Cannabinoids (CBD) and the Effects on Osteoporosis

A new approach to a coming major public health crisis

By

Eric I. Mitchell MD MA FACPE CPE

Medical Director for AGRiMED Industries LLC

NO BONES ABOUT IT!

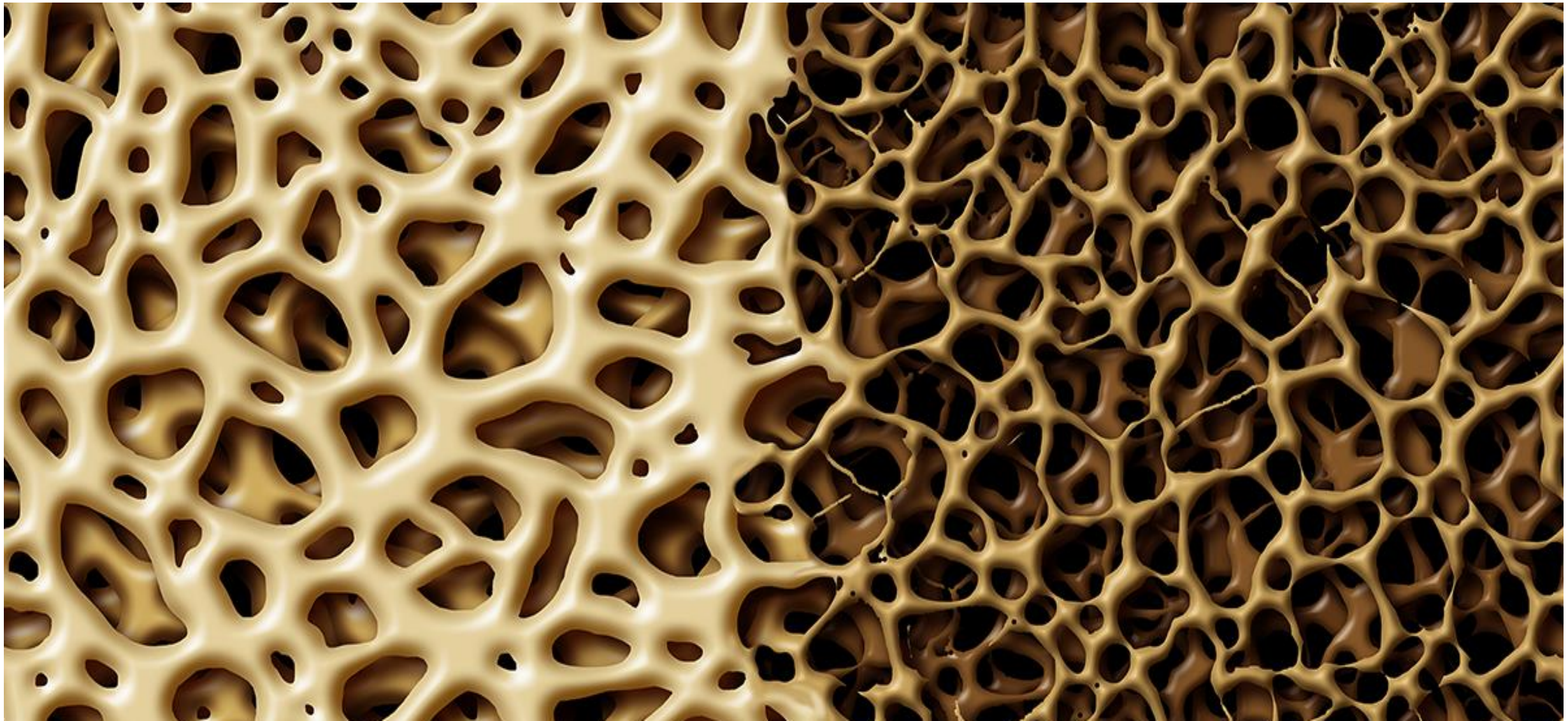


Osteoporosis, as the World Turns

- USA: Osteoporosis and low bone mass are currently estimated to be a major public health threat for almost 44 million U.S. women and men aged 50 and older
- USA: The 44 million people with either osteoporosis or low bone mass represent 55 percent of the people aged 50 and older in the United States
- USA: By the year 2010, it is estimated that more than 52 million women and men in this same age category will be affected and, if current trends continue, the figure will climb to more than 61 million by 2020 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4757905/

