

Harmful Effects of Cigarette Smoking

Presented by:

Scott Sevinsky MSPT



Facts About Cigarettes and Their Contents

Cigarette smoke contains over **4,000** different chemicals and compounds, **43** are known carcinogens. Below is a brief list of the major chemicals and compounds:

- Nicotine
- Tar
- Ammonia
- Lead
- Licorice
- Cocoa
- Carbon monoxide
- Carbon disulfide
- Hydrogen cyanide
- Menthol
- Acetone
- Arsenic
- Polonium – 210
- Cadmium
- Mercury
- Benzene
- Formaldehyde
- Acetylaldehyde

Absorption of nicotine from tobacco smoke is pH dependent.

- **Nicotine** (insecticide/addictive drug): One of the most addictive substances known to man, a powerful and fast-acting medical and non-medical poison.
- **Tar**: Particulate matter drawn into lungs when you inhale on a lighted cigarette. Once inhaled, smoke condenses and about 70 % of the tar in the smoke is deposited in the smoker's lungs.
- **Ammonia** (toilet cleaner): Ammonia, an alkali found in dry cleaning fluids is added to cigarettes to speed the rate at which nicotine is absorbed through the blood stream and blood-brain-barrier. Ammonia raises the pH levels of smoke creating “free nicotine” which can be absorbed by the body more quickly than “bound nicotine”.
- **Carbon Monoxide (CO)** (car exhaust fumes): An odorless, tasteless and **poisonous** gas, rapidly fatal in large amounts – it is the main gas in cigarette smoke, formed when the cigarette is lit.
- **Hydrogen Cyanide** (gas chamber poison)
- **Acetone** (nail polish remover): Fragrant volatile liquid ketone, used as a solvent, for example, nail polish remover.
- **Arsenic** (rat poison)
- **Benzene** (gas additive): A colorless cyclic hydrocarbon obtained from coal and petroleum, used as a solvent in fuel and in chemical manufacture. It is a known carcinogen and is associated with leukaemia.
- **Polonium – 210** (Radon): a radioactive element found in smoke and is equivalent to the radiation from 4 chest x-rays
- **Formaldehyde** (embalming fluid) A colorless liquid, highly poisonous, used to preserve dead bodies. Known to cause cancer, respiratory, skin and gastrointestinal problems.
- How can cocoa and licorice be harmful? When burned together they act as bronchodilators allowing greater amounts of smoke inhalation providing larger amounts of nicotine delivery.
- Cocoa, along with other sweeteners are added to mask the taste of tobacco while menthol and other similar additives are used to anesthetize the throat so the smoker does not feel the irritating effects.

Nicotine: One Of The 3 Most Addictive Drugs

Nicotine ($C_{10}H_{14}N_2$) is a naturally occurring **liquid alkaloid**. An alkaloid is an organic compound made out of carbon, hydrogen, nitrogen and sometimes oxygen. Nicotine is a natural component of the tobacco plant leaf and is present in cigarettes in varying concentrations. Nicotine delivery from the smoke of a cigarette influences smoking behavior as the smoker is trying to meet their body's 'demand' for nicotine. If a cigarette has a low nicotine concentration then the smoker may draw from the cigarette more frequently and more deeply and inhale larger volumes of smoke. This, of course, means that they are also inhaling more of the other harmful components of cigarette smoke. *

Nicotine is efficiently extracted in the lungs where it enters the circulatory system and is absorbed throughout the body. It easily crosses the blood-brain-barrier and there are nicotine receptors throughout the central and peripheral nervous systems. Nicotine has multiple neurobiological effects and follows a variety of neurological pathways that control pleasure and reward within the central nervous system. It is an extremely addictive drug and stimulates its own taking by its neurobiological actions: nicotine's effects, the sensations of pleasure and well-being, produce rapid, positive reinforcement, i.e. the desire for more nicotine. Nicotine withdrawal causes physiological and behavioral changes including an increase in resting metabolic rate, a decrease in heart rate and feelings of aggression, irritability and insomnia. The withdrawal effects begin within 6 to 12 hours, peak at 1 to 3 days and can last over a month. *

Nicotine is principally metabolized in the liver to **cotinine**, its main metabolite but some nicotine remains active for 6 to 8 hours, especially if the person regularly smokes another cigarette. Nicotine has various effects on the cardiovascular system. Although the effect of one dose of nicotine may be small and transient, repeated doses throughout the day can have a significant effect. Nicotine stimulates the release of the hormone adrenaline, increasing heart rate and blood pressure. It also stimulates the release of free fatty acids (an effect of adrenaline), increases fibrolytic activity and platelet activity.*

Only 60mg of pure nicotine placed on a person's tongue would kill within minutes.

