

The Family Cannabaceae, or making  
“sens” out of CBD, THC, and hemp

**Donato Borrillo MD JD**

Certificate to Recommend (CTR) under the Ohio Medical Marijuana Control Program

Certified Medical Review Officer

Of Counsel, Zoll and Kranz LLC

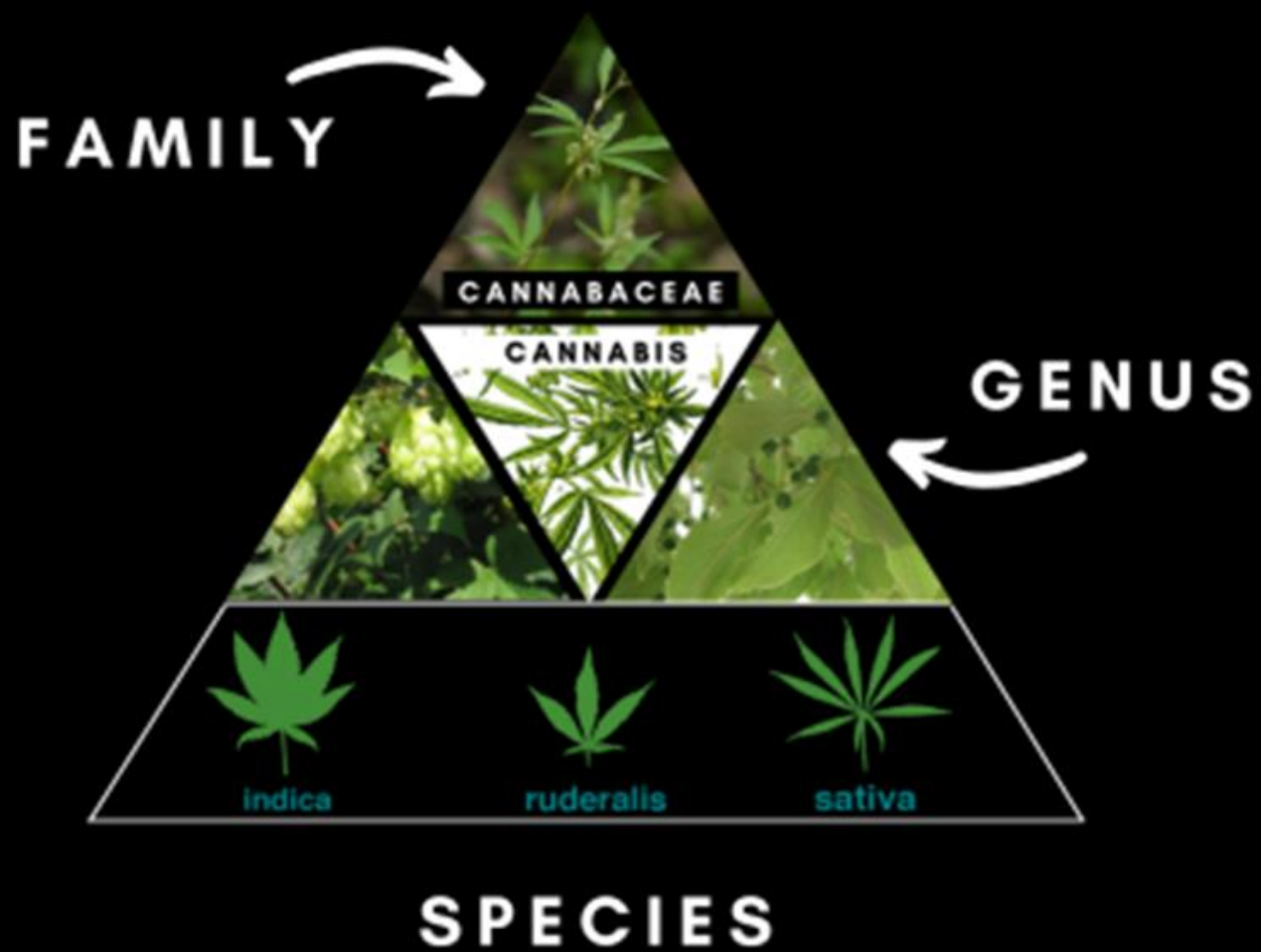
May 21, 2022, The Akron Bar Association Workers' Compensation Meeting

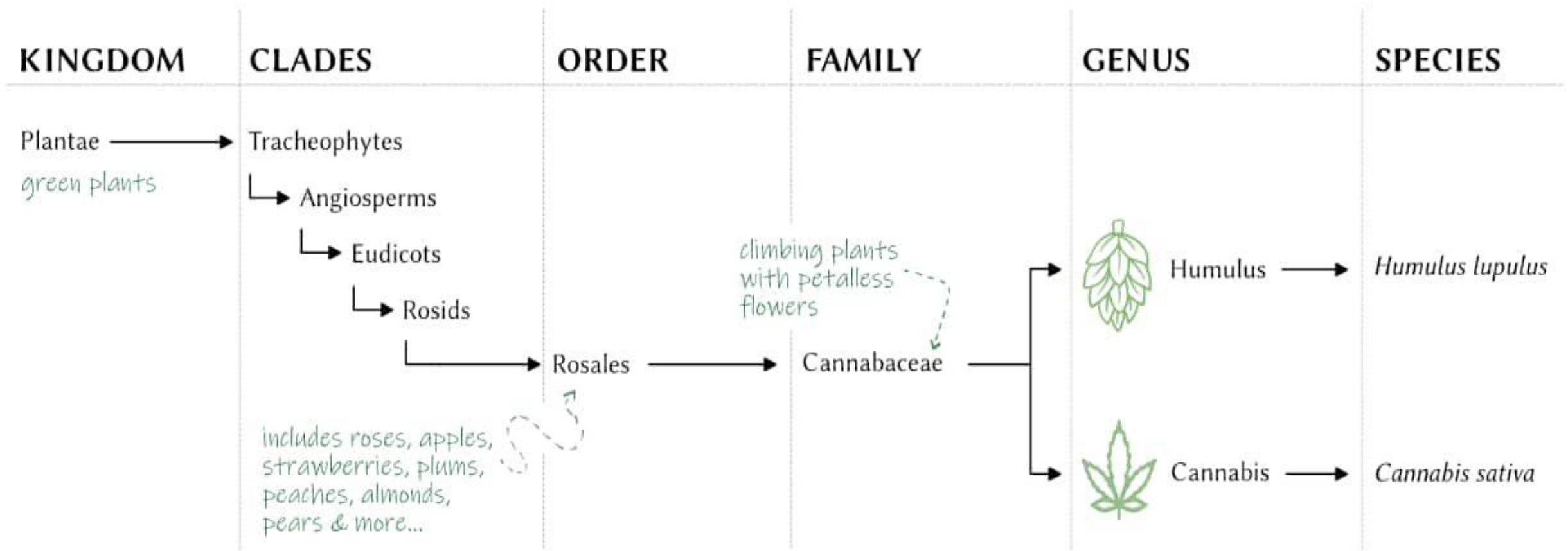
**I wrote a song  
about a tortilla.**

Actually, it's  
more of a wrap.



