

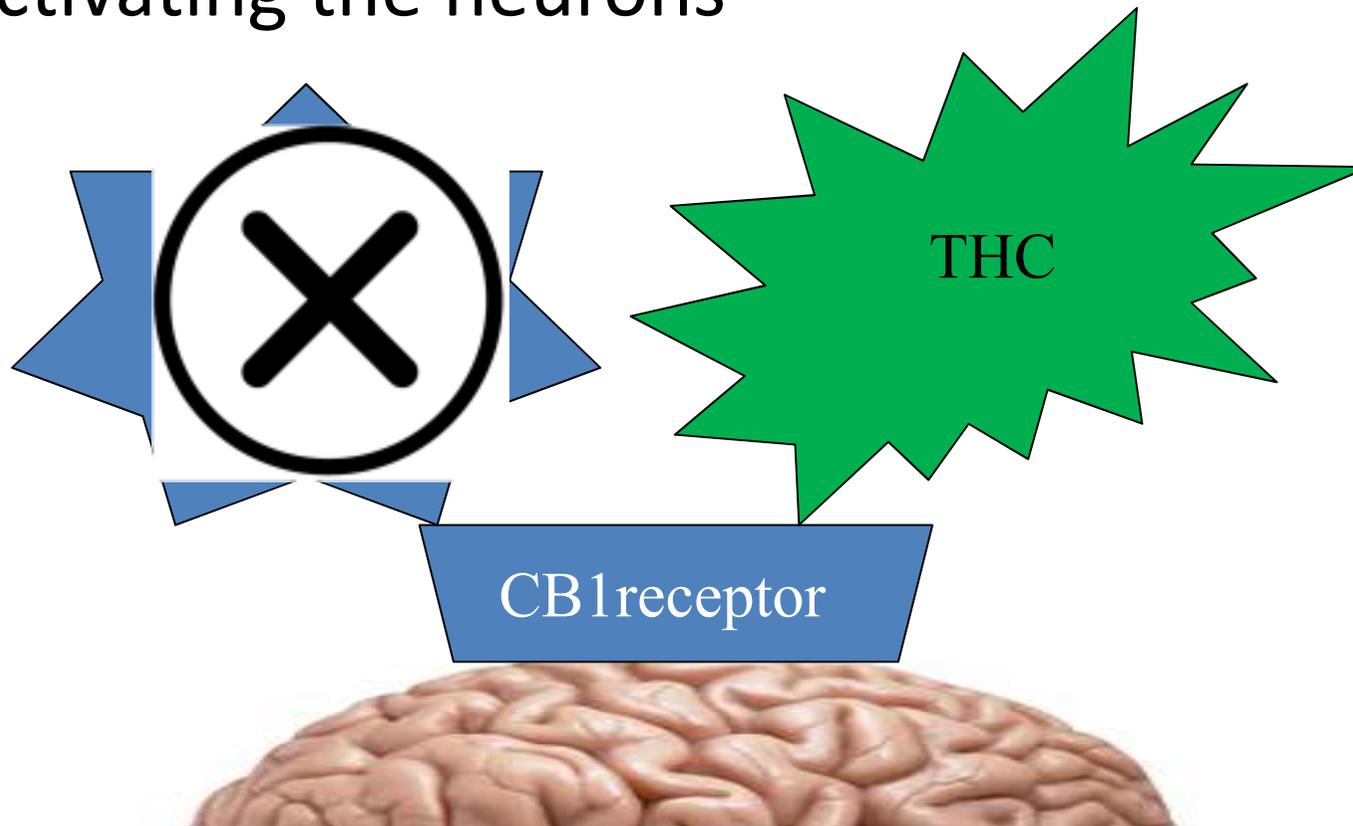
# Brain mechanisms, medical use and harmful effects of cannabis



