



Science of CBD

When it comes to the science of CBD as derived from hemp, everything boils down to understanding the following three significant observations:

- 1. NOT ALL CBD PRODUCTS ARE THE SAME**
(hemp source, extraction, and blend matter)
- 2. MORE IS NOT NECESSARILY BETTER**
(CBD demonstrates a Biphasic dose response curve)
- 3. IT'S ALL ABOUT ABSORPTION**
(CBD has a very poor oral natural absorption curve)

NOT ALL CBD PRODUCTS ARE THE SAME

Source – Not all sources yield usable, reliable, and/or safe materials from which to work with.

- Hemp seed oil typically has no commercial cannabinoid value and therefore on its own, is not an appropriate source for obtaining CBD.
- Hemp is also a **bio-accumulator** that draws toxins from soil. Therefore, care must be taken with the source of hemp utilized for producing products. For example, some sources grow their hemp in “**phytoremediation projects**.” These sources literally grow their hemp in contaminated, toxic or radioactive soils with the purpose of cleaning those soils. And..., this is because hemp is so effective at drawing contaminants out of the soil.
- Markets will increasingly be flooded with cheap products because they’ve been sourced from locations where labor is cheap (like China), and where control and/or regulations are lacking. This warrants care, because you may not know where a producer sources hemp to make their product.

Vediol is a whole-plant blend of botanical extracts from lawfully cultivated industrial hemp “grown to pharmaceutical standards,” that is 100% legal and is produced in the USA. Vediol is also backed by multiple, highly specialized, patented and patent-pending technologies.

Extraction – Extractions methodologies vary and play a significant role in determining resultant product yield, quality, and performance:

- There are many extraction technologies available, many much cheaper than others. And the technology utilized makes a significant difference in phytonutrient oil quality and performance. For example: because phytonutrients are so easily damaged by heat, allowing heat to rise above

A few Definitions:

Pharmacokinetics

The way in which compounds move throughout the body. *MOVEMENT*

Pharmacodynamics

How compounds affect the body. *EFFECTS*

Bioavailability

The degree and rate at which a substance is absorbed into a living system and made available at the site of interaction.

115°F during the extraction process significantly damages phytonutrients, thus yielding less-effective end results. The simple process of pressure extraction alone produces heat capable of damaging phytonutrients.

- As a point of observation, the higher the quality the product, the more expensive it will be to make. This is because sophisticated extraction technologies take more time and money than cheaper shortcuts.

Vediol utilizes a proprietary subcritical “cold-pressed” technology to deliver a stable and high level of active CBD in every dose, ensuring there is no heat damage to active phytonutrients in the oils.

Blend – It is now well known that CBD blended with other phytonutrients like terpenes and sesquiterpenes is more pharmacodynamically effective than CBD isolates alone. This may be in part due to alterations in CBD First Pass Metabolism Effects combined with synergistic benefits gained by utilizing a proper combination of whole-plant components.

- A proper combination of whole-plant cannabinoids, terpenes, and sesquiterpenes is necessary to produce a true and enhanced “**Entourage Effect**.” This is because the combination of ingredients work together in synergy to produce a sum effect greater than that of single isolates alone.
- Equally important, is knowing which combinations of compounds working together produce the best sustained “Entourage Effects.”

Vediol’s proprietary blend insures maximized “Entourage” and enhanced synergistic product effectiveness.

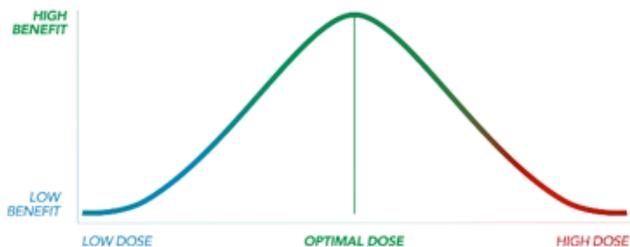
¹ Overcoming the Bell-Shaped Dose-Response of Cannabidiol by Using Cannabis Extract Enriched in Cannabidiol – Pharmacology and Pharmacy 2015, 6, 75-78 – Gallily, Yekhtin, Hanus.



