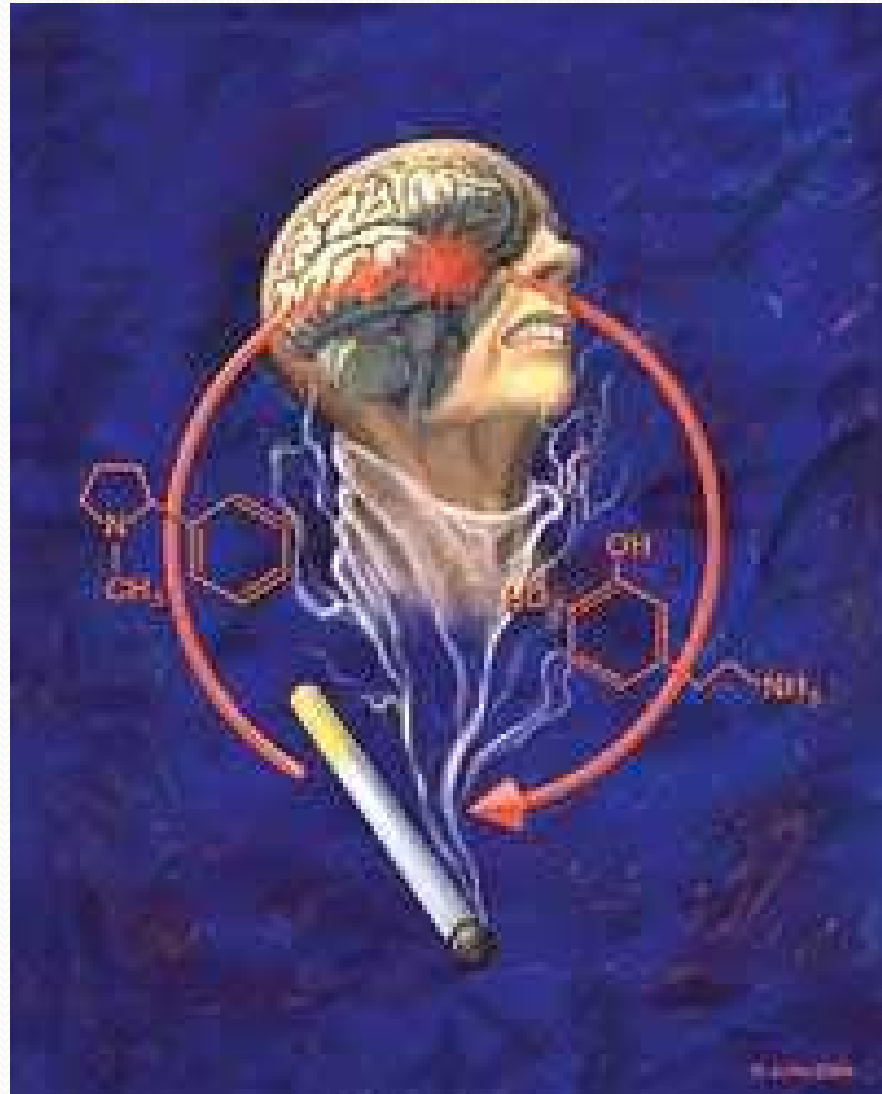
- All tobacco dependents fear what the drug is doing to them and they fear that they will not be able to enjoy or cope with life without it.
- With smoking there is a chain effect. Each cigarette creates the need for the next.
- By the time a smoker is so addicted that they are chain-smoking, they are completely immune to the effects of the drug and no longer even have the illusion that smoking provides pleasure or support.
- At the very time that a part of their brain wants them to smoke more and more, another part wants them to smoke less and less.

Addiction PLUS Habit

- Smoking is both a highly-repetitive or compulsive drug addiction and a **habit**. Habits are well-learned behaviors effected by environment; something a smoker sees or does in daily life – a cue or trigger – gets them going. Triggers are the stimuli associated with smoking and its reinforcers. Triggers tend to expand and make new connections which is why smokers may feel that almost everything they do has become a trigger.
- It is nicotine's effect on the heart, nervous system and endocrine system that significantly contribute to the relaxation, alertness, stress relief and other good feelings they experience while smoking. The combination of **physiological, psychological and social effects** provides so much positive reinforcement that smoking quickly becomes an established habit.

Nicotine Plus Habit = Vicious Cycle

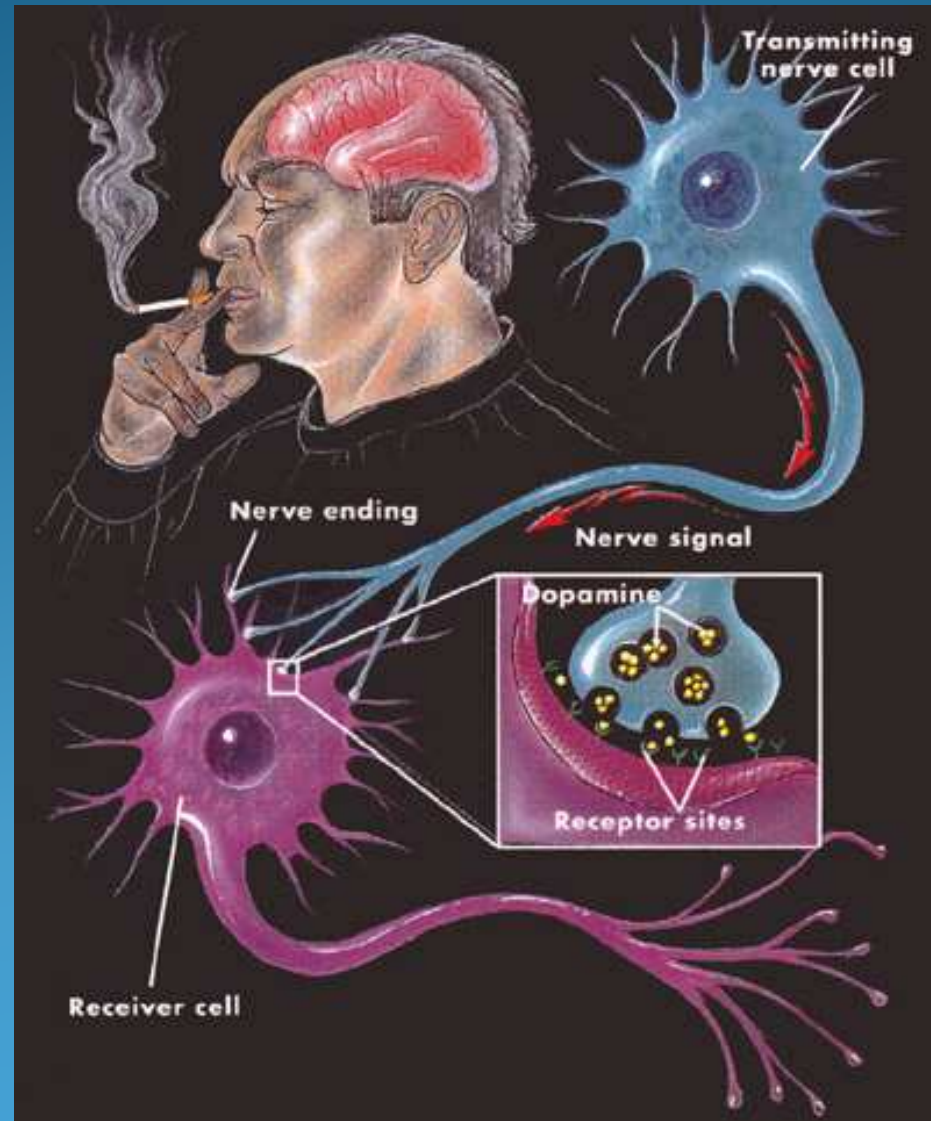
When tobacco changes the brain chemistry and hijacks the body's own pleasure system, the endorphins, it creates dependency on outside action – smoking – to alter mood. Smoking becomes rote, automated or what psychologists call “**overlearned**” habitual behavior.



