

Obesity Strategies to Fight a Rising Epidemic

There may be more myths and misunderstandings about obesity than about any other major health epidemic. Americans are constantly besieged with faulty or incomplete weight-loss information—some of it from mainstream sources. To lose weight, we are advised to avoid entire food categories (such as carbohydrates or fats) or to eat only one food category (proteins, for instance). And every new fad diet is accompanied by an avalanche of new products and marketing hype as companies try to cash in on Americans' desperate desire to slim down. The result is a stream of conflicting information that leaves many people confused.

Worse yet, none of it seems to be working. The National Institutes of Health (NIH) estimate that more than half the adult population of the United States is overweight (defined as a body mass index [BMI] of 25 to 30). A significant number of these people are obese (defined as a BMI greater than 30). The obesity epidemic is even beginning to affect children, whose obesity rates have doubled in the past two decades (NIH 2005). And instead of declining, obesity rates are rising, along with the frequency of conditions that are closely associated with obesity, such as type 2 diabetes and metabolic syndrome.

The government's answer to the growing epidemic of obesity has been to recommend more exercise and a balanced diet. While there is no doubt these strategies are important, they also display an incomplete understanding of the biological and hormonal changes that underlie obesity among aging adults. The fact is that as we age, we undergo physiological changes that encourage weight gain. These include hormonal changes and alterations in the way our bodies process nutrients.

Life Extension (LE) believes that, in addition to a sensible, balanced diet and exercise, the only way to successfully lose weight is to address the underlying hormonal imbalances that promote weight gain. Ideally, by using bioidentical hormone replacement, dieters can restore their hormonal profile to what it was at the age of 25, an age at which weight gain is less often a problem. In addition, numerous dietary nutrients have been shown to encourage weight loss. In this chapter, LE presents a specific plan, based on scientific literature that will help aging people lose weight.

WHY MIDDLE-AGED MEN GAIN WEIGHT

About age 30 to 35, most men (and some women) notice they are gaining weight around the middle. Their pants become tight and at some point no longer fit. The words “pot belly,” “beer belly,” or “spare tire” are sometimes used to describe the medical condition called “abdominal obesity.” This sort of fat accumulation greatly increases the risk of cardiovascular and other diseases.

Low testosterone = abdominal fat gain

As it turns out, there is a scientific explanation for the tendency toward abdominal obesity among middle-aged men. As men age, their levels of free testosterone decline, and levels of estrogen and insulin increase. This is partly because aging men convert much of their testosterone into estradiol, a form of estrogen. Of the remaining testosterone, much is bound to sex hormone-binding globulin, a protein in the blood, and is not biologically active. Studies have shown that men with low free testosterone have higher rates of coronary artery disease, mental depression, and dementia (Tan et al 2004).

The idea behind testosterone replacement therapy is to restore the level of free testosterone to that of a healthy 25-year-old to counteract the effects of increased estrogen. Studies have shown that fat cells, particularly abdominal fat cells, convert testosterone to estradiol (Schneider et al 1979; Kley et al 1980; Killinger et al 1987; Khaw et al 1992). The more belly fat a man accumulates, the greater the conversion of his testosterone into estradiol. As long as free testosterone is low and the ratio of estrogen to insulin is high, most aging men will store fat around their belly (Abate 2002).

Clinical studies have shown that testosterone replacement therapy can provide a variety of benefits.

- In one study of 86 men aged 50 to 70, waist-to-hip ratio and blood pressure markedly decreased after 60 days of testosterone therapy (Li et al 2002).
- Another testosterone-replacement study in middle-aged obese men showed improved waist-to-hip ratio along with a decrease in plasma insulin and an increase in glucose disposal, suggesting improved insulin sensitivity (Marin et al 1992).
- In another trial, abdominally obese middle-aged men showed improved glucose control, decreased abdominal body fat, and improved sexual function after testosterone therapy (Boyanov et al 2003).

Given that these studies looked only at testosterone levels, one can only speculate about what the results might have looked like if

excess estrogen and insulin had also been suppressed.

HORMONE THERAPY FOR WOMEN

In women, the relationship between excess body fat, testosterone, estrogens, and progesterone is somewhat more complicated.

It is believed that estrogen reduces lipid oxidation at puberty and in early pregnancy to facilitate efficient fat storage in preparation for fertility, birth and lactation (O'Sullivan et al 2001; Rosenbaum et al 1999). This modification in lipid oxidation enables fat storage without significant changes in dietary fat and caloric intake (O'Sullivan et al 2001).

The drop in gonadal estrogen production at menopause is associated with an increase in the waist to hip ratio and an increase in size of visceral adipose tissue, and administration of estrogen to postmenopausal women is associated with a lowering of the waist to hip ratio (Rosenbaum et al 1999). However, as women age, levels of progesterone and all estrogens (including estriol, estradiol, and estrone) decline. Progesterone declines much more rapidly than do the estrogens, leading to "estrogen dominance" (Lee et al 1999). LE believes the imbalance of estrogens and progesterone may play a pivotal role in the dynamics of metabolic obesity and visceral fat accumulation in aging women.

DHEA AND WEIGHT LOSS

Testosterone and estrogen are not the only hormones implicated in weight gain. Low levels of DHEA (dehydroepiandrosterone), a steroid hormone, have also been linked to increased weight gain. Virtually everyone over age 35 experiences a significant reduction in DHEA. Studies suggest that supplementing with DHEA produces beneficial body composition changes (Villareal et al 2000; Villareal et al 2004).

For example, a 6-month trial in aging men and women with low DHEA levels demonstrated that 50 mg of DHEA per day reversed age-related changes in fat mass (Villareal et al 2000).

Another study showed that DHEA decreased abdominal obesity and improved insulin action. This randomized, double-blind, placebo-controlled trial evaluated 50 mg of DHEA per day for 6 months in 56 individuals with age-related decline in DHEA levels. The study showed that DHEA was associated with significant decreases in visceral and subcutaneous fat and improved insulin sensitivity (Villareal et al 2004).

Note: In woman DHEA can convert to testosterone, which is acceptable as long as testosterone is kept within proper range.

7-keto DHEA. A metabolite of DHEA called 7-keto DHEA has also attracted considerable attention for its value as a fat-loss supplement. Like DHEA, 7-keto DHEA levels dramatically decline with age (Marenich 1979).

In animal studies, 7-keto DHEA boosted fat-burning enzymes (Bobyleva et al 1993; Bobyleva et al 1997). Studies using 7-keto DHEA supplements produced encouraging results. For example, researchers assessed the effects of taking 100 mg of 7-keto DHEA or placebo twice daily for 60 days. Compared with placebo, the 7-keto group lost more body weight (6.3 lb vs. 2.1 lb). This study also found that supplementing with 7-keto DHEA was associated with a significantly greater percentage of body fat loss compared with the placebo group (Kalman et al 2000).

