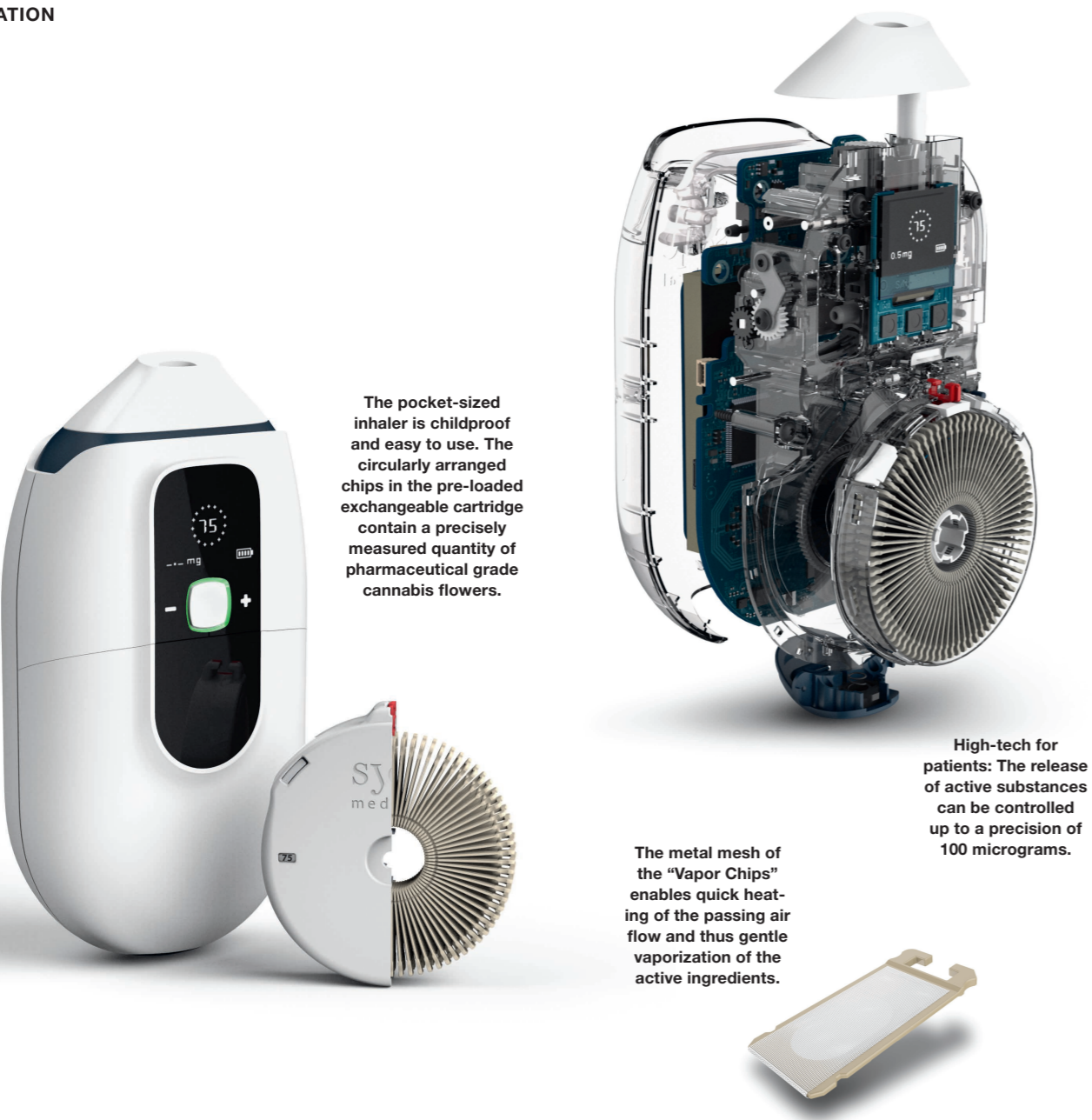


# *It's the dose that counts*

An ancient medicinal plant is making a comeback. Although its recreational use is controversial, the medical use of cannabis can help many severely ill patients. The key to symptom alleviation without serious side effects is precise dosage.



