Marijuana Molecules (THC/CBD): Stuff we all need to know

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Turn to your buddy and discuss this question: (1 minute)

Is “legal” the same as Safe?

- Alcohol
- Tobacco
- Prescription Drugs

- Above are legal... but not necessarily safe!
POLICY & history
Our relationship with Marijuana in the U.S.
Since the 1930s, federal law makes use, sale or distribution of marijuana illegal.

The Controlled Substances Act (CSA) schedules drugs according to their medicinal value and potential for abuse.

Since 1970s, CSA made marijuana a **Schedule I controlled substance**.
- Only drugs with high potential for abuse,
- lack any medical value and
- can’t be safely prescribed

**NOTE:** Therefore -- Doctors can’t prescribe it!

Hence, research on marijuana’s medicinal properties is NOT where it needs to be.

Some good news

• In 2017, the National Institutes of Health funded cannabinoid research $140 million

• Including $15 million on CBD.

Federal Law

• Federal law still treats marijuana as a controlled substance

Even if you live in a state that legalized medical or recreational marijuana use, you are still committing a federal crime by possessing, buying, or selling marijuana.

- The FDA doesn't regulate it because it’s illegal.
- And colleges don’t allow use because they need federal dollars to run programs.

Marijuana Legalization and Answers to Our "Drug Problems"

Educate yourself. Impress your friends. Nuanced drug policy positions explained.

Posted Jul 11, 2017

A word about the Policy Continuum

• Prohibition (Criminalization)

• Decriminalization (you are caught in possession of small amounts of a drug for personal use, you do not incur a criminal penalty. It is still illegal to use the drug. The penalty, however, is typically nothing more than a modest fine)

• DePenalization (What Portugal did - Administrative penalties with referral for free help)*

• Defacto Decriminalization - existing criminal law prohibiting use is no longer enforced.

• Medicalization is medically “recommended” rather than actually “prescribed,” due to a limited availability of rigorous empirical evidence on health benefits.

• Legalization- without commercialization (bans product branding and advertising that are designed by industries to proactively increase sales, consumption, and profits. An alternative is to have local, state, or federal control over the production and sale of the drug.

• Legalization – with limits on commercialization such things as having a minimum age for use (e.g. being at least age 21), ensuring quality control in production, and listing of ingredients including the nature and potency of its psychoactive content; limiting the number of licensed sales outlets in a given area; prohibiting use under certain conditions, such as when driving a car; and having a minimum price per unit ...

• Legalization –with FULL commercialization

We haven’t legalized marijuana, we have commercialized THC.

Source: 2017 TED Talk Dr. Sabat
The False Dichotomy of Legalization and Criminalization

Helpful website from SAM (Smart Approaches to Marijuana)
www.learnaboutSAM.org
TED talk that is a great social justice discussion prompt

Commercial sales goal: get people to use a lot targeting the adolescent brain
Increased risk of addiction and heavy users

“30% of the population consumes 80% of the product”

www.learnaboutSAM.org
Drug Bio 101

The science behind the molecules

How they work in the brain/body

AND...

why it matters!
Marijuana: THC vs CBDs
Bio 101 - the science

Thanks to-
My best resource:
Dr. Tricia Smith
Pharmacologist
Cannabis Researcher
VCU Drug Bio Teacher

THEMED ISSUE: CANNABINOIDS

REVIEW

Cannabinoid CB₁ receptor-interacting proteins: novel targets for central nervous system drug discovery?

Tricia H Smith, Laura J Sim-Selley and Dana E Selley
Marijuana:
3 varieties (two smoked)
thousands of strains

• Fast growing plant

• Requires 6 gallons of water a day (twice as much as a grape plant)

• To force grow marijuana even more: Fertilizers, 24/7 lighting, genetic breeding

• Because it’s moist- pesticides and antifungals are used to prevent mold/disease

Marijuana – THC strength increasing

1970’s
?1-1.5% THC

1980’s
?3-4% THC

What’s in marijuana?

It depends...
The plant has over 400 known components!

All can be influence by
The breeding
The strain
The pesticides & fertilizers
3 Classes of Cannabinoids

1. **Endogenous cannabinoids** — 5 known, we make them in our body
   Anandamide and 2AG are most studied

2. **Phytocannabinoids**
   THC & CBD are the two most talked about but about 100 exist
   found in leaves, flowers, stems, and seeds collected from the Cannabis plant

1. **Many Synthetics** (synthesized in a laboratory) like spice, K2, etc
   Examples include CB1 agonists (CPP-55, ACPA)
   CB2 agonists (JWH-133, NMP7, AM1241)
   CB1/CB2 nonselective agonist (CP55940)
   ajulemic acid (AJA), nabilone, and dronabinol.
Anandamide & THC work on our cells!
Anandamide fits Cannabinoid Receptors

**CB1** – “central” cannabinoid receptor
- most abundant G-coupled receptor in the brain!
- also present in the gut

**CB2** – “peripheral” cannabinoid receptor
- localized mainly on immune cells and in lymphoid organs

**GPR55**? - Orphan receptor. Now CB3?!
Basal Ganglia includes VTA! The pleasure center
All addictive molecules work in the VTA
Cannabinoid addiction

• Addiction: ~9% of users become addicted (NIDA)
• Addiction increases with those who start younger (17%) and those who use daily (25-50%)

• How to diagnose if there is a problem:
  • Would life be different without it?
    • Yes, I’d be into hobbies,
    • have friends who didn’t smoke,
    • not be tolerant,
    • not live in a privately defined world,
    • have a better job,
    • keep my promises to smoke less,
    • not plan my life around it, etc.)
Marijuana Use Disorder (MUD) is on a **CONTINUUM** (DSM 5)

Most either
No use or no problem with use

Some Misuse

MUD

Mild Moderate
Severe= Addiction

Usually about 1 in 10 more if young onset & heavy use

*Table*  DSM 5 criteria for cannabis use disorder severity

- Used for longer periods in larger amounts
- Unable to cut down use
- Excessive time spent acquiring, using and recovering from cannabis use
- Strong urge to use cannabis
- Problems fulfilling work, school, and family obligations due to cannabis use
- Continued use despite persistent interpersonal problems caused by cannabis use
- Decrease in important social and recreational activities because of cannabis use
- Repeated use in physically dangerous situations
- Ongoing use despite worsening physical and psychological problems that are likely to have been caused by cannabis
- Have to use increased amount for the same desired effect
- Withdrawal reaction upon cessation

Mild: 2–3 symptoms; moderate: 4-5 symptoms; severe: ≥6 symptoms.

https://www.psychiatrictimes.com/addiction/therapeutic-cannabis-user-5-key-issues
How cells communicate

If it’s a drug of abuse, dopamine is released
Cannabinoids don’t work like other neurotransmitters

• Other brain chemicals –
  • are stored in “bubbles” (like dopamine and serotonin) in the PRE-synaptic membrane
  • When signaled, get “dumped” into the synapse
  • Action potential moves forward in the system

• Anandamide and 2AG are synthesized..
  • on demand and in the POST synaptic membrane
  • The signal moves in a retrograde fashion NOT forward.
Almost all drugs of abuse move action potentials forward

Cannabinoids are the volume control system for your brain
Cannabinoids are calming but...

*we have more than 1 kind of neuron*

**Excitatory Neurons**
- If calmed work like a STOP SIGN
- “Don’t go”
- Examples
  - Chill out
  - Calming seizures
  - Inflammation etc.

**Inhibitory Neurons**
- If calmed then it is like Stopping the STOP SIGN
- Which means “GO”
- Examples
  - perceptual effects
  - Taste
  - Sight
  - Hallucinations (psychosis)
• Cancer!
• Cancer chemotherapy-induced **nausea & emesis**
• Appetite increase in AIDS and cancer patients
• Palliative (quality of life)
• Inflammatory diseases
• Pain (Neuropathic, arthritis)
• Movement Disorders (MS)
• PTSD
If you use THC or CBD, they work all over the body & you can’t effect just one system.

- Energy Balance
- Sexual Reproduction
- Cardiovascular Effects
- Immune System Control
Synthetic Cannabinoids

• HU210, JWH-073, JWH-018, AM2201
  • John W. Huffman: organic chemist at Clemson University

• FULL to potent agonists at the CB1 Receptor!
  • Panic attacks
  • Vomiting
  • Convulsion
  • Psychosis (prolonged!)
  • Tachycardia
  • Hypertension
  • Agitation
  • Hallucinations
  • Myocardial infarction
  • Professor John W. Huffman, who first synthesized many of the cannabinoids used in synthetic cannabis, is quoted as saying, "People who use it are idiots." "You don't know what it's going to do to you."
• THC (see green line) is a very weak partial agonist.
• You can NOT overdose
• Synthetics are strong agonists and hold on (see WIN)
• You CAN over dose
Marijuana is great at reducing nausea and vomiting!

What about its use during pregnancy?
Marijuana & Pregnancy don’t mix

• Animal Studies:
  • lifelong changes in behavior; including hyperactivity, learning deficits, and enhanced response to rewarding drugs

• Human studies (following maternal use):
  • impairments in mental development; including decreased memory, verbal reasoning, and attention and sleep efficiency and an increase in impulsivity and hyperactivity

• functional magnetic resonance imaging (fMRI) scans show decreased activity in parts of the prefrontal cortex and the cerebellum and increased activity in frontal gyrus
IS MARIJUANA AS SAFE AS WE THINK?

Permitting pot is one thing; promoting its use is another.

By Malcolm Gladwell

https://www.newyorker.com/magazine/2019/01/14/is-marijuana-as-safe-as-we-think

Article that sums up the 2017 NASEM Report

The academic Impact of marijuana?

RESOURCE
Check out the VCU COBE Town Hall 2018 videos

Look for Dr. Jason Kilmer
the brilliant guy in the sweater vest
Marijuana and cognitive abilities

• Effects on the brain (hippocampus)
  
  Attention, Concentration and Memory

• Research with College Students
  
  • Impact on these even after 24 hours (Pope & Yurgelun-Todd, 1996)
  • After daily use, takes 28 days for cognitive impact to go away (Pope, et al 2001)
  • Hanson et al (2010) study on verbal learning, memory and attention:
    • Deficits in verbal learning (takes 2 weeks before no differences with control group)
    • Deficits in verbal working memory (takes 3 weeks before no differences)
    • Deficits in attention (still present at 3 weeks)

And mental health implications...

Suicide risk – 7 fold
Psychosis – 4-5 fold

If you have a family history of psychotic illness (schizophrenia, bipolar, etc) look at this research. Use Caution!
There is such a thing as too much cannabis: Cannabis Hyperemesis Syndrome

- Occurs rarely in heavy users
- Repetitive vomiting
- Improves in hot shower
- Only cure – stop using

https://www.mdedge.com/ccjm/article/100709/gastroenterology/cannabinoid-hyperemesis-syndrome-marijuana-both-antiemetic-and
Times are changing fast...
It’s Not just grandpa's joint

Find a discussion “buddy” (pun intended)
<table>
<thead>
<tr>
<th>Question</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Job title of the person at marijuana dispensary who helps you select a THC/CBD product for your health issues?</td>
<td>• Budtender</td>
</tr>
<tr>
<td>2. When you use too much marijuana and feel dizzy, look green or pale, nausea, may get paranoid, anxious, psychotic?</td>
<td>• “Greening out”</td>
</tr>
<tr>
<td>3. Where to find weed in Wash D.C.?</td>
<td>• Pop Up Pot Parties</td>
</tr>
<tr>
<td>4. JUUL like device for THC concentrates?</td>
<td>• PAX ERA</td>
</tr>
<tr>
<td>5. Who just bought 35% of JUUL and 45% of Cronos?</td>
<td>• Altria</td>
</tr>
</tbody>
</table>
Green CulturED Online Cannabis Education

Green CulturED has developed an online Budtender Certification course that can provide you with the skill-set and knowledge as it relates to the various strains of medical marijuana, dosing limitations, chemistry, compounds, growing and laws governing sales, social media promotion and advertising and managing inventory and sales. The 19-part course includes:

- 19 Course Videos (4:38:57 Time) with access to supplemental video materials
- Discussion Forum – Ask Questions, Get Answers
- Photo Glossary of strains and a Medical Marijuana Photo Dictionary
- 19 eBooks (117 Pages Total)
- Handouts including talking points, customer conversation tips, strain abbreviations and factual tables
- 19 Learning Outcome Assessments
- Certificate of Completion

The total cost of the Budtender Certification is $119, which makes it one of the most affordable comprehensive online programs on the market. Green CulturED also offers Master Grower certification courses for indoor, green house and hybrid growing. Learn more at https://www.thecannabisreporter.com/want-budtender/
What are “green outs”? 

- A term used to describe a situation where a person feels sick after smoking cannabis.
- They go pale (turning ‘green’ or ‘white’) and start to sweat, they feel dizzy and nauseous, and may even start vomiting.
- The experience can be quite frightening and users can become very anxious and start to panic.
- In extreme cases, the person may experience prolonged vomiting and even hallucinations.
- Cannabis users often report that the only way they can alleviate these symptoms is to lie down.

4 steps to helping a friend who’s greened out

Sometimes when people smoke or eat too much weed too quickly, they can become very pale and feel nauseous, dizzy, sweaty and possibly vomit.

1. Take them to a quiet safe place
2. If not vomiting, have them sip on water or juice
3. Put them in the “recovery position” - Lie them on their side
4. If anxious or paranoid, stay with them, be soothing and reassuring

This figure has less to do with Civilized’s wallet than it does with the district’s shaky legal status surrounding the substance. Back in 2014, DC voters passed ballot initiative 71, which effectively legalized both the possession and use of recreational marijuana, but Congress stepped in to prevent the nation's capital from allowing marijuana retailers.

So, basically, you’re allowed to grow it, store it and smoke it, but you can’t buy it. This, of course, begs the question--how does one get it in the first place? This was what I hoped to answer.
Future of Vaping and THC/marijuana connection
Pax Era Vapor app-
download it free in the Google Play or Apple App stores and turn on your Bluetooth.
Open the app up side-by-side with your Era, shake the vape to activate its Bluetooth pairing function and wait for the four-LED logo on the front to blink white.

The fun features:
name your Era (mine is Lil’ Homie)
choose a color scheme for the LED (I match it to my mood and/or outfit).
The four LEDs are the interface for three simple games to play while puffing:
Simon, Pax Man, and Spin the Pax.
Altria (aka: Philip Morris the company who makes Marlboro) just bought Marlboro company buys 35% stake in Juul e-cigarette maker for $12.8bn

Altria Group preparing for future in which ‘adult smokers overwhelmingly choose non-combustible products’

The deal values San Francisco-based Juul at $38bn

Impact on performance

Driving
Sports
Academic
Almost half of young adults who use marijuana are driving impaired.
SUMMARY: Marijuana Use in NCAA Student Athletes

- Self-reported marijuana use
  - lower among student-athletes (25% use by inhaling or ingesting)
  - than the non-athletes (33%, Core; 39%, MTF).

- In 2017, 24% inhaling marijuana in the last year (compared to 22% in 2013).

- 11% of used edibles

- Use was higher if living in a state where it is legal for recreational or medical use (39% vs. 26%)

- Division III student-athletes – highest use.

http://www.ncaa.org/about/resources/research/ncaa-student-athlete-substance-use-study
Marijuana Use During the Playing Season

The majority of athletes endorsed testing for banned substances to deter drug use. AND believed that the associated punishments were appropriate.

Note: Represents percentage of all student-athletes.

http://www.ncaa.org/about/resources/research/ncaa-student-athlete-substance-use-study
What Student-Athletes Need to Know About Marijuana

Updated October 2018

http://www.ncaa.org/sport-science-institute/topics/what-student-athletes-need-know-about-marijuana
Break Out 3

Take time to read the infographic.

- What are the potential consequences of using marijuana for your personal well-being and goals?
- How could marijuana impact the success of your team?
- Do you have a team agreement about marijuana?
- How will you feel if a teammate’s decreased performance or legal problems cost the team a game? How about a season?

Against NCAA Policy
Marijuana is a banned substance in the “Illicit Drug” class. If you test positive on an NCAA drug test, you will lose:

+ Half the season (1st test)
+ + Full calendar year of eligibility (2nd test)

And because it is a “Illicit Drug”, there is no “Medical Exception” waiver available.

http://www.ncaa.org/sport-science-institute/topics/what-student-athletes-need-know-about-marijuana
Marijuana’s impact on sports performance

http://adai.washington.edu/marijuana/factsheets/sports.htm

**Ergolytic- decreases performance**

- Research shows negative impact on sports performance:
  - Increase heart rate while decreasing cardiac stroke volume, resulting in diminished peak performance
  - Alterations to motor performance
    - Slowed reaction time
    - Problems of motor coordination
    - Problems of hand-eye coordination
    - Problems of perceptual accuracy
  - When smoked, harmful to the respiratory system
    - Increases the risk of respiratory tract infection, bronchitis
  - Potentially dangerous in sports that rely on quick reactions and fast decision-making.

**Ergogenic- enhances performance**

- Indirect possible benefits (not studied)
  - Euphoric effect, reducing anxiety and increasing the sociability of a player

- To date, no research has objectively demonstrated that marijuana use has resulted in observable increases in performance through relaxing the athlete or improving their sleeping patterns.

- In contrast, for some users, the acute adverse effects of marijuana use have been demonstrated to result in increased anxiety, panic, nervousness and restlessness, thus causing disruption to sleeping patterns.
Marijuana and Its Effects on Athletic Performance: A Systematic Review.

Trinh KV1, Diep D, Robson H.

Abstract

OBJECTIVE: To determine the effects of marijuana on athletic performance.

DESIGN: We searched MEDLINE, EMBASE, CINAHL, PsycINFO, AMED, and SPORTDiscus from their beginning to September 2016. Study quality was assessed using the Cochrane collaboration tool for assessing risk of bias and the Cochrane GRADE scale. No meta-analyses were performed for this review.

SETTING: Subjects in a track, gym, or recreational ward.

PARTICIPANTS: Any primary study which included male and female adults of any athletic background between ages 18 and 65, with no other comorbid conditions.

INTERVENTIONS: Any primary study which used marijuana cigarettes and included a control group.

MAIN OUTCOME MEASURES: Vital signs, pulmonary measures, physical work capacity, grip strength, and exercise duration were determined to be relevant outcomes.

RESULTS: Three trials examined marijuana and its effects on athletic performance. Two trials had a high risk of bias and 1 trial had an unclear risk of bias. The effect of marijuana on outcomes including heart rate, blood pressure, and exercise duration remains unclear. Low quality evidence suggests that treatment, sham, and inactive control groups do not have a significant difference for grip strength. Low quality evidence suggests that there is an ergogenic effect of treatment demonstrated by increased bronchodilation and FEV1 compared with inactive control and that there is an ergolytic effect of treatment demonstrated by decreased physical work capacity compared with sham and inactive control groups.

CONCLUSION: Because the number and quality of studies was low, the effects of marijuana on athletic performance remain unclear.

Conclusion:
Number & quality of studies was low...

“The effects of marijuana performance remains unclear.”
Travel and student athletes

Curiosity? Accidental use?

Legal & Health Risks are possible

Discussion buddies – talk about

What could happen if...

You are stopped at the Denver Airport with weed?

You have it on campus in Washington state?

You are in Colorado & mail some edibles to your friend in Virginia?

You eat your roommates brownie before post-season play?
THC concentrates
THC - The dose (and delivery method) is the difference!

Photo from http://treespotshop.com/greenwoods-best-cannabis-concentrates/
THC concentrates...

The fastest-growing segment of the legal market in Washington State was extracts for inhalation!

the mean THC concentration for those products was more than 65%.

https://www.newyorker.com/magazine/2019/01/14/is-marijuana-as-safe-as-we-think
So... what was on your gummy bears?
1 gummy bear could = 17 servings of THC

“Repurposed Candy”
Spray the outside with TCH concentrate

In Colorado
House Bill 16-1436
recently banned animal- and fruit-shaped edibles.
Harm reduction and THC concentrate

• ACCIDENTAL CONSUMPTION is possible!

• Start with a single **10mg (of THC) serving or less 2..5 to 5 mg**

• Wait at least 2 hours, don’t take more   Go low and slow in the dose

• Have other non THC food available if you get the munchies

• **Keep away** from children and pets!

*Will Ingesting Marijuana Affect Me Differently Than Smoking It?*

Yes. Smoking/vaping almost immediate: Edibles es can take from 30 minutes to 2 hours

Intoxication may last longer than expected

- depending on the dose

- Time of last meal

- Other meds, drugs or alcohol used at the same time.

http://learnaboutmarijuanawa.org/factsheets/edibles.htm
How do THC concentrates get made?
• 57 California medical cannabis concentrates screened for:
  - cannabinoid content
  - residual solvents
  - pesticides

• Over 83% of concentrates were contaminated with solvent (0% of the hash group)

• 1/3rd had pesticides

• THC ranged 24%-76%

• Only 5 out of 57 samples contained >5% CBC
Edible harm reduction fact sheet

Learn About Marijuana: Concentrates, Edibles & Flowers

Edibles

- Hard to control THC
- THC not evenly distributed
- Stronger potency
- Long-lasting effects

What is the dosage for edibles?

- 1 dose = 10mg THC
- Some edibles have > 1 dose
- Directions to consume only part
- Read dosing information carefully

What about CBD?
What are people saying/doing about CBD?
Why Is CBD Everywhere?

Cannabidiol is being touted as a magical elixir, a cure-all now available in bath bombs, dog treats and even pharmaceuticals. But maybe it’s just a fix for our anxious times.

Snake Oil or Wonder Drug?

“It’s hot, everywhere and yet almost nobody understands it.”

CBD oils are expensive. No quality control!

• Only 26 of 84 samples of CBD oils, tinctures and liquids purchased online contained the amount of CBD claimed on the labels.

• 18 of them contained THC, which could lead to intoxication/impairment.

The FDA has also found many products did NOT have CBD.

The researchers at VCU, tested Diamond CBD products -

Found synthetic cannabinoids in Liquid and in Vape products
“Nature endowed us with our own cannabinoids, so unless you have a deficiency of them or sluggish receptors, you really don’t need supplementation.”

“Future studies may show otherwise, but at present CBD looks more like an expensive placebo than a panacea.”

Useful skill...
How to conduct a **SNOWBALL SURVEY**

- Blank paper, same color pen
- Do NOT put name or identifying marks on paper
- You can write with opposite hand
- Respond to a question
- Crumple paper into snowball
- Have snowball fight
- Share each others answers, questions or comments
Today’s snowball survey

1. What was your biggest “Ahha” (or learning point)

2. What questions/concerns do you still have?
Comments on

Prevention
Early Intervention
Treatment/Cessation
TED talk that is a great social justice discussion prompt

Growing marijuana requires prodigious amounts of water, regardless of whether it is grown inside or outdoors. In California, where growers have decades of experience cultivating, plants still require about six gallons of water per plant each day. That adds up to almost 300 million gallons of water for each square mile of marijuana grown each growing season. (1)

For reference, that is twice the amount of water wine grapes use, and the same amount of water consumed by almond orchards—a crop some experts say has aggravated water problems in the Western United States. (2)

Recent peer-reviewed research from fish and wildlife experts also indicates that marijuana is likely to have lethal or sub-lethal effects on state-and-federally protected salmon and steelhead trout and other aquatic species. (3)

People, in 2015, the Department of Justice announced a wave of prosecutions on federal land resulting in seizure of 20,000 marijuana plants and over 300 kilograms of dried marijuana. Suspects included Mexican nationals with ties drug trafficking organizations. (4)

Power consumption is a similar story. In 2012, since which time, marijuana cultivation has expanded significantly—marijuana growing was responsible for one percent of the nation’s entire electricity use. That is marijuana cultivation already accounts for one percent of the United States’ total electricity consumption, and is almost four times more energy-intensive than the petroleum and coal industries.
Reduce your use:
An online program to help your clients cease or reduce their cannabis use

National Cannabis Prevention & Information Centre (AUS)
- Free, self-guided program
- Evidence-based
- Quit or cut back

- Practical ideas
- Good place to start

http://learnaboutmarijuanawa.org/elearning/helping/story_html5.html
Just like you don’t want to be disrespected for your Substance Use Disorder...

Please don’t disrespect Marijuana Addiction
It devastates people’s lives.
SUMMARY

• Marijuana – has been selectively grown for more THC
  - Pesticides, fungicides and fertilizers contaminate THC products
  - The Dose and Delivery is the Difference

• Not enough research on THC & CBDs

• Receptors are ALL over the body, if you use THC or CBs you hit ALL receptors

• Yes, CBDs could be a beneficial source of meds – but research pending

• Solid Research shows impair learning, memory and concentration

• It is still against FEDERAL LAW and NCAA regs

• THC has never been shown to enhance sports performance

• THC can be addictive

• Synthetic THC is very dangerous - avoid

• THINK THINK THINK THINK THINK – use common sense