

Marijuana Component Opens The Door For Virus That Causes Kaposi's Sarcoma

ScienceDaily (Aug. 2, 2007) — The major active component of marijuana could enhance the ability of the virus that causes Kaposi's sarcoma to infect cells and multiply, according to a team of researchers at Harvard Medical School. According to the researchers, low doses of Δ-9 tetrahydrocannabinol (THC), equivalent to that in the bloodstream of an average marijuana smoker, could be enough to facilitate infection of skin cells and could even coax these cells into malignancy.

While most people are not at risk from Kaposi's sarcoma herpes virus (KSHV), researchers say those with lowered immune systems, such as AIDS patients or transplant recipients, are more susceptible to developing the sarcoma as a result of infection. Their findings, reported in the August 1 issue of *Cancer Research*, a journal of the American Association for Cancer Research, offer cautionary evidence that those with weakened immune systems should speak with their doctors before using marijuana medicinally or recreationally.

"These findings raise some serious questions about using marijuana, in any form, if you have a weakened immune system," said lead study author Jerome E. Groopman, M.D., professor of medicine at Harvard Medical School. "While THC is best known as the main psychotropic part of marijuana, an analog of THC is the active ingredient of marinol, a drug frequently given to AIDS patients, among others, for increasing appetite and limiting chemotherapy-induced nausea and vomiting."

While previous studies indicated that marijuana smoking was associated with Kaposi's sarcoma, this is the first to demonstrate that THC itself can assist the virus in entering endothelial cells, which comprise skin and related tissue.

According to Dr. Groopman, the study illustrates the complicated role marijuana and other cannabinoids play in human health. Numerous types of cells display cannabinoid receptors on their outer surfaces, which act as switches that control cellular processes. Dr. Groopman's laboratory had previously demonstrated that THC could have a protective effect against a certain form of invasive, drug-resistant lung cancer.

To study the combined effect of THC and KSHV, the researchers examined a culture of human skin cells, which are susceptible to infection and could provide a model of Kaposi's sarcoma. These culture cells display many copies of two prominent cannabinoid receptors. Dr. Groopman and his colleagues found that by bonding to these receptors, low doses of THC activate two proteins responsible for maintaining a cell's internal framework, or cytoskeleton.

By altering the cytoskeleton, THC effectively opens the door for KSHV, allowing the virus to more easily enter and infect the cell. "We can take away that effect by using antagonists that block the two cannabinoid receptors, which adds evidence that THC is the culprit," Dr. Groopman said.

Once a cell is infected, the presence of THC may also promote the cellular events that turn it cancerous, the researchers say. They found that THC also promotes the production of a viral receptor similar to one that attracts a cell-signaling protein called interleukin-8. Previous studies have noted that this receptor could trigger the cell to reproduce, causing Kaposi's sarcoma-like lesions in mice. Indeed, the researchers saw that THC induced the infected cells to reproduce and form colonies in culture.

"Here we see both infection and malignancy going on in the presence of THC, offering some serious concerns about the safety of THC among those at risk," Dr. Groopman said. "Of course, we still do not know the exact molecular events that are occurring here, but these results are just the first part of our ongoing research."

The study was funded by the National Institutes of Health.

Adapted from materials provided by *American Association for Cancer Research*, via *EurekAlert!*, a service of AAAS.

Science News

Marijuana Smoke Contains Higher Levels Of Certain Toxins Than Tobacco Smoke

ScienceDaily (Dec. 18, 2007) — Here's another reason to "keep off the grass." Researchers in Canada report that marijuana smoke contains significantly higher levels of several toxic compounds -- including ammonia and hydrogen cyanide -- than tobacco smoke and may therefore pose similar health risks



Marijuana smoke contains higher levels of several toxic compounds, including ammonia and hydrogen cyanide, than tobacco smoke. (Credit: U.S. Drug Enforcement Administration)

See also

Health & Medicine

- Smoking
- Lung Cancer

Mind & Brain

- Smoking Addiction
- Marijuana

Plants & Animals

- Biochemistry Research
- Biology

Reference

- Smoke
- Nicotine
- Emphysema
- Tobacco smoking

David Moir and colleagues note that researchers have conducted extensive studies on the chemical composition of tobacco smoke, which contains a host of toxic substances, including about 50 that can cause cancer. However, there has been relatively little research on the chemical composition of marijuana smoke.

