Supera-CBD: A Novel CBD Derived Drug Candidate

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INTRODUCTION

CBD (cannabidiol) has been shown to have neuroprotective effects[1,2] and can increase adult hippocampal neurogenesis.[3] On a behavioral level, CBD has been found to carry anti-anxiety and anti-psychotic-like properties[4-6] and improve social impairments,[7] suggesting psychotherapeutic potential.

The drug candidate Supera-CBD is being developed to address the rapidly growing CBD market, which includes FDA approved drugs and CBD products not currently regulated as a drug. SUPERA-CBD is a drug candidate based on a novel (patent pending) synthetic derivative of cannabidiol (CBD) that targets numerous key receptors including CB2 and opioid receptors and inhibits monoamine oxidase (MAOI). While naturally grown CBD is a constituent of cannabis sativa, SUPERA-CBD is a synthetic derivative of CBD, thus eliminating potential complications associated with the psychoactive effects of Tetrahydrocannabinol (THC). SUPERA-CBD appears to be superior to CBD in terms of inhibiting CB2 receptors and MAO-B enzymes and binding to opioid receptors. Initial studies have demonstrated a robust safety and toxicity profile, similar to plant-derived CBD. SUPERA-CBD is positioned to become a prescription drug (super CBD) alternative to unregulated CBD, and we are exploring its potential to treat depression and other indications where there is significant unmet need for safe and effective treatments.

OBJECTIVES

To study the role of a new therapeutic drug Supera-CBD that will be utilized in the treatment of psychiatric disorders including anxiety, depression and chronic pain. We propose to start with preclinical studies using mouse models relevant to human psychiatric disorders to evaluate the effects of the proposed pharmacological agents on behavior.

METHODS

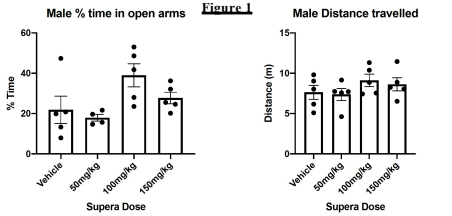
We studied the effect of acute administration of Supera-CBD on depression and anxiety-related phenotypes in mice to mimic human conditions. An intraperitoneal (i.p.) injection of vehicle (saline + 1%DMSO) or Supera-CBD (50mg/kg or 100mg/kg) was administered to 8 -12-week-old C57Bl/6 mice (n=5/group). 30 minutes following injection, mice were tested in anxiety and depression related measures including the elevated plus maze (EPM) and the forced swim test (FST).

There are two endogenous cannabinoid receptors: CB1 (present predominantly in the brain) and CB2 (present in the brain and immune system cells). To assess their binging affinity to CB1 and CB2 receptors, Supera-CBD and CBD were examined in a radioligand binding assay. CB1 and CB2 were expressed in Human recombinant Chem-1 cells, and the ability of 10 µM Supera-CBD or CBD to inhibit binding of 2.0 nM [3H] SR141716A (CB1 selective ligand) or 2.40 nM [3H] WIN-55,212-2 (CB2 selective ligand) as ascertained.

RESULTS

ANOVA revealed that there was a significant effect of dose on time spent in the open arms of the EPM ($p<0.05$). Post-hoc tests revealed a trend for decreased anxiety-like behavior in mice administered 100mg/kg Supera-CBD compared to vehicle treated mice ($p=0.09$), and no effect of 50mg/kg Supera-CBD on anxiety related behavior ($p=0.87$).

Figure 1

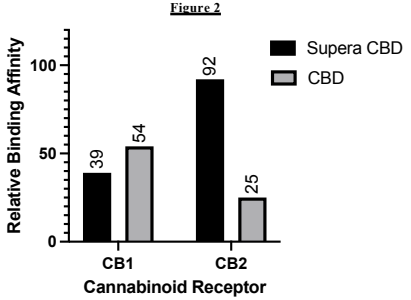


ANOVA summary	
F	3.318
P value	0.0487
P value summary	*
Significant diff. among means (P < 0.05)?	Yes
R squared	0.3989

ANOVA summary	
F	1.058
P value	0.3945
P value summary	ns
Significant diff. among means (P < 0.05)?	No
R squared	0.1655

Supera-CBD compared to CBD has dramatic 3.7-fold higher binding affinity to the CB2 receptor and 0.7-fold decrease in binding to the CB1 receptor in a radioligand binding assay using human cannabinoid receptors. CB1 and CB2 are the endogenous endocannabinoid receptors. CB1 is believed to mediate the intoxicating effects of THC, the predominant active component of Cannibis, whereas CB2 is found in immune-related cells and is thought to mediate the anti-inflammatory and analgesic effects of CBD.

Figure 2



Ratio of Super-CBD : CBD at CB2 is 3.7

CONCLUSIONS

Our initial tests revealed Supera-CBD's potent anxiolytic properties, and a dramatically higher binding affinity for the CB2 receptor. CB2 receptors are found in the both central and peripheral immune-system related cells, and have been implicated in mediating a number of the therapeutic effects of CBD, including its anxiolytic, anticonvulsant, antipsychotic, neuroprotective and anti-inflammatory effects. Given the significantly higher affinity of Supera-CBD for the CB2 receptor, it may indeed prove superior to CBD for a myriad of applications.

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