# THE CANNABIS FAMILY HIERARCHY





Genus: Tremā Aphananthe Parasponia **Cannabis** Gironniera Humulus Celtis

Species:

**Cannabis Ruderalis**

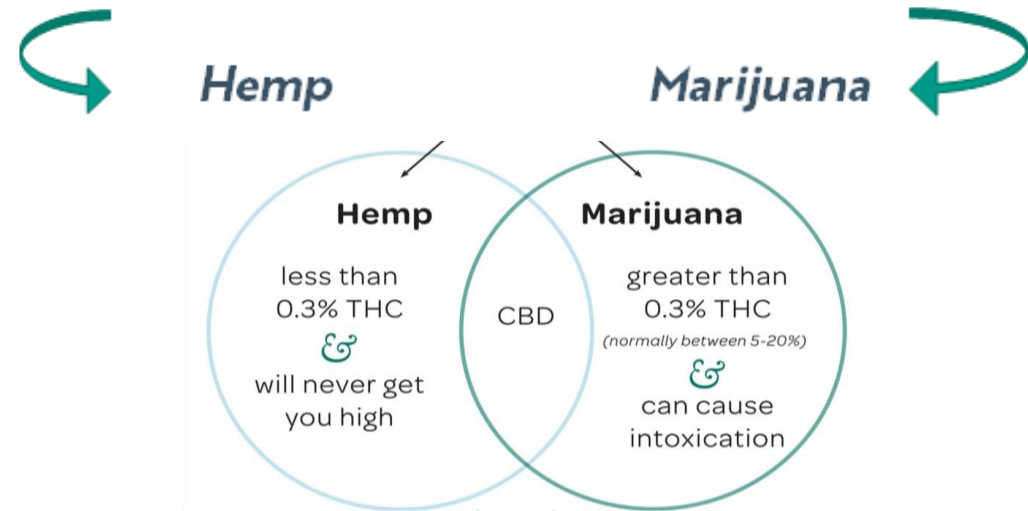
**Cannabis Sativa**

**Cannabis Indica**

Contains less than 0.2% THC

Contains more than 0.2% THC

Categories simplified:

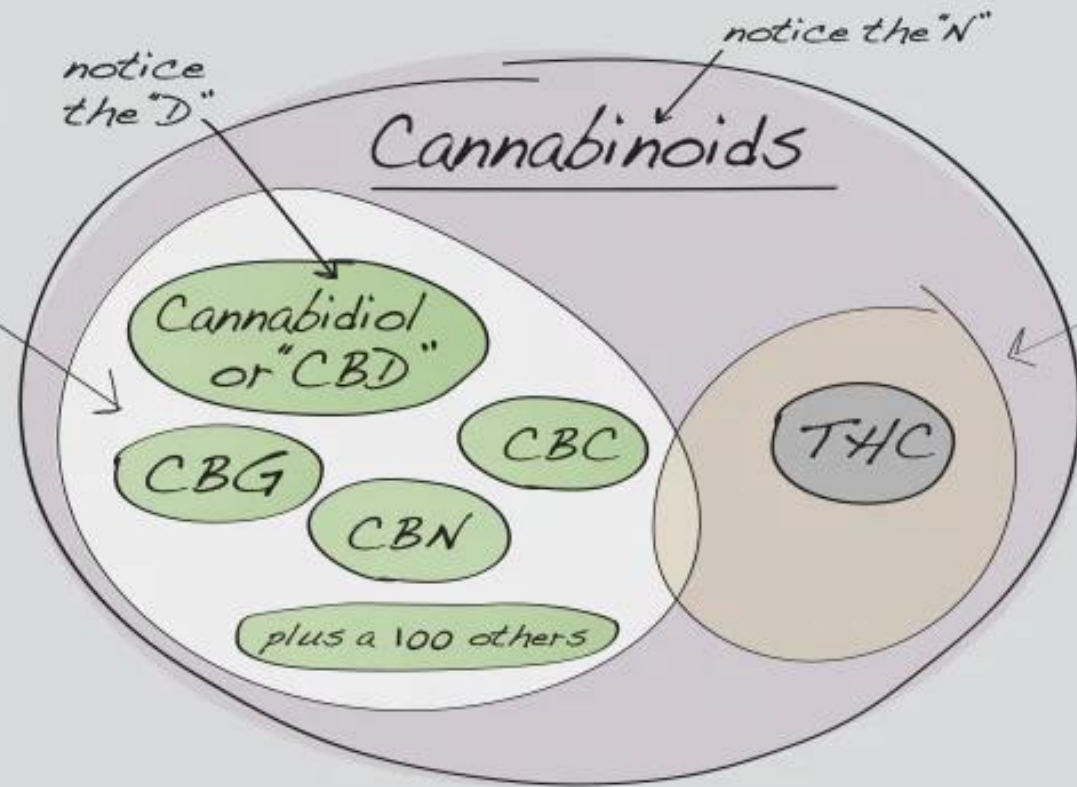
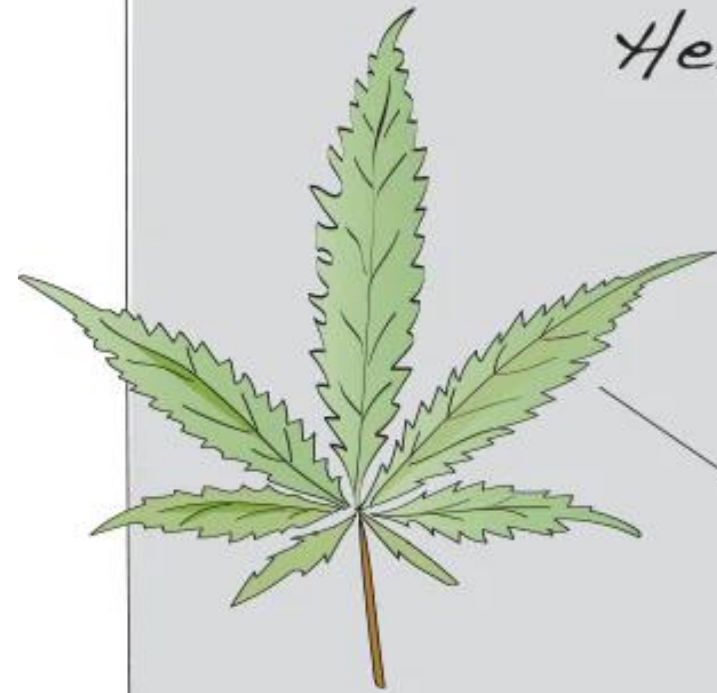


# Cannabis Plants

Hemp Plant

vs.