In this new study, researchers compared marijuana smoke to tobacco smoke, using smoking machines to simulate the smoking habits of users. The scientists found that ammonia levels were 20 times higher in the marijuana smoke than in the tobacco smoke, while hydrogen cyanide, nitric oxide and certain aromatic amines occurred at

levels 3-5 times higher in the marijuana smoke, they say. The finding is "important information for public health and communication of the risk related to exposure to such materials," say the researchers

The study, "A Comparison of Mainstream and Sidestream Marijuana and Tobacco Cigarette Smoke Produced under Two Machine Smoking Conditions," is scheduled for the Dec. 17 issue of ACS' *Chemical Research in Toxicology*

Adapted from materials provided by American Chemical Society, via EurekAlert!, a service of AAAS

Science News

Impact On Lungs Of One Cannabis Joint Equal To Up To Five Cigarettes

ScienceDaily (Aug 2, 2007) — A single cannabis joint has the same effect on the lungs as smoking up to five cigarettes in one go, indicates research published ahead of print in the journal *Thorax*.

See also

Health & Medicine

- Smoking
- Lung Disease
- Lung Cancer

Mind & Brain

- Smoking Addiction
- Marijuana
- Brain Injury

Reference

- Bronchitis
- Emphysema
- Tobacco smoking
- COPD

The researchers base their findings on 339 adults up to the age of 70, selected from an ongoing study of respiratory health, and categorised into four different groups

These comprised those who smoked only cannabis, equivalent to at least one joint a day for five years; those who smoked tobacco only, equivalent to a pack of cigarettes a day for at least a year; those who smoked both; and those who did not smoke either cannabis or tobacco.

All the participants had high definition x-ray scans (computed tomography) taken of their lungs and they took special breathing tests designed to

assess how well their lungs worked.

They were also questioned about their smoking habits.

Seventy five people smoked only cannabis, and 91 smoked both. Eighty one people did not smoke either, and 92 smoked only tobacco.

Combined smokers tended to use less tobacco, the findings showed.

Cannabis smokers complained of wheeze, cough, chest tightness and phlegm. But emphysema, the progressive and crippling lung disease, was only seen in those who smoked tobacco, either alone or in combination.

But cannabis still damaged the lungs and stopped them from working properly.

It diminished the numbers of small fine airways, which are important for transporting oxygen and waste products to and from the blood vessels effectively.

And it damaged the large airways of the lung, blocking airflow, and forcing the lungs to work harder.

The extent of this damage was directly related to the number of joints smoked, with higher consumption linked to greater incapacity.

The effect on the lungs of each joint was equivalent to smoking between 2.5 and five cigarettes in one go.

The authors explain that the impact of cannabis is strongly associated with the way in which it is smoked. It is usually smoked without a filter, and at a higher temperature. Smokers tend to inhale more deeply and to hold their breath for longer.

Adapted from materials provided by BMJ Specialty Journals, via EurekAlert!, a service of AAAS.



News

Articles

Health & Medicine

Mind & Brain

Science News

Marijuana Smokers Face Rapid Lung Destruction -- As Much As 20 Years Ahead Of Tobacco Smokers

ScienceDaily (Jan 27, 2008) — A new study finds that the development of bullous lung disease occurs in marijuana smokers approximately 20 years earlier than tobacco smokers.

See also

Health & Medicine

- Lung Cancer
- Lung Disease
- Smoking
- Cystic Fibrosis
- Diseases and Conditions
- Mesothelioma

Reference

- Emphysema
- Bronchitis
- COPD
- Lung cancer

A condition often caused by exposure to toxic chemicals or long-term exposure to tobacco smoke, bullous lung disease (also known as bullae) is a condition where air trapped in the lungs causes obstruction to breathing and eventual destruction of the lungs.

At present, about 10% of young adults and 1% of the adult population smoke marijuana regularly. Researchers find that the mean age of marijuana-smoking patients with lung problems was 41, as opposed to the average age of 65 years for tobacco-smoking patients.

The study "Bullous Lung Disease due to Marijuana" also finds that the bullous lung disease can easily go undetected as patients suffering from the disease may show normal chest X-rays and lung functions. High-resolution CT scans revealed severe asymmetrical, variably sized bullae in the patients studied. However, chest X-rays and lung functions were normal in half of them.