Normal Bone

Osteoporotic Bone



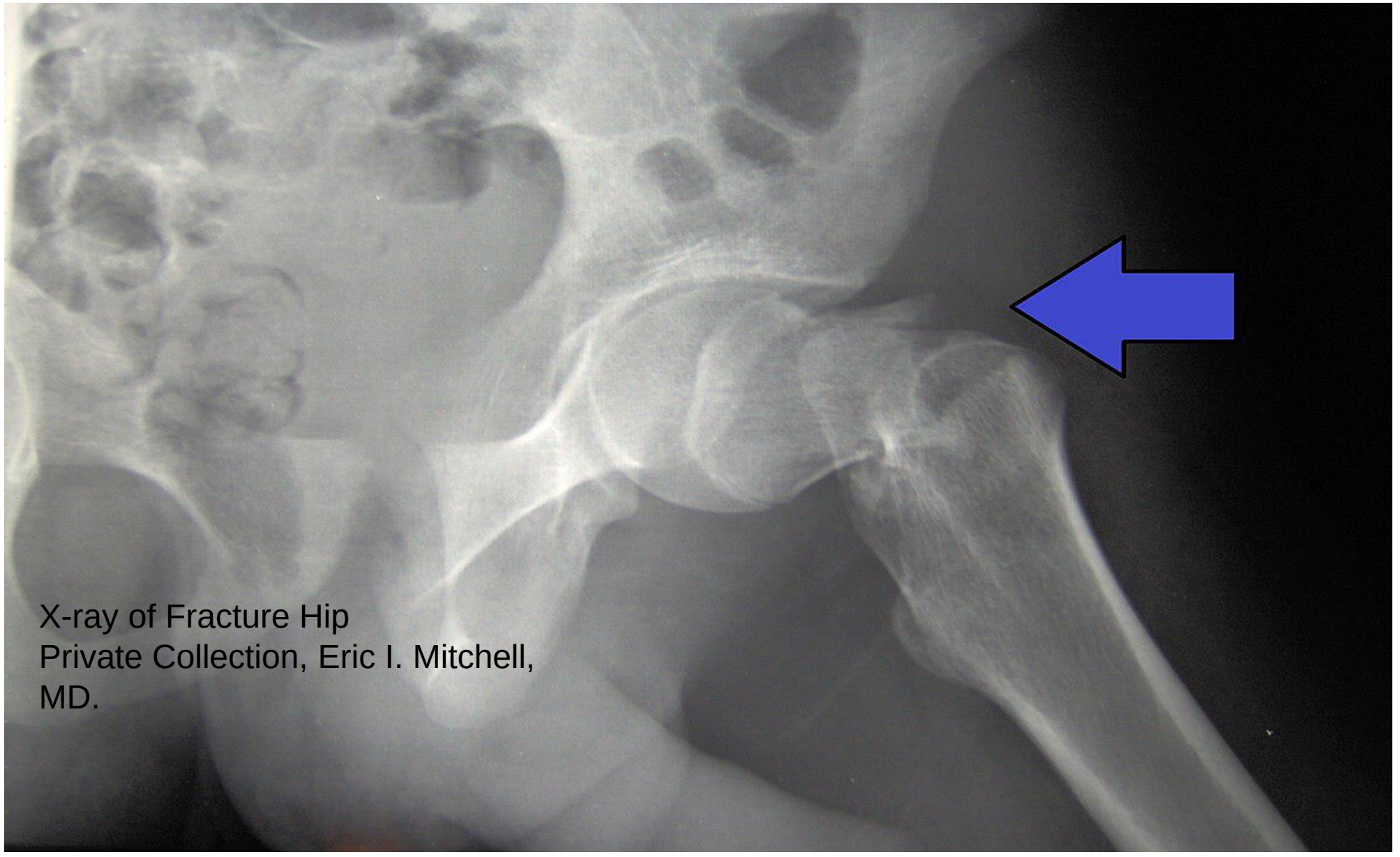
European Union as the World Turns

- Based on WHO diagnostic criteria (T-score less than or equal to -2.5 SD), approximately 22 million women and 5.5 million men aged between 50-84 years of age are estimated to have osteoporosis in the EU
- Due to changes in population demography the number of men and women with osteoporosis in the EU will rise from 27.5 million in 2010 to 33.9 million in 2025, corresponding to an increase of 23%. The number of new fractures in 2010 in the EU was estimated at 3.5 million, comprising approximately 620,000 hip fractures, 520,000 vertebral fractures, 560,000 forearm fractures and 1,800,000 other fractures
- The annual number of fractures in the EU will rise from 3.5 million in 2010 to 4.5 million in 2025, corresponding to an increase of 28%. https://www.statista.com/statistics/274514/life-expectancy-in-europe/

A Coming Public Health Crisis in the World

- American population of people 65 years of age 2018 = 46 million
- Over the age of 65 years old by 2060 = 96 million
- China's over the age of 65 in 2018 = 120 million
- World population of people over 65 in 2050 = 330 million
- Age management of bone health will be a major health issue http://www.advancedholistichealth.org/history.html

Fracture of Hip



X-ray of Fracture Hip
Private Collection, Eric I. Mitchell, MD.

Past, Present, and Future in Age Management

- Social Security Act of 1935 – the trigger
- Life expectancy 1935 – 62 years
- Life expectancy 2018 – 78.8 years
- Life expectancy 2030 – 90.3 (South Korea)
- Age management for an aging population???
