An Introduction to:

Nanoemulsions

Contents

Summary 2
Introduction to nanoemulsions 3
How cannabis nanoemulsions work 4
References 6
Cannabis plants have been cultivated and used for thousands of years as a source of both medicines and intoxicating drugs. Popular traditional consumption methods include smoking (rapid onset and short duration of effects, easy dosage control); edible products such as chocolates or baked goods (delayed onset and long duration of sometimes intense and unpredictable effects); and oils, which represent a middle ground in terms of the speed and duration of effects. However, some consumers prefer alternative methods without, for example, the strong odour and respiratory health risks associated with smoking, the high calorie count of some edible products, or the strong taste of cannabis oil. A number of new products are now coming onto the market, designed for consumers who are looking for discreet ways to consume known doses of cannabis with predictable effects. Popular new formats include topical products such as lotions and patches, and nanoemulsions of cannabis oil.

**Summary**

Cannabis nanoemulsion products consist of tiny droplets of oil dispersed in water.

Nanoemulsion formulations can be consumed easily and discreetly, with a high degree of control over the dosage.

The small size of the droplets helps the body absorb more of the medically important molecules, for faster and more predictable effects on the user and a more economical product.

New users looking for an easy and safe way to consume medicinal cannabis are likely to find nanoemulsion formulations to be an appealing and accessible entry point.

**New Formats for a Traditional Medicine**

Cannabis plants have been cultivated and used for thousands of years as a source of both medicines and intoxicating drugs. Popular traditional consumption methods include smoking (rapid onset and short duration of effects, easy dosage control); edible products such as chocolates or baked goods (delayed onset and long duration of sometimes intense and unpredictable effects); and oils, which represent a middle ground in terms of the speed and duration of effects. However, some consumers prefer alternative methods without, for example, the strong odour and respiratory health risks associated with smoking, the high calorie count of some edible products, or the strong taste of cannabis oil. A number of new products are now coming onto the market, designed for consumers who are looking for discreet ways to consume known doses of cannabis with predictable effects. Popular new formats include topical products such as lotions and patches, and nanoemulsions of cannabis oil.
Oil and water don’t mix; at least, not in the same way in which two water-based liquids (say, gin and tonic) mix. However, it’s possible to disperse small droplets of oil into water, or vice versa, in what’s called an emulsion. For example, salad dressing is an emulsion of oil and water-based vinegar. Nanoemulsion simply means “very small emulsion”, indicating that the droplets are much smaller than in a regular emulsion.

Salad dressings separate back into oil and vinegar layers over time. The harder you shake the mixture, the smaller the droplets become and the longer it takes for them to separate. Nanoemulsions are produced using very high energy methods such as ultrasound waves, which can generate much smaller droplets than is possible with mechanical shaking. This makes nanoemulsions extremely stable. Adding an emulsifier ingredient that coats the surface of the oil droplets (such as mustard or honey in salad dressings) also helps to stabilise the mixture.

Advantages of Nanoemulsions to the cannabis consumer

- **Faster, shorter, and more predictable effects**: the effects of nanoemulsion products are felt sooner, wear off faster, and are more predictable than those of traditional edible products such as brownies or chocolates.

- **More discreet**: nanoemulsions can be easily mixed into water and other transparent liquids without making them cloudy, and without the typical odour that’s associated with smoking or vaping cannabis products.

- **Natural, plant-derived ingredients**: regular emulsions with large oil droplets require strong, synthetic emulsifiers to stop the oil and water components from separating. Nanoemulsions produced using high-energy methods are stable enough to allow the use of gentler emulsifiers made from food-grade natural products.

- **More economical**: the increased effectiveness of nanoemulsion formulations means that a lower dose is needed to achieve the same effect.
How Cannabis Nanoemulsions Work

Cannabinoids (the active molecules in cannabis) dissolve in fats and oils, but not directly into water, which makes it difficult for the body to absorb them. When you eat cannabis products, many of the medically important molecules travel from the gut straight to the liver, where they’re broken down and inactivated before they can have the desired effects. The molecules that remain in the gut have to cross into the water-based bloodstream, and then through the fatty outer membrane of human cells. This is an inefficient process; most molecules don’t reach their target cells, a problem referred to as low bioavailability.

The tiny droplets of oil found in nanoemulsions have a high surface area per unit of volume. This makes it much easier for the molecules carried in the oil to rapidly cross the gut wall then disperse out of the droplets and into the bloodstream, avoiding breakdown in the liver and increasing the bioavailability of the product.

Nanoemulsions are increasingly being used to enhance the bioavailability of cannabinoids and other fat-soluble natural health products. These natural health products include omega-3 fatty acids, resveratrol, curcumin, and many vitamins. A recent scientific study showed that a nanoemulsion formulation increased total CBD absorption by 65% compared to a CBD oil product, in about one third of the time.

Consumers can soon expect to be able to choose from cannabis nanoemulsion products in a range of formats including:

- Tinctures
- Topicals
- Edibles
- Capsules
- Sprays
- Beverages
Absorption increased by 65%

Smaller oil droplets have a proportionally larger surface area in contact with the water into which they’re dispersed. This helps cannabinoid molecules to disperse out of the oil and into the bloodstream more efficiently - just like how a spoonful of loose granulated sugar dissolves into a hot drink faster than a sugar cube does.

*A nm is one-billionth of a meter
References

(d) “Nanoemulsion-based delivery systems to improve functionality of lipophilic components”. Odriozola-Serrano I, Oms-Oliu G, Martin-Belloso O, Front Nutr. 2014 1:24
(e) “Utilization of nanoemulsions to enhance bioactivity of pharmaceuticals, supplements, and nutraceuticals: Nanoemulsion delivery systems and nanoemulsion excipient systems”. Aboalnaja KO, Yaghmoor S, Kumosani TA, McClements DJ, Expert Opin Drug Deliv. 2016 13(9):1327

About Emerald Health Therapeutics

Emerald Health Therapeutics is led by a team of life science professionals that are dedicated to advancing health and wellness through science. Specifically, we have focused on harnessing the power of the endocannabinoid system and the cannabis plant with the goal of delivering better, more controlled outcomes for consumers seeking to enhance health and wellness. Our team is here to assist you every step of the way with any questions or queries you may have.

Please visit www.emeraldhealth.ca for more information, or contact info@emeraldhealth.ca.