

## German-made "Volcano" Excels in Trial

## Recommendation to Patients: "Don't smoke, Vaporize"

By Dale Gieringer

Patients receiving physician approval to use cannabis should be warned that chemicals released when the dried leaves and/or flowers are burned put heavy smokers at increased risk for bronchitis and respiratory infections.<sup>1</sup>

The risk can be avoided, however, by an alternative delivery system: a device called a vaporizer that heats dried cannabis to a temperature where cannabinoid vapors are released, but below the point of combustion, where noxious and carcinogenic smoke toxins are formed. Patients can thus inhale the pharmaceutically active cannabinoids without exposing themselves to harmful respiratory toxins.

Although the principle of vaporization has been known for a long time, until recently there were no scientific studies demonstrating its feasibility. The situation has changed thanks to a pair of studies sponsored by California NORML and MAPS at Chemic Laboratories in Canton, Mass.

The first, completed in 2001, tested a vaporizer known as the M-1 Volatizer, ([www.volatizer.com](http://www.volatizer.com)). The M-1 resembles an auto cigarette lighter that is designed to fit over a pipe or bong bowl and heat the sample to the point of vaporization. Efficient vaporization occurs around 180° - 190° C (356° - 374° F) while combustion occurs around 230° C (446° F).

The study found that the M-1 delivered effective levels of THC, CBD and CBN, while completely eliminating three specific toxins—naphthalene, benzene, and toluene—in the solid phase of the vapor. A qualitative reduction in carbon monoxide was also detected.<sup>2</sup>

**Volcano Study**

The second vaporizer study, released in April of this year, looked at a much wider range of toxins, focusing particularly on the highly carcinogenic polynuclear aromatic hydrocarbons (PAHs), a prime suspect in smoking-related cancers. The device tested was the "Volcano" ([www.storz-bickel.com](http://www.storz-bickel.com)), a vaporizer that has become extremely popular with medicinal cannabis users who can afford it—the retail price is around \$600 due to its high-tech innovative design.

The Volcano consists of a heater with a sample chamber on top. An air pump blows hot air through the sample into a balloon, where the vapors are collected. After being filled, the balloon is detached and fitted with a valved mouthpiece, through which the vapors are inhaled. The novel design has been patented in the U.S. and internationally by Storz & Bickel GmbH&Co. KG, Tuttlingen, Germany.

The study compared Volcano vapors to smoke produced by combusted marijuana. The cannabis was the standard product provided to researchers by the National Institute on Drug Abuse, containing 4% THC. Analysis by gas chromatograph mass spectrometer (GCMS) showed that the Volcano vapor consisted almost entirely of THC (95%), with traces of cannabidiol (CBD), another cannabinoid. The remaining 5% consisted of small amounts of caryophyllene, a fragrant oil in cannabis and other plants, and two other components of uncertain origin.

In contrast, analysis of the combusted smoke showed a potpourri of at least 111 different gas phase components, including six known PAHs. Non-can-

nabinoids accounted for as much as 88% of the total gas content of the smoke.<sup>3</sup>

A separate study was undertaken to determine the efficiency of the Volcano in delivering THC. Three balloonfuls of vapor were drawn from the sample and analyzed quantitatively via high-pressure liquid chromatography. On average, 46% of the THC from the sample appeared in the vapor. This compares favorably with the efficiency of marijuana cigarettes as observed in other studies, which can fall below 25% due to loss of THC in sidestream smoke.

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The efficiency of the Volcano appears to be due to the innovative balloon containment system, which prevents loss of vapor as well as providing a fixed dosage quantity useful for controlled studies. It is possible that higher efficiencies could have been realized by stirring the sample around and drawing another balloonful, as recommended by the manufacturer.

The Volcano study provides the most compelling evidence to date that vaporizers offer an effective means of eliminating the respiratory hazards of marijuana smoking. In its 1999 report on medical marijuana, the Institute of Medicine recommended against long-term use of smoked marijuana because of the health risks of smoking. However, the IOM report was silent on the subject of vaporizers.

Foes of medical marijuana such as the California Narcotics Officers Association have continued to harp on the health hazards of smoking as an objection to legalization. However, advocates can now reply that the vaporizer studies put these objections to rest.

