

Cannabis alters human DNA

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A new study published by University of Leicester researchers has found "convincing evidence" that cannabis smoke damages DNA in ways that could potentially increase the risk of cancer development in humans.

Using a newly developed highly sensitive liquid chromatography-tandem mass spectrometry method, the University of Leicester scientists found clear indication that cannabis smoke damages DNA, under laboratory conditions.

They have now published the findings in the journal *Chemical Research in Toxicology*.

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.

"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."

Writing in the journal *Chemical Research in Toxicology*, the scientists describe the development of a mass spectrometry method that provides a clear indication that cannabis smoke damages DNA, under laboratory conditions.

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.

"These results provide evidence for the DNA damaging potential of cannabis smoke," the researchers conclude, "implying that the consumption of cannabis cigarettes may be detrimental to human health with the possibility to initiate [cancer development](#)."

Citation: Rajinder Singh, Jatinderpal Sandhu, Balvinder Kaur, Tina Juren, William P. Steward,

Dan Segerback and Peter B. Farmer (2009)
Evaluation of the DNA Damaging Potential of
Cannabis Cigarette Smoke by the Determination of
Acetaldehyde Derived N2-Ethyl-2'-deoxyguanosine
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