- https://www.economist.com/news/united-states/21733980-thats-not-really-meant-

Total Hip Arthroplasty



X-ray of Total Hip Arthroplasty. Private Collection, Eric I. Mitchell, MD.

Policy History on Cannabis Sativa L from 1937

- Reefer Madness HOLLYWOOD 1937 – purpose control public opinion
- The Marihuana Tax Act of 1937 – directed at Hemp Production, not Medical Cannabis
- 1970 Control Substance Act – Nixon's War on Drugs
- The Farm Act of 2014 – Hemp unchained
- The Farm Act of 2018 – Who knows with current AG? Who is the AG? https://www.medicaljane.com/category/cannabis-classroom/

WHAT ARE THE BENEFITS OF USING CANNABIS AS MEDICINE?

- Slow the progression of Alzheimer's and Parkinson's diseases
- Reduce the number and severity of debilitating epileptic seizures
- Reduce muscle spasms experienced by those with multiple sclerosis
- Kill or limit the growth of cancer cells
- Bone homeostasis and Rx for Osteoporosis
  https://www.ncbi.nlm.nih.gov/pubmed/29558287#
  https://www.ncbi.nlm.nih.gov/pubmed/19634029#

Cannabis History of Discovery

- 7-10 thousand year history
- Used as a major medicine in the world
- Used as a major medicine around the world
- 98 years in America's Pharmacopeia
- Anti-Immigration tool of the 30s and 40s
- 1970 added to the Control Substance Act – now a Federal Crime
  http://www.advancedholistichealth.org/history.html

Cannabis without THC

CBD is cannabis that won’t get you high. So why are so many people using it?



https://www.washingtonpost.com/lifestyle/style/cbd-is-cannabis-that-wont-get-you-high-so-why-are-so-many-people-using-it/2018/03/29/3836922a-2d2c-11e8-8ad6-fbc50284fce8_story.html?utm_term=.ed618c7eb7cf

Guilty in Name Only

- Cannabis sativa L genotype, phenotype
- Medical Cannabis with THC
- Hemp with little or no THC
  http://www.advancedholistichealth.org/history.html

Policy History on Medical Effects of Cannabis

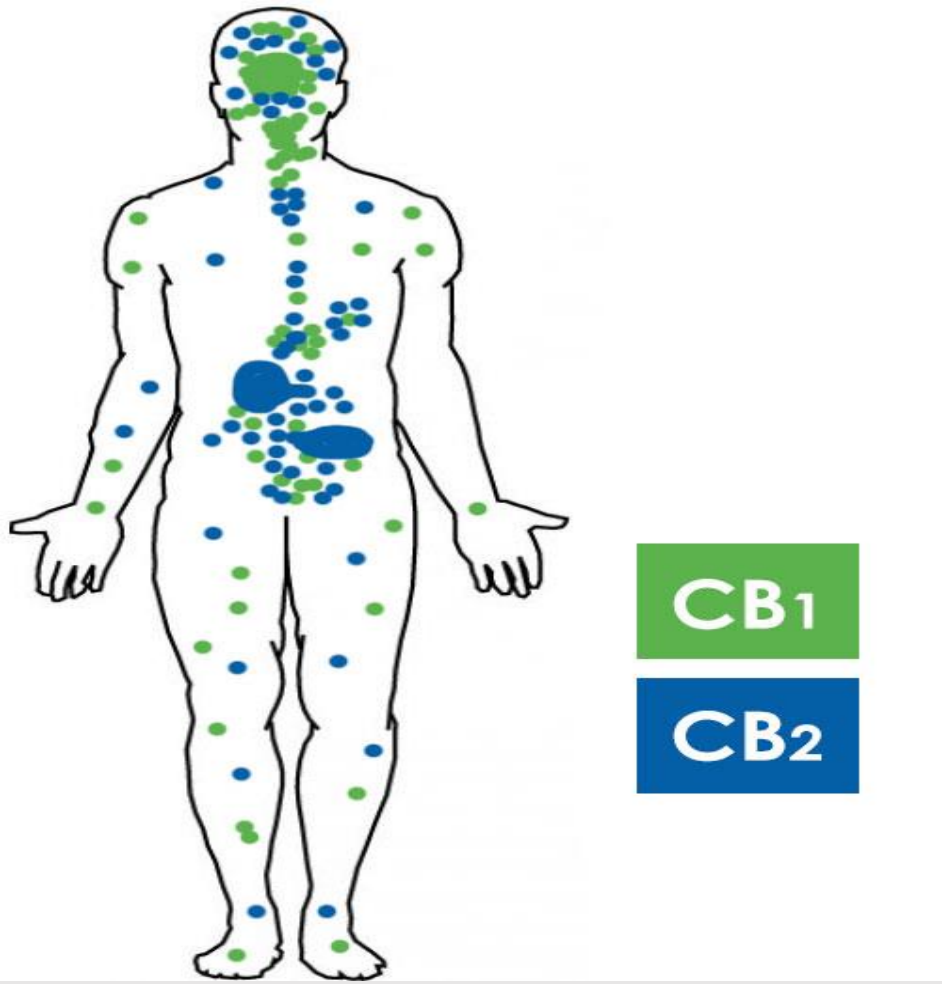
- By the early 1990s, there was new evidence that cannabis may have medical applications, 1964 and the discovery of Anandamide was the first step in formation of the Endocannabinoid system by Dr. Raphael Mashayla
- Cannabis sativa in America became a Schedule 1 drug according to the DEA 1970
- According to the DEA, Schedule 1 drugs have no accepted medical use and a high potential for abuse
- 1970s 50 million dollars would be spent in ads to reinforce the negative – egg on griddle! http://www.advancedholistichealth.org/history.html

Endocannabinoid Signaling System

- two G-protein-coupled receptors, known as the cannabinoid
- CB_1 and CB_2 receptors were discovered following studies on the mechanism of action of Δ^9-tetrahydrocannabinol known as THC
- the endogenous agonists at these receptors, known as endocannabinoids, of which anandamide (AG) and 2-arachidonoylglycerol (2-AG) are the 2 best known cannabinoids
- proteins and enzymes for the regulation of endocannabinoid levels and action operate as the two receptor sites CB_1 and CB_2

Endocannabinoid Research Group, Istituto di Chimica Biomolecolare, Consiglio Nazionale delle Ricerche, Via Campi Flegrei 34, Comprensorio Olivetti, Fabbricato 70, 80078 Pozzuoli (Napoli), Italy

Receptor Sites in the Human Body

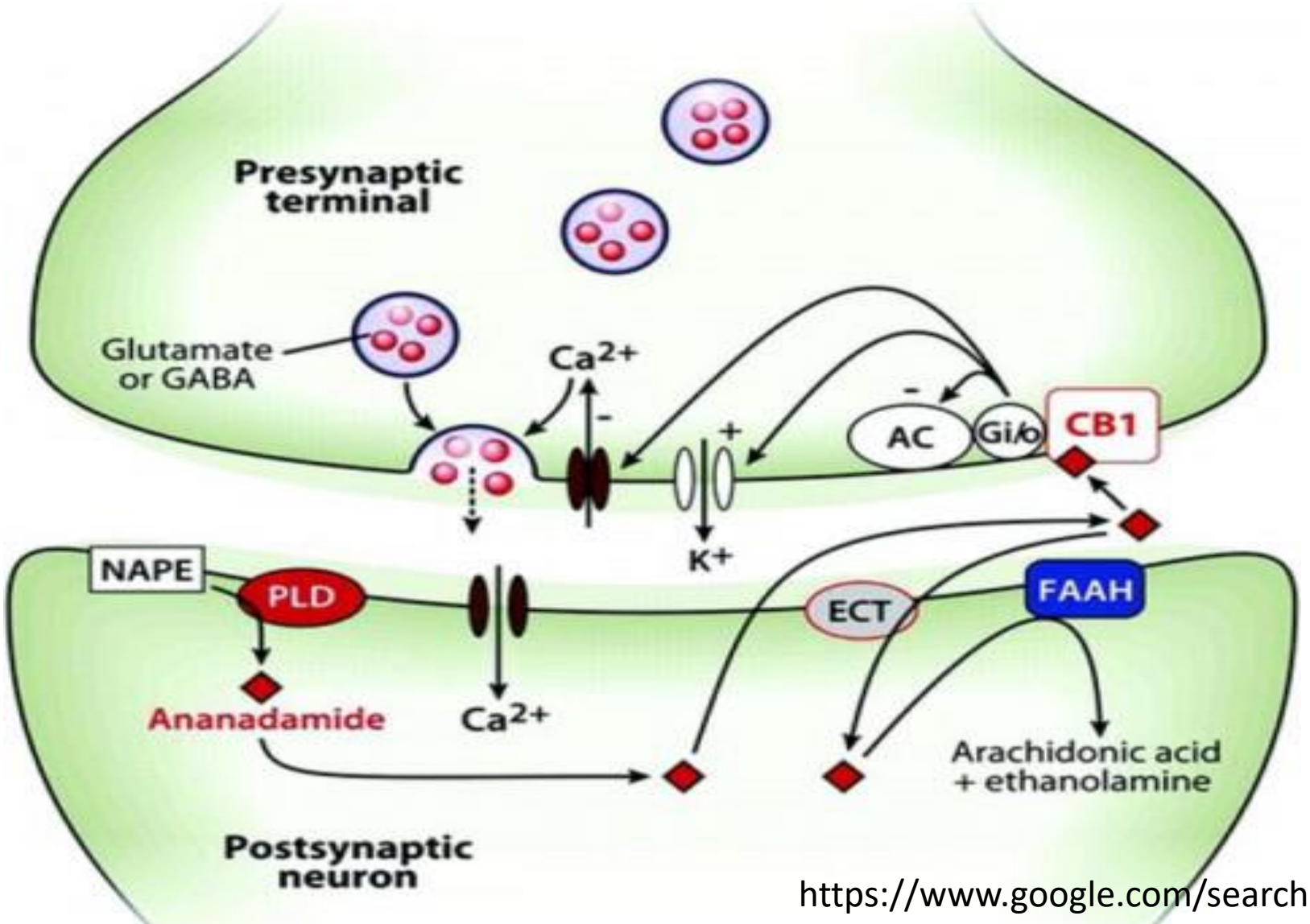


https://www.ncbi.nlm.nih.gov/pubmed/18426493#

Non-Psychoactive CBD

- Entry of non-psychoactive CBD. While THC binds with cannabinoid receptors directly, CBD does not. Instead, it works its magic on an enzyme. The enzyme in question is called FAAH, and it is responsible for pulling excess anandamide (AG) out of circulation.
- CBD puts a stop to this. Psychoactive THC works by mimicking the body's own endocannabinoids. But, CBD increases the amount of endocannabinoids in your system.
- CBD stops enzyme FAAH from breaking down all of the anandamide, and therefore makes more of it available for use by your cells. This is why CBD is a natural mood-lifter without psychoactive effects. https://link.springer.com/article/10.1007%2Fs11064-005-6978-1
- Laprairie RB, et al. "Cannabidiol is a negative allosteric modulator of the type 1 cannabinoid receptor." Br J Pharmacol. 2015 Jul 27.

Pre and Post Synaptic Neuron on Receptors



https://www.google.com/search?q=presynaptic+and+post

Seniors and Aging

- By 2050, the number of Americans over the age of 65 will nearly double, and seniors will comprise 24% of the total population
- Seniors are the fastest growing demographic of cannabis users
- In the U.S., chronic illnesses account for two-thirds of all healthcare costs
- and 95% of those costs is spent on chronic diseases in older adults.
- Moreover, healthcare provided to adults over the age of 65 can range from 3-5 times higher than the costs associated with younger patients http://www.pewresearch.org/fact-tank/2014/12/03/health-affairs-among-11-nations-american-seniors-struggle-more-with-health-costs/

Proof – is in the Pudding – Rx or Dx

- Fractures
- Osteopenia
- Osteoporosis
- Osteoarthritis
- Bone Pain, i.e. Sickle Cell Disease
- Inflammation
- Chronic post injury pain Current Treatment Options in Neurology 2015 17:39 DOI: 10.1007/s11940-015-0370-5 https://www.ncbi.nlm.nih.gov/pubmed/24494687

CBD and Bone Growth

- Research shows that cannabinoids, including CBD, increase the bone growth but also bone density
- Cannabinoids work on receptors in the endocannabinoid system to produce bone formations
- Bone fractures are one of the leading injuries today
- Cannabinoid Receptor Type 1 Protects against Age-Related Osteoporosis by Regulating Osteoblast and Adipocyte Differentiation in Marrow Stromal Cells https://www.ncbi.nlm.nih.gov/pubmed/18426503#

The Future for Bone Health and Cannabis

- A ‘fracture tsunami’ is approaching, and the resulting human and socioeconomic burden will have an enormous impact on all countries with ageing populations. The result of fragility fractures can be profoundly debilitating, with chronic pain and disability leading to reduced mobility and quality of life. Fewer than half of seniors who survive a hip fracture will walk unaided again, and up to 20% will become residents of care homes in the year following the fracture.” www.iofbonehealth.org/news/report-reveals-why-millions-people-osteoporosis-remain-undiagnosed-and-untreated

Please and Thank you

- Questions:

