



Cigarette and Tobacco Research

Research into cigarette and tobacco smoking is not new. The health hazards have been clearly established. But ongoing research into the harmful effects of smoking tobacco continues; and every so often it contributes something to our knowledge about the broader field of addiction. This article will be periodically updated as these findings come to my attention.

Genetic Link to Nicotine Addiction

Scientists in three separate studies have found that genetic variations to chromosome 15 make people more vulnerable to nicotine addiction and developing lung cancer. These variations, which govern nicotine receptors on cells, may even help explain compulsive chain smoking, why there are elderly smokers who don't get cancer and people who can light up an occasional cigarette and don't get hooked. The three studies, funded by governments in the U.S. and Europe, were published in the journals *Nature* and *Nature Genetics*. The researchers weren't sure if what they found is a set of variations in one gene or in three closely connected genes.

Christopher Amos, a professor of epidemiology at the M.D. Anderson Cancer Center in Houston and author of one of the studies commented this was a bit of a “double whammy” in that “It also makes you more likely to be dependent on smoking and less likely to quit smoking.”

Psychiatry professor Dr. Laura Bierut of Washington University in St. Louis, a genetics and smoking expert who did not take part in the studies said the research was “very intriguing . . . This is really telling us that the vulnerability to smoking and how much you smoke is clearly biologically based.”

The findings in the studies included:

Smokers who get the set of variants from only one parent see a risk of lung cancer that is about one-third higher than that of people without the variants. They also smoke about one more cigarette a day on average than other smokers. This group makes up about 45 percent of the population studied.

Smokers who inherit the variants from both parents have nearly a 1-in-4 chance of developing lung cancer. Their cancer risk is 70 to 80 percent higher than that of smokers without the genetic variants. They smoke on average two extra cigarettes a day. This group accounts for about one in nine people of European descent.

Smokers who don't have the variants are still more than 10 times more likely to get lung cancer than nonsmokers. Smokers without the variant have about a 14 percent risk of getting lung cancer. The risk of lung cancer for people who have never smoked is less than 1 percent, said another study author, Paul Brennan of the International Agency for Research on Cancer in Lyon, France.

Researchers working on different teams linked the genetic variation itself — when triggered by smoking — directly to lung cancer. One researcher said the nicotine receptors that the variants act on also can stimulate tumor growth. But the increased lung cancer risk is indirect — the variants led to more smoking, which led to more cancer.

For more information see the following: article and mp3 file at:
<http://www.npr.org/templates/story/story.php?storyId=89318789&ft=1&f=1007>

Forgetting the Urge to Smoke

A study published in the January 26, 2007 issue of the journal *Science* reported that some smokers may have their addiction to nicotine essentially eliminated . . . without cravings or nicotine patches; and no reported struggles to maintain abstinence.

This research was prompted by a stroke survivor with a two pack per day who just didn't want to smoke anymore. While it's not unusual for a health crisis to prompt a desire to quit, the man had no intention of

quitting. He just stopped smoking and said it was like “my body forgot the urge to smoke.”

Researchers scanned the brains of 69 smokers and ex-smokers with some degree of brain damage to pinpoint the region involved. They identified 19 smokers with lesions on a small, little known area of the brain called the insula. Thirteen of the 19 had quit smoking. Twelve of these individuals 1) quit less than one day after their brain surgery; 2) had minimal difficulty quitting; 3) did not smoke again; and 4) had no craving to smoke since quitting. Nicotine is highly addictive, and it's common for smokers to suffer repeated relapses when they try to quit smoking. Dr. Nora Volkow, the Director of NIDA, said “Research that identifies a way to alter the function of this area could have major implications for smokers and addiction treatment in general.”

The insula appears to be where the brain turns physical reactions into feelings. And when those physical reactions are caused by substances like nicotine, the insula seems to then act as a control center for cravings of the addictive substance. Other neurologic functions, such as the brain's "reward" or pleasure pathway center in the medial forebrain bundle (MFB), are known to be involved with addiction as well. The insula discovery doesn't contradict that work, but adds another layer of understanding to how addiction grips the brain through the craving for the drug as well as the experience of the high.

The study is just preliminary research that needs to be validated by studies. Medications that target receptors within the insula are years away. More immediately, Dr. Volkow suggests trying to verify the hypothesized role of the insula (for turning physical reactions into feelings), by temporarily altering its functions with pulses of magnetic energy, called "transcranial magnetic stimulation."

See <http://www.nih.gov/news/pr/jan2007/nida-25b.htm> for the NIH new release on the research. Do a “Google” search on insula and smokers for dozens of additional articles. See the Addiction Science Research and Education Center for information on the latest findings in addiction science: <http://www.utexas.edu/research/asrec/>.

Hookah Bars and Carbon Monoxide

Smoking water pipes (also referred to as hookahs, arghiles or shishas) is an increasing global trend which has prompted the World Health organization to call for research into the health effects of water pipe

smoking. Hookah bars have become trendy in the US, especially among college students. Chicago alone has dozens of hookah bars. A study of freshmen at a US university indicated 15% were currently using a water pipe, and 13% reported past use of water pipes. Hookahs are similar to the bong used to smoke marijuana, and so the allure for college students to patronize hookah bars is often irresistible. As long as tobacco is used, it's legal to smoke water pipes in a public, social setting.

Hookah users inhale tobacco smoke after it bubbles through water, a process that some people think filters toxins from the tobacco. However, toxic components such as nicotine, carbon monoxide, tar, and heavy metals actually remain after the smoke passes through water before being inhaled by the smoker, and therefore potentially increases the risk of malignancy, impaired lung function, and cardiovascular disease. The large volumes of smoke produced when a water pipe is smoked and the use of charcoal as a heat source raise additional health concerns.

A recently published research letter in *JAMA, The Journal of the American Medical Association*, reported findings on the concentrations of exhaled carbon monoxide (CO) among a group of US university students who are water pipe smokers. The research found that an hour of smoking a hookah has the same CO effects as a pack-a-day cigarette habit. The study's co-author, S. Katharine Hammond, noted that while the research only looked at a single toxic gas, where cigarettes contain thousands of toxic chemicals, the findings suggest that hookah fans should still think twice before lighting that pipe. You may not get lung cancer, but hookahs "may compromise your health in other ways. . . . "This is not the risk-free activity they think it is."

Thomas Eissenberg, an associate professor of psychology at Virginia Commonwealth University who also studies hookah use, said that research has suggested that smoking a water pipe for 45 minutes produces 36 times more tar than smoking a cigarette for five minutes. While it's not clear if water pipe tar is different from cigarette tar, Eissenberg noted that tar is the "nicotine-free, dry particulate matter" which contains the cancer-causing elements of the smoke.

For further information on this topic:

<http://en.wikipedia.org/wiki/Hookah>

El-Nachef and Hammond. (2008). "Exhaled Carbon Monoxide With Waterpipe Use in US Students." *JAMA*. vol. 299, no. 1: 36-38.

“Hookah Smoking as Tough on Lungs as Cigarettes” by Randy Dottinga.
US New and World Report online:
<http://health.usnews.com/usnews/health/healthday/080103/hookah-smoking-as-tough-on-lungs-as-cigarettes.html>

“Hookah Delivers Carbon Monoxide Equivalent of a Pack of Cigarettes.”
Online at Join Together:
<http://www.jointogether.org/news/research/summaries/2008/hookah-delivers-co2.html>