Are Phytosome Herbal Extracts Worth It?

Recently, while shopping at my local nutritional supplements store, I was faced with a dilemma: should I shell out more money for an herbal extract that was prepared using the **patented phytosome technology** or opt for the considerably **cheaper regular extract**? I then was made to recall an incident at the same store concerning a very similar quandary.

I overheard a woman loudly exclaim, "It's a no-brainer!" while grabbing the large, cheap bottle of raw herb when confronted with the higher price tag on the more refined herbal extracts in the smaller bottles. Whenever I hear that expression I reflexively cringe and immediately become wary. My supplement store dilemma, along with this unpleasant memory, initiated an investigation into **phytosome-prepared herbal extracts**. I sincerely hope you will find the results of my investigation beneficial in your own herbal supplements shopping.

Let's breakdown the word **phytosome**: phyto=plant, some=cell. "Plant-cell" you say, well no. "Phyto" here refers to the plant constituent that is the target of an herbal extract. For example, my dilemma was brought about by the herbal extract of **hawthorn** (*pictured above in the lead image of this post*). **Vitexin** is thought to be the active ingredient in hawthorn, responsible for its reputed heart and cardiovascular health effects and is the *phyto* in this case [1]. The *some* or cell part of the preparation is created using **phosphotidylcholine** and is the same for all phytosome preparations.

The phospholipid – phosphatidylcholine – contains two unique parts to its structure: one part is **hydrophilic** or "water-

loving" and the other part is **hydrophobic** or "water-hating." What this all boils down to is that these phospholipid molecules will assemble themselves into a cell-like membrane and structure when placed in water. Think of a **red blood cell** and the **hemoglobin** contained within. The vitexin in our case is chemically bonded to the choline head group of the phospholipid. The only way "to get the picture" is to get the picture. A picture is indeed worth a thousand words – seriously, click on the reference link.

Let's look at the schematic more closely [2]. Those things that look like tadpoles with two tails are the phosphotidylcholine molecules. The triangles inside the tadpole head are the phytos, and in our case, represent the vitexin molecules.

The schematic also addresses another issue that needs clarification. The top half is labeled as a **liposome**. This differs from a phytosome in that the extracted plant chemicals are floating freely in the liquid center. Some readers may be familiar with the liposomes used in the **cosmetics industry** in lotions and creams to deliver substances to the skin. We will shortly see why this distinction is important. **Hint**: compare the number of triangles to double-tailed tadpoles in the top (liposome) to the bottom (phytosome) parts in the previously referenced schematic.

So why go through all this trouble to prepare a herbal extract as a phytosome preparation?

Phytosomes are used mainly for herbal extracts containing **polyphenols** which are water soluble. Vitexin is a type of polyphenol. Large water soluble substances are poorly absorbed through the intestinal lining and phytosomes present a way to overcome this by enclosing these substances in a lipid soluble structure [3].

There is also the other problem of the active compound being destroyed by the harsh environment of the stomach and its gastric juices before even reaching the intestine. Incorporation of the extract into the phytosome protects it [3, 4].

I thought by doing this post it would provide a respite from

mentioning gut bacteria, but it seems there is no rest for the weary. Some gut bacteria will “eat” polyphenols that make it to the intestine. In some cases, this might not be entirely bad as the byproducts of bacteria consumption may have their own health benefits [5]. So packaging of an extract as a phytosome would prevent it from being available to bacterial degradation.

Furthermore, the chemical bonding of the plant compound to a phoshotidylcholine molecule in a phytosome provides greater stability and protection than the freely-floating compound within the liquid center of a liposome and allows for greater packaging of the compound than a liposome [6].

I recently watched the movie *Troy* and this suggested an analogy: packaging phytonutrients in a phytosome is like packaging Greek warriors in a Trojan horse. In the former to make it through the intestinal wall to the bloodstream intact and in the latter to make it from the beach and then through the Trojan Wall intact.

So what exactly is the evidence that phytosome preparations provide better absorption over regular extracts?

In many cases, it’s indirect. Parameters associated with an herbal supplement, say lipid profiles, were found to be positively affected by phytosome preparations and superior

over regular extracts [7]. However, no attempts were made at measuring the actual appearance in the bloodstream.

One study looking at the uptake of a component of **milk thistle** from a phytosome and non-phytosome preparation was studied in gall bladder surgery patients [7]. The appearance of the active ingredient in the bile was measured and it was found that the phytosome preparation was superior over the regular extract with four times greater passage through the liver for the phytosome version.

Another study where human subjects were given phytosome silibinin or regular silymarin extract found seven times greater plasma levels of silbinin with the phytosome preparation [7]. I do have a problem with this study however; the phytosome preparation used pure silibinin which is one component of silymarin extract. This particular study used an amount of silymarin that had the equivalent amount of silbinin of the phytosome preparation to overcome this discrepancy. For a proper control, a non-phytosome, pure silibinin extract should have been used. The devil is often in the details (methods) of a scientific study.

Below are some other human studies [7]:

- In a Gingko biloba study 2 to 4 times greater plasma concentration of terpenes was achieved over non-phytosome preparation.
- In a green tea polyphenols study plasma concentrations of polyphenols more than doubled over non-phytosome preparation.

Unfortunately, I could not find studies on hawthorn phtyosome and plasma levels. Phtyosome research for now seems to be focused on **milk thistle**, **green tea polyphenols**, **grapeseed extracts**, and **gingko biloba**.

Okay, so what about just taking more of the cheaper variety to

compensate for its lesser bioavailability, which the lady in the supplements store proclaimed as a no-brainer? The price of my hawthorn regular extract is $5 for 120 capsules of 250 mg extract standardized to 1.8% “hyperosides” while the phytosome is $20 for 60 capsules of 300 mg of 3% vitexin standardized extract.

First, we are confronted with the problem that one extract is standardized to 1.8% “hyperosides” while the other is standardized to 3% vitexin. Hmm, okay. I’m putting “hyperosides” in quotes because hyperoside is a specific compound and not a group of compounds, as in say polyphenols, so don’t know why it appears in the plural form on the label. If you look at the molecular structure of the two they are pretty damn close, differing by only a hydroxyl group. But in the world of biochemistry, any minor change in a molecule can have a huge biological effect. **Methamphetamine** and **pseudoephedrine** vary by only one measly hydroxyl group – just ask Walter White or perhaps Jessie. “Science, bitch!”

However, these are relatively crude extracts and since vitexin is present in greater amounts than hyperoside in the leaves and flowers and would be co-extracted with hyperoside the non-phytosome extract may have similar levels of vitexin as the phytosome extract [8].

For simplicity’s sake, we will say both have similar amounts of active ingredient, capsule for capsule. If we were seeing four to seven times greater absorption we would need to take four to seven times more of the regular extract. Let’s go with the lower ratio of 4 times. This would work out to saving approximately ten dollars if we were to quadruple the dose of the regular extract. It should be noted that it may be naive to assume taking more of the regular extract can overcome this difference in absorption.

I’ve made some pretty liberal assumptions in the above calculations to get to a point. The pharmaceutical industry

knows that people in general don’t relish taking pills and they go to great lengths to devise formulations to reduce the number of pills one has to take. I know, I don’t enjoy choking down a bunch of pills, so we must also consider intangible factors.

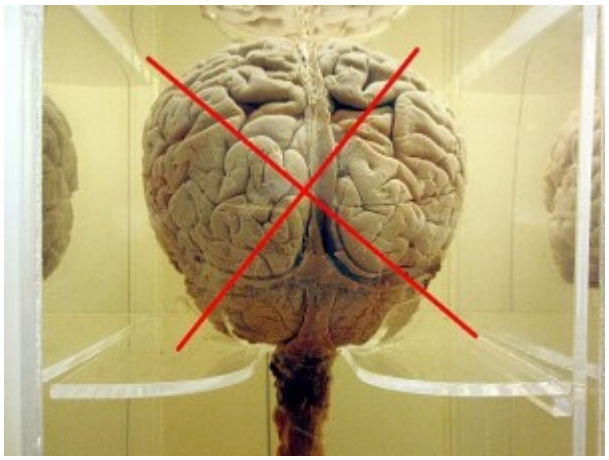
Furthermore, we may be unwittingly ingesting more unwanted compounds by increasing the number of pills taken of an extract. Plants can contain heavy metals, pesticides, or even co-occurring toxic compounds. Crude extracts could very well concentrate these undesirables, so less of an extract taken is probably better in the long run.

However, there is a much greater consideration.

The aforementioned studies often found *that not only were the phytosome compounds better absorbed, but they also stayed in the bloodstream longer*. Therefore, we not only have to take more of the regular extract, but also *we need to keep re-dosing to compensate for the more rapid clearance of the non-phytosome preparation*. This would also suggest that the phytosome is protecting the compound in the bloodstream from being degraded and thereby aiding in getting it to the site within the body where it’s being targeted.

Finally, if the compound needs to affect its action inside the cell then it would exhibit the same barriers to getting through the intestinal lumen as through the cell membrane.

This barrier could potentially be overcome by a phytosome prep.



Bottom line: I've convinced myself that the phytosome preparation is the one for me – it's a genuine "no brainer." But I may have to start a cloud-funding campaign to purchase it!

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- *Brain: Yoel (red x added by me)*

Berberine Supplement Analysis

A subset of people interested in low-carb diets have issues with insulin resistance, high fasting blood glucose levels, and potentially type 2 diabetes. Berberine, a yellow compound occurring abundantly in some plants, has been drawing some attention in the low-carb blogosphere. This is due to both its folk use along with scientific research showing positive effects on insulin and glucose control. On a side note, my first encounter with berberine was while working as a researcher for the Department of Agriculture. We used it in the lab for histological work to stain cells.

This post will explore some of that research, along with availability and cautions regarding self-treatment with berberine. In addition, we'll look at berberine in a head-to-head matchup with the popular prescription, glucose control medication, metformin.

At the outset, a cautionary note should be given to those operating under the, "Natural Supplement Product = Perfectly Safe and Superior to Big Pharma's Pills" worldview. Berberine is available in its pure form as an over the counter (OTC) supplement. This type of potency is rarely seen in the supplement herb market where extracts are standardized to contain some fraction of the compound. Please see my post on the standardization of herbal supplements for more on this issue.

Furthermore, berberine is a benzylisoquinoline alkaloid. Morphine is also a benzylisoquinoline alkaloid. In fact, there is a host of natural and synthetic isoquinolines with potent pharmacological properties. As a result, berberine supplements have the potential to possess both the potency of a pharmaceutical as well as the potential towards toxicity.

The Chinese have a long-standing relationship with berberine. Berberine containing plants were mentioned in ancient Chinese texts over 2,000 years ago for the treatment of infections.

More recently in 1988, Chinese researchers noticed a beneficial effect on glucose parameters in diabetic patients given berberine for diarrhea. Since then, there has appeared quite a bit of research showing positive effects on glucose and insulin control. These studies run the gamut of experimental subjects and protocols: mice and rats, isolated cells all the way to human studies. The bulk of this research is coming from Chinese institutions and researchers [1].

Berberine has been proposed to work in a multitude of ways. Some mechanisms include:

- Increases AMPK activity which has a variety of actions and requires its own posting [2,3].
- Increases glucose uptake and utilization [4].
- Increases glycolysis and inhibits oxidative phosphorylation [5].
- Inhibits glucose production in the liver [6].
- Has a positive effect on the insulin receptor [7].
- Has a positive effect on beneficial gut bacteria, which is a subject that is worthy of its own post [8].

Metformin, the pharmaceutical agent used as a treatment option for type 2 diabetes, works in ways similar to berberine. Metformin isn't all that far removed chemically from compounds built around the molecule, guanidine, found naturally in some plants. In fact, metformin consists of two guanidine molecules linked together.

One such plant is goat's rue, which was used in the middle ages to treat diabetes. It was later found to contain guanidine compounds responsible for its glucose lowering properties. In fact, these plant compounds were found to be too toxic to use pharmaceutically for the treatment of type 2 diabetes, but led the way to metformin's development [9].

In one study comparing metformin to berberine, it was found that both had similar beneficial effects on HbA1c, pre and post meal blood glucose, and insulin. However, it turned out that berberine had a greater beneficial effect on triglycerides and cholesterol [10].

Other human and mice studies support berberine's effect on lipid profiles by reducing LDL (bad) cholesterol and triglycerides by up to 16 percent and 23 percent respectively [11,12].

What about cost of the two?

A post on berberine by Evelyn aka CarbSane on her blog quotes a month's script for metformin at $4/month and compares it to Glycosolve, a supplement formula containing berberine, at $30/month. Swanson Health Products sells generically labeled, berberine, at $10 for a month's supply. I suspect one is paying in part for the fancy name (among other things) in the Glycosolve product.

However, there are some other differences—tangible and subtle—between metformin and berberine.

You will need a prescription and a doctor's approval for metformin. This is not the case with berberine. I can walk down the street to my friendly retail supplement store and buy a bottle of pure berberine. This gives some empowerment to the individual with glucose issues, but also comes with added responsibility in the form of precautions.

Considering that berberine has statin-like qualities that

metformin doesn’t appear to have, it could provide a potential benefit to those having to take metformin in addition to a statin as statins come with added costs and side effects. The typical dose of berberine is 500 mg before each meal. I suspect there will be products in the future that claim better absorption properties since berberine has poor oral bioavailability [13].

I’m certainly not advocating that you rush out and load up on berberine, quite the contrary. As mentioned earlier, prescription version or OTC, berberine is still a powerful substance with definite effects on your endocrine system. It’s in your best interest to discuss the possible use of berberine with your doctor. Perhaps more conservative means can be tried first to control blood glucose such as diet and activity modifications. A graduated protocol beginning with very conservative treatments and only progressing to more aggressive ones when necessary is almost always the best approach when it comes to your health. Taking a drug – prescription or natural – is no exception.

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- *Berberine Bottle: Rob Rojas (not morguefile.com)*
- *Chinese Writing on Rock/Guilin, China: SamHakes*
- *Blood Sampling: cohdra*
- *Pharmacy: calgrin*
- *Statue with Scale: southernfried*

Standardized Herbal

Supplements – Digging Beyond Percentages

> *I'm delighted to welcome **Rob Rojas** as an occasional contributor to the PracticalCarbs.com blog. He's chosen as his first topic the vexing issue of standardization for herbal supplements. He's covered this issue previously on his own blog and expands upon it further here. **Warning**: contains some mild chemistry lingo along with some very basic math. - Rich Rojas*

The greatest advance in the herbal supplements industry has been the introduction of standardized products to the consumer and researcher. The standardization process brings herbal supplements more in line with prescription medicines in terms of potency and consistency. In short, these products typically contain plant material that has been extracted in such a manner as to concentrate the active ingredient(s) to a specific concentration, which in turn, requires verification by various analytical methods.

While great for the consumer, it can be a daunting undertaking when navigating the aisles of your favorite retail store or browsing nutritional supplement sites online. This is because there are often a variety of standardized products for a single herbal product. By way of example, I'd like to take you along with me as I have a look at a one specific herb (Turmeric) and the various products for sale containing it in

one particular store near where I live. I think it will be enlightening.

Turmeric is known for its anti-inflammatory properties. It's also been getting its fair share of press recently for its possible roles in preventing the development of Alzheimer's disease and for use as an antidepressant. It also happens to have one of the widest selections of standardized forms of all the herbal products in the store that I checked, so a great one to start our investigation with. The active part of turmeric is thought to reside in a class of compounds called curcuminoids and this is what we'll focus on.

A Dizzying Array of Options

First, we'll head towards the end of the 'T' section, where just beyond the Turkey Tail Mushroom bottles, we encounter our quarry. The first specimen is a Full Spectrum Turmeric with a rather generic looking black and white label. The term Full Spectrum kills me. It's akin to calling a burrito a "wrap." In reality it's just the unprocessed, ground-up turmeric root

stuffed into 00-size gelatin capsules. Yes, the same stuff that is in the turmeric spice jar from the supermarket. I reflexively smack my head and then look around to see if anyone was looking.

You can actually see the presence the curcuminoids in the raw spice. They're responsible for the characteristic yellow-orange color and annoying stains. Typically, the raw spice has 3.14% by weight, curcumin, which is its major curcuminoid. A bottle of 240 capsules of 720 mg each costs a whopping $1.99 which comes out to less than a penny per capsule. Going by the 3.14% by weight figure, one capsule should contain about 22.6 mg curcumin (720mg x 0.0314). But this is mere conjecture, since there is no standardization. Not that the raw spice couldn't be standardized. It would require that it be tested in the lab for curcumin content and then state on the label the percentage of concentration.

Sticker Shock

We next come upon a product labeled "Turmeric Phytosome with Meriva." The first thing that jumps out is a fancier label which dollars-to-donuts is probably going to mean a higher sticker price. Looking at the back-of-the-bottle label, we find that it is an extract standardized to contain 18%-22% curcuminoids. Note that this is not specific for any one curcuminoid, but if we assume the majority is curcumin, this would be about a 67% increase in curcumin content over the raw unprocessed product. Each 500 mg capsule would contain 110 mg curcumin (500 mg x 0.22). Just like the carat system in gold pricing, the higher the curcumin content, the higher the price. It turns out sixty 500mg capsules cost $10.99.

A bit further down, we find ourselves in the high-rent district. A product labeled "Curcumin Complex" presents itself and the back label shows it is standardized to contain a whopping 95% curcuminoids. But wait, there's a further breakdown: 73-83% Curcumin, 14-24% Desmethoxy Curcumin and

2-4% Bisdemethoxy Curcumin. For this type of breakdown, a more sophisticated analysis must have been required than the previous product, which along with increased curcumin content, is reflected in the price: $17.99 for sixty capsules. Doing the math, we would expect each 875 mg capsule to contain 682 mg curcumin (875 mg x 0.78).

So far things have progressed as one would expect: move down the line of products and one goes from raw (unprocessed-unstandardized) product of approximately 3.14% to 18-22% and then to 73-78% standardized curcumin. The price increases from 2, 11 to 18 dollars a bottle respectively. However, there are two other products lurking in the hinterlands before getting to the Uva Ursi that aren’t following the pattern of increasing curcuminoid content. It’s tough to do much better than 95% curcuminoids.

What Your Body Can’t Absorb is Money Down The Drain (Literally)

The products on the outskirts attempt to address a problem with curcuminoids: due to their low solubility in water, they’re not readily absorbed. All that effort by the manufacturer to come up with a product containing 95% curcuminoids in the end offers little benefit to the consumer if only a fraction is capable of being absorbed. That’s why the previous standardized products had either Bioperine or was prepared as a Phytosome. Both formulations attempt to overcome the absorption problem.

These last two outliers are “Advanced Tetrahydro-Curcuminoids” and “Theracurmin.” Advanced Tetrahydro-Curcuminoids is standardized to contain 95% tetrahydrocurcuminoids, which are hydrogenated curcuminoids and theoretically more bioavailable. The cost is $14.99 for sixty 200 mg capsules. Finally, Theramin would seem like an anomaly standardized to a mere 8.5% curcumin and the most expensive at thirty 300 mg capsules for $14.99, however, it’s in a colloidal form which again tries to deal with the low absorption problem.

Hopefully, this little adventure will have begun the discussion of the challenges of standardizing herbal supplements and the attendant confusion it generates for the consumer. Though we just focused on turmeric here, the variations in both contents, concentration of the active ingredient, and perhaps most importantly, the ability of the human body to absorb it, extend to most other herbs. We’ll have ample opportunity to explore these issues with more of the popular herbal supplements in future posts, so please stay tuned!