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## Cannabis as Medicine: Pros and Cons

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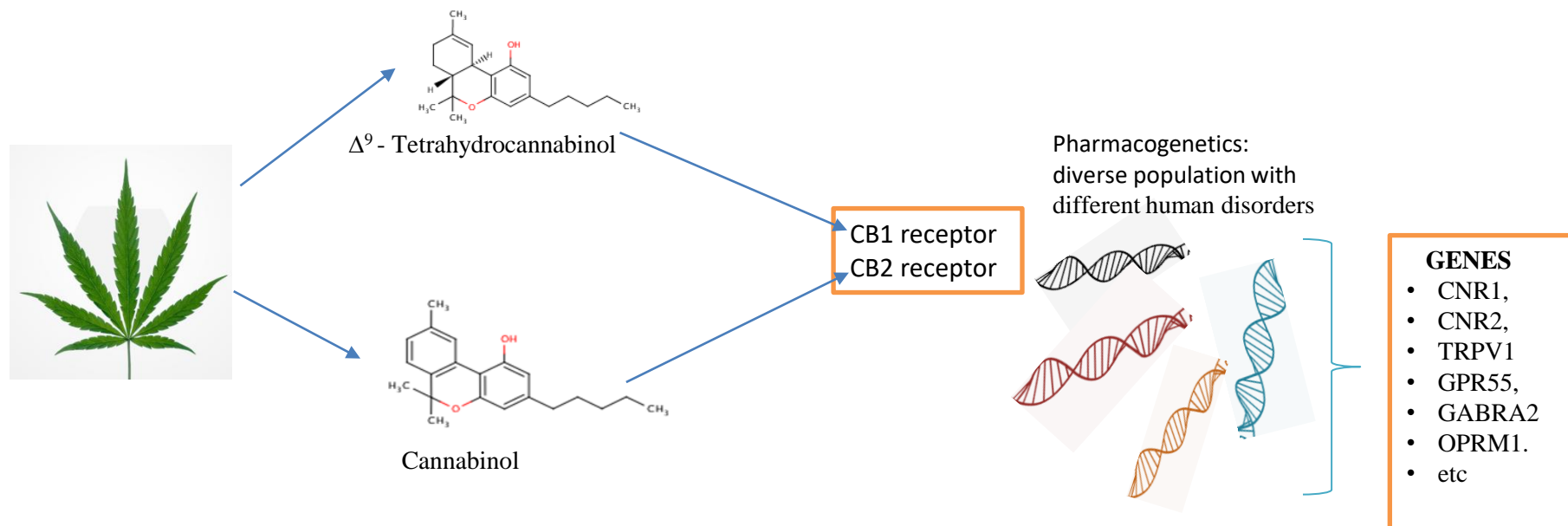
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# Cannabis as Medicine: Pros and Cons



**Abstract:** The use of cannabis for medical reasons is surrounded by numerous pharmacological dilemmas. However, its use in modern day medicine is here to stay. Complexity of the cannabinoid pathway as well as individual genetic predisposition is responsible for different body responses on cannabinoid treatment. Knowledge of cannabinoid receptors and their polymorphisms should enable prediction of patients with gene variations coding these receptors via gene expression studies. Pros of its use as medicine is also undermined by cons. This is further compounded by paucity of literature which highlight the association of genetics with side effects of cannabis use.

**Aim:** To discuss the pharmacogenetics of cannabis on cannabinoid receptors to highlight receptors that can be screened via gene expression studies in order to better profile patients for medical marijuana.

**Methods:** Online searches on the following database; Google Scholar, PubMed, Biomed Central and SciELL was done. Attempts were made to review articles with keywords; cannabis, cannabinoid receptors, gene profiling and medical marijuana.

**Conclusion:** Medical profiling via cannabinoid gene expression studies of patients who are medical candidates of cannabis should prevent negative effects associated with its medical use.

