Supplement Binders, Fillers, and Additives: Making Sense of the Chaos

This is an area of great disagreement and debate, even among leaders in the functional medicine and scientifically-anchored, alternative health community. There are several areas in which it is well agreed on the need to avoid certain supplement additives (e.g. artificial colors, artificial sweeteners, partially hydrogenated fats). However, in many areas, the science is still quite unclear, and each practitioner must decide for themselves what to choose and what to recommend.

To support this inquiry, I am happy to share below an excellent article from the Naturally Healthy Concept blog (http://blog.naturalhealthyconcepts.com/2014/07/01/excipients-in-supplements/) which is as good as I have seen in giving a balanced and realistic assessment of common additives:

The kinds of people who choose to get their vitamins, supplements and other products from Natural Healthy Concepts are people who truly care about their health and well-being. In addition, many of those people may have certain dietary restrictions, allergies and sensitivities or even ethical standards that make them very interested in each and every ingredient contained in whatever they put in their bodies.

One issue that causes concern is the use of what are known as excipients in natural health products. Excipients are basically the extra stuff. They are inactive components which are often listed under “Other Ingredients” on our website and on product labeling.

Many times, these ingredients are used during manufacturing or as part of the encapsulation process. But how do you know what ingredients you should avoid, and what you shouldn’t have to worry about? That was what Natural Healthy Concepts customer, Alice, wanted to know. She sent us an email explaining her problem. Alice wrote:

“One thing that would be extremely helpful is if you could provide a page listing the ‘other stuff’ – the various types of capsules and what they are made of, fillers and so on. And with each one, provide information as to safety.”

That's what we’re going to try and explain in this article. You may have to do some further research based on your health requirements, and in the end you’ll have to make your own decision about what’s right for you. But we hope to at the very least give you a good place to start.

Types of Excipients
Before we break down the actual ingredients, let’s take a look at why excipients are used in supplements.

Fillers
These kinds of ingredients could also be referred to as bulking agents. The purpose of fillers is to add substance so that the size of a tablet or capsule is filled out. Fillers may also be described as carriers. And yes – that means some of the powder you see in the capsule isn’t the active ingredients you wanted to take. Fillers can be a wide range of things – from hypoallergenic rice flour and oils to more controversial ingredients like magnesium stearate. Some supplement manufacturers use fillers because without them – the actual active ingredients would be barely visible.

Keep in mind that some dietary supplements deliver the intended ingredients in micrograms. It takes 1-million micrograms to equal one gram. Things like iodine, folic acid and chromium have very small daily values measured in micrograms (mcg), which would leave even the smallest capsules looking practically empty.
Binders
Binders do exactly what it sounds like. They help bind the ingredients in a tablet together. Without something to hold the tablet together, supplements could easily shed some of the powder and even crumble and break apart. That would make it a lot harder to take the right dose. Binders also add volume to low active dose tablets.

Flow Agents
Some ingredients are added to supplements to help make the manufacturing process more efficient. Flow agents or flow enhancers make sure capsules move through the process smoothly and prevent things from sticking to machinery. While flow agents may not be necessary — they do help keep the cost of making supplements lower — which means the cost to customers like you is more affordable. In addition to flow agents, supplement manufacturers may also use lubricants, glidants and anti-adherents, all of which reduce friction and prevent manufacturing equipment from getting gunked up.

Acidulants
This type of excipient is only used in liquid supplements — particularly those containing water. The problem is that water is an ideal environment for microbial growth. Acidulants prevent unwanted bacteria from forming. While the same anti-microbial effects can be achieve through heat processing, supplements often contain ingredients that are heat sensitive. Fruits and vegetables are often the source of acidulants.

Disintegrants
If something is described as “fast-acting,” there’s a good chance it contains disintegrants. This excipient causes a tablet to break apart in your digestive tract and release the active ingredients into your body where they are absorbed. Disintegrants are formulated to dissolve when they come into contact with water or other liquids.

Coatings & Glazes
Coating a tablet is another way to keep it from falling apart and it protects the ingredients from exposure to humidity. A coating or glaze — like gelatin — may also make it easier for a person to swallow capsules. There is also enteric coating — which has a specific function. It controls the rate at which active ingredients are released in your digestive tract and can protect the supplement from stomach acid.

Coloring & Flavoring
Colors are sometimes added to enhance the appearance of a product, and flavors are often added to mask an unpleasant taste or to improve compliance. While traditional medication may use food dyes, that’s something you’d be very unlikely to see with a quality supplement manufacturer. The same goes for flavors. Supplement manufacturers tend to use natural flavoring, such as fruit extracts, in their products. Sweeteners may also be used in some products. With supplements it is usually a natural sugar substitute like xylitol rather than actual sugar (glucose/sucrose) or artificial sweeteners like aspartame, saccharin or high fructose corn syrup.

Preservatives
Again — it is unlikely artificial preservatives would ever be used in natural supplements. However, some natural substances are used to help improve shelf-life and protect against decomposition and bacterial growth or any other undesired chemical change. Natural preservatives could be actual antioxidant vitamins like A, C and E. They could be specific amino acids like cysteine and methionine. Familiar ingredients that are naturally derived like citric acid or ascorbic acid are other natural preservatives. Artificial preservatives include parabens, benzoates, sorbates, sulfites and more.
15 Common Excipients Used in Supplements

1. Magnesium Stearate
   *(Flow Agent, Binder)*

   The use of magnesium stearate in supplements is one of the most controversial topics in the industry right now. There are strong opinions from respected individuals on both sides of the debate. Magnesium stearate is a white powder that is most commonly used because it has lubricating properties. This keeps ingredients from sticking to equipment during manufacturing and lowers costs significantly. It can also help keep the mix of ingredients consistent through the process.

   The FDA considers magnesium stearate to be a GRAS (general recognized as safe) substance, and it says there are no “reasonable grounds” to suspect public concern used at current levels.

   There are some people who believe they have a sensitivity to magnesium stearate and try to avoid it. The main argument against magnesium stearate stems from a 1990 study (PDF), which found stearic acid (not actual magnesium stearate) seemed to inhibit T-cells in laboratory mice. T-Cells are known as natural killer cells and are an important part of the immune system.

   But many refute the study as inconsequential. Natural health advocate Chris Kresser points out that magnesium stearate wasn’t even used in the study, nor was the study conducted in the right way to make such conclusions.

   Other concerns include the possibility that magnesium stearate is toxic and could contain GMOs when it is made from hydrogenated cottonseed oil. However, this excipient can also be obtained from other sources. NOW Foods, for instance, uses non-hydrogenated palm oil for its magnesium stearate. It is also non-GMO, non-irradiated and certified Kosher.

   One final worry about magnesium stearate is that it could impede nutrient absorption. But most experts agree the tiny amount of this substance found on or in a capsule or tablet is too miniscule to have an impact on bioavailability.

   The vast majority of supplements (90% or more) contain magnesium stearate. You can avoid it if desired – but you will have most likely have to pay more because it is more time-consuming and costly to produce supplements without magnesium stearate.

   Get Both Sides of the Story
   - Chris Kresser on Magnesium Stearate
   - Dr. Joseph Mercola on Magnesium Stearate
   - Nutritionist Byron Richards on Magnesium Stearate

2. Stearic Acid
   *(Flow Agent, Lubricant)*

   Magnesium stearate is formed by adding magnesium to stearic acid. But straight stearic acid is another common excipient with a waxy consistency that makes it an effective lubricant. As a natural, saturated fatty acid, it is found in many foods – especially oils, poultry, soybeans and chocolate.

   Even though it is a saturated fat, it does not appear that stearic acid causes cholesterol to rise. According to Nutri-Dyn (PDF), the typical tablet is made of only 2% stearic acid. Since there is a much higher amount of active ingredients, stearic acid wouldn’t be able to coat nutrients and block benefits. Plus, it’s important to note that you’d get much higher stearic acid content in everyday foods than in a supplement. For example, an ounce of cheddar cheese contains more than 1100 mg of stearic acid and the average tablet might contain 20 mg.

3. Carrageenan
   *(Thickening Agent)*

   Another excipient that has become the center of controversy is carrageenan. This inactive ingredient is typically harvested from red seaweeds and is a common food additive found in everything from ice cream and soy/almond/coconut milk to vegetarian hot dogs and beer.

   It is a thickening agent that’s considered a vegan/vegetarian alternative to gelatin – which is derived from animals.
Studies on the safety and potential health risks of carrageenan are mixed. Some believe it can cause inflammation in the digestive system and more serious intestinal issues as well as possibly malignant tumors.

There are also worries that the seaweed used to make carrageenan could be contaminated by radiation from nuclear disasters – such as the one in Fukushima, Japan. This adds to fear that carrageenans could cause cancer.

Like magnesium stearate – views on this inactive ingredient are mixed. Some say to avoid foods containing carrageenans. Others say that evidence against its use is overblown. But because studies are still inconclusive – most natural health experts advise to at least use caution in consuming products with this ingredient.

People who have an allergy to MSG may also be sensitive to carrageenan.

More Information on Carrageenan
- Chris Kresser on Carrageenan
- Dr. Peter Weil on Carrageenan
- PDF from Cornucopia.org

4. Gelatin

(Encapsulation Coating, Binder)

Gelatin is an animal protein – which is why vegans look to avoid products containing it as an inactive ingredient.

It is typically made from the bones of cows and pigs, from which collagen is extracted. Supplement manufacturers may use gelatin to make hard and soft capsules.

For instance, so-called softgels contain active ingredients in a gelatin-based shell. However, there are also vegan and vegetarian-friendly forms of softgels.

Gelatin may also be used to help bind supplement ingredients together.

5. Titanium Dioxide

(Coloring)

Titanium dioxide is a widely-used pigment that is often chosen because it gives supplements a bright white color. (Yep – that’s it! No real purpose otherwise.) Titanium dioxide does not occur naturally in the human food supply.

It’s often used in popular brand name supplements such as those under the Centrum brand. Yet many other supplement manufacturers make it a point to say that titanium dioxide is not included. The biggest risk with this inactive ingredient is its possible risk to cause cancer. But the carcinogenic potential of titanium dioxide is still unproven and more studies are needed.

At Natural Healthy Concepts, you’ll find titanium dioxide used more commonly in beauty products such as makeup and not as often in products taken orally. It is believed that when coarse particles are used in cosmetics – rather than nano-particles – the titanium dioxide is not absorbed in skin.

Some health experts, like Dr. Mercola, suggest that the use of titanium dioxide in supplements is completely unnecessary. And it is easily avoidable if preferred.

6. Silicon Dioxide

(Flow Agent)

This excipient is another additive that helps prevent the active ingredients from clumping together. It absorbs moisture, which makes it an ideal anti-caking agent.

Silicon dioxide is completely natural. It is actually the main chemical compound found in sand and rocks. That’s also the reason why some people are adverse to it – they just don’t like the idea of putting sand in their bodies.

But one reason silicon dioxide works well as an inactive ingredient is that it passes through your body without doing anything. Your body doesn’t absorb any of it and it does not react or interfere with the active ingredients in your supplements.

7. Lanolin

(Diluent)
Lanolin is a wax substance – somewhat like petroleum jelly – that is derived from sheep’s wool. It is sometimes used in lip balms like Carmex. Lanolin may be added to some topical supplements, as well as health and beauty products as a diluent. It is used to dilute the product. Vitamin D3 can also be derived from lanolin oil. People who are concerned about mercury levels in fish oils may choose to get Vitamin D3 from this source instead. Because it is technically an animal byproduct – vegans typically want to avoid lanolin.

8. Glycerin
(Preservative, Sweetener, Lubricant)
Glycerin (or glycerol) is an inactive ingredient used in the pharmaceutical world as well as in supplements. It is a sugar alcohol that is often found in herbal extract tinctures. A mixture of glycerin and water is used to suspend the active ingredients in a liquid. Glycerin is a useful alternative to using ethanol. Glycerin has antimicrobial properties, which make it a good preservative. It also prevents tannins from forming in plant extracts. Tannins can bind to plant proteins and impede proper digestion. It also has a sweet flavor. However, it has a much lower glycemic index and the amount used in typical supplements should have little to no effect on insulin.

9. Calcium Carbonate
(Filler, Binder, Coating Agent)
Calcium Carbonate is another natural filler. It is commonly found in the shells of marine animals as well as eggshells. This ingredient is also regularly used in some calcium supplements and for antacids as well as toothpastes. Sometimes it is even added to almond and soy milk to fortify nutritional content. (We don’t recommend this as a primary ingredient or as an optimal way to absorb calcium). However, as an excipient, calcium carbonate is used as a diluent or filler in tablets and capsules. Excessive consumption of calcium carbonate could be harmful to your health. So if you’re already taking calcium supplements and getting calcium from your diet – you may want to be careful – because too much can be toxic.

10. Potassium Sorbate
(Preservative)
Potassium sorbate is generally used as a food preservative. It is the potassium salt of sorbic acid. In natural health products, potassium sorbate is used to prevent the formation of unwanted microorganisms in personal care products. It is often added as an alternative to parabens. This excipient is used in small amounts to increase the shelf life of herbal supplements. Some people avoid potassium sorbate because it is typically created synthetically. Excessive use or a sensitivity to this ingredient could cause nausea and indigestion. Potassium sorbate has been extensively tested for safety. However, some people are allergic to it.

11. Cellulose
(Binder, Filler, Coating)
Cellulose is an organic compound that is a structural component of cell walls in green plants. In supplements, it is mainly used as a binder or filler. It is sometimes referred to as a form of dietary fiber. Humans don’t absorb much of it, but it does aid in normal digestion. As a binder, cellulose helps hold tablets together, but it also works as yet another anti-caking agent and as a thickener in food products. Because it has no caloric value, cellulose may be used as a bulking agent. It adds weight to dietary foods while reducing caloric intake. Plant cellulose is commonly used in many dietary supplements.

12. Hydroxypropyl methylcellulose (HPMC)
(Lubricant, Binder, Controlled Release)
Hydroxypropyl methylcellulose or HPMC is a semi-synthetic food additive that is also used in some supplements.
As an excipient, HPMC may be added to liquid drops for the eyes because it extends lubricant time. In oral tablets, HPMC works to control the release of active ingredients. That means nutrients in supplements can make it through stomach acid and be absorbed deeper in your digestive tract. Hydroxypropyl methylcellulose is even sometimes used as a replacement for gluten in bread-making and as a substitute for animal gelatin, which is why it is sometimes used in vegetarian capsules. But because it is not all-natural, and is also used in certain construction materials – such as adhesives – some people are opposed to having it in their supplements.

13. Palmitate
(Lubricant, Preservative)
Palmitate is among the most common fatty acids. It comes from the oils of palm trees. Used as an excipient, it can improve the flow of the powder used to make tablets and help the tablets eject from the press that shapes them. Ascorbyl palmitate is a fat-soluble form of vitamin C that is sometimes sold as a supplement on its own. Retinyl palmitate is the ester of Vitamin A. But neither of these is the inactive ingredient. The World Health Organization has said there is evidence that consuming palmitic acid could increase the risk of developing cardiovascular disease. Some classify it in the same category as trans-fatty acids – but there is controversy over its effect on cholesterol.

14. Citric Acid/Ascorbic Acid
(Flavor Enhancer, Preservative)
Citric acid and ascorbic acid are often used as food additives. They can add a citrusy flavor to mask the taste of other ingredients. These inactive ingredients are used as antioxidant preservatives. Bacteria struggles to grow in an acidic environment. Citric acid may also be used as a disintegrant, as it can make it easier for your body to absorb certain minerals – including calcium. Ascorbic acid is the same as Vitamin C. However, citric acid has no Vitamin C content. Both are generally considered safe – but some people have concerns about these ingredients being derived from sources containing hidden GMOs. (It is also true that some individual experience gastrointestinal distress in taking in much citric acid – another good example that individuals are unique! People also have unique bowel tolerance to Vitamin C intake; in small quantities as filler, this is seldom an issue.)

15. Xylitol
(Sweetener)
Xylitol is usually extracted from birch wood or certain fruits for use as a sugar substitute. You'll often find it in things like sugar-free gum, mints and toothpaste. Xylitol is absorbed more slowly in the body, which can alleviate concerns for people watching their blood sugar levels. It's also ideal for oral health because bacteria cannot use xylitol to produce energy – which may in turn help prevent tooth decay. While it is considered safe for human consumption, it could be potentially lethally poisonous to your pets. So it is important to keep it away from animals. It can actually cause a sharp drop in a dog's blood sugar that could be life-threatening.

Here’s What Will REALLY Surprise You!

Get this…
The law requires manufacturers of supplements to list all non-medicinal ingredients on the label so consumers know exactly what they are putting in their bodies.

However – there is no such law for the pharmaceutical industry. Listing inactive ingredients is only voluntary. This is a perfect example of the misconception surrounding how supplements are regulated. It’s not the free-for-all many people claim it is. And in cases like this – the rules are much less stringent for traditional drug makers.
The American Academy of Pediatrics has even pushed for mandatory labeling of inactive ingredients on pharmaceuticals: "Since voluntary labeling was adopted, the legislative push for mandatory labeling has been abandoned, other than for nutritional supplements. A recently published survey of labeling on 102 chewable and liquid pediatric preparations found that only 90% labeled sweeteners, 80% labeled dyes and coloring agents, and 65% labeled preservatives. Although 90% of the preparations labeled flavorings, few provided the specific ingredient, in accordance with the voluntary guidelines. Therefore, the voluntary system is clearly inadequate."

And there are many more excipients found in pharmaceuticals. Just take a look at this database of inactive ingredients from Drugs.com.

**The Bottom Line**

Most inactive ingredients are probably so miniscule that they pose little to no health risk to those who take them. However, everybody's body is unique and we each react differently to different things. Plus, you also have to take into account what other supplements and medications you are taking and how certain things could be accumulating inside your body over time.

That's why it is always good to discuss the medications, vitamins and supplements you are taking with a healthcare professional. They can help you in considering any allergies or other health conditions you may have.

Natural Healthy Concepts chooses to work with manufacturers we believe you can trust. Brands like NOW Foods explain their choice to use excipients like this: "Although excipients do not contribute significant nutritional benefits, their function remains unquestionably essential. NOW's use of excipients, however, is governed with extreme caution and only in limited amounts. We scrutinize excipients like all our ingredients for safety, effectiveness, and quality. We look for ingredients that are safe for people with allergies and acceptable for people who are vegetarian."

That philosophy is closer to the rule than the exception when it comes to the vast majority of brands you'll find at Natural Healthy Concepts. They are responsible and often choose only to work with licensed healthcare professionals – like our founder, certified nutritionist Theresa Groskopp.

However, if you absolutely must have supplements that contain no excipients – you'll find many products at Natural Healthy Concepts making that guarantee. Check out our excipient-free products here, and find the perfect product to support your health.

Another good option is to take your supplements in a powder or liquid form. Since these types of supplements are not formed into tablets or encapsulated, they are less likely to contain excipients.