DISCLOSURES

• We are medical students
• This session is not intended to give you a diagnosis or replace going to see a health care professional
• No medical marijuana will be given out after this talk
CLEARING THE HAZE ABOUT THIS TALK

- What is the science behind medical marijuana
- How to get and where to get medical marijuana
- Indications for medical marijuana
- CMA position
- Has society changed as a result of medicalization of marijuana
THE HISTORY

- Marijuana has been used for over 5000 years
- Cannabinoids isolated in 1960’s
- Cannabinoid receptor discovered in 1980’s
- Endocannabinoids discovered in 1990’s
CHALLENGES WITH STUDYING CANNABIS

- Political climate
- Lack of pharma interest
- Formal RCTs of smoked cannabis are “limited”
- Public perception
- Most research has been done in animals
- Since 1960s THC increased from 1 - 5% to 10-15%
WAYS OF CONSUMPTION
BIOAVAILABILITY (OF THC)

- Smoked - 10-25%, peaks in minutes
- Oral/Sublingual – 5-20%, peaks 1-3h later
**ACTIVE INGREDIENTS**

- tetrahydrocannabinol (THC)
- cannabidiol (CBD)
- Cannabavarin
- Cannabigerol
- Cannabichromene
- Delta-8-THC
- Cannabicyclol
- Cannabitiol
- + 70 other cannabinoids
- + terpenes
- + other bioactive compounds

*Cannabis sativa* contains a higher ratio of Δ9-THC to CBD, producing more stimulating, psychotropic effects. *Cannabis indica* strains contains a higher ratio of CBD:Δ9-THC and are typically more sedating.
The Basics

The compounds:

- **Endocannabinoids**
  - anandamide (AEA)
  - 2-arachidonoylglycerol (2-AG)

- **Phytonannabinoids**
  - delta-9-tetrahydrocannabinol (THC)
  - cannabidiol (CBD)

- **Synthetic cannabinoids**
  - Nabiximol
  - Dronabinol
  - Nobilone
TYPES OF RECEPTORS

- CB1:
  - regulation of neurotransmitter release
  - the heart
  - vascular smooth muscles and endothelial cells
- CB2:
  - in the immune cells
  - hematopoietic cells
- GPR55, PPARy
  - Regulation of neuronal excitability
  - Cell proliferation
EXAMPLE
EFFECTS OF CANNABINOIDs ON RECEPTORS

