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On The COVER

Calorie Restriction without Hunger!

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People today are missing out on a tremendous opportunity to achieve a radically extended healthy life span, along with significant reductions in body fat.

In a study just published in the *Journal of the American Medical Association*, the effects of caloric restriction were measured in a group of overweight adults over a six-month period.[1] The findings were nothing short of astounding!

In response to reduced food intake, fasting insulin levels plummeted. As Life Extension members learned long ago, excess insulin functions as a death hormone that devastates virtually every cell and organ system in the body.

Insulin overload increases the risk of heart disease, cancer, blindness, stroke, Alzheimer's, and other age-related diseases.[2-6]

The most exciting finding of this study was the amount of weight lost in the groups that restricted their calorie intake. The moderate caloric-restriction group experienced a 24% reduction in body fat mass, while the very low-calorie group achieved a 32% reduction in fat mass.[1]

You may be wondering how these findings pertain to you, since hunger is the factor that precludes most people from even considering a low-calorie diet.

The remarkable news is that pinolenic acid—a natural plant extract discovered in Europe—has been shown to suppress appetite dramatically without causing any stimulatory effect. This plant extract attacks the underlying mechanisms involved in hunger so effectively that study participants reduced their food intake by 36%.[7]

Aging adults too often suffer from the pathological effects of insulin overload and excess fat mass. This natural appetite-suppressing nutrient could help great numbers of people enjoy the multiple health benefits documented in the recent Journal of the American Medical Association study. These benefits include reduced DNA damage, along with significant reductions in fasting insulin, total body weight, and fat mass.[1]

An increasing body of scientific findings reveals that excess serum insulin, also known as hyper-insulinemia, is a major health problem. High serum insulin promotes high blood pressure by impairing sodium balance.[4,8] Prolonged exposure to excess insulin can severely compromise the vascular system.[4,8] By acting as a catalyst in promoting cell growth, excess insulin also increases the risk for and progression of certain cancers.[3] High insulin promotes the formation of beta-amyloid in brain cells and may contribute to the development of Alzheimer's disease.[5] Overproduction of insulin even contributes to prostate enlargement by helping to promote the overgrowth of prostate cells.[9] Insulin resistance is associated with the development of abdominal obesity and health problems such as atherosclerosis and impotence. Furthermore, insulin resistance and obesity are risk factors for type II diabetes.[4] Excess insulin (hyper-insulinemia) is predictive for type II diabetes mellitus.[10]

Perhaps the simplest way to evaluate the toxic effects of excess insulin is to look at its effects on human mortality. One study showed that over a 10-year period, the risk of dying was almost twice as great for those with the highest insulin levels than for those with the lowest levels. The study authors stated that hyperinsulinemia is associated with increased all-cause and cardiovascular mortality independent of other risk factors.[6]

Decreasing excess insulin by enhancing insulin sensitivity and improving the function of pancreatic beta cells (the cells that produce insulin in the body) is a crucial component in the quest for longevity. The best way to lower excess insulin levels is to eat less and lose weight.

MULTIPLE HEALTH DANGERS OF EXCESS FAT

As fat accumulates, it releases free fatty acids into the bloodstream, a process that promotes insulin resistance.[11] As cells lose their ability to respond to insulin efficiently, insulin levels rise. Insulin serves to shepherd glucose molecules from the bloodstream across cell membranes and into cells, where the sugar molecules are metabolized for energy. As insulin resistance mounts, the body attempts to compensate by pumping out ever higher amounts of insulin. Meanwhile, excess glucose in the bloodstream—a condition known as hyperglycemia—damages blood vessels and nerves, and may eventually cause problems throughout the body.[12,13]

In the past, fat cells were considered metabolic "dead weight," so to speak—inactive and unimportant to metabolism. Life Extension members have known for several years that nothing could be further from the truth.Fat cells (adipose tissue) release fatty acids and generate proteins and hormones that are associated with potentially deadly inflammation.[14,15] At the current time, scientists have identified more than 100 proteins, fatty acids, hormones, and inflammatory agents that are secreted by fat cells.[16]

As fat accumulates, especially in the abdominal area, insulin sensitivity and glucose tolerance worsen. Left unchecked, this can lead to type II diabetes and a host of other diseases, including high blood pressure, elevated blood lipids such as triglycerides and low-density lipoprotein (LDL), and sky-high insulin levels.

The combination of insulin resistance leading to high blood pressure, abnormal cholesterol levels, abdominal obesity, and high blood sugar (glucose) is known as metabolic syndrome.[17,18] Elevated cholesterol and high blood pressure also contribute to the development of endothelial dysfunction, a critical step in the development of atherosclerosis and cardiovascular disease.

One of the most effective ways to fight the scourge of deadly insulin resistance and obesity is caloric restriction, the practice of voluntarily decreasing calorie intake while maintaining good nutritional status. This is the same strategy shown to radically extend life span in lower animals and primates. A number of human studies are ongoing to validate the effects of caloric restriction in human longevity.

