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# The Backbone of the Cannabis Plant: Cannabinoids



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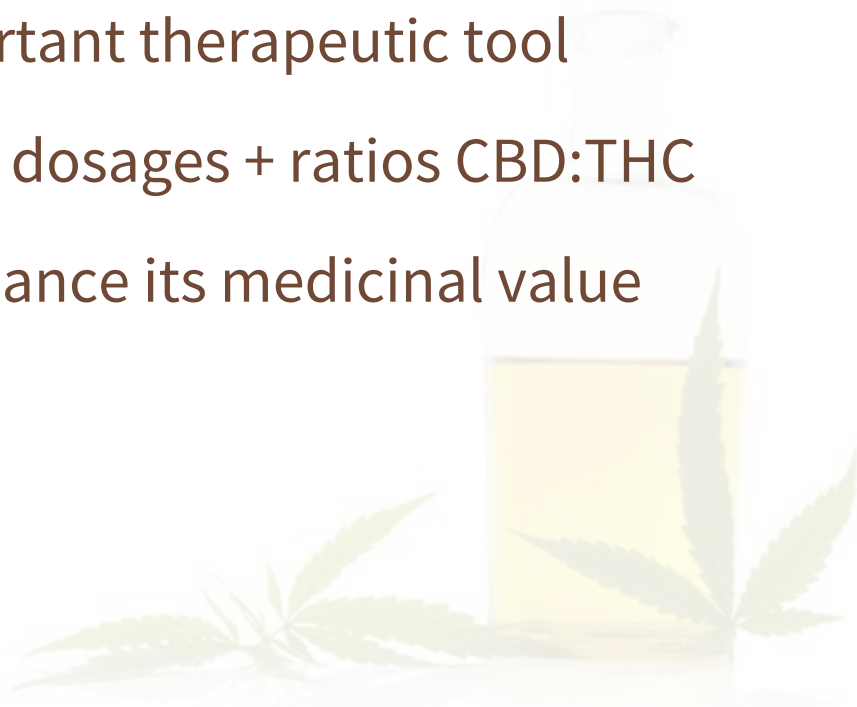


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# Relearning the Plant

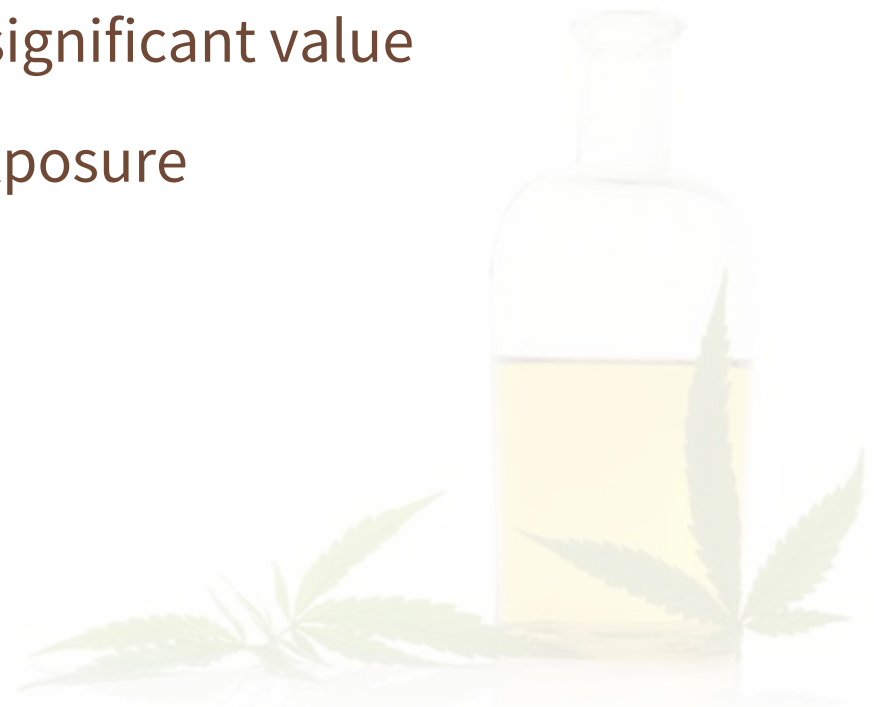
- 1937 prohibition → lapse of cannabis knowledge
- Reappearance of CBD (cannabidiol) as important therapeutic tool
- Availability of potent extract oil with varying dosages + ratios CBD:THC
- CBD can modulate THC psychoactivity + enhance its medicinal value





# CBD Emerges

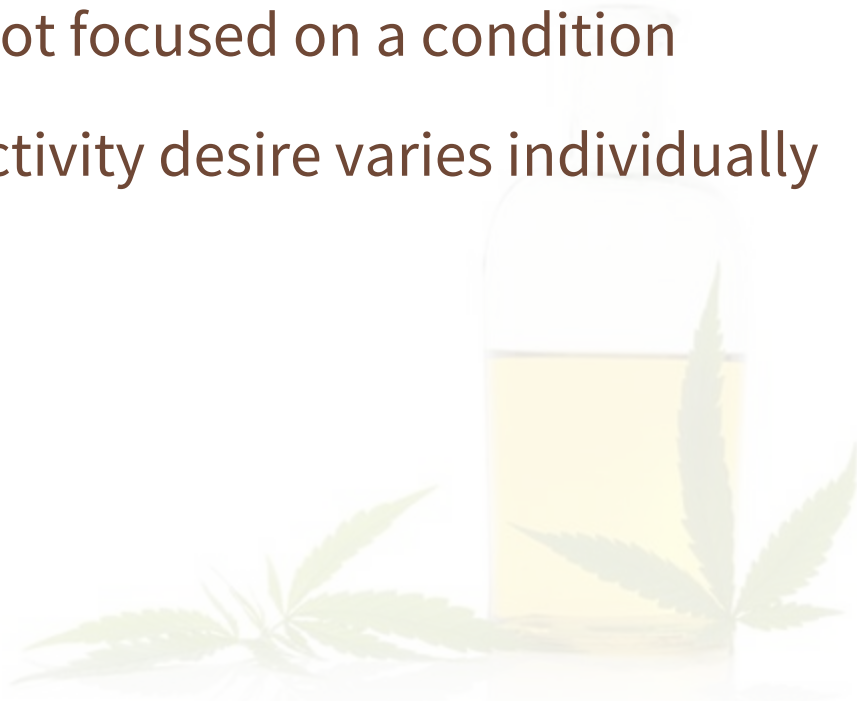
- Interbreeding created strains with significant amounts of CBD
- Preclinical research indicates that CBD has significant value
- CNN documentary provided broad media exposure
- Medicine without the psychotropic high