*<http://www.healthnet.org.uk/new/facts/level3/f009.htm>

Systemic Effects of Smoking

Cardiovascular System Effects

- Nicotine, one of the main compounds found in cigarettes exerts its effects on the cardiovascular system by stimulating the production of catecholamines (epinephrine & norepinephrine) resulting in:
 1. increased heart rate
 2. elevated blood pressure
 3. increased peripheral vascular resistance
 4. increased myocardial oxygen demand (Taylor & Goldhill, 1992:46).
 5. tissue hypoxemia
 - While there is a greater demand for oxygen, the carbon monoxide in cigarette smoke binds with the hemoglobin in the blood to form carboxyhemoglobin which reduces the supply of oxygen to the tissues by up to 15%. This results in a supply demand imbalance. (Amoroso, 1996).
 6. increased plasma viscosity (polycythemia 2° to tissue hypoxemia from carbon monoxide)
 7. elevated total cholesterol and LDL levels
 8. increase fibrolytic and platelet activity.

Respiratory System Effects

1. paralysis of mucociliary transport. (1 cigarette = ~ 20 minutes of paralysis!)
2. destruction of lung cilia leads to increased mucosal production.
3. small airway narrowing, reduced pulmonary surfactant and compliance mean less oxygen exchange and a tendency for a ventilation-perfusion (V/Q) mismatch (Amoroso, 1996).

Immune System Effects

1. decreased neutrophil activity (Jones et al., 1997: 1).
2. impaired immunity increases the risk for lung infection. (Nimmo & Smith, 1989).
3. impaired wound healing attributed to the toxins in smoke which are the result of poor oxygen perfusion throughout the body. (Nel & Morgan, 1996:3 10).

Musculoskeletal System Effects

1. increased risk of osteoporosis.
2. increased risk of fracture(s) with impairment of fracture healing
 - smoking may impair osteoblast (bone forming cells) function.
 - Non-smokers produce approximately 1cm of bone in 2 months while it takes a smoker 3 months to make the same amount of bone.
3. increased risk of herniation of an intervertebral disc.
 - It is suggested that smoking makes discs more susceptible to disease by affecting the blood supply to the discs.

Facts About Second Hand Smoke

When you smoke so does everyone else around you!

Secondhand smoke comes from two places: smoke breathed out by the person who smokes, and smoke from the end of a burning cigarette. Secondhand smoke causes or exacerbates a wide range of adverse health effects, including cancer, respiratory infections, and asthma.

- Secondhand smoke contains over **4,000** chemicals; **200** are poisons; **43** cause cancer.
- Secondhand smoke has been classified by the Environmental Protection Agency (EPA) as a known cause of cancer in humans (Group A carcinogen).
- Secondhand smoke causes lung cancer and other health problems. The EPA estimates that secondhand smoke causes approximately **3,000** lung cancer deaths and **35,000** heart disease deaths in nonsmokers each year.
- Secondhand smoke is especially harmful to young children. EPA estimates that secondhand smoke is responsible for between **150,000** and **300,000** lower respiratory tract infections in infants and children under 18 months of age annually, resulting in between **7,500** and **15,000** hospitalizations each year.
- Secondhand smoke is harmful to children with asthma. The EPA estimates that for between **200,000** and **one million** asthmatic children, exposure to secondhand smoke worsens their condition.
- Secondhand smoke can make healthy children less than 18 months of age sick; it can cause pneumonia, ear infections, bronchitis, coughing, wheezing and increased mucus production. According to the EPA, secondhand smoke can lead to the buildup of fluid in the middle ear, the most common cause of hospitalization of children for an operation.

