

REPORT

The Nine Pillars of Successful Weight Loss

By William Faloon

The Life Extension Foundation® has a 29-year track record of identifying novel methods to address the health concerns of aging humans. For example, Life Extension warned long ago that atherosclerosis was caused by more than a dozen independent correctable risk factors, with cholesterol and LDL being only two of them.¹

When it comes to *weight loss*, mainstream medicine has recommended “diet and exercise” for so long that this phrase has become more of a cliché than any kind of momentous scientific communication.

The fact is that aging people need to do a lot more than reduce calorie intake and increase physical activity if they are going to lose and keep off excess body fat.

In this article, we succinctly address the nine steps that most overweight aging people should follow if they are to achieve optimal removal of surplus body fat. This multi-step program is analogous to the “drug cocktails” that doctors now use to control HIV infections in a way that enables patients to live for decades instead of less than one year, as was the case when the disease first manifested.

The Nine Pillars of Successful Weight Loss are also analogous to what progressive oncologists are doing to cure cancer today by administering multiple therapies designed to neutralize the numerous survival mechanisms cancer cells use to escape eradication.

In some respects, the uncontrolled proliferation and size of adipocytes (fat cells) in the aging body is like a benign tumor growing in our abdomens, buttocks, and other areas of the body where it is unwanted.

Just like most *Life Extension* members understand that they often have to correct several vascular disease risk factors if they are to protect against heart attack and stroke, those seeking to lose weight should consider making many of these *Nine Pillars of Successful Weight Loss* a regular part of their health-maintenance program.

PILLAR NUMBER 1: RESTORE INSULIN SENSITIVITY

Normal aging causes the insulin receptors on cell membranes to lose their youthful sensitivity or functionality. The result is a pathological condition called “insulin resistance” that impairs the ability of cells to efficiently take up glucose and utilize it for energy production. Glucose not taken up by energy-producing cells prompts the release of excess insulin. Hyperinsulinemia, a condition of high circulating insulin levels, is associated with a significantly increased risk of heart disease. In fact, a recent study showed that patients with heart disease had significantly higher plasma levels of blood sugar and circulating insulin.²

There are several ways to restore insulin sensitivity to our cell membranes. For example, nutrients such as *chromium*,^{3,4} *magnesium*,⁵ *cocoa polyphenols*,⁶ and *fish oil*.⁸ can help.

A low-cost prescription drug called *metformin* can also significantly enhance insulin sensitivity.⁹⁻¹¹ It is approved only as a treatment for type 2 diabetes, but published scientific studies indicate it can help reduce body fat.¹² The dose range for those seeking to enhance their insulin sensitivity and reduce body weight can vary from 250 mg three times daily with meals up to 850 mg three times daily with meals. Consult with your prescribing physician to make sure that metformin is right for you. As you will read later in this section, restoring free *testosterone* to youthful ranges markedly enhances insulin sensitivity in aging men.



The absolute most effective way of restoring insulin sensitivity is to reduce calorie intake. Calorie restriction to under 1,500-1,800 calories/day significantly enhances insulin sensitivity, as documented by dramatic lowering of fasting glucose and insulin blood levels.¹³⁻¹⁷ Even a moderate cutback of excess calories can markedly improve insulin sensitivity.

So the first pillar to successful long-term weight loss should involve a moderate reduction in calorie intake, at least long enough to restore insulin receptor sensitivity to more youthful ranges. The use of nutrients, hormones, and drugs that enhance insulin sensitivity should also be considered. As you probably know already, a lot more than just eating less is needed to lose weight.

PILLAR NUMBER 2: RESTORE YOUTHFUL HORMONE BALANCE

Most overweight human beings have suffered the agonies of calorie deprivation (dieting), but have failed to achieve any kind of sustained fat reduction. While eating less addresses some of the underlying causes of weight gain, the high failure rate of dieting is partially attributable to the severe alteration in hormone levels that occurs as part of normal aging.

A large percentage of men today suffer from abdominal obesity—the most dangerous kind of body fat. It is often difficult, if not impossible for aging men to lose inches off their waistline if they are deficient in *free testosterone*, especially in the presence of *excess estrogen*.¹⁸⁻²⁰ Low levels of dehydroepiandro-sterone (DHEA) can also contribute to undesirable fat accumulation in men and women.²¹

A comprehensive blood test panel can reveal free testosterone and estrogen (estradiol) levels so that a physician can prescribe a topical testosterone cream and an *aromatase-inhibiting* drug (if necessary) to restore a man's sex hormone profile to a youthful range. The same blood test panel can also detect DHEA blood levels to enable one to take the proper dose of this over-the-counter dietary supplement.



A comprehensive blood test panel should also measure prostate-specific antigen (PSA) in men to help rule out prostate cancer. Those with prostate cancer cannot restore these hormones until the cancer is completely eradicated. Some men are able to reduce excess estrogen while simultaneously boosting free testosterone by taking nutrient formulas that contain plant extracts to help inhibit the aromatase enzyme (which converts testosterone into estrogen) and decrease levels of *sex hormone-binding globulin* (which binds free testosterone).

A substantial percentage of aging women (and many aging men) have less-than-optimal thyroid levels, thus predisposing them to weight gain. Thyroid hormone is needed to maintain healthy metabolic rates. Those who are deficient in thyroid hormone should be prescribed thyroid medication to maintain or improve their overall health, as well as to provide this hormone involved in the regulation of body composition. Drugs to consider are *Armour® natural thyroid complex* (containing both T4 and T3) or *Cytomel®* (containing T3). Trying to lose weight in the face of thyroid hormone deficit can be particularly challenging.

A common problem women experience during menopause is an *increase* in belly fat mass. Estrogen levels plummet during menopause and some studies correlate this *estrogen deficiency* with greater abdominal adiposity in women. While excess levels of horse urine-derived estrogen drugs may cause weight gain, evidence suggests that individually dosed natural estrogen replacement facilitates a reduction in abdominal fat in women who are estrogen deficient.^{22,23} Restoring hormone balance in aging females requires the intervention of a health care practitioner with specialized expertise in prescribing *bioidentical hormone replacement therapy*. Men are more fortunate in that almost any doctor can prescribe the proper dose of testosterone (and aromatase-inhibiting drugs, if needed).

WHAT YOU NEED TO KNOW: THE NINE PILLARS OF SUCCESSFUL WEIGHT LOSS

- Simply eating less and exercising more is not enough to help most people remove excess body fat and keep it off. A comprehensive program is necessary to aggressively target the many factors that contribute to excess body fat.
- Excess body fat is not only unsightly, it can be deadly, increasing the risk for heart disease, diabetes, and cancer. Abdominal fat is particularly dangerous.
- A comprehensive fat-loss program includes improving insulin sensitivity, achieving youthful hormone balance, controlling the rate of carbohydrate absorption, controlling the amount of dietary fat absorption, increasing physical activity, normalizing brain serotonin, restoring energy expenditure rate, and adopting a long-term healthy eating strategy.
- Certain nutritional supplements offer important support for reducing appetite, promoting satiety, and enhancing fat-burning.
- The rewards of removing excess body fat go far beyond a slim physique to the promise of a lengthy, disease-free life.

PILLAR NUMBER 3: CONTROL RATE OF CARBOHYDRATE ABSORPTION

We already know that too much blood glucose (and the subsequent insulin spike) predisposes people to gaining unwanted fat pounds. By taking just five grams of soluble fiber before or with each meal, one can significantly blunt the glucose-insulin surge.³⁴

Fiber may protect against unwanted weight gain via several mechanisms that involve both effects on satiety and glucose-insulin responses.³⁴⁻³⁶ For example, research has shown that vegetarians weigh significantly less than non-vegetarians, whether measured by body mass index or body weight.³⁷ Some experts believe that vegetarians' lower average body weight is linked to one factor: the high fiber content of the plant foods consumed.³⁸ Plant fiber fills you up quickly, and studies indicate that this results in less snacking and bingeing later in the day.

The *Seven Countries Study* provides additional evidence linking a high-fiber diet with lower body weight. Researchers found that people living in countries with high fiber intake weighed less than those living in countries where fiber intake is low.³⁹ Higher fiber intake is also associated with lower average body weight in the US. In the famous *Nurses' Health Study*, those who ingested more dietary fiber consistently weighed less than those who consumed less fiber.³⁶

Finally, in the *Coronary Artery Risk Development in Young Adults Study* examining how heart disease develops in adults, researchers linked higher dietary fiber intake with lower body weight and waist-to-hip ratios, along with a reduction in markers of heart disease risk. Higher fiber consumption predicted less weight gain more strongly than did total or saturated fat consumption.³⁸

Not all fibers are created equal. Beta-glucans (derived from oats and barley) are particularly effective in slowing the absorption of carbohydrates—enabling one to control blood sugar levels and induce the satiety needed to achieve healthy weight management. Studies show that when taken with meals, beta-glucan fibers markedly blunt post-meal elevations in blood sugar and insulin levels. Like other foods rich in soluble fiber, beta-glucans help improve blood glucose metabolism while also lowering serum lipid levels.^{40,41}

Getting into the routine of taking five grams of a neutral-tasting beta-glucan fiber mix before or with each meal would help provide weight loss effects via this mechanism (i.e., controlling rate of carbohydrate absorption). Alternatively, taking fiber capsules (containing the highly viscous fiber glucomannan, which promotes healthy glycemic status) before each carbohydrate-rich meal would also help reduce the glucose-insulin surge that contributes to obesity.

Some people with chronic weight control problems will need more than soluble fibers to impede carbohydrate *absorption*. *Carbohydrates* contribute to surplus body fat by converting to *triglycerides* that bloat our adipocytes. Compounds that interfere with complex and simple carbohydrate breakdown and absorption can be important components of a weight loss program.

Alpha-glucosidase inhibitors interfere with the breakdown of simple carbohydrates into glucose. *Alpha-amylase inhibitors* interfere with the breakdown of large carbohydrate molecules like starch into linked glucose polymers. These simple sugars are then broken down to glucose by the *alpha-glucosidase* enzyme.

An extract from the white kidney bean (*Phaseolus vulgaris*) functions as an *alpha-amylase inhibitor*. In a placebo-controlled study, those taking white kidney bean extract before meals lost **1.5 inches of abdominal fat** over an eight week period. An even greater benefit might be seen by taking an *alpha-glucosidase* and *alpha-amylase inhibitor* together. Such combinations are available in dietary supplement form. Alternatively, one can be prescribed 50 mg three times a day (before each carbohydrate meal) of the drug acarbose (an alpha-glucosidase inhibitor) and take 1,000 mg of *white kidney bean extract* (an *alpha-amylase inhibitor*) before each meal containing carbohydrates.

WHERE'S THE FAT?

The location of body fat stores is directly related to disease risk factors. People with excess levels of abdominal fat are at markedly increased risk of chronic illnesses such as cardiovascular disease and type 2 diabetes—both of which are closely related to the metabolic syndrome.^{24,25} Direct entry of fats from abdominal stores into the liver may trigger increased insulin resistance, accounting for the relationship with type 2 diabetes.²⁶

Recent studies have also shown that the potent endocrine function of abdominal body fat may explain the relationship between abdominal fat and cognitive decline, such as that seen in Alzheimer's and other neurodegenerative diseases.²⁷

Abdominal fat is not just a problem in adults—new studies have established a relationship between fat distribution in early childhood and adolescence and serious chronic disease in early to mid-adulthood.^{28,29} Responsible doctors now include abdominal circumference measurements at routine visits as a means of identifying these risk factors.³⁰

Even within the abdomen, the location of fat stores matters. People with excessive amounts of fat in their livers (fatty liver

disease) are at even higher risk for all of these chronic conditions, compared with those who have lower levels of liver fat.³¹ Indeed, damage to liver cells, as measured by increased levels of liver-based enzymes in the bloodstream, is closely associated with decreased insulin sensitivity and is a risk factor for development of type 2 diabetes.^{32,33}

PILLAR NUMBER 4: INCREASE PHYSICAL ACTIVITY

Most people think the only weight-loss benefit of exercise is to use up more stored body fat calories. In reality, exercise induces many beneficial changes at the cellular level that contribute to better weight control. Increased physical activity itself improves insulin sensitivity and mimics the effect of certain antidiabetic drugs (such as the PPAR-gamma agonists), which can have a favorable effect on body fat contouring.⁴⁴

The type and intensity of physical activity will vary considerably among individuals. The purpose of making *increased physical activity* one of the *Nine Pillars of Successful Weight Loss* is to encourage everyone seeking to achieve optimal fat loss to engage in some form of increased physical activity.

It is our opinion that people who could follow a good exercise program to keep fat pounds off would do so if they saw rapid and meaningful weight loss results. Even a modest increase in physical activity, as a component of the *Nine Pillars of Successful Weight Loss*, should produce a reduction of fat mass (especially in the abdomen) remarkable enough to motivate even sedentary individuals to find ways to become more consistently physically active.

PILLAR NUMBER 5: RESTORE BRAIN SEROTONIN

When the brain is flooded with serotonin, satiety normally occurs. A serotonin deficiency has been associated with the *carbohydrate binging* that contributes to the accumulation of excess body fat.⁵⁰ Obese individuals have low blood tryptophan levels, which indicate that their overeating patterns may be related to a serotonin deficiency in the brain.^{51,52}

In addition, cutting-edge research reveals that chronic inflammation and immune system overactivation appear to play critical roles in obesity.^{52,53} Inflammatory cytokines like interferon-gamma are made and released in body fat. An enzyme called *indoleamine 2,3-dioxygenase* is activated by interferon-gamma, which then *degrades* tryptophan in the body. *Tryptophan* is needed to produce *serotonin* in the brain.

In fact, human studies suggest that obese patients have *decreased* plasma tryptophan levels that remain low, *independently* of weight reduction or dietary intake.^{51,52} This altered **tryptophan** metabolism reduces **serotonin** production and contributes to impaired satiety, which in turn contributes to increased caloric intake and obesity.



When obese patients were given 1,000 mg, 2,000 mg, or 3,000 mg doses of L-tryptophan one hour before meals, a significant *decrease* in caloric consumption was observed. The majority of the reduction in caloric intake was in the amount of *carbohydrates* consumed and not the amount of protein consumed.⁵⁴

In a double-blind, placebo-controlled study, obese patients on protein-rich diets who received tryptophan (750 mg twice daily orally) had significant weight loss, compared with a placebo group.⁵⁵

For 19 years, *tryptophan* dietary supplements were restricted. The good news is that pharmaceutical-pure tryptophan supplements are once again available to Americans.

Those seeking to embark on a *comprehensive* weight-loss program should consider adding *tryptophan* (along with nutrients that inhibit tryptophan-degrading enzymes) to their daily program in starting doses of 500 mg before meals, two to three times per day.

FAT AND OXIDATIVE STRESS

Because of its chemical nature, fat is readily oxidized by free radicals—and it is the oxidized form of many lipids that triggers the blood vessel damage and eventual plaque formation that leads to atherosclerosis and its deadly consequences. Obesity is closely associated with increased oxidative stress,⁴² while loss of body fat is associated with decreasing levels of molecules associated with oxidation.⁴³ The bottom line is that people with excessive adipose tissue are walking “oxidant factories” whose bodies must cope with enormous loads of these violently destructive molecules.

FAT AND INFLAMMATION

The metabolic syndrome and its related conditions all derive from increased levels of inflammatory molecules called cytokines—and inflammatory cytokines are more prominent in people with excessive stores of body fat.^{25,45} Indeed, physicians now commonly measure certain markers of inflammation such as C-reactive protein (CRP) as a means of screening for people at risk for cardiovascular disease.⁴⁶ Fortunately, reductions in body fat content (through exercise, diet, and appropriate supplementation) are associated with healthy reductions in inflammatory markers such as CRP—and that means a reduction in the many risk factors associated with obesity-related inflammation.⁴⁷⁻⁴⁹

PILLAR NUMBER 6: RESTORE RESTING ENERGY EXPENDITURE RATE

It is often challenging for aging humans to lose significant body fat stores, even when following a low-calorie diet, restoring youthful hormone balance, ingesting fiber, and aggressively exercising. A missing link for successful long-term weight loss is failing to boost *resting energy expenditure*, i.e., **to burn off stored body fat**.

Fucoxanthin and **pomegranate seed oil** have demonstrated interesting effects in enabling aging humans to safely boost their metabolic rate and obtain some fat loss.^{56,57}

Several other natural nutritional agents offer safe and effective means of enhancing metabolic rate:

- The green tea polyphenol, *epigallocatechin gallate* (EGCG), in combination with caffeine (50 mg caffeine, 90 mg EGCG) has been shown to enhance 24-hour energy expenditure in human test subjects. In this same clinical study, treatment with caffeine alone had no effect upon energy expenditure, indicating that the effect of green tea in promoting fat burning goes beyond that explained solely by its caffeine content.⁵⁸ Other scientific data indicate that green tea polyphenols in combination with caffeine synergistically enhance thermogenesis (fat burning).⁵⁹
- Although many people are aware of the cardiovascular benefits of *fish oils* rich in EPA and DHA, few people are aware that these omega-3 fatty acids also have beneficial effects on thermogenesis. They inhibit key enzymes responsible for lipid synthesis, such as fatty acid synthase and stearoyl-CoA desaturase-1, enhance lipid oxidation and fat burning, and inhibit free fatty acids from entering adipocytes (fat cells) for fat storage.⁶⁰
- Experimental studies consistently show the benefits of *conjugated linoleic acid*, in particular the *trans-10, cis-12* isomer, which has metabolic benefits that include increased energy expenditure, decreased fat cell differentiation and proliferation, decreased fat synthesis, and increased fat burning and fat oxidation.⁶¹
- *Capsaicin*, the active agent in red pepper, has been shown to enhance thermogenesis and energy metabolism in humans. In one study, energy expenditure was seen to increase in lean young women after consuming a capsaicin-rich curry.⁶² Another study showed that consumption of a cultivar of red pepper increased core body temperature and metabolic rate in test humans.⁶³
- Extracts of *ginger* rich in *gingerols* and *shogaols* have been shown to increase oxygen consumption and enhance fat burning in experimental models.⁶⁴

REPORT

The Nine Pillars of Successful Weight Loss

By William Faloon

PILLAR NUMBER 7: RESTORE HEALTHY ADIPOCYTE SIGNALING

The adipocyte (fat cell) is the primary site for fat storage. Adipocytes of obese individuals are bloated with *triglycerides*, which is the form that most fat exists in the body. Fat storage and release is tightly regulated by adipocyte *command signals*.

Weight gain occurs when adipocytes (fat cells) enlarge with large amounts of *triglycerides*. Adipocytes accumulate excess *triglycerides* due to overeating, nutrient deficiencies, excessive stress, and other causes. These factors, however, fail to address the reason why aging individuals put on fat pounds despite eating less, taking dietary supplements, and following other practices that should in theory lead to weight loss.



FAT AND CANCER

Excess body fat not only increases the risk of cardiovascular disease, it also increases the risk of deadly cancers. In one large European study, increasing body mass index was associated with a significant increase in the risk of cancer for 10 out of 17 specific types examined.⁷¹ Recent studies have shown a powerful association between body fat content and kidney and liver cancers.^{72,73} By now, it should be no surprise to learn that weight loss, specifically body fat reduction, can lead to lowered risks for cancers just as it does for other devastating conditions.^{74,75} One study has estimated a reduction of **45%** in the risk of breast cancer in women who lost more than about nine pounds.⁷⁵

The aging process adversely affects the adipocyte *command signal* network, which helps explain the difficulty maturing individuals have in controlling their weight.

Adipocytes regulate their size and number by secreting *command signals*. The three *command signals* that regulate adipocytes are:

- **Leptin**
- **Adiponectin**
- **Glycerol-3-phosphate dehydrogenase.**

A West African medicinal food called *Irvingia gabonensis* has been shown to favorably affect the three adipocyte command centers in the following ways:

LEPTIN

Released by adipocytes, **leptin** travels to the brain to perform two critical functions. First it signals the brain that enough food has been ingested and shuts down appetite. It then depletes bloated adipocytes by promoting the burning of stored *triglycerides*. Leptin is much more abundant in the blood of obese individuals, yet leptin functions to turn off appetite while promoting the burning of triglycerides that bloat our adipocytes. The reason why obese people have higher blood levels of leptin is that leptin receptor sites on cell membranes are inactivated by inflammatory factors in the body. **Irvingia** helps unblock “leptin resistance”.

ADIPONECTIN

The second *command signal* released by **adipocytes** is adiponectin. The transcription factors associated with adiponectin help determine the amount of triglycerides stored in adipocytes and number of adipocytes formed in the body. Higher levels of adiponectin enhance insulin sensitivity, which is a long established method to induce weight loss. Gene *transcriptional factors* involved with adiponectin are directly involved in sequential expression of adipocyte-specific proteins. **Irvingia** suppresses **transcriptional factors** involved in the formation of new adipocytes, while enhancing cell membrane insulin sensitivity by increasing **adiponectin**. High circulating levels of **adiponectin** have been shown to protect against coronary artery disease, whereas low adiponectin levels are observed in overweight individuals.

GLYCEROL-3-PHOSPHATE DEHYDROGENASE

An enzyme that facilitates the conversion of blood *glucose* into stored *triglyceride* fat is **glycerol-3-phosphate dehydrogenase**. The presence of this enzyme in the body reveals why low-fat diets alone fail to achieve sustained weight loss, i.e. the body will take ingested *carbohydrates* and convert them into stored triglyceride fat via the **glycerol-3-phosphate dehydrogenase** enzyme. **Irvingia** inhibits *glycerol-3-phosphate dehydrogenase*, thus reducing the amount of ingested sugars that are converted to body fat.



Clinical studies have demonstrated significant belly fat and total weight loss in response to taking a **150 mg *Irvingia gabonensis*** extract twice daily. A mechanism for this weight loss reported by many *Irvingia* users is a reduction in *appetite* with a concomitant decrease in the number of ingested calories.

PILLAR NUMBER 8: INHIBITING THE LIPASE ENZYME

Orlistat is an inhibitor of pancreatic and gastric lipase. It decreases the intestinal absorption of ingested dietary triglycerides by **30%**. By reducing the breakdown and absorption of dietary fat, orlistat enhances weight loss and lessens insulin resistance.

In studies of obese subjects, orlistat treatment improves *insulin* and *glucose* blood levels while significantly decreasing *C-reactive protein*, a marker for chronic inflammation. Orlistat treatment favorably influences other blood markers (such as *leptin* and *adiponectin*) that are involved with obesity.

In a one-year trial of overweight women, a group with metabolic syndrome treated with orlistat (120 mg three times a day) and lifestyle modification lost 20.5 pounds compared with only 0.44 pounds weight loss in the placebo control group. A group of overweight women without metabolic syndrome taking the same dose of orlistat + lifestyle modification lost **20.2** pounds more than the control group with metabolic syndrome.

FAT AND CARDIOVASCULAR DISEASE

High body fat is of course strongly associated with cardiovascular disease—but the relationship is more complicated and subtle than we used to think. Atherosclerosis is clearly the result of the cycle of lipid oxidation, inflammation, and vascular injury, as mentioned above, but fat tissue causes other risks that are independent of plasma lipid levels. Acting as an endocrine organ, fat tissue can increase the flow of hormones (known as adipokines) involved in blood pressure control,²⁶ potentially accounting directly for some of the hypertension we used to attribute simply to “stiff blood vessels” and “extra force needed to pump blood.”⁶⁵ Again, it seems to be specifically the accumulations of abdominal fat that produce these remarkable and deadly effects.⁶⁶ And again, it is fortunate that adequate reduction in body fat content through lifestyle changes, diet, and supplementation has been associated with decreased risk for cardiovascular catastrophes, such as heart attacks and strokes.⁶⁷⁻⁷⁰

CONTROLLING BODY FAT CONTENT SAFELY

Despite the obvious dangers of obesity and specifically, elevated abdominal body fat content, most Americans have a hard time losing weight. Many turn to “quick-fix” solutions such as bariatric surgery (“stomach stapling”), which actually does provide some benefit in extreme cases,⁷⁶ or to “diet pills” that are usually ineffective and often dangerous.⁷⁷⁻⁸¹ The best and safest approaches to weight loss continue to be a modest reduction in caloric intake coupled with a careful increase in energy expenditure.

In a three-month open-label trial of overweight patients without type 2 diabetes treated with orlistat (120 mg three times a day), men lost **17.4** pounds and women lost **12.3** pounds. In overweight patients with type 2 diabetes mellitus, men lost **18.7** pounds and women lost **12.5** pounds. In this study, leptin levels decreased by 51% in men with type 2 diabetes and 25% in women with type 2 diabetes mellitus. Leptin levels dropped by **48%** in overweight men and **23%** in overweight women without type 2 diabetes mellitus. A reduction in leptin blood levels is considered a favorable response as it indicates a reduction in the “leptin resistance” phenomenon that so often precludes successful weight loss.

Not all studies demonstrate this much weight loss in response to orlistat. Poor compliance is always a factor in the variability that exists among studies of the same compound. Another reason for these discrepancies is that orlistat users are warned to avoid excess ingestion of dietary fats, and are likely to switch to consuming more simple carbohydrates. Overweight individuals often suffer metabolic disturbances, meaning that ingested sugars more readily convert to stored (triglyceride) fats on the body. This is why taking carbohydrate-blocking agents (alpha-glucosidase and amylase inhibitors) in conjunction with orlistat for the first 60 days of a weight-loss program may be necessary to induce some immediate reduction of fat pounds that overweight and obese individuals expect.



Orlistat is available by prescription in **120** mg capsules as Xenical®, or over-the-counter under the trade name **alli®** in **60** mg capsules. The suggested dose for the 60-day initiation period is **120** mg before each meal (three times a day). Make sure to take fat-soluble nutrients such as omega-3 fish oil, vitamins D, E, and K, and carotenoids (like lutein and zeaxanthin) at the time of the day most removed from the last orlistat dose as its fat-blocking effects can interfere with absorption of these critical nutrients into the blood.

PILLAR NUMBER 9: EAT TO LIVE A LONG AND HEALTHY LIFE

No one should embark on a weight-loss program by trying to follow a fad **diet** that cannot be adhered to over the long term. At the same time, aging individuals have to make *choices* as to what is more important, i.e., ingesting foods that are known to promote weight gain (and cause horrendous diseases) or selecting healthier foods that facilitate weight loss and protect against illness.

Six years ago, *Life Extension®* published an article about the dangers of eating foods cooked at high temperatures (over 250 degrees). Overcooked foods damage our body's proteins, while foods cooked at lower temperatures have been shown to facilitate weight loss. So just changing how your foods are prepared could help you shed body fat and, at the same time, protect against age-related disease (see "Eating food cooked at high temperature accelerates aging," *Life Extension*, May 2003).



Solid scientific evidence shows that excess calorie ingestion accelerates the onset of degenerative disease and the aging process itself—in addition to promoting the unsightly accumulation of **body fat**. With the help of the various elements described in this Nine Pillars of *Successful Weight Loss*, the reduction in body fat one may see should provide a strong motivational basis to initiate more sensible food intake patterns.

It's never too late to change one's lifestyle in a manner that promotes better health while melting away excess body fat.

CONCLUSION

Lifestyle changes are clearly critical to safe and responsible loss of weight and body fat and provide additional quality-of-life benefits that vastly exceed simple reduction in disease risk. Clinicians and patients who are truly committed to attaining a long and happy life will always include responsible diet and moderate exercise programs in their long-term plans.

If you have any questions on the scientific content of this article, please call a Life Extension Health Advisor at 1-800-226-2370.

References

1. Available at: http://www.lef.org/magazine/mag96/aug_new_therapies.html. Accessed January 2, 2008.
2. Yamasa T, Ikeda S, Koga S, et al. Evaluation of glucose tolerance, post-prandial hyperglycemia and hyperinsulinemia influencing the incidence of coronary heart disease. *Intern Med.* 2007;46(9):543-6.
3. Rodriguez-Moran M, Guerrero-Romero F. Oral magnesium supplementation improves insulin sensitivity and metabolic control in type 2 diabetic subjects: a randomized double-blind controlled trial. *Diabetes Care.* 2003 Apr;26(4):1147-52.
4. Yasmin T, Shara M, Bagchi M, Preuss HG, Bagchi D. Toxicological assessment of a novel niacin-bound chromium, known to ameliorate the symptoms of metabolic syndromes. *J Amer College Nutr.* 45th Annual Meeting, Abs 77. (Long Beach, California.) 2004 Oct;76(2):272-5.
5. Anderson RA, Cheng N, Bryden NA, et al. Elevated intakes of supplemental chromium improve glucose and insulin variables in

individuals with type 2 diabetes. *Diabetes*. 1997 Nov;46(11):1786-91.

6. Grassi D, Necozione S, Lippi C, et al. Cocoa reduces blood pressure and insulin resistance and improves endothelium-dependent vasodilation in hypertensives. *Hypertension*. 2005 Aug;46(2):398-405.
7. Ebbesson SO, Risica PM, Ebbesson LO, Kennish JM, Tejero ME. Omega-3 fatty acids improve glucose tolerance and components of the metabolic syndrome in Alaskan Eskimos: the Alaska Siberia project. *Int J Circumpolar Health*. 2005 Sep;64(4):396-408.
8. Wilkins C, Long RC, Jr., Waldron M, Ferguson DC, Hoenig M. Assessment of the influence of fatty acids on indices of insulin sensitivity and myocellular lipid content by use of magnetic resonance spectroscopy in cats. *Am J Vet Res*. 2004 Aug;65(8):1090-9.
9. Emral R, Koseoglulari O, Tonyukuk V, et al. The effect of short-term glycemic regulation with gliclazide and metformin on postprandial lipemia. *Exp Clin Endocrinol Diabetes*. 2005 Feb;113(2):80-4.
10. Deutsch JC, Santhosh-Kumar CR, Kolhouse JF. Efficacy of metformin in non-insulin-dependent diabetes mellitus. *N Engl J Med*. 1996 Jan 25;334(4):269-70.
11. Charles MA, Eschwege E. Prevention of type 2 diabetes: role of metformin. *Drugs*. 1999;58 Suppl 1:71-3.
12. Paolisso G, Amato L, Eccellente R, et al. Effect of metformin on food intake in obese subjects. *Eur J Clin Invest*. 1998 Jun;28(6):441-6.
13. Henry RR, Wiest-Kent TA, Scheaffer L, Kolterman OG, Olefsky JM. Metabolic consequences of very-low-calorie diet therapy in obese non-insulin-dependent diabetic and nondiabetic subjects. *Diabetes*. 1986 Feb;35(2):155-64.
14. Larson-Meyer DE, Heilbronn LK, Redman LM, et al. Effect of calorie restriction with or without exercise on insulin sensitivity, beta-cell function, fat cell size, and ectopic lipid in overweight subjects. *Diabetes Care*. 2006 Jun;29(6):1337-44.
15. Bodkin NL, Ortmeyer HK, Hansen BC. Long-term dietary restriction in older-aged rhesus monkeys: effects on insulin resistance. *J Gerontol A Biol Sci Med Sci*. 1995 May;50(3):B142-7.
16. Gumbs AA, Modlin IM, Ballantyne GH. Changes in insulin resistance following bariatric surgery: role of caloric restriction and weight loss. *Obes Surg*. 2005 Apr;15(4):462-73.
17. Nakai Y, Taniguchi A, Fukushima M, et al. Insulin sensitivity during very-low-calorie diets assessed by minimal modeling. *Am J Clin Nutr*. 1992 Jul;56(1 Suppl):179S-81S.
18. Abate N, Haffner SM, Garg A, Peshock RM, Grundy SM. Sex steroid hormones, upper body obesity, and insulin resistance. *J Clin Endocrinol Metab*. 2002 Oct;87(10):4522-7.
19. Vermeulen A, Kaufman JM, Goemaere S, van Pottelberg I. Estradiol in elderly men. *Aging Male*. 2002 Jun;5(2):98-102.
20. Marin P, Krotkiewski M, Bjorntorp P. Androgen treatment of middle-aged, obese men: effects on metabolism, muscle and adipose tissues. *Eur J Med*. 1992 Oct;1(6):329-36.
21. Villareal DT, Holloszy JO. Effect of DHEA on abdominal fat and insulin action in elderly women and men: a randomized controlled trial. *JAMA*. 2004 Nov 10;292(18):2243-8.
22. Mayes JS, Watson GH. Direct effects of sex steroid hormones on adipose tissues and obesity. *Obes Rev*. 2004 Nov;5(4):197-216.
23. Bjorntorp, P. The regulation of adipose tissue distribution in humans. *Int J Obes Relat Metab Disord*. 1996 Apr;20(4):291-302.
24. Haffner SM. Abdominal adiposity and cardiometabolic risk: do we have all the answers? *Am J Med*. 2007 Sep;120(9 Suppl 1):S10-6.
25. Despres JP, Lemieux I. Abdominal obesity and metabolic syndrome. *Nature*. 2006 Dec 14;444(7121):881-7.

26. Bergman RN, Kim SP, Hsu IR, et al. Abdominal obesity: role in the pathophysiology of metabolic disease and cardiovascular risk. *Am J Med.* 2007 Feb;120(2 Suppl 1):S3-S8.
27. Whitmer RA. The epidemiology of adiposity and dementia. *Curr Alzheimer Res.* 2007 Apr;4(2):117-22.
28. Lee CD, Jacobs DR Jr, Schreiner PJ, Iribarren C, Hankinson A. Abdominal obesity and coronary artery calcification in young adults: the Coronary Artery Risk Development in Young Adults (CARDIA) Study. *Am J Clin Nutr.* 2007 Jul;86(1):48-54.
29. Botton J, Heude B, Kettaneh A, et al. Cardiovascular risk factor levels and their relationships with overweight and fat distribution in children: the Fleurbaix Laventie Ville Santé II study. *Metabolism.* 2007 May;56(5):614-22.
30. Connelly PW, Hanley AJ, Harris SB, Hegele RA, Zinman B. Relation of waist circumference and glycemic status to C-reactive protein in the Sandy Lake Oji-Cree. *Int J Obes Relat Metab Disord.* 2003 Mar;27(3):347-54.
31. Arslan U, Türkoğlu S, Balcioglu S, Tavil Y, Karakan T, Cengel A. Association between nonalcoholic fatty liver disease and coronary artery disease. *Coron Artery Dis.* 2007 Sep;18(6):433-6.
32. Ruhl CE, Everhart JE. Determinants of the association of overweight with elevated serum alanine aminotransferase activity in the United States. *Gastroenterology.* 2003 Jan;124(1):71-9.
33. Vozarova B, Stefan N, Lindsay RS, et al. High alanine aminotransferase is associated with decreased hepatic insulin sensitivity and predicts the development of type 2 diabetes. *Diabetes.* 2002 Jun;51(6):1889-95.
34. McCarty MF. Glucomannan minimizes the postprandial insulin surge: a potential adjuvant for hepatothermic therapy. *Med Hypotheses.* 2002 Jun;58(6):487-90.
35. Available at: http://www.ars.usda.gov/research/publications/publications.htm?SEQ_NO_115=181996. Accessed January 9, 2008.
36. Liu S, Willett WC, Manson JE, et al. Relation between changes in intakes of dietary fiber and grain products and changes in weight and development of obesity among middle-aged women. *Am J Clin Nutr.* 2003 Nov;78(5):920-7.
37. Appleby PN, Thorogood M, Mann JI, Key TJ. Low body mass index in non-meat eaters: the possible roles of animal fat, dietary fibre and alcohol. *Int J Obesity Relat Metab Disord.* 1998 May;22(5):454-60.
38. Ludwig DS, Pereira MA, Kroenke CH, et al. Dietary fiber, weight gain, and cardiovascular disease risk factors in young adults. *JAMA.* 1999 Oct 27;282(16):1539-46.
39. Kromhout D, Bloemberg B, Seidell JC, Nissinen A, Menotti A. Physical activity and dietary fiber determine population body fat levels: the Seven Countries Study. *Int J Obes Relat Metab Disord.* 2001 Mar;25(3):301-6.
40. Reyna-Villasmil N, Bermudez-Pirela V, Mengual-Moreno E, et al. Oat-derived beta-glucan significantly improves HDLC and diminishes LDLC and non-HDL cholesterol in overweight individuals with mild hypercholesterolemia. *Am J Ther.* 2007 Mar;14(2):203-12.
41. Poppitt SD, van Drunen JD, McGill AT, Mulvey TB, Leahy FE. Supplementation of a high-carbohydrate breakfast with barley beta-glucan improves postprandial glycaemic response for meals but not beverages. *Asia Pac J Clin Nutr.* 2007;16(1):16-24.
42. Luo W, Cao J, Li J, He W. Adipose tissue-specific PPARgamma deficiency increases resistance to oxidative stress. *Exp Gerontol.* 2007 Nov 21.
43. Ziccardi P, Nappo F, Giugliano G, et al. Reduction of inflammatory cytokine concentrations and improvement of endothelial functions in obese women after weight loss over one year. *Circulation.* 2002 Feb 19;105(7):804-9.
44. Hawley JA, Lessard SJ. Exercise training-induced improvements in insulin action. *Acta Physiol (Oxf).* 2008 Jan;192(1):127-35.
45. Bodary PF, Iglay HB, Eitzman DT. Strategies to reduce vascular risk associated with obesity. *Curr Vasc Pharmacol.* 2007 Oct;5(4):249-58.

46. Williams MJ, Williams SM, Milne BJ, Hancox RJ, Poulton R. Association between C-reactive protein, metabolic cardiovascular risk factors, obesity and oral contraceptive use in young adults. *Int J Obes Relat Metab Disord.* 2004 Aug;28(8):998-1003.
47. Kim YJ, Shin YO, Bae JS, et al. Beneficial effects of cardiac rehabilitation and exercise after percutaneous coronary intervention on hsCRP and inflammatory cytokines in CAD patients. *Pflugers Arch.* 2007 Sep 29.
48. Milani RV, Lavie CJ, Mehra MR. Reduction in C-reactive protein through cardiac rehabilitation and exercise training. *J Am Coll Cardiol.* 2004 Mar 17;43(6):1056-61.
49. Lee M, Aronne LJ. Weight management for type 2 diabetes mellitus: global cardiovascular risk reduction. *Am J Cardiol.* 2007 Feb 19;99(4A):68B-79B.
50. Leigh C. Serotonin and the Biology of Bingeing. *Eating Disorders: A Reference Sourcebook.* In: Lemberg R. Ed., Oryx Press; 1998:51.
51. Breum L, Rasmussen MH, Hilsted J, Fernstrom JD. Twenty-four-hour plasma tryptophan concentrations and ratios are below normal in obese subjects and are not normalized by substantial weight reduction. *Am J Clin Nutr.* 2003 May;77(5):1112-8.
52. Brandacher G, Hoeller E, Fuchs D, Weiss HG. Chronic immune activation underlies morbid obesity: is IDO a key player? *Curr Drug Metab.* 2007 Apr;8(3):289-95.
53. Xu H, Barnes GT, Yang Q, et al. Chronic inflammation in fat plays a crucial role in the development of obesity-related insulin resistance. *J Clin Invest.* 2003 Dec;112(12):1821-30.
54. Cavaliere H, Medeiros-Neto G. The anorectic effect of increasing doses of L-tryptophan in obese patients. *Eat Weight Disord.* 1997 Dec;2(4):211-5.
55. Heraief E, Burckhardt P, Wurtman JJ, Wurtman RJ. Tryptophan administration may enhance weight loss by some moderately obese patients on a protein-sparing modified fast (PSMF) diet. *Int J Eating Disord.* 1985;4(3):281-92.
56. Abidov M, Roshen S. Effect of Fucoxanthin and Xanthigen™, a phytomedicine containing fucoxanthin and pomegranate seed oil, on energy expenditure rate in obese non-diabetic female volunteers with non-alcoholic fatty liver disease: a double-blind, randomized and placebo-controlled trial. Submitted for publication. *Int J Obesity.* 2008.
57. Abidov M, Siefulla R, Ramazanov Z. The effect of Xanthigen™, a phytomedicine containing fucoxanthin and pomegranate seed oil, on body weight and liver fat, serum triglycerides, C-reactive protein, and plasma aminotransferases in obese non-diabetic female volunteers: a double-blind, randomized and placebo-controlled trial. Submitted for publication. *Int J Obesity.* 2008.
58. Dulloo AG, Duret C, Rohrer D, et al. Efficacy of a green tea extract rich in catechin polyphenols and caffeine in increasing 24-h energy expenditure and fat oxidation in humans. *Am J Clin Nutr.* 1999 Dec;70(6):1040-5.
59. Dulloo AG, Seydoux J, Girardier L, Chantre P, Vandermander J. Green tea and thermogenesis: interactions between catechin-polyphenols, caffeine and sympathetic activity. *Int J Obes Relat Metab Disord.* 2000 Feb;24(2):252-8.
60. Li JJ, Huang CJ, Xie D. Anti-obesity effects of conjugated linoleic acid, docosahexaenoic acid, and eicosapentaenoic acid. *Mol Nutr Food Res.* 2008 Jun;52(6):631-45.
61. Wang YW, Jones PJ. Conjugated linoleic acid and obesity control: efficacy and mechanisms. *Int J Obes Relat Metab Disord.* 2004 Aug;28(8):941-55.
62. Matsumoto T, Miyawaki C, Ue H, Yuasa T, Miyatsuji A, Moritani T. Effects of capsaicin-containing yellow curry sauce on sympathetic nervous system activity and diet-induced thermogenesis in lean and obese young women. *J Nutr Sci Vitaminol (Tokyo).* 2000 Dec;46(6):309-15.
63. Ohnuki K, Niwa S, Maeda S, Inoue N, Yazawa S, Fushiki T. CH-19 sweet, a non-pungent cultivar of red pepper, increased body temperature and oxygen consumption in humans. *Biosci Biotechnol Biochem.* 2001 Sep;65(9):2033-6.
64. Eldershaw TP, Colquhoun EQ, Dora KA, Peng ZC, Clark MG. Pungent principles of ginger (*Zingiber officinale*) are thermogenic in the perfused rat hindlimb. *Int J Obes Relat Metab Disord.* 1992 Oct;16(10):755-63.

65. Safar ME, Czernichow S, Blacher J. Obesity, arterial stiffness, and cardiovascular risk. *J Am Soc Nephrol.* 2006 Apr;17(4 Suppl 2):S109-11.
66. Rosa EC, Zanella MT, Ribeiro AB, Kohlmann JO. Visceral obesity, hypertension and cardio-renal risk: a review. *Arq Bras Endocrinol Metabol.* 2005 Apr;49(2):196-204.
67. Rush EC, Chandu V, Plank LD. Reduction of abdominal fat and chronic disease factors by lifestyle change in migrant Asian Indians older than 50 years. *Asia Pac J Clin Nutr.* 2007;16(4):671-6.
68. Rokling-Andersen MH, Reseland JE, Veierod MB, et al. Effects of long-term exercise and diet intervention on plasma adipokine concentrations. *Am J Clin Nutr.* 2007 Nov;86(5):1293-301.
69. Nagao T, Hase T, Tokimitsu I. A green tea extract high in catechins reduces body fat and cardiovascular risks in humans. *Obesity (Silver Spring).* 2007 Jun;15(6):1473-83.
70. Slentz CA, Aiken LB, Houmard JA, et al. Inactivity, exercise, and visceral fat. STRRIDE: a randomized, controlled study of exercise intensity and amount. *J Appl Physiol.* 2005 Oct;99(4):1613-8.
71. Reeves GK, Pirie K, Beral V, et al. Cancer incidence and mortality in relation to body mass index in the Million Women Study: cohort study. *BMJ.* 2007 Dec 1;335(7630):1134.
72. Setiawan VW, Stram DO, Nomura AM, Kolonel LN, Henderson BE. Risk factors for renal cell cancer: the multiethnic cohort. *Am J Epidemiol.* 2007 Oct 15;166(8):932-40.
73. Ahrens W, Timmer A, Vyberg M, et al. Risk factors for extrahepatic biliary tract carcinoma in men: medical conditions and lifestyle: results from a European multicentre case-control study. *Eur J Gastroenterol Hepatol.* 2007 Aug;19(8):623-30.
74. Campbell KL, McTiernan A. Exercise and biomarkers for cancer prevention studies. *J Nutr.* 2007 Jan;137(1 Suppl):161S-9.
75. Schapira DV, Kumar NB, Lyman GH. Estimate of breast cancer risk reduction with weight loss. *Cancer.* 1991 May 15;67(10):2622-5.
76. Khaitan L, Smith CD. Obesity in the United States: is there a quick fix? Pros and cons of bariatric surgery from the adult perspective. *Curr Gastroenterol Rep.* 2005 Dec;7(6):451-4.
77. Celio CI, Luce KH, Bryson SW, et al. Use of diet pills and other dieting aids in a college population with high weight and shape concerns. *Int J Eat Disord.* 2006 Sep;39(6):492-7.
78. Cohen PA, McCormick D, Casey C, Dawson GF, Hacker KA. Imported compounded diet pill use among Brazilian women immigrants in the United States. *J Immigr Minor Health.* 2007 Dec 9 [Epub ahead of print].
79. Fleming RM. The effect of ephedra and high fat dieting: a cause for concern! A case report. *Angiology.* 2007 Feb-Mar;58(1):102-5.
80. Rakovec P, Kozak M, Sebestjen M. Ventricular tachycardia induced by abuse of ephedrine in a young healthy woman. *Wien Klin Wochenschr.* 2006 Sep;118(17-18):558-61.
81. Blanck HM, Serdula MK, Gillespie C, et al. Use of nonprescription dietary supplements for weight loss is common among Americans. *J Am Diet Assoc.* 2007 Mar;107(3):441-7.

without first consulting your physician.