Neuropsychological Medicine, Madness, & Myths

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Outline

- Marijuana Chemistry
- Research Complications
- Dependence
- Negative Effects
- Biopsychosocial
- Medicinal Effects
- Recreational
Marijuana Chemistry

The chemistry of Cannabis is quite complex,

and the isolation and extraction of the active ingredients is difficult, even today.
Marijuana Chemistry

There are 486 chemicals in marijuana, but only 85 of them are unique to the Cannabis plant -- these are called Cannabinoids.
Cannabinoids Identified in Marijuana

Mohamed M. Radwan, Mahmoud A. ElSohly, et al., researchers at the University of Mississippi, reported in their Apr. 3, 2009 study titled "Biologically Active Cannabinoids from High-Potency Cannabis Sativa,“ the discovery of nine (9) new cannabinoids
<table>
<thead>
<tr>
<th>Cannabinoid Group</th>
<th>Abbreviation</th>
<th>Variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $\Delta^9$-Tetrahydrocannabinol</td>
<td>$\Delta^9$-THC</td>
<td>9</td>
</tr>
<tr>
<td>2. $\Delta^8$-Tetrahydrocannabinol</td>
<td>$\Delta^8$-THC</td>
<td>2</td>
</tr>
<tr>
<td>3. Cannabichromene</td>
<td>CBC</td>
<td>5</td>
</tr>
<tr>
<td>4. Cannabicyclol</td>
<td>CBL</td>
<td>3</td>
</tr>
<tr>
<td>5. Cannabidiol</td>
<td>CBD</td>
<td>7</td>
</tr>
<tr>
<td>6. Cannabielsoin</td>
<td>CBE</td>
<td>5</td>
</tr>
<tr>
<td>7. Cannabigerol</td>
<td>CBG</td>
<td>6</td>
</tr>
<tr>
<td>8. Cannabinidiol</td>
<td>CBND</td>
<td>2</td>
</tr>
<tr>
<td>9. Cannabinol</td>
<td>CBN</td>
<td>7</td>
</tr>
<tr>
<td>10. Cannabitriol</td>
<td>CBT</td>
<td>9</td>
</tr>
<tr>
<td>11. Miscellaneous types</td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>
What other pharmaceutical "medication" contains 85 active ingredients?
Cannabinoids Identified in Marijuana

85 Cannabinoids discovered

Beware of research that states: “THC is the psychoactive ingredient in marijuana”
Other constituents of the cannabis plant are:

- nitrogenous compounds (27 known),
- amino acids (18),
- proteins (3),
- glycoproteins (6),
- enzymes (2),
- sugars and related compounds (34),
- hydrocarbons (50),
- simple alcohols (7),
- aldehydes (13),
- ketones (13),
- simple acids (21),
- fatty acids (22),
- simple esters (12),
- lactones (1),
- steroids (11),
- terpenes (120),
- non-cannabinoid phenols (25),
- flavonoids (21),
- vitamins (1) Vitamin A,
- pigments (2),
- and elements (9).
Marijuana smoke contains

50 percent to 70 percent more carcinogenic hydrocarbons than does tobacco smoke

and has the potential to cause cancer of the lungs and respiratory tract

Mayo Clinic

Donald P. Tashkin, MD, Director of the Pulmonary Function Laboratories at the University of California, Los Angeles,
Main Modes of Marijuana Use

Smoking – 2000+ chemicals
   Joints, Bongs, Pipes, Blunts

Vaporizing – unknown # of chemicals
   Volcano, Arizer, Silver Surfer, Hot Box, da Buddha, Easy Vape

Ingestion- 486 chemicals
   Baked goods, brownies
Vaporizing

Little research, reportedly fewer chemicals, expensive.
Vaporizing

- Volcano
- Arizer
- Silver Surfer
- Da Buddha
- Herbalaire
Vaporizing

Vapire-One

Easy Vape
Flash Points of some Cannabinoids

tetrahydrocannabinvarin (THCV)
Flash Point: 137.6 °C (279.68 °F)

delta-8-tetrahydrocannabinol (delta-8-THC)
Flash Point: 144.5 °C (292.10 °F)

delta-9-tetrahydrocannabinol (THC)
Flash Point: 149.3 °C (300.74 °F)

cannabichromene (CBC)
Flash Point: 174.2 °C (345.56 °F)

cannabidiol (CBD)
Flash Point: 206.3 °C (403.34 °F)

cannabigerol (CBG)
Flash Point: 207.2 °C (404.96 °F)

cannabinol (CBN)
Flash Point: 212.7 °C (414.86 °F)
Cannabinoids

Fat soluble and, therefore, easily stored and later released into the bloodstream