**Keywords:** Cannabinoid receptors, gene expression



# Introduction

- Cannabis remains the most widely used drug globally, with an estimated 188 million people having used the drug. It was estimated that 5.5 per cent of the global population aged 15- 64 had used cannabis (UNODC, 2019 ).
- Cannabis plant is a plant used for its psychoactive or medicinal properties.
- Cannabis sativa is the source of a set of compounds known collectively as phytocannabinoids or plant cannabinoids.
- The cannabis plant contains about 540 chemical substances.
- The main cannabinoids are Tetrahydrocannabinol (THC) and Cannabinol (CBD)



- Medicinal cannabis is sometimes referred to as medicinal marijuana, but they are practically not the same because marijuana contains more of the psychoactive agent which is the Delta 9 tetrahydrocannabinoid -  $\Delta^9\text{THC}$  acts on cannabinoid1 (CB1) receptor (Bostwick et al., 2013).
- The second cannabidiol (CBD) acts on cannabinoid 2 (CB<sub>2</sub>) receptor and lacks psychoactivity but works in synergy with  $\Delta^9\text{-THC}$  to minimize “highs” maximize analgesic properties (Bostwick et al., 2013).
- Although Cannabis plant has not been approved for medical use. several drugs that contain individual cannabinoids have been approved by FDA

Table 1: Approved FDA Cannabis and Cannabis product

Cannabis Product	Active ingredient (and Pharmaceutical formulation)	Therapeutic Use
Epidiolex,	<ul style="list-style-type: none"> <li>• Purified CBD, (Oral)</li> </ul>	Severe forms of epilepsy <ul style="list-style-type: none"> <li>• Lennox-Gastaut syndrome</li> <li>• Dravet syndrome</li> </ul>
Marinol	<ul style="list-style-type: none"> <li>• Dronabinol (synthetic <math>\Delta^9\text{THC}</math>) (Oral gelatinous gel capsules formulated in sesame oil)</li> <li>(Oral solution)</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of appetite and Anorexia - weight loss in people with HIV/AIDS.</li> <li>• Nausea and vomiting induced chemotherapy</li> </ul>
Syndros Cesamet	<ul style="list-style-type: none"> <li>• Nabilone (synthetic <math>\Delta^9\text{THC}</math>) and dibenzopyrane derivative (Oral off-white polymorphic crystalline powder)</li> </ul>	<ul style="list-style-type: none"> <li>• treat nausea and vomiting caused by cancer chemotherapy</li> <li>• antiemetic and as adjunct analgesic for neuropathic pain,</li> <li>• chronic pain management</li> </ul>





# Results and discussion

The cannabinoid receptors on activation by the binding of specific ligands inhibit the adenylyl cyclase, protein phosphorylation and certain voltage dependent calcium channels (VDCC). This process is cAMP- dependent and leads to the activation of mitogen activating protein kinase (MAPK). MAPK modulates the G- protein coupled  $Ca^{2+}$  and  $K^{+}$  channels (causing inward arrangement of  $K^{+}$  channels). AEA, 2AG, N- Arachidonoyl – dopamine (NADA) act at vanilloid receptor (transient receptor potential vanilloid type 1, TRPV1, a ligand gated channel).

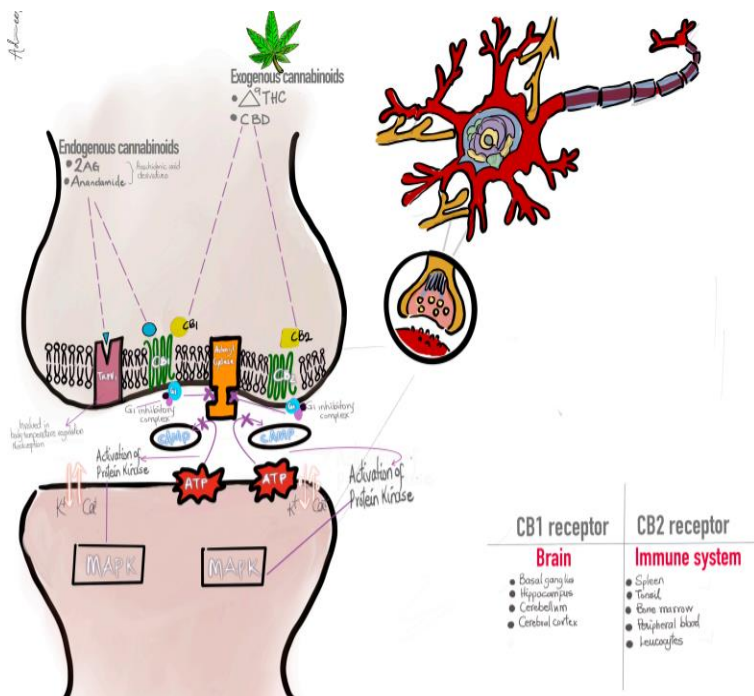


Figure1: Cannabinoids and endocannabinoid metabolism



## Highlights of Cannabinoids Pharmacogenetics

- The effect of medical cannabis can be elucidated by knowledge of its pharmacogenetics in individual human organism. Knowledge based on molecules and the proteins involved in the transport, mechanism of action, and metabolism of cannabinoids can lead to prediction of variations in human genes that are responsible for the therapeutic and adverse effects of medical cannabinoid-based drugs (Hryhorowicz et al., 2018; Onaivi, 2009)
- The group of genes involved are
  - CNR1, CNR2, TRPV1, encoding CB1, CB2 and TRPV receptors respectively. Other receptor genes include GPR55, GABRA2 and OPRM1.
  - The transporter genes and genes involved in metabolism of cannabinoids ABCB1, ABCG2, SLC6A4, and COMT;
  - enzymes involved in the metabolism of cannabinoids CYPs and UGTs;
  - biosynthesis of endocannabinoids FAAH, COX2, MAGL, ABHD6, and ABHD12; and cannabinoid-related cellular signalling processes: MAPK14. (Atakan, 2012; Hryhorowicz et al., 2018; Onaivi, 2009).



Short nucleotide polymorphism (SNP) variations in genes encoding the endocannabinoids, cannabinoids have been associated with different human disorders. Polymorphism of CNR1 and CNR2 genes have been associated with human disorders including, posttraumatic stress disorder (PTSD), drug dependency, osteoporosis, obesity, depression and ADHD (Onaivi, 2009)



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## Conclusion

In conclusion, in situations where conservative options with minimal success, patients may benefit from the potential relief that medical cannabis affords, Further well-powered studies are required to resolve the pressing dilemma.



# References

- Atakan, Z. (2012). Cannabis, a complex plant: Different compounds and different effects on individuals. In *Therapeutic Advances in Psychopharmacology* (Vol. 2, Issue 6, pp. 241–254). <https://doi.org/10.1177/2045125312457586>
- Bostwick, J. M., Reisfield, G. M., & DuPont, R. L. (2013). Medicinal use of marijuana. *New England Journal of Medicine*, 368(9), 866–868. <https://doi.org/10.1056/NEJMc1de1300970>
- Hryhorowicz, S., Walczak, M., Zakerska-Banaszak, O., Słomski, R., & Skrzypczak-Zielińska, M. (2018). Pharmacogenetics of Cannabinoids. In *European Journal of Drug Metabolism and Pharmacokinetics* (Vol. 43, Issue 1). Springer-Verlag France. <https://doi.org/10.1007/s13318-017-0416-z>
- Onaivi, E. S. (2009). Cannabinoid Receptors in Brain. Pharmacogenetics, Neuropharmacology, Neurotoxicology, and Potential Therapeutic Applications. In *International Review of Neurobiology* (Vol. 88, Issue C, pp. 335–369). [https://doi.org/10.1016/S0074-7742\(09\)88012-4](https://doi.org/10.1016/S0074-7742(09)88012-4)
- UNODC 2019. *World Drug Report 2019: 35 million people worldwide suffer from drug use disorders while only 1 in 7 people receive treatment*. Retrieved February 1, 2020, from [https://www.unodc.org/unodc/en/frontpage/2019/June/world-drug-report-2019\\_-35-million-people-worldwide-suffer-from-drug-use-disorders-while-only-1-in-7-people-receive-treatment.html](https://www.unodc.org/unodc/en/frontpage/2019/June/world-drug-report-2019_-35-million-people-worldwide-suffer-from-drug-use-disorders-while-only-1-in-7-people-receive-treatment.html)



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