Within the last decade, scientists have discovered hundreds of biologically active nutrients called phytochemicals, which are found in whole, unprocessed foods. There’s pterostilbene, a powerful antioxidant found in almonds, blueberries and Pinot Noir grapes that enables cells to break down fat and cholesterol; compounds like lycopene, which colors tomatoes red, and anthocyanin, which gives berries of all kinds their deep hues of blue. And of course, there’s the exciting world of phytocannabinoids, cannabis-derived compounds including the famously psychoactive THC, as well as the less-known such as CBDV, a proven anti-epileptic.

Food and health researchers have long concluded that while our bodies readily absorb these kinds of nutrients from whole foods, our ability to absorb synthetic, isolated supplements is limited at best. That’s exactly what cannabis researchers at the Hebrew University of Jerusalem discovered when comparing the efficacy of whole-plant cannabinoid (CBD) extracts with synthetic, single-molecule CBDs.

As the pharmaceutical industry rushes to market synthetic CBDs, research points to what’s called the “Entourage Effect,” wherein compounds working together synergistically in whole-plant medicines amplify the overall effects and benefits of the medicine. When comparing synthetic CBDs with whole-plant extract, the Israeli researchers observed a narrow therapeutic window that limits the usefulness of the synthetic form and a far greater range of effectiveness for CBD-rich, whole-plant extract. This, combined with the Entourage Effect, makes whole-plant CBD extracts more effective at lower doses, with fewer adverse side effects, making it ideal for clinical use.
From Plant to Extract

As many as 80 phytocannabinoids are known to exist at different levels in different varieties of cannabis. Of these compounds, tetrahydrocannabinol (THC), cannabidiol (CBD) and cannabinol (CBN) are found in the highest concentrations and have been subjects of the most research.

Unlike THC, CBD is not psychoactive, and it has a far greater effect on the body. Medically, it appears to relieve convulsions, inflammation, anxiety, nausea and mediate the euphoric effect of THC. Most of the other cannabinoids don’t exist in large enough concentrations to have any noticeable effect, but CBD concentration can be as high as 40% in certain cultivars of industrial hemp and medical cannabis strains like Avidekel, aka ACDC, and Charlotte’s Web.

Traditionally, cannabinoids are separated from the plant by extraction with organic solvents including hydrocarbons and alcohols, many of which are flammable and toxic. An alternative method known as supercritical CO₂ solvent extraction uses carbon dioxide and high pressure to produce extracts of exceptional purity. Once extracted, the cannabinoid blend (THC, CBD) is separated into individual components using gentle, low-temperature distillation techniques. The result is a whole plant extract in the form of an oil that is 60 to 70 percent pure. Through multiple distillations, manufacturers can achieve as high as a 98 percent pure CBD oil.

Bioavailability

Because of the variable rate at which we absorb oils, 95 percent of all pharmaceutical medicines are water-soluble rather than fat-soluble. According to Dr. Greg Smith, author of Medical Cannabis: Basic Science and Clinical Applications - What Clinicians Need to Know and Why, a seminal textbook for training medical students and primary care doctors on the use of medical cannabis, the problem with fat-based medicines such as cannabis oil is that we don’t know how much will be absorbed. “Water solubility makes accurate dosing possible,” he attests.

So in order to increase the bioavailability of cannabis-derived medicine, scientists can now employ nanotechnology to make CBD oil water-soluble. By creating hybrid molecules that contain a nanoparticle of CBD oil encapsulated in a hydrophilic carrier or surfactant, CBD can be quickly absorbed. “A good hybrid molecule is 100 percent bioavailable,” says Smith. Because there are many ways to create hybrid molecules and those processes can be patented, this is the least transparent aspect of the CBD industry.

At EAD Labs in Encinitas, CA, water-soluble CBDs have been formulated using high-CBD raw hemp oil combined with a full spectrum of other cannabinoids and terpenes in conjunction with curcumin, the active ingredient in turmeric, and a surfactant that makes the molecule water-soluble. A Reese’s Peanut Butter Cup makes a handy analogy: The CBD oil and the curcumin form the filling, and the surfactant, the chocolate shell. “We want to keep the CBD as close to nature as possible,” said CEO and co-founder James Sol Radina. “During this unregulated, early-adoptions phase of the industry, consumers need to look carefully at manufacturers’ claims. Many companies are adding isolated CBD to boost the concentration of CBDs in their whole-plant products.”

According to Smith, the best process for making water-soluble CBD has yet to be determined. “At this stage, our concern is for a consistent, pure product and consistent dosing during clinical trials. Determining which hybrid molecule is superior is a next step.”

So as the cannabis industry and consumer continue to develop, so too does the CBD industry and consumer in search of whole plant medicine.