

EINGEGANGEN

02. Aug. 2012

Ri



nova-Institut GmbH, Chemiepark Knapsack, 50351 Hürth, Deutschland

nova-Institut GmbH – Chemiepark Knapsack

Briefadresse 50351 Hürth Besucher-/Zustelladresse Industriestraße, 50354 Hürth

Tel: +49 (0)22 33 – 48 14-40

Fax: +49 (0)22 33 – 48 14-50

E-Mail: contact@nova-institut.de

Internet: www.nova-institut.de

STORZ & BICKEL GmbH & Co. KG
Rote Strasse 1
78532 Tuttlingen

31 July 2012

Certification

I confirm that I follow the issue of the medical use of cannabis and cannabinoids since 1994 and am aware of all relevant publications concerning vaporization of cannabis and cannabinoids since this time. Since the preparation of my review for Storz & Bickel three relevant scientific articles on this issue came to my attention, which will be presented in brief here. These results are in line with the results of my previous review and have no consequences for the use of the Volcano Medic.

1. Preclinical study on the comparison between vapor of the Volcano vaporizer and smoke of the cannabis cigarette

At the Institute of Biology at Leiden University, The Netherlands, the Volcano vaporizing device was compared with cannabis cigarette smoke (Pomahacova et al. 2009). The cannabis smoke and vapor (obtained at different temperatures) were quantitatively analyzed by high-performance liquid chromatography (HPLC). In addition, different quantities of cannabis material were also tested with the vaporizer. The cannabinoids:by-products ratio in the vapor obtained at 200 °C and 230 °C was significantly higher than in the cigarette smoke. The worst ratio of cannabinoids:by-products was obtained from the vaporized cannabis sample at 170 °C.

In contrast to vapor samples smoked cannabis contained many compounds not observed in vapor. These included several hydrocarbones, phenolic compounds, nitrogen containing compounds and significant compounds of CBN. These results suggest a much higher degree of pyrolytic degradation in cannabis smoke when compared to cannabis vapor and is consistent with previous literature including my review on clinical data.

2. Preclinical study on the binding activity to the CB1 receptor of cannabis smoke and cannabis vapor produce by the Volcano vaporizer

A study was conducted at the Institute of Biology at Leiden University, The Netherlands, to compare cannabis vapor produced by the Volcano vaporizer, cannabis smoke and pure THC for cannabinoid receptor 1 (CB1) binding activity (Fischedick et al. 2010). Three cannabis varieties, which are available



* Eine Dienstleistung der nova-Institut für politische und ökologische Innovation GmbH · Geschäftsführer: Michael Carus und Dirk Schubert
Sitz der Gesellschaft: Hürth, Amtsgericht Köln · HRB Nr. 44144 · USt-IdNr. DE 811 827 699 · Umsatzsteuer-Nr. 224 / 5731 / 0281
Konto 528 684 009, Kölner Bank · BLZ 371 600 87 · S.W.I.F.T.-Code GENODE33 · IBAN-Code: DE 74371 600870528684009

in Dutch pharmacies, called Bedrocan, Bedrobinol and Bediol with different THC concentrations were used. The top five major compounds in Bedrocan extracts were THC, cannabigerol (CBG), terpinolene, myrcene, and cis-ocimene, in Bedrobinol THC, myrcene, CBG, cannabichromene (CBC), and camphene, and in Bediol cannabidiol (CBD), THC, myrcene, CBC, and CBG. The major components in Bedrocan vapor (>1.0 mg/g) were THC, terpinolene, myrcene, CBG, cis-ocimene and CBD, in Bedrobinol THC, myrcene and CBD, and in Bediol CBD, THC, myrcene, CBC and terpinolene. The major components in Bedrocan smoke (>1.0 mg/g) were THC, cannabinol (CBN), terpinolene, CBG, myrcene and cis-ocimene, in Bedrobinol THC, CBN and myrcene, and in Bediol CBD, THC, CBN, myrcene, CBC and terpinolene. There was no statistically significant difference between CB1 binding of pure THC compared to cannabis smoke and vapor at an equivalent concentration of THC.

THC volatilization efficiency was higher for each variety when vaporized compared to smoked. For example the efficiency of THC volatilization was 22.0% for Bedrocan vapor and 15.9% for Bedrocan smoke.


3. Clinical study on pulmonary function in cannabis users after using the Volcano vaporizer for one month

A clinical study was conducted at the Department of Psychology of the University at Albany, New York, USA, with 20 regular cannabis users with respiratory problems (Van Dam & Earleywine 2010). Participants completed subjective ratings of respiratory symptoms and spirometry measures prior to and following 1 month's use of the Volcano vaporizer in a pre/post-design. Outcome measures included self-reported severity of nine respiratory symptoms as well as spirometry measures, including the maximum amount of air exhaled in 1 second (forced expiratory volume; FEV1) and maximum total lung volume (forced vital capacity; FVC).

The 12 participants who did not develop a respiratory illness during the trial significantly improved respiratory symptoms ($p < 0.001$) and FVC ($p < 0.01$). FEV1 improved but not significantly ($p = 0.05$). Authors concluded: "These preliminary data reveal meaningful improvements in respiratory function, suggesting that a randomized clinical trial of the cannabis vaporizer is warranted. The vaporizer has potential for the administration of medical cannabis and as a harm reduction technique."

Summary:

Recent research confirms the potential of the Volcano Medic to reduce the harm associated with the inhalation of cannabis smoke by reducing pyrolytic compounds and to improve the safety of a treatment with cannabis and cannabinoids by the inhalative route, while being similar or more effective.



Dr. med. Franjo Grotenhermen

Literature

- Fischedick J, Van Der Kooy F, Verpoorte R. Cannabinoid receptor 1 binding activity and quantitative analysis of Cannabis sativa L. smoke and vapor. *Chem Pharm Bull (Tokyo)*, 2010;58(2):201-7.
- Pomahacova B, Van der Kooy F, Verpoorte R. Cannabis smoke condensate III: the cannabinoid content of vaporised Cannabis sativa. *Inhal Toxicol*, 2009;21(13):1108-12.
- Van Dam NT, Earleywine M. Pulmonary function in cannabis users: Support for a clinical trial of the vaporizer. *Int J Drug Policy*, 2010;21(6):511-3.