Because of the fat burning, or thermogenic effects of 7-keto DHEA, simultaneous supplementation with antioxidants is recommended to help guard against excessive free radical production. Animal studies have shown that 7-keto DHEA is not converted into testosterone or estradiol (Lardy et al 1995). Unlike caffeine or ephedra, 7-keto DHEA does not have a noradrenaline-induced central nervous system stimulating effect, nor does 7-keto increase heart rate or blood pressure.

THE THYROID CONNECTION

There has been a great deal of misunderstanding about the connection between thyroid hormone and weight loss. Produced in the thyroid gland, thyroid hormone is the master metabolic control mechanism. A lack of thyroid hormone (a condition called hypothyroidism) is connected to weight gain, as well as dry hair and skin, fatigue, and sluggishness. Overweight people may want to check their thyroid levels to make sure they aren't lacking thyroid hormone. If they are, a physician may prescribe thyroid hormones to correct the condition.

In the 1960s and 1970s, the connection between hypothyroidism and weight gain caused some people to assume they could speed up their metabolism and lose weight by using supplemental thyroid hormones. This led to an abuse of thyroid hormone as people created an artificial state of excess thyroid hormone (a condition medically known as hyperthyroidism). Hyperthyroidism can cause weight loss as well as irregular heartbeats, sweating, and tremors. Although people taking supplemental thyroid hormones may have lost weight, they were losing lean muscle mass in addition to undesirable body fat (Braunwald et al 2001).

Today our understanding of the relationship between thyroid hormone and weight loss is more complete. It works like this: when calorie intake is drastically reduced, the activity of an enzyme called 5'-monodeiodinase is reduced; 5'-monodeiodinase is necessary to convert the thyroid hormone T4 into T3. As a result, the levels of T3 drop (Merimee et al 1976; Carlson et al 1977; Beer et al 1989; Wadden et al 1990). T3 is the stronger form of thyroid hormone. The connection is especially valid when it comes to a reduction in carbohydrate calories:

- As little as 50 g of glucose reverses the change in T3 (Burman et al 1979)
- Replacement of carbohydrate with fat results in thyroid hormone changes typically observed during times of starvation (Danforth et al 1975; Azizi 1978)
- Protein consumption improves the rate of T3 generation more than carbohydrate consumption (Harris et al 1978)

Therefore, consuming more carbohydrate calories during dieting can counteract the drop in T3 associated with dieting. Alternatively, decreased T3 levels can be directly replaced. Some older clinical studies testing this theory were promising. However, later studies showed that direct T3 supplementation by dieters was connected with muscle wasting (Gardner et al 1979; Vignati et al 1978). During fasting, administration of large doses of T3 caused even more severe muscle wasting (Carter et al 1975).

More recent studies suggest that using very low doses of replacement thyroid hormone during dieting, once the body has switched over from carbohydrate burning to fat burning, may not be associated with muscle breakdown (Nair et al 1989; Byerley et al 1996, Pasquali et al 1984).

THE INSULIN TRAP

Recent advances in dietary science have highlighted the crucial role of insulin in weight gain. Produced in the pancreas, insulin is a critical hormone for the control of blood sugar (glucose). Its job is to transport glucose into cells, where the glucose is burned as fuel. While this process is necessary for life, abnormalities in the insulin-glucose system caused by aging, lack of exercise and poor diet can cause major health problems. In aging, cells become more resistant to the effects of insulin. As cells become increasingly insulin resistant, the body compensates by increasing the number of insulin receptors on cells and secreting more insulin in an attempt to drive more blood sugar into muscle and liver cells (Fulop 2003).

Insulin resistance is a dangerous condition. Research suggests that adipose tissue (fat) is a source of pro-inflammatory chemicals that have a role in the development of insulin resistance (Sharma AM et al 2005). Insulin resistance is associated with obesity (in particular, abdominal obesity) (Greenfield JR et al. 2004). It is also associated with aging muscle (Nair KS 2005), physical inactivity, and genetics.

This increase in insulin (called hyperinsulinemia) and decreased insulin sensitivity have a number of harmful effects, including contributing to diseases associated with being overweight (Zeman et al 2005; Garvey et al 1998).

Over time, high insulin and insulin resistance may lead to type 2 diabetes in susceptible individuals, a major risk factor for heart disease. A study sponsored by the NIH showed that over a 10-year period, hyperinsulinemia was associated with increased all-cause and cardiovascular mortality, independent of other risk factors (NIH 1985).

Controlling insulin levels as we age is essential for overall health, longevity, and weight management. An increasing number of physicians recognize the role of insulin resistance in the current obesity epidemic. The good news is that nonprescription drugs and low-cost dietary supplements that have demonstrated beneficial effects upon insulin action are already available.

What You Have Learned So Far...

- Although overeating and lack of exercise are critical causes of weight gain and obesity, there are also underlying hormonal causes that affect men and women.
- In aging men, a deficiency of testosterone and an overproduction of estrogen contribute to abdominal obesity.
- In aging women, hormone imbalance involving progesterone-estrogen imbalances causes unwanted visceral adiposity/ central body fat accumulation.
- Men and women universally experience DHEA hormone deficiencies after age 35.
- Insulin resistance, which occurs as we age, is associated with obesity.

FIBER REDUCES INSULIN SPIKE

When it comes to weight loss, fiber has not received the attention it deserves. The recent focus on carbohydrates has led some

people to reduce their intake of whole fruits and some vegetables because these foods contain carbohydrates. By doing this, those dieters deprive themselves of the many benefits of a naturally fiber-rich food source. According to the American Heart Association (AHA) and the National Cancer Institute (NCI), Americans should consume about 30 g or more of fiber every day. The actual average consumption, however, is between 12 and 17 g (AHA 2005; NCI 2005).

Consumed before a meal, soluble fiber has multiple benefits. First, it is filling and causes people to eat less because they are satiated sooner. Anecdotally, LE has received reports that some people can actually cut the size of their meals in half by consuming a glass of soluble fiber mix before eating.

Equally important, consuming fiber before meals can reduce the rapid absorption of simple carbohydrates (such as refined sugar) and modulate blood sugar levels (Anderson et al 1993). A review of clinical studies of fiber shows that it has numerous weight-loss benefits, including the following:

- Soluble fiber-rich bread improved glycemic control, reduced blood pressure, and decreased cholesterol and triglyceride levels (Nizami et al 2004).
- Consumption of an additional 14 g of fiber per day for more than two days was associated with a 10 percent decrease in calorie intake and body weight loss of 1.9 kg over 3.8 months (Howarth et al 2001).
- A prospective cohort study showed that weight gain is slowed with higher intake of high-fiber, whole-grain foods, whereas study subjects put on more weight when consuming refined-grain foods (Liu et al 2003).
- A prospective, randomized, double-blind study showed that soluble fiber supplements can increase post-meal satisfaction (satiety) significantly (Heini et al 1998).
- A randomized controlled clinical trial demonstrated that soluble fiber can lower lipids and plasma glucose levels (Aller et al 2004).
- A clinical trial suggested that a diet rich in fiber may lower blood pressure moderately (He et al 2004).
- A highly regarded study in the *New England Journal of Medicine* showed that a high-fiber diet (50 g fiber, including 25 g soluble and 25 g insoluble) lowered 24-hour plasma glucose and insulin concentrations (Chandalia et al 2000).

