Therapeutic cannabis and the Post Poliomyelitis Syndrome (PPS)

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"In its natural form, Marijuana is one of the safest therapeutic substances that is known to mankind"

Frances L. Young
Judge for administrative law at the Drug Enforcement Administration (DEA)

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The history of cannabis goes back thousands of years. There are written records of its medical use e.g. in China and India (Wikipedia). In modern times, commercially competing outgrowths finally forced it out of the market for all applications. Under the pretence of illegal addiction the pharmacologically important substances and their medical use were unfortunately affected. Reference was made to the psychoactive THC component of the intoxication hemp. Other medically active ingredients have been deliberately overlooked. The beneficial hemp fell, in trusted togetherness with the THC drug hysteria victims, without differentiated consideration for a long time. Instead, far more dangerous drugs found their way into everyday practice.

Quote: "Every 19 minutes, a person dies of an overdose through prescribed medication. This cannot happen with cannabis. "(Sanjay Gupta, M.D., neurosurgeon, USA, 2013)

There are many ingredients of the existing hemp varieties that possess an individual specific pharmacological effect. They complement, reinforce or inhibit each other, depending on the type of hemp and cultivation conditions, growth phase, harvest time and extraction methods in different proportions to obtain, depending on individual illnesses, a matched medically usable spectrum of action. The relatively low concentration of the components in the natural extracts compared to synthetic cannabis medicines, together with their synergistic effect, offer the advantage of a low-side-effect to side-effect-free application in therapeutic dosage.

Half a million patients in Germany suffer severe drug-related side effects each year, especially the fight against chronic pain using conventional pain medicine. Other long-term medication is also often associated with significant side effects and even death. Estimates for Germany amount of up to 58,000 deaths per year due to adverse drug reactions. Patients with chronic analgesic treatment include, e.g. most dialysis patients, thousands of deaths from internal bleeding, and up to two thirds from acute liver failure.

Quote: "Despite the millions of people who have been using cannabis for millennia, there has never been a case of anyone who has died from an overdose."
(Professor Lester Grinspoon M.D., psychiatrist at the Harvard Medical School)

Cannabis has more than 600 ingredients, including over 200 terpenes, over 100 cannabinoids, 50 hydrocarbons, and over 200 other biochemical compounds such as cannaflavins as cannabis-specific flavonoids. According to current knowledge, the cannabinoids and terpenes are of particular importance and interest for medical use. Cannaflavins are still awaiting further research. The medicinal properties of the already known ingredients of cannabis and the experience gained from and with patients, as well as from research, suggest that cannabis is more than just a painkiller.

The selection of cannabis ingredients with their medically significant spectrum of effect is consistent in the majority of known publications. In the following, the most important of them are presented:

Cannabinoids

CBD (Cannabidiol): Non-psychoactive, anti-inflammatory, anti-bacterial, analgesic, anticonvulsant, anxiolytic, nausea-inhibiting, calming (high dose), stimulating (low dose), neuroprotective, anticancer, hypotensive

THC (Tetrahydrocannabinol): Psychoactive (intoxicating), pain relieving, muscle-relaxing, anticonvulsant, muscle-spasm inhibiting, anti-inflammatory, allergy-inhibiting, bronchial expanding, appetite-increasing, anti-cancer, neuroprotective, nerve growth promoting, anxiety controlling, nausea inhibiting, lowering intraocular pressure, sleep-promoting

CBN (Cannabinol): Weak psychoactive, soothing, sleep promoting, antibacterial, muscle-spasm inhibiting, nausea-inhibiting

THCA (Tetrahydrocannabinol acid): Non-psychoactive, anti-inflammatory, neuroprotective, nausea-inhibiting, selected cancer retardant

CBDV (Cannabidivarin): Not psychoactive, CBD-like

CBC (Cannabichrome): Calming, painkilling with THC, antifungal, antibiotic, cancer cell destroying, anti-inflammatory