- Δ9-THC is a partial agonist at central nervous system CB1 and CB2 in the immune system
  - The high is from its action on CB1 in the CNS
  - Regulates mood, learning, memory, food intake
  - Anti-inflammatory functions via CB1 and CB2
- CBD is an agonist at GPR55, TRPV1, TRPV2, TRPA1, GRP55, adenosine receptors
  - Limits the excitability of neurons by modulating calcium release
  - Reduces inflammation and oxidative stress
  - Reduces reperfusion injury post-stroke
  - Antiarrhythmic effects
CURRENT EVIDENCE: PAIN
<table>
<thead>
<tr>
<th>Lead author</th>
<th>Year</th>
<th>Type of study</th>
<th>Study focus</th>
<th>Subjects</th>
<th>Drug</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>RJ Noyes</td>
<td>1975</td>
<td>RCT</td>
<td>Cancer pain</td>
<td>10</td>
<td>Oral THC vs placebo</td>
<td>Improved pain relief at higher doses (with side effects)</td>
</tr>
<tr>
<td>RJ Noyes</td>
<td>1975</td>
<td>RCT</td>
<td>Cancer pain</td>
<td>36</td>
<td>Oral THC vs codeine vs placebo</td>
<td>Equianalgiesis</td>
</tr>
<tr>
<td>PR Joehnisen</td>
<td>1978</td>
<td>RCT</td>
<td>Cancer pain</td>
<td>35</td>
<td>Benzopyranoperidine vs placebo</td>
<td>Not as effective as codeine</td>
</tr>
<tr>
<td>JR Johnson</td>
<td>2010</td>
<td>RCT</td>
<td>Cancer pain</td>
<td>177</td>
<td>Nabiximols vs THC vs placebo</td>
<td>Nabiximols showed pain reduction &gt;30%</td>
</tr>
<tr>
<td>RK Portenoy</td>
<td>2012</td>
<td>RCT</td>
<td>Cancer pain</td>
<td>263</td>
<td>Nabiximols vs placebo</td>
<td>Did not reach response rate goal but per patient report, superior analgesia overall</td>
</tr>
<tr>
<td>M Karst</td>
<td>2003</td>
<td>RCT</td>
<td>Neuropathic pain</td>
<td>21</td>
<td>CT-3 vs placebo</td>
<td>Reduction in pain scores</td>
</tr>
<tr>
<td>JS Berman</td>
<td>2004</td>
<td>RCT</td>
<td>Neuropathic pain</td>
<td>48</td>
<td>Nabiximols vs THC vs placebo</td>
<td>Did not meet study target for clinical significance, but improved pain scores and quality of sleep</td>
</tr>
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<td>DT Wade</td>
<td>2003</td>
<td>RCT</td>
<td>Neuropathic pain</td>
<td>20</td>
<td>THC vs CBD vs nabiximols vs placebo</td>
<td>THC and CBD superior to placebo</td>
</tr>
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<td>DJ Rog</td>
<td>2005</td>
<td>RCT</td>
<td>Neuropathic pain</td>
<td>66</td>
<td>Nabiximols vs placebo</td>
<td>Superior to placebo in pain reduction/sleep disturbance</td>
</tr>
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<td>TJ Nurmikko</td>
<td>2007</td>
<td>RCT</td>
<td>Neuropathic pain</td>
<td>125</td>
<td>THCCBD vs placebo</td>
<td>Greater reduction in pain scores, allodynia, improved sleep over placebo</td>
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<tr>
<td>DI Abrams</td>
<td>2007</td>
<td>RCT</td>
<td>Neuropathic pain</td>
<td>50</td>
<td>Inhaled THC vs placebo</td>
<td>Greater pain reduction vs placebo</td>
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<tr>
<td>RJ Ellis</td>
<td>2009</td>
<td>RCT</td>
<td>Neuropathic pain</td>
<td>28</td>
<td>Inhaled THC vs placebo</td>
<td>Greater pain reduction vs placebo</td>
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<td>B Wilsey</td>
<td>2008</td>
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<td>Neuropathic pain</td>
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<td>Superior to placebo in pain reduction</td>
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<td>21</td>
<td>Inhaled THC vs placebo</td>
<td>Highest dose reduced pain and improved quality of sleep over placebo</td>
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<td>A Holdcroft</td>
<td>2006</td>
<td>RCT</td>
<td>Acute pain (post-op)</td>
<td>20</td>
<td>Cannador</td>
<td>Dose-dependent pain reduction overall</td>
</tr>
<tr>
<td>DJ Buggy</td>
<td>2003</td>
<td>RCT</td>
<td>Acute pain (post-op)</td>
<td>40</td>
<td>Dronabinol vs placebo</td>
<td>Did not show benefit for post-op pain</td>
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<tr>
<td>P Beaulia</td>
<td>2006</td>
<td>RCT</td>
<td>Acute pain (post-op)</td>
<td>41</td>
<td>Nabilone vs placebo</td>
<td>Did not show benefit for post-op pain (actually increased pain)</td>
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<tr>
<td>AK Jain</td>
<td>1981</td>
<td>RCT</td>
<td>Acute pain (post-op)</td>
<td>56</td>
<td>Levotranadol vs placebo</td>
<td>Better analgesic effects over placebo, but no significant dose-response curve</td>
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<td>D Raft</td>
<td>1977</td>
<td>RCT</td>
<td>Acute pain</td>
<td>10</td>
<td>IV THC vs diazepam vs placebo</td>
<td>Diazepam&gt; low-dose THC&gt; placebo for analgesia. High dose&lt;both placebo and diazepam</td>
</tr>
<tr>
<td>S Narang</td>
<td>2008</td>
<td>RCT</td>
<td>Chronic pain</td>
<td>30</td>
<td>Dronabinol vs placebo</td>
<td>Decreased pain intensity/increased satisfaction</td>
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<tr>
<td>DR Blake</td>
<td>2005</td>
<td>RCT</td>
<td>Chronic pain</td>
<td>58</td>
<td>Nabiximols vs placebo</td>
<td>Improved pain control/quality of sleep</td>
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<tr>
<td>W Notcuti</td>
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<td>RCT</td>
<td>Chronic pain</td>
<td>34</td>
<td>Sublingual THC vs cannabidiol vs Both in 1:1 combo vs placebo</td>
<td>THC and THC-CBD combo most effective in pain relief/sleep improvement</td>
</tr>
</tbody>
</table>
### Table 2  Clinical trials of cannabidiol (CBD) and epilepsy (adapted from [11, 13])