Individuals can take several steps to reduce their exposure to secondhand smoke, including:

- If you smoke, quit!
- Keep smoke away from you and your family by asking people not to smoke in your home.
- Make sure your child's day care site and school are smoke-free.
- Use no-smoking signs, buttons and stickers at home, at work, and in your car.
- Eat in smoke-free environments.
- Seek a smoke-free worksite.
- Support clean air laws that protect you from secondhand smoke.

What Are The Benefits of Smoking Cessation?

Within **20 minutes** of smoking that last cigarette the body begins a series of changes.....

▪ **20 minutes after quitting:**

- blood pressure decreases
- pulse rate drops
- body temperature of hands and feet increases

At 8 hours:

- carbon monoxide level in blood drops to normal
- oxygen level in blood increases to normal

At 24 hours:

- chance of a heart attack decreases

At 48 hours:

- nerve endings start regrowing
- ability to smell and taste is enhanced



▪ **The first year after quitting:**

At 2 weeks to 3 months:

- circulation improves
- walking becomes easier
- lung function increases

1 to 9 months:

- coughing, sinus congestion, fatigue, shortness of breath decreases

1 year:

- excess risk of coronary heart disease is decreased to $\frac{1}{2}$ that of a smoker

LONG TERM BENEFITS OF QUITTING

At 5 years:

- from 5 to 15 years, stroke risk is reduced to that of people who have never smoked.

At 10 years:

- risk of lung cancer drops to as little as $\frac{1}{2}$ that of continuing smokers
- risk of cancer of the mouth, throat, esophagus, bladder, kidney, and pancreas decreases
- risk of ulcer decreases

At 15 years:

- risk of coronary heart disease is now similar to that of people who have never smoked
- risk of death returns to nearly the level of people who have never smoked.

Source: American Lung Association Fact Sheet: Benefits of Quitting Smoking
http://www.lungusa.org/tobacco/quit_ben.html

Do You Want To Stop Smoking?

Is It Too Late To Give Up?

Whatever your age, it is never too late to give up. Giving up drastically reduces the risk of a heart attack; within 5 years your risk is half that of a smokers; and after 10 years it is the same as a non-smokers. Giving up is especially important for those who have already had a heart attack.

But there are other advantages too: you reduce your risk of lung cancer and lung diseases such as emphysema. You will be able to breathe more easily, have a better sense of taste and smell and feel fitter. Your complexion will improve and you'll have a lot more money in your pocket!

How Do You Stop Smoking?

There is no magic answer to quitting but the following tips may be helpful:

- convince yourself that you really want to give up smoking and that you will succeed.
- choose a time when you are not under too much stress.
- give up with a friend.
- throw away all your cigarettes.
- make a point of telling people that you have given up.
- work out how much money you are saving and put that amount aside each week.
- make a big effort not to smoke after meals.

People who change to low tar cigarettes tend to inhale more to maintain their nicotine intake. As they inhale more they may increase the amount of carbon monoxide absorbed. So, although they may reduce their risk of lung cancer, their risk of heart disease may increase. People who change to low tar cigarettes tend to inhale more to maintain their nicotine intake. As they inhale more they may increase the amount of carbon monoxide absorbed. So, although they may reduce their risk of lung cancer, their risk of heart disease may increase.

If you stop smoking a key point to remember is that according to the American Cancer Society

All benefits from smoking cessation are LOST by smoking just one cigarette a day!

What Are The Side Effects Of Giving Up?

