Bioavailability Study

Purzorb® Full Spectrum CBD Oil

Human Subjects Trial - April 2018

Introduction

Cannabidiol (CBD), a non-psychoactive component of the marijuana plant. Cannabidiol is a pleiotropic drug in that it produces many effects through multiple molecular pathways. The cannabis plant has been consumed by humans for thousands of years in medicine for its sedative, antidepressant, analgesic, anticonvulsant, antiemetic, and anti-inflammatory. The plant is composed of a chemical mixture that includes phytocannabinoids, terpenoids, flavanoids, steroids and enzymes.

CBD is an antagonists at the cannabinoid receptors and modulators of theendogenous cannabinoid system are also promising candidates for clinical research and therapeutic uses. Cannabinoid receptors including C1 and C2 are distributed in the central nervous system and many peripheral tissues (spleen, leukocytes; reproductive, urinary and gastrointestinal tracts; endocrine glands, arteries and heart, etc.). Additionally, there is now evidence for non-receptor dependent mechanisms of cannabinoids.

Five endogenous cannabinoids, anandamide, 2-arachidonylglycerol, noladine ether, virodhamine, and NADA, have been detected and studied. There is also evidence that besides the two cannabinoid receptor subtypes cloned so far, additional cannabinoid receptor subtypes and vanilloid receptors are involved in the complex physiological functions of endocannabinoids that include, for example, motor coordination, memory procession, pain modulation and neuroprotection. (Grotenhermen, 2004)

Pharmacokinetics refers to what happens to a substance from entering into the body until the exit of all traces. The absorption of a drug or a supplement is also called its bioavailability. The purpose of this study is to identify and define cannabidiol (CBD) bioavailability when a special absorption product is added. Understanding the pharmacokinetics of a drug is essential to understanding the onset, magnitude, and duration of its pharmacodynamic effects, maximizing therapeutic and minimizing negative side effects.

Both THC and CBD are highly lipophilic and have poor oral bioavailability (estimated to be as low as 6%). Oral THC formulations have shown variable absorption and undergo extensive hepatic first-pass metabolism resulting in lower peak plasma THC concentration relative to inhalation and a longer delay (~ 120 minutes) to reach peak concentration. While the metabolic pathways differ slightly, CBD exhibits similar pharmacokinetics: Following oral administration of CBD, a similar plasma concentration-time profile to oral THC has been observed and documented. (Lucas, 2017)

Purzorb® is a proprietary micellization process which micellizes a decarboxylated full spectrum hemp oil (including CBD and trace amounts of THC) mixture suitable for oral ingestion. According to the manufacturer each particle size is approximately 22 nm making it highly permeable in water. Previous animal models have demonstrated a rapid and almost complete absorption in the intestinal lining using Franz diffusion apparatus. (PHRX, 2016) This study will evaluate the blood levels of Purzorb® orally administered to human subjects over a 12—hour period.

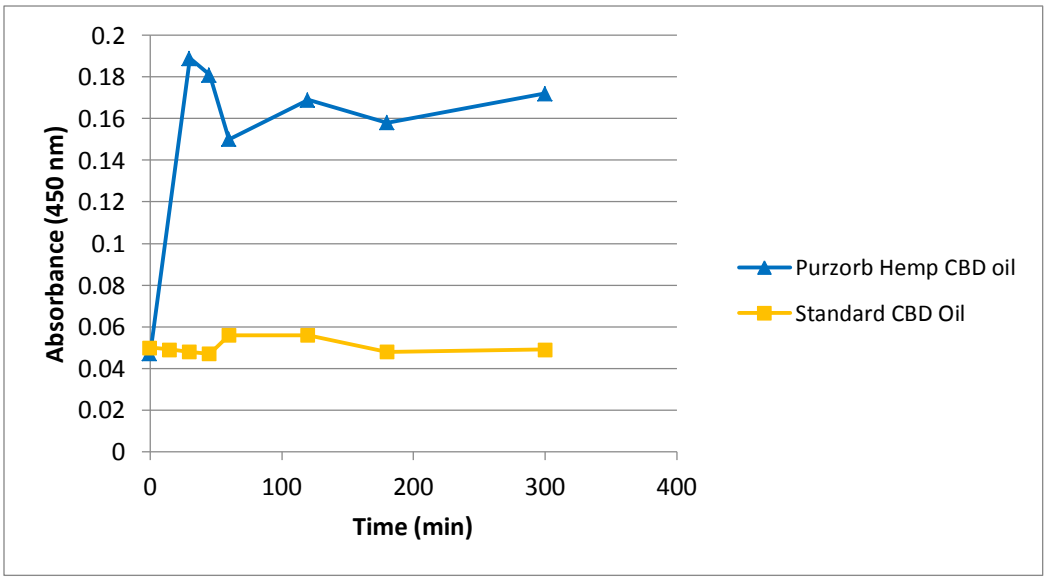

Figure 1. Purzorb® CBD oil and standard CBD oil (formulated in MCT) absorption in animal intestinal model.

Background

HPLC Testing

High-performance liquid chromatography (HPLC; formerly referred to as high-pressure liquid chromatography), is a technique in analytical chemistry used to separate, identify, and quantify each component in a mixture. Each component in the sample interacts slightly differently with the adsorbent material, causing different flow rates for the different components and leading to the separation of the components.

Each time set had 3 vials of arterial blood drawn. Each sample was testing using HPLC. The report indicates the average of the three blood vials drawn and tested from each subject at each time point. Samples were drawn at: Baseline and Post ingestion of product 15-minutes, 30-minutes, 45-minutes, 1hour 45 min, 2hour 45 min,3 hour 45 minutes, 4hours 45 minutes, 5hours 45 minutes, 6hour 45 minutes,7hour 45 minutes, 8 hours 45 minutes, 9hour 45 minutes, 10hours 45 minutes, and 11 hour 45 minutes.