MORE IS NOT NECESSARILY BETTER

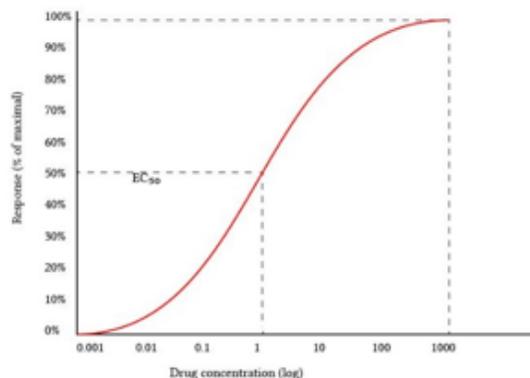
Biphasic:

Because CBD demonstrates a “Biphasic” dose/response curve, and a high one at that, it behaves differently than other compounds demonstrating a Monophasic or “linear” curve. For compounds having a “linear” curve, more product produces greater effect. With “Biphasic” compounds on the other hand, there’s an optimum dosage “above which” effects begin to decline and/or produce diminishing returns.



Biphasic

Alcohol for example, demonstrates a Biphasic dose/response curve like that of CBD. So, like with Alcohol, more CBD is not necessarily better at producing desired effects.



Linear

IT'S ALL ABOUT ABSORPTION

The better a product is absorbed, the more bioavailable it is to pharmacodynamically produce intended effects upon the body.

Delivery mechanisms and altering how a substance is assimilated within the body, will directly affect its absorption.

This is extremely important because orally, CBD on its own has a very poor natural absorption curve of only 4% to 12%.

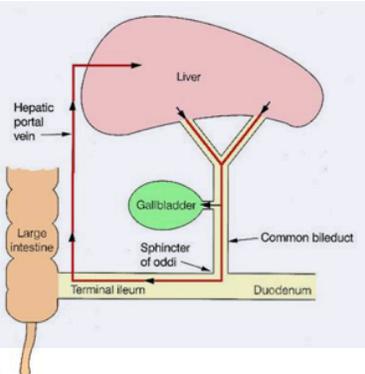
CBD is not water soluble and following oral ingestion is significantly affected by gastric acids. Furthermore, CBD undergoes very high First Pass Metabolism Effects by the liver.

Utilizing technologies to enhance product stability, solubility, and therefore absorption, can markedly alter its ability to work.

First Pass Effect:

The “First Pass Effect” is defined as the rapid uptake and metabolism of a substance into inactive compounds by the liver (and to a lesser extent by the intestines) immediately after enteric absorption and before reaching systemic circulation.

- Drugs that are absorbed via the GIT are circulated to the liver first via the hepatic portal vein
- Liver then acts as a filter
- Only part of the drug is circulated systemically
- The combination of processes is termed the ‘First Pass’ effect



- Substances are ingested, enter the intestines, enter the Hepatic Portal Vein to the liver, and then undergo **First Pass Effect Metabolism** and elimination by the liver.
- Think of the liver as being a **Border Patrol Agent for the body** tasked with keeping out unwanted substances, CBD being one of those substances.
- First Pass Metabolism is all about the material in question being soluble or not.

Studies have found that consuming CBD oil with certain fatty acids can help bypass First Pass Metabolism Effects and increase how much CBD is absorbed directly into the bloodstream.

Bioavailability:

While intravenous bioavailability of a compound is always 100%, oral bioavailability is usually less because of incomplete absorption and/or First Pass Metabolism Effects of the liver and subsequent elimination of that compound.

Bioavailability of CBD can be increased by:

1. **Protection** from gastric acid degradation and destruction.
2. **Minimizing** “First Pass Metabolism Effects” of the intestines and liver.
3. **Enhancing Direct Absorption** into the bloodstream through the lymphatics, thereby effectively bypassing “First Pass Metabolism Effects.”



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How Vediol Enhances Bioavailability:

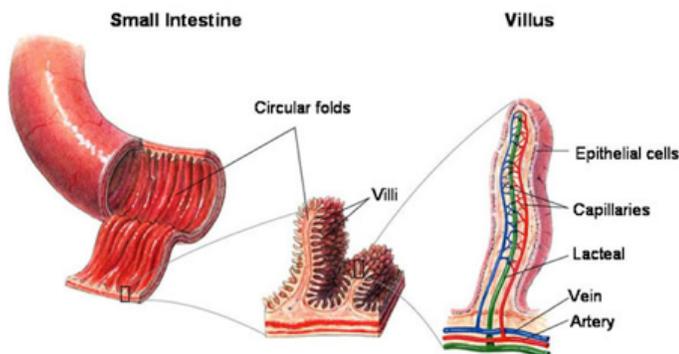
Natural plant-based enteric coatings stabilize Vediol, extend its shelf-life (lots are stamped with 3-year expiration periods), and protect it from stomach acid degradation so its components are more readily available for direct absorption in the intestines.