Lead author Dr. Matthew Naughton says, "What is outstanding about this study is the relatively young ages of the lung disease patients, as well as the lack of abnormality on chest X-rays and lung functions in nearly half of the patients we tested."

He added, "Marijuana is inhaled as extremely hot fumes to the peak inspiration and held for as long as possible before slow exhalation. This predisposes to greater damage to the lungs and makes marijuana smokers are more prone to bullous disease as compared to cigarette smokers."

Patients who smoke marijuana inhale more and hold their breath four times longer than cigarette smokers. It is the breathing manoeuvres of marijuana smokers that serve to increase the concentration and pulmonary depositor of inhaled particulate matter – resulting in greater and more rapid lung destruction.

This paper is published in the January 2008 issue of *Respirology*.

Adapted from materials provided by Blackwell Publishing

Science News

Marijuana Damages DNA And May Cause Cancer, New Test Reveals

ScienceDaily (June 15, 2009) — Using a highly sensitive new test, scientists in Europe are reporting "convincing evidence" that marijuana smoke damages the genetic material DNA in ways that could increase the risk of cancer.

See also:

Health & Medicine

- Smoking
- Lung Cancer

Mind & Brain

- Smoking Addiction
- Marijuana

Plants & Animals

- Biotechnology
- Biochemistry Research

Reference

- Smoke
- Carcinogen
- Formaldehyde
- Vector (biology)

Researchers note that toxic substances in tobacco smoke can damage DNA and increase the risk of lung and other cancers. However, there has been uncertainty over whether marijuana smoke has the same effect. Scientists are especially concerned about the toxicity of acetaldehyde, present in both tobacco and marijuana. However, it has been difficult to measure DNA damage from acetaldehyde with conventional tests.

The research was carried out by Rajinder Singh, Jatinderpal Sandhu, Balvinder Kaur, Tina Juren, William P. Steward, Dan Segerback and Peter B. Farmer from the Cancer Biomarkers and Prevention Group, Department of Cancer Studies and

Molecular Medicine and Karolinska Institute, Sweden.

Raj Singh said: "Parts of the plant *Cannabis sativa*, also known as marijuana, ganja, and various street names, are commonly smoked as a recreational drug, although its use for such purposes is illegal in many countries.

The scientists describe development and use of a modified mass spectrometry method that showed clear indications that marijuana smoke damages DNA.

"There have been many studies on the toxicity of tobacco smoke. It is known that tobacco smoke contains 4000 chemicals of which 60 are classed as carcinogens. Cannabis in contrast has not been so well studied. It is less combustible than tobacco and is often mixed with tobacco in use. Cannabis smoke contains 400 compounds including 60 cannabinoids. However, because of its lower combustibility it contains 50% more carcinogenic polycyclic aromatic hydrocarbons including naphthalene, benzanthracene, and benzopyrene, than tobacco smoke."

The authors added: "It is well known that toxic substances in tobacco smoke can damage DNA and increase the risk of lung and other cancers. Scientists were unsure though whether cannabis smoke would have the same effect. Our research has focused on the toxicity of acetaldehyde, which is present in both tobacco and cannabis."

The researchers add that the ability of cannabis smoke to damage DNA has significant human health implications especially as users tend to inhale more deeply than cigarette smokers, which increases respiratory burden. "The smoking of 3-4 cannabis cigarettes a day is associated with the same degree of damage to bronchial mucus membranes as 20 or more tobacco cigarettes a day," the team adds.

"In conclusion, these results provide evidence for the DNA damaging potential of cannabis [marijuana] smoke, implying that the consumption of cannabis cigarettes may be detrimental to human health with the possibility to initiate cancer development," the article states. "The data obtained from this study suggesting the DNA damaging potential of cannabis smoke highlight the need for stringent regulation of the consumption of cannabis cigarettes, thus limiting the development of adverse health effects such as cancer."



Marijuana smoke may increase the risk of cancer, scientists report. (Credit: US Drug Enforcement Administration)

Journal reference:

Singh et al. Evaluation of the DNA Damaging Potential of Cannabis Cigarette Smoke by the Determination of Acetaldehyde Derived N²-Ethyl-2'-deoxyguanosine Adducts. *Chemical Research in Toxicology*, 2009; 22 (6) 1181 DOI: 10.1021/tx900106y

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