Have a long half-life and can be detected in urine from 1 day to 90 days
Cannabinoids are oily.
Oily Cannabinoids

Complicates research on effects

Reduces withdrawal symptoms

Illusion of “non-addicting”
Major Research Complications

- Which Chemicals?
- What Concentration(s)?
- Cannabinoid Interactions
- Pre-natal exposure?
- Age of initiating use?
- Frequency of use?
- Other drug use
Major Research Complications

Research Publications

Most are in the non-psychological literature

Botany, Chemistry, Pulmonology, Oncology, Neurology, Urology, Reproductive Medicine, Pharmacology, Medical, Transportation, Aviation, Toxicology, etc
The Endocannabinoid System (video)
Prevalence, Abuse, Addiction
Prevalence of Marijuana Use

Most widely used illicit substance

Usage rates increasing dramatically

Monthly Pot Use Up 80 % Among Teens 2008 - 2012

Nearly 1 in 10 teens said they smoke marijuana at least 20 or more times a month.
The “harmless herb”
Prevalence of Marijuana Use

10% become daily users

Marijuana Dependence: 7-9%
Alcohol Dependence: 5-7%
Cocaine Dependence: 12%

Weekly users: rate of dependence est. 30%
Prevalence of Marijuana Use

Among those seeking treatment for psychosis: 23% are currently using

Among those seeking substance abuse treatment: 25% treated for marijuana dependence
Cycles of marijuana growing
Marijuana Dependence

- Difficulty controlling use
- Despite negative consequences
- Tolerance
- Withdrawal symptoms

90 day rule (unofficial)
Cannabinoids

8 nanograms activate receptors

Nanogram = 1 billionth of a gram
APPENDIX 1. Proposed Cannabis Withdrawal Syndrome Criteria

<table>
<thead>
<tr>
<th>Common symptoms</th>
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<tbody>
<tr>
<td>Anger or aggression</td>
</tr>
<tr>
<td>Decreased appetite or weight loss</td>
</tr>
<tr>
<td>Irritability</td>
</tr>
<tr>
<td>Nervousness/anxiety</td>
</tr>
<tr>
<td>Restlessness</td>
</tr>
<tr>
<td>Sleep difficulties, including strange dreams</td>
</tr>
<tr>
<td>Less common symptoms/equivocal symptoms</td>
</tr>
<tr>
<td>Chills</td>
</tr>
<tr>
<td>Depressed mood</td>
</tr>
<tr>
<td>Stomach pain</td>
</tr>
<tr>
<td>Shakiness</td>
</tr>
<tr>
<td>Sweating</td>
</tr>
</tbody>
</table>
New study claims 40% of adolescents show withdrawal symptoms when they give up the drug.
Teens who exhibited withdrawal symptoms were more likely to experience negative consequences of using marijuana such as:
- trouble at school
- or on the job
- or financial problems
- or relationship problems
Treatment Participants who:
Reported both withdrawal symptoms, and Recognized having a problem
had a small but steady improvement in abstinence through the entire study period.

Those who reported withdrawal symptoms but did not recognize a substance use problem had a slight increase in abstinence in the first 3 months But then had an increase in cannabis use during the subsequent 9 months This pattern that was also seen in participants not experiencing withdrawal.
The effects of *sativa* are well known for its cerebral high, hence used more in daytime.

*Indica* is well known for its sedative effects and is preferred for night time.

*Ruderalis* – not used recreationally, low cannabinoid content.
Starting to bud -indoors
Dried buds
It’s natural

Pretty buds
Poison Ivy

Poison Sumac
It grows in nature

Looks harmless
Poison Oak
Marijuana and the Brain

Laboratory for Clinical Cognitive Neuroscience
Carnegie Mellon University / University of Pittsburgh
1986: discovery of the first Cannabinoid receptor (CB1) Primarily localized in the central nervous system.

The CB1 receptor system is widely distributed in the body. The highest concentrations are found in deep brain structures, the cerebellum, spine

1992: a second receptor (CB2)

The CB2 receptor appears to be primarily localized in the liver, spleen and immune cells
Acute Effects Studies

Researchers first began studying the acute effects of cannabis on neuropsychological functioning in the 1970s and consistently found disruptions in learning and memory functions.
Acute Neuropsychological Effects

Dose dependent relationship

Perceptual distortions (hallucinatory)
Déjà vu, Jamais vu, Presque vu,
Munchie vu

Relaxation
Anxiety, Paranoia

Deficits in complex psychomotor tasks
Meta-Analytic Studies (Grant et al) Strict inclusion/exclusion criteria

Out of 1,014 studies retrieved using a thorough search strategy, only 11 studies met essential a priori inclusion criteria, providing data for a total of 623 cannabis users and 409 non- or minimal users.
Meta-Analytic Studies (Grant et al)
Strict inclusion/exclusion criteria

Examined the 8 Neuropsychological Domains

Primary Deficits

Learning

Forgetting (failure to recall or recognize)
# A Summary of Research Findings on the Effects of Cannabis on NP Functions

<table>
<thead>
<tr>
<th>Domain</th>
<th>Acute Effects 0-6 hours</th>
<th>Residual Effects 7 hrs -20 days</th>
<th>Long-Term Effects 3 weeks +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention/Concentration</td>
<td>Impaired – light users</td>
<td>Mixed findings</td>
<td>Largely normal</td>
</tr>
<tr>
<td></td>
<td>Normal – Heavy users</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision making and risk taking</td>
<td>Mixed</td>
<td>Impaired</td>
<td>Impaired</td>
</tr>
<tr>
<td>Inhibition/Impulsivity</td>
<td>Impaired</td>
<td>Mixed findings</td>
<td>Mixed Findings</td>
</tr>
<tr>
<td>Working Memory</td>
<td>Impaired</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Verbal Fluency</td>
<td>Normal</td>
<td>Mixed Findings</td>
<td>Mixed Findings</td>
</tr>
</tbody>
</table>
Researchers have discovered how marijuana disrupts short-term memory. It impairs users’ working memory — the ability to retain and use information over short periods of time.

Mariscano & Zhang Cell 2012
Researchers have discovered how marijuana disrupts short-term memory.

Cannabinoids weaken the connections, or synapses, between neurons in the hippocampus, a structure that is crucial for memory formation.  

Mariscano & Zhang, Cell 2012

But wait! There’s more!
Astrocytes

The star-shaped astrocytes have long been considered nothing more than support cells that protect neurons.
Researchers have discovered how marijuana disrupts short-term memory.

Found compelling evidence that astrocytes control neurons and memory. Mariscano & Zhang Cell 2012

“The supporting actor has become the leading actor”
1 Marijuana users activate less within the normal attention network, especially in the dorsal parietal regions, right dorsal and inferior lateral PFC and the medial cerebellum (red regions).

2 Marijuana users activate more than non-drug users in several small brain regions outside the normal attention network (blue).
Historically, marijuana has been viewed by some as a “less severe” or “soft” drug.

In contrast, scientific study has provided a corpus of empirical evidence that marijuana use and its disorders are associated with a number of clinically significant problems.

These negative effects are evident in physical, social, interpersonal, and, more recently, psychological realms.
Feb 2015, Journal of Developmental and Behavioral Pediatrics:

Review: Links cannabis to “long-term and potentially irreversible physical, neurocognitive, psychiatric and psychosocial adverse outcomes.”
Frequent marijuana use is associated with increased risk of severe respiratory illnesses, especially chronic bronchitis.

Br Med J 295; CHEST, 112
Compared with individuals who do not use marijuana or tobacco, or with tobacco smokers who have no marijuana use history, the lung functions of those who use marijuana regularly is significantly poorer.
Some investigations suggest that there is an increased risk of lung cancer among more frequent users of marijuana.

But there are few controlled studies in this area.
Smoking one cannabis cigarette a day for a year increases the risk of lung cancer by 8%, according to the BLF report.

By comparison, smoking 20 tobacco cigarettes a day for a year increases the risk of lung cancer by 7%.
The average puff on a cannabis joint is two-thirds larger and is held for four times longer than the average puff on a tobacco cigarette.

As a result, someone smoking a cannabis joint inhales four times as much tar as from a tobacco cigarette, and five times as much carbon monoxide.
Some research suggests that marijuana use may be related to impaired immune system functioning,

but these investigations have not been consistently replicated.

The risk of testicular cancer in young pot users appears to double
In a survey of nine epidemiological studies, the National Cancer Institute said:

among pot smokers,

• throat cancers seemed to increase
• while tongue cancers decreased.