<table>
<thead>
<tr>
<th>Study</th>
<th>Seizure type</th>
<th>Population size</th>
<th>Treatment (subjects per group)</th>
<th>Continued AEDs?</th>
<th>Duration</th>
<th>Outcome</th>
<th>Toxicity</th>
<th>Limitations</th>
</tr>
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<tr>
<td>Meikle and Carlini [261]</td>
<td>Treatment-resistant, temporal lobe epilepsy</td>
<td>9</td>
<td>CBD, 200 mg/day (4)</td>
<td>NS</td>
<td>3 months</td>
<td>CBD: seizure free (2), partial improvement (1), no change (1), placebo: no change (4)</td>
<td>None</td>
<td>No baseline seizure frequency; no definition of improvement; unclear if AEDs were changed; not truly randomized or blinded; unknown if groups were matched</td>
</tr>
<tr>
<td>Cunha et al. [262]</td>
<td>Treatment-resistant, temporal lobe epilepsy</td>
<td>15*</td>
<td>CBD 200–300 mg/day (8*)</td>
<td>Yes</td>
<td>3–18 weeks</td>
<td>CBD: near seizure freedom (4), partial improvement (3), no change (1); placebo: no change (7), partial improvement (1)</td>
<td>Somnolence</td>
<td>Not clearly blinded (1 patient transferred groups); doses were not adjusted in CBD group, not in placebo; CBD group received longer average treatment</td>
</tr>
<tr>
<td>Arne and Criklund [263]</td>
<td>Treatment-resistant epilepsy, intellectual/ developmental disability</td>
<td>12</td>
<td>CBD 300 mg/day for 1 week; 200 mg/day for 3 weeks (67)</td>
<td>NS</td>
<td>4 weeks</td>
<td>No difference between CBD and placebo</td>
<td>Somnolence</td>
<td>Brief letter to editor, details lacking on specifics; discontinued owing to “technical difficulties in preparing the drug”</td>
</tr>
<tr>
<td>Tremblay and Sherman [264]</td>
<td>Treatment-resistant epilepsy</td>
<td>10–12*</td>
<td>CBD 100 mg once daily</td>
<td>Yes</td>
<td>3 months baseline, 6 months CBD or placebo, then 6 months crossover to alternative treatment</td>
<td>No difference between CBD and placebo (seizure frequency or cognitive/behavioral task)</td>
<td>None</td>
<td>Differences in sample size reporting; data reported are incomplete (conference abstract)</td>
</tr>
</tbody>
</table>

AEDs = antiepileptic drugs; NS = not stated

*1 patient switched groups after 1 month

† Abstract and subsequent book chapters have different numbers

‡ Only truly double-blind study
THE CURRENT EVIDENCE: SATIVEX (NABIXIMOL)

- Treatment of multiple sclerosis complications
- Neuropathic pain, overactive bladder, spasticity
  - Mean difference of -0.32 (out of 10) compared to placebo
THE CURRENT EVIDENCE: DRONABINOL (MARINOL)

- Anorexia
  - Found to be most effective in HIV/AIDS induced anorexia
- Chemotherapy nausea and vomiting
  - Superior to placebo, inferior to metaclopramide
- Chronic pain
THE CURRENT EVIDENCE: NABILONE (CESAMET)