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# Brain mechanisms

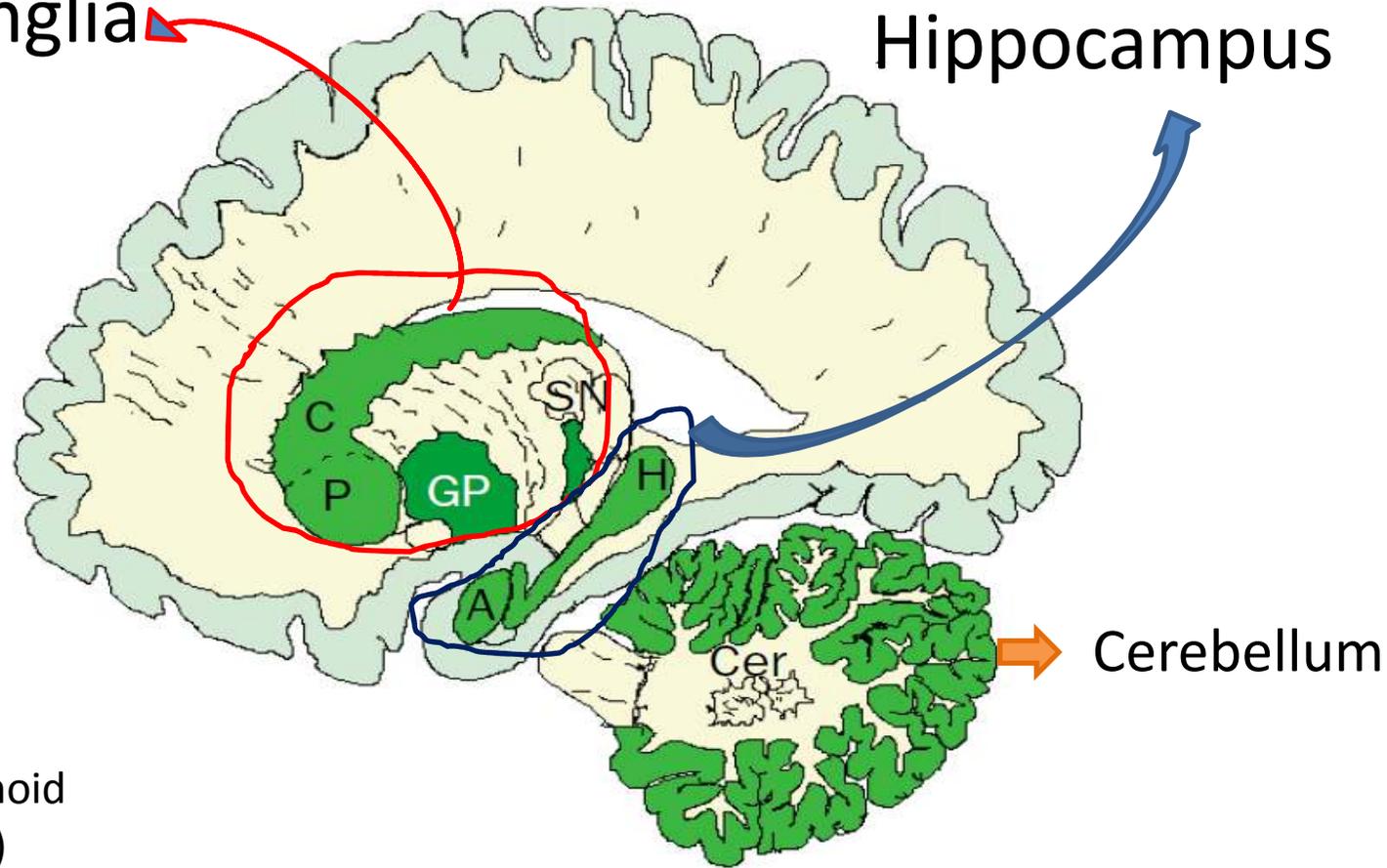
- delta-9-tetrahydrocannabinol (THC) mimics anandamide, binding with the CBRs and activating the neurons