Psychological Dependence

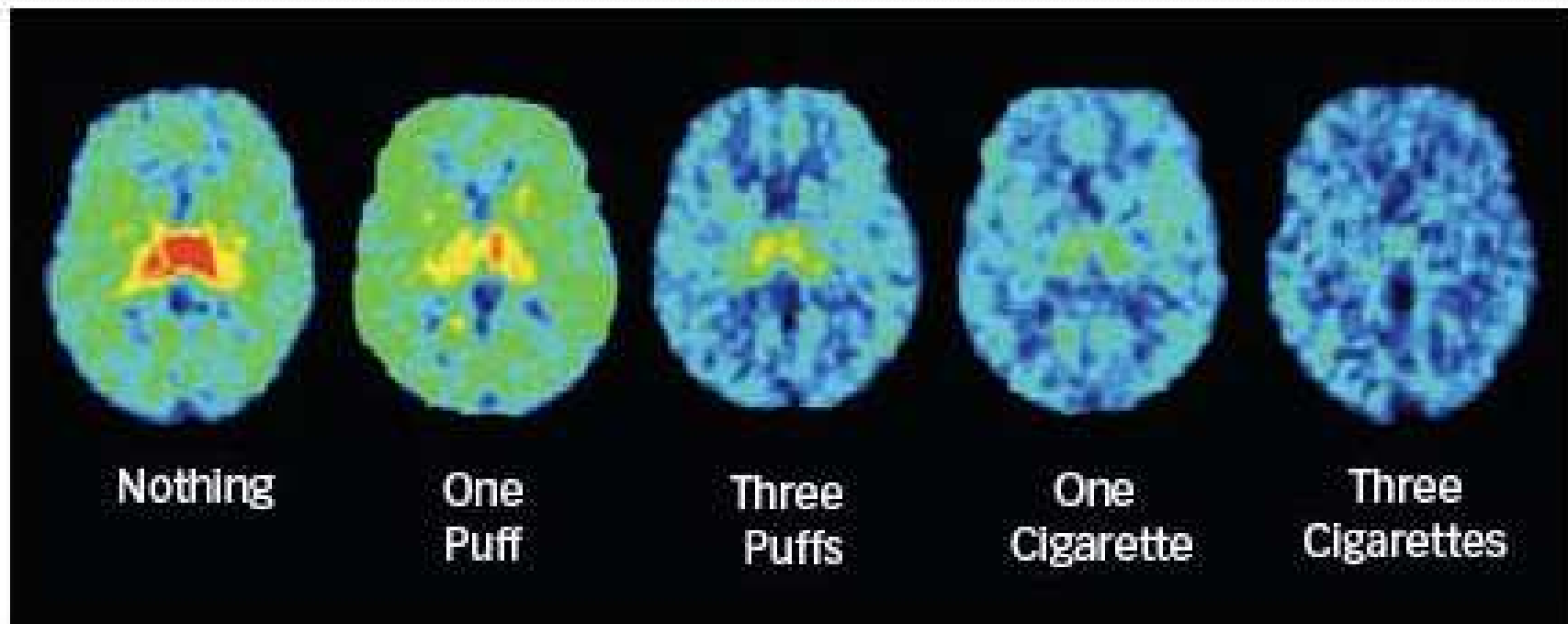
- After the habit is established, the smoker needs to smoke in order to feel “normal”, a condition referred to as **psychological dependence**. Smokers believe they are dependent on nicotine in order to live their lives the way that they do.
- One of the evils of all drug addiction is the ingraining in victims’ minds that they have some intrinsic flaw in their physical and/or mental make-up and are dependent on the magic provided by the drug in order to enjoy life or cope with stress. It is obvious that smoking provides no physical advantages, nor does it provide pleasure or a crutch.
- The **addictive process** and the **conditioning process** by which smoking becomes a habit work together to make smoking a lethal behavior that is **very resistant to change**. The conditioning makes the addiction worse and the addiction makes the conditioning worse. The key is to combat both processes together.

The Brain/Body Connection



Nicotine – The Brain’s Hitchhiker

Nicotine attaches to nerve cells throughout the brain in just 3 puffs.



Impact on the Brain

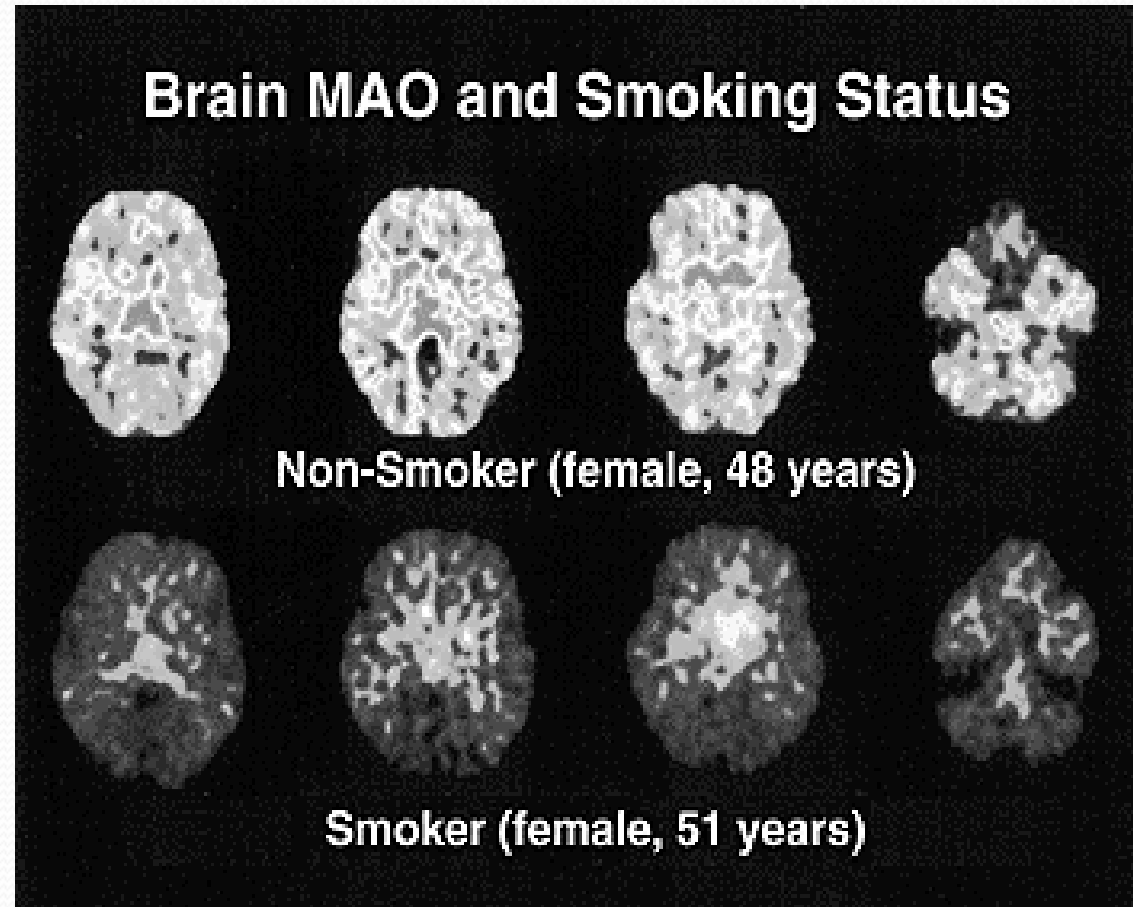
- Nerve cells in the brain and peripheral nervous system have special protein receptors on their surfaces to which nicotine binds.
- When a molecule of nicotine binds to a nicotine receptor, the receptor causes the neuron to transmit a nerve impulse to various target organs and tissues.
- This process stimulates the release of **neurotransmitters** (chemical messengers) which produce the physiological and psychological effects of nicotine.