# Educator's Role

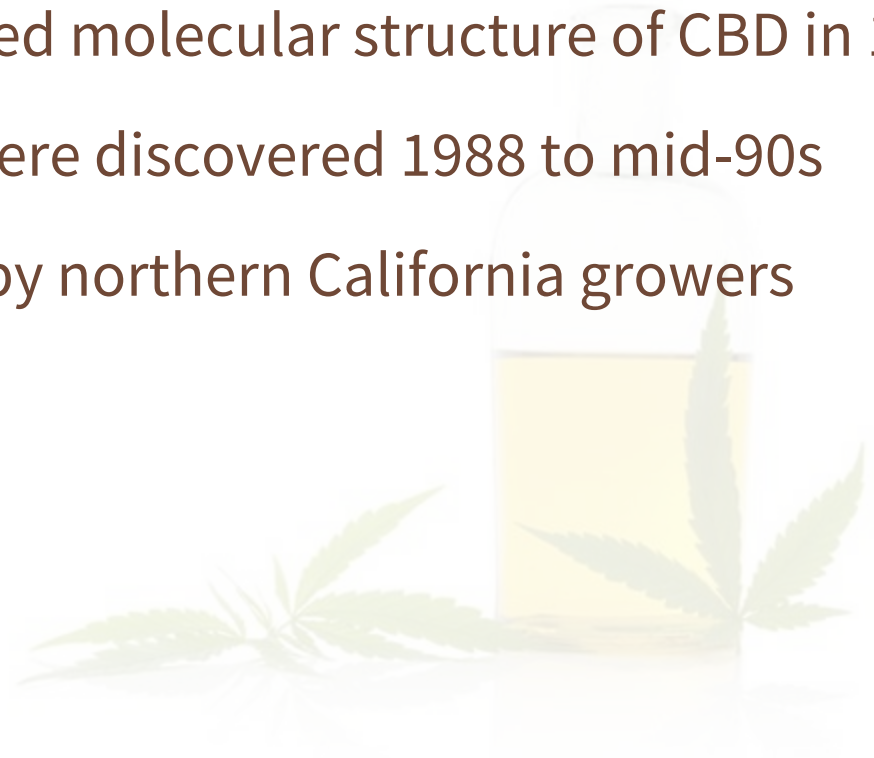
- Help patients find comfortable entry point to therapeutic use
- Shift to patient's needs with comfort level, not focused on a condition
- Best ratio, administration method, psychoactivity desire varies individually





# CBD Timeline

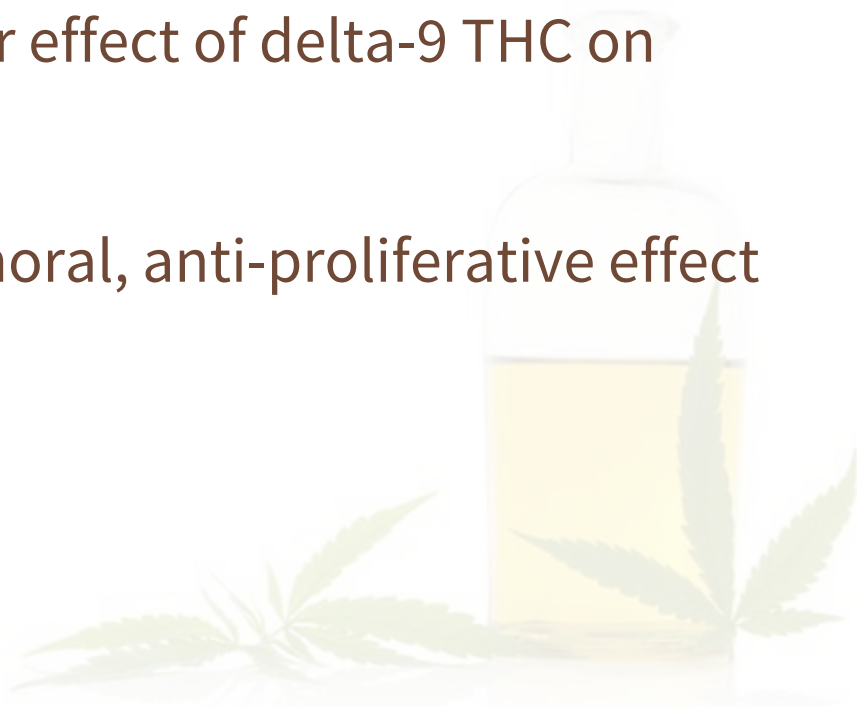
- Isolated from cannabis in 1940
- Israeli scientist Raphael Mechoulam identified molecular structure of CBD in 1963
- CB1 receptors + endocannabinoid system were discovered 1988 to mid-90s
- CBD-rich strains were rediscovered in 2009 by northern California growers





