Not Just a Weed-Medical Marijuana for Optometrists Uses in Eyecare/Systemic Impact

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This set of notes are a condensed version of the most relevant information that accompanies the presentation. If there is any specific aspect of this presentation, please contact me for further assistance.

1. Offer guidelines on who may or may not benefit from Medical Marijuana
2. Review the pros and cons of therapeutic uses of cannabis and cannabis-based preparations on systemic conditions
3. Present the ocular conditions that cannabis has an impact
4. Present precautions and advice regarding drug interactions and side effects of marijuana on the systemic and ocular systems
What is History and Origins of Cannabis for Medical purposes?

2737 BC: Pen Ts’ao Ching
Earliest record of cannabis as a medicinal drug. At this time, Emperor Shen-Nung recognized its treatment properties for over 100 ailments such as gout, rheumatism, and malaria.

2000-1000 BC: Ayurvedic Medicine
Open religious use of cannabis allowed for exploration of medical benefits. During this period, it was used to treat a variety of ailments such as epilepsy, rabies, anxiety, and bronchitis.

1550 BC: Ebers Papyrus
Egyptian medical papyrus of medical knowledge notes that medical cannabis can treat inflammation.
Not Just a Weed—Medical Marijuana for Optometrists Uses in Eyecare/Systemic Impact ©

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**History of Medical Marijuana**

- **900 BC: Assyrians**
  Employed the psychotropic effects of cannabis for recreational and medical purposes.

- **450-200 BC: Greco-Roman use**
  Physician Dioscorides prescribed cannabis for toothaches and earaches. Greek doctor Claudius Galen noted it was widely consumed throughout the empire. Women of the Roman elite also used cannabis to alleviate labor pains.

- **207 AD: Hua T'o**
  First recorded physician to describe cannabis as an analgesic. He used a mixture of cannabis and wine to anesthetize patients before surgery.

- **1000 AD: Treats Epilepsy**
  Arabic scholars al-Mayusi and al-Badri regard cannabis as an effective treatment for epilepsy.

- **1025 AD: Avicenna**
  The medieval Persian physician publishes “Avicenna’s Canon of Medicine”, stating that cannabis is an effective treatment for gout, edema, infectious wounds, and severe headaches.

- **1300 AD: Arab traders**
  Arab traders bring cannabis from India to Eastern Africa, where it spreads inland. It is used to treat malaria, asthma, fever, and dysentery.

- **1798: Napoleon**
  Napoleon brought cannabis back to France from Egypt. At this time, cannabis would be used to treat tumors, cough, and jaundice.

**1850-1900: Medical Cannabis**

Medical cannabis was used to treat nausea, rheumatism, and labor pain. At this point in time, it is available over-the-counter.
History of Medical Marijuana

- 1970 – Controlled Substance Act – classified cannabis as having:
  - High abuse potential
  - No medical use
  - Not safe to use under medical supervision

- 1964: Discovery of THC, the active component of cannabis, was discovered and synthesized by Israeli chemist Dr. Raphael Mechoulam.

- 1980: Discovery of the first Endocannabinoid System, or ECS is a biological system found in all mammals, composed of endocannabinoids and cannabinoid receptors.

- 1992: Discovery of the first endocannabinoid. Anandamide was the first, naturally occurring endogenous cannabinoid, or endocannabinoid.

The Use of Medical Marijuana and Prescribed Medication

Pros and Cons

What are ocular conditions that cannabis has can affect?
GLAUCOMA USE – NOT BASED ON STRONG RESEARCH

- Glaucoma is the #2 cause of blindness globally.
- 1992 – American Academy of Ophthalmology’s Committee on Drugs: no scientific verifiable evidence that the use of marijuana is safe and effective in the treatment of glaucoma.
- 1997 – NEI: no studies have demonstrated that marijuana can safely and effectively lower IOP any more than a variety of drugs on the market.

- 1999 – Institute of Medicine: although IOP can be reduced by using cannabinoids and marijuana, the effect is too short lived and requires too high doses.
- There are too many side effects to recommend lifelong use in the treatment of glaucoma.
- Would have to smoke 10-12 joints per 24 hours to maintain low IOP throughout the day.
Ocular Effects of Cannabis

- Blurred vision
- Conjunctival Injection (Blood Shot Eyes)
- Dilated Pupil
- Reduced Pupillary Reaction
- Reduced Accommodation
- Convergence Dysfunction (CI)
- Effects on Eye Movements
- Reduced IOP
- Attention and Functional Visual Fields Defects

Research on Cannabis Effects and signs of Impairment

Drug Recognition Expert (DRE) examination characteristics of cannabis impairment.

Hartman RL, Richman JE, Hayes CE, Huestis MA.

What is Measured?

Three Testing Conditions For Pupil Size Estimations

Room Light is approximately 4.0 mm with an average range of normal pupil sizes ranging from 2.5 to 5.0 mm.