"Cannabinoids could provide advantages compared to current antitumoral therapies"
“No known overdoses from cannabis”
Cardiotoxicity & Death

A case report 08/04/2014 links MJ to the deaths of two young men in Germany

"After exclusion of other causes of death, we assume that the young men died from cardiovascular complications evoked by smoking cannabis"

"The potential cardiotoxicity of cannabis has been reported in peer-reviewed abstracts as well as scientific proceedings.

Institute of Legal Medicine, University Hospital Duesseldorf, Germany
Cardiotoxicity & Death

Journal of the American Heart Association, 04/2014

Researchers examined data on health complications following marijuana use.

They found that among the 2,000 cases of reported complications, 35 cases involved heart problems. Among those were 20 people who had heart attacks, including nine who died.

The risk of cardiovascular effects of marijuana use in the general population is low, but it is higher in people who have cardiovascular issues.

Forensic Science International journal 04/2014
Effects on Reproduction
Non-human research suggests that heavier marijuana use is related to impaired reproduction capacity,

but controlled evidence among humans is currently lacking.

Any Volunteers?
Prenatal – Pre-Pregnancy

Mothers who use marijuana as teens—long before having children—may put their future children at a higher risk of drug abuse.

Journal of Psychopharmacology 2012
Cannabinoid exposure during pregnancy (in rats, monkeys and humans) can affect offspring development, including impairment of cognitive function, increased impulsivity, and increased risk of depression and anxiety.
Health Benefits

Anecdotal vs. Empirical

vs. Placebo Effect
(PTSD in Rats)
WIN55,212-2 prevented the effects of the shock and SRs on extinction, plasticity, and startle response.

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Synthetic Cannabinoid Research

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Peer-reviewed studies in several countries show that cannabinoids are effective not only for cancer-symptom management (nausea, pain, loss of appetite, fatigue), they also confer a direct antitumoral effect.

Certain cannabinoids selectively target and destroy tumor cells while leaving healthy cells unscathed.

Cannabidiol (CBD), a nonpsychoactive component of the marijuana plant, is a potent inhibitor of breast cancer cell proliferation, metastasis, and tumor growth.

McAllister – NIH Grant 2007
Breast cancer cells killed by CBD
The Miami Cannibal

Rudy Eugene -2012
Social Functioning Evidence

Marijuana use was a contributing factor to impaired educational attainment. (Zvolensky et al 2011)

Others have found that marijuana use leads to reduced workplace productivity, as well as impaired judgment

Lehman, et al; Leirer, et al
The general users fared worse on all behavior and academic measures than the students who had no history of marijuana use.

This was even more pronounced in the students who were in-school users. In particular, the students with in-school use had the lowest levels of academic integrity, attendance, and classroom involvement.

N =1112, 11 schools
Vulnerability of adolescent brain growth to cannabis

Ashtari-Handbook of Growth and Growth Monitoring in Health and Disease 2012

Results from neuroimaging studies show astonishing similarities between the areas of damage due to heavy cannabis use and the areas undergoing normal development during late adolescence.

The hippocampal formation, which undergoes neurogenesis (the birth of new neurons) during adolescence, is reported to be significantly affected.
CNS Structural Changes

The Journal of Neuroscience April 16, 2014

The size and shape of two brain regions involved in emotion and motivation may differ in young adults who smoke marijuana at least once a week.

The more the marijuana users reported consuming, the greater the abnormalities in the nucleus accumbens (reward processing) and the amygdala (fight/flight emotion).
Heavy use of MJ linked to changes in hippocampus, poor memory for life events

2 years after stopping use

- Study links oddly shaped hippocampus to poor long-term memory in former marijuana users
- The longer teens used cannabis, the more abnormal the hippocampus as adults
- Former users perform 18 percent worse on long-term memory test
- Cannabis affects short and long-term memory

Csernansky, J., Hippocampus (Journal) 03/2015
Previous research by the same Northwestern team showed:

- poor short-term and working memory performance and
- abnormal shapes of brain structures in the sub-cortex including the striatum, globus pallidus and thalamus
Driving Issues

Loss of some of our peripheral vision

It affects the passage of time, or the idea of how rapidly time is passing

It can affect our ability to make decisions

It can make it hard to multitask

Interferes with drivers' ability to hold the vehicle in the middle of the traffic lane
Marijuana use has recently been linked to fatal traffic accidents and general driving impairment even after statistically controlling for the variance accounted for by alcohol use.

