

Dr. Paul G. Varnas & WholeHealthAmerica.com present

THE BETTER HEALTH NEWS

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WHAT DOES "EMULSIFIED" MEAN?

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The adage "oil and water don't mix" is based on the characteristics of hydrophobic versus hydrophilic interactions. Fats are hydrophobic, which means they appear to avoid water and instead form large globules when mixed with a water-

based liquid. Water molecules prefer to bond with each other rather than with the

fats. Water is a "polar" molecule, and fats are "non-polar"; polar molecules prefer to bond with other polar molecules. Fat-soluble nutrients, like vitamin A, vitamin D, vitamin E, vitamin K and CoQ10 are all non-polar and the body may have problems absorbing them.

Emulsification is a process by which you mix two liquids that normally do

not mix well together. Emulsification of fats allows you to mix them with water-based substances, which has important implications for digestion. Emulsification of fat means that you change the environment so the fat and water molecules can mix together more easily.

Emulsification of fats is also a critical part of digestion. Most of the fluid in your digestive tract is water-based, so when you consume fats, they tend to

form large globules in your intestines. When the fat is in large globules, it is hard for the enzymes in your digestive tract to break down dietary fats. Large globules of fat are also poorly absorbed by your intestines. As a result, your body uses an emulsifier known as bile to break up these fat globules.



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EMULSIFICATION: SIZE MATTERS

Emulsified oil in water systems can be prepared with natural gums. The oil droplet size in the Biotics Research Corporation preparations has an average particle size of 0.5 microns. This diameter is approximately one tenth the size of a red blood cell. 0.5 microns is also the same as 500 nanometers (nm). The visible spectrum is from 400 to 700nm. This is significant because oil particles from 500 nm will reflect light. The emulsified droplets are white in appearance in solution. Particles below 400 nm will not reflect visible light. Visible light will pass through those solutions and appear clear.

Oil particles have surface tension...oil is attracted to oil. In a natural gum emulsions the emulsions system is stable, as oil particles become small the total amount of surface area on the oil particles dramatically increases. At 0.1 microns the total attraction between the oil particles becomes such that the oil particles start to aggregate into larger particle and the oil starts to separate into an oil and water phase (i.e. the emulsion has broken). We experimented with reducing the 0.5 micron oil system to smaller oil particles by using homogenization technology. Essentially the homogenizers added

energy into the system giving smaller oil particles. The smaller oil particle had larger surface areas and the system separated after a day or two. The CurcumRx oil droplets appear to have particle sizes of about 0.5 microns also. Chemical surfactants such as tween dramatically reduce the surface tension between oil and water and allow them to essentially blend together. These emulsions have an average particle size of 4 microns.

In nature oil droplets are stored in seed and fruits and have similar particle sizes. Olive oil production is a good example of adding mechanical energy to the olive (stone grinder for example or mechanical press). The mechanical energy allows the olive oil particles to aggregate and allows the oil to separate from the olive. This principle is used in the production of flax seed oil. A large mechanical press is used to press the seeds that have been ground into the oil, which is emulsified in the seed, and can be separated. When oils are "cold pressed", the mechanical pressing is done at cold temperatures. This reduces the possibility of oil oxidation.

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EMULSIFICATION USED BY PHARMACEUTICAL INDUSTRY

Drug companies use emulsification to improve solubility, dissolution and stability in their products. Research that appeared in *Pharmaceutical Development and Technology* (2016 Dec 8:1-9. [Epub ahead of print]) looked at water solubility of artemether; a poorly soluble drug used for the treatment of malaria. Researchers found that emulsification improved the solubility and absorbability of the drug.

Efficacy of vaccinations have been improved by making them absorbable through mucous membranes with emulsification. Research that appeared in *Microbes and Infection* (2016 Nov;18 (11):706-709. doi: 10.1016/j.micinf.2016.06.007. Epub 2016 Jul 7) demonstrated that intranasal vaccination with either a combination adjuvant comprising emulsified fine particles (namely PELC) together with LD-indolicidin or Alum enhanced protective influenza-specific serological immunity in mice.



Biotics Research Corporation, in effort to further the education of Healthcare Professionals and their patients, is pleased to offer several significant and useful practice building tools, all included in a weekly email, the **Biotics Bulletin**.

- **Tuesday Minute** - weekly video clip, full of nutritional education & clinical pearls
- **Weekly Product Feature** - product specific, informational summary
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- **Monthly Newsletter** - filled with research, condition-specific topics, product education, and recommended protocols
- **Upcoming Seminars** - seminar announcements featuring world-renowned speakers
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BIOAVAILABILITY OF EMULSIFIED & MICELLIZED VITAMIN PREPARATIONS

Micellized vitamin preparations have appeared in the holistic market accompanied by claims of greater absorption into plasma than both oily and emulsified forms. However, four factors negate this supposed advantage.

FIRST: Extensive basic and clinical research has shown that properly emulsified preparations are equal or greater in effectiveness than micellized preparations in tissue storage, utilization and biological effects. (Ellingston, RC, et al. "Relative Effectiveness of Vitamins A & D in Oil and Water; *Pediatrics* [1951] 8, 107-116)).

SECOND: Blood levels of vitamins do not necessarily correlate with biological use. (Smith, FR & Goodwin, DS; "Transport in Human Vitamin A Toxicity; *New England Journal of Medicine* [1976] 294, 805-808).

THIRD: Rapid increases in blood levels of vitamins from micellization can overload the normal mechanism of vitamin transport and metabolism, resulting in toxicity and tissue damage from non-specific properties of vitamins. (Mallia, AK, et al. "Metabolism of Retinol-binding Protein & Vitamin A During Hypervitaminosis in the Rat; *Journal of Lipid Research* [1975] 16, 180-188).

FOURTH: Micellized vitamin preparations are two to five times more costly than oily or emulsified products, thus making the

emulsified products the most cost-effective of all preparations.

All emulsions are not equal. Some studies have shown increases in absorption and storage for micellized preparations when compared to oil or emulsified forms. The reason for relatively poor results of these emulsions was the large size of the lipid droplets (some visible to the naked eye), reducing the effectiveness to only a little better than oily forms.

Biotics Research emulsions have reproducibly exhibited the smallest particle sizes upon microscopic examination when compared to other emulsions. Research appearing in the *American Journal of Clinical Nutrition* (1986; 43[6] #40) found that fat-soluble vitamins from Biotics Research:

1. Possess the smallest particle sizes of commercial emulsions.
2. Have equal or greater uptake and bioavailability than micellized products.
3. Show much less toxicity than micellized preparations.
4. Are the most cost-effective form of fat-soluble vitamin supplementation.

These results reproduce and confirm the consensus of results from over 40 years of scientific literature.

To order useful products for your patients, call Biotics Research at (800)231-5777 for product information.

All Emulsions are NOT Created Equal



Experiments published in peer-reviewed nutrition journals have confirmed Biotics Research's emulsified fat-soluble vitamins*:

- ✓ Possess the smallest particle sizes of commercial emulsions tested
- ✓ Have equal or greater uptake and bioavailability than micellized products
- ✓ Show significantly less toxicity than micellized preparations
- ✓ Are the most cost-effective form of fat-soluble vitamin supplementation

*Journal of Nutrition (1986) 116 (6), R27

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DIGESTION AND ABSORPTION OF FATS

Fats and oils, including fat-soluble vitamins are hydrophobic and are poorly absorbed in the aqueous environment of the digestive tract. Oddly enough, pancreatic lipase is water soluble, and can only work on the surface of fat globules. It is one reason why emulsifying fat-soluble vitamins makes them more absorbable.

Of course the body makes its own attempt at making lipid molecules into much smaller emulsion droplets. Bile salts and phospholipids have both hydrophilic and hydrophobic parts, and work to emulsify fats during digestion. The peristaltic movement of the small intestine helps to prevent the fat globules from being cohesive and to break them up into small droplets coated with bile salts and phospholipids. The action of the small intestine

and the gallbladder increase surface area for lipase to work more effectively.

Bile is very important for the digestion and absorption of fats and oil-soluble nutrients. Cholestasis, which is an impaired flow of bile, may interfere with absorption of fats and oil soluble vitamins. It triggers intense itching, usually on the hands and feet but often on many other parts of the body. Other less common signs and symptoms of cholestasis may include nausea, yellowing of the skin and whites of the eyes (jaundice) or loss of appetite. Biotics Research has two products that can help, **Beta TCP** to help thin the bile and **Beta Plus**, which actually contains bile salts. **Beta Plus** is highly recommended for patients who have had their gall bladder removed.