Cameron Howe

Professional Portfolio

School
University of Maryland School of Pharmacy

Program
Medical Cannabis Science & Therapeutics

Degree
Master of Science

Antidote to Cannabis Intoxication

Objective: Apply knowledge of analytical toxicology methods to identify, quantify, and interpret results related to cannabinoid use and misuse.

Context: Describe CB1 and CB2 receptors. Identify the sites of action of cannabinoids in the human body. Describe the role of endogenous cannabinoids. Is it possible to create an antidote to cannabis intoxication, in a similar manner to Narcan (naloxone) for heroin? In fact, does such a medication exist already and, if so, why isn't it used?

Description and Rationale: The principles of drug actions and cannabinoid pharmacology are becoming increasingly vital area of science that must be fully understood as more states legalize cannabis. This piece of work highlights the rare risk of cannabis overdose and what is currently available as an antidote treatment.

Cameron Howe
Cameroncch@gmail.com
434-238-3598

Spring 2021

Cameron Howe
MCST 602
Assignment 3.1: Antidote to Cannabis Intoxication
November 6, 2019

The human body works in incredible ways. For instance, the human body has endocannabinoids that impact our ability to relax, sleep, eat, and thrive.[2] The endogenous cannabinoids that are naturally in our body interact with exogenous ligands and that interaction has the potential ability to activate the reward system part of our body.[1] When tetrahydrocannabinol, otherwise known as THC, enters the body it is doing so as an exogenous cannabinoid and it activates the CB1 and CB2 receptors in the body.[1] CB1 is predominantly in the brain and central nervous system (CNS).[1] CB1 is responsible for the neuroactive effects of cannabis and the "high" feeling.[1] CB2 is found outside of the brain and CNS, such as in immune cells and skin.[1] CB2 is a significant contributor to the immune system of the body.[1]

When medical cannabis enters the body and activates the CB1 and CB2 receptors it can have a variety of effects depending on the combination of cannabinoids in the strain of cannabis, the amount of THC, and the method of which it is administered.[2,1] There are times when some people might experience unpleasant side effects, such as anxiety, extreme confusion, paranoia, fast heart rate, increased blood pressure, and other symptoms that could result in "unintentional injury, such as a motor vehicle crash, fall, or poisoning."[3] However unpleasant the side effects are, humans are unlikely to die as the sole result of cannabis overdose.[3]

Despite that it is unlikely to die from an overdose, there are still unwanted side effects that may occur in some patients, prompting scientists and medical providers to inquire about an antidote to cannabis. For instance, the drug narcan works as an antagonist to block or inactivate the specific receptors of a person who has overdosed on opioids.[4] Finding the antidote of cannabis the way narcan prevents an opioid overdose would be beneficial as cannabis becomes more common in medical practice. The closest thing to a cannabis antidote is Rimonabant.[5] The drug Rimonabant that was designed to be an anti-obesity drug is an antagonist for the cannabinoid receptor CB1.[5] Since THC activates the CB1 and CB2 receptors, Rimonabant may be used as a medical cannabis antidote.[5]

However, the side effects of Rimonabant make it an unlikely long-term solution as a cannabis antidote.[5] Side effects include, but are not limited to, insomnia, nausea, vomiting, diarrhea, fatigue and negative changes in mental health status.[5] Specifically, Rimonabant may increase suicidal ideation, depression, anxiety, and other symptoms associated with psychiatric disorders.[5] Due to the concerns for the increased risk of depression and suicidal thinking the United States has rejected the proposal to approve Rimonabant for medical use.[5] Currently, Rimonabant is the only known CB1 receptor blocker on the market.[5] It is currently available in 38 counties, but remains illegal in the US.[5]

While it is possible to create a medical cannabis antidote by making a drug that acts as a CB1 cannabinoid receptor antagonist, as evident by Rimonabant, it must not have side effects that are worse than those experienced from cannabis and it must not put individuals at an increased risk of suicide.[5] Currently, 33 states and the District of Columbia have legalized medical cannabis.[6] With more states in the foreseeable future that will legalize medical cannabis or expand their laws that currently authorize CBD or low THC, reports of side effects are also likely to increase.[6] As such, it is vital that research continues in the area of development for a cannabis intoxication antidote.

References:

[1] Coop, A. How Drugs Work Part III: The Endocannabinoid System. Module 3 Video Lectures and PPTs. https://blackboard.umaryland.edu/webapps/blackboard/content/listContent.jsp?course_id=_17464_1&content_id=_1795791_1. Accessed November 4, 2019.

[2] Meiri, D. Behind the Smokescreen of Medical Cannabis. https://www.youtube.com/watch?v=9ioJbVyNg08. Published March 2018. Accessed November 8, 2019.

[3] Is it possible to "overdose" or have a "bad reaction" to marijuana? Centers for Disease Control and Prevention. https://www.cdc.gov/marijuana/faqs/overdose-bad-reaction.html. Published March 7, 2018. Accessed November 6, 2019.

[4] Understanding Naloxone. Harm Reduction Coalition. https://harmreduction.org/issues/overdose-prevention/overview/overdose-basics/understanding-naloxone/. Accessed October 22, 2019.

[5] Rimonabant. DrugBank. https://www.drugbank.ca/drugs/DB06155. Accessed November 6, 2019.

[6] Hanson K, Garcia A. State Medical Marijuana Laws. http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx. Published October 16, 2019. Accessed November 6, 2019.