

Cannabis 101

What is Cannabis?

- Botanically, hemp and cannabis come from the same plant species, *Cannabis sativa*.
- Cannabis grows with relative ease in a variety of climates.
- Evolution of the plant has been heavily directed by human intervention through a combination of attempted eradication and selective breeding for cannabinoid content (high THC, non-detectable THC, and high CBD), which has resulted in an incredibly enormous variety of phytochemicals produced by an array of biochemical pathways.

What are Cannabinoids?

- Cannabis plants produce sticky, oily, hydrophobic compounds known as **cannabinoids**, which interact with the endocannabinoid system.
- There are more than 100 cannabis-derived cannabinoids.
- Cannabigerol, CBG, is sometimes called the “mother cannabinoid” due to its role as a precursor molecule to other cannabinoids. The acid form, CBGA, is the primary precursor of cannabinoid synthesis in the plant.
- Present in relatively small amounts in the live plant and potentially the primary cannabinoid present in extracts is Cannabinol, CBN.

Medical Use of Cannabinoids

- There is great interest in the potential medical use of the cannabinoid, Cannabidiol (CBD), for various ailments.
- Multiple preclinical and clinical studies indicated for the treatment of seizures led to approval of CBD-based Epidiolex® by the U.S. Food and Drug Administration in 2018.
- With increasing public and patient interest in the use of CBD and other cannabinoids as medically promising, non-intoxicating substances, there is demand for more research to better understand their potential efficacy and safety profile.
- Anecdotal evidence indicates that cannabinoids other than CBD may have medicinal applications, including its intoxicating relative, THC.
- Many consumers claim anecdotally that cannabinoids provide relief from pain, inflammation and stiffness; help with insomnia and sleep issues; as well as quell feelings of anxiety and stress.

What Are Terpenes?

- Terpenes are a large class of organic hydrocarbons present in many living plants and animals. They are utilized for their associated smell, flavor, or other functions.
- Terpenes that contain oxygen are collectively referred to as terpenoids.
- Most terpenoids are produced through oxidation or thermally produced during processing or storage of harvested cannabis.
- Depending on the composition of cannabis terpene profiles, different strains elicit different fragrance impressions, which may affect consumer preference.
- There is little evidence to explain potential synergy of terpenes at the cannabinoid receptor, also known as the entourage effect.

Cannabis Processing and Extraction Methods

Cannabinoids and terpenes can be extracted and purified using a number of different methods depending on preference and safety considerations.

Solvent Extraction: A solvent such as butane is added to dissolve the cannabinoids, then evaporated, leaving a concentrated oil.

Non-solvent (Mechanical) Extraction: Using temperature or pressure changes, cannabinoid oils can be separated yielding very pure extracts.

Different methods are used to produce the following extracts:

Crude Oil: Contains all naturally occurring compounds in the plant, including terpenes, essential oils, cannabinoids, waxes, and other lipids, without further refinement.

Full Spectrum: Contains identical ratio of cannabinoids, terpenes, and flavonoids from the original plant source material, with extraneous unnecessary chemicals removed.

Broad Spectrum: Retains large amounts of cannabinoids, terpenes, and other volatiles but often in the absence of THC or below detectable levels of THC (below 0.3%).

Isolate: Purest form of extracted cannabinoids created through crystallization following distillation. The additional processing steps are expensive but often utilized due to the high purity level of 99%.

Methods of Consumption

Inhalation: When the cannabis plant is ignited or vaporized and inhaled, the plant compounds are absorbed rapidly into the bloodstream through the lungs resulting in rapid effects.

Sublingual: The dose is placed under the tongue where the tissue is highly vascularized. The onset takes longer than inhalation but faster and more efficient than others.

Oral: Cannabinoids can be consumed via infused food and beverages. The onset, duration, and offset times vary from product to product and are influenced greatly by stomach contents.

Topical: Topicals such as lotions, balms, and rubs are highly popular, though the least efficient route to systemic circulation. Cannabis terpenes in these products are thought to aid in dermal penetration synergy with cannabinoids.

Research: Interest & Legal Hurdles

- Even as US states and countries actively discuss and pass legislation to legalize and decriminalize Cannabis, there remains a large gap in research and understanding.
- There are many hurdles that scientists face when doing cannabis research including access to the plant and misrepresented quality of plant material.
- In the US, stringent and cumbersome review processes involving NIDA, FDA, DEA & many other institutions create a barrier for sourcing cannabis for research.
- Israel is at the forefront of cannabis research largely due to Hebrew University's School of Pharmacy, The Multidisciplinary Center for Cannabinoid Research.

Conclusion

- Cannabis, and with it the popular cannabinoid, Cannabidiol (CBD), has ultimately entrenched itself into the world economy and can easily be grown all over the world in relation to other agricultural commodities.
- Since the early days of medical marijuana advocacy in the US, approval of cannabis has steadily increased, with the biggest jump being the legalization of adult use cannabis in Canada in 2018.
- While still in its infancy, the acceptance of the cannabis plant as a useful commodity continues to grow.