Impact on the Brain

- Each neurotransmitter has its own specific family of receptors. Nicotine works by docking to a subset of receptors that bind the neurotransmitter, **acetylcholine**.
- Depending on what region of the brain a neuron is in, these altered chemicals - acetylcholine and norepinephrine – deliver signals from brain to muscles; control basic functions like energy level, heartbeats and how you breath; acts as “traffic cop” overseeing the flow of information to the brain and plays a role in learning and memory.

Nicotine: Dope For Dopamine

- Nicotine causes the release of **Dopamine** within 10 seconds of a puff.
- Nicotine also shuts off the flow of the chemical assigned to clean up dopamine once released – **MAO B**.
- MAO B is the “killjoy enzyme.”
- Suppressing the “Kill Joy’ enzyme” allows dopamine to linger far longer in the adjoining brain cells than a natural release.

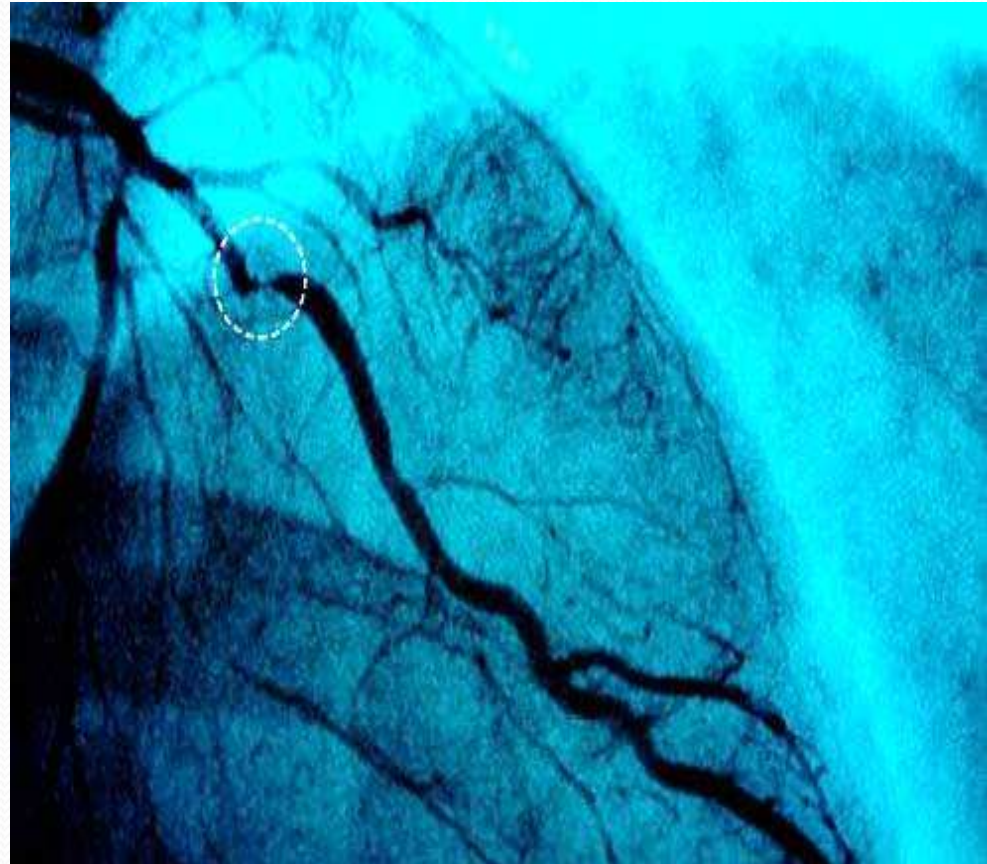


Brain Change = Brain Drain

- Even small amounts of nicotine affect adrenal glands which pump out adrenaline and **cortisol**. Cortisol is a stress response hormone that triggers the “fight-or-flight” response which:
 - shuts down the immune system
 - causes relaxation of many smooth muscles
 - raises metabolic rates
 - causes changes in the brain’s electrical activity
- The nicotine-caused changes to the brain are **long-lasting** and remain in brain tissue in the nucleus accumbens and ventral midbrain long after the smoker has quit. This nicotine residue leads to easy relapse.

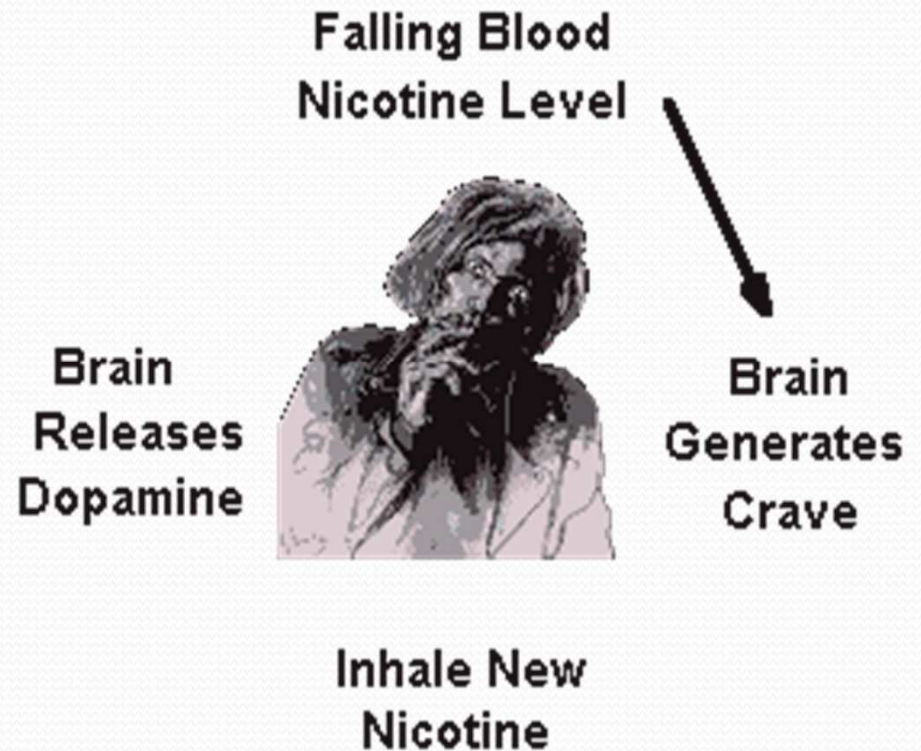
Impact on the Body

- Nicotine profoundly affects **hormones/ neurotransmitters**
- This affects the **nervous system** and the **cardiovascular network**.
- The result is diminished and eventually **destroyed breathing** ability and **elevation** of already dangerous levels of **carbon monoxide**.
- It also increases bad **cholesterol levels**, etc.