Marijuana Plant



CANNABIS HAS OVER **100** CANNABINOIDS



**HEMP**

contains

**0.3%**

**THC**

(OR LESS)

**MARIJUANA**

contains

**15-20%**

**THC**

(TYPICALLY)

THC  
Amount



# CANNABIS PLANT SPECTRUM

THC, THCV, CBD,  
CBN, CBG, CBC

TERPENES

FLAVONOIDS

PIGMENTS

SUGARS

LIGNIN

CELLULOSE

SESQUITERPENES

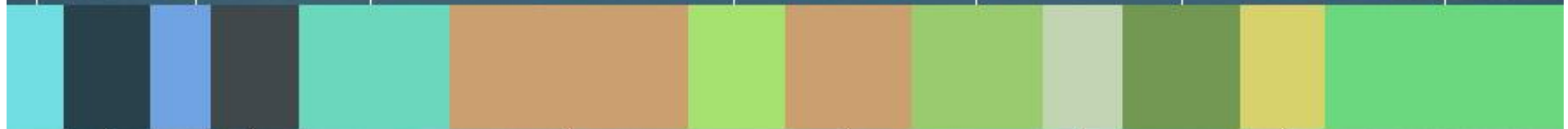
WAXES

PECTINS

FATS

STARCHES

CHLOROPHYLL



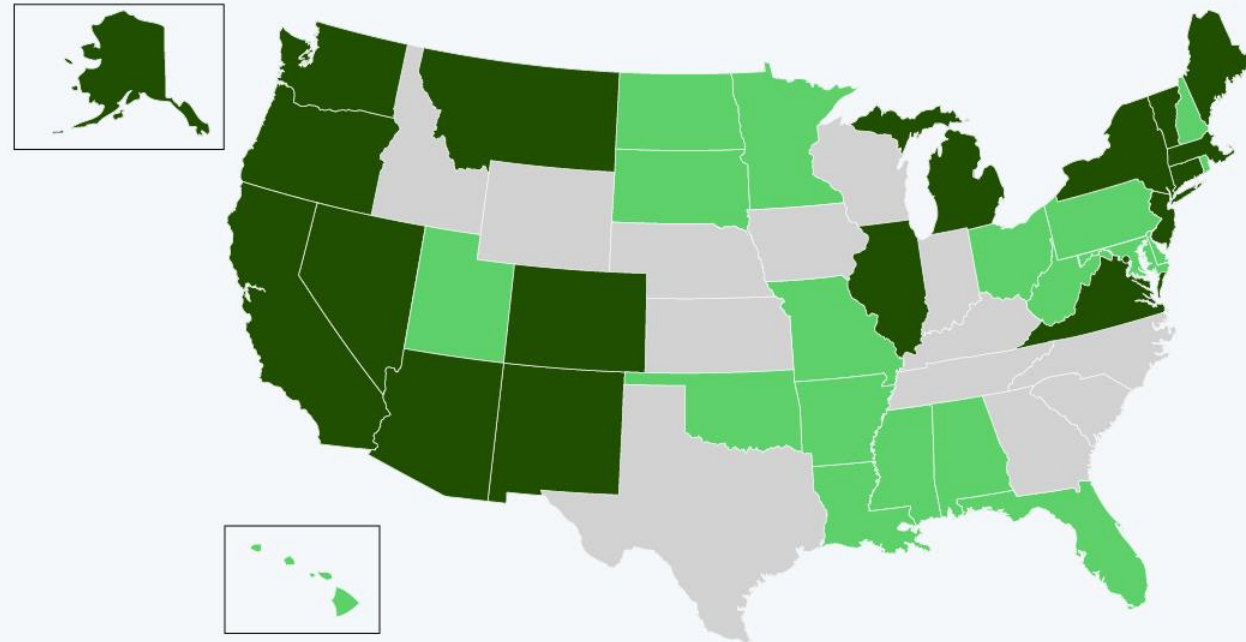


# The State of Marijuana Legalization in the U.S.



Laws on recreational and medical marijuana use in the United States

■ Legal recreational & medical use ■ Medical use only



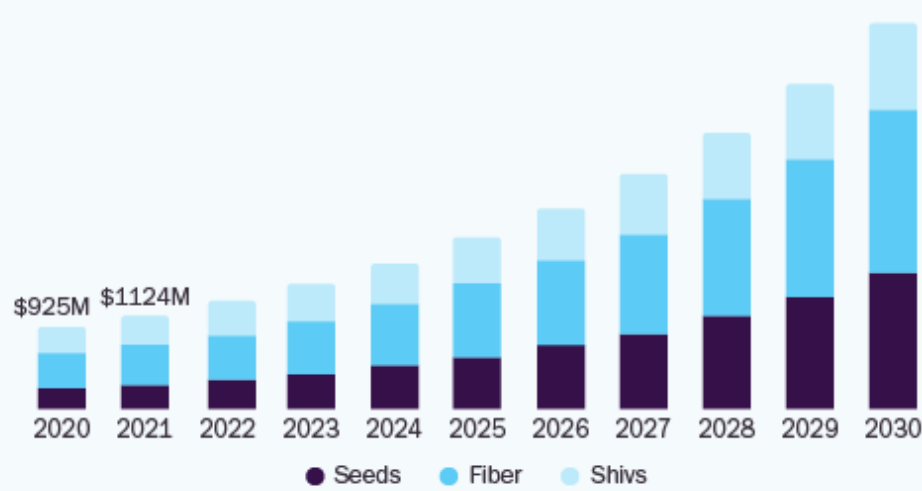
As of April 20, 2022. Some states not highlighted allow limited medical marijuana access. Recreational legalization by ballot ruled invalid in South Dakota.