THCV (tetrahydrocannabivarin): THC-like in a much weaker form

CBG (Cannabigerol): Analgesic, anti-cancer, anti-depressant, anti-inflammatory

Terpenes

MYRCEN: Antiinflammatory, sedative, soothing, muscle relaxant, antibiotic, antimutagenic, sleep promoting, potentiating THC, potent analgesic, anticarcinogenic (anti-cancer)

LIMONS: Antifungal (fungicidal), antibacterial, anticancer, anti-inflammatory, thinking ability, attention and concentration improvement, mood-enhancing, analgesic, immune stimulating, anxiolytic, antioxidant

LINALOOL: Psychoactive, slightly calming, anti-cancer, sleep-inducing, anti-inflammatory, antispasmodic, anti-seizure (anti-epileptic), promoting attention

CARYOPHYLENE: Strong anti-inflammatory, anti-viral, anti-biotic, fungicidal, analgesic, antioxidant

PINEN: Anti-inflammatory, anti-cancer, asthmatic, attention, improving concentration and memory, THC-inhibiting

TERPINEOL: Antioxidant, soothing, relaxing

NEROLIDOL: Soothing, relaxing, antifungal

BORNEOL: Pain-relieving, sleep-inducing, antiseptic, soothing, antispasmodic

EUKALYPTOL: Soothing pain

HUMULES: Antibacterial, anti-inflammatory, appetite suppressant, anticancer (anticarcinogenic)

3-CAREN: Anti-inflammatory

Alpha-BISABOLOL: Antibacterial, anti-inflammatory

Flavonoids

CANNAFLAVIN A: Anti-inflammatory (30 times stronger than aspirin and twice as strong as cortisone)

Synergism / Entourage effect

Mixtures of substances often have other medicinal effects by nature and / or strength than the individual substances contained in them.

Synergism is understood to mean the co-effective action of various active substances with and without mutual enhancement of action or only unilateral or mutual enhancement of action.

In addition, the so-called ***entourage effect*** (combination effect) is mentioned, which states that the overall effect of a drug mixture is more than the sum of the effect of their individual active ingredients. For example, isolated CBD is less effective than in a cannabis extract with all cannabis drugs.

Examples of synergism among the cannabis active ingredients are:

β-myrcene + THC mutually reinforce pain inhibition.

β-myrcene + THC-A lead to a mutual amplification in anti-inflammation.

THC + CBD-A + THC-A is said to be particularly effective in inhibiting muscle spasms.

Limonene is credited to have a synergistic effect with THC-A, CBD-A, CBC-A, CBC, CBG, caryophyllene and linalool.

A combination of THC-A, THC, CBD, CBD-A, CBG-A and myrcene is particularly suitable for the treatment of muscle and skeletal pain, as well as inflammation and muscle tension.

Post-polio syndrome (PPS)

The post-polio syndrome is characterized by wear- and tear-related degenerative failure leading to cell death of the previously damaged and / or numbers of diminished healthy nerve cells as a result of comparatively chronical as well as absolute overloading. The cell disintegration triggers an immunological reaction in conjunction with an inflammation, which is further enhanced with the release of any polio virus fragments that may still be present in the nerve cells. This process is associated with pain. In addition, in many cases, the central nervous pain processing system may have been directly damaged by polio and cause pain sensations of different localization to the whole body. Overloaded muscles tend to cramp with PPS. Similarly, the stress-control system may be polio damaged, causing high levels of exhaustion. PPS is a concurrent stressor and self-stressor. As PPS progresses, attention and concentration via the formatio-reticularis are also affected by polio and in later stages memory as well.