Impact on the Brain and Body

- The quick burst of energy (or “buzz”) from smoking a cigarette is closely followed by tiredness.
- The energy lasts only seconds and then the energy expended and the chemicals ingested drag your energy level right down.



Impact on Sleep



- Cigarette smokers are four times as likely to feel unrested after a night's sleep.
- Smoking results in less deep sleep, more easily disturbed light sleep.
- Nicotine withdrawal each night contributes to sleep disturbances.
- **Sleep deprivation** increases depression, anxiety and other psychiatric disorders.

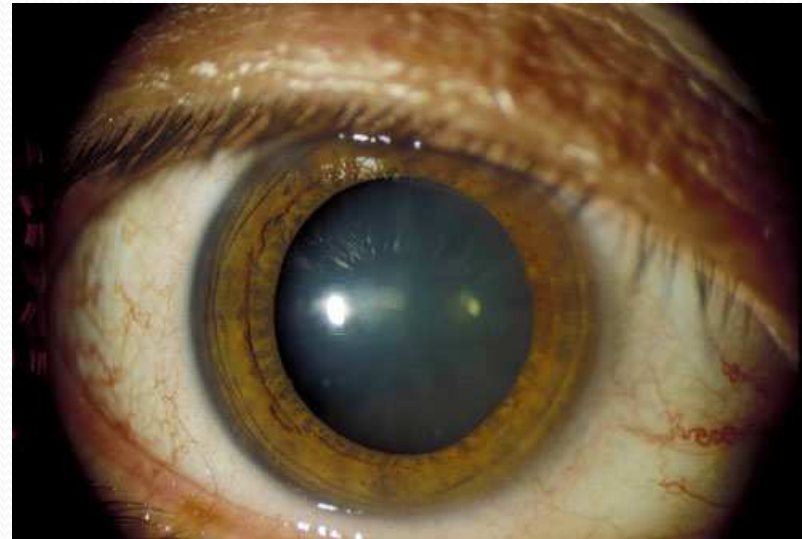
Nicotine and Insulin

- Nicotine also inhibits the release of insulin from the pancreas, a hormone that is responsible for removing excess sugar from a person's blood.
- This leaves the smoker in a slightly hyperglycemic condition, meaning he has more sugar in his blood than is normal. High blood sugar acts as an appetite suppressant, which may be why smokers think their cigarettes reduce hunger.

Smoking and Eyesight

Cataracts

- Increases the risk of cataracts as you age.
- These are cloudy areas on the lens of the eye that keep light from reaching the retina.



Serious vision problems are treated with *surgery*.

The Risk of Heart Attacks

- Smoking increases blood pressure and makes it easier for **blood to clot**.
- For people who have recently had heart attacks or have unstable irregular heartbeats, nicotine can **speed up the heart rate** and promote an irregular rhythm.
- The **arteries** that carry blood to the heart become narrowed over time.

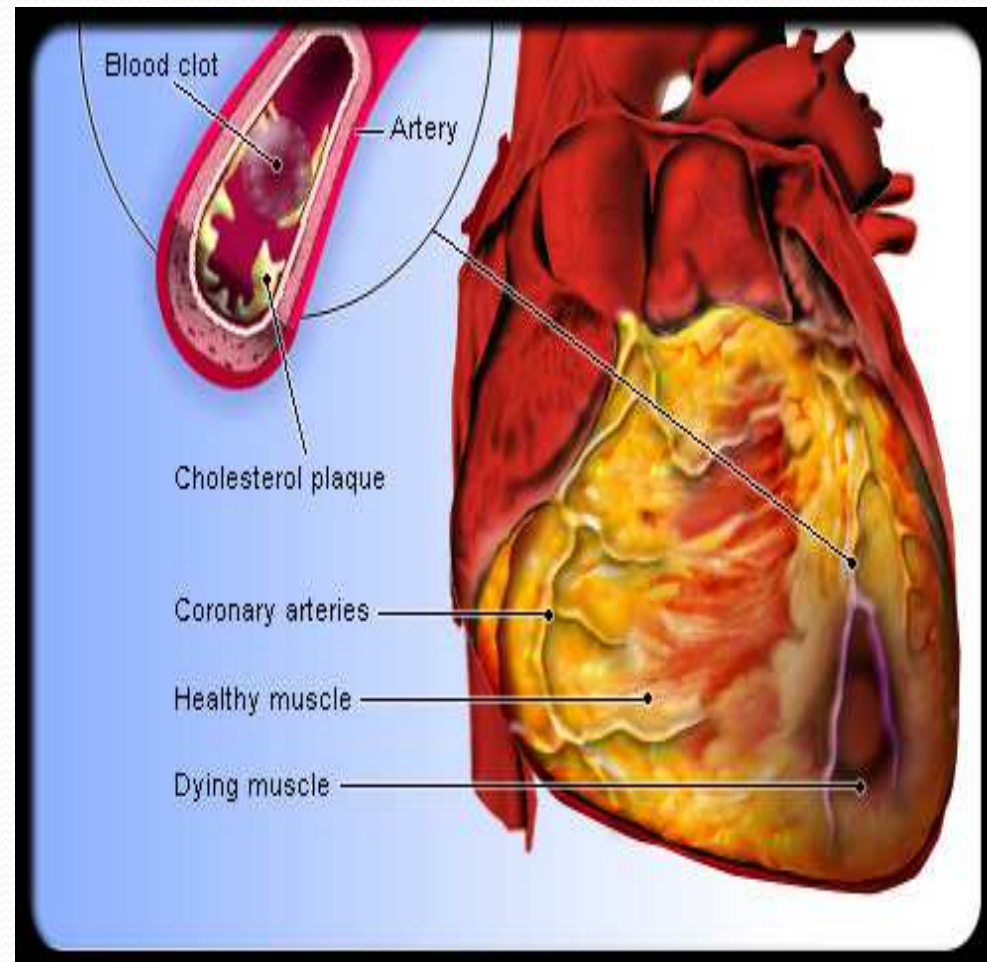


Second-Hand Smoke



Second-Hand Smoke and Cardiovascular Disease

- Secondhand smoke can and does cause cardiovascular disease and heart attack.
- Every year in the U.S., approximately 46,000 non-smokers who live with smokers die from heart disease.



Second-Hand Smoke and Cardiovascular Disease

- Brief exposure to secondhand smoke can have immediate harmful effects.
- People with **existing heart disease** are at especially high risk and should avoid *any* exposure.