- Fibromyalgia
  - Modest effect
- Nausea
  - Better efficacy than metoclopramide for some forms of chemo
- Neuropathic pain
THE CURRENT EVIDENCE: NEEDS MORE WORKS

• Stoke
  • Reducing reperfusion injury
• Glaucoma
• Cancer
  • inhibits growth of some tumors in vitro and in animal models
  • Variety of cancers expressing CB1 or CB2 receptors
  • No good human clinical trials as of yet***
CANNABIDIOL

- Decreased brain edema following brain injury
- Increased fracture healing
- Decreased development of diabetes
- Improved arthritis
SAFETY

• Need to smoke 1500 lbs in 15 minutes to achieve lethal dose
• Side effects
  • euphoria and easy laughter, temporal and spatial perception alterations and disorientation, drowsiness, dizziness and motor incoordination, confusion, memory lapses and difficulty concentrating
  • tachycardia and hypotension, conjunctival injection, bronchodilation, muscle relaxation, and decreased gastrointestinal motility
• Synthetic cannabinoids are well tolerated
THE RISKS

- Lungs
  - 50% more carcinogens in inhaled marijuana smoke than cigarette
  - One cannabis joint had a similar effect to 2.5–5 tobacco cigarettes in regard to airflow obstruction
  - Exacerbation of pulmonary conditions (asthma, cystic fibrosis, COPD)
- Heart
  - Increased risk of cardiovascular events in people with heart disease
- Reproductive
  - Decreased libido, impotence, decreased sperm count, gynecomastia (man boobs)
THE RISKS

• Brain health
  • Associated with development of schizophrenia in young users
  • Depression and anxiety
  • Permanent reduction in IQ points if smoking from childhood/teens
  • Problems with study design?
  • Problems with attention and concentration and with acquisition of complex new verbal material
  • If used with benzodiazepines, opiates, and tricyclic antidepressants can cause a further decrease in alertness
  • Decrease in brain volume of the amygdala and hippocampus
CONCLUDING REMARKS
WHO? HOW? WHERE?
CURRENT LEGISLATION

The Access to Cannabis for Medical Purposes allow for reasonable access to cannabis for medical purposes for Canadians who have been authorized to use cannabis for medical purposes by their health care practitioner.
HOW: STEP BY STEP (100% LEGALLY)

- Consult a Health Care Practitioner
- Obtain a Medical Document completed by Health Care Professional
• In BC can be a licensed physician or a nurse practitioner
• Long term treating relationship with the patient
• Not selling or dispensing marijuana for medical purposes to any patient
• Can not authorize through telemedicine (BC specific)
WHERE TO GET CANNABIS FOR MEDICAL PURPOSES
LICENSED PRODUCER
# Dispensaries in Victoria

<table>
<thead>
<tr>
<th>Dispensary</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees Dispensaries</td>
<td>2710 Rock Blvd, 1000 North Park 148 Years.</td>
</tr>
<tr>
<td>Ocean Grown</td>
<td>1720 Cook St.</td>
</tr>
<tr>
<td>Victoria's Natural Way</td>
<td>156 Fort St.</td>
</tr>
<tr>
<td>BC Pain Society</td>
<td>179 Quadra St.</td>
</tr>
<tr>
<td>Cloud Nine Medicinal</td>
<td>719 Fort St.</td>
</tr>
<tr>
<td>Weeds Social Club</td>
<td>1617 Douglas St.</td>
</tr>
<tr>
<td>Buds &amp; Leaves</td>
<td>130 Yate Rd.</td>
</tr>
<tr>
<td>The Green Ceiling</td>
<td>1630 Quadra St.</td>
</tr>
<tr>
<td>Jupiter THC</td>
<td>810 Johnson St.</td>
</tr>
<tr>
<td>Cannabis Buyers Club</td>
<td>650 Johnson St.</td>
</tr>
<tr>
<td>Alternative Aromatic</td>
<td>2301 Quadra St.</td>
</tr>
<tr>
<td>Nature's Botanicals</td>
<td>471 Johnson St.</td>
</tr>
<tr>
<td>V I Compassion Society</td>
<td>651 Forrest St.</td>
</tr>
<tr>
<td>Beard Brothers Society</td>
<td>Pineapple Express</td>
</tr>
<tr>
<td>Nature's Aid Medicinal</td>
<td>610 77th Avenue.</td>
</tr>
<tr>
<td>Green Buddha Medicinals</td>
<td>2818 Bridge St.</td>
</tr>
<tr>
<td>Burnside Dispensary</td>
<td>3175 Haro St.</td>
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<tr>
<td>Urban Earth Med</td>
<td>3032 Douglas St.</td>
</tr>
<tr>
<td>Herb's Victoria</td>
<td>3150 Cook St.</td>
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<tr>
<td>Nature Aid Medicinal</td>
<td>650 77th Avenue.</td>
</tr>
</tbody>
</table>
WHO
INDICATIONS FOR MEDICAL MARIJUANA (HC)