# Science Supports CBD

- CBD works synergistically with THC
- 2010 study indicated CBD enhances inhibitor effect of delta-9 THC on glioblastoma cell survival
- CBD + THC = enhanced anti-cancer, anti-tumoral, anti-proliferative effect

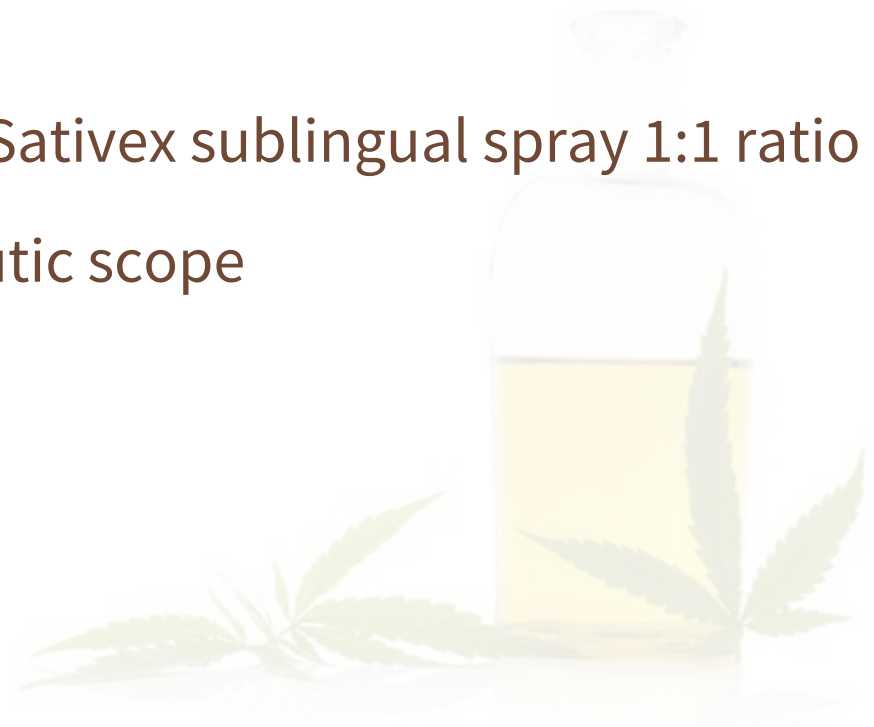






# Synergistic Interactions

- CBD potentiates THC's analgesic effects for managing neuropathic pain, brain injuries, etc
- Extensive trials with GW Pharmaceuticals – Sativex sublingual spray 1:1 ratio
- Together, CBD + THC offer broader therapeutic scope