Soluble fiber is found in oat bran, barley, vegetables, fruits, and other foods. However, for weight-management purposes, it is important to have soluble fiber before every meal. Therefore, soluble fiber supplements (such as powders or capsules) should be kept where meals are consumed, such as the kitchen or the office.

Some people shy away from fiber because they experience lower bowel disturbances if too much fiber is consumed at first. This can be avoided by beginning with a low dose of fiber before each meal and gradually increasing doses over a two- to three-week period. Once the body adjusts to increased fiber intake, gastrointestinal side effects usually disappear.

HOW TO USE FIBER SUPPLEMENTS

Before every meal, consume enough soluble fiber to slow the rapid carbohydrate absorption that can cause insulin levels to spike. Consuming soluble fiber before each meal also enables you to feel satisfied sooner, thereby reducing the number of calories consumed.

The type of dietary fiber to use is an important consideration. To help induce weight loss, purified soluble dietary fibers, such as pectin, guar, psyllium, glucomannan, alginate, and beta-glucan, help normalize blood glucose and have an antidiabetic effect (Trepel 2004). A study showed that 7 g of soluble fiber (psyllium) significantly decreased hunger feelings, decreased food intake, and blunted increases in serum glucose-insulin levels (Rigaud et al 1998). A trial in patients with type 1 diabetes illustrated that 16 g of soluble fiber (guar) daily significantly decreased blood glucose after eating (Lafrance et al 1998). Another study showed that as few as 5 g of soluble fiber (alginate) significantly decreased the post-meal rise in glucose and insulin (Torsdottir et al 1991).

Some people find it difficult to consume high-dose fiber powder drinks before every meal. Yet taking only a few grams of specialized soluble fiber blends can produce remarkable benefits. Led by University of Toronto scientist Vladimir Vuksan, Ph.D., researchers combined glucomannan with two other soluble fibers (xanthan and alginate) in an exact ratio and added mulberry concentrate (20:1) to enhance glycemic-control and lipid-lowering effects (Andallu et al 2001). This proprietary blend is called PGX.

At the 2004 meeting of the American Diabetes Association (Orlando, Florida), results of two studies using PGX fiber blend were presented by researchers from the Risk Factor Modification Centre at St. Michael's Hospital and the University of Toronto (Vuksan et al 2004):

- Study participants who took 3 g of the fiber blend had a 65 percent reduction in post-meal glucose elevation after consuming a 50-gram acute glucose challenge.
- Study participants who took 3 g of the fiber blend (three times a day, before meals) had a 23 percent reduction in post-meal glucose, a 40 percent reduction in post-meal insulin release, and a 55.9 percent improvement in whole-body insulin

sensitivity scores.

- Study participants taking the fiber blend reduced body fat by 2.8 percent from baseline by the end of the three-week study period.

Optimal weight-loss benefits occurred when six PGX capsules were taken before meals, although some studies indicate as few as two capsules might produce some results (Vuksan et al 2004).

An advantage of PGX is that its benefits may be obtained by swallowing capsules, which usually do not cause intestinal distress. However, to induce early satiety, drinking a soluble powder mix before meals is preferable to swallowing capsules.

The typical dose for soluble fiber drink mix is 8 to 12 g taken before meals. Begin with only 4 g before each meal for the first week or two to allow your digestive system to adjust to higher fiber intake.

CHROMIUM ENHANCES INSULIN'S ACTIONS

Chromium is an essential trace element required for normal carbohydrate metabolism. Chromium increases insulin binding, the number of insulin binding receptors, and insulin sensitivity (Anderson 1997; Vincent 2000).

Human studies show that chromium picolinate decreases insulin levels and improves glucose disposal in obese and type 2 diabetics (Anderson et al 1997; Bahadori et al 1999; Ghosh et al 2002). Chromium picolinate was evaluated for treatment of insulin resistance syndrome in obese rats. Oral chromium picolinate improved carbohydrate and lipid metabolism and enhanced skeletal muscle glucose transport in the obese rats (Cefalu et al 2002). In infant rats, elevated doses of chromium picolinate increased muscle mass by stimulating protein anabolism (muscle building) (Bernao et al 2004). In growing pigs, plasma glucose concentrations in chromium-supplemented pigs were lower before feeding, suggesting increased insulin sensitivity (Van de Ligt et al 2002).

Chromium polynicotinate (600 mcg daily for two months) given to modestly dieting and exercising African-American women caused a significant loss of fat and sparing of muscle compared with placebo (Crawford et al 1999). A formula including chromium polynicotinate reduced appetite, inhibited fat synthesis, and decreased body weight in 60 moderately obese subjects in an eight-week randomized, double-blind, placebo-controlled trial (Preuss et al 2004). Another double blind, four-week trial with a formula including chromium increased the rate of body fat loss and helped to maintain muscle mass (Hoeger et al 1998).

Always take antioxidants when taking chromium to protect against any oxidative reactions that might occur in response to chromium (Hendler et al 2001).

Physical Activity

One of the most modifiable of risk factors for obesity is physical inactivity (Grundy et al 1999). In unveiling new health objectives, the US government dramatically increased target exercise goals. To maintain a healthy weight, the NIH now recommends that adults engage in 30 to 60 minutes of exercise most days of the week. For weight loss, or for people who have recently lost weight and want to keep it off, the recommendation is between 60 and 90 minutes of exercise most days of the week (MMWR 2002). Consult your physician before embarking on any exercise program.

MAGNESIUM IS AS IMPORTANT AS CHROMIUM

Although chromium has received considerable media attention, scientific literature shows that magnesium has a more important role in regulating carbohydrate metabolism. Magnesium is involved in a number of reactions required for cells to uptake and metabolize glucose. Magnesium deficiency causes insulin resistance and elevated blood sugar levels (Paolisso et al 1990; Nadler et al 1993; Nadler et al 1995; Lefebvre et al 1994).

Approximately 68 percent of Americans are magnesium deficient. When magnesium-deficient individuals undertake a diet, they often become severely magnesium deficient, which aggravates insulin resistance and contributes to failure of the diet.

DRUG THERAPY FOR OBESITY

Sibutramine. Sibutramine helps control feelings of hunger and appetite by regulating neurotransmitters involved in energy intake and expenditure. Sibutramine increases signal transmission between nerves in the central nervous system (CNS).

Sibutramine has demonstrated energy-producing (thermogenetic) effects in animal studies (Connoley et al 1999). Obese Zucker rats treated with 10 mg/kg of sibutramine were found to consume smaller amounts of carbohydrates and fats (LeBlanc et al 2003), resulting in both increased energy expenditure and decreased body weight (Casado et al 2003). Most interestingly, sibutramine targets a type of fat known as "brown" fat. "Brown" fat activation is thought to allow more calories to be burned than stored (Giordano et al 2002).