The greatest obstacle faced by anyone undertaking caloric restriction and trying to achieve sustained weight reduction is the nagging sensation of feeling hungry. Most people give in to this craving and thus forgo the opportunity to reduce their risks for life-threatening diseases. Fortunately, pinolenic acid, a newly discovered phytonutrient from the Korean pine nut, increases food satisfaction and food fullness by encouraging the secretion of hormones in the gut that are intimately involved in appetite control.

HOW SATIETY HORMONES AFFECT APPETITE

Satiety is the sense of food satisfaction and fullness experienced after eating. Hunger and satiety both depend on a complex feedback loop involving many hormones and other substances secreted by the gut that interact with control centers in the brain. The gut participates in the hunger-satiety circuit by secreting two important hormones, cholecystokinin (CCK) and glucagon-like peptide-1 (GLP-1), among others.

Pine nuts

Cholecystokinin is recognized to suppress appetite in humans. When a partially digested meal rich in fats or proteins leaves the stomach to enter the duodenum (the first portion of the small intestine), the duodenal mucosa cells secrete CCK. In turn, CCK stimulates the pancreas to secrete numerous enzymes to help digest food. CCK also acts on the gallbladder to stimulate the release of bile into the small intestine, which helps to emulsify and break down fats. Most important to appetite control, CCK acts to slow gastric emptying and to promote a feeling of fullness, thus suppressing further food intake.[19]

Glucagon-like peptide-1 is another hormone that is intimately connected with fullness and satiety. Produced in the small intestine in response to fat and carbohydrates, GLP-1 works in part by activating the "ileal brake" mechanism. This slows down the absorption of food in the gut, promoting feelings of fullness and satiety, and therefore limits the desire for further food intake.[20]

GLP-1 also helps to control the health of pancreatic beta cells, which serve the crucial function of manufacturing insulin in the body. Abnormal beta-cell function plays a key role in the development of insulin resistance, and scientists believe that therapies that boost GLP-1 levels could help to favorably alter the course of diabetes.[21]

CCK and GLP-1 are key hormones for appetite control and satiety, and scientific studies show that these two hormones exert effects in combination that are more powerful than either alone (synergistic effects).[15,22-27] Studies of normal-weight and obese subjects have shown that GLP-1 and CCK reduce feelings of hunger and decrease voluntary food intake at meals.[28-31]

Recent findings demonstrate that pinolenic acid, a polyunsaturated fatty acid derived from pine nuts, stimulates the secretion of the hunger-suppressing hormones CCK and GLP-1.[7] This exciting finding suggests that pinolenic acid may have powerful effects in reducing appetite and increasing food satisfaction and fullness.

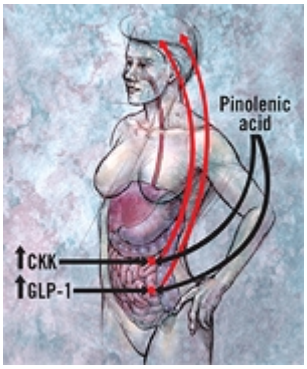
PINOLENIC ACID: EFFECTIVE APPETITE SUPPRESSANT

In early 2006, scientists reported on the health benefits of Korean pine nut extract at a meeting of the American Chemical Society.

They described the results of a randomized, double-blind, placebo-controlled trial to determine how supplementing with pine nut-derived pinolenic acid affected feelings of satiety and hunger.[7] The researchers discovered that the pine-nut extract stimulates production of the two important hunger suppressing hormones CCK and GLP-1.

In this study, overweight women were given either 3 grams of pinolenic acid or inactive placebo (olive oil) immediately before eating a modest breakfast consisting of carbohydrates. Scientists drew blood and measured for hormones associated with hunger, satiety, and eating behavior, at baseline and thereafter at regular intervals for four hours following the initial dose. The women also provided assessments of their perceived hunger at each interval.[7]

The women were asked to rate their “desire to eat” and “prospective food intake.” Those who received pinolenic acid reported significantly decreased hunger compared to subjects who had taken placebo. Subjects who received pinolenic acid rated their “desire to eat” an impressive 29% lower than placebo subjects, while they rated their “prospective food intake” 36% lower than those who received placebo.[7]



Pinolenic acid decreases appetite by stimulating the release of CCK and GLP-1, two hormones involved in satiety.

Furthermore, the lab tests in this study showed that pinolenic acid increased satiety hormones like CCK in the participants’ bloodstreams.[7] Specifically, four hours after taking pinolenic acid, test subjects had 60% more CCK circulating in their bloodstreams than did placebo subjects.[7]

Among the pinolenic acid subjects, levels of GLP-1 initially climbed in both the placebo and pinolenic acid subjects. In the placebo group, however, GLP-1 values began to drop after 30 minutes and continued to decline steadily for the remainder of the four-hour test period. In the women supplemented with pinolenic acid, GLP-1 levels continued to rise, peaking at one hour and reaching a level well above that achieved by placebo subjects. GLP-1 levels remained comfortably above those of placebo subjects throughout the trial, peaking again at three hours post-dose, and this time achieving an even greater increase in levels of this satiety-enhancing hormone over placebo subjects. In total, over four hours, GLP-1 increased 25% more in subjects who took pinolenic acid than in those who took the placebo.[7]

The benefit of appetite control at mealtime is critical to anyone interested in cutting calories and losing weight, especially those who have struggled to overcome feelings of hunger and deprivation while dieting. Pinolenic acid, a natural fatty acid derived from the Korean pine nut, offers an effective tool to help enhance satiety and appetite control.