Atherosclerosis, Strokes, Aortic Rupture

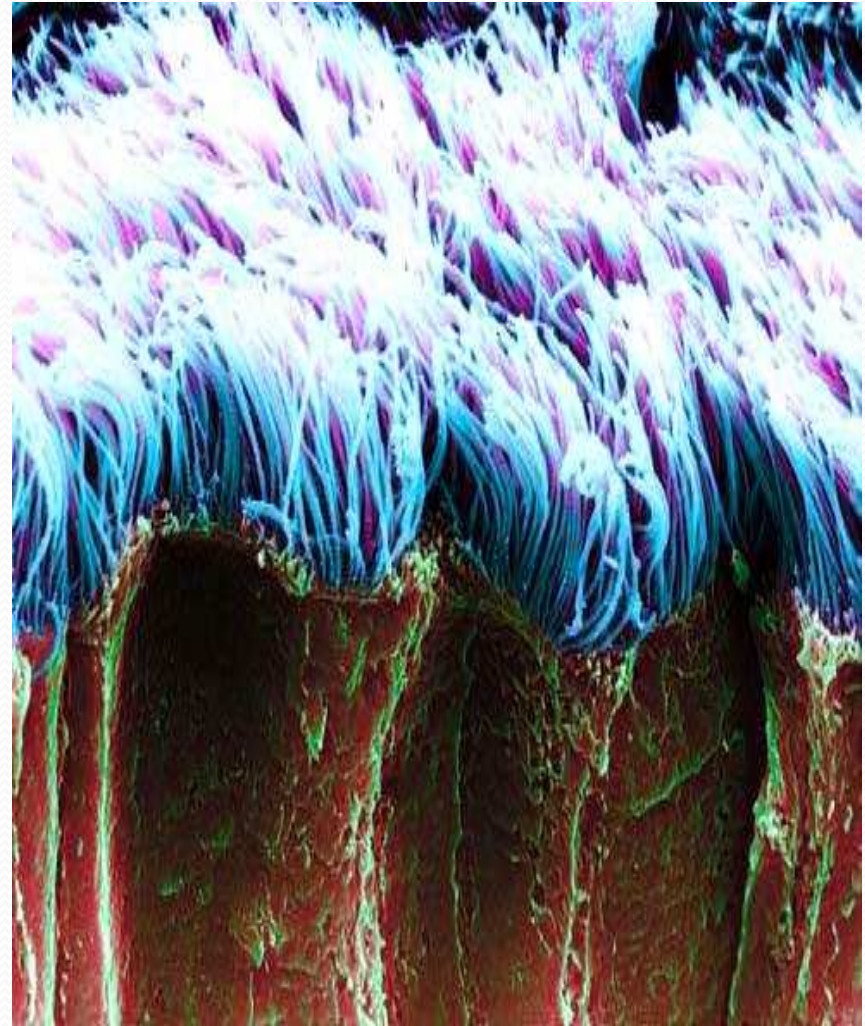
Early smoking by teens damages the blood vessels that can later lead to heart attack, stroke and aortic rupture.

White males ages 25 to 34 are twice as likely to have advanced damage (“atherosclerosis”) of the abdominal aorta as non-smokers.



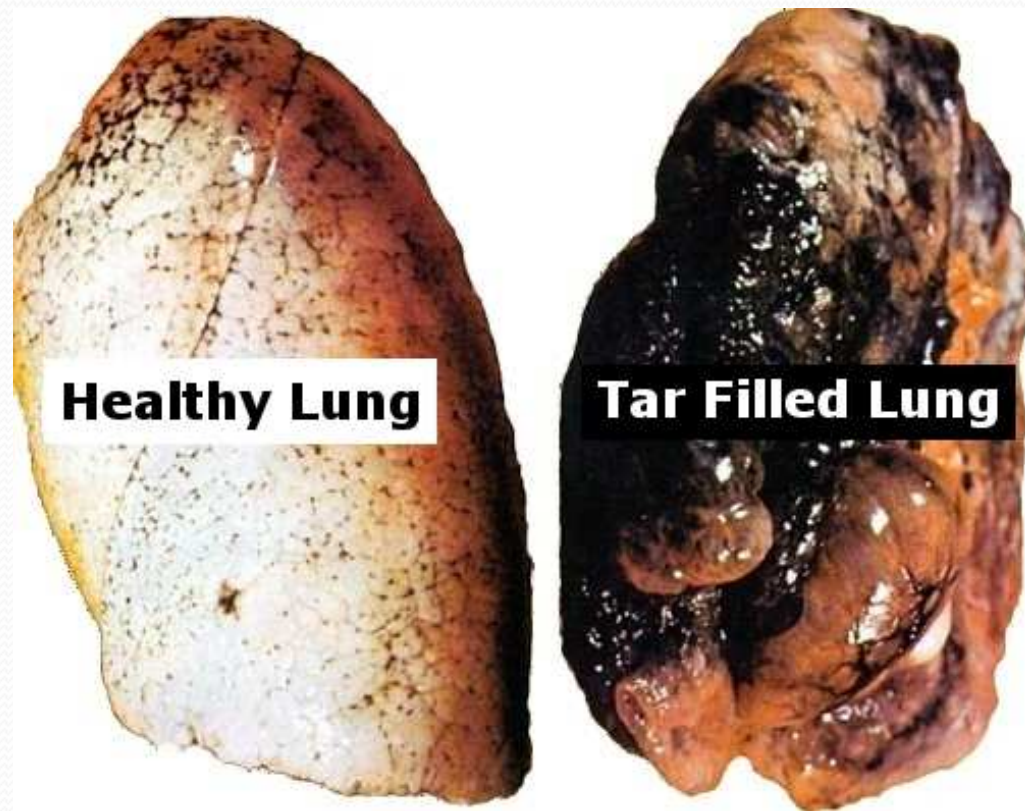
Smoking and the Lungs

- **Tar:** The oily, sticky, brown stuff that leaches out of cigarettes.
- Tar coats the inside of the lungs.
- The cilia are burned off by the hot smoke and paralyzed by nicotine.
- There is almost no resistance to the buildup of tar.



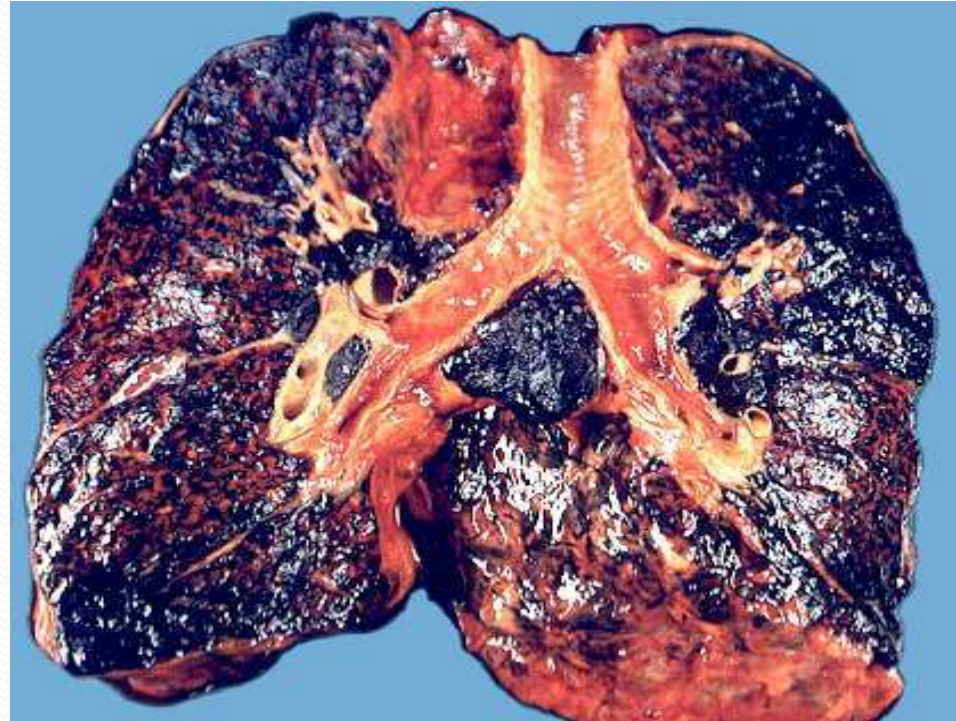
Tar Build-up in the Lungs

- The amount of tar accumulated in one year in the lungs can exceed a **full quart**.
- As the tar gets thicker and thicker, it traps more and more of the 1000's of poisonous chemicals in cigarette smoke.