These functionally and structurally degrading processes can be effectually inhibited by many cannabis ingredients. Although the controlling of chronic pain with the PPS is of particular importance for the quality of life of those affected, the anti-inflammatory effect can significantly reduce the effects of cramps, the inhibition of stress, the improvement of attention, concentration and memory, the pacification, the lightening of mood, sleep promotion and above all the neuro plasticity as well as the nerve growth promotion within the framework of the neuro plasticity of the central nervous system – essentially the only limited symptomatic treatment possibility for PPS and thus the long-term preservation, or even the improvement of the quality of life, as well as a postponement of the need for care in relation to occurrence and progression.

The call for controlled trials of cannabis medication in the course of the disease PPS should be rejected as absurd. A control group is ethically unjustifiable. In view of the average age of the patients and the enormous diversity of the PPS manifestation in the associated inequality or inconsistency of

the subject groups, this would mean a comparability obstacle and for those affected the withholding of an effective therapy with minimal to no side effects. The latter should be considered first, given the calculable, but undetectable subliminal (subclinical) however clinically effective and randomly complex the previously damaged CNS may be, as this may affect the entire regulatory system directly or indirectly. On the other hand, case studies and field research should receive their due importance in scientific evaluation. In addition, there are reputable experiences and findings regarding treatment options with cannabis to be taken into consideration. Numerous studies are to be found among them.

The current focus should be on the targeted characterization of hemp varieties in terms of their ingredients and their largely complex extraction and as far as possible standardization, which does not mean that the existing cannabis-based therapeutics should not be used and / or further developed. Due to the known entourage effect, preference should be given to natural extracts in complete form before the use of mono-isolates, synthetics and semi-synthetics.

Table: Selection of cannabis active substances and their post-polio syndrome significant medicinal effects

Medicinal effect	Cannabis drug
Pain inhibition	CBD, THC, CBC, THCV, CBG, myrcene, limonene, cariophylls, borneol, eucalyptol
Anti-inflammatory	CBD, THC, CBC, THCA, THCV, myrcene, linalool, cariophylls, pinene, humulene, 3-carene, alpha- bisbolol, cannaflavin A
Stress inhibition	CBD, THC, CBDV, CBC, THCV, CBN, myrcene, limonene, linalool, terpineol, nerolidol, borneol
Muscle spasm inhibition	CBD, THC, CBN, CBDV, THCV, myrcene, linalool, borneol
Nerve protection and Nerve building	CBD, THC, THCA, CBDV
Attention and Concentration improvement	Limes, linalool, pinene
Sleep promotion	THC, THCV, CBN, myrcene, linalool

In essence so far:

The call for research has failed primarily due to the illegalisation of cannabis and commercial unattractiveness of the pharmaceutical market, especially regarding the late effects of polio due to a lack of knowledge or widespread medical disinterest of the same. The victims are the patients.

A highly individualized treatment is required due to the special characteristics of the medical condition of the PPS. As with other drugs, cannabis does not always provide the desired effect, although it is usually the case. Apart from cannabis, there is no drug on the market which would be more suitable for the symptomatic treatment of PPS, especially not for chronic use with the serious side effects not to be expected in a therapeutic dosage. In addition, a treatment covering all sensitive areas is more effective for the overall course of events, as every single disorder, including parallel diseases, have a negative impact on the incurably chronically progressive polio late effects PPS.

It goes without saying that a therapy with a cannabis preparation must be carried out under medical supervision in order to ensure its desired effect per targeted selection and dose control and not to overlook possible undesirable interactions with other simultaneously prescribed drugs. With regard to the usually almost negligible side effects of cannabis preparations, particular PPS symptoms such as muscle weakness and continuing pre-existing clinical pictures should be kept under observation.

Indispensable prerequisites for such a treatment are:

Comprehensive knowledge of the clinical picture post-polio syndrome and relevant knowledge in the cannabis application.

Conclusion:

The medicinal effect of cannabis is not reduced purely to the effects of THC and / or as an application for pain relief. In view of its various ingredients, cannabis offers the reasonable possibility of a complex effective PPS therapy for anti-inflammatory, pain relief, nerve protection, muscle spasm inhibition, stress inhibition, attention and concentration promotion.

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