At present, the only FDA-approved method for administering marijuana to human research subjects is via smoking NIDA-supplied cigarettes. NORML and MAPS are supporting efforts to have vaporizers approved by the FDA. Donald Abrams, MD, of the University of California, San Francisco, has submitted a grant proposal to the California Center for Medical Cannabis Research in San Diego to test the Volcano in human subjects. If the protocol is funded and the Volcano approved by the FDA for human research, it will be the first human study using a vaporizer.

In the meantime, vaporizers are enjoying growing popularity in the medical marijuana community. Dozens of models are currently on the market, ranging from homemade glass vaporization pipes to sophisticated electronic devices. To avoid the paraphernalia laws, most are discreetly sold as "herbal vaporizers."

**References:**

1. Tashkin, Donald P. 2001, "Airway Effects of Marijuana, Cocaine and Other Inhaled Illicit Agents." *Curr Opin Pulmon Med* 7:43-61."
2. Gieringer, Dale 2001, "Cannabis Vaporization, A Promising Strategy for Smoke Harm Reduction," *Journal of Cannabis Therapeutics* Vol 1 (3/4) pp 153-170.
3. Press release on Volcano study at [www.canorml.org/healthacts/vaporizerstudy2.html](http://www.canorml.org/healthacts/vaporizerstudy2.html)



Inventor Markus Storz photographed at his workbench. Demand for the handcrafted "Volcano" vaporizer exceeds his output at present. Photo by David Moore.

*Good news from Kaiser Study—***Marijuana Smoking Doesn't Lead to Higher Death Rate**

Although the inhalation of chemical toxins in cannabis smoke has been linked to bronchitis and other respiratory problems, it has not been shown to cause lung cancer or a higher death rate.

The most extensive study to date on marijuana and mortality was conducted by investigators at Kaiser Permanente and published in the April 1997 issue of the *American Journal of Public Health*. It showed no substantial link between regular marijuana smoking and death, but suggested that marijuana prohibition may itself pose a health hazard to the user.

The Kaiser team, led by Stephen Sidney, MD, looked at 10 years of mortality statistics for more than 65,000 men and women who received health check-ups at Kaiser's Oakland and San Francisco hospitals between 1979 and 1985. Patients were divided into groups ranging from those who had never tried marijuana to those who use it currently or regularly.

Mortality statistics for all patients were followed until 1991 and analyzed for any association between marijuana and death. The study's statistical methodology controlled for the use of tobacco and alcohol so that deaths from marijuana smoking could be clearly defined.

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Researchers found no increase in deaths among the more than 14,000 patients who reported they were marijuana users as compared to those who had never used marijuana. They further noted that the total mortality risks associated with marijuana use were lower than those for tobacco-cigarette smoking for both men and women. Women

who used marijuana also had a lower risk of total mortality as compared to those who consumed alcohol regularly.

The study noted that marijuana smokers with AIDS did have a significantly higher death rate than non-smokers, but said that their mortality was virtually the same as it was for AIDS patients who didn't smoke marijuana. Researchers stressed that the links they found between marijuana use and death were associations and not an indication that marijuana was a cause of death.

In addition to reporting their findings on mortality, researchers also criticized the federal government's current War on Drugs and stated that marijuana has medical value. The following excerpt is taken from the "Discussion" section of the Kaiser Permanente report:

"... Relatively few adverse clinical health effects from the chronic use of marijuana have been documented in humans. [However,] the criminalization of marijuana use may itself be a health hazard, since it may expose the consumer to violence and criminal activity.

"While reducing the prevalence of drug abuse is a laudable goal, we must recognize that marijuana use is widespread despite the long-term, multibillion dollar War on Drugs. Therefore, medical guidelines regarding its prudent use should be established, akin to the commonsense guidelines that apply to alcohol use.

"Unfortunately, clinical research on potential therapeutic uses for marijuana has been difficult to accomplish in the United States, despite reasonable evidence for the efficacy of ... THC and marijuana as antiemetic and antiglaucoma agents and the suggestive evidence for their efficacy in the treatment of other medical conditions, including AIDS."

Why the insult to the lungs by cannabis smoke does not lead to a higher rate of lung cancer and death has not been established; one hypothesis proposed by McPartland, Russo and others is that the presence of anti-oxidants in cannabis negates the carcinogenic effects of benzene, toluene and byproducts of combustion.