Sources: NORML



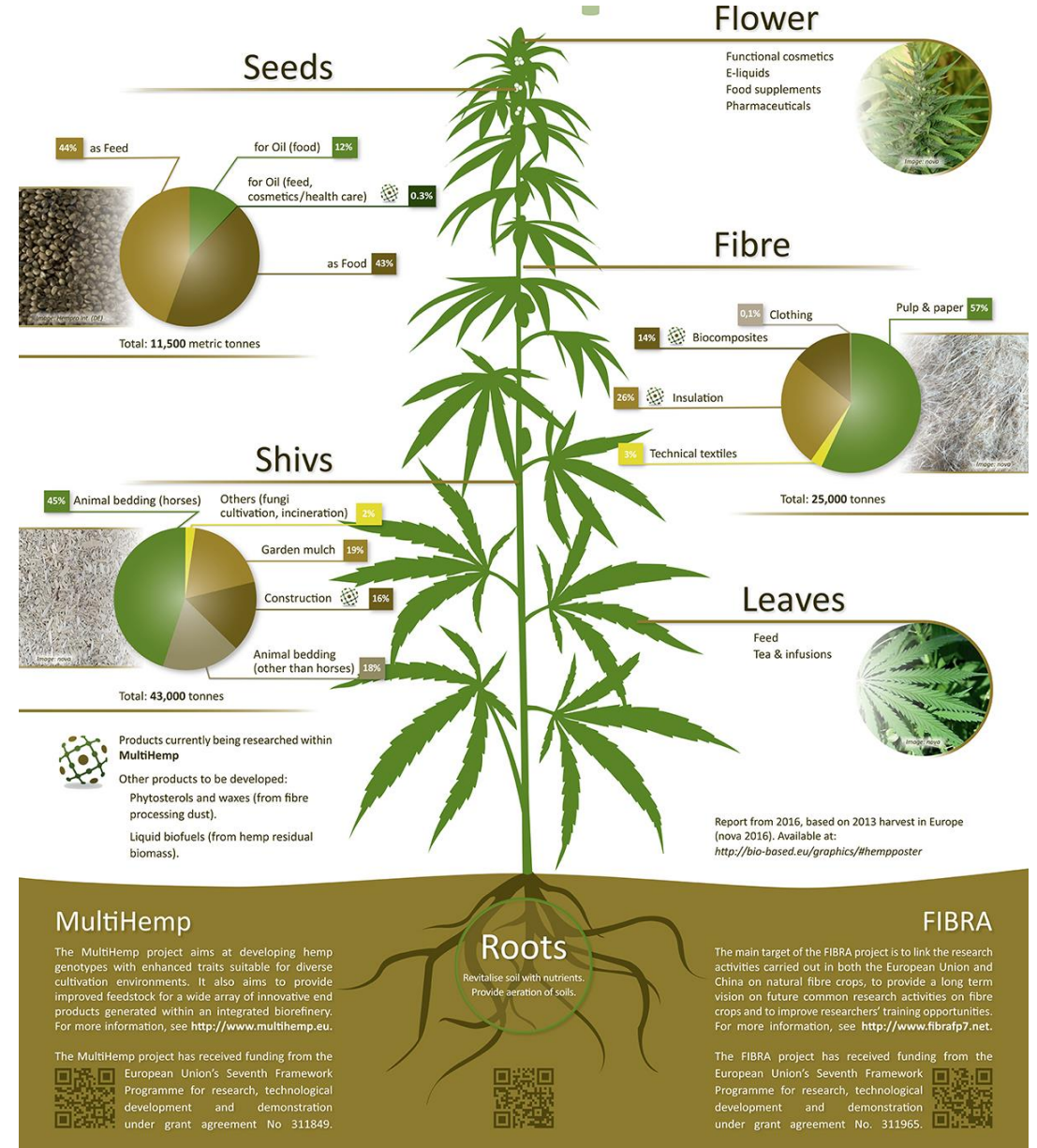
# Hemp a natural bio-refinery

## U.S. Industrial Hemp Market size, by product, 2020 - 2030 (USD Million)



**21.0%**  
U.S. Market CAGR,  
2022 - 2030

Source:  
[www.grandviewresearch.com](http://www.grandviewresearch.com)



**WHALE WHALE WHALE**



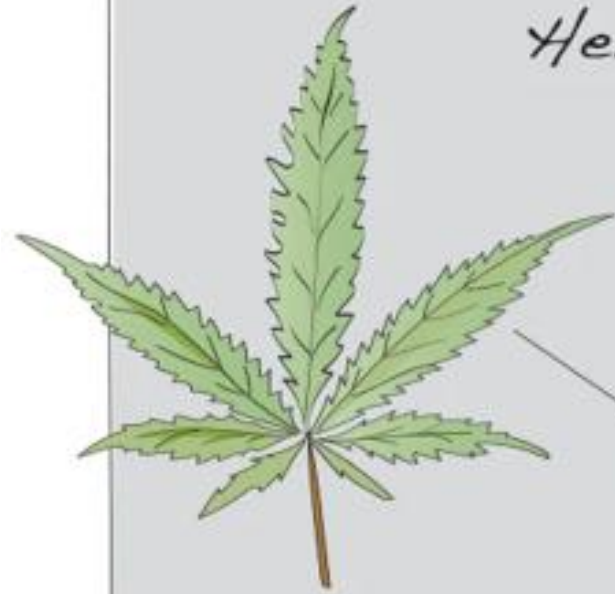
**what have we got here?**

# Cannabis Plants

Hemp Plant

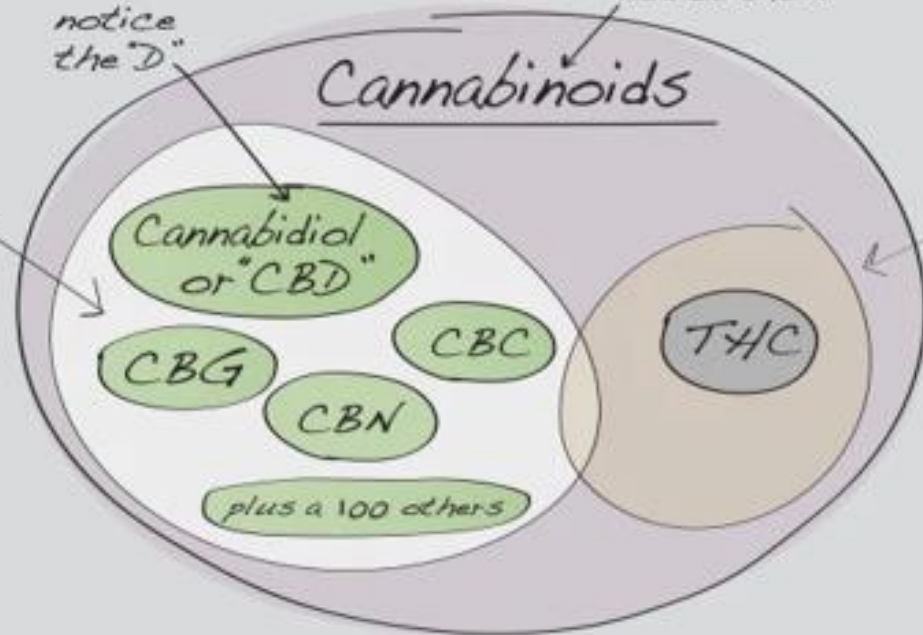
vs.

Marijuana Plant



notice the "D"

notice the "N"



# Flavonoids; a novel pilot study of anti-inflammatory and nociceptive properties

Donato Borrillo MD JD MS, Sparrow Hospital, Lansing Michigan, correspondence donato@borrillo.net



TABLE 1. 30-day clinical response to HempFlavin.