Near Total Darkness is approximately 6.5 mm with an average range of normal pupil sizes ranging from 5.0 to 8.5 mm.

Direct Light is approximately 3.0 mm with an average range of normal pupil sizes ranging from 2.0 to 4.5 mm.
Comparison of Mean Pupil Size for Three Test Conditions between Cannabis Impaired vs. Normal

Impaired Convergence
(NPC < 2°)

What are the Therapeutic uses of cannabis and cannabis-based preparations on systemic conditions?
Cannabinoids and Pain

MECHANISM OF ACTION for PAIN

- Cannabinoids presynaptically inhibit glutamate release.
- THC anti-inflammatory potency
  - 20X aspirin
  - 2X hydrocortisone

Selective blockade of endocannabinoid metabolism by NSAIDs previously unrecognized mechanism of anti-inflammatory and analgesic action!
Cannabinoids and Pain

- Cannabis was widely used in 19th century medicine for pain relief.
- Cannabinoids suppress electrophysiological responses of spinal cord neurons to noxious stimulation, and block spinal pain.
- Cannabinoids and anandamide also block stimulation of peripheral nerve fibers in inflammatory pain when injected directly into spinal cord, brain stem or thalamus.
- There is interaction between cannabinoid and opioid mechanisms in brainstem.

Chronic Pain

Reduces need for narcotics in chronic pain or addiction.

Summary:
- Changes emotional perceptions of pain via CB1 (Dopamine).
- Reduces glutamate (excitatory) at CB1.
- Increases GABA (inhibitory) via CB2 to relieve pain.
- CBD and CBC and CBG.

Cannabis and Seizures

When excessive neuronal activity occurs:
- Endocannabinoids are generated on demand.
- Activate cannabinoid type 1 (CB1) receptors.
Cannabis and Seizures

- THC and other cannabinoids have inhibitory effects on the release of a variety of neurotransmitters from CNS neurons including glutamate, GABA, noradrenaline, dopamine, 5-HT and acetylcholine.
- Cannabis can relieve muscle pain and spasticity in patients suffering from seizures, multiple sclerosis.

Cannabis and Seizures

75 children who took CBD, found that 33% of them had their seizures drop by more than half.

BUT 44% of the children experienced adverse effects after taking CBD, including increased seizures.

Epidiolex, GW Pharmaceuticals, found in 58 patients, 40% saw seizures decline by more than half and 10% of them became seizure-free. One patient had an increase in seizures.

Disorder – Disease SPECIFIC ??

Cannabinoids and Anti-emetic control

- Anti-emetic effects of cannabinoids are mediated through CB1 receptors in the hypothalamus.
- Vomit and Nausea triggers
- Emetic neurotransmitters modulators in the brainstem
- Serotonin
- Dopamine
- Enteric nervous system (ENS)
- $\Delta_9$-THC behaves as broad-spectrum antiemetics.
Cannabis and Bowel and Gastro-Intestinal Disorders

Effects of the Endocannabinoid activation
- Suppression of gastrointestinal motility,
- inhibition of intestinal secretion,
- reduced acid reflux,
- protection from inflammation,
- promotion of epithelial wound healing in human tissue.

Multiple Sclerosis
For Spasticity

The Canadian Medical Association Journal (CMAJ) published a study in May 2012 which showed that smoking marijuana helps alleviate pain and muscle tightness in patients with MS. Depends on the recognized courses of progression

Treatment generally falls into categories:
- Disease modifying medication
- Steroids
- Medication to ease symptoms

Useful for Symptoms of MS, Not the Progression of the Disease

Cannabis and Anti-Tumor Activity

1. Effects of cannabinoids on tumor biology:
   Modulation of key cell-signaling pathways involved in control of cell fate

2. Effects of cannabinoids on tumor progression:
   Modulation of angiogenesis
CONCLUSIONS: Our findings about the activity of CBD in nbl support and extend previous findings about the anti-tumour activities of CBD in other tumours and suggest that cannabis extracts enriched in CBD and not in THC could be suitable for the development of novel non-psychotropic therapeutic strategies in nbl.
CBD Cannabidiol for Breast Cancer

Dr. McAllister and colleagues at the California Pacific Medical Center Research Institute have discovered that CBD (Cannabidiol) is a very potent inhibitor of breast cancer.


Targeting the endocannabinoid system as a potential anticancer approach.

Schwarz R1, Ramer R1, Hinz B1.

https://www.academia.edu/14486873/The_endocannabinoid_signaling_system_in_cancer

Can THC protect brain cells and stimulate their growth?

THC is considered a “neuroprotectant,” meaning it can protect brain cells from damage caused by inflammation and oxidative stress.

It has been shown that THC can promote neurogenesis. (2005 Xia Zhang)

Did the US Government know about this neuroprotectant effect?
CBD: ANTICONVULSIVE EFFECTS

CBD was active in reducing or blocking convulsions and were comparable to those of diphenylhydantion (DPH) and other drugs, which are clinically effective in major seizures.

CBD: Side Effects
Did not elicit signs of CNS inhibition or stimulation
Did not cause autonomic irregularity.
**Not Just a Weed: Medical Marijuana Uses in Eyecare/Systemic Impact**

*Harvey Richman, OD, FAAO, FCOVD, Diplomate ABO*

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<table>
<thead>
<tr>
<th>Promotes bone growth</th>
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<tbody>
<tr>
<td>Modulates function in the immune system</td>
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<tr>
<td>Reduces contractions in the small intestines</td>
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<tr>
<td>Protects nervous system degeneration</td>
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<table>
<thead>
<tr>
<th>Relieves pain</th>
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<tbody>
<tr>
<td>Suppresses appetite / Helps with weight loss</td>
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<tr>
<td>Anti-infective</td>
<td></td>
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<tr>
<td>Kills algae/bacteria growth</td>
<td></td>
</tr>
<tr>
<td>Reduces Bladder levels</td>
<td></td>
</tr>
<tr>
<td>Reduces vomiting and nausea</td>
<td></td>
</tr>
<tr>
<td>Reduces cancer and inflammation</td>
<td></td>
</tr>
<tr>
<td>Treats fungal infection</td>
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<table>
<thead>
<tr>
<th>Reduces inflammation</th>
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<tbody>
<tr>
<td>Anti-inflammatory</td>
<td></td>
</tr>
<tr>
<td>Anti-arthritic</td>
<td></td>
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<tr>
<td>Reduces risk of artery blockage</td>
<td></td>
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<tr>
<td>Anti-oxidative</td>
<td></td>
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<tr>
<td>Inhibits cell growth in tumors/cancer cells</td>
<td></td>
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<tr>
<td>Treats pain</td>
<td></td>
</tr>
<tr>
<td>Temps pain</td>
<td></td>
</tr>
<tr>
<td>Temporarily / Used to manage psychosis</td>
<td></td>
</tr>
<tr>
<td>Suppresses muscle spasms</td>
<td></td>
</tr>
<tr>
<td>Believes anxiety</td>
<td></td>
</tr>
<tr>
<td>Stabilizes appetite</td>
<td></td>
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What is the Right Strain of Cannabis that Will Help My Symptoms?

Finding the Right Strain of Cannabis that Will Help Reduce Patient’s Symptoms?
**Indica vs Sativa: Understanding The Differences**

**Sativa**
- Uplifting and energetic
- Cerebral, spacey or hallucinogenic
- Best suited for day use

**Indica**
- Relaxing and calming
- Body buzz or ‘couch lock’
- Best suited for night use

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**Jacks Herer Strain - Top Sativa Hybrid**
- THC: 15-24%
- CBD: 1-2%

**ACDC**
- This strain is a 50/50 Indica hybrid and has one of the highest CBD (20%) CBD versions of ACDC: THC 6% - 0.42%.
Indica vs. Sativa: Understanding the Differences

Indica
- Short and bushy, suited for indoor growing
- Origin: Originates between 30 to 60 degrees latitude
- Effects: Tend to be sedating and relaxing with full-body effects

Sativa
- Tall and leafy, suited for outdoor growing
- Origin: Originates between 30 to 60 degrees latitude
- Effects: Tend to be stimulating and energizing with head effects

**Haro-Tsu (The Painkilling Marijuana Strain)**
- Contains up to 22% CBD against less than 1% THC.
- It works well to treat conditions such as PMS, PTSD, migraines, depression, inflammation, and insomnia.

**High CBD Strains**

**Charlotte’s Web (20% CBD)**
- Charlotte’s Web is believed to be one of the highest CBD strains. It contains 20% CBD and less than 0.5% THC.

**Harlequin Cannabis Strain**
- Harlequin is a 75/25 sativa-dominant hybrid that is popular for pain relief. This strain has been known to have particularly high levels of CBD, making it a favorite of medical patients.
What is the Right Strain of Cannabis that Will Help My Symptoms?

Factors that determine which product will best meet your needs are determined by:

- Your individual symptoms
- Unique characteristics of the strain you select to treat them.
- Your medical conditions and treatment

Dispensaries can provide a range of selections even within specific categories like indica or sativa, enabling patients to explore options.
How Does Use of Medical Marijuana Compare with the Use of Other Drugs?

70 percent of Americans are on at least one prescription drug, and more than half receive at least two prescriptions,

20 percent of U.S. patients were also found to be on five or more prescription medications

Less than one half percent of U.S. patients use Medical Marijuana!

Each day, 46 people die from an overdose of prescription painkillers in the US.

Health care providers wrote over 250 million prescriptions for painkillers in 2016, enough for every American adult to have a bottle of pills.

The Northeast had the most prescriptions per person for long-acting and high-dose painkillers.
Is there Research to support the use of Medical Marijuana?

A sampling of 60 Peer-reviewed studies on medical marijuana, listed by condition treated

<table>
<thead>
<tr>
<th>Condition</th>
<th># of Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALS</td>
<td>1</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>2</td>
</tr>
<tr>
<td>Cancer</td>
<td>5</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>0</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>5</td>
</tr>
<tr>
<td>Huntington's Disease</td>
<td>0</td>
</tr>
<tr>
<td>IBD/Crohn's</td>
<td>1</td>
</tr>
<tr>
<td>Multiple Sclerosis</td>
<td>11</td>
</tr>
<tr>
<td>Nausea</td>
<td>1</td>
</tr>
<tr>
<td>Parkinson's Disease</td>
<td>2</td>
</tr>
<tr>
<td>Psychosis / Schizophrenia</td>
<td>2</td>
</tr>
<tr>
<td>Rheumatoid Arthritis</td>
<td>1</td>
</tr>
<tr>
<td>Tourette's Syndrome</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>41 (68%)</strong></td>
</tr>
<tr>
<td><strong>Pro</strong></td>
<td><strong>40</strong></td>
</tr>
<tr>
<td><strong>Con</strong></td>
<td><strong>6</strong></td>
</tr>
<tr>
<td><strong>Not Clearly Pro or Con</strong></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

What are the Side Effects of Cannabis that can interfere with Daily Tasks?
Cannabis affects everyone differently, but effects may include:

- Feeling relaxed and sleepy
- Spontaneous laughter and excitement
- Increased appetite
- Dry mouth
- Quiet and reflective mood

Large amount of THC will often cause:

- Trouble concentrating
- Clumsiness
- Slower reaction time
- Seeing and hearing things that aren’t there
- Increased heart rate
- Raised blood pressure
- Mild anxiety and paranoia

What are the Side Effects of Cannabis?

Cannabinoid Withdrawal

Symptoms include:

- Anxiety
- Irritability
- Aggressive and angry behaviour
- Loss of appetite and upset stomach
- Possible hyperemesis
- Sweating, chills, and tremors
- Restless sleep and nightmares
TAKING HISTORY

Medical Marijuana

- What conditions do you take marijuana for?
- When is the last time you took your “medicine”?
- How do you take your medicine?
- How often do you take your medicine?
- What does it do for you?
- Did your doctor recommend you smoke it?
  - Ask why they didn’t follow their doctors’ recommendations.

Is Medical Marijuana Safe
Relative to Other Drugs?

What’s the Dose? How Much Will Kill You?

1. It is estimated that marijuana’s LD-50 is between 1:20,000 or 1:40,000 (mg/kg).
2. 1,500 pounds within about fifteen minutes

<table>
<thead>
<tr>
<th>DRUG CLASSIFICATION</th>
<th>Specific Drugs/Category</th>
<th>Primary Suspect of the Death</th>
<th>Secondary Suspect to death</th>
<th>Total Suspects 1997-2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. MARIJUANA (used to treat anxiety)</td>
<td>Marijuana, Cannabis</td>
<td>9</td>
<td>279</td>
<td>279</td>
</tr>
<tr>
<td>B. ANTI-EMETICS (used to treat nausea)</td>
<td>Compazine, Wellbutrin</td>
<td>106</td>
<td>422</td>
<td>528</td>
</tr>
<tr>
<td>C. ANTI-SPASMODICS (used to treat muscle spasm)</td>
<td>Baclofen, Adderall</td>
<td>116</td>
<td>56</td>
<td>174</td>
</tr>
<tr>
<td>D. ANTI-PSYCHOTICS (used to treat psychosis)</td>
<td>Haldol, Ritalin</td>
<td>1,983</td>
<td>732</td>
<td>2,715</td>
</tr>
<tr>
<td>E. OTHER POPULAR DRUGS (used to treat various)</td>
<td>Suspect</td>
<td>8,191</td>
<td>492</td>
<td>8,683</td>
</tr>
</tbody>
</table>
Is Second-hand Marijuana Smoke An Emerging Problem?

Health effects of exposure to second- and third-hand marijuana smoke: a systematic review 2017
CMAJ 2017 Nov 24;5(4)

A direct relation between the THC content of marijuana and effects on those passively exposed. This relation is affected by:
- amount of smoke,
- ventilation,
- air volume,
- number of marijuana cigarettes lit and number of smokers present.

Positive tests for THC in oral fluid and blood were obtained for nonsmokers up to 3 h following exposure.

People can experience psychoactive effects after such exposure.

Ratings of subjective effects correlated with the degree of exposure.