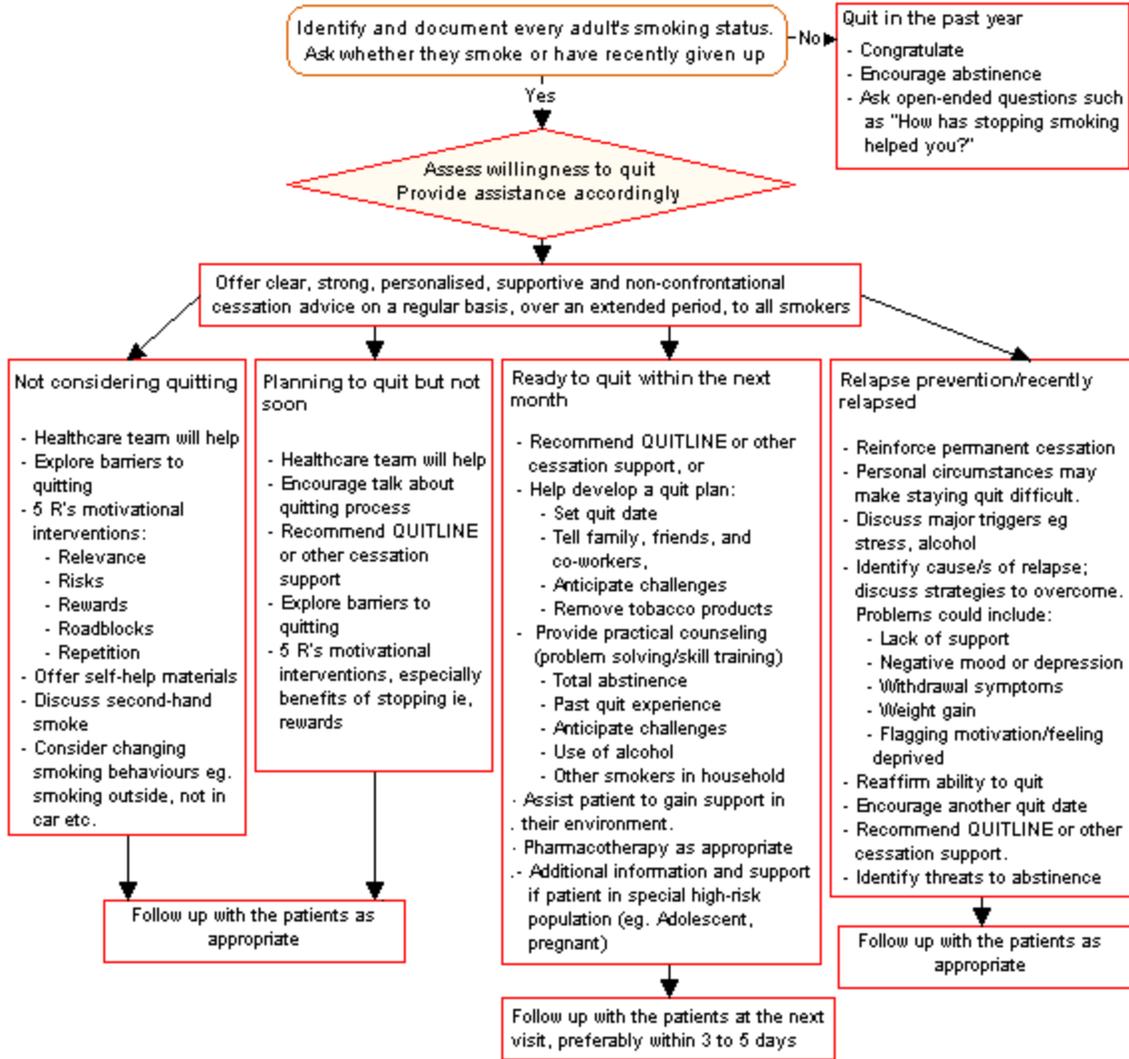
Quitting is difficult because the body is addicted to nicotine. Consequently, when you give up you may become irritable, depressed or restless and have difficulty concentrating. These feelings will pass though and it is important to persevere as the benefits will last a lifetime.

Many people worry about gaining weight when they quit smoking. This is not inevitable but many quitters do gain a little weight, six to eight pounds on average. The first thing to remember is *don't* go on a crash diet but be careful not to replace your cigarettes with lots of sweet or fatty snacks. If you need to nibble on something choose fruit. Secondly, the risk to your health of a few extra pounds is small compared to the risks of smoking - it is not worth smoking to keep your weight down. Those pounds can easily be lost by eating healthily and exercising.

Suggested NRT dose for different daily smoking levels

Type of NRT	<10 cigarettes/day	10-20 cigarettes/day	>20 cigarettes/day
Patches	none	14 mg (Nicabate and Nicotinell) 10 mg (Nicorette)	21 mg (Nicabate and Nicotinell) 15 mg (Nicorette)
Gum	none	2 mg gum, 8-12 per day	4 mg gum, 8-12 per day
Nasal Spray	none	1 mg (2 sprays) each hour 8-12 times per day	1-3 mg (2-6 sprays) each hour 8-12 times per day
Inhaler	none	6-12 cartridges per day	not recommended

Algorithm for Smoking Cessation Advice



References

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