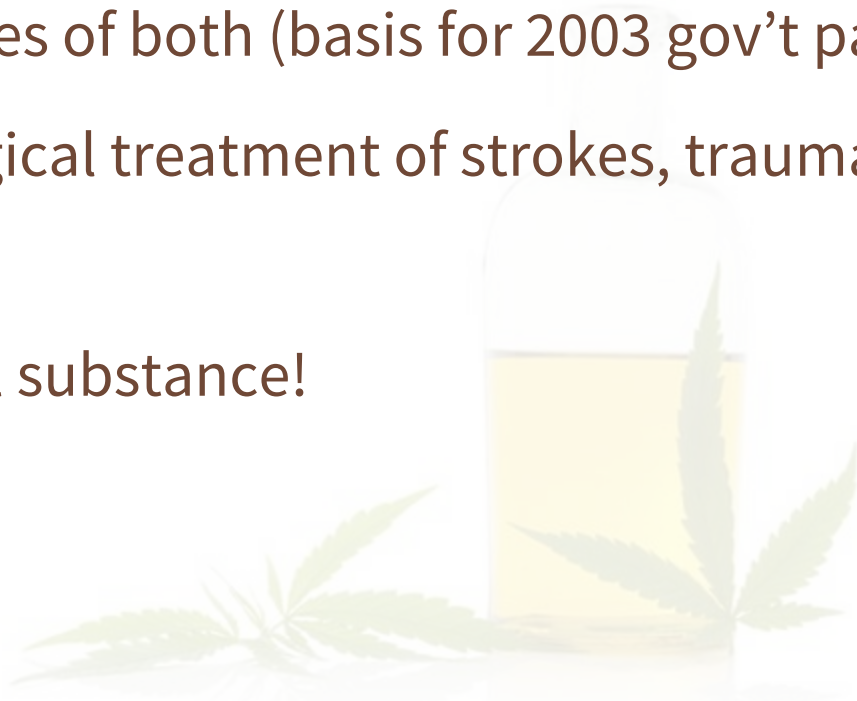






# US Government Confirms Efficacy

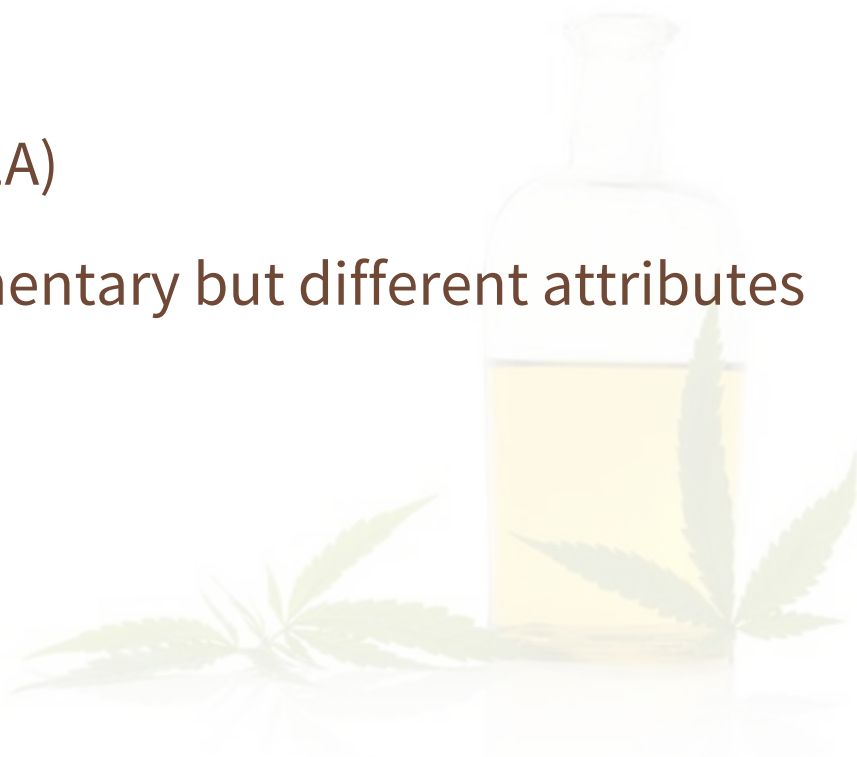
- CBD + THC both stimulate neurogenesis – creation of new brain cells
- NIH 1998 study verified antioxidant properties of both (basis for 2003 gov't patent)
- Patent addresses CBD + THC use in neurological treatment of strokes, trauma, Alzheimer's, Parkinson's, HIV dementia
- Yet, the plant is a Schedule 1 federally illegal substance!





# How Does Synergy Work

- CBD + THC bind to different receptors
- THC binds to brain receptors + periphery
- CBD binds to many others (serotonin, 5-HT 1A)
- THC or CBD dominant strains have complementary but different attributes





# CBD-THC Interaction

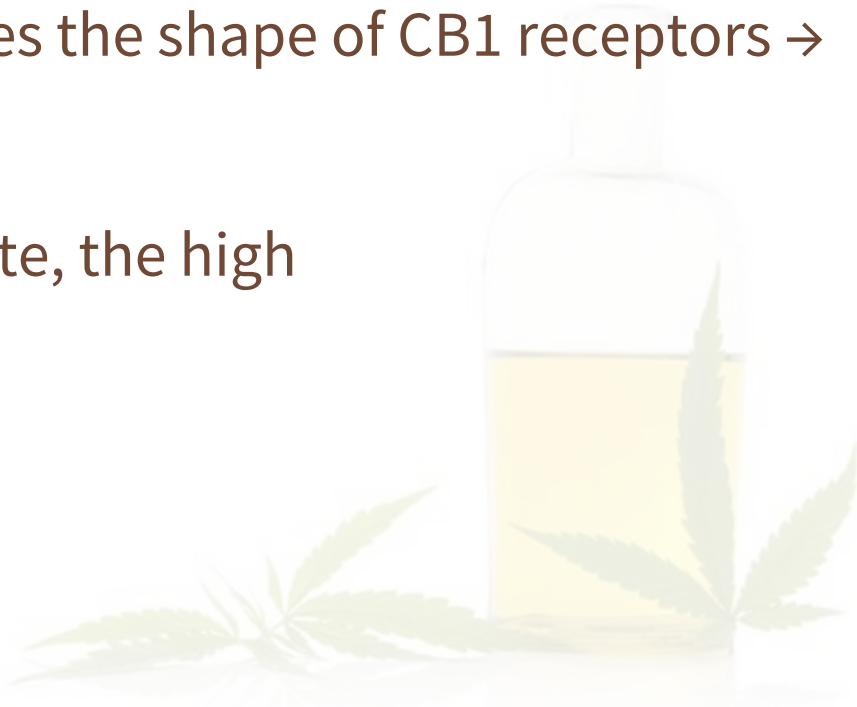
- In equal amounts, CBD delays THC metabolism via cytochrome P450 detoxification pathway
- CBD metabolized first means THC stays longer in the body
- CBD can interfere with some drug metabolism





# Lowering the High

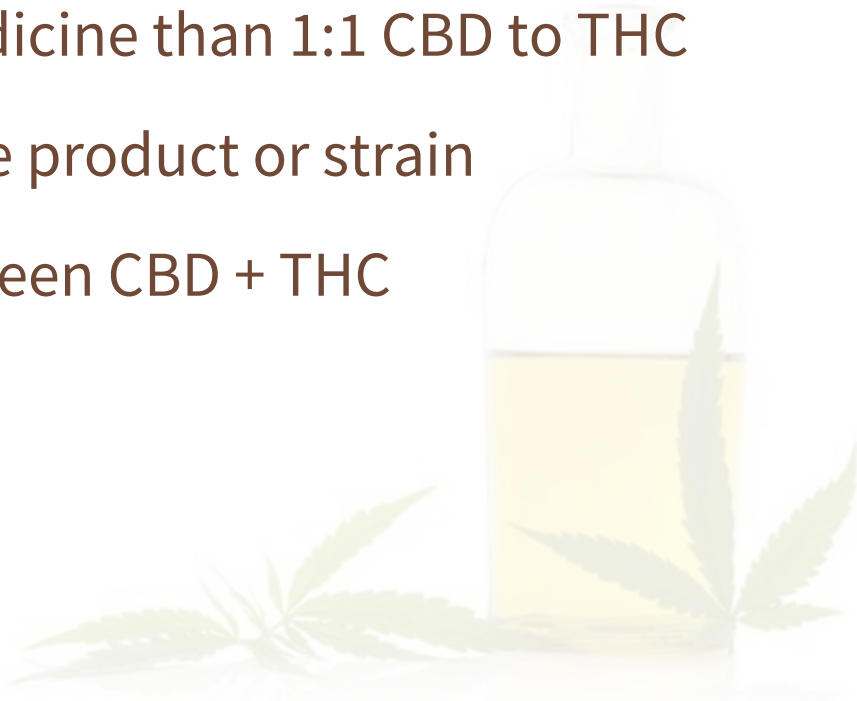
- THC binds to CB1 brain receptors → psychoactivity
- CBD as negative allosteric modulator changes the shape of CB1 receptors → more difficult for THC to bind
  - Mechanism helps to temper, or modulate, the high





# Understanding Ratios

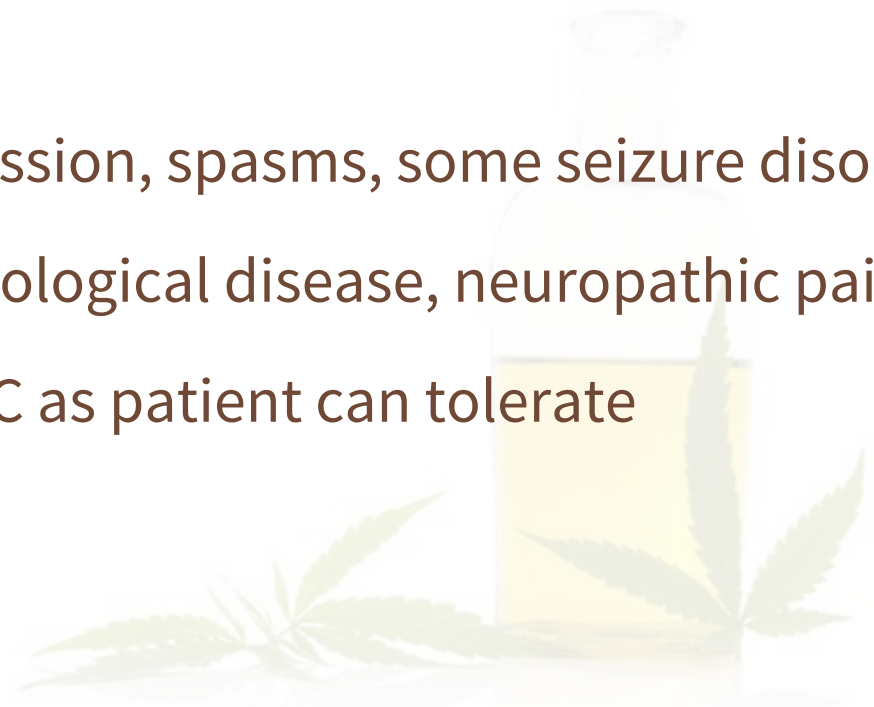
- Greater ratio of CBD to THC, less of a high
- 30:1 CBD to THC is not necessarily better medicine than 1:1 CBD to THC
- Ratio is not an indicator of how much is in the product or strain
- Low THC remedy reflects lower synergy between CBD + THC
- Optimal ratio varies among individuals





# Finding the Right Ratio

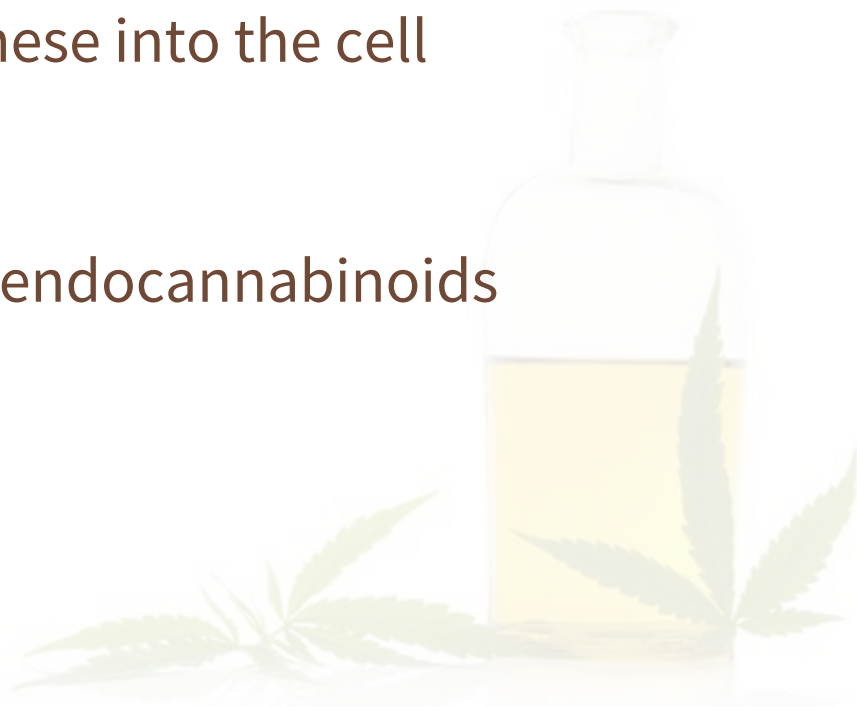
- Closer the numbers to each other = greater the synergy
- Match ratio to person, not condition
- Moderate CBD, lower THC for anxiety, depression, spasms, some seizure disorders
- Balanced ratio (1:1, 2:1, 3:2) for cancer, neurological disease, neuropathic pain
- Consistent CBD-rich doses with as much THC as patient can tolerate





# CBD as a Reuptake Inhibitor

- Endocannabinoids (made by body) + CBD + THC penetrate cell membranes
- Fatty acid-binding proteins help transport these into the cell
- CBD binds to PPAR (nuclear) receptors
- CBD + THC can delay reuptake of the body's endocannabinoids  
= boosting body's own levels

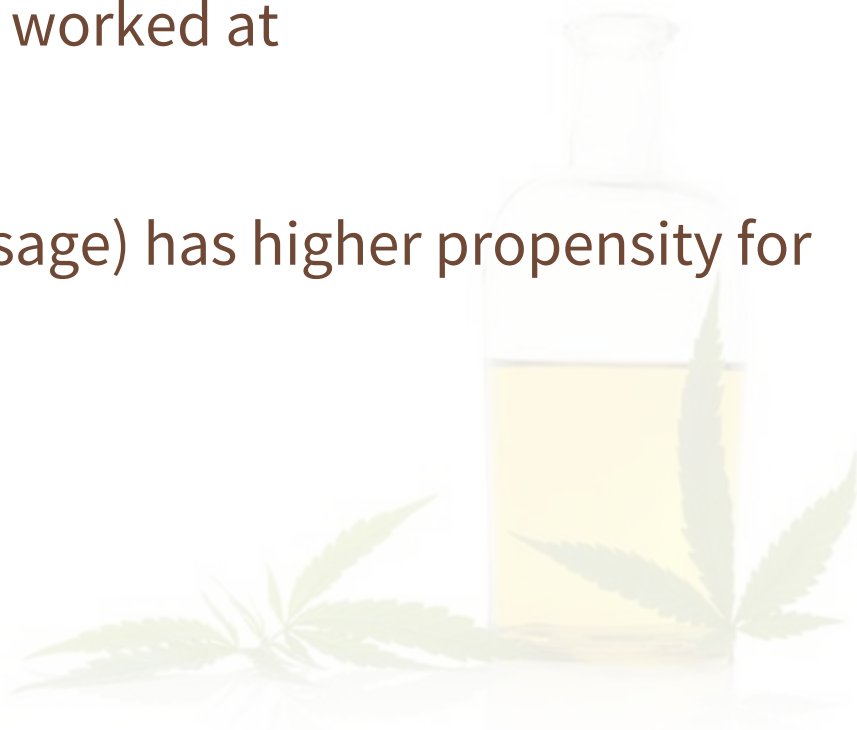






# Whole Plant CBD versus Single Molecule

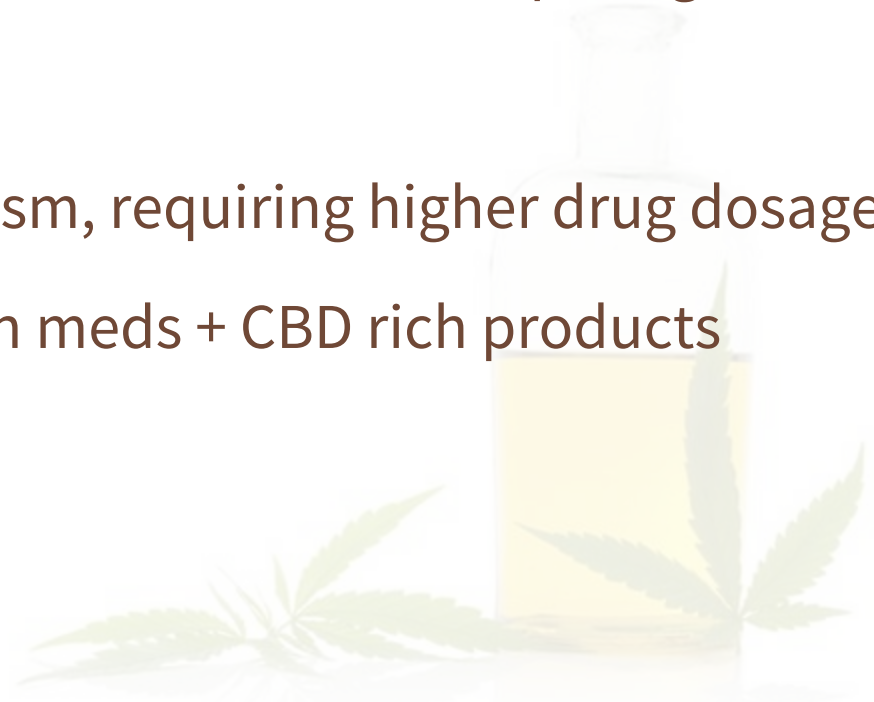
- 2015 study found higher + more precise dose of single molecule CBD was needed for painkilling effect versus whole plant CBD worked at lower + broader dosages
- Single molecule approach (due to higher dosage) has higher propensity for drug interaction
- Whole plant CBD offers more leeway





# Drug Interactions: Good + Bad

- Positive: opiates + cannabis
  - Cannabis delays opioid metabolism for sustained effect, requiring lower dose
- Negative: blood thinners
  - Single molecule CBD can alter metabolism, requiring higher drug dosage
- Monitor blood levels when using prescription meds + CBD rich products





# All CBD Is Not Created Equally

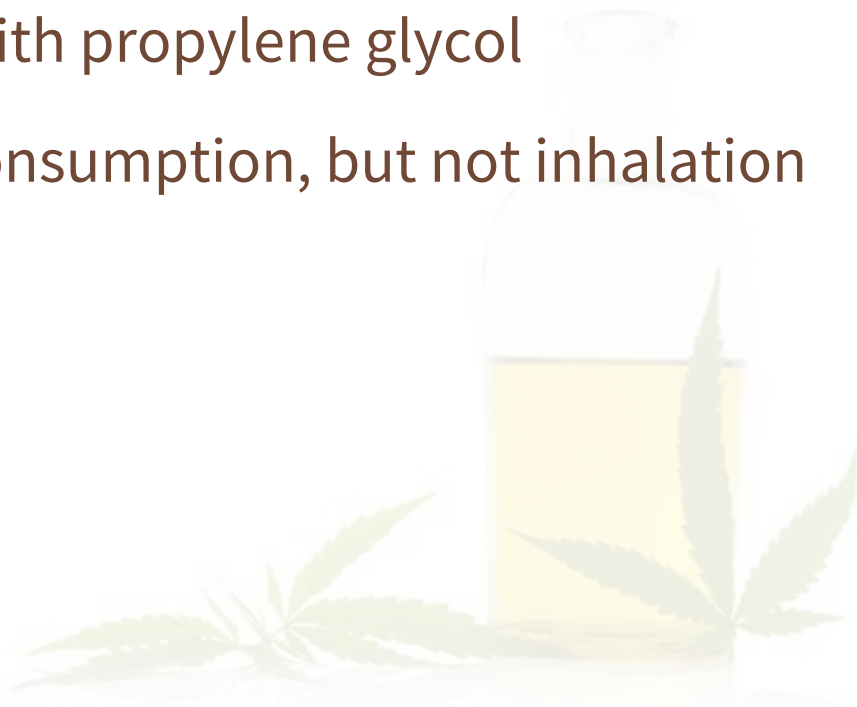
- Hemp-derived CBD: isolates lack terpenes + minor cannabinoids for efficacy
- CBD + THC reside in resin
- Industrial hemp is low resin
- High resin cannabis plants are bred to be THC or CBD dominant





# CBD from Industrial Hemp

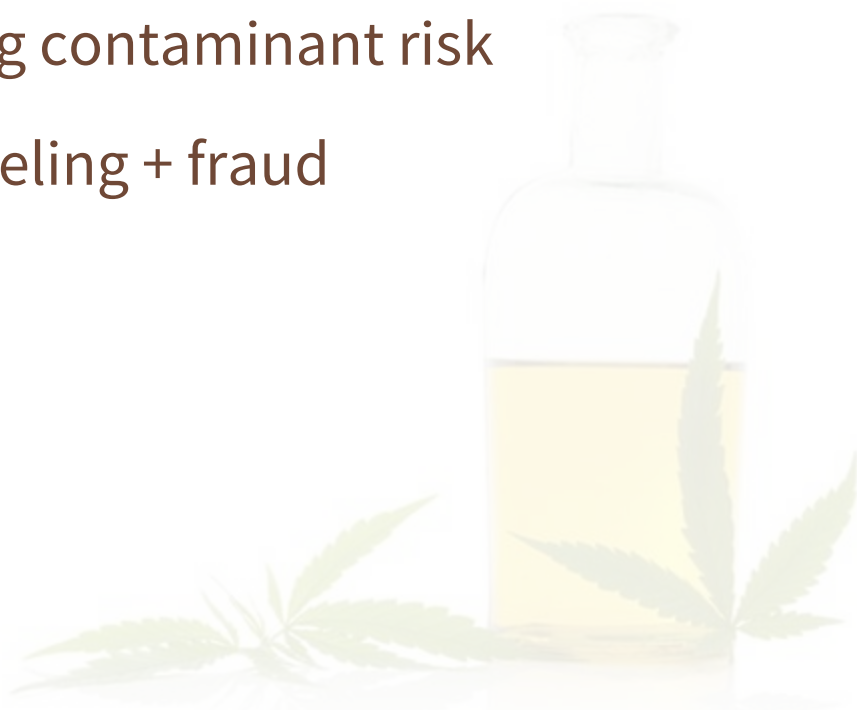
- Dubious quality, not legal in all 50 states
- Hemp oil vape pen cartridges often mixed with propylene glycol
- Flavoring agents may be FDA-safe for oral consumption, but not inhalation





# Hemp as a Bioaccumulator

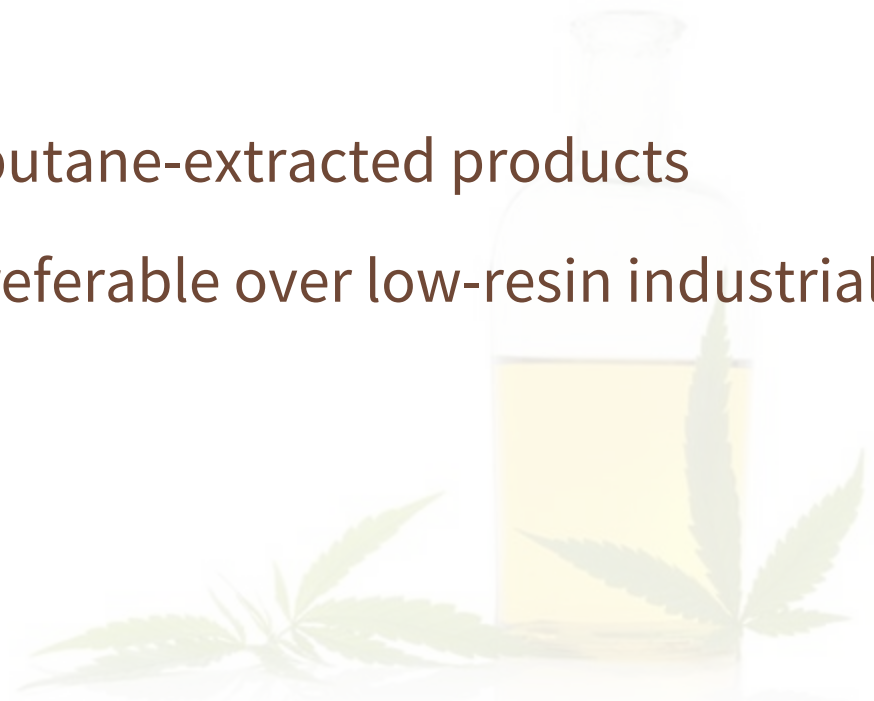
- Low-resin industrial hemp requires large quantities to obtain CBD
- Hemp accumulates ground toxins, increasing contaminant risk
- Hemp oil products – buyer beware of mislabeling + fraud





# Making Good Choices

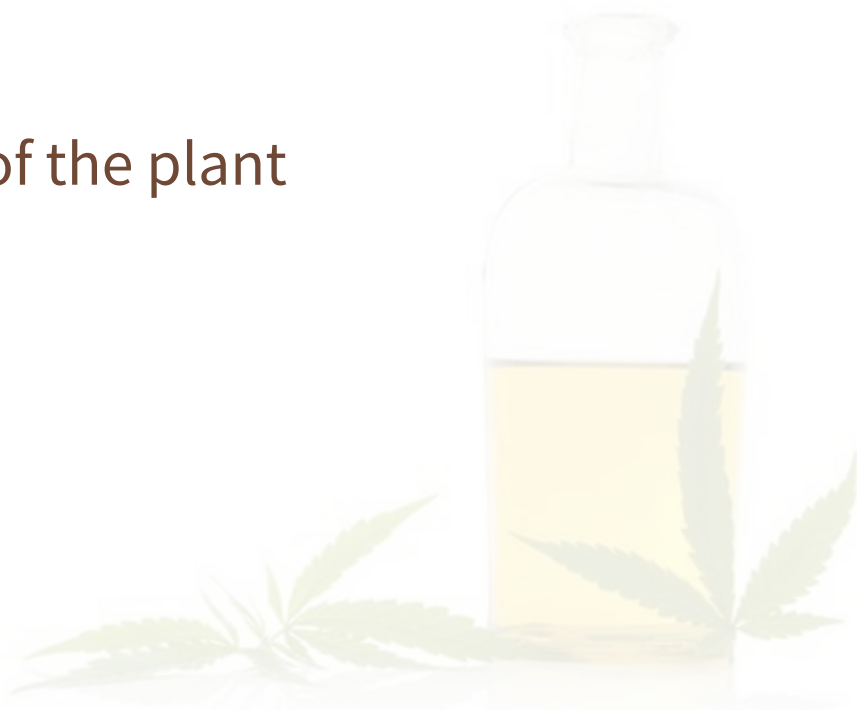
- Label shows quantity + ratio of CBD + THC
- Lab tested + free of contaminants
- Avoid artificial additives, propylene glycol, butane-extracted products
- Product from high-resin cannabis plant is preferable over low-resin industrial hemp





# Debunking Myths

- Whole plant medicinals are superior to single molecule CBD
- CBD is *more* effective with THC
- CBD + THC are *both* medicinal components of the plant
- Psychoactivity can be a useful *healing* effect







# CBD Recap

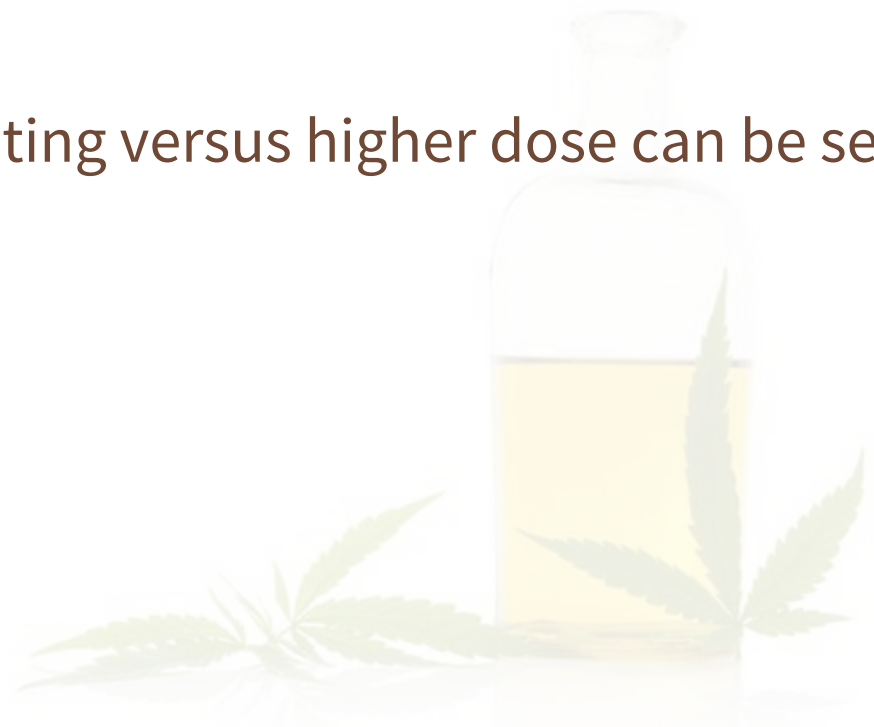
- Cannabis therapeutics is personalized medicine
- Treat people, not conditions
- Whole plant, CBD-rich cannabis is effective + preferable





# Patient Stories

- Prostate cancer patients responded to CBD-rich sublingual sprays (repeatable, measurable dose)
- Biphasic response – low dose mildly stimulating versus higher dose can be sedating
- Ideal dose varies by patient





# Trial + Error

- Child with Dravet Syndrome with limited response to various CBD-rich strains + ratios
- Ideal solution – THCA (not THC) from raw plant before its heated + decarboxylated
- Responsibility is with the patient to discover their best remedy