Smoking and The Lungs

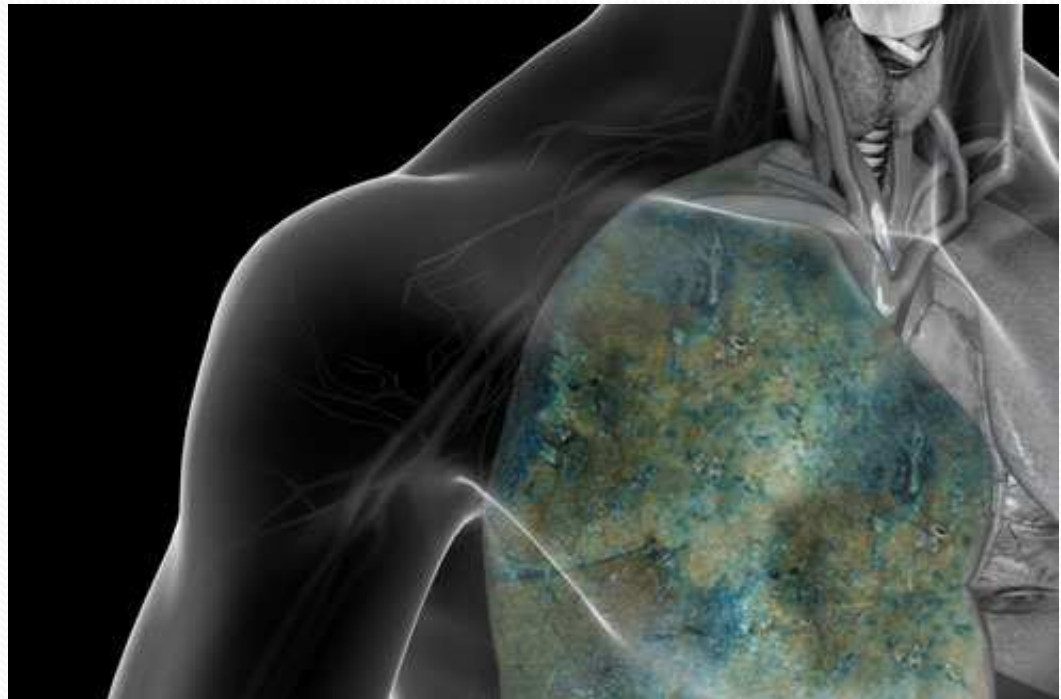
- The tar also causes the body to produce higher amounts of mucus in a constant attempt to clean the lungs.
- The mucus covers the remaining stubs of the embattled cilia.



Smokers are consistently bringing in new tar, while their body struggles to remove the old tar.

Lung Cancer

Lung cancer is the top cancer killer of men and women in the U.S.



Nine out of ten people who die from cancer will die from lung cancer.

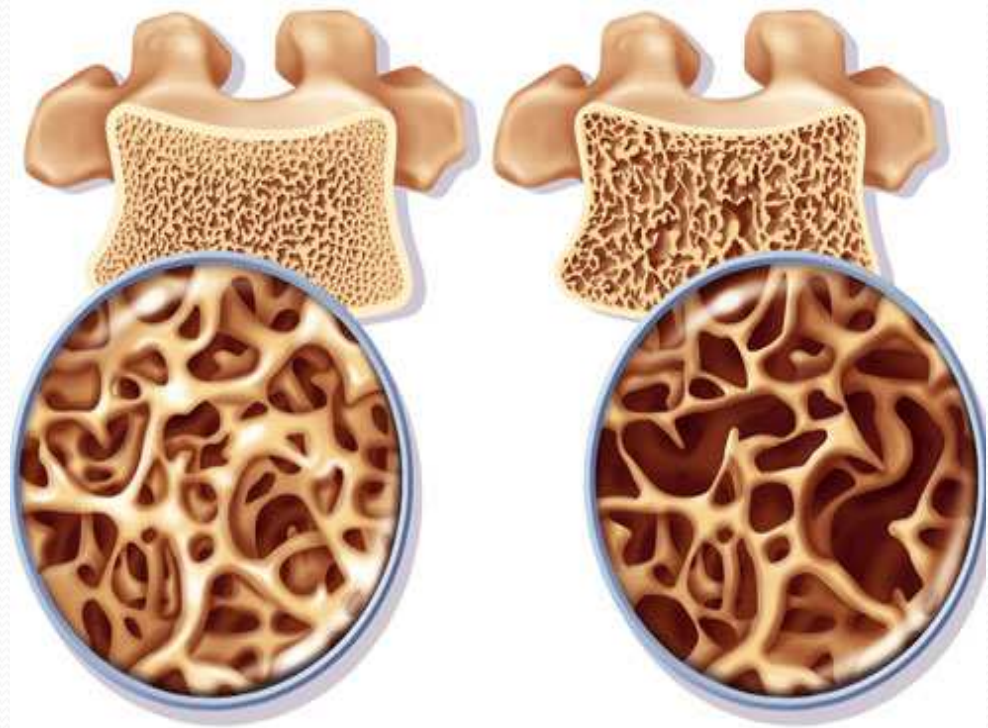
Smoking and The Lungs

- Even low exposure to tobacco causes permanent damage to lung tissue.
- ANY level of cigarette smoking or exposure to smoke makes the cells in the lungs sick.
- The growth of lung and lung capacity stops a year earlier in teens who smoke.
- Lung function declines 15 years earlier in smokers.

Brittle Bones

Smoking raises your risk of:

- Weak bones (osteoporosis)
- Bone fractures
- Curvature of the spine (leaving you hunched over)



Which Twin Is The Smoker?