# CB1 Receptors

Basal ganglia

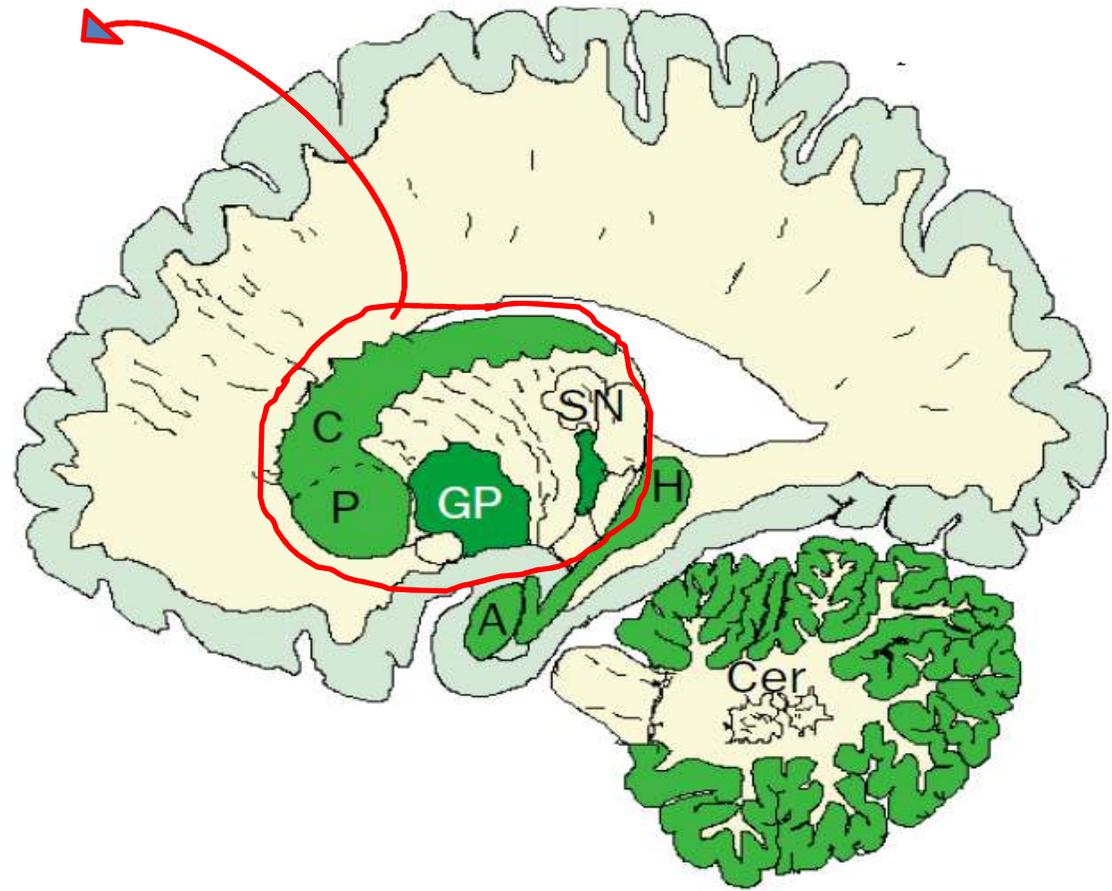
Hippocampus

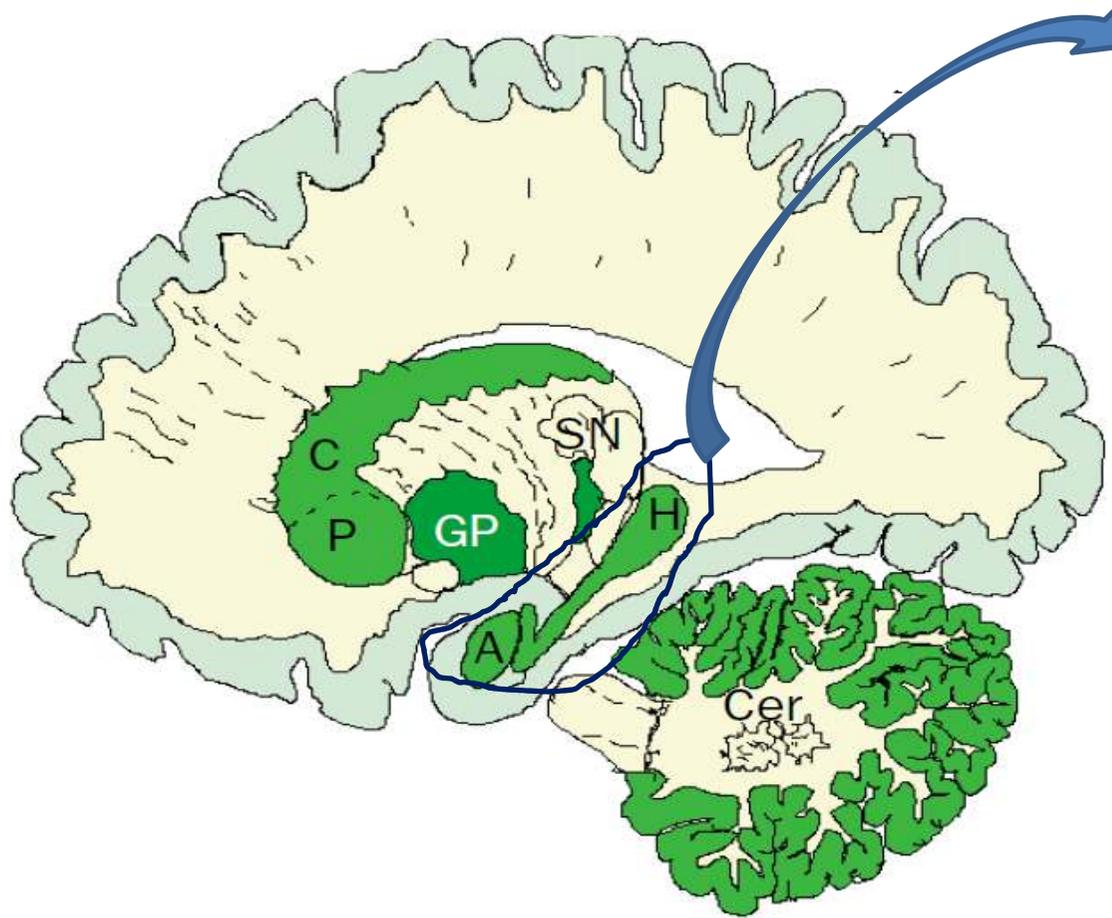


Endocannabinoid  