	HempFlavin					
	300 mcg or 100 mcg/day		100 mcg/day		300 mcg/day	
	Clinical Response		Clinical Response		Clinical Response	
	Positive	Negative	Positive	Negative	Positive	Negative
Participants (percentage)	42 (91%)	4	6 (85%)	1	36 (92%)	3
Pain scale reported	8.5/10 to 1.6/10					

**I. Introduction:** Flavonoids, a group of natural substances with variable phenolic structures, are found in plants and over 5,000 have been structurally identified. The focus of developing cannabis-based medicinal products has largely centered around cannabidiol and trans- $\Delta^9$ -tetrahydrocannabinol; however, the plant contains an abundance of other metabolites including flavonoids. The present paper focuses on the effect of flavonoids, specifically the Cannflavins, which make up less than 0.15% of the fresh weight of cannabis. Barrett and colleagues identified Cannflavins A and B and verified that these prenylated flavonoids could inhibit the production of PGE2 in human rheumatoid synovial cells and provide anti-inflammatory benefits that were approximately thirty times more effective than aspirin. The usual outcome of the acute inflammatory program is successful resolution and repair of tissue damage, rather than persistence and dysfunction of the inflammatory response, which can lead to scarring and loss of organ function. It may be anticipated, therefore, that failure of acute inflammation to resolve may predispose to autoimmunity, chronic dysplastic inflammation, and excessive tissue damage. **The clinical response to prostaglandin inhibition by HempFlavin in acute and chronic pain patients is the basis for this pilot study.**

**II. Materials and methods:** Doctors Hemp Solutions, Labelle, Florida, utilizing a proprietary method for extraction from a 2,000-year-old Heirloom Hemp Variety, isolated Cannflavin A, B, & C, Chlorophyll, and lesser constituents. This tincture has no tetrahydrocannabinol or cannabinoid contaminants. The tincture has not been evaluated by the U.S. Food and Drug Administration for efficacy or safety and is considered a dietary supplement distributed under the tradename HempFlavin. Dosing regimens were 300 mcg/day or 100 mcg/day; with pre-study, 10 and 30 interviews. Sixty-five adult volunteer patients randomly generated; forty-six completed the full study protocol without adverse effects. Of forty-six responders, twenty-four were female, and twenty-two male; mean age was sixty with a range of thirty-one to ninety years of age. Participants suffered from a variety of osteoarthritic ailments of spine, large and small joints.

**III. Results:** Table 1, of the forty-six respondents, ninety-one percent (91%) reported a decrease in pain (8.5/10 to 1.6/10 average) and increase in activity with daily HempFlavin use, dosed at 300 mcg/day and 100 mcg/day, after 30 days of supplement use. A slightly better (92%) response to the 300 mcg/day dosing was observed.

**IV. Discussion:** This pilot study identifies a significant clinical response to HempFlavin, with a decrease in inflammatory related symptoms.

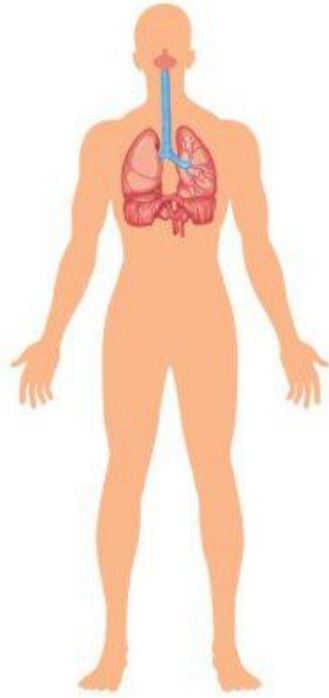
Given the current literature, more likely than not, Cannflavin A and B are inhibiting prostaglandin E2 release from joint synovial cells with a potency some 30 times that of aspirin.

A further robust study is recommended.





