Assignment

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**Explain how cannabis works in the body by including information regarding the endocannabinoid system (ECS) and endocannabinoid deficiency syndrome**

**Introduction**

Cannabis is a term that is used to denote the different psychoactive preparations of the Cannabis Sativa plant. The main psychoactive constituent in this is ∆-9 tetrahydrocannabinol (THC). The compounds that are structurally similar to THC are known as cannabinoids.

The endocannabinoid system is a lipid signaling system that is comprised of endogenous cannabis-like ligands (endocannabinoids), 2-arachidonoylglycerol (2-AG) and anandamide (AEA). These bind to G protein-coupled receptors that are known as CB1 and CB2. The CB1 receptors are present in brain areas that are associated with emotional responses, energy homeostasis, emotional senses, and motor control. The CB2 receptors are present in periphery and expressed in the pancreas liver, adipose tissue, GI tract, and reproduction system. Scientists have identified different active ingredients in marijuana and also discovered that how it works in a brain via a system known as endocannabinoid system. This is a complex cell signaling system that is identified in the early 1990s by scientists who were exploring THC (well-known cannabinoid found in cannabis). The endocannabinoid system plays an important role in regulating a wide variety of processes and functions such as mood, appetite, sleep, memory, reproduction and fertility, cardiovascular system function, liver function, stress, bone remodeling, and growth and skin, and nerve function.

The ECS system is consists of three main components: endocannabinoids receptors, enzymes, and receptors. The two main endocannabinoids which are identified so far are anandamide (AEA) and 2-arachidonoylglyerol (2-AG). These help in keeping the internal function of the body smoothly. Endocannabinoid receptors are found throughout the body. The two main endocannabinoid receptors are

* CB1 receptors: they are found in the central nervous system
* CB2 receptors: they are found in the peripheral nervous system

 The main function of enzymes is to break down endocannabinoids after they have carried out their functions. The two main enzymes that are responsible for this role are fatty acid amide hydrolase, which is responsible for the breakdown of AEA and monoacylglycerol acid lipase, which breaks down 2-AG (Mouslech and Valla).

**What Is Clinical Endocannabinoid Deficiency (CECD)?**

 According to many researchers, the deficiency in the endocannabinoid system can be a cause of many underlying medical conditions such as fibromyalgia, migraine, and irritable bowel syndrome. Endocannabinoid deficiency occurs due to an underlying problem in the endocannabinoid system. This can be due to defective and missing receptors. If the body does not maintain the physiological system balance, then disease occurs (Greco et al.). Although the exact cause of the migraine is not fully understood, it is predicted in some studies that deficiency in the production of anandamide can contribute to the migraine due to lack of regulating of serotonin. Another condition that is associated with the deficiency of endocannabinoid is fibromyalgia, which is a chronic condition. According to some studies endocannabinoid system regulates the nociceptive threshold, which is responsible for the detection of pain and transmitting signals to the brain. Serotonin has great involvement in fibromyalgia, and studies have shown that cannabinoid can block peripheral, spinal, and gastrointestinal mechanisms, which promote pain. Irritable bowel syndrome is also caused by the deficiency of endocannabinoid deficiency. In this also, serotonin plays an important part as it is caused by the increased level of serotonin in the blood (Russo).

**Describe four different delivery routes patients may use cannabis, the onset of action for each, and one pro and one con of each route.**

**Vaporization**

One method of administration of cannabis is vaporization. In this instead of burning plant material, cannabis is heated to a high temperature, which releases the medicine in vapor form, which in turn is inhaled by the patient just like a nebulizer treatment. The original vaporizers used for cannabis were clumsy, but today, many vaporizers are available in a market in a different size, cost, shape, and effectiveness. One of the advantages of this mode of administration is that many home and portable models are available with digital temperature control, which patients can also use while traveling. The disadvantage associated with this mode of administration is amount of cannabinoids that are incorporated into the body depends on parameters such as the type and amount of cannabis, the duration of vaporization and temperature.

**Sublingual Delivery**

Another mode of administration of cannabis is oromucosal and sublingual delivery. Tinctures are prepared in a base of oil, glycerol, and alcohol. Most of the concentrated tinctures are administered by dropper under the tongue, and in a few minutes, the patient feels the effect. One of the advantages of this method is that it provides a rapid onset of action as medicine is quickly absorbed into the bloodstream. This mode of administration is best for those who are not comfortable with smoking cigarettes and patients with chronic diseases who need cannabinoids high level in their bodies in a continuous manner. One of the disadvantages of this route is that it can be associated with overdose.

**Oral Ingestion**

Taking of cannabis in both pill and liquid form has both benefits and drawbacks. Cannabinoids are fat-soluble, and their absorption through gut is less predictable and slow. Absorption depends on the metabolism of individuals. In this mode of delivery, the onset of action is about 30 minutes to an hour. The medicine is metabolized in the liver before getting into the bloodstream. In the liver, THC is converted into 11 hydroxy THC, which is more psychoactive as compared to THC. One of the advantages of this route is that the effect of medicine lasts longer, and the patient does not have to take medicine frequently. The disadvantage of this mode of administration is that on prolonged use, it can cause lesions and sores.

**Topical Application**

Cannabis can be applied externally as lotion and topical ointment. It is used in the treatment of arthritis, muscle pain, and skin inflammation. One advantage of this mode of administration is that it helps in the target delivery of medicine. The disadvantage of this route is that the exact mechanism of its absorption through the skin is not clear (Mary Lynn Mathre).

**Conclusion**

Cannabis, which is a [psychoactive drug](https://en.wikipedia.org/wiki/Psychoactive_drug) and derived from the [cannabis plant](https://en.wikipedia.org/wiki/Cannabis), is used for recreational and medicinal purposes. The deficiency in the endocannabinoid system can be a cause of many underlying medical conditions such as fibromyalgia, migraine, and irritable bowel syndrome. Cannabis can be administered by several routes such as oral, sublingual, topical, and inhalation.

**References**

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