

## Rebuild from Depression

Amanda Rose, Ph.D., Forthcoming 2007

### Chapter 13: Grains and Legumes

#### *Excerpt: Phytic acid and mineral loss*

In the research for this book I am struck by the solid research about phytic acid and yet the American public's relative lack of knowledge about its effects. I certainly never heard about them in my vegetarian days, yet they have profound implications for the vegetarian diet. Some nutritionists estimate that vegetarians whose primary source of protein comes from grains and legumes absorb only about 15% of the minerals in those foods. Based on the research I present here, that is a fair estimate, though absorption from soy-based foods is even lower. If you are a vegetarian, you can very quickly double the minerals you are absorbing by using the techniques I describe.

#### **Phytates Matter**

Whole grains and fresh legumes are problematic, unfortunately, because of their naturally high level of phytic acid, which inhibits the absorption of key minerals that we are trying to increase in our diets: zinc and magnesium specifically. Phytic acid binds to minerals in your digestive tract and escorts them out through your bowels. There will be no cell-building or body-building with these minerals, even though the label on the grain or legume suggests you are eating mineral-rich food. Research has shown that phytates inhibit the absorption of significant levels of minerals in the phytate-laden food. The iron in your soybean will not help rebuild your body if you do not break down the phytic acid first.

Researchers have conducted experiments on mineral absorption that show clearly that phytates matter. A study of iron absorption in cereal porridges found in some cases a 12-fold increase in the absorption of iron when the phytic acid was removed from the food. Participants absorbed only about 1% of the iron in their

wheat porridge but that absorption rate increased to 12% when the phytic acid was removed (Hurrell et al. 2003).

Another set of experiments examined depression-fighting zinc and magnesium. Researchers provided two groups of people with bread – one group with a bread with phytates and one with a control bread with the phytates removed. Researchers then studied participants' mineral absorption via stool samples. Without phytic acid, participants absorbed about 30% of magnesium and zinc. With phytic acid, participants absorbed only 13% of their magnesium and 23% of their zinc (Egli et al. 2004; Bohn et al. 2004).

These results make clear two points. First, we absorb relatively little of the minerals in our food even when there are no phytates present. Keep this in mind as you read food labels. All of the nutrients on the label will not make it into the cells of your body. Second, even in products lower in phytic acid, we can absorb about 50% more minerals if we could reduce the phytate content to zero. In higher-phytate foods such as soybeans and whole wheat, we might more than double our absorption of minerals if we can reduce the phytate levels to zero.

### **The solution in your kitchen**

Some grains and legumes are high in phytates, some are low. As a class, milled grains such as white flour, are low in phytates. Do not worry about phytates in your white flour (and you are cutting back on that anyway). For our purposes here, what turns out to be the more important question is how to reduce the phytic acid content of our foods and what grains and legumes prove to be wily exceptions to these techniques.

### **Rise time, soaking, and sprouting: putting the enzyme phytase to work for you**

For the most part, if grains and legumes are allowed to sit and stew for a while in warm water with a slightly acid medium, their

phytic acid level will decline. These techniques will fight your phytates:

- 1) Take advantage of bread rising time. As yeast bread dough sits and is allowed to rise, the phytic acid content will be reduced. Sourdough techniques are generally the most effective if only because the rise time tends to be longer and the lactic acid in the starter breaks down the phytates.
- 2) Use sourdough techniques for flatbreads, quick breads, pancakes, and waffles. We turn every quick bread into a sourdough around here and have a “cheater’s sourdough” process in the Appendix and recipes from my mom on the website.
- 3) Soak grains for porridges. Your breakfast porridge should be soaked in advance of cooking, as should grains to be used in dishes such as tabouli. Ground grains are preferable to whole kernels since the phytic acid breaks down easier. Follow these steps:
  - a. Soak in water, about equal parts water to grains (enough to cover them well).
  - b. The water temperature should be between 45° and 55°C (113-131° F), just above body temperature.
  - c. Add an acidic ingredient to water to achieve a pH level of 4.5 to 5.5. For best results use whey, yogurt, or kefir (approximately 2 tablespoons per cup of grain). Otherwise add about 2 tablespoons of lemon juice per cup of grain.
  - d. Cover with a clean dishcloth to keep the bugs out.
  - e. Soak in a warm spot for at least two, and at best, twelve hours.

- 4) Germinate grains and legumes. Make sprouts to reduce phytic acid. Sprouted grains are used in higher-end health breads increasingly. These are great options particularly for flat breads such as tortillas and pizza crusts. Germinating will increase the folate content as well.
- 5) Soak your beans in very warm water (140° Fahrenheit) for about 18 hours in a warm spot. I start mine one morning and cook them the following evening.

You will find a fairly extensive discussion of each of the above five areas on my website.

### **Two exceptions: oats and soy**

If you eat a lot of oatmeal or soy products, keep reading. You need to know that the basic techniques to reduce phytates are not very effective in these two cases. Oats, soy, millet, corn, and sorghum are known to be low in phytase, the enzyme that breaks down the phytic acid. I focus on oats and soy here because they are the most common. If you consume a large amount of millet, corn, or sorghum, you can adapt some of the methods I describe for oats and soy.

### **Oats**

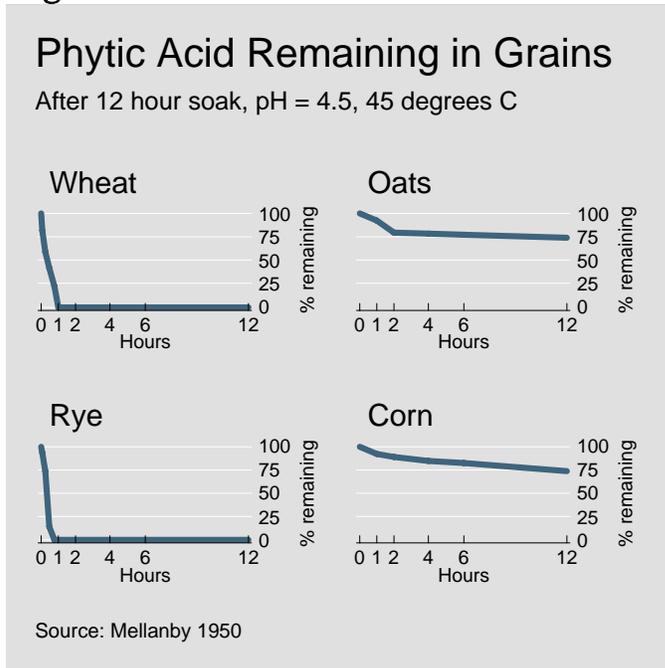
In a 1950 study, Mellanby reported an experiment reducing the phytic acid content of various grains which I present in the figure below. Note that with rye and wheat it takes only two hours to reduce the phytate content under optimum conditions. With oats and corn, soaking for 12 hours is insufficient – the phytic acid levels are still about 75% of their original levels.

**Simple solution: Add fresh ground wheat to your oats.**

When making oatmeal, use about 10% fresh ground wheat and follow the instructions I provide above on soaking. Grind this small amount of wheat in your coffee maker if you do not have a grain mill. (For larger quantities, purchase a grain mill before you burn out your coffee grinder.) I do not highlight corn because

baking with corn almost always includes wheat. For corn bread, follow the instructions in the Appendix on turning a quick bread into a sourdough. The wheat in the corn bread recipe will help break down the phytates in the corn.

**Figure 14.1**



## MAKE ONE CHANGE WITH BREAKFAST

Replace your breakfast cereal with whole grain, ground porridge. Soak that porridge overnight according to the process described in this section.

You will benefit twice: (1) by replacing a processed cereal with a whole grain alternative and (2) by reducing the phytate content of that cereal grain.

It's fast: Because of the soaking, your breakfast cereal will cook in 1-2 minutes, making it a fast and easy breakfast solution.

Add fat: Use butter from grass-fed cattle. The fat will help your body absorb the minerals in the cereal and will add Omega 3 fatty acids to your meal.

And when you're feeling ambitious: Buy the whole grain kernel and grind your cereal grains fresh just before soaking.

## **Soy and its unavailable minerals**

In this house, soy products used to be a staple. We valued them for their low cost and high protein and mineral content. One of those 12 ounce tubs of tofu has 100 milligrams or so of magnesium. That's 25% of the recommended daily intake of magnesium. It's too bad that only about 10 milligrams are absorbed into your body. To make matters worse, there is some discussion in the nutrition literature that the phytic acid in soy may make soy protein less useable for our bodies (Reddy et al. 1989, 57-69).

A study of phytic acid in soybeans documents in detail the phytic acid level at different stages of preparation. I provide many of those stages in the figure below. Keep in mind that the activities I list in the figure are successive: the researchers boil the beans, pour off the water, soak them again, dehull them, steam them, drain them, and cool them. The phytic acid levels change very little with all of this effort.

It is only when they ferment the beans in the form of tempeh that the phytate levels reduce to about 45% of the levels of the soaked soybean. Fried tempeh is an improvement still, but if the tempeh is stored for two weeks at 5°C and then fried, the researchers reached the optimal (but not perfect) reduction of the phytic acid. A 2003 study also found that the phytic acid level decreased by only 31% by fermenting soybeans (Egounlety and Aworth 2003).

Keep these results in mind as you shop for soymilk and tofu. Soybeans in soymilk are soaked, strained, and cooked. Tofu has an additional step – a coagulant is added. Both of these products retain nearly 100% of the phytates according to the results of the research I present. Eat tempeh for a soy fix, but eat it sparingly if you do not prepare it yourself and do not know that traditional preparation methods were used. Soybean fans should learn to ferment soybeans in their own home using traditional fermentation techniques. I provide more information on my website.

<<<Figure 14.2 about here>>>

People who make their own soy milk and tofu might be able to improve them if not through fermentation techniques, by soaking them with a high-phytase grain such as wheat. Researchers have combined grains and legumes strategically to reduce the phytates in one item with the phytase in another. In the case of soybeans, researchers included only 20% soy and 80% wheat. They successfully reduced the phytic acid in the porridge. Homemade milk aficionados might use a similar strategy. There is no research that I am aware of that would direct us with the proper ratio of soybeans to wheat to make a soymilk. I do not eat soy so this is an idea for experimental cooks who do.

### **Alternative milks**

Speaking of soy milk, phytates are a problem in all of the alternative milk products available in the market place except perhaps rice milk made from white rice (which we are reducing in our diet anyway). Brown rice, nuts such as almonds, and soy all have phytic acid. If I relied on alternative milks for their nutrients, I would try to make them myself. I would use the soaking strategy for rice I outline above or for nuts and seeds that I outline in the next chapter and then follow the usual process for making these milks.

### **Phytates can be therapeutic**

There is increasing discussion in research that phytates play a role in cancer prevention. Indeed, the bad news about phytates is that they inhibit mineral absorption. The good news about phytates is that they inhibit mineral absorption. Sometimes it's all about perspective. Here's the key question: What's more important for you now, increasing your body levels of magnesium and zinc or decreasing your levels of iron? For younger women reading this book, low iron is more likely a problem than high iron. For women who are post-menopausal, high iron may be a problem. Excess iron is implicated in disease as well and phytates in your diet is an effective way to reduce your body's iron levels.

Depending on your own circumstances and stage in the life cycle, your needs are going to be different. Pick and choose the food preparation suggestions in this chapter accordingly.

*To-Do List: Grains and Legumes*

- For flat breads such as tortillas, pocket bread, pizza crust, pancakes, and waffles find sprouted or sourdough varieties.
- Turn quick breads into sourdough breads using our cheaters' methods.
- Soak your breakfast porridge or your grain dish (about 120° Fahrenheit with a bit of yogurt or lemon juice for 2-12 hours).
- In porridges, eat ground grains instead of whole kernels.
- Add rye flakes to your oatmeal before soaking.
- Soak legumes for 18 hours in very warm water (140° Fahrenheit) before cooking.
- Eat fermented soybeans in the form of tempeh or combine your soybeans with a high-phytase grain.