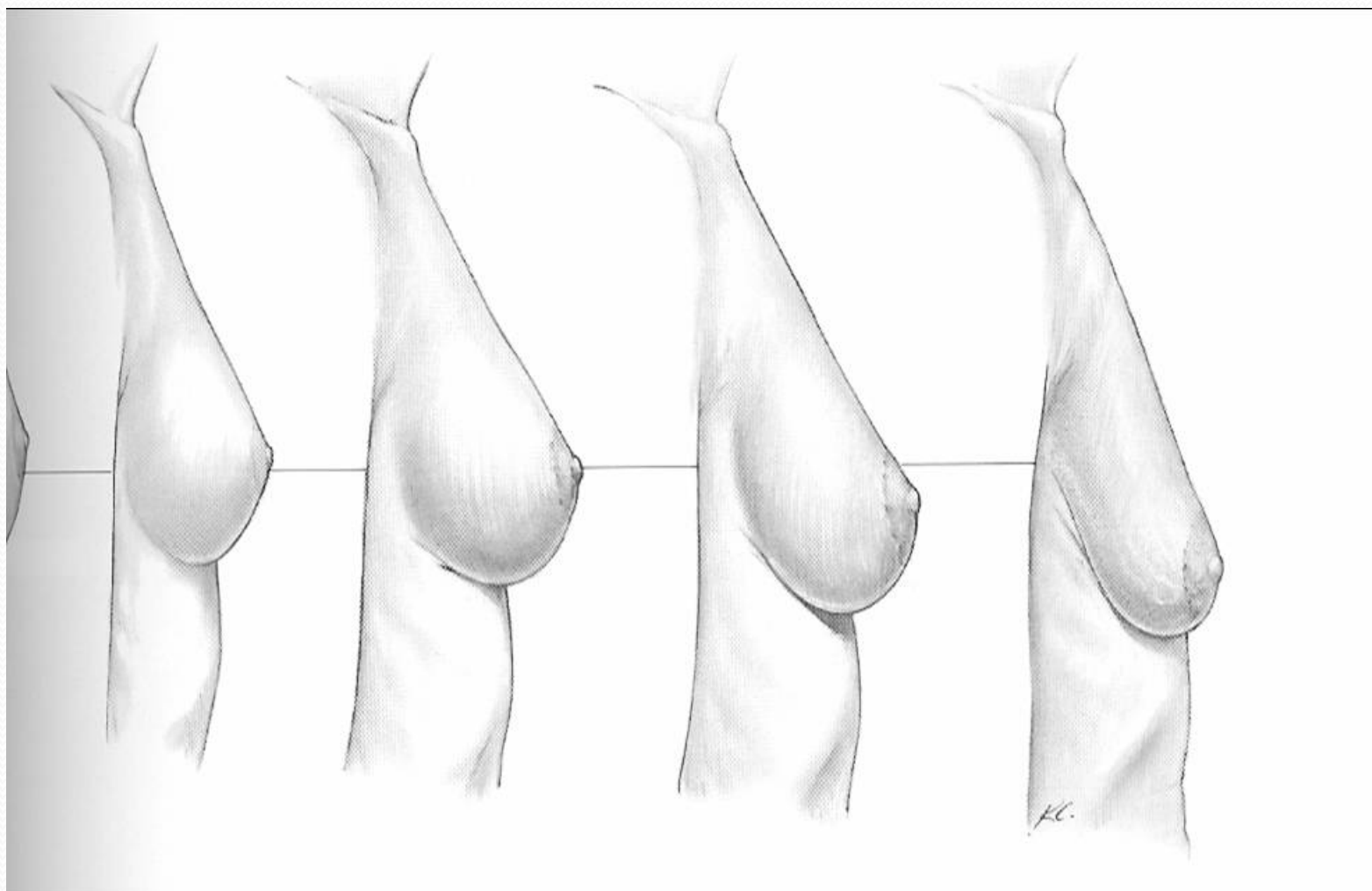


Smoking and the Skin

- Smoking
 - Changes the color of skin to a sallow-gray.
 - Can cause wrinkles on the faces of smokers as young as 20 years old!
 - Destroys collagen and elasticity.
 - Post operative scars of smokers are three times as wide as those of non-smokers.



Smoking Can Cause Sagging Breasts



Skin Damage: Age Spots



Skin Damage: Smoker's Pucker



Crow's Feet Eye Wrinkles



Did You Know...

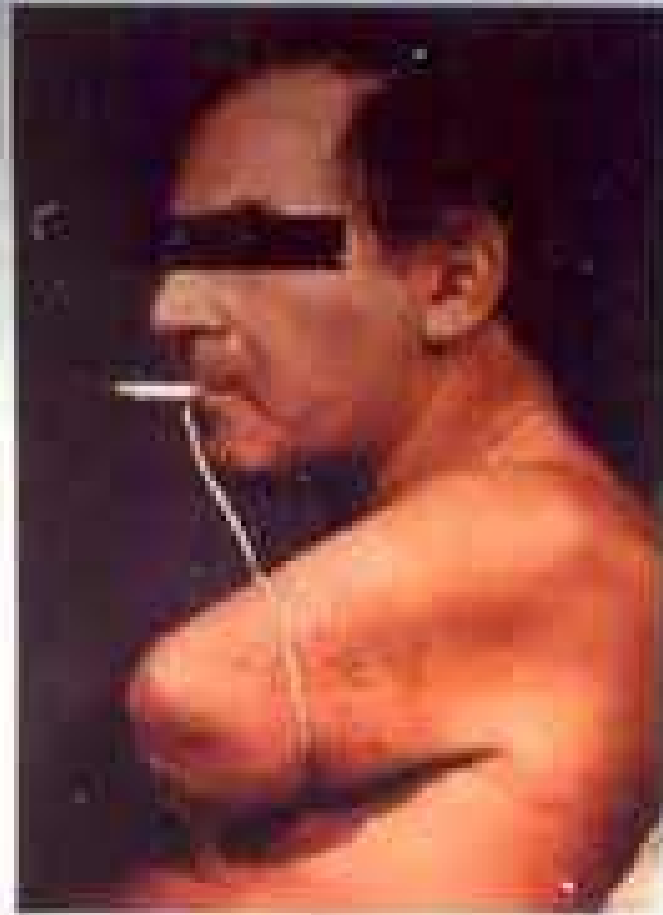
- During the quitting process, the tobacco tars released by healing tissues come in contact with vastly enhanced senses of smell and taste. This can result in extremely **vivid nicotine use dreams**.
- **More women die** each year from **lung cancer** than from breast cancer.
- Women who smoke are also at a much higher risk of heart attacks and strokes.
- Nicotine doubles the rate by which the body **depletes caffeine**. If no intake reduction is made when quitting, blood-caffeine levels will rise to 203% of a normal baseline.

Did You Know...

- Nicotine kills off the beneficial bacteria in a healthy **colon** designed to complete the digestion process, resulting in poor nutrition.
- Instead of leading to constipation in the smoker, nicotine also has the effect of **artificially stimulating the bowel**, so the problem is not discovered until the smoker stops smoking.
- **Buerger's disease** has been linked to tobacco use and causes blood vessels in the hands and feet to become blocked. It can result in infection or gangrene, sometimes leading to amputation. This can occur as early as age 30.

Buerger's Disease

- **Self mutilation** by smoking.
- The patient lost all four of his limbs to this smoking-related disease but still manages to feed his nicotine addiction.
- His cigarette holder was made out of a coat hanger by one of his friends on the ward.



Self-mutilation by smoking – this patient had all four limbs amputated for a Buerger's type of arteritis. His cigarette holder was made out of a coat hanger by one of his friends on the ward.

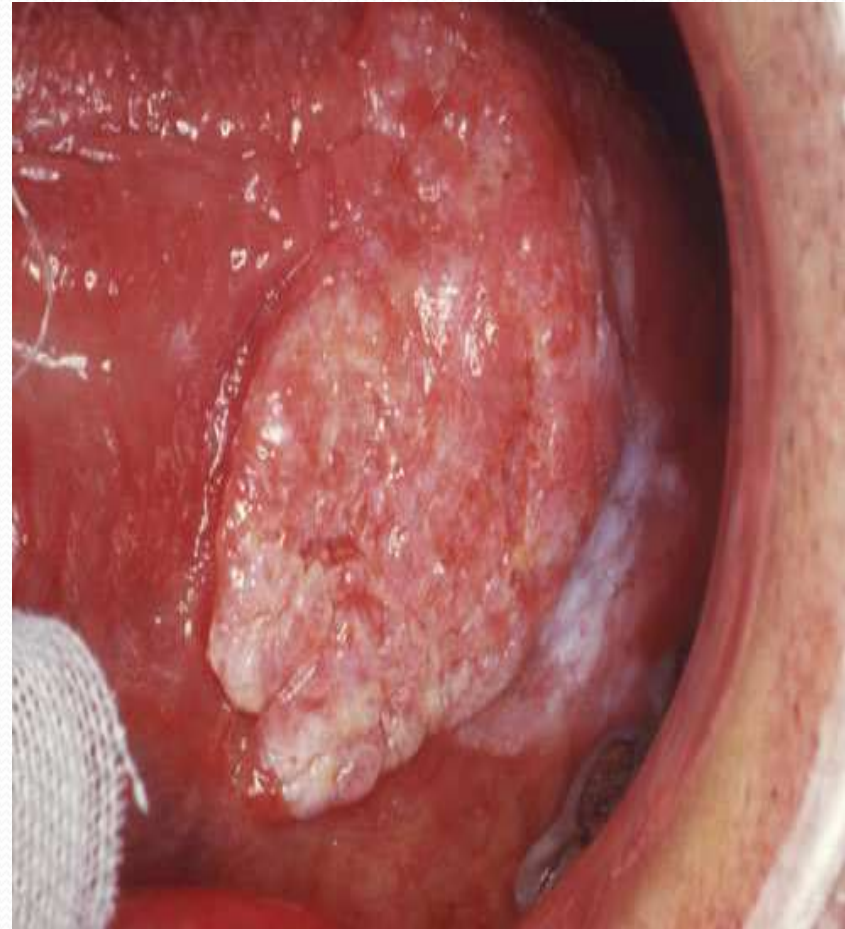
Smoking and Oral Health

- Yellow teeth
- Gum disease
- Persistent bad breath
- Tooth loss (twice as likely as non-smokers)



Oral Cancer

- People who smoke or chew tobacco are much more likely to develop oral cancer.
- Smoking and drinking can increase the risk of oral cancer 15 times.
- Quitting smoking lowers the risk for oral cancer substantially within a few years.



Smoking and Weight

- Smoking speeds up the metabolism, thus increasing the amount of energy – calories - being used up.
- When the smoker quits, their metabolism returns to its pre-smoking rate.
- Smoking can cause a loss of **lean muscle mass** (the true key to a faster metabolism) primarily because of the accelerated increase in metabolism from smoking.
- Smokers are actually more likely to put on weight over time due to the damage caused by smoking to their lean muscle mass.

Smoking and Weight

- Thinness from smoking weakens the body from poor health. At the same time, using cigarettes for stress management weakens the mind's psychological response to life's coping through rote responses.
- Some scientists think that the cravings for sweets may be because nicotine addiction affects the level of blood sugar in the body so that nicotine withdrawal triggers an increased craving for sweet foods.
- The extra hunger people feel after quitting is not a genuine need for nutrition, but an addictive hunger so they end up replacing one addiction with another.

Smoking and Sex

- **ED** typically presents itself in long-term smokers once they hit their late 40's and 50's.
- Smoking can cause lower **sperm count** and reduced sperm motility.
- Women can experience **less sensitivity** during intercourse and find it harder to achieve orgasms.
- The **smell** of smoking on the breath, hair and clothes reduces attraction and can lead to dating break-ups, marital separation and divorce.



Erectile Dysfunction (ED)

Smoking and Reproduction

- **Fertility** problems
- Premature **menopause**
- Problems giving **birth**
- Smoking **during pregnancy**:
 - Low birth weights
 - Clef palates
 - Pre-term births
 - Low blood flow/oxygen to the fetus
 - Cerebral Palsy
 - Lower IQ
 - Attention Deficit Disorder



SecondHand Smoke and Children

- Children have increased risk of:
 - asthma flare-ups
 - cold and ear infections
 - sudden infant death syndrome
 - Developmental problems may not show up until later in their childhood



Smoking In Utero

- During pregnancy a smoking mother is:
 - more likely to bleed (sometimes severely)
 - more likely to have abnormal placement/location of the placenta
- Infants suffer nicotine withdrawal when their mothers smoke in utero.



Nicotine-Addicted Babies

- Nicotine withdrawal is identical to a hunger for food.
- A baby suffering the physical withdrawal effects from nicotine will feel permanently hungry and will keep crying.
- Feeding it won't satisfy that feeling. The tired and confused mother will tend to overfeed the baby.
- A constantly crying child adds to the mother's stress level and we all know what smokers do when stressed – they reach for a cigarette and smoke.

Smoking and Pets

- Family pets are also at risk from secondhand smoke.
- **Dogs** that inhale secondhand smoke are 3 times more likely to develop lung or nasal cancer than dogs in non-smoking households.
- Eating 1-5 cigarettes or 1/3 of one cigar can kill a dog.
- Dogs can experience allergic reactions such as scratching, biting and chewing of their skin.
- **Birds** can start coughing.
- Birds that sit on a smoker's hand can pull out their feathers (contact dermatitis.)



Smoking and Pets

- **Cats** have a higher rate of oral cancer when exposed to secondhand smoke due to the way they groom themselves.
- Cats also have a higher rate of feline *lymphoma*, a deadly form of cancer.
- Cats can develop
 - respiratory problems
 - lung inflammation
 - asthma



Big Tobacco – A License to Kill ?

- Cigarettes are a complex and scientifically engineered chemical cocktail.
- Designed to increase its addictiveness.
- Manufacturers artificially add nicotine to cigarettes.



New Albany, Indiana



Cigarettes: The ‘Crack Cocaine’ of Nicotine Delivery

- Big Tobacco does this in a 2-step process: First, it takes reconstituted tobacco which is made from the stalks, stems and dust that manufacturers used to throw away.
- Then a powerful tobacco extract containing nicotine and flavor is applied to the reconstituted tobacco (waste filler.)
- Another method is combining pure nicotine with alcohol which is called “denaturing.” The mixture can then be applied to tobacco during the manufacturing process to improve taste and nicotine levels.
- These processes turns cigarettes into nicotine dispensers as opposed to natural products. Cigarettes are considered the ‘crack cocaine’ of nicotine delivery.

The Chemical Cocktail

Chemicals in a cigarette include:

- hydrogen cyanide
- carbolic acid
- arsenic trioxide
- carbon monoxide

Smokers inhale **600 times** more carbon monoxide than the safe level in industry.



Why is Smoking Cessation Important ?

- **Medical outcomes will not** be as good if the patient continues to smoke or chew.
- During clinical contact with a tobacco dependent, **a non-judgmental approach is critical.** The person needs help, (whether they can admit it or not) empathy, and positive encouragement that **they CAN succeed** in quitting.

A Final Message



Patients who express a readiness to quit smoking or chewing should be referred to **BMC's Tobacco Cessation Program.**

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