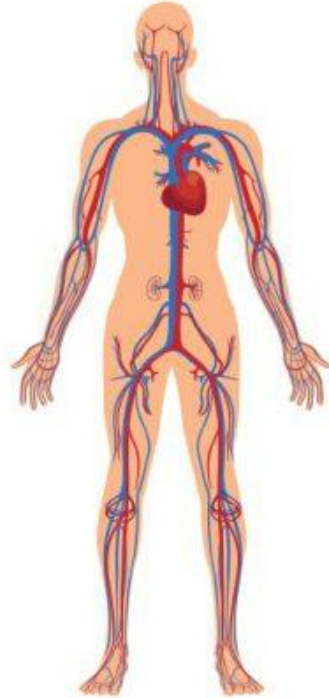
Skeletal System



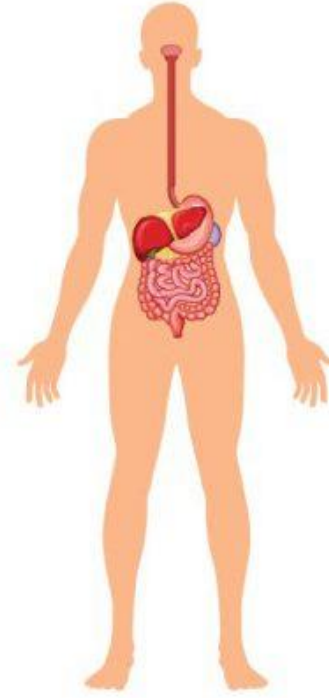
Respiratory System



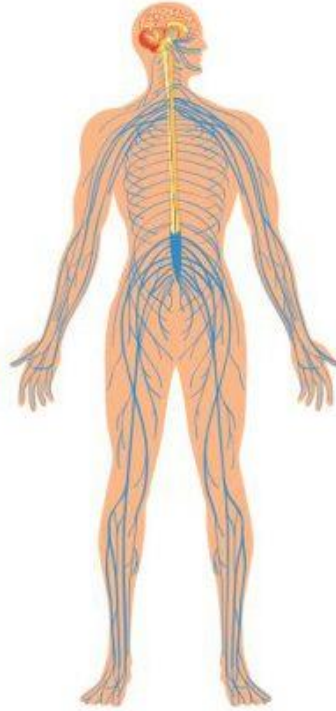
Muscular System



Circulatory System



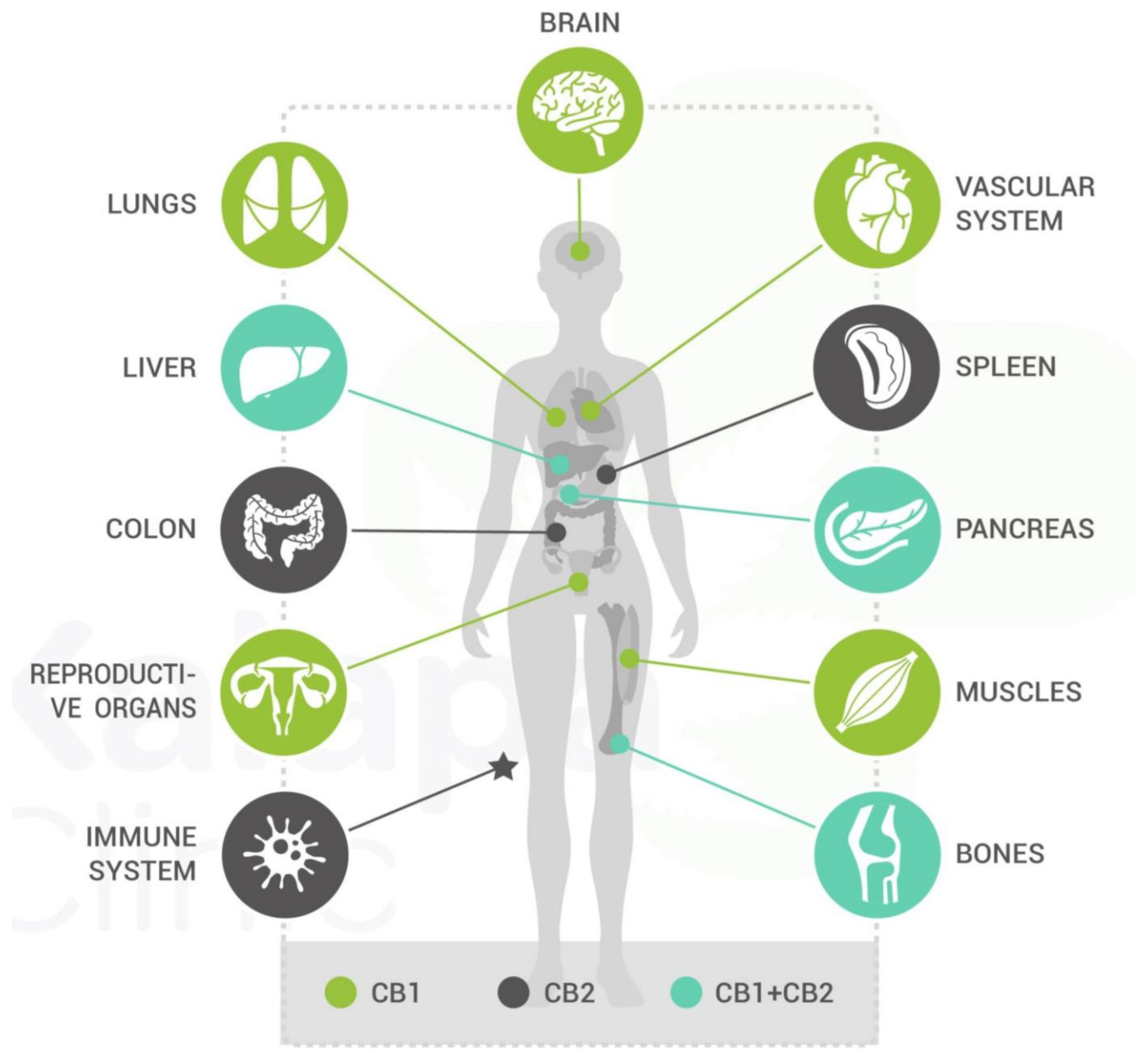
Digestive System



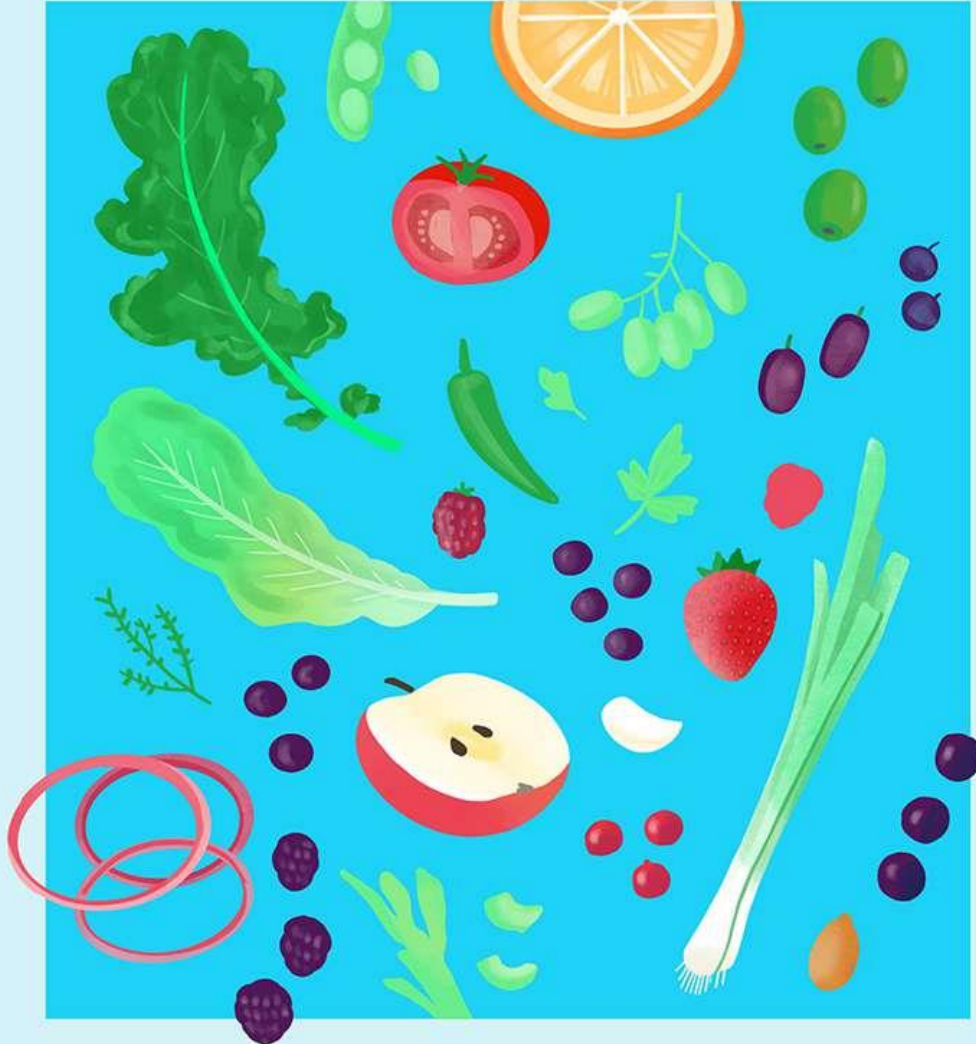
Nervous System



Endocannabinoid System



# Flavonoids and Foods



## **Flavanols and flavan-3-ols:**

Kale, lettuce, tomatoes, apples, grapes, berries, garlic, scallions, and onions

## **Flavones:**

Parsley, thyme, celery, hot peppers, and green olives

## **Flavanones:**

Citrus fruits

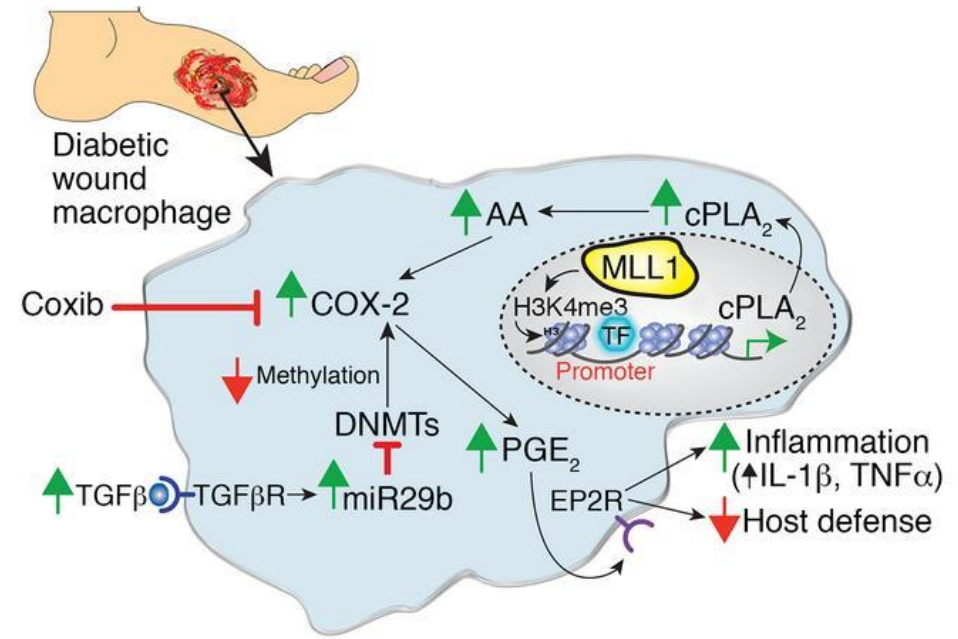
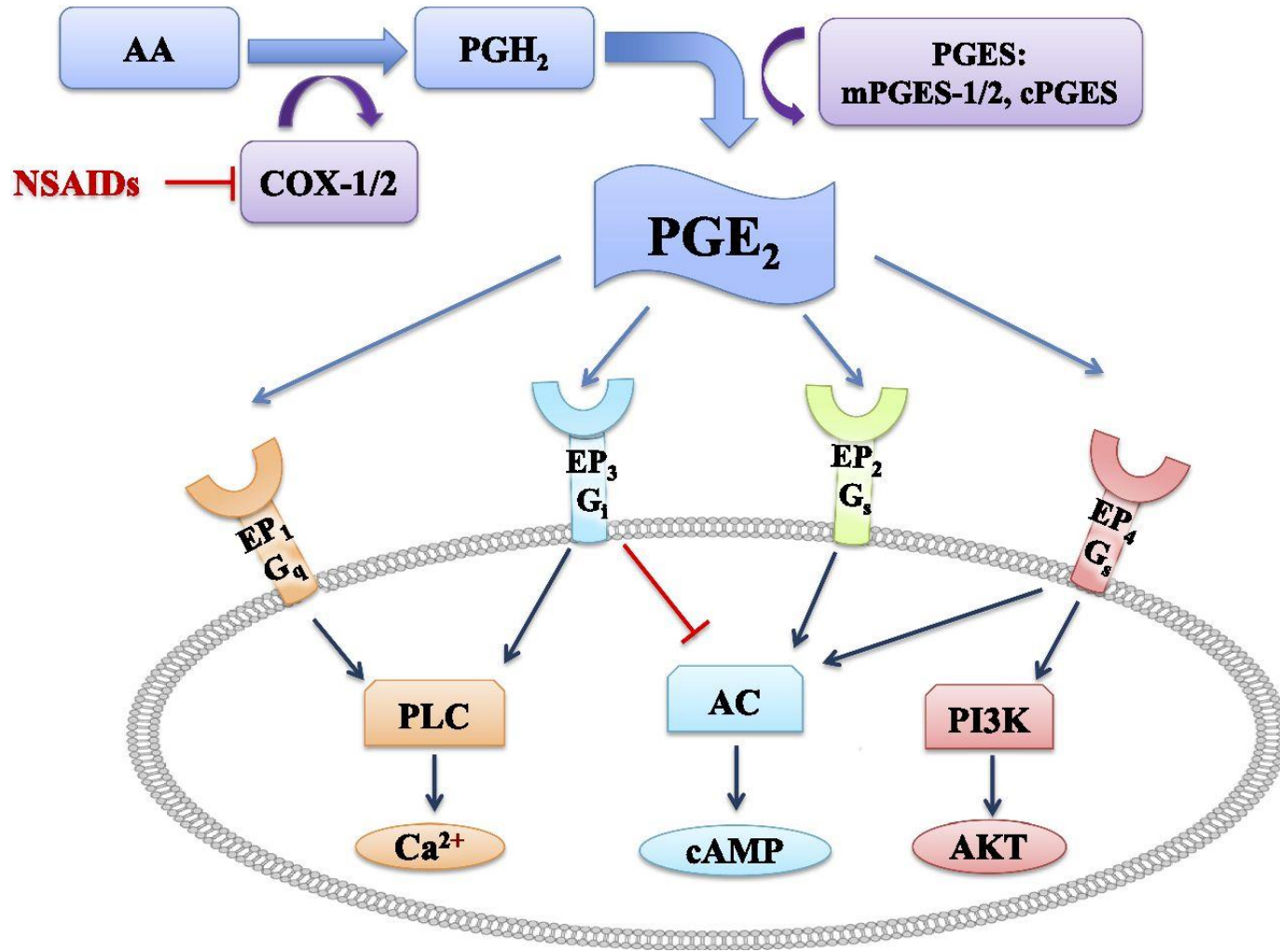
## **Isoflavones:**

Soybeans and other legumes

## **Anthocyanins:**

Cranberries, black currants, red grapes, merlot grapes, raspberries, strawberries, blueberries, bilberries, and blackberries





# Literature

- Barrett and colleagues identified Cannflavins A and B
  - these prenylated flavonoids inhibit the production of PGE2 in human rheumatoid synovial cells
  - provide anti-inflammatory benefits that were approximately thirty times more effective than aspirin
  - 1985. Isolation from Cannabis sativa L. of cann-flavin-a novel inhibitor of prostaglandin production. Biochem. Pharmacol. 34, 2019-2024, see *also*, Barrett et al., 1986. Cannflavin A and B, prenylated flavones from Cannabis sativa L. Experientia 42, 452-453.
- Werz and colleagues
  - The basis for their potent anti-inflammatory properties was that Cannflavins A and B act to inhibit the in vivo production of two pro-inflammatory mediators, prostaglandin E2 and the leukotrienes
  - Werz et al., 2014. Cannflavins from hemp, a novel cannabinoid-free hemp food product, target microsomal prostaglandin E2 synthase-1 and 5-lipoxygenase. Pharm. Nutr. 2, 53-60.

