

From the desk of Dr. Robert Kaufmann, MD –

There has been a lot of confusion lately in regards to the Water Soluble and the Hemp Oil Tincture, and their individual solubility, efficiency, and proper administration of each. There are several things to consider when discussing this and I will try to explain them here.

1. The size of the particles in each product
2. The surface area of the tissue that the CBD oil product in question comes into contact with
3. The amount of time the product is exposed to specific tissue and the effects thereof
4. The dilution of the product by other processes and elements (ex.: food in stomach)
5. The blood circulation of the organs responsible for digesting, absorbing, and/or distributing the product throughout the body
6. The binding of CBD to proteins in the blood stream
7. The metabolization of CBD by the liver and how efficiently, quickly, and effectively it does this
8. The distribution of CBD in the body once it is ingested in a certain area and/or delivery method
9. The acidity of undiluted Water Soluble and its effects on the mucosa of the mouth
10. The taste of concentrated terpenes

Here are the facts.

- The size of an individual drop of the Tincture is much, much bigger than the size of an individual drop of Water Soluble. The larger the droplet, the less CBD is absorbed in any given amount of time, because it takes longer to be broken down by the body. This is true *regardless* of where the CBD oil is being absorbed. This relationship is not linear, but exponential.

Point 1: If you have a particle that is 2 nanometers in diameter, and a particle that is 4 nanometers in diameter, would you assume that the 2nm particle is absorbed in half the time that the 4nm particle is? This is not the case; in fact, the 4nm particle would be absorbed **16 times** slower. As a result, even a slightly larger particle will take exponentially longer to be broken down before it can be absorbed by the body.

- The larger the surface over which the CBD is spread, the faster absorption will occur. Because the surface area of the stomach is greater than that of the area underneath the tongue, CBD gets absorbed faster in the stomach than the mouth.
- One can only hold any liquid under the tongue for a short period of time before they will have to swallow. This occurs regardless of whatever substance you put in the mouth, as it causes an increased production of saliva; as it accumulates, we must ultimately either swallow or drool. (Think about brushing your teeth.)
- **The maximum percentage of CBD that can be absorbed under the tongue is between 15 and 24%.** Additionally, the large particle size of the Tincture means that the maximum amount that can be absorbed is only between 15 and 20%. However, CBD will remain in the stomach for up to 3 hours, depending on how much food is also in the stomach at the time. (The more

undigested food present, the longer it stays there.) Because of the small particle size of the Water Soluble, **the maximum threshold for Water Soluble absorption is between 80 and 100%**. We currently have studies underway to determine what this percentage actually is.

- If there is other food or fluid in the stomach when CBD is ingested, the rate of absorption of CBD will be slowed. How much it is slowed depends on the size of the particles. The rate of the slowing is not linear to the particle diameter, meaning it is increased exponentially as the size of the particle increases (just like the example in point 1).
- Materials absorbed in the digestive tract through the blood stream must pass through the liver before it can reach the rest of the body. Materials absorbed in the mouth go to the rest of the body without having to go through the liver first.
- Immediately after being absorbed into the blood stream, the majority (about 90%) of individual CBD molecules are immediately bound to proteins in the blood. The larger the size of the CBD particle, the longer it takes for it to be broken up into individual CBD molecules so that it can be bound.
- The liver absorbs and metabolizes most of the CBD particles that have not bound to anything as the blood passes through from the stomach. This will happen regardless of the size of the CBD particle. However, the bound CBD is a different story. Very little of this gets metabolized. It appears that our Water Soluble only has a small portion that gets metabolized by the liver – most gets to the peripheral tissue. Studies are soon going to be done to determine how exactly this occurs. The goal is to finish absorption and bioavailability studies by the first of next year.
- Once CBD gets to the tissues, it is rapidly absorbed and concentrated in fat tissue. This allows the body to store “extra” CBD and release it back into the blood stream when the body needs it. This is so efficient that for all practical purposes it doesn’t matter what form the CBD is given. What does matter, though, is that the CBD gets to the tissues.

For scientifically-minded people: the volume of distribution is 3 times that of the volume of the person, and half life is approximately 23 hours.

- Water Soluble is very acidic with a pH level of 4. This is the same acidity of raw tomato juice. A substance with this acidity will produce ulceration of the mucosa in the mouth if repeatedly applied to the same area. In addition, the acidity of the liquid causes vasoconstriction of the vessels, decreasing the absorption of the CBD.
- Undiluted terpenes taste terrible. The worse the taste, the more saliva is produced, and the sooner involuntary swallowing must occur.

- Compliance is very important for a product to work well and the client to be happy. If something burns your mouth and tastes terrible, they are not going to take it correctly. As a result, they will not get the result desired.

Summary: Given everything covered here and everything we know about the size of the particles in our Water Soluble versus our Tincture and how that affects bioavailability, our Water Soluble when taken as directed (swallowed in liquid so that it reaches the stomach) should provide our bodies with more CBD than our Tincture when taken under the tongue. The magnitude of this difference is not known in exact terms right now, but given the clinical responses that have been seen, it is apparent that oral ingestion of Water Soluble is much better absorbed and distributed to the body than sublingual tinctures.

As for taking Water Soluble under the tongue, I cannot and will not recommend that anyone take Water Soluble under the tongue.