But, because fats do not mix with water, they are digested and absorbed into the bloodstream differently than carbs and proteins. And, are subject to First Pass Metabolism Effects (effects which are substantial for CBD). At least that's true for most fats in the diet – *but not all of them*. One group of materials present in Vediol – are an exception. They are digested more like carbohydrates than fats, so they can take a more direct path to the bloodstream.

Vediol utilizes patent-pending Taurinol to enhance bioavailability of fat-soluble compounds, and Piperine ester to increase bioavailability of non-fat soluble compounds.

As muscles in the stomach churn food, fats begin to break down, but digestion of triglycerides and cholesterol doesn't begin in earnest until they leave the stomach and enter the small intestine. The liver releases bile into the small intestine while the pancreas contributes digestive enzymes. The bile forms a coating over fats, and enzymes cleave them into smaller bile-covered pieces called micelles. Then cells in the lining of the small intestine absorb the tiny micelles.

Once inside the intestinal cells, micelles go through another repackaging. They're now covered in a mixture of lipids and proteins. **This new coating allows fats to travel through water-based environments in the body.** But they still don't go straight to the bloodstream. These fats, which are now called lipoproteins, are transported into the nearest lymph vessels. While the lymphatic system is better known for filtering body fluids to remove bacteria and other damaging substances, it also carries fats to where they finally enter the bloodstream bypassing "First Pass Metabolism Effects" of the liver, and thus enhancing bioavailability.



Vediol utilizes natural additives so the blend can be directly absorbed into the lymphatic system, thus avoiding and minimizing First Pass Metabolism Effects. This enhances assimilation by several fold.

HDL/LDL Cholesterol Analogy:

Once in the bloodstream, lipoproteins have different jobs. One type of lipoprotein carries fatty acids to tissues that need them for energy, such as muscles. High-density lipoproteins, or HDLs, take cholesterol back to the liver where it's removed from the system (**via First Pass Metabolism Effects**). For this reason, HDL's are commonly known as "good cholesterol".

Low-density lipoproteins, or LDLs, remain in the bloodstream, delivering cholesterol to cells, where it fills important jobs. When you have too many LDLs circulating in your blood, the cholesterol they carry may end up sticking to arterial walls. That makes LDL's the "bad cholesterol."

Vediol uses a technology that creates a condition of polymorphism to enhance absorption through formation of micro-particles called "micelles" for holding small volumes of chemical reactants for improved assimilation (digestion and absorption) of active ingredients, plus two absorption enhancing technologies to further enhance mucosal penetration for accelerated onset of beneficial effect.

WHY VEDIOL?

Taken together, the technologies within Vediol enhance overall oral CBD absorption from a normal curve of only 4% - 12%, to that approaching inhalation and sublingual routes of administration. This is a significant performance boost over other orally administered products that lack the sophisticated enhancement technologies found within Vediol.

PBBD=E

- **Purity** - we utilize a novel, "cold-pressed" technology to deliver a stable and high level of active CBD in every dose, ensuring there is no heat damage to the active phytonutrients in the oils.
- **Blend** - our proprietary blend insures the Entourage Effect and enhanced synergistic product effectiveness.
- **Bioavailability** - we utilize patent pending Taurinol™ to enhance bioavailability of fat-soluble compounds, and Piperine ester to increase bioavailability of non-fat soluble compounds.
- **Delivery** - we utilize a technology that creates a condition of polymorphism to enhance absorption through formation of micro-particles ("micelles") for holding small volumes of chemical reactants for improved assimilation (digestion and absorption) of active ingredients, plus two absorption enhancing technologies to enhance mucosal penetration for accelerated onset of beneficial effect.

All this technology = Enhanced Product Effectiveness

Because we believe that decisions about pet health are best made in concert with veterinary advice, we have chosen to make our products available only through licensed veterinarians.



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