# Materials and Methods

- Extraction from Hemp, isolated in 100 microgram per milliliter (mcg/ml) Cannflavin A, B, & C, Chlorophyll, and lesser constituents of Apigenin, Pelargonidin-3-O-glucoside, Baicalin, Vitexin, Beta Sitosterol, Wogonin, Chrysin, Rutin, Fisetin, Quercetin, Luteolin, Kaempferol, and Orientin.
- The tincture has zero (0) tetrahydrocannabinol (THC) and zero (0) cannabinoid.
- The tincture has not been evaluated by the U.S. Food and Drug Administration (FDA) for efficacy or safety and is considered a dietary supplement and is distributed under the tradename HempFlavin.
- Dosing is performed by the participants, utilizing a 1 milliliter (ml) dropper dispenser with 100 micrograms (mcg) per ml., participants were divided into two dosing regimens; a dosing of 300 mcg/day in the morning or 100 mcg/day in the morning was selected based on random assignment.
- Participants were contacted at 10 day and 30-day intervals, with a pre-study interview performed by this paper's author.

# Materials and Methods cont.

- Sixty-five (65) adult volunteer patients were randomly generated for participation in the study
- Forty-six (46) or seventy percent (70%) completed the full study protocol of ten (10) and thirty (30) days
  - 24 were female, 22 male
  - Mean age 60, with range of 31 to 90
- Participants suffered from a variety of osteoarthritic ailments, both micro-trauma (e.g., DJD) and macro-trauma (e.g., MVA fractures) in origin.

TABLE 1. 30-day clinical response to HempFlavin.

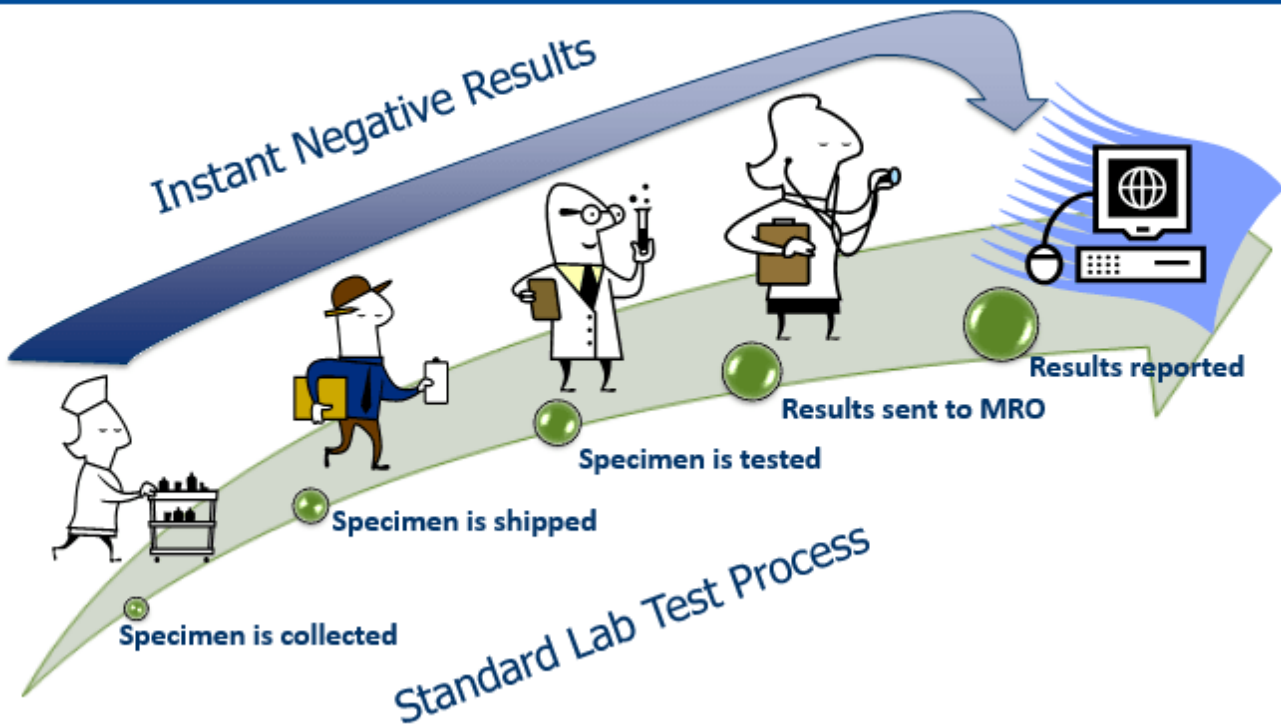
	HempFlavin					
	300 mcg or 100 mcg/day		100 mcg/day		300 mcg/day	
	Clinical Response		Clinical Response		Clinical Response	
	Positive	Negative	Positive	Negative	Positive	Negative
Participants (percentage)	42 (91%)	4	6 (85%)	1	36 (92%)	3
Pain scale reported	8.5/10 to 1.6/10					

- No adverse effects
- The overall positive response rate, for decreased pain and increased function, was observed as ninety-one percent (91%).



- The goal of medicinal marijuana use is to treat an ailment without a high; whereas, the goal of recreational marijuana use is to achieve a high without treating an ailment.
- Impairment, regardless of the source (medicinal drugs, recreational drugs, legal or illegal sources), does not have to be tolerated by the employer in the workplace.
- Federal courts have ruled that the ADA does not require a medical marijuana accommodation. In 2012, the 9th U.S. Circuit Court of Appeals held in [James v. City of Costa Mesa](#) that although the plaintiffs were "gravely ill," and California legalized medical marijuana use, the ADA did not protect the plaintiffs' use of the drug.
  - The court said that the plain language of the ADA only protects drug treatments prescribed by health care professionals when those drugs are not explicitly banned by the federal Controlled Substances Act, like marijuana is.

# Instant vs. Standard Lab



## 5 PANEL DRUG TESTS



### DRUG TEST CUP INSTRUCTIONS



# Pre-Employment

- Is the most common type of drug screening.
- Courts have generally ruled that pre-employment drug screens for illegal drugs do not constitute medical examinations under the Americans with Disabilities Act.
- Such screens should be administered after a conditional offer of employment has been made because the employer may need to ask job applicants follow-up medical questions based on the results.
- "Testing an applicant is different than testing an employee, as they don't work for you yet."



# Post accident

Under Ohio law, a positive, post-accident drug test raises only a “rebuttable presumption” that the injured worker’s use of drugs or alcohol proximately caused the industrial injury. However, the presumption is triggered only if the following elements are first satisfied:

1. The employer must have previously posted written notice that a positive test may disqualify the employee from benefits.
2. The detected levels of alcohol or other controlled substances must have been above the applicable threshold. Alternatively, if the injured worker refuses to submit to a test, the presumption will be triggered.
3. A post accident test will qualify for the presumption only where: (1) the employer had reasonable cause to suspect that the employee was under the influence of drugs or alcohol at the time of the accident; (2) the testing was done at the request of a police officer; or 3) the testing was done at the request of a licensed physician, who is not otherwise employed by the employer.



**Questions?**

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