Method to Produce Medical Cannabis Extract for Treatment of Pediatric Epilepsy

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Recently, in December of 2015, THC Safety, Inc. conducted a presentation in Honolulu Hawaii. The course was titled Cannabis Concentrate Production Technology. The objective of the course was to provide the attendees with an understanding of the technology, processes and safety concerns associated with commercial extraction of cannabis. One of the attendees was the mother of a child that suffered from epileptic seizures that resulted in convulsions. Even though home-based extraction is not our business, we decided to write this paper to assist people like the mother, Jari, in creating an effective home-based pediatric cannabis extract for prevention of convulsions. The first task was to conduct research of the scientific literature to identify the cannabinoid profile and dose that was recommended, in addition to taking into consideration Jari's personal findings that an approximate 1:1 THC:CBD mix was efficient at controlling night time seizures.

From different sources, we found that the recommended THC:CBD ratio varied from about 1:1 – 1:15. We would recommend starting with a 1:6 mixture. Please note that the author is not a physician, but a chemist and a Certified Industrial Hygienist; therefore if possible we recommend that you get advice from an MD, but unfortunately for pediatric cases this may be almost impossible. I strongly recommend that you review the references that are listed in this document. It is often recommended that the dose gets split into two administrations per day (BID).

Here are *some* results:

> Oral cannabidiol, 200–300 mg/day for 8–18 weeks; n = 8 patients; placebo: seven patients.
>
> Efficacy: Of the eight patients receiving cannabidiol, four subjects remained virtually convulsion-free for the duration of the study and three other subjects exhibited a clinical improvement.
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> Note: The sublingual spray (under the tongue)…. compared to the oral administration, reduces the first-pass metabolism, thus increasing the bioavailability of the drug and allowing a greater dose-titration.
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> **Note: Epidiolex®** A liquid formulation of pure plant-derived Cannabidiol (CBD), as a treatment for various orphan pediatric epilepsy syndromes…98% oil-based CBD extract.. daily dose was gradually increased by 2-5mg/kg increments at 1-2 intervals until intolerance occurred or a maximum dose of 25 mg/kg/day.

In order to get a the desired THC:CBD ratio, you must start with whole plant material that has the ratio that you are looking for. The ratio in the extract will be mirrored by the ratio in the plant material, so select an appropriate cannabis breed that has the ratio desired. For example, the following Tikun Olam breeds have the following specified cannabinoid profile:

	THC	CBD
1) Midnight	13%	13%
2) Mango	9%	9%
3) Jasmine	14%	14%

One would need to contact the medical cannabis provider and their state to identify the local breed that would have the designated THC:CBD ratio profile desired.

Now that we have identified the appropriate starting cannabinoids ratio and breed to extract, we would need to conduct the extraction. We would want to keep it simple, inexpensive, but effective and reproducible. Therefore, we would want to use an oil extraction method.

Extract with oil

Cannabinoids in cannabis are readily dissolvable in fats and oils, so fats and oils may be used for extraction and dilution. Vegetable and nut oils, as well as clarified butter, can be used. One of the advantages of using oil for extractions is that they are for the most part non-soluble in water, so they don't extract excessive water soluble constitutes, like chlorophyll.

There are practical limits to the potency that can be achieved extracting with oil. So to maximize the extraction, the plant material must be relatively dry, the correct size, and must be heated, stirred or mixed periodically during the extraction process.

Choosing an Oil:

We would suggest clarified butter (Ghee), Coconut oil, Canola, or Olive oils. They all work well, so they are a good place to start. If you are new to extraction, start off with Olive or Canola oil. If you use Olive oil, never heat the oil above 160 C or 320 F.

Preparing the material:

The material should have a moisture content of less than 12%, preferably around 8%. Somewhat moist material may be more thoroughly dried in an oven by heating it for about 15 minutes at 220 F to reach lower moisture content.

Choosing material:

Oil from plant bud extract is higher in cannabinoids but more expensive than trim, but usually we would recommend using the trim because it is more cost effective. You need to get the decarboxylated potency (CBD and THC Percent) for the different cannabinoids of the exact strain that you will be using (find a provider with a Sage™ Real-Time Tester to test the plant material).

Decarboxylation

You MUST decarboxylate the plant material or the resulting extract to activate the inactive acid forms of THC and CBD. If one were to decarboxylate the plant matter at about 240 to 250° Fahrenheit (F) for about 30 to 60 minutes (depending on moisture content & THC/CBD Ratio hotter for higher CBA containing) most of the THCA and CBDA would be converted to THC and CBD. We would recommend a two-step process. First, heat the plant material for about 15 minutes at 220 F to dry it, and then conduct the decarboxylation at the higher temperature. Again, you could do it after the extractions by heating the oil at the higher temperature for 30 to 60 minutes. DO NOT OVER HEAT!

Remember the literature recommends treatment with the active ingredients; your body's metabolism will not activate the acid forms, and therefore you would lose potential medical benefit.

Using a Roaster Oven:

We would suggest using high quality electric roaster oven such as NESCO 4816-47 Silver 6 Qt. Roaster Oven or Nesco® Professional 18 Quart Nonstick Cookwell Roaster Oven type, depending on the amount of material you will be extracting. You will need to test the setting on the roaster with a thermometer to determine the exact temperature desired from the numerical settings. You will need to identify 220, 230, 240 and 250 degrees Fahrenheit. The units should be able to hold a + or – 5 degree setting, so don't get a cheap unit; they will not hold a constant temperature.

How Much Oil?

To reach maximum extraction efficiency, we would suggest using at least 30 ml of oil for every gram of cannabis. Simmer the oil / cannabis mixture at about 220 F for 6 hours, mixing every 1/4 to ½ hour, stirring thoroughly. If possible, continue to simmer for 12 hours, stirring every hour.

Recovering the Oil:

Before pressing the warm oil, place the plant material in muslin and place it into a restaurant sized potato ricer. Press the oil from the plant material. Refold the cloth over and press it a few times to remove as much oil as possible. Measure the amount of oil recovered. You may add some additional warm oil to the strained plant matter to remove more of the extracted material.

Calculating Oil Potency

For this example assume:

1) That you started with a theoretical decarboxylate plant material potency of 10% THC and 10% CBD
2) 400 grams (a little less than 1 pound) of Cannabis plant material
3) 85% extraction efficiency

4) Used (30 x 400) 12,000 ml or 12.0 liters or 12.7 quarts of Oil
5) Oil specific gravity = 0.90 g/cc

10% x 0.85 = 8.5% or 0.085

0.085 x 400 grams = 34 grams

34g x 1000 = 34,000 mg

34,000 /12,000ml = 2.8 mgs of THC or CBD per ml of oil

If we use an oral dose of 2.0 mg per pound per day for a 50 lb child, then the dose (100mg) of cannabinoid mix (1:1 THC:CBD) would be about 36 ml of the oil per day.

I sincerely hope that this helps Jari and others to make a more economic, potent and consistent home extract.

The author, Jim Lieberman, is a Chemist, a Certified Industrial Hygienist, and the president of THC Safety, Inc.
Please note warning to consult a physician!

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