- Severe nausea and vomiting associated with cancer chemotherapy
- Cachexia and Anorexia associated with terminal illness, cancer, or HIV/AIDS
- Spasms and pain associated with MS
- Chronic pain
- Severe cancer-associated pain
- Insomnia or depression associated with chronic diseases
- Palliative setting

# Indications for Medical Marijuana (Dispensaries)

- Alcohol and Opioid Withdrawal Symptoms
- Alzheimer’s
- Anorexia
- Anxiety and Depression
- Any condition diagnosed as “debilitating” by a licensed physician
- Arnold-Chiari malformation and syringomyelia
- Arthritis
- Asthma
- Autism
- Cachexia (wasting syndrome)
- Cancer
- Causalgia
- Central and peripheral chronic
- Chronic inflammatory demyelinating polyneuropathy
- Chronic or severe pain
- Crohn’s disease
- CRPS (Complex Regional Pain Syndrome Type I)
- CRPS (Complex Regional Pain Syndrome Type II)
- Decompensated cirrhosis
- Dementia
- Diseases of the Liver
- Diseases of the Pancreas
- Dravet syndrome
- Dystonia
- Epilepsy
- Fibromyalgia
- Fibrous dysplasia
- Glaucoma
- Hepatitis C
- HIV/AIDS
- Huntington’s Disease
- Hydrocephalus
- Hypertension
- Inflammatory Bowel Diseases
- Inflammatory Skin Diseases
- Interstitial cystitis
- Intractable skeletal muscular spasticity
- Irritable Bowel Syndrome
- Lennox-Gastaut syndrome
- Lou Gehrig’s disease (Amyotrophic lateral sclerosis, or ALS)
- Lupus
- Metabolic Syndrome – Obesity, Diabetes
- Migraines
- Mitochondrial disease
- Multiple Sclerosis
- Muscle spasms
- Muscular dystrophy
- Myasthenia gravis
- Myoclonus
- Nail-patella syndrome
- Nausea and Vomiting
- Neurofibromatosis
- Neuropathies
- Osteoarthritis
- Osteoporosis
- Pain
- Painful peripheral neuropathy
- Parkinson’s Disease
- Post-concussion syndrome
- Post-traumatic stress disorder
- Residual limb pain
- Rheumatoid Arthritis
- Schizophrenia and Psychosis
- Seizure disorders
- Sickle cell disease
- Sjogren’s syndrome
- Sleep Disorders
- Spastic quadriplegia
- Spasticity disorders
- Spinal Cord Injury or Disease (including but not limited to arachnoiditis, Tarlov cysts, hydromyelia & syringomyelia)
- Spinocerebellar ataxia (SCA)
- Terminal illness
- Tourette’s Syndrome
- Traumatic brain injury (TBI)
- Ulcerative Colitis