*Cannabis sativa.* Hemp.



**T**he evidence for the therapeutic benefits of cannabis is astonishing. Its active substances, particularly the cannabinoids THC and CBD, ease chronic pain and side effects of chemotherapy, and reduce spasticity and inflammation. Despite this, for decades the plant was never used as medication or only when all other drugs had failed, as it was classified in most countries around the globe as a narcotic drug and was illegal.

Eventually the thinking began to change. Increasing numbers of physicians value the therapeutic potential of the flowers of the plant, the leaves of which resemble a hand with the fingers outstretched. As of spring 2017, cannabis can be prescribed by physicians in Germany and obtained from pharmacies in dried form or as a ready-to-use preparation. A separate authority within the German Federal Institute for Drugs and Medical Devices (BfArM), the Cannabis Agency, monitors the import, quality, dispensation, and in the future the cultivation of cannabis as well. Other countries, such as Canada and 28 states in the United States of America, approved cannabis for medical use and in some cases even for recreational use much earlier.



The founder of Syqe, Perry Davidson, banks on the administration of cannabis in a medically controllable dosage. The first inhaler series and its version for hospital use are from the 3D printer.

Among the pioneers is Israel, where Professor Raphael Mechoulam and the scientists working with him were the first to identify the most important substances in cannabis and also discovered the human system of cannabinoid receptors. Today, well over 25,000 Israelis legally receive medical cannabis, and the research is supported by the health ministry. This is manifested in the commitment of Perry Davidson, founder and CEO of the start-up Syqe Medical from Tel Aviv, who is dedicated to increasing acceptance of cannabis as a medical treatment both in the general public and among patients. He aimed at delivering to patients the lowest possible, reproducibly precise and medically controllable dosage, without adverse psychoactive effects wherever possible.

**Smart metered-dose inhaler**

Syqe Medical therefore developed an intelligent aerosol inhaler that is capable of electronically controlling the dispensation of the active substance in 100-microgram increments and immediately transmitting all relevant data to the attending physician via a smartphone app. First series of the devices are manufactured at Syqe using a 3D printer. They contain a replaceable magazine with 75 single doses, each with 10 to 15 milligrams of cannabis in rigorously controlled quality. During the inhalation procedure, the dried herb is heated, but does not burn; the volatile substances evaporate. In contrast to when it is taken orally, the pain-relieving, relaxing effect sets in just a few minutes after inhalation.

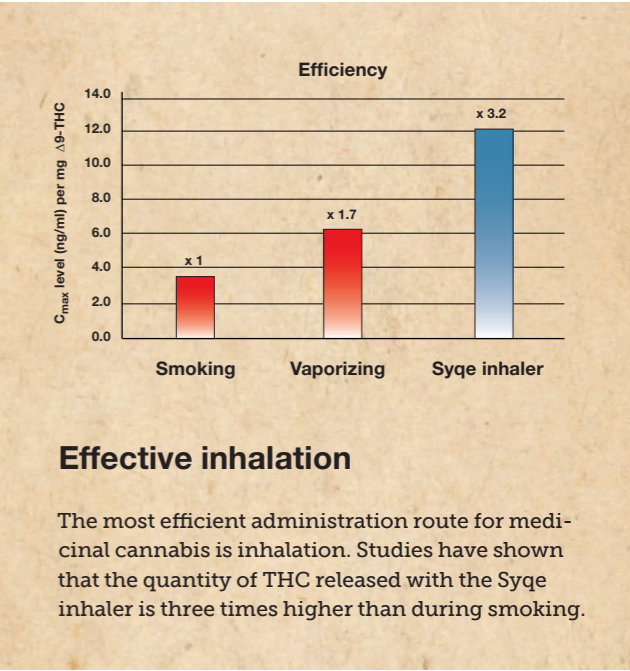
For the microdosing of cannabis in the cartridges for the inhaler, Perry Davidson decided that the technology from Harro Höfliger was the best option. “The administration of untreated plant material via a metered-dose inhaler is a very special challenge, and there is very little empirical evidence to work with,” he says. “During our research we quickly discovered Harro Höfliger. Their diverse range of dosing systems and relevant experience with unusual inhalation projects convinced us that they were the right choice. We’ve been collaborating successfully since early 2016.”