(Anandamide)

## BASAL GANGLIA

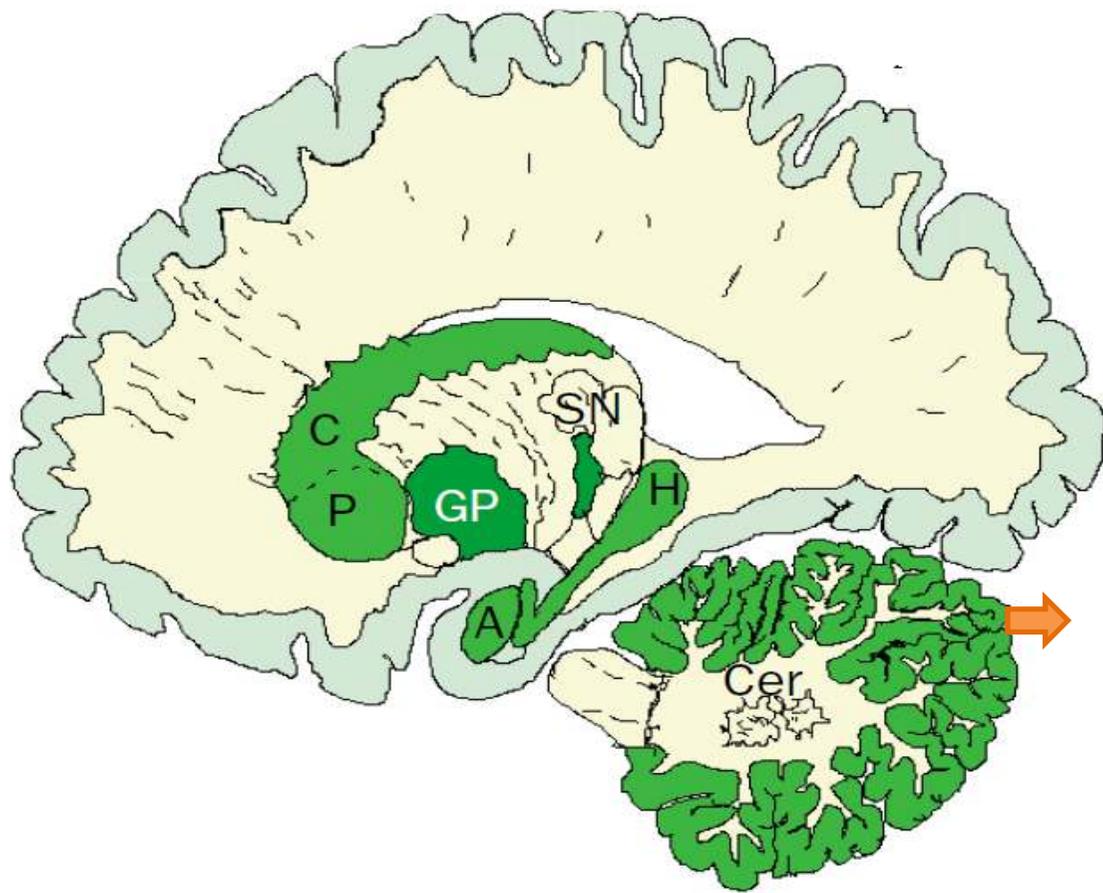
- Motor control
- Motivation
- Appetitive
- Parkinson's disease