Promoting satiety and thus curbing the impulse to over-indulge at mealtime is just one of the beneficial effects of pinolenic acid. Recent research has demonstrated that when subjects are given GLP-1 before a meal, their blood sugar remains lower and their blood cholesterol levels are reduced compared to subjects given placebo. Since elevated blood sugar and high cholesterol after meals are associated with diabetes and cardiovascular disease, researchers speculate that therapies that boost GLP-1 levels (such as pinolenic acid) may be helpful in preventing cardiovascular disease.[32]

In another study, Japanese researchers fed pinolenic acid to animals bred to develop high blood pressure, a known risk factor for cardiovascular diseases like stroke and heart attack. After five weeks of feeding, the animals’ blood pressure readings were substantially lowered. Decreased cholesterol levels also were noted in the pinolenic acid-fed animals.[33]

Scientists have investigated the mechanism by which pinolenic acid lowers cholesterol. They found that after adding concentrated pinolenic acid extracted from pine nuts, enhanced uptake of detrimental LDL by liver cells was observed. The scientists suggest that the pinolenic acid concentrate may have LDL-lowering properties by enhancing liver LDL uptake.[34]

HEALTH BENEFITS OF CALORIC RESTRICTION

By suppressing appetite, pino-lenic acid may contribute to a successful caloric-restriction regimen. Scientific studies continue to confirm the life span-enhancing, disease-preventive benefits of caloric restriction. If you are not overweight but are interested in limiting your calorie intake to promote longevity and reduce disease risk, pinolenic acid can help enhance satiety and control appetite, critical factors involved in decreasing calorie intake.

In a recent study reported in the Journal of the American Medical Association (JAMA), subjects were put on calorie-restricted diets for six months, after which they were assessed for known markers of aging, such as core body temperature and levels of glucose, fasting insulin, and dehydroepiandrosterone sulfate (DHEA-S). Fasting insulin levels were significantly reduced in all the treatment groups, while DHEA-S and glucose (blood sugar) levels remained steady. On average, body weight decreased by 10% in the calorie-restriction and calorie-restriction-with-exercise groups, while body fat decreased by 24-25%. The subjects on a very low-calorie diet lost 13.9% of their initial body weight and 32% of their body fat. By contrast, body weight remained virtually unchanged in the control subjects.[1]

Core body temperature also fell in the calorie-restriction and calorie-restriction-with-exercise groups. Absolute 24-hour energy expenditure and sleeping energy expenditure decreased in all treatment groups, and the effect was more than could be explained by changes in body composition (fat loss). The researchers concluded that caloric restriction induced a “metabolic adaptation”—that is, a reduction in the baseline rate at which the body burns fuel. This adaptation is desirable for the purpose of slowing aging. People seeking to improve fitness and lose weight often exercise vigorously in the hope that exercise will boost their metabolic rate. While this may burn calories slightly more rapidly, it also accelerates the production of dangerous free radicals. According to a prevailing theory of aging, oxidative damage at the level of the mitochondria is responsible for much of the inflammation and degeneration associated with aging.[1]

In the JAMA study, DNA damage decreased from baseline levels in all the calorie-restricted groups. Accumulating DNA damage is thought to contribute to aging and disease processes such as cancer. This provides further evidence of the potentially life-extending effects of caloric restriction. In just six months, caloric restriction favorably altered fasting insulin levels and reduced core body temperatures in all treatment groups. Fasting insulin level and body core temperature are considered biomarkers for longevity. Taken together, the changes in longevity parameters among all calorie-restriction groups suggest that long-term caloric restriction may extend life span.[1] Conversely, mounting evidence suggests that excess fat (what scientists call “adiposity”) is associated with accelerated aging.[2]

CONCLUSION

Although a reliable method of increasing longevity in countless scientific studies, caloric restriction is very difficult on a practical level over the long term, due in large part to sensations of hunger and food deprivation. Furthermore, given the well-known health dangers associated with excess body weight and fat, successful weight loss may literally be a matter of life and death for many overweight people.

Pinolenic acid from the Korean pine nut is a safe, effective nutritional supplement that can help overweight, aging adults by increasing feelings of food satisfaction and fullness. By stimulating the release of satiety and appetite-control hormones like CCK and GLP-1, pinolenic acid supplementation can suppress the feelings of gnawing hunger and deprivation that may sabotage weight-loss efforts.

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