



Reducing Carb & Fat Absorption

©2003 Huntington College of Health Sciences

Literature Education Series On Dietary Supplements

By Gene Bruno, MS, MHS – Dean of Academics, Huntington College of Health Sciences

Smart Supplementation™ is a free series of educational literature created by Huntington College of Health Sciences (HCHS) as a public service. Although copyrighted, it may be freely photocopied and distributed, but may not be altered in any way. Smart Supplementation™ is not intended as medical advice. For diagnosis and treatment of any medical condition, consult your physician.

Perhaps you are one of the millions of people following a low-carbohydrate or low-fat diet plan for weight loss. If so, you may be finding it very difficult to cut your carbohydrates or fats to the recommended limits.

The good news is that there are some dietary supplement ingredients that can help you to reduce the absorption of dietary carbohydrates and fats, which will allow you to “have your cake and eat it too.” Essentially, this means that you’ll still be able to consume more grams of the restricted carbs and fats, while not having to pay the piper for doing so. This doesn’t mean that you’ll be able to cheat to excess, but you will be able to cheat a little. In fact, being able to cheat a little may make all the difference in the world between being able to stick to your weight loss program and achieve long-term success, or giving up prematurely in frustration and defeat. Before describing these ingredients, let’s first review the concept of low-carbohydrate and low-fat diet diets.

The low-carbohydrate diet

The low-carbohydrate diet is actually a high-protein / low carbohydrate diet. This concept started in the 60s with the Atkins diet. In the 70s, it was reincarnated as the Stillman diet. Then in the 80s it peaked again as the popular Scarsdale diet. In the latter part of the 90s, and into the new millennium, a new crop of high-protein diet books, such as *The Zone* and *Dr. Atkins’ New Diet Revolution* have caught the public's attention again.

Ketogenic

In its current incarnation, the high-protein / low carbohydrate diet is also termed a “ketogenic diet.” Ketogenic refers to the process of ketosis. Ketones are chemicals that your body produces as a by-product of combusting fat. You can buy “ketostix” in the drug store which, when passed through urine, can tell you whether or not you are in ketosis. Ketosis happens during fasting, low carbohydrate diets, pregnancy and it can be caused by diabetes. For many high protein / low carbohydrate aficionados, ketosis is the goal. You use up your store of glycogen (muscle sugar) and then your body goes into fat burning mode, burning fat reserves to fuel your bodily functions. See one of Dr. Atkins' books for more information. The diet advocates restricted consumption of carbohydrates with a higher percentage of calories coming from protein.

Low carbohydrates

The lower consumption of carbohydrates is another important factor in this type of diet. The concept is to restrict carbohydrate intake so that further glucose or sugars are not added to the body’s metabolism. Dr. Atkins proposes that the body regularly produces insulin to convert excess carbohydrates into body fat, and so that excess carbohydrates must be eliminated so as not to create more fat. The fuel that the body needs, in the form of calories, can be “burned off” through dietary ketosis, or the burning off of stored fat, rather than from the intake of fuel in the form of carbohydrates. The logic continues as follows: If lower amounts of carbohydrates are consumed, the body naturally produces less insulin. Once the body lacks its carbohydrate-fueling source, it looks to alternative methods (and specifically ketosis) for calories or fuel.

The low-fat diet

Most people are familiar with the concept of eating a low-fat diet—and there are two very good reasons to reduce the consumption of dietary fat when trying to

lose weight. The first reason is that fat has more than twice as many calories per gram as does carbohydrates and proteins (9 cal./g. fat, 4 cal./g. carbohydrate or protein). That means that more weight can be gained eating fat than when eating the same amount of carbohydrates and protein.

The second reason to reduce the consumption of fat is that individuals who are obese produce more of the At first glance, the low-carbohydrate and low-fat concepts may seem incompatible. In fact, they are not only compatible, but they're not nearly as restrictive as it may seem. Low-fat is pretty much self-explanatory. Low-carbohydrate really refers to restricting those carbohydrates which are most likely to raise the blood sugar quickly, and initiate an insulin increase. In other words, carbohydrates that are higher on the "glycemic index." Basically, carbohydrates with the least amount of naturally-occurring fiber are more likely to be higher on the glycemic index (see the Glycemic Index Table for examples). Consequently, the low-carbohydrate and low-fat concepts are actually complementary.

Carbohydrate Food	Glycemic Index
Fructose	20
Glucose	100
Sucrose	59
White Bread	69
Whole Grain Rye Bread	42
White Spaghetti	50
Whole Wheat Spaghetti	42
Bananas	62
Apples	39
Oranges	40
Baked Beans	40
Lentils	29

Now let's take a look at aforementioned dietary supplement ingredients.

Dietary Supplement Ingredients That Reduce Carb & Fat Absorption

The natural substances which can be found in dietary supplements, and which supporting the body's ability to reduce the absorption of unwanted, excess calories from carbohydrates (particularly starches) and fats include Northern White Kidney Bean Extract, Gymnema sylvestre, and Citrimax. These natural substances in the doses recommended have the potential to reduce the absorption of fat, complex carbohydrates, and sugars by about 1700 calories. That's 1700 unwanted calories that can be eliminated by using these natural substances! Due to the reduction in carbohydrate absorption, these ingredients are ideal for those individuals who are

enzyme lipoprotein lipase (LPL). LPL is highly effective at taking fat from dietary sources and storing it in human fat cells. This being the case, it is important that obese individuals who are trying to lose weight avoid ingesting too many of their calories from fat. Otherwise, LPL might store those fat calories as body fat.

Low-carbohydrate vs. Low-fat

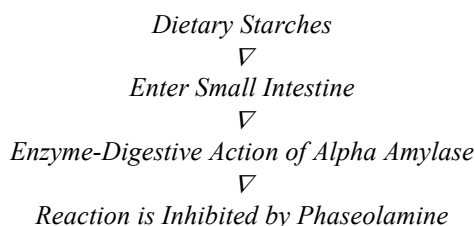
trying to follow an "Atkins-type" diet; although it is also good for individuals on a low-fat diet as well. So how do these natural substances work? Read on.

Northern White Kidney Bean Extract

The carbohydrates in starchy foods are composed of polysaccharide molecules. Polysaccharides are essentially long chains of sugar.¹ As these starches enter the small intestines an enzyme called alpha amylase breaks them down into their component sugars.² If the individual isn't burning up enough of the sugars through exercise and other metabolic activities, then it will be reassembled into a triglyceride (fat) and stored in the fat cells. Naturally, the best way to prevent this scenario from occurring is to carefully balance the amount of carbohydrate calories eaten with the amount of exercise and other activities. Of course, if it were only that simple nobody would be overweight. The facts are that at times, people do overeat starchy foods. It is likely that this will always be the case. Northern White Kidney Beans may help people when they do eat an excessive amount of starchy foods.

Phaseolamine

Northern White Kidney Bean Extract contains an anti-metabolite called Phaseolamine, which has the unique property of inhibiting or blocking the action of the enzyme alpha amylase.^{3,4} Here's how it works:



If alpha amylase is inhibited, then it cannot digest starches. If starches are not digested, then their component sugars cannot be absorbed and converted into stored fat. Although the use of Northern White Kidney Bean Extract should not be a license to abuse good dietary practices and overeat starchy foods on a regular basis, this supplement certainly can be helpful to individuals who do the right thing and eat a good diet 80 - 90 % of the time. For the 10 - 20% of the time that they cheat on their diet, Northern White Kidney Bean Extract can help to prevent the

excessive starches from ending up around their waistline.

For example, in one study human subjects using a proprietary extract of Northern White Kidney Bean, called Phase 2®, absorbed 85% less of starch from bread, compared to other subjects who ate the bread but did not use the Phase 2®.⁵ In a review of this study and two others, researchers found that subjects who used Phase 2® absorbed an average of 66% less starch compared to other subjects.⁶ Other studies have shown similar benefits.^{7, 8} Perhaps most significantly is research that has demonstrated weight loss. In one study, subjects who used Phase 2®, lost

Gymnema sylvestre is an East Indian herb that contains gymnemic acid. The molecular structure of gymnemic acid is similar to sugar. If taken before a meal, Gymnema competitively inhibits the intestinal absorption sites for sugar and permits it to pass through without being utilized—and if you can't absorb the sugar, it can't contribute any calories to your waistline. This sugar-blocking effect of Gymnema has been demonstrated and discussed in a number of studies.^{11, 12, 13}

Gymnemic acid can also suppresses the sweetness being felt on the tongue. As with the sugar-blocking effects of Gymnema, studies have also demonstrated the sweetness-suppression properties of this herb.^{14, 15}

If the tablet is chewed and allowed to spread over the tongue, the gymnemic acid reduces the ability of the taste buds to detect sugar (see the figure below). The advantage to this is that if a person is unable to enjoy the sweet flavor of a dessert food, then there is no taste reward for consuming it. Consequently, he or she is less likely to desire sweets.

The combination of the reduced capacity of the intestines to absorb sugar and the reduced ability of the taste buds to detect sugar, seems to justify the Hindu name for gymnema sylvestre, "Gurmer"; which means "sugar eliminator." At least 500 mg of Gymnema sylvestre extract standardized to 24% gymnemic acid is the way to go.

Chitosan

Chitosan is a shellfish fiber that acts like a tiny magnet, binding dietary fat, preventing its digestion and absorption and allowing it to pass naturally through the body. Chitosan works because it has a positive ionic charge while fat has a negative ionic charge, and so they are attracted to one another. Such a reduction in fat absorption can directly result in weight loss, as was demonstrated in Finland.

Chitosan research

A double blind study was conducted in Helsinki, Finland using chitosan over two week and four week period. All subjects were placed on a 950 - 1000 calorie diet consisting of 40% fat, 40% carbohydrate

nearly a half pound per week (3.8 lbs. over eight weeks), on average, or better than 200% more than those on placebo. Patients on Phase 2® also lost 1.5 inches around their waists, on average, or 43% more than those on placebo.⁹ In a 12-week randomized, placebo-controlled, double-blind study, Phase 2® resulted in significant difference in weight reduction over the placebo group (7.7 pounds versus 2.64 pounds). Body composition measurements showed that at least 85% of the weight reduction in the Phase 2® group was fat loss.¹⁰

Gymnema sylvestre

and 20% protein. Half of the subjects were also given 960 mg of chitosan daily, while the other half were given a placebo and served as the control group.

Although weight loss was achieved in both groups, the chitosan group experienced weight loss that was significantly (statistically) higher: An average of 14¾ pounds in the chitosan group vs. 6¼ in the placebo group after 4 weeks. Corresponding figures after 2 weeks were 9¼ pounds in the chitosan group, and about 5 pounds for the placebo group. Please note that the placebo group only lost an average of 1¼ additional pounds after being on the low calorie diet and placebo for 4 weeks. By contrast, the chitosan group lost an average of 5½ additional pounds after 4 weeks.¹⁶

Cardiovascular benefits

There were also cardiovascular benefits resulting from the use of chitosan. At the end of 4 weeks, the chitosan group experienced a statistically significant decrease in blood pressure associated with the weight reduction. The placebo group did not experience a similar statistically significant decrease in blood pressure. Furthermore previous clinical trials in Norway showed the lipid binding capacity of chitosan to help reduce serum cholesterol and serum triglycerides in the blood while the HDL fraction of cholesterol (the "good cholesterol") increased.¹⁷

Now not all Chitosan is created equal, and some grades of this material are more effective than others.

The best Chitosan material is called Chitoclear™. Clinical research has demonstrated that 500 mg of Chitoclear™ can prevent the absorption of 10 grams of dietary fat. This is the type of Chitosan to go for.

Citrimax™

Lipogenesis is the process of producing and storing fat. Certain substances are considered to be lipogenesis inhibitors since they slow the production of fats from the metabolism of carbohydrates and proteins. This means inhibiting, for instance, the synthesis of triglycerides and/ or cholesterol, and likewise preventing the storage of fat in fat cells. One

such substance which has been clinically demonstrated to inhibit lipogenesis and promote fat loss is *Garcinia cambogia*, also known as Citrimax™^{18 19 20}.

The ingredient in this plant which is active in blocking lipogenesis is called (-)-hydroxycitrate. It reduces lipid (fat) synthesis, but does not seem to cause the loss of lean tissue. Here's how it works: The normal metabolism of carbohydrates in the liver readily converts some of these calories into fat by way of the enzyme ATP-citrate lyase. (-)-Hydroxycitrate inhibits this enzyme. As a result, the production of low density lipoprotein (LDL) and triglycerides is slowed. At the same time, energy which would have been used in fat synthesis is diverted into the production of glycogen in the liver. The net effect is that fat production and storage is reduced, especially that involving triglycerides.²¹ At least 500 mg of Citrimax™ standardized for 50% of the valuable (-)-hydroxycitrate is the way to go.

Conclusion

These natural ingredients are ideal for both individuals who are trying to follow an “Atkins-type” diet, and for individuals on a low-fat diet; or for those who are doing both. Please note that if you choose to use the Northern Kidney Bean extract and the Gymnema, it is a wise idea to increase your fiber intake concurrently (this could even include the use of fiber supplements). The reason is that you don't want excess sugar and starch sitting around in gut for an extended period of time. The result might be bloating and discomfort. The fiber will help to prevent this by moving the sugar and starch along at a good pace.

References

1. Whitney, E. and S. Rolfes., *Understanding Nutrition*, sixth edition (1993) West Publishers, St. Paul. pp. 98.
2. Whitney, E. and S. Rolfes., *Understanding Nutrition*, sixth edition (1993) West Publishers, St. Paul. pp. 100.
3. Layer, P., et al, *Gastroenterology* (1986) 91(1): pp. 41-8.
4. Maranesi, M., et al, *Acta Vitaminol Enzymol* (1984) 6(4): pp. 259-69.
5. Vinson JA, Shuta DM. In vivo effectiveness of a starch absorption blocker in a double-blind placebo-controlled study with normal college-age subjects. 2001. unpublished. <http://www.starchstopper.com/study3.html>.
6. Vinson JA, Shuta DM, Al Kharrat H. In vivo effectiveness of a starch absorption blocker in a double-blind placebo-controlled study with normal subjects. 2001. unpublished. <http://www.starchstopper.com/study6.html>.
7. Vinson JA, Al Kharrat H. In Vivo Effectiveness of a Starch Absorption Blocker in a Double-Blind Placebo-Controlled Study with Normal Subjects. 2003. unpublished. http://www.starchstopper.com/study_vivoeffect.html.
8. Vinson JA. Investigation of the efficacy of Phase 2® , a purified bean extract from Pharmachem Laboratories. 2001. unpublished. <http://www.starchstopper.com/study1.html>

9. Anonymous. Starch Neutralizer Promotes Weight Loss, Lowers Triglyceride Levels. http://www.starchstopper.com/study_dec1002.html
10. Thom E. A randomized, double-blind, placebo-controlled trial of a new weight-reducing agent of natural origin. *J Int Med Res* 2000; 28:229-33 .
11. Yoshikawa M, et al, *Chem Pharm Bull* (1997) 45(10): pp. 1671-6
12. Shimizu K, et al, *J Vet Med Sci* (1997) 59(4): pp 245-51.
13. Shimizu K, et al, *J Vet Med Sci* (1997) 59(9): p 753-7.
14. Ibid.
15. Suttisri R, Lee IS, Kinghorn AD, *J Ethnopharmacol* (1995) 47(1): pp. 9-26.
16. Abelin, J., and A. Lassus, *L112 Biopolymer-Fat Blocker As a Weight Reducer in Patients With Moderate Obesity*, Genesis Research Corp, Lake Forest, IL, pp. 1-113.
17. Ibid.
18. McCarty, M., *Med Hypotheses* (1995) 45(3): pp. 247-54.
19. McCarty, M., *Med Hypotheses* (1994) 42(4): pp. 215-25.
20. Greenwood, M., et al, *Am J Physiol* (1981) 240(1): pp. E72-8.
21. Sullivan, C. and J. Triscari, *Am J Clin Nutr* (1977) 30(5): pp. 767-76.



For more than two decades, Huntington College of Health Sciences (HCHS) has offered more than a conventional undergraduate or graduate education. Our accredited*, distance learning degrees and diploma programs also include the breadth of responsible complementary and alternative medicine viewpoints, providing our students with a well-rounded and comprehensive approach to nutrition and the health sciences:

- Master of Science in Nutrition
- Bachelor of Health Science in Nutrition
- Associate of Science in Applied Nutrition
- Diploma in Comprehensive Nutrition
- Diploma in Dietary Supplement Science
- Diploma in Sports Nutrition
- Diploma in Women's Nutrition
- Diploma in Natural Sciences
- Diploma in Small Business Management

1204D Kenesaw
Knoxville, TN 37919
865-524-8079 • 800-290-4226
E-Mail: studentservices@hchs.edu
www.hchs.edu.com

*Accredited member Distance Education & Training Council.