In a 24-week clinical study consisting of 1047 patients treated with varying doses of sibutramine or a placebo, sibutramine demonstrated dose-responsive weight loss (Weintraub et al 1991; Bray et al 1996; Hanotin et al 1998; Bray et al 1999). Even intermittent sibutramine treatment was found to reduce body weight (Wirth et al 2001).

A 2004 study of obese patients with type 2 diabetes found treatment with sibutramine was associated with significant reductions in body fat mass and weight. Significant improvements in plasma glucose control, plasma lipids, and markers of insulin resistance were also observed (Tankova et al 2004).

Another study of obese patients treated for 12 months with a combination of sibutramine and a low-calorie diet demonstrated significant improvements in glucose tolerance, insulin sensitivity, and some lipid levels (Sabuncu et al 2004). Further, sibutramine, when combined with metformin, was also shown to be a useful adjunctive treatment for obese individuals with type 2 diabetes mellitus (McNulty et al 2003).

Sibutramine is generally well tolerated. However, safety concerns have arisen regarding possible increased heart rate (5–6 beats per minute increase) and blood pressure (1–2 mm Hg increase) (de Simone et al 2005; Gaciong et al 2005; Faria et al 2005; Jordan et al 2005). Individual response to sibutramine may vary; therefore, blood pressure and heart rate should be monitored carefully.

Sibutramine should not be taken with other centrally acting antidepressants such as tricyclic antidepressants, selective serotonin reuptake inhibitors, ergotamine derivatives, opiates, herbs such as St. John's wort, supplement precursors to serotonin (e.g., L-tryptophan), and certain other medications because of the very rare but potential risk of serotonin syndrome (Trakas et al 2000; Giese et al 2001).

Orlistat. Orlistat is an inhibitor of intestinal lipase, an enzyme involved in the breakdown of dietary fat. At a therapeutic dose of 120 mg three times daily with main meals, orlistat inhibits the absorption of approximately 30 percent of the dietary fat ingested. Based on a weight-reduction diet of about 2200 calories a day, this would amount to a 200-calorie reduction in total caloric intake.

Animal studies have demonstrated orlistat's ability to inhibit absorption of fat regardless of the type of fat (e.g., saturated fat, polyunsaturated fat) (Porsgaard et al 2003), as well as the absorption of triglycerides (Isler et al 1995). Experiments in mice suggest that orlistat treatment also reduce interest in consuming dietary fat (Ackroff et al 1996). Further, in rats, the use of orlistat has demonstrated decreased atherosclerosis in the aorta (Ueshima et al 2004).

Clinical studies with orlistat have produced positive results. In double-blind, placebo-controlled, parallel-group randomized studies, a total of 171 subjects received oral daily doses that ranged from 30 to 1200 mg orlistat or a placebo three times a day for 9 to 10 days, resulting in a steep dose-response up to approximately 400 mg/day (Zhi et al 1994). Further, early dose-ranging trials showed that an additional weight loss of 1.75 kg with 360 mg a day of orlistat (120 mg three times daily) was observed in a 12-week period (Drent et al 1995).

A 2004 double-blind study showed that orlistat combined with a reduced-calorie diet produced weight loss and improvements in risk factors in overweight and obese patients with poorly controlled type 2 diabetes, hypertension, or hypercholesterolemia. (Guy-Grand et al 2004). A prospective, multicenter, open-label, randomized, controlled study showed that orlistat modified several cardiovascular risk factors in patients with both metabolic syndrome and type 2 diabetes (Didangelos et al 2004).

The Xenical in the Prevention of Diabetes in Obese Subjects trial (a four-year study involving more than 3000 patients randomized to either orlistat 120 mg three times daily or placebo) showed that orlistat treatment resulted in a greater reduction in the incidence of type 2 diabetes over four years and produced greater weight loss in a clinically representative obese population (Torgerson et al 2004).

Orlistat is generally well tolerated, although side effects can include flatulence and frequent loose stools but not frank diarrhea or intestinal malabsorption (Harp 1999). Consistent with orlistat's mechanism of action, malabsorption of fat-soluble vitamins is a potential risk (Cahill et al 1999).

A PRESCRIPTION DRUG THAT CAUSES WEIGHT LOSS... AND EXTENDS LIFE SPAN

Metformin is a prescription drug used to treat type 2 diabetes. Published research shows that it also helps nondiabetics lose weight (Paolisso et al 1998). Metformin reduces the release of glucose (sugar) stored in the liver as glycogen. This prevents blood glucose levels from rising too high, so the body does not need to produce as much insulin (Davidson et al 1997; Maggs 1997; Pugh 1997). Metformin also prevents some of the detrimental effects associated with normal aging (Kiho et al 2005). Phenformin, a similar drug, extended the life span of mice in a Russian study (Anisimov et al 2003).

In women, a common cause of obesity is polycystic ovary syndrome, which is characterized by high blood levels of insulin. Metformin helps women with polycystic ovary syndrome lose weight (Velazquez et al 1997; Holte et al 1998; Mauras et al 1998; Morin-Papunen et al 1998; Nestler et al 1998a,b).

Metformin can be used with relative safety to lose weight (Mogul et al 2003). Consider consulting your physician about taking metformin. A typical dose is 500 mg three times a day, a few minutes before meals. Metformin is not recommended for individuals who have kidney disease, heart failure, or any medical condition that could make blood acidic (Bralow et al 2004). Consult your physician about the appropriateness of combining metformin with any of your medications. Nausea or diarrhea may occur when using metformin.

Carbohydrate Misconceptions

Over the past few years, the idea that carbohydrates are responsible for obesity has gradually seeped into our national diet dialogue. As a result, many weight-conscious people cut out whole fruits from their diet, thinking that fruits contain too many carbohydrates. This carbohydrate-restriction philosophy is due to a misunderstanding of the role of insulin and the metabolic dysfunction that accompany weight gain and aging. Carbohydrate restriction is not a good approach to sustained weight loss and good health.

Obtaining dietary carbohydrates from foods (e.g., vegetables, whole fruits, and whole grains) is an important component of an effective anti-aging weight-management program. What's important to understand, however, is that not all carbohydrates are created equal. Complex carbohydrates, such as those found in leafy vegetables and whole grains, are an important part of a healthy diet. They are absorbed slowly and do not cause rapid increases in blood sugar levels.

To better monitor the kind of carbohydrates we eat, it's helpful to understand the concepts of "glycemic index" and "glycemic load." The glycemic index is a measure of how much insulin a particular food will stimulate based on its carbohydrates. The glycemic load, which is based on the actual impact that typical meals have on blood glucose levels, is probably a better indicator because not all foods with a high glycemic index actually stimulate the rapid release of insulin (watermelon, for instance). Once again, foods with a high glycemic load tend to stimulate overproduction of insulin and should be avoided. For a list of common foods and their glycemic index and glycemic load, see Table 1.

Table 1: Glycemic Index and Glycemic Load

Comparison of Foods with High and Low Glycemic Index

	High Glycemic Index + High Glycemic Load		Low Glycemic Index + Low Glycemic Load		
	Glycemic Index*	Glycemic Load*	Glycemic Index*	Glycemic Load*	
Instant rice**	91	24	Popcorn	72	8
Baked potato**	85	20	Watermelon	72	4
Corn Flakes ®	84	21	Carrot	71	4
Corn Chex ®	83	21	Ice cream	62	8
Pretzels	83	16	Oat bran, raw	50	2
Corn Pops ®	80	21	Green peas	48	3
Doughnut	76	17	Grapes	43	7
French fries	75	22	Orange	42	5
Bread stuffing	74	16	Apple	40	6
Cheerios ®	74	15	Strawberries	40	1
Kaiser rolls	73	12	Fish fingers	38	7
Bagel	72	25	Apple	36	8
White bread	70	21	Pear	33	4
Pancakes	67	39	Yogurt, low fat	31	9
Cranberry juice cocktail	68	24	Lentils	29	5
Fanta ® Orange soft drink	68	23	Peach	28	4
Mars bar	65	26	Milk	27	3
Rye bread	65	20	Plum	24	3
Sweet corn	60	20	Kidney beans	23	6
Macaroni and cheese	64	32	Cherries	22	3
Sushi	52	19	Cashew nuts, salted	22	3
Orange juice	52	12	Peanuts	14	1
Linguini	48	23	Broccoli	-	-

* Glycemic index and load can vary based on brand or a particular lot of a food or beverage.

** Glycemic load calculation is based on differing quantities of each food group.

The Fat Trap

Before carbohydrates became a popular dietary villain, the focus was on fat. Americans were told that to lose weight, they had to dramatically cut down on the amount of fat they consumed. Once again, this simple advice presented an incomplete picture of weight loss. In fact, some kinds of fats (monounsaturated) are essential to good health and should be consumed every day. Other kinds of fats (e.g., saturated and trans fats) should be eaten in limited quantities or avoided because of their close association with obesity and heart disease.

Saturated fats have been shown to worsen insulin sensitivity in overweight individuals. For example, four diets (57 percent carbohydrate, 28 percent saturated fat, and 15 percent protein) enriched with fatty acids were evaluated in 25 healthy men and women over a four-week period. It was found that insulin sensitivity decreased by 24 percent in overweight subjects on the saturated

fat diet compared with overweight subjects on a low-fat diet, but insulin sensitivity was unchanged in lean subjects (Lovejoy et al 2002).

Low-calorie diets that feature monounsaturated fats enhance the beneficial effects of weight loss in decreasing cardiovascular risk factors in obese patients. Foods containing monounsaturated fats include olive oil (73 percent), canola oil (60 percent), hazelnuts (50 percent), almonds (35 percent), Brazil nuts (26 percent), cashews (28 percent), avocado (12 percent), sesame seeds (20 percent), and pumpkin seeds (16 percent) (Gumbiner et al 1998).

Replacing saturated fats with carbohydrates or monounsaturated fats reduces low-density lipoprotein (LDL) during weight loss (Heilbronn et al 1999). Be diligent in avoiding the trans fats found in many processed foods because these fats are especially dangerous. Trans fats are formed by a process called hydrogenation. This process turns liquid vegetable oils into solids at room temperature and extends the shelf-life of the product. Solid stick margarine and Crisco are examples of hydrogenated fats. Trans fats are found in many commercially baked cookies, cakes, and breads. Read food labels!

Consuming foods high in refined carbohydrates (e.g., white bread, cookies, candy, soda, white potatoes, white rice) and foods high in saturated fat (e.g., luncheon meats, beef, bacon, tropical oils) is a poor weight-management strategy. Instead, mixed meals that contain easily digested animal protein (e.g., fish, skinless chicken, turkey), unrefined fiber-rich carbohydrates (e.g., wild rice, yams, broccoli), and foods high in monounsaturated fat (e.g., olives and olive oil, pistachio nuts, avocados) are more effective in achieving a healthy, optimal body weight.

GREEN TEA ENHANCES METABOLIC RATE

Green tea and green tea extract have shown an ability to increase metabolic rate.

- A study in mice found that the primary polyphenol found in green tea (epigallocatechin gallate, or EGCG) decreased diet-induced obesity by decreasing energy absorption and increasing fat burning (Klaus et al 2005).
- Another study in mice evaluated the effects of caffeine, polyphenols, and L-theanine, the three major components of green tea. Additive benefits were found from green tea polyphenols, caffeine, and theanine on fat accumulation (Zheng et al 2004). Furthermore, another study showed that feeding 4 percent green tea powder to mice resulted in weight loss as well as lower concentrations of total cholesterol in the liver, triglycerides in serum and liver, and fatty acids in serum (Sayama et al 2000).
- A well-known study examined whether or not green tea extract, rich in caffeine and polyphenols, could increase 24-hour energy expenditure and fat oxidation in humans. On separate occasions, subjects were randomly assigned to one of three treatments: green tea extract and caffeine (90 mg EGCG and 50 mg caffeine), caffeine (50 mg), and placebo, which were ingested at breakfast, lunch, and dinner. The results showed that treatment with the green tea extract (which included caffeine) resulted in a significant increase in metabolic rate, as evidenced by a significant increase in 24-hour energy expenditure (Dulloo et al 1999).
- An open-label trial demonstrated that after three months, green tea extract decreased body weight by 4.6 percent and waist circumference by 4.48 percent (Chantre et al 2002).

Green tea is available in both caffeinated and decaffeinated forms. For more safety information about green tea, please see “Safety Caveats” at the end of this chapter.

Conjugated Linoleic Acid Increases Metabolic Rate and Reduces Abdominal Obesity

Conjugated linoleic acid (CLA) is found in ruminant meats such as beef and lamb and in dairy products such as milk and cheese. Many studies support the anticancer, antiobesity, antidiabetic, and antiatherogenic properties of CLA (Lee et al 1994; Park et al 1997, 1999; West et al 1998; Yamasaki et al 2003).

Human clinical trials have shown reductions in body fat from CLA supplementation.

- Supplementation with 1.8 g daily of CLA for 12 weeks reduced body fat in healthy, exercising humans of normal body weight (Thom et al 2001).
- Men with abdominal obesity who consumed 4.2 g daily of CLA for 4 weeks decreased their abdominal diameter (Riserus et al 2001).
- Supplementation with 3.4 or 6.8 g of CLA daily for two weeks decreased body fat mass in overweight and obese people, and the trans-10, cis-12 CLA isomer inhibited the activities of the fat-storage enzyme lipoprotein lipase (Pariza et al 2001).
- The cis-9, trans-11 isomer, a specific isomer of CLA, increases metabolic rate and energy production (thermogenesis) (Ryder et al 2001; Brown et al 2003).

Evidence from a short-term study (12 weeks) has suggested that treatment with CLA may worsen insulin resistance (Riserus et al 2002). However, a long-term study (one year) in overweight and obese men and women has shown that CLA is effective for weight

loss with no adverse effects on insulin sensitivity (Gaulhier et al 2004). A 36-week toxicity study in animals given CLA at doses far exceeding those given to humans also showed CLA to be without toxicity (Scimeca 1998).

ENHANCING METABOLISM AND FAT BURNING WITH GUARANA

Guarana is a South American shrub traditionally used by Indians to help maintain energy levels. Today, Brazilians use guarana as a health tonic.

Guarana seeds contain 4 percent to 8 percent caffeine, as well as trace amounts of theophylline and theobromine. These chemicals are believed to account for guarana's energy-stimulating and fat-burning effects (Carlson et al 1998).

Toxicology studies assessing guarana's effect in mice and rats demonstrated high doses of guarana (1000 to 2000 mg/kg) had no significant toxicity effects while low doses (1.2 mcg/mL) actually had an antioxidant effect (Mattei et al 1998).

In animals, guarana has been shown to increase physical endurance under stressful conditions to a greater extent than do comparable doses of caffeine or ginseng (Espinola et al 1997).

In another study, Guarana extract in an herbal formulation given to overweight human patients for 45 days was associated with an 11.2-lb weight loss in the guarana group compared with less than a 1-lb weight loss in the placebo group (Andersen et al 2001).

Guarana is well tolerated. However, adverse side effects, including heart palpitations and anxiety, have been reported when guarana is combined with powerful CNS stimulants such as ephedra and bitter orange (*Citrus aurantium*) (Pittler et al 2005). Therefore, guarana should not be taken in conjunction with CNS stimulants.

FISH OILS PROMOTE FAT BURNING

Essential fatty acids (omega-3) found in fish oils promote thermogenesis, the process by which foods are converted to heat. Because of this, the body burns calories instead of converting them into fat for storage (McCarty 1994). Another benefit of essential fatty acids is to make cell membranes more sensitive to the effects of insulin (Storlien et al 1986, 1987, 1996; Borkman et al 1993; Vessby et al 1994; Pan et al 1995).

Eating fish is an excellent way to promote weight loss. Many people also choose to take essential fatty acid supplements that are high in EPA and DHA extracted from fish oils.

Consuming cold-water fish (e.g., salmon, herring, and mackerel) and fish oil supplements favorably influences hormone-like substances in the body known as prostaglandins, specifically PgE1, conferring a protective effect against chronic inflammation and vascular disease, common in overweight individuals (Maachi et al 2004).

THE PREMISE BEHIND EATING EARLY IN THE DAY

The American Journal of Clinical Nutrition published a study reporting that food eaten early in the day generated more energy (diet-induced thermogenesis) than food eaten later in the day. This study provided evidence that the body's basal metabolic rate is highest early in the day, burning off calories as energy, whereas these same calories consumed at night are more likely to be stored as fat (Romon et al 1993). Based on this evidence, some physicians advocate that overweight patients should not eat anything after 7:00 p.m.

At the 43rd Annual Conference of the AHA (March 5, 2003), a study was presented reporting that people who eat breakfast every day are less likely to be obese and diabetic. In contrast to subjects who ate breakfast twice a week or less, subjects eating breakfast every day had 35 to 50 percent lower rates of obesity and insulin resistance (Pereira et al 2003).

Dr. Mark A. Pereira, a scientist involved in the study, stated that breakfast may reduce the risk of obesity, type 2 diabetes, and cardiovascular disease by controlling appetite and reducing the likelihood of overeating later in the day. The study included 2681 young adults who were followed for eight years. Those who ate whole-grain breakfast cereals had a lower incidence of obesity and insulin resistance than those who ate refined-grain breakfast cereals (Pereira et al 2003). The study did not evaluate the nighttime eating habits of the subjects.

LE advises against consuming large amounts of food late in the day, when insulin sensitivity is lower. Eat the majority of your food earlier in the day, when insulin sensitivity is better. Severely obese people should consider consuming the bulk of their calories for breakfast and avoiding any food after 7:00 p.m.

Another strategy is to consume daily six small-calorie meals containing small amounts of protein, monounsaturated or polyunsaturated fat, and unrefined, low-glycemic carbohydrates. These small meals should not exceed 250-300 calories each.

Obesity-Related Disease and Mortality

The risk of death from all causes, including cardiovascular disease and cancer, increases with rising obesity in both men and women in all age groups, and the risk associated with a high BMI is greater for whites than for blacks (Calle et al 1999).

Obesity increases the risk of developing metabolic syndrome and coronary heart disease (Shirai 2004); type 2 diabetes (Mensah et al 2004); osteoarthritis of major load-bearing joints, such as the knee (Felson et al 1997); hypertension (high blood pressure); sleep apnea (periods of suspended breathing during sleep) (Wolk et al 2003); and gall bladder disease (Petroni 2000).

The International Agency for Research on Cancer has classified obesity as a critical causal risk factor for cancers of the colon, breast (postmenopausal women), endometrium, kidney (renal cell), and esophagus (adenocarcinoma) (Calle et al 2004).

A study reported in the Journal of the American Medical Association suggests that obesity causes 111,909 deaths annually (Flegal et al 2005), while epidemiological evidence shows that a lower body weight is associated with lower mortality risk (Stevens 2000). In the well-known Framingham Heart Study, risk of death increased by 1 percent for each extra pound (0.45 kg) of weight between age 30 and 42 and increased by 2 percent between age 50 and 62 (Solomon et al 1997; Kopelman 2000).

AVOID FOOD COOKED AT HIGH TEMPERATURES

Diabetics were studied to assess the difference between consuming a diet high in foods cooked at higher temperatures compared with foods cooked at lower temperatures. After six weeks, diabetics consuming the foods cooked at lower temperatures lost weight, and their blood glucose levels dropped. The group eating foods cooked at higher temperatures did not lose weight and had increased blood glucose levels. The number of calories and amounts of carbohydrates, proteins, and fats consumed were the same in both groups (Vlassara et al 2002).

Foods cooked at high temperature were fried, barbecued, broiled, or cooked in the microwave. While the worst culprits in the study were animal products, any food exposed to extreme high heat can scorch the natural sugars in food and create fat-inducing toxins. Foods often cooked in this way include many prepackaged foods that have been preserved, pasteurized, homogenized, or refined, such as white flour, cake mixes, dried milk, dried eggs, dairy products including pasteurized milk, and canned or frozen precooked meals (Vlassara et al 2002).

While it may be impossible to totally avoid foods cooked at high temperatures, it is possible to reduce exposure by changing the way food is prepared. Consider steaming, boiling, poaching, stewing, stir-frying, or using a slow cooker. These methods not only cook foods with a lower amount of heat, but they create more moisture during the cooking process. Water or moisture can help delay toxic reactions associated with higher-temperature cooking. Marinating foods in olive oil, cider vinegar, garlic, mustard, lemon juice, and dry wines can also help. Finally, consider making small dietary changes by adding more fresh fruits and raw and steamed vegetables to your diet.

In addition, eating foods cooked at lower temperatures was found to reduce the levels of other potentially harmful substances in the blood, including LDL, C-reactive protein, and pro-inflammatory cytokines. A six-week diet cooked at low temperatures caused a 33 percent reduction of LDL, while a diet cooked at high temperatures increased LDL by 32 percent (Vlassara et al 2002).

YOU ARE NOW READY TO BEGIN

If you have tried to lose weight in the past and failed, you now understand why. When there are hormone imbalances, food restriction (or dieting) may have only a minimal effect. For optimal fat loss to occur, hormones must be restored to youthful levels. Otherwise, you are fighting an uphill battle.

If you are deficient in nutrients such as magnesium and chromium, the effects of hormone imbalances can be exacerbated. Eating foods at the wrong time of the day can negatively impact your attempt to shed fat. If your metabolic rate is not maintained, then weight loss can become virtually impossible.

What is critical to remember is that following only certain portions of the following program and neglecting others will not produce optimal results. For instance, you should lose some weight if you faithfully take enough soluble fiber before each meal. You should also experience some fat reduction in response to taking 7-keto DHEA early in the day.

To see meaningful benefits, however, you need to follow every step outlined in this chapter. Remember: Your body is programmed to store fat. That is how your ancestral genome survived the mass starvation that has plagued humankind since its inception.

Amid the food abundance we enjoy in the United States, our bodies are behaving as they are programmed to do. In response to

abundance, ingested food is stored as fat awaiting the next famine. The problem comes when there is no famine. Food is plentiful. Fat-promoting meals are affordable and convenient. Is it any wonder that the United States is now experiencing the worst obesity epidemic in its history?

In order to prevail against your body's innate propensity to store fat, you must restore fat-reducing hormones such as DHEA and testosterone lost to aging, and suppress hormones such as insulin and estrogen, which promote body fat. You'll want to enhance insulin sensitivity and maintain a youthful metabolic rate so that your cells are able to release stored fat.

Americans have been misled for decades about what causes them to become overweight. Physicians have failed to provide the complete solution needed to induce significant long-term reductions in body fat. For the first time, a comprehensive program has been designed to address all the factors that scientists have identified as causing or contributing to age-related weight gain and obesity.

THE IMPORTANCE OF BLOOD TESTING

The LE weight loss plan begins with comprehensive blood testing to help determine which hormones are low and whether thyroid function needs to be supported. In the past, many people have found it difficult to obtain proper hormone blood tests and a cooperative physician to work with. A new program makes this both simple and cost-effective. You can order the suggested hormone profile blood tests over the telephone, (800) 208-3444, or on a special website (www.lef.org/blood). You will also have an opportunity to speak directly with a knowledgeable health advisor over the phone. You will be sent filled-in paperwork that will enable you to go to a convenient blood-drawing station in your area. After your blood is tested, the results will be mailed to you.

Life Extension members also have the opportunity to discuss the results of these tests with one of the organization's knowledgeable doctors. If a hormone imbalance is identified, these results, as well as a prescribed hormone replacement program, should be discussed with your personal physician.

If you do not have a cooperative physician, you may be referred to a physician in your area who regularly prescribes hormones for both anti-aging and weight loss purposes.

The recommended blood tests include:

Thyroid blood tests. Several blood tests assess thyroid function. If any of these tests indicate a thyroid deficiency, a physician should consider prescribing the appropriate dose of the drugs Cytomel (T3) or Armour desiccated thyroid to bring the thyroid level into the normal range.

TSH. If your blood test shows an increase in thyroid stimulating hormone (TSH), this indicates your pituitary gland is over-secreting a hormone to stimulate thyroid function because of an apparent thyroid deficiency. The normal range for TSH can vary from 0.2 to 5.5 mU/mL. However, if TSH levels are above 2.0 mU/mL, you may be deficient in thyroid hormone and could benefit from Cytomel® or Armour™ drug therapy. The higher the level of TSH, the more likely you are to be thyroid deficient (Braunwald et al 2001).

T4. A total thyroxine (T4) test measures the actual hormone being secreted by your thyroid gland. If T4 is deficient, most physicians will prescribe Synthroid®, a synthetic T4 hormone. However, LE recommends Cytomel® (T3) or Armour™ desiccated thyroid instead of Synthroid® (T4) because T3 is the more metabolically active form of thyroid that aids in fat burning. Further, LE believes the T4 blood level in men who want to lose weight should be in the range of 8.5 to 10.5 mcg/dL. In women under age 60 who want to lose weight, the range should be between 9 and 11 mcg/dL. For women older than age 60, optimal T4 should be within a range of 8.5 to 10.7 mcg/dL. Excess T4 is a sign of hyperthyroidism, which should receive immediate medical treatment (Tietz 1995).

T3. Measuring the level of triiodothyronine (T3) is a way to determine how much metabolically active thyroid hormone is available to tissues. Normal T3 range is 2.3 to 4.2 pg/mL (LabCorp 2005), but to lose weight, LE believes you should consider a range of 3.2 to 4.2 pg/mL. If your level is below this, Cytomel® drug therapy is suggested. Most individuals begin at 12.5 mcg of Cytomel® twice a day. The dose can be increased if blood T3 levels do not return to a normal range or if symptoms of thyroid deficiency persist. Above-normal T3 levels can indicate an overdose of drugs such as Synthroid® or Cytomel® or suggest hyperthyroidism (Bralow 2004).

Thyroglobulin. A less frequently used blood test to assess thyroid function measures thyroglobulin (normal range, 0 to 55 ng/mL; LabCorp 2005). If thyroglobulin is decreased, hypothyroidism is indicated.

Thyroxine-binding globulin. Another less commonly used blood test to assess thyroid function measures thyroxine-binding globulin (normal range, 13 to 39 mcg/dL). If thyroxine-binding globulin is increased, an individual is usually deficient in thyroid function (hypothyroid) (LabCorp 2005).

Some physicians think it is more accurate to assess thyroid function by measuring body temperature in the morning before getting out of bed. This method, known as the Barnes Basal Temperature Chart, is thought to be especially useful in the treatment of obesity (Broda et al 1976).

Every morning, as soon as you wake up, and before getting out of bed, put a thermometer under your tongue and let it remain there for three minutes. If your under-the-tongue temperature is less than 98.2 degrees F (Fahrenheit), you are likely to be hypothyroid. For the most accurate results, repeat this test every day for at least two weeks. Write down the date, time, and temperature and bring the readings with you when you go to your weight-loss physician. Chronic morning basal temperature readings below 98.2 degrees F might indicate a need for thyroid hormone replacement (Broda et al 1976).

BLOOD TESTING FOR MEN

Male hormone imbalances may be detected through proper blood testing and are correctable with currently available drugs and nutrients. The following blood tests are suggested:

1. LE panel for men

- Chemistry panel/complete blood count (CBC)
- Free testosterone
- Total testosterone
- Dehydroepiandrosterone (DHEA) sulfate
- Prostate-specific antigen (PSA)
- Estradiol
- Homocysteine
- C-reactive protein (cardiac; high sensitivity)

2. Thyroid panel

- TSH
- Tri-iodothyronine (T3), free levels
- Thyroxine (T4)

3. Fasting insulin

BLOOD TESTING FOR WOMEN

Hormone imbalances in women can be detected through proper blood testing and are correctable with currently available drugs and nutrients. The following blood tests are suggested:

1. LE panel for women

- Chemistry panel/CBC
- Free testosterone
- Total testosterone
- Dehydroepiandrosterone (DHEA) sulfate
- Estradiol
- Progesterone
- Homocysteine
- C-reactive protein (cardiac; high sensitivity)

2. Thyroid panel

- TSH
- Tri-iodothyronine (T3), free
- Thyroxine (T4)

3. Fasting insulin

For weight loss, these easy steps can be taken every day:

1. Before each meal, take one of the following:
 - 8–9 g of **Enhanced Fiber Food Powder** or
 - 8–9 g of **High Lignan Flax** seed powder or
 - 3–6 capsules of **PGX** soluble fiber blend
2. Take 200–600 mcg of **Chromium** daily.
3. Take 160–320 mg of **Magnesium citrate** daily before bedtime.
4. Take 3000–4000 mg of **CLA** (with or without 1000 mg guarana) daily.
5. Take 2400 mg of **EPA/DHA** with sesame lignans daily.
6. Take 200 mg of **7-keto DHEA** daily in the morning.
7. Take 725–1450 mg of **Green Tea extract** (minimum 93 percent; caffeinated or decaffeinated) daily.
8. Minimize consumption of foods cooked at high temperatures.
9. Consume most calories early in the day (avoid late-night snacking).
10. Reduce intake of high glycemic foods (breads, pasta, potatoes, fruit juices, sugary snacks).
11. Reduce intake of saturated fats such as those found in beef and butter, and increase consumption of foods rich in omega-3 fats, such as fish.
12. Increase consumption of fresh fruits and vegetables.

Once your blood test results are received, your physician might prescribe one or more of the following:

- Testosterone cream at a dose to restore blood levels to those of a 25-year-old
- Arimidex ® to reduce excess estrogen levels (typical dose is 0.5 mg twice a week)
- Metformin to reduce excess glucose and insulin levels (dose range is 500–1700 mg daily)
- Cytomel ® or Armour ™ thyroid to bring thyroid hormone levels into ideal ranges (typical doses for Cytomel® are 12.5–25 mcg daily or higher)
- **DHEA** to restore blood levels to those of a 25-year-old (DHEA does not require a prescription, but blood testing enables you to take an optimal dose. A typical dose is 50 mg daily for men.)

For more information...

For individuals who want to learn more about using hormone therapy to lose weight and combat aging, read the Male Hormone Modulation protocol.

LIFE EXTENSION FOUNDATION WEIGHT LOSS PLAN FOR WOMEN

Before having blood work, there some steps you can take now to help facilitate fat loss. Consider implementing the following 12-step program every day.

1. Before each meal, take one of the following:
 - 8–9 g of **Enhanced Fiber Food Powder** (flavored or unflavored) or
 - 8–9 g of **High Lignan Flax** seed powder or
 - 3–6 capsules of **PGX** soluble fiber blend
2. Take 500–700 mcg **Chromium** daily
3. Take 160–320 mg **Magnesium citrate** daily before bedtime.
4. Take 3000–4000 mg **CLA** (with or without 1000 mg guarana) daily.
5. Take 2400 mg **EPA/DHA** with sesame lignans daily.
6. Take 200 mg **7-keto DHEA** daily in the morning.
7. Take 725–1450 mg **Green Tea extract** (minimum 93 percent, caffeinated or decaffeinated) daily.
8. Minimize consumption of foods cooked at high temperatures.
9. Consume most calories early in the day (avoid late-night snacking).
10. Reduce intake of high-glycemic foods (breads, pasta, potatoes, fruit juices, sugary snacks).
11. Reduce intake of saturated fats such as those found in beef and butter, and increase consumption of foods rich in omega-3 fats, such as fish.
12. Increase consumption of fresh fruits and vegetables.

Once your blood test results are received, your physician might prescribe one or more of the following:

- Natural progesterone cream if the ratio of estrogen to progesterone in your blood is too high (estrogen dominance)
- Arimidex ® or some other aromatase-inhibiting drug if estrogen levels are too high
- Estriol, BiEst, or TriEst if estriol, estrone, or estradiol levels are severely deficient
- Metformin if fasting insulin levels are high, especially if polycystic ovary syndrome is present (The typical dose is 500–1700 mg a day. Women with polycystic ovary syndrome secrete large amounts of insulin, which usually causes uncontrollable weight gain.)
- Testosterone cream in very low doses (150–300 mcg) if free testosterone levels are very low and do not respond to DHEA replacement
- Cytomel ® or Armour ™ to bring thyroid hormone levels into ideal ranges (typical doses are 12–25 mcg a day and higher)
- **DHEA** to restore blood levels to those of a 25-year-old (The typical dose is 15–25 mg a day; DHEA does not require a prescription, but blood testing enables you to take the optimal dose.)

For more information...

For individuals who want to learn more about using hormone therapy to lose weight and combat aging, read the Female Hormone Modulation protocol.

OBESITY SAFETY CAVEATS

An aggressive program of dietary supplementation should not be launched without the supervision of a qualified physician. Several of the nutrients suggested in this protocol may have adverse effects. These include:

Chromium

- Consult your doctor before taking chromium if you have hyperglycemia or type 2 diabetes. See your doctor and monitor your blood glucose level frequently if you take chromium and have hyperglycemia or type 2 diabetes.

DHEA

- Do not take DHEA if you could be pregnant, are breastfeeding, or could have prostate, breast, uterine, or ovarian cancer.
- DHEA can cause androgenic effects in woman such as acne, deepening of the voice, facial hair growth and hair loss.

EPA/DHA

- Consult your doctor before taking EPA/DHA if you take warfarin (Coumadin). Taking EPA/DHA with warfarin may increase the risk of bleeding.
- Discontinue using EPA/DHA 2 weeks before any surgical procedure.

Fiber

- Take fiber supplements with a full 8-ounce glass of water.
- Drink eight 8-ounce glasses of water daily while taking fiber.

Green Tea

- Consult your doctor before taking green tea extract if you take aspirin or warfarin (Coumadin). Taking green tea extract and aspirin or warfarin can increase the risk of bleeding.
- Discontinue using green tea extract 2 weeks before any surgical procedure. Green tea extract may decrease platelet aggregation.
- Green tea extract contains caffeine, which may produce a variety of symptoms including restlessness, nausea, headache, muscle tension, sleep disturbances, and rapid heartbeat.

Magnesium

- Do not take magnesium if you have kidney failure or myasthenia gravis.

Progesterone

- Do not take progesterone if you could be pregnant or are breastfeeding.
- Consult your doctor before taking progesterone if you have cancer of the reproductive organs.

Hormone replacement should be conducted only under the supervision of a qualified physician. The effects of hormone replacement must be consistently monitored to assess effectiveness and safety. Not everyone will be able to follow the aggressive weight loss recommendations made in this chapter. For example, men with prostate cancer should not take testosterone-boosting drugs. Your individualized report will warn you against certain aspects of this program that may not be appropriate for you. Your physician may identify additional aspects of the program that may be inappropriate for you.

For more information see the Safety Appendix

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