(Everett et al; Meta Analysis- BMJ 2012)
Driving stoned: The dangers of driving under the influence of marijuana
In all of these studies, a consistent pattern emerges: The greater the amount of use (measured in frequency of use), the greater the impairment.
There is evidence indicating that cannabis impairment can be at its peak despite low measurements of tetrahydrocannabinol in the blood.

Acute cannabis consumption nearly doubles the risk of a collision resulting in serious injury or death.

*BMJ* 2012;344:e536

The influence of cannabis use on the risk of “minor” collisions remains unclear.
DENVER – 08/19/2014
A study found the number of people killed in marijuana-related accidents increased 100 percent over five years where the state legalized marijuana.

There were 78 fatalities where a driver, bike rider or pedestrian tested positive for marijuana. In 2007, the number was 39.
Effects of marijuana on visuospatial working memory: fMRI

Smith, et al, Psychopharmacology 2010

When subjected to the effects of 17 mg THC, regular marijuana smokers hit the walls more often on the virtual maze task than without THC.

fMRI- reduced metabolism in areas that are related to visual integration of motion in the occipital lobes.

Conclusion

These findings suggest that in regular marijuana users, the immediate effects of marijuana may impact cognitive–motor skills and brain mechanisms that modulate coordinated movement and driving.
A study of postal workers found that employees who tested positive for marijuana had

55% more accidents,

85% more injuries,

75% increase in being absent from work.
Numerous lines of empirical evidence have provided robust evidence of an association between marijuana use and psychotic-spectrum disorders.
Acute effects of marijuana use have been found to contribute to the elicitation of psychotic episodes and exacerbations of such symptoms among previously afflicted persons.

Mathers, et al BMJ 161
Among those medicated with antipsychotics, (schizophrenics vs. normal controls)
marijuana use exacerbated positive schizophrenic symptoms
Cannabis Risk Factor over time

N = 1923

Jauhar et al, BMJ 2011; 342:d738
Neuroimaging studies also have found similarities between neural networks impaired by marijuana and those known to be implicated in the etiology of schizophrenia.
In a meta-analytic review of the existing empirical literature, Semple and colleagues concluded that:
The early use of marijuana increased risk of schizophrenia or a schizophrenia-like psychotic illness by approximately three-fold.

Semple et al, J Psychopharmacaco 2005
Marijuana and Depression

Scientific activity has been focused on addressing marijuana’s relationship to depressive symptoms or problems.

Marijuana users often reported a “lack of motivation” for completing day-to-day activities (e.g., going to school).
The depression-marijuana literature has sometimes identified statistically significant relations between marijuana use and depressive symptoms and disorders.


Recent work in this domain has indicated that the strength of such marijuana-depressive associations may be relatively weak.

Zvolensky, 2011
When a person is intoxicated from using marijuana, they may experience acute paranoia, escalating anxiety symptoms, and perhaps a panic attack.

Thomas, Drug & Alcohol Dependency 1996

Among weekly users of marijuana, approximately 40% reported having had at least one panic attack related to such use.

Hathaway, Addiction Res & Theory 2003
Marijuana and Anxiety

A representative sample (n = 4,745) found that a lifetime history of marijuana dependence, but not use or abuse, was related to an increased risk of panic attacks (after covarying the effects of polysubstance use, alcohol abuse, and demographic variables).

Zvolensky, J Psychiatric Res 2006
Marijuana and Anxiety

Adolescents (n = 1,709) with a mean age of 16.6 and were reassessed 1 year later and then again as young adults age = 24.2 years.

Adolescent-onset marijuana use and dependence, especially among tobacco users, were both associated with the development of later panic attacks and panic disorder.

Chronic Use

August 20, 2014
A long-term study of Swedish men finds that those who smoked marijuana 50 times before age 18, were more likely to end up on the nation’s disability rolls by age 59.

N=50,000 Men born between 1947-51
Daily or near-daily use of marijuana among college students

1990-1994
1 in 50

2013
1 in 20

Most widely-used illicit drug in 34 years of survey

N = 1,100
2011 Colorado Study
74% of adolescents in substance abuse treatment had used someone else’s medical marijuana.

They reported using “diverted” medical marijuana a median of 50 times.
Edibles
“Medical” Marijuana?
Research Hurdles

Schedule 1 Drug

Need approval from
  FDA
  DEA
  HHS
Research Hurdles

Marinol –Schedule III
   Synthetic THC
   Nausea –Chemotherapy
   Appetite enhancer

Cesamet –Schedule II
   Nausea –Chemotherapy
   Can cause A/V Hallucinations
Cannabinoids
THC, THC-A, CBD, THC-V
CBG, CBC,
And Terpenes
Cannabinoids
THC and THC-a

Chemical analysis complications

Video 5:14
THC Metabolism

THC - 3-5 hours

OH-THC  6-8 hours

C-THC  1 – 7 Days
Cannabinoids

THC – V
tetrahydrocannabinolvarin

Video 2:54
Cannabinoids

THC – Varin

video
Cannabinoids

CBD
Cannabidiol

Anti-Inflammatory
Anti-Convulsant

Apoptosis-Cancer cells
Protect Neurons
Protect Damaged Cells

Stimulant -> Sedative

Video 5:00
Cannabinoids
CBC
Cannabichromene

- Anti-Inflammatory
- Analgesic
- Anti-Fungal
- Anti-Bacterial
- Anti-Tumoral
- Anti-Depressant

Video 3:00
video
Cannabinoids

CBG
Cannabigerol

Video 3:59
Cannabinoids

CBG

Cannabigerol

video
Terpenes

Aromatic Compounds
Anti-Inflammatory
Anti-Depressant
Psychoactive

Video 2:13
Health Benefits
Complicated

The strongest evidence of possible health benefits for marijuana use appears to be on

+/- appetite, decreasing nausea and vomiting (not any better than Rx), preventing systemic weight loss, Auto-Immune Disorders, Cancer, anti-convulsant, anti-inflammatory, and possibly improving pain tolerance.
Brief List of Ailments “treated” with Medical Marijuana

(1) Acquired immune deficiency syndrome (AIDS).
(2) Anorexia.
(3) Arthritis.
(4) Cachexia.
(5) Cancers
(6) Chronic pain.
(7) Glaucoma.**
(8) Migraine.
(9) Persistent muscle spasms, including, but not limited to, spasms associated with multiple sclerosis.
(10) Seizures, including, but not limited to, seizures associated with epilepsy.
(11) Severe nausea.
(12) PTSD
(13) Anxiety
(14) Depression  (14B) ADD
(15) Any other chronic or persistent medical symptom that either:
(A) Substantially limits the ability of the person to conduct one or more major life activities as defined in the Americans with Disabilities Act of 1990 (Alcoholism)
(B) If not alleviated, may cause serious harm to the patient’s safety or physical or mental health.
Health Benefits

Anecdotal vs. Empirical vs. Placebo Effect
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McAllister – NIH Grant 2007
CANCER Research
Cannabinoids

Antiproliferative
Prevents cancer cells from reproducing

Antiangiogenic
Prevents formation of new blood vessels needed by the tumor to grow
CANCER Research

Antimetastatic
Prevents cancer cells from spreading to other organs

Apoptotic
Induces cancer cell suicide

Video 13:05
Synthetic Cannabinoid Research

Italian investigators described CBD as “the most efficacious inducer of apoptosis” in prostate cancer.

Ditto for cannabidiol and colon cancer, according to British researchers at Lancaster University.

International Cannabinoid Research Society Conference 2014
Breast cancer cells killed by CBD
video
Immune System Research

80 Auto-Immune Diseases

Video 3:39
Seizure Disorder Research

Anecdotal & Conflicting Results

2014 –American Epilepsy Society

Kevin Chapman MD –Chart Review
75 children -Denver

Parental Bias
“Seizure-Free” but still having Seizures
EEG data showing no improvement
Seizure Disorder Research

Epidolex - CBD

Phase 2/3 Studies underway

Randomized, double-blind, placebo controlled
NYU Langone Comprehensive Epilepsy Center
Dr. Orrin Devinsky

Gravet and Lennox-Gastaut Syndrome
2014 study by the American Academy of Neurology reported that medical marijuana may be beneficial in easing some of the symptoms associated with multiple sclerosis.
“Medical” Marijuana?

The number of applications for medical marijuana made by people saying they have severe arthritis has jumped 2,400 per cent in a two-year period. Severe arthritis is a category that requires the OK of only one physician (Canada).
The marijuana industry’s newest customers are sick and elderly dogs.
Auntie Dolores’ “Treatables”
“Medical” Marijuana?
What do YOU think?

• Which chemicals,
• In what concentrations,
• In what combinations,
• At what dosages,
• For what patients?
• For what disorders?
• Side Effects?
Coming Up: Sunday

Monday: 4/20
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MEDICAL MARIJUANA

Neuropsychological Medicine, Madness, & Myths

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