[https://treesdispensary.com/conditions/](https://treesdispensary.com/conditions/)
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- Alcohol and Opioid Withdrawal Symptoms
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- Arthritis
- Asthma
- Autism
- Cachexia (wasting syndrome)
- Cancer
- Causalgia
- Central and peripheral chronic
- Chronic inflammatory demyelinating polyneuropathy
- Chronic or severe pain
- Crohn’s disease
- CRPS (Complex Regional Pain Syndrome Type I)
- CRPS (Complex Regional Pain Syndrome Type II)
- Decompensated cirrhosis
- Dementia
- Diseases of the Liver
- Diseases of the Pancreas
- Dravet syndrome
- Dystonia
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https://treesdispensary.com/conditions/
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The Canadian Medical Association has consistently opposed Health Canada's approach which places physicians in the role of gatekeeper in authorizing access to marijuana.
SOCIAL EFFECTS OF MEDICAL MARIJUANA

• Discuss the controversy
• Case study Colorado
• Explore the difficulty
CANNABISDIGEST.CA – 5 SOCIAL IMPACT

1. Fewer Deaths from Opiates
2. Reduced Crime Rates
3. Reduced Marijuana use in Youth
4. Decrease in Car Crash Deaths
5. Fewer Suicides in Young Men
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COLORADO – THE IMPACT

The Legalization of Marijuana in Colorado
The Impact

Volume 4
September 2016

Rocky Mountain High Intensity Drug Trafficking Area
www.rmhidta.org
COLORADO - THE IMPACT

• Dates to remember
  • **2000-2008:** Medical marijuana legalized, 2 oz. & 6 potted plants
    • ~6000 applications
    • No retailers, no dispensaries
  • **2009-current:** Commercialization of medical marijuana
    • 38,000 applicants in 1 year, went from 4800 to 41,000 cardholders
    • by 2012, there were 108,000 cardholders
  • **2013-current:** Recreational marijuana legalized, first retailers Jan 2014
COLORADO - THE IMPACT (2014)

- Traffic fatalities involving operators testing positive for marijuana have increased 100% from 2007 to 2012.

- In 2012, **10.47% of youth ages 12 to 17** were considered current marijuana users compared to **7.55% nationally**. Colorado, ranked 4th in the nation, was 39% higher than the national average.


- From 2011 through 2013, there was a **57% increase** in marijuana-related emergency room visits.

- Hospitalizations related to marijuana have increased **82%** from 2008 to 2013.
EFFECTS ON YOUTH - SCHOOL

Percentage of Total Suspensions in Colorado, 2005 - 2013 School Years

Percentage of Total Expulsions in Colorado 2005 to 2013 School Years

SOURCE: Colorado Department of Education, Academic Years 2006-2013
NOTE: The Colorado Department of Education included all drugs in this dataset. However, department officials reported that most drug-related expulsions reported since the 2008-2009 academic year have been related to marijuana.
Effect on Youth - School

Percent of Total Suspensions in Colorado

Academic Years

Drug Violations

Alcohol Violations

Commercialization

Legalization

Percent of Total Suspensions


Drug Violations: 1.3 1.1 1.0 1.0 1.0 1.0 0.9 0.9 1.3 0.8

Alcohol Violations: 3.2 3.0 3.1 3.1 4.4 5.0 5.1 5.4 6.4 5.6 5.3
EFFECT ON YOUTH - SCHOOL

Percent of Total Expulsions in Colorado

SOURCE: Colorado Department of Education, 10-Year Trend Data: State Suspension and Expulsion Incident Rates and Reasons
Most Prominent Marijuana Violations on Campus

- Possession of Marijuana: 51%
- Under the Influence: 37%
- Possession of Edibles: 6%
- Sharing Marijuana: 4%
- Selling Marijuana: 2%
EFFECT ON YOUTH – SCHOOL (2014)

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**Where Marijuana is Obtained**

- Friends Legally Obtaining: 38%
- Parents: 23%
- The Black Market: 22%
- Medical Marijuana Dispensary: 9%
- Medical Marijuana Cardholder: 9%
- Retail Marijuana Store: 3%
EFFECT ON YOUTH – SCHOOL (2016)

