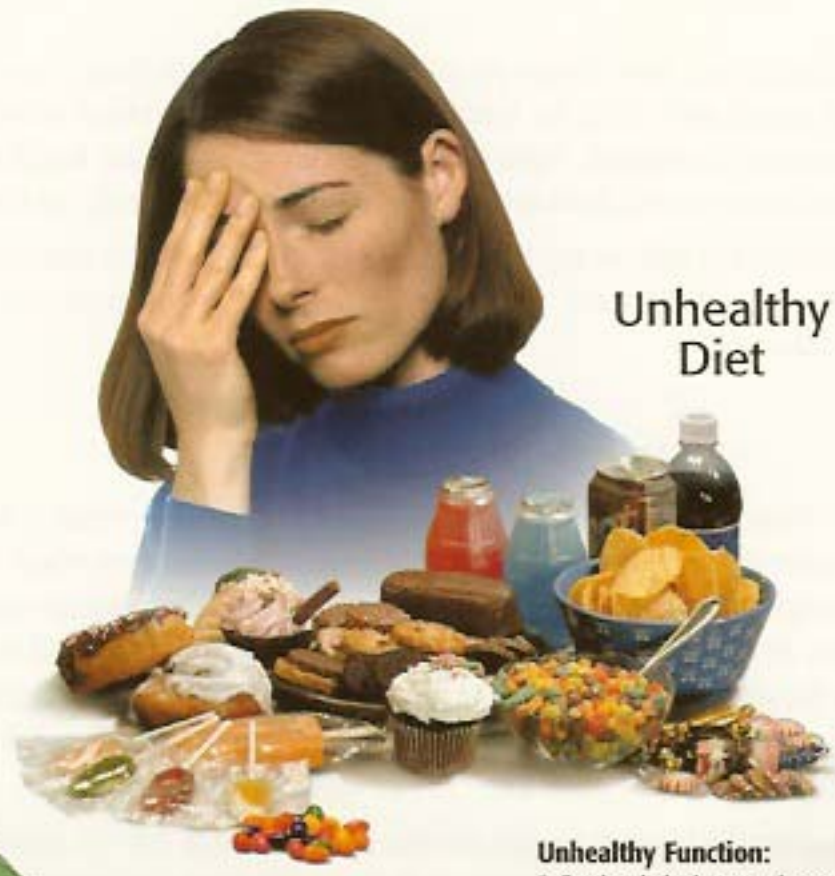
BLOOD SUGAR METABOLISM

Healthy Diet

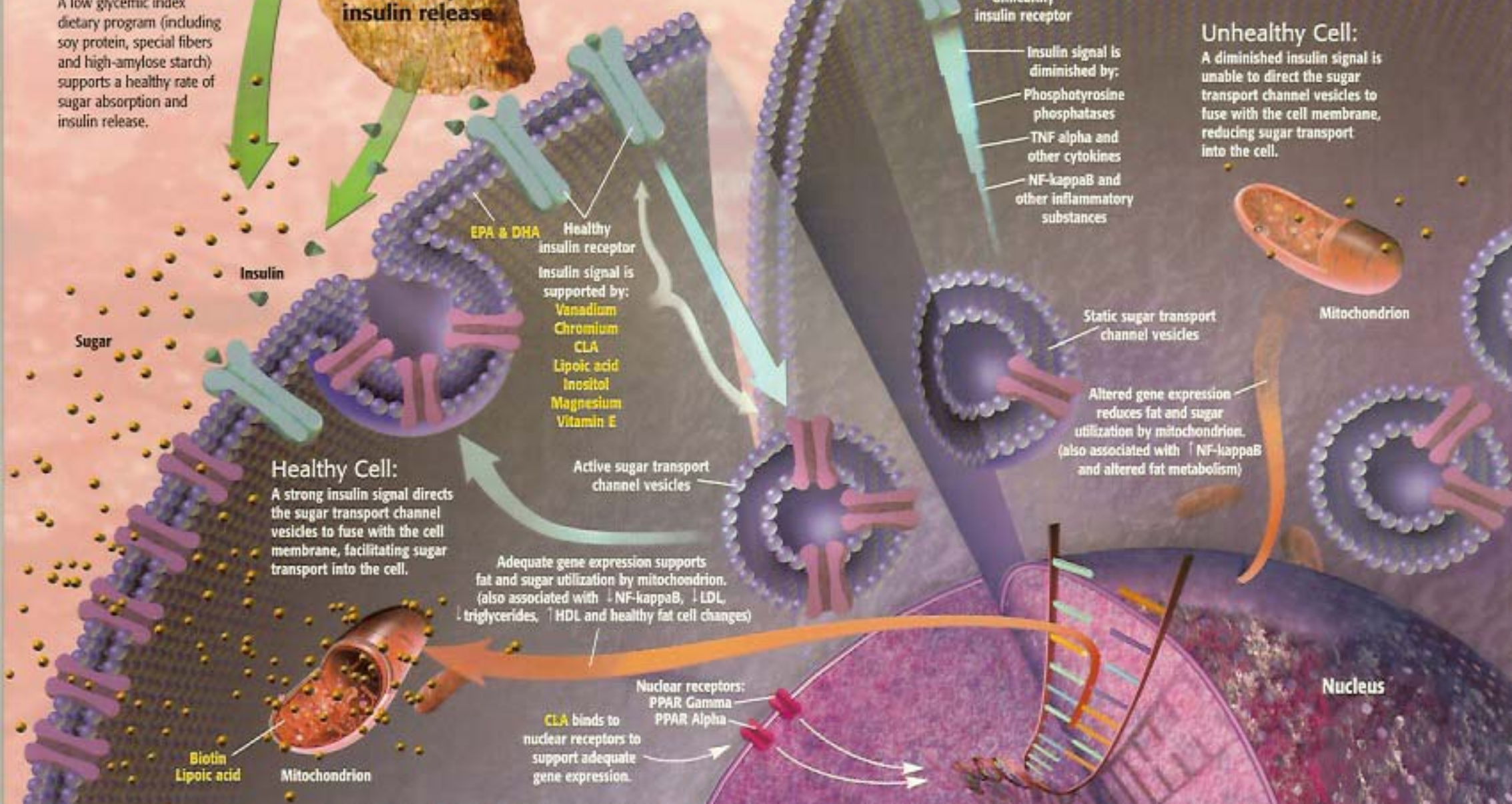
Unhealthy Diet



Healthy Function:
Complex, unrefined carbohydrates from whole foods are absorbed more slowly through the intestine causing the release of appropriate, healthy levels of insulin from the pancreas.

Unhealthy Function:
Refined carbohydrates and sugars are absorbed more rapidly through the intestine and can trigger the release of excess, unhealthy levels of insulin from the pancreas.

A low glycemic index dietary program (including soy protein, special fibers and high-amylose starch) supports a healthy rate of sugar absorption and insulin release.



THE IMPORTANCE OF HEALTHY SUGAR METABOLISM

Achieving and maintaining proper blood sugar metabolism is essential for a lifetime of excellent health. Prolonged unhealthy blood sugar metabolism can significantly affect the health of your nerves, eyes, blood vessels, kidneys and pancreas. It can impact your weight, body shape, energy levels, blood pressure, cholesterol, triglycerides, overall cