A New Frontier: The Evolving Legal and Policy Landscape of Medical Cannabis in Maryland: The Science

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Ancient Medicine

• First cultivated crop – 12,000 years
• Used as medicine – 5000 years
  • TCM – 2700 BC
  • Egyptian Papyri – 1400 BC
  • First Anesthetic – 150 AD
  • Ayurveda
  • Ancient Islamic Medicine
  • Western Medicine – 1830’s
  • US Pharmacopoeia – 1857 -1942
Endocannabinoid System (ECS)

- Appetite
- Sleep
- Stress
- Emotions
- Memory
- Pain
- Fat, glucose metabolism
- Autoimmune system
Endocannabinoid System (ECS)

**Endocannabinoids:**
- Anandamide, 2-AG, PEA
- Produced on demand
- Act locally
- Bind to transmembrane G-protein receptors principally inhibiting neurotransmitter release
- Inactivated rapidly

**Receptors:**
- CB1 – primarily brain, CNS
- CB2 - tissues, organs, immune cells
- Others: GPR55, TRPV, IL, TNF, 5-HT

**Enzymes:**
- Fatty Acid Amide Hydrolase (FAAH)
- Monoarachylglycerol Lipase (MAGL)
Pain Neuron

Release of Ca+, Glutamate, GABA, Serotonin, Dopamine

Activation of lipid precursors forms AEA

Anandamide, 2-AG, PEA

Cannabinoid Receptor

Lipid Precursors (Fat Cells)

Action Potential

Presynaptic (Sending Neuron)

Postsynaptic (Receiving Neuron)

Neurotransmitter

Cannabinoids
Immunomodulation

• Increases interleukin I
• Decreases interleukin II
• Decreases interferon production
• Suppresses natural killer cell activity
• Increases release of pro-inflammatory cytokines
• Therefore immunomodulating, not immunosuppressing
What we know

What we don’t know due to federal restrictions on clinical trials
It’s All Cannabis

- Marijuana = >0.3% THC
- Hemp = <0.3% THC; fibrous
- 165 Cannabinoids
- Terpenes
- Flavonoids
What are acids?

Raw plant
- CBGA
- THCA
- CBDA
- CBCA
- THCVA

Heated plant
- CBG
- THC
- CBD
- CBC
- THCV

intoxicating
All Phytocannabinoids Are Active

- THCA – anti-inflammatory; anti-tumor; pain relieving
- CBDA – anti-inflammatory; anti-tumor
- THCV – appetite suppression, intoxicating
- CBC – anti-inflammatory, anti-bacterial
- CBG – anti-inflammatory; anti-tumor; lowers IOP; appetite stimulation
- CBN - sedation
Most Studied Phytocannabinoids

THC
- Anti-inflammatory
- Analgesic
- Anti-Spasmodic
- Anti-Emetic
- Neuroprotective
- Anti-Oxidant
- Anti-proliferative
- Appetite Stimulant
- Anti-psychotic
- Pain Distracting
- Antidepressant
- Lowers IOP
- Mood Elevating
- Slow-wave sleep

CBD
- Anti-inflammatory
- Analgesic
- Anti-Spasmodic
- Anti-Emetic
- Neuroprotective
- Anti-Oxidant
- Anti-proliferative
- Appetite suppressant
- Neuropathic pain
- Anxiolytic
- Autoimmune modulation
- Mood Stabilizer
- Anti-psychotic
- Gastrocytoprotective
- Bone growth
- Anticonvulsant
- Regulates glucose, fat metabolism
Cannabidiol (CBD)

- Mitigates THC’s
  - Intoxicating Effect
  - Effect on
    - Memory
    - Coordination
    - Balance
    - Reaction time
TERPENES

Limonene – depression, anxiety, gastric acidity
Pinene – bronchodilator, anti-inflammatory
Humulene – anti-inflammatory
β-caryophyllene - analgesic, anti-spasmodic
Myrcene – sedation, anti-inflammatory
Linalool – anxiolytic, sedation, anticonvulsant
Entourage effect

“Cannabinoids, terpenes, and flavonoids work together in an entourage such that the medicinal impact of the whole plant is greater than the sum of its individual parts.”

- Ben-Shabat, Mechoulam 1998
Chronic Pain
- Osteoarthritis
- Tendinitis
- Ehlers-Danlos
- Chronic Regional Pain Syndrome
- Degenerative Disc Disease
- Migraines
- Neuropathy
- Carpal tunnel
- Dysmenorrhea
- Tendinitis

Autoimmune
- Lupus
- Myasthenia gravis
- Rheumatoid & Psoriatic arthritis

Fibromyalgia
- Mixed Connective Tissue Disease
- Interstitial cystitis
- Hashimoto’s

Mental Health
- Anxiety
- Depression
- Mood disorder
- Schizophrenia
- Stress
- Insomnia
- PTSD

Neurological
- Muscle sclerosis
- Seizures
- Parkinson’s

Metabolic
- Obesity
- Diabetes
- Hyperlipidemia

Other
- Glaucoma
- Macular degeneration
- Opioid Use Disorder
- Crohn’s
- Ulcerative colitis
- Irritable Bowel

Huntington’s
- Tourette’s
- Autism
- Cerebral palsy
ADVERSE EFFECTS

• Anxiety/paranoia
• Tachycardia
• Lowered blood pressure
• Confusion
• Poor balance/coordination
• Neurodevelopmental
• Memory/Cognition
• Cannabinoid Hyperemesis Syndrome
• Psychological dependence/addiction (9%)
• No LETHAL dose
Special Considerations

- **Pediatrics**: Neurodevelopment Seizures
- **Geriatrics**: Sensitive to THC Fall risks Mental confusion
- **Cannabis Naïve**: No tolerance Respond to lower levels of THC
- **Use Disorder**: High CBD
Cannabinoid Profiles

**CBD:THC**

**20:1-2:1**
- Pain
- Muscle spasm
- Inflammation
- Neuropathy
- Anxiety
- Alleviates
- No intoxicating effect

**1:1-1:20**
- Pain
- Muscle spasm
- Inflammation
- Neuropathy
- Anxiety
- Depresssion
- Intoxicating

**10:1-1:1**
- Pain
- Muscle spasm
- Inflammation
- Neuropathy
- Anxiety
- Depression
- No intoxicating effect
Cannabis and Pain

- Cannabis increases the pain relieving effects of opioids without increasing risk of respiratory depression
- CBD quells cravings for opioids, alcohol, benzodiazepines, and nicotine
- Patients can reduce opioid doses by 50-75% and experience equal or better pain relief via crosstalk between opioid and cannabinoid receptors
- Cannabis has been found to relieve both inflammatory and neuropathic pain
- Cannabis addresses comorbidities of chronic pain: anxiety, depression, muscle spasm, and insomnia
- Cannabis alleviates symptoms of opioid withdrawal: pain, muscle spasm, nausea/vomiting, anxiety, insomnia, anorexia, and cravings
Modes of Administration

- Inhalation
- Sublingual/Oromucosal
- Oral
- Topical
- Transdermal
**DOSING**

1. **Start low, go slow**
   - Less is more

2. Wide variation in individual patient's response to cannabis

3. Takes time to titrate the right dose; find the right ratios, and strains

4. **Start with 1-2 drops or puffs and increase gradually:**
   - 1 puff q 10 – 15 mins (Inhalation)
   - 1 drop q 20 – 30 mins (sublingual)
• Too little or too much
• Decreases efficacy
CBD: Marijuana vs Hemp

- CBD is CBD is CBD
- Terpene profile usually higher in dispensary medicine
Cannabis: Nature’s Cleaner

- Cannabis absorbs contaminants from the soil, air, and water
- Can be used to clean toxic fields (China)
- Heavy metals: lead, mercury, arsenic, cadmium
Hemp: Unregulated Industry

• Inaccurate labeling
• Contaminants
  • Heavy metals
  • Pesticides
  • Solvents
  • Bacteria/mold/aflotoxin
Medicine by Zip Code

- 33 states and DC with medical program; additional 14 with CBD/low THC; CBD still illegal in Idaho, Nebraska, South Dakota

- New York – insurance covers provider office visits; prohibits pre-employment testing for THC-COOH

- New Mexico – children can receive medication at school; will not impact transplantation eligibility
Federal Status: Schedule I = no medical benefit and high risk of abuse

- 2018 Farm Bill legalized hemp at federal level
- 2018 CBD FDA approved for seizures (Epidiolex)
- 1986 THC FDA approved for nausea, vomiting, anorexia (Marinol)
- THC and CBD and all non-intoxicating cannabinoids in plant still illegal

NO JOB PROTECTION
NO HOUSING PROTECTION
CHILDREN UNABLE TO BE MEDICATED AT SCHOOL
MEDICATION NOT COVERED BY INSURANCE
IMPEDES RESEARCH AND CLINICAL TRIALS
Thank You!

Ann Marie

Tamika