Davidson was also impressed by the imaginative ideas incorporated in the initial series of dosing tests by the specialists at Harro Höfliger. Because the test cannabis was still on its way from the supplier, they simply used powdered industrial hemp, which is easily and legally available. ■

**About Syqe**

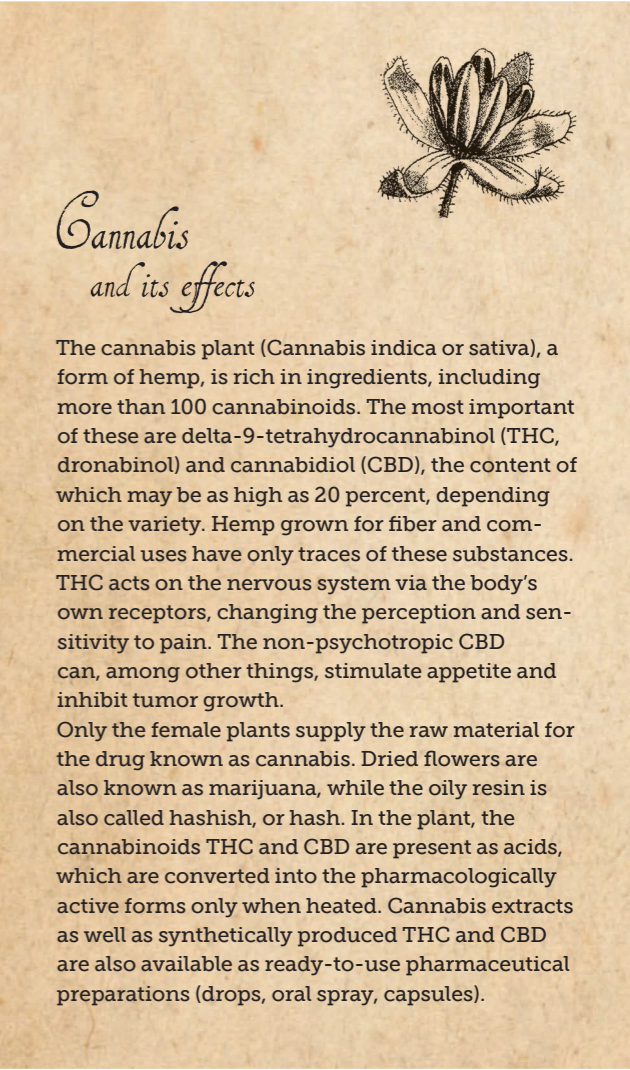
Syqe Medical in Tel Aviv is developing medical administration forms for cannabis and other botanicals and employs a multi-disciplinary team of electronic and mechanical engineers, industrial designers, chemists, biologists, physicians and pharmacologists. The enterprise was founded by Perry Davidson in 2011.

Pictures: Eyal Izhar, Syqe Medical



**Effective inhalation**

The most efficient administration route for medicinal cannabis is inhalation. Studies have shown that the quantity of THC released with the Syqe inhaler is three times higher than during smoking.



The cannabis plant (*Cannabis indica* or *sativa*), a form of hemp, is rich in ingredients, including more than 100 cannabinoids. The most important of these are delta-9-tetrahydrocannabinol (THC, dronabinol) and cannabidiol (CBD), the content of which may be as high as 20 percent, depending on the variety. Hemp grown for fiber and commercial uses have only traces of these substances. THC acts on the nervous system via the body's own receptors, changing the perception and sensitivity to pain. The non-psychoactive CBD can, among other things, stimulate appetite and inhibit tumor growth. Only the female plants supply the raw material for the drug known as cannabis. Dried flowers are also known as marijuana, while the oily resin is also called hashish, or hash. In the plant, the cannabinoids THC and CBD are present as acids, which are converted into the pharmacologically active forms only when heated. Cannabis extracts as well as synthetically produced THC and CBD are also available as ready-to-use pharmaceutical preparations (drops, oral spray, capsules).