Study

This is a study with seven subjects participating for a period of twelve hours. At the onset of this study each subject had arterial blood drawn to set the Baseline of CDB in their bodies, each had a Baseline of 0.0 mg of CDB at Baseline. Each subject was given an oral dose of one vial with 8.95 mg of CDB. Vilas were prepared by PurhealthRX and delivered to the researcher for use in this study. Each subject was given a vial and instructed to spray the liquid under their tongue and hold it there for 30 seconds before swallowing. The nurse in attendance let each subject know when their 30 seconds was up so they could swallow the remaining liquid.

	Baseline	15 min.	30 min.	45 min.	1 hr 45 min.	2 hr 45 min.	3 hr 45 min.	4 hr 45 min.	5 hr 45 min.	6 hr 45 min.	7 hr 45 min.	8 hr 45 min.	9 hr 45 min.	10 hr 45 min.	11 hr 45 min.
Subject	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**
1	0	0.23	0.33	0.39	0.39	0.37	0.38	0.39	0.38	0.36	0.32	0.3	0.29	0.36	0.27
2	0	0.25	0.31	0.3	0.32	0.3	0.31	0.31	0.29	0.28	0.3	0.24	0.22	0.2	0.2
3	0	0.23	0.36	0.46	0.49	0.47	0.49	0.49	0.44	0.46	0.49	0.4	0.34	0.26	0.32
4	0	0.16	0.2	0.37	0.45	0.47	0.47	0.47	0.45	0.44	0.44	0.39	0.4	0.3	0.3
5	0	0.2	0.25	0.3	0.37	0.4	0.48	0.49	0.49	0.48	0.48	0.36	0.35	0.3	0.26
6	0	0.21	0.25	0.37	0.38	0.39	0.38	0.39	0.39	0.37	0.37	0.34	0.32	0.3	0.26
7	0	0.2	0.32	0.4	0.43	0.44	0.44	0.43	0.44	0.43	0.42	0.4	0.4	0.38	0.3
		1.48	2.02	2.59	2.83	2.84	2.95	2.97	2.88	2.82	2.82	2.43	2.32	2.1	1.91
		0.21	0.29	0.37	0.40	0.41	0.42	0.42	0.41	0.40	0.40	0.35	0.33	0.30	0.27
Ave % Plasma Blood Levels	0%	21%	29%	37%	40%	41%	42%	42%	41%	40%	40%	35%	33%	30%	27%

Figure 2. Plasma blood levels of Purzorb® CBD by patient

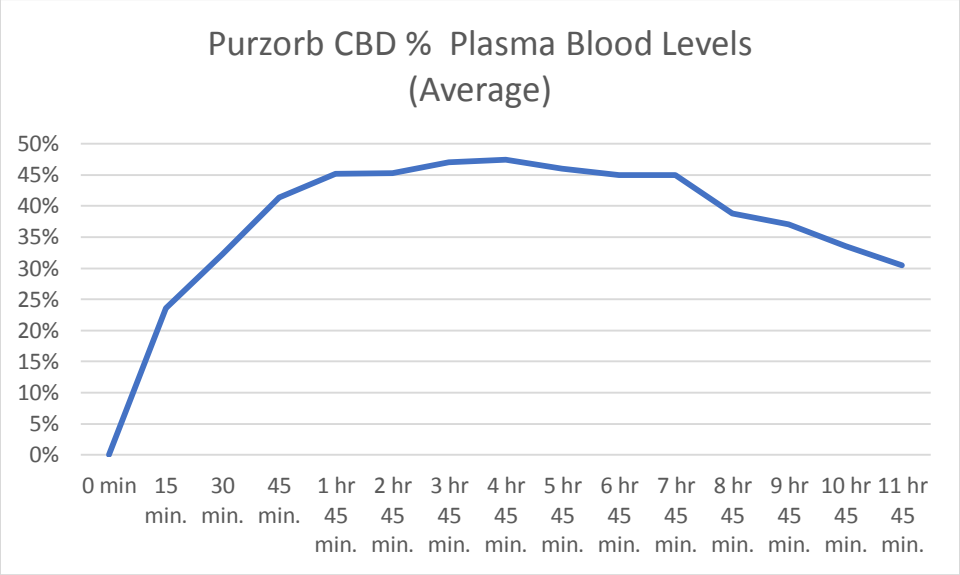

Figure 3. Plasma blood levels prior to adjustment for blood volume

Conclusion

The onset of Purzorb® is rapid and it has a lasting duration of CBD availability in the blood stream. All the patients were measured to have over 50% of the available CBD in their blood stream by the first measurement of 15 minutes. This exceeds what has been shown with CBD or THC that has been inhaled or vaped. The blood levels then measured significantly higher than what has been seen with standard CBD oil and other solubilizing methods. From this study it is concluded that the uptake of Purzorb® CBD far exceeds the average uptake of CBD products available on the market today.

References

Grotenhermen F[1]. Pharmacokinetics and pharmacodynamics of cannabinoids. Clin Pharmacokinet. (2003) 42(4):327-60

Lucas, CJ; et al. The Pharmacokinetics and the Pharmacodynamics of Cannabinoids, Br J Clin Pharmacol (2018) 84 2477–2482.

PurhealthRX., The Bioavailability of Purzorb CBD in Animal Intestinal Model. (2016) Unpublished abstract.