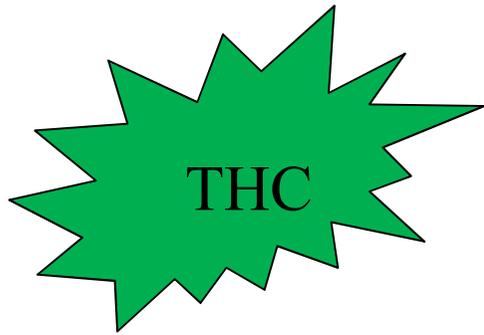
## HIPPOCAMPUS

- short-term-memory processing
- Impair learning and memory



## CEREBELLUM

- Effects on motor coordination



CB1 receptor

Dopamine

GABA

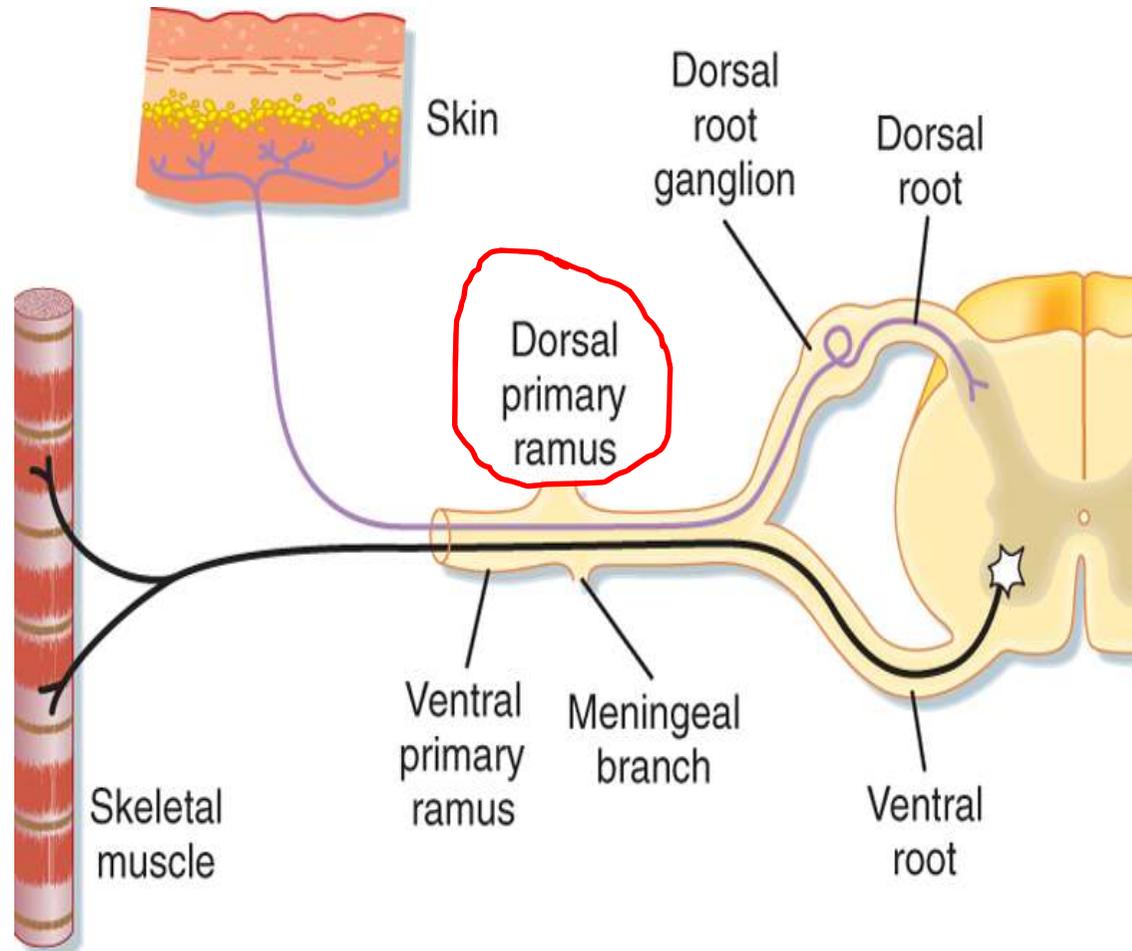
**SCHIZOPHRENIA**

Positive symptoms

Negative symptoms

Cognitive symptoms

# SPINAL CORD



## DORSAL PRIMARY AFFEERENT

- analgesic properties

## Neurotransmitter functions under cannabinoid control

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### **Neurotransmitter**

### **Associated disorder**

#### *Excitatory amino acids*

Glutamate

Epilepsy, nerve-cell death in stroke

#### *Inhibitory amino acids*

GABA

Spinal cord motor disorders, epilepsy, anxiety

Glycine

Startle syndromes

#### *Monoamines*

Noradrenaline

Autonomic homeostasis, hormones, depression

Serotonin

Depression, anxiety, migraine

Dopamine

Parkinson's disease, schizophrenia, vomiting, pituitary hormones, drug addiction

Acetylcholine

Neuromuscular disorders, autonomic homeostasis, dementia, parkinsonism, epilepsy, sleep-wake cycle

Neuropeptides

Pain, movement, neural development, anxiety

# CANNABIS

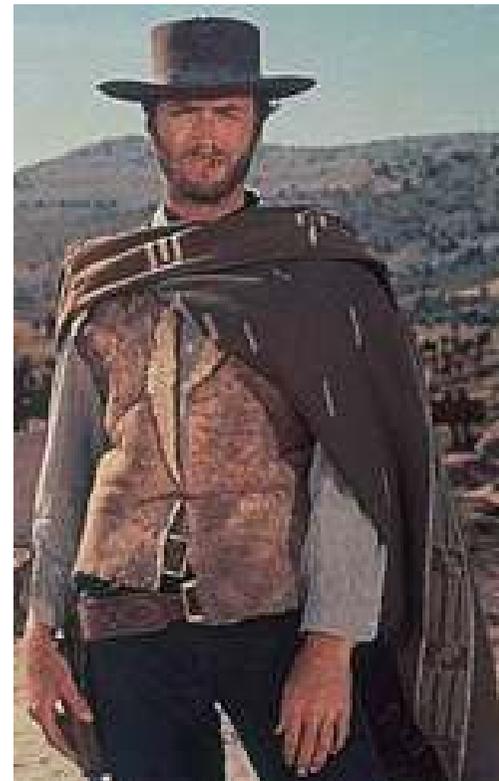
- There are more than 500 components found within the Cannabis sativa plant
- Around 66 of these components have been classified as "cannabinoids":
- **delta-9-tetrahydrocannabinol (THC)**
- **Cannabidiol (CBD)**

# Psychotic effects

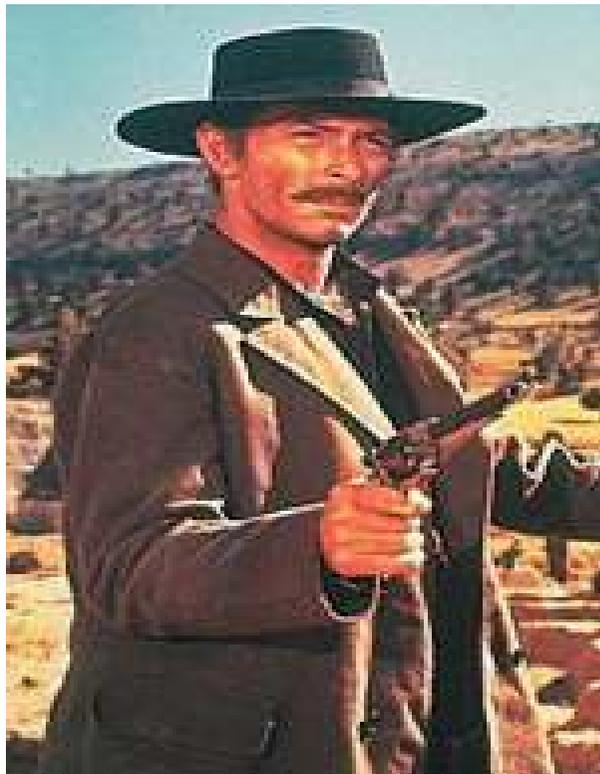
delta-9-tetrahydrocannabinol  
(THC)



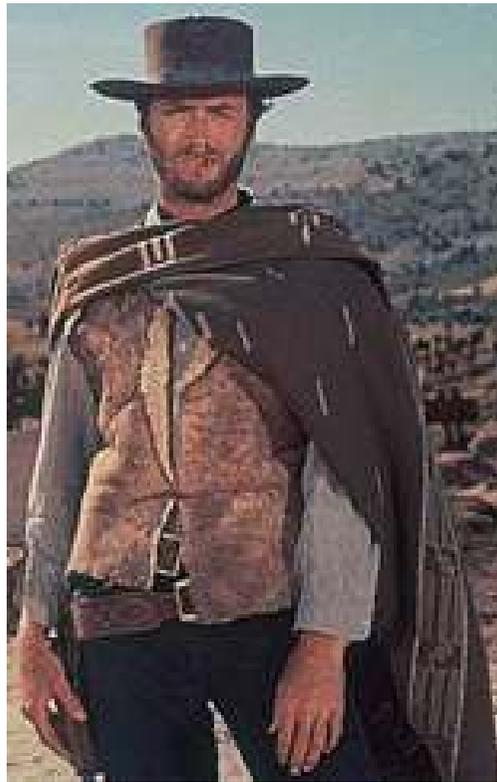
Cannabidiol  
(CBD)



delta-9-tetrahydrocannabinol  
(THC)



# Cannabidiol (CBD)



# CANNABIDIOL (CBD)

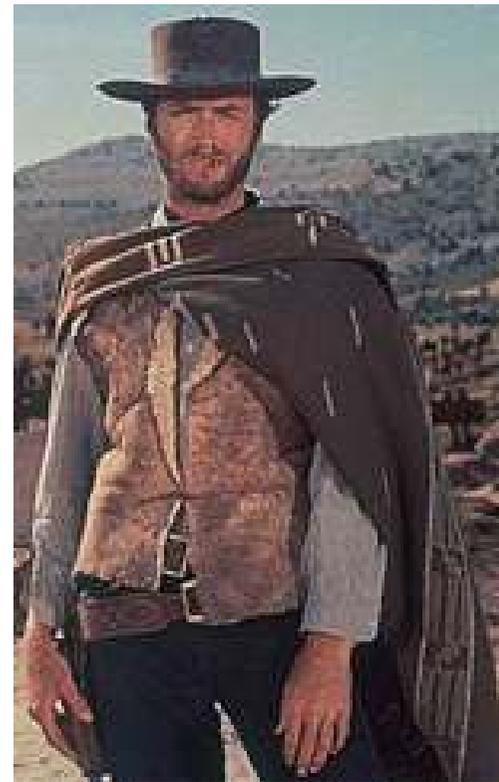
- Anxiolytic properties
- Antipsychotic effect (suggested)
- Reverse the effect of THC (memory, suggested)
- Maximize analgesia
- Anti-convulsant

# CANNABIS

delta-9-tetrahydrocannabinol  
(THC)



Cannabidiol  
(CBD)



# Possible medical effects

## EFFECTIVE

- Control spasticity in patients with multiple sclerosis (symptomatic relief)
- Central pain or painful spasms
- Nausea and vomiting (chemotherapy)
- Appetite (AIDS patients)

# Uncertain medical effects

- Sleep disturbance (multiple sclerosis)
- Anti-convulsant
- Head injury
- inflammatory disorders
- Glaucoma

# Adverse effects

- Effects on cognition (executive functions such as attention and working memory)
- Addictive (1 in 9)
- Poor educational attainment (Systematic Review, drug alcohol depend 2010)
- Psychosis (Systematic Review, Lancet 2007)
- Fatal collisions (Meta-analysis, BMJ 2012)

# Uncertain adverse effects

- Chronic bronchitis
- Lung cancer
- Breast cancer (cannabinoid receptor GPR55)
- Myocardial infarction
  
- Depressive disorders
- Bipolar
- Suicide

# Uncertain adverse effects (con)

- Use of hard-drugs
  - gateway theory: reward system(prenatally, adolescence)
  - correlated vulnerability

# Important to distinguish

- Medical use:

Regulate or not regulate

- Decriminalization

- Legalization

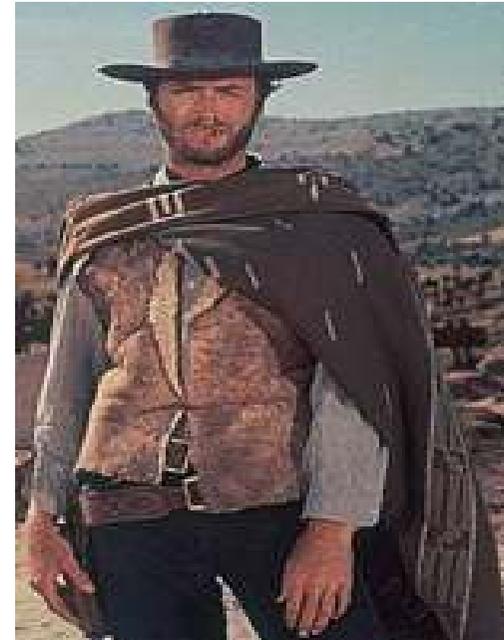
# Food and drug administration (FDA)



# FDA approved

## Nabiximols

- Neuropathic pain, and spasticity among patients with multiple sclerosis. CANNABIDIOL (CBD)



# FDA to approve (con)

## Marinol and Nabilone

- Nausea and vomiting (chemotherapy)
- Appetite (AIDS patients)

(THC)



# Food and drug administration (FDA)



FDA has not approved



# Risks of medical use of cannabis

- Interaction with other medications
- Traffic accidents
- Tolerance
- Dependence
- No other medication is smoked (dose, respiratory problems)

# Revenue VS evidence-based medicine



# Medical use of cannabis in 2014



<http://norml.org/states>

# Federal drug enforcement administration (DEA)

- Give up their DEA registration  
(acting as a medical doctors or entrepreneur)

DEA action against a medical doctors was permissible only if the government had substantial evidence that the medical doctors are promoting “purchases, cultivation, or possession of marijuana”

(New England Journal of Medicine, 2014)

# Medical conditions

- Glaucoma
- Epilepsy
- Alzheimer

# Without medical regulation



# important issues about medical use

- Medical use relies largely on testimonials instead of appropriate studies (powered, double-blind, placebo-controlled randomized clinical trials)
- Comparative effectiveness of medical cannabis VS other therapies

# Cannabis use among youngsters

The main reason why most young people use cannabis are:

- For curiosity
- to experience a so-called high: mild euphoria, relaxation, and perceptual alterations, including time distortion and intensification of ordinary experiences

# Important to distinguish

- Medical use:

Regulate or not regulate

- Decriminalization
- Legalization

# Decriminalization

- Small amounts no longer lands the perpetrator with a criminal record or a jail sentence.



# legalization

- legalization means that consumers face no penalty at all.

More importantly, it means that the

- supply side of the business
- cultivation, transportation and retailing—is also legal.

# Pros of legalization

- Protection of individual rights
- Elimination of black market
- Collection of tax revenue

# Pros of decriminalization

- The low prevalence of schizophrenia mean that cannabis use accounts for a very small proportion of the disability associated with schizophrenia
- An estimated 4700 men would have to be stopped from smoking cannabis to prevent one case of schizophrenia

# Eliminations of criminal sentencing for minor offenses



# Cons of legalization

- Cannabis is the world's 3th most popular recreational drug after alcohol and tobacco
- Escalation of use
- Possible increase in use of “hard drugs”
- Adverse mental and physical health effects

# Cons of legalization

- Boydell et al. found that during the period 1965–1999, the cases of schizophrenia in South London doubled
- Send signals that cannabis is harmless
- Potential medical and social cost
- Against UN convention of drugs

# Important to distinguish

- Medical use:

Needs to be regulated

- Legalization:

May have severe consequences

- Decriminalization:

May depend on social or culture background

THANK YOU