Predominant Marijuana Violations, 2016

- Student sharing marijuana with other students: 2%
- Student selling marijuana to other students: 2%
- Student in possession of marijuana infused edibles: 7%
- Student in possession of marijuana: 43%
- Student under the influence during school hours: 45%

SOURCE: Colorado Association of School Resource Officers (CASRO) and Rocky Mountain HIDTA

Student Marijuana Source, 2016

- Medical Marijuana Cardholders: 1%
- Retail Marijuana Stores: 2%
- Medical Marijuana Dispensaries: 6%
- Parents: 22%
- Black Market: 24%
- Friend Who Obtained it Legally: 45%

SOURCE: Colorado Association of School Resource Officers (CASRO) and Rocky Mountain HIDTA
Past Month Usage by 12 to 17-Year-Olds in Medical Marijuana States, 2012

SOURCE: SAMHSA.gov, National Survey on Drug Use and Health, 2013
EFFECT ON YOUTH – MARIJUANA USE

Past Month Usage, 12 to 17 Years Old, 2013/2014

TRAFFIC

• Meta-analysis
ODDS RATIO

Group A  Group B

children who go trick-o-treating  children who do not go trick-o-treating

children who are out of control the morning following Halloween
ODDS RATIO

children who go trick-o-treating

children who are out of control the morning following Halloween

children who do not go trick-o-treating

children who are out of control the morning following Halloween
Risk of road accident associated with the use of drugs: A systematic review and meta-analysis of evidence from epidemiological studies

Rune Elvik, 2012

Accident Analysis & Prevention
<table>
<thead>
<tr>
<th>Drug</th>
<th>Accident severity</th>
<th>Number of estimates</th>
<th>Best estimate of odds ratio&lt;sup&gt;a&lt;/sup&gt;</th>
<th>95% confidence interval</th>
<th>Best estimate adjusted for publication bias&lt;sup&gt;a&lt;/sup&gt;</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphetamines</td>
<td>Fatal</td>
<td>8</td>
<td><strong>5.61</strong></td>
<td>(2.74, 11.49)</td>
<td><strong>5.17</strong></td>
<td>(2.56, 10.42)</td>
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<tr>
<td></td>
<td>Injury</td>
<td>2</td>
<td><strong>6.19</strong></td>
<td>(3.46, 11.06)</td>
<td><strong>6.19</strong></td>
<td>(3.46, 11.06)</td>
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<td>Property damage</td>
<td>1</td>
<td><strong>8.67</strong></td>
<td>(3.23, 23.32)</td>
<td><strong>8.67</strong></td>
<td>(3.23, 23.32)</td>
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<tr>
<td>Analgesics</td>
<td>Injury</td>
<td>8</td>
<td>1.06</td>
<td>(0.92, 1.21)</td>
<td>1.02</td>
<td>(0.89, 1.16)</td>
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<tr>
<td>Anti-asthmatics</td>
<td>Injury</td>
<td>6</td>
<td><strong>1.33</strong></td>
<td>(1.09, 1.62)</td>
<td><strong>1.31</strong></td>
<td>(1.07, 1.59)</td>
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<tr>
<td>Anti-depressives</td>
<td>Injury</td>
<td>20</td>
<td><strong>1.39</strong></td>
<td>(1.17, 1.70)</td>
<td><strong>1.35</strong></td>
<td>(1.11, 1.65)</td>
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<td>Property damage</td>
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<td>1.28</td>
<td>(0.90, 1.80)</td>
<td>1.28</td>
<td>(0.90, 1.80)</td>
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<tr>
<td>Anti-histamines</td>
<td>Injury</td>
<td>7</td>
<td><strong>1.12</strong></td>
<td>(1.02, 1.22)</td>
<td><strong>1.12</strong></td>
<td>(1.02, 1.22)</td>
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<tr>
<td>Benzodiazepines</td>
<td>Fatal</td>
<td>10</td>
<td><strong>2.30</strong></td>
<td>(1.59, 3.32)</td>
<td><strong>2.30</strong></td>
<td>(1.59, 3.32)</td>
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<tr>
<td></td>
<td>Injury</td>
<td>51</td>
<td>1.65</td>
<td>(1.49, 1.82)</td>
<td>1.17</td>
<td>(1.08, 1.28)</td>
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<td></td>
<td>Property damage</td>
<td>4</td>
<td><strong>1.35</strong></td>
<td>(1.04, 1.76)</td>
<td><strong>1.35</strong></td>
<td>(1.04, 1.76)</td>
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<tr>
<td>Cannabis</td>
<td>Fatal</td>
<td>10</td>
<td>1.31</td>
<td>(0.91, 1.88)</td>
<td>1.26</td>
<td>(0.88, 1.81)</td>
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<tr>
<td></td>
<td>Injury</td>
<td>15</td>
<td>1.26</td>
<td>(0.99, 1.60)</td>
<td>1.10</td>
<td>(0.88, 1.39)</td>
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<tr>
<td></td>
<td>Property damage</td>
<td>17</td>
<td><strong>1.48</strong></td>
<td>(1.28, 1.72)</td>
<td><strong>1.26</strong></td>
<td>(1.10, 1.44)</td>
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<tr>
<td>Cocaine</td>
<td>Fatal</td>
<td>4</td>
<td><strong>2.96</strong></td>
<td>(1.18, 7.38)</td>
<td><strong>2.96</strong></td>
<td>(1.18, 7.38)</td>
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<tr>
<td></td>
<td>Injury</td>
<td>3</td>
<td>1.66</td>
<td>(0.91, 3.02)</td>
<td>1.66</td>
<td>(0.91, 3.02)</td>
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<tr>
<td></td>
<td>Property damage</td>
<td>4</td>
<td>1.44</td>
<td>(0.93, 2.23)</td>
<td>1.44</td>
<td>(0.93, 2.23)</td>
</tr>
<tr>
<td>Opiates</td>
<td>Fatal</td>
<td>7</td>
<td><strong>2.13</strong></td>
<td>(1.23, 3.72)</td>
<td><strong>1.68</strong></td>
<td>(1.01, 2.81)</td>
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<tr>
<td></td>
<td>Injury</td>
<td>18</td>
<td><strong>1.94</strong></td>
<td>(1.51, 2.50)</td>
<td><strong>1.91</strong></td>
<td>(1.48, 2.45)</td>
</tr>
<tr>
<td></td>
<td>Property damage</td>
<td>1</td>
<td><strong>4.76</strong></td>
<td>(2.10, 10.80)</td>
<td><strong>4.76</strong></td>
<td>(2.10, 10.80)</td>
</tr>
<tr>
<td>Penicillin</td>
<td>Injury</td>
<td>5</td>
<td>1.12</td>
<td>(0.91, 1.39)</td>
<td>1.12</td>
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</tr>
<tr>
<td>Zopiclone</td>
<td>Fatal</td>
<td>1</td>
<td>2.60</td>
<td>(0.89, 7.56)</td>
<td>2.60</td>
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<td></td>
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<td>4</td>
<td>1.42</td>
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<tr>
<td></td>
<td>Property damage</td>
<td>1</td>
<td><strong>4.00</strong></td>
<td>(1.31, 12.21)</td>
<td><strong>4.00</strong></td>
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<sup>a</sup> Estimates shown in bold are statistically significant at the 5% level.
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<td>Fatal</td>
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<td></td>
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<td>6</td>
<td>1.10</td>
<td>(0.91, 1.33)</td>
<td>1.05</td>
<td>(0.73, 1.53)</td>
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<td></td>
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<td>5</td>
<td>1.16</td>
<td>(0.99, 1.35)</td>
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<td>Anti-convulsant</td>
<td>Fatal</td>
<td>10</td>
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FURTHER COMPLICATIONS

- Did the drug cause the accident?
- Was the driver tested for the drug?
- Were multiple drugs being used at the time?
  - Which ones were tested for?
SOCIAL EFFECTS OF MEDICAL MARIJUANA

• It’s complicated
• Background is muddied by tobacco, alcohol, other prescription drugs
• Personal stories….