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2019 NSCA PERSONAL TRAINERS VIRTUAL CONFERENCE

OCTOBER 7 – 11

#NSCAPT19

CBD – Useful Nutritional Supplement or All Hype?

Mike T Nelson, PhD, CSCS,*D

CONFLICT OF INTEREST STATEMENT

I currently have, or I have had in the past 2 years an affiliation or financial interest with Charlottes Web / Driven Nutrition around this presentation


keeps the
doctor away
Veggimins
CBD Pops
$3.50
We Have
CBD

SLIDES & EXTRAS

HOW CAN I BE SO SURE?

HOW CAN I BE SO SURE?

I will speak English (only a little geek).

ETHICS

- Talking only about research / experience, not ethics or legality
- As of this recording, THC/ marijuana is federally illegal
- Talk to your doc if you are using it for medical reasons

OUTLINE

- Cannabinoids background / research
- Strains / compounds
- Delivery methods
- Exercise
- CBD and Sleep
- #1 CBD Use

RESEARCH

Source: http://mentalfloss.com/article/78547/there-was-once-secret-pool-mojave-desert

CANNABIS

Source: By Walther Otto Müller - From Franz Eugen Köhler's Medizinal-Pflantzen. Published and copyrighted by Gera-Untermhaus, FE Köhler in 1887 (1883–1914).

WEED SCHOOL: IN

Cannabis

- Subtypes:
- Sativa
- Indica
- Ruderalis

Cannabis

Cannabis

Cannabi

STRAINS

- 14,031 single-nucleotide polymorphisms (SNPs) genotyped in 81 marijuana and 43 hemp samples
- Marijuana and hemp are significantly differentiated at a genome-wide level
- *Moderate* correlation between the genetic structure of marijuana strains and their reported sativa and indica

APASawler, J., Stout, J. M., Gardner, K. M., Hudson, D., Vidmar, J., Butler, L., Page, J. E., … Myles, S. (2015). The Genetic Structure of Marijuana and Hemp. *PloS one*, *10*(8), e0133292. doi:10.1371/journal.pone.0133292

STRAINS

*"…. strain names often **do not** reflect a meaningful genetic identity."*

APASawler, J., Stout, J. M., Gardner, K. M., Hudson, D., Vidmar, J., Butler, L., Page, J. E., … Myles, S. (2015). The Genetic Structure of Marijuana and Hemp. *PloS one*, *10*(8), e0133292. doi:10.1371/journal.pone.0133292

COMPOUNDS

- Phytocannabinoids – cannabinoids that are found in leaves, flowers, stems, and seeds collected from the Cannabis sativa plant.

- Endogenous – cannabinoids that are made by the body: examples include N-arachidonoylethanolamine or anandamide (AE) or 2-arachidonoylglycerol (2-AG).

COMPOUNDS

- Purified – compounds isolated from plant sources: examples include cannabidiol (CBD) and delta-9-tetrahydrocannabinol (THC).

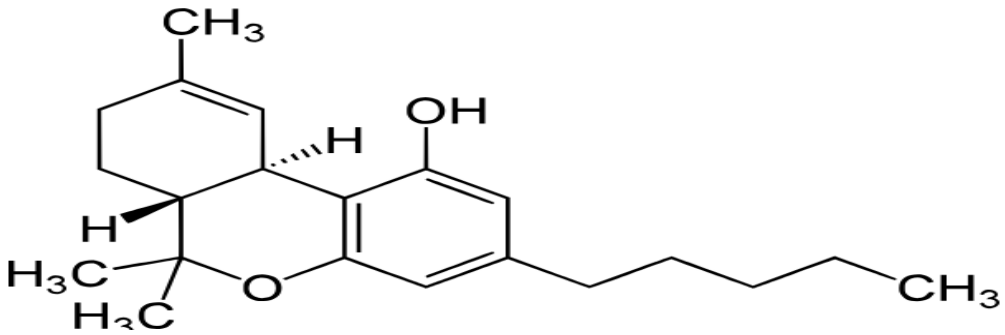
- Synthetic – cannabinoids synthesized in a laboratory: examples include CB1 agonists (CPP-55, ACPA), CB2 agonists (JWH-133, NMP7, AM1241), CB1/CB2 nonselective agonist (CP55940), ajulemic acid (AJA), nabilone, and dronabinol

Source NIH Research on Marijuana and Cannabinoids

COMPONENTS

Marijuana vs. hemp

- THC content
- Delta-9-tetrahydrocannabinol



Source: https://commons.wikimedia.org/wiki/File:Tetrahydrocannabinol.svg

CANNABINOIDS

- 113 cannabinoids identified in cannabis
- THC
  - Isolated in 1964
  - Only psychoactive cannabinoid
- CBD
  - Isolated in 1940
  - Non-psychoactive
  - Currently “legal”
- CB1 and CB2 receptors

CANNABINOIDS

- Cannabis as a plant is a scheduled 1 drug by Federal Government
  - High addiction potential
  - No medical use
- Dronabinol (Marinol) is a synthetic form of delta-9-tetrahydrocannabinol
  - Approved May 31, 1985
  - Schedule III drug

CANNABINOIDS

Position Statement: Medical Use of Cocaine

Position Statement, Quality and Safety, Reimbursement, AAO-HNS/F Policy, Ethics

The American Academy of Otolaryngology-Head and Neck Surgery considers cocaine to be a valuable anesthetic and vasoconstricting agent when used as part of the treatment of a patient by a physician. No other single drug combines the anesthetic and vasoconstricting properties of cocaine.

Adopted 12/4/1988
Submitted for Review 4/13/1995
Submitted for Review 3/1/1998
Reaffirmed 3/1/1998
Revised 5/6/2013

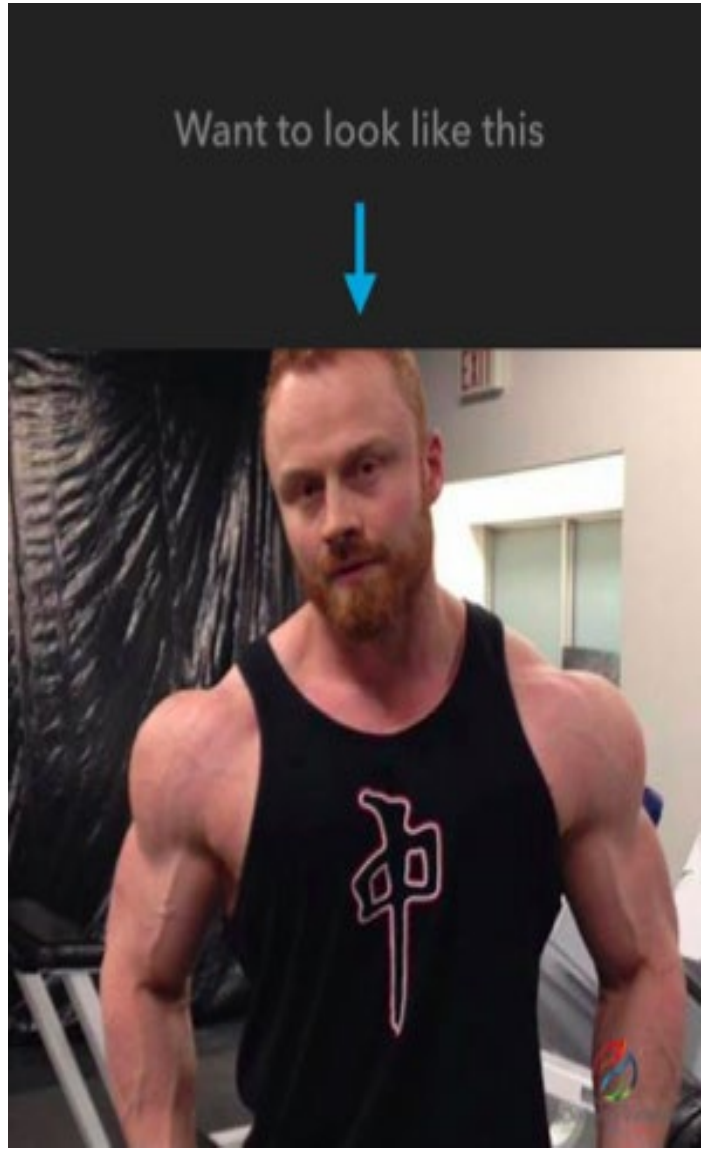
More Resources About:

General Otolaryngology

Head and Neck Surgery

Source: https://www.entnet.org/content/medical-use-cocaine

REVERSE GAINZZZZ



Credit: Jeff Snow

DELIVERY METHODS

1870 - The Boston Medical and Surgical Journal. Grimault's Indian Cigarettes

Source: https://www.leafly.com/news/cannabis-101/cannabis-history-journey-joint

DELIVERY METHODS

- Inhale / Smoke

  Vaporize

  - Oil vs. flower

  Old school

  - 1870 first modern reference

- Eat (edibles)

  Liver→ 11-hydroxy-THC

- Other

  Transdermal, etc

DECARBOXYLATION

*"The two main catalysts for decarboxylation to occur are **heat and time**. Drying and curing cannabis over time will cause a partial decarboxylation to occur. … Smoking and vaporizing will instantaneously decarboxylate cannabinoids due to the extremely high temperatures present, making them instantly available for absorption through inhalation." – Patrick Bennet*

Patrick Bennet, CANNABIS 101: What Is Decarboxylation, and Why Does Your Cannabis Need It? Leafly, April 30, 2016, accessed Oct 2017, URL https://www.leafly.com/news/cannabis-101/what-is-decarboxylation

EXERCISE PERFORMANCE

- 1975 Study
- 20 healthy subjects
- 1.4 g cannabis in a glass pipe
- Slight increase in heart rate, blood pressure
- Decreased work capacity
- No change in FVC or grip strength

Steadward RD, Singh M. The effects of smoking marihuana on physical Performance. Med Sci Sport. 1975;7:309-311..

EXERCISE PERFORMANCE

- 12 young healthy volunteers
- Single cigarette of smoked cannabis
- 1.7% THC
- No placebo condition

"..Cannabis use reduced max work capacity raised heart rate, and increased metabolic rate."

Renaud AM, Cormier Y. Acute effects of marihuana smoking on maximal exercise performance. Med Sci Sports Exerc. 1986;18:685 –689..

EXERCISE PERFORMANCE

"…there is no direct evidence of performance-enhancing effects in athletes.

The potential beneficial effects of cannabis as part of a pain management protocol, including reducing concussion-related symptoms, deserve further attention."

Ware, M. A., Jensen, D., Barrette, A., Vernec, A., & Derman, W. **(2018)**. Cannabis and the Health and Performance of the Elite Athlete. Clinical journal of sport medicine : official journal of the Canadian Academy of Sport Medicine, 28(5), 480-484.

Title: Cannabis: exercise performance and sport. A systematic review

Author: Michael C Kennedy

Institutions & affiliations: Dept Clinical Pharmacology & Toxicology, St Vincent's Hospital, Darlinghurst, NSW. Conjoint Associate Professor Dept Medicine UNSW.

Corresponding author: Michael C Kennedy, drmkenn@ozemail.com.au

Word count: 3576

No funding was provided for this study.

There are no commercial interests involved and the author does not have any conflict of interest.

Abstract

Objectives: To review the evidence relating to the effect of cannabis on exercise performance.

Design: A systematic review of published literature

Method: Tetrahydrocannabinol (THC) is the principal psychoactive component of cannabis.

A search was conducted using PUB med, Medline and Embase searching for cannabis, marihuana,

EXERCISE PERFORMANCE

- 15 published studies
- Effects of THC in association with exercise
- None showed any improvement in aerobic performance.
- Exercise induced asthma was shown to be inhibited.

Some subjects could not complete an exercise protocol because adverse reactions caused by cannabis.

EXERCISE PERFORMANCE

"…much more scientific information is needed, based on current animal and human studies as well as on interviews with athletes and information from the field, cannabis can be performance enhancing for some athletes and sports disciplines.."

Huestis, M. A., Mazzoni, I., & Rabin, O. (2011). Cannabis in sport: anti-doping perspective. *Sports medicine (Auckland, N.Z.)*, *41*(11), 949-66.

EXERCISE PERFORMANCE

".. THC has a direct dose-dependent toxic effect on brain mitochondria and to demonstrate for the first time that THC mainly inhibits complexes I, II, and III of the mitochondrial respiratory chain and decreases mitochondrial coupling."

APAWolff, V., Schlagowski, A. I., Rouyer, O., Charles, A. L., Singh, F., Auger, C., Schini-Kerth, V., Marescaux, C., Raul, J. S., Zoll, J., … Geny, B. (2015). Tetrahydrocannabinol induces brain mitochondrial respiratory chain dysfunction and increases oxidative stress: a potential mechanism involved in cannabis-related stroke. *BioMed research international*, *2015*, 323706.

EXERCISE PERFORMANCE

"....THC increases ROS production by the brain, which likely participates in its toxicity"

Research Article

Tetrahydrocannabinol Induces Brain Mitochondrial Respiratory Chain Dysfunction and Increases Oxidative Stress: A Potential Mechanism Involved in Cannabis-Related Stroke

Valérie Wolff,[1,2,3] Anna-Isabel Schlagowski,[1,4] Olivier Rouyer,[1,4] Anne-Laure Charles,[1] François Singh,[1,4] Cyril Auger,[5] Valérie Schini-Kerth,[5] Christian Marescaux,[2] Jean-Sébastien Raul,[6] Joffrey Zoll,[1,4] and Bernard Geny[1,4]

APAWolff, V., Schlagowski, A. I., Rouyer, O., Charles, A. L., Singh, F., Auger, C., Schini-Kerth, V., Marescaux, C., Raul, J. S., Zoll, J., … Geny, B. (2015). Tetrahydrocannabinol induces brain mitochondrial respiratory chain dysfunction and increases oxidative stress: a potential mechanism involved in cannabis-related stroke. *BioMed research international*, *2015*, 323706.

CANNABINOIDS SAFE?

Generally, yes

- Ahmed AI, van den Elsen GA, Colbers A, van der Marck MA, Burger DM, Feuth TB, et al. Safety and pharmacokinetics of oral delta-9-tetrahydrocannabinol in healthy older subjects: a randomized controlled trial. Eur Neuropsychopharmacol. 2014;24(9):1475-82.
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CONVERSION

Decarboxylation (decarb)

- Convert CBDA and THCA-A to actives

Function of

- Time
- Temperature
- Atmosphere (pressure)

Pacifici R, Marchei E, Salvatore F, Guandalini L, Busardo FP, Pichini S. Evaluation of cannabinoids concentration and stability in standardized preparations of cannabis tea and cannabis oil by ultra-high performance liquid chromatography tandem mass spectrometry. Clinical chemistry and laboratory medicine. 2017;55(10):1555-63.

CANNABINOIDS

Vary depending on temperature

Compound	Boiling point
THC	157 C
CBD	160 -180 C
CBN	185 C
B-CARYOPHYLLENE	130 C

Cannabis and Cannabis Extracts: Greater Than the Sum of Their Parts?

McPartland & Russo, 2001 Haworth Press

RECOVERY: CBD / THC

Bioorganic & Medicinal Chemistry

journal homepage: www.elsevier.com/locate/bmc

Review

Cannabidiol (CBD) and its analogs: a review of their effects on inflammation

Sumner Burstein *

Department of Biochemistry & Molecular Pharmacology, University of Massachusetts Medical School, 364 Plantation St., Worcester, MA 01605, United States

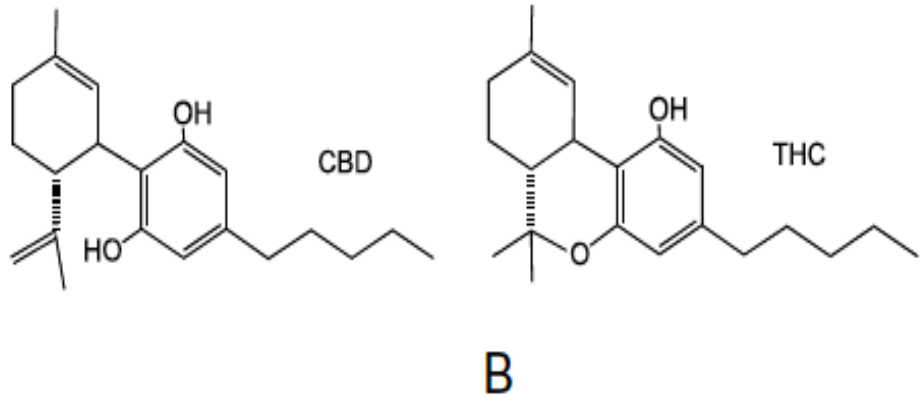


Figure 1. The minimal energy conformations of CBD and Δ^9-tetrahydrocannabinol (THC) are shown in 1A. THC has a fairly planar conformation whereas CBD has a bent conformation. This difference results in different pharmacological profiles even though there is considerable structural overlap of both when viewed in a two-dimensional as shown in 1B. CBD refers to (–)-CBD here and throughout this paper.

CBD: NON-PSYCHOACTIVE

- Dr. Peter Rouse
- Patent 6,630,507, titled “Cannabinoids as antioxidants and neuroprotectants,”
- issued on Oct. 7, 2003
- Expires 2019
- Hemp and Farm Bill
  - “More legal” to produced CBD
  - Not all products are equal

CBD: NON-PSYCHOACTIVE

- Epidiolex, GW Pharmaceuticals

"…proprietary oral solution of pure plant-derived cannabidiol, or CBD. …concentrating on severe, orphan, early-onset, treatment-resistant epilepsy syndromes including Dravet syndrome, Lennox-Gastaut syndrome (LGS), Tuberous Sclerosis Complex (TSC) and Infantile Spasms (IS)."

Source: https://www.wikileaf.com/thestash/epidiolex-nearing-approval/

PAIN

TABLE 1. Effects of Cannabinoids on Quantitative Sensory Testing From Clinical Trials in Humans

Population	Drug	Sensory Test	Result	Reference
Unilateral neuropathic pain with allodynia	Oral cannabis extract (tea)	Punctate pain threshold	Increased threshold correlated with reduced pain only in last 2 weeks of study	Keizer et al (2007)[40]
Neuropathic pain with allodynia	Nabiximols	Dynamic and punctate mechanical allodynia; punctate pain threshold	Reduced dynamic mechanical allodynia	Nurmikko et al (2007)[41]
Fibromyalgia	Nabilone	Pressure pain threshold	No change	Skrabek et al (2007)[42]
MS-associated neuropathy	Dronabinol	Cold and warm detection threshold, cold and heat pain threshold, cold and heat sensibility index, tactile detection and pain threshold, pressure pain threshold, vibration threshold, temporal summation, and mechanical and cold allodynia	Pressure pain threshold higher after dronabinol	Svendsen et al (2004)[43]
HIV-associated SN	Smoked cannabis	Heat-/capsaicin-induced hyperalgesia	Reduced area of tactile and dynamic allodynia	Abrams et al (2007)[44]
Peripheral neuropathy (various)	Smoked cannabis	Tactile allodynia, heat pain threshold	No change	Wilsey et al (2008)[45]

MS, multiple sclerosis; SN, sensory neuropathy.
From Ware MA. Cannabinoids. In: Toth C and Moulin D, eds. Neuropathic pain: causes, management, and understanding. Cambridge University Press; 2013.

Ware, M. A., Jensen, D., Barrette, A., Vernec, A., & Derman, W. (2018). Cannabis and the Health and Performance of the Elite Athlete. Clinical journal of sport medicine : official journal of the Canadian Academy of Sport Medicine, 28(5), 480-484.

PAIN / INFLAMMATION

European Neuropsychopharmacology (2014) 24, 608-620

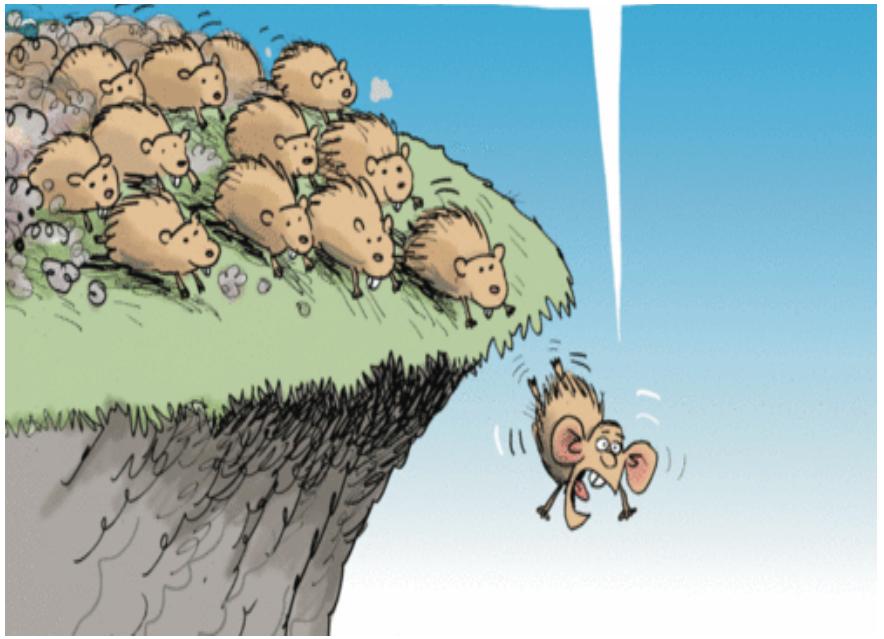
ELSEVIER

www.elsevier.com/locate/euroneuro

The cannabinoid CB_2 receptor-selective phytocannabinoid beta-caryophyllene exerts analgesic effects in mouse models of inflammatory and neuropathic pain

A.-L. Klauke[a,1], I. Racz[a,*,1], B. Pradier[a], A. Markert[a], A.M. Zimmer[a], J. Gertsch[b], A. Zimmer[a]

RESEARCH VS PEOPLE



Source
https://www.pinterest.com/pin/512636370065878182/

CBD

Contents lists available at ScienceDirect

Bioorganic & Medicinal Chemistry

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Review

Cannabidiol (CBD) and its analogs: a review of their effects on inflammation

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Cannabidiol
Δ^9-Tetrahydrocannabinol
Anti-inflammatory
CBD receptor binding
Signaling events
Downstream events
Functional effects

ABSTRACT

First isolated from *Cannabis* in 1940 by Roger Adams, the structure of CBD was not completely elucidated until 1963. Subsequent studies resulted in the pronouncement that THC was the 'active' principle of *Cannabis* and research then focused primarily on it to the virtual exclusion of CBD. This was no doubt due to the belief that activity meant psychoactivity that was shown by THC and not by CBD. In retrospect this must be seen as unfortunate since a number of actions of CBD with potential therapeutic benefit were downplayed for many years. In this review, attention will be focused on the effects of CBD in the broad area of inflammation where such benefits seem likely to be developed. Topics covered in this review are; the medicinal chemistry of CBD, CBD receptor binding involved in controlling Inflammation, signaling events generated by CBD, downstream events affected by CBD (gene expression and transcription), functional effects reported for CBD and combined THC plus CBD treatment.

RECOVERY: SLEEP

PLOS ONE

RESEARCH ARTICLE

Endocannabinoid Signaling Regulates Sleep Stability

Matthew J. Pava[1], Alexandros Makriyannis[2], David M. Lovinger[1]*

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RECOVERY: SLEEP

Central Nervous System Agents in Medicinal Chemistry, 2011, *11*, 189-196

The Emerging Role of the Endocannabinoid System in the Sleep-Wake Cycle Modulation

Eric Murillo-Rodríguez[1,*], Alwin Poot-Ake[1], Oscar Arias-Carrión[2], Elda Pacheco-Pantoja[1], Alfredo de la Fuente-Ortegón[1] and Gloria Arankowsky-Sandoval[3]

[1]*Laboratorio de Neurociencias Moleculares e Integrativas, Escuela de Medicina, División Ciencias de la Salud, Universidad Anáhuac Mayab. Mérida, Yucatán. México;* [2]*Department of Neurology, Philipps University. Marburg, Germany;* [3]*Laboratorio de Neurobiología. Departamento de Neurociencias, Centro de Investigaciones Regionales "Dr. Hideyo Noguchi" Universidad Autónoma de Yucatán, Mérida, Yucatán. México*

Abstract: The endocannabinoid system comprises amides, esters and ethers of long chain polyunsaturated fatty acids. *N*-arachidonoylethanolamide (anandamide; ANA) and 2-arachidonoylglycerol (2-AG) are endogenous cannabinoids (endocannabinoids) ligands for the cannabinoid family of G-protein-coupled receptors named CB_1 and CB_2. Endocannabinoids are released upon demand from lipid precursors in a receptor-dependent manner and behave as retrograde signaling messengers, as well as modulators of postsynaptic transmission, interacting with other neurotransmitters systems. The two principal enzymes that are responsible for the metabolism of ANA and 2-AG are fatty acid amide hydrolase and monoacylglycerol lipase, respectively. Pharmacological experiments have shown that the administration of endocannabinoids induce cannabimimetic effects, including sleep promotion. This review will focus on some of the current evidence of the pharmacological potential of the endocannabinoid system on sleep modulation.

Keywords: Anandamide, cannabinoids, cannabidiol, rapid eye movement sleep, cannabinoid receptors, VDM-11.

INTRODUCTION

Exogenous Cannabinoids

During centuries, *Cannabis sativa* has been used in diverse cultures for mystical ceremonies, social interaction as well as for treatment of diseases [1-6]. The principal active compound of this plant, delta-9-tetrahydrocannabinol (Δ^9-

CANNABINOID RECEPTORS

The cannabinoid receptors are G-protein coupled proteins composed of seven transmembrane spanning helices interconnected by three intracellular loops and three extracellular loops. The family of the cannabinoid receptors includes the CB_1 and CB_2 subtypes [19].

RECOVERY: SLEEP

Curr Psychiatry Rep (2017) 19: 23
DOI 10.1007/s11920-017-0775-9

SLEEP DISORDERS (P GEHRMAN, SECTION EDITOR)

Cannabis, Cannabinoids, and Sleep: a Review of the Literature

Kimberly A. Babson[1] · James Sottile[2] · Danielle Morabito[1]

".. CBD may hold promise for REM sleep behavior disorder and excessive daytime sleepiness"

- Maybe?
- Anxiety driven sleep loss

HEAD TRAUMA

- 3 retrospective reviews of data
- 446 patients sustaining a TBI
- Toxicology screen for THC
- THC illegal, only retroprospective

"…positive-THC screen was associated with a decreased mortality in adult patients sustaining TBI."

Nguyen BM, Kim D, Bricker S, Bongard F, Neville A, Putnam B, et al. Effect of marijuana use on outcomes in traumatic brain injury. The American surgeon. 2014;80(10):979-83.

PRACTICAL POINTS

- Risk / reward
- Standard warning about legality
- THC vs. CBD
- Methods of consumption
- Sport dynamics
- Test your outcomes
- Data is currently lacking

PRACTICAL POINTS: CBD

- Pros
  - May help inflammation and pain
  - Currently legal
  - TBI / Head trauma risk?
- Cons
  - Expensive (pro?)
  - Not much long term data
- Starting point
  - Mixed cannabinoids standardized to 18 mg CBD → *highly theoretical*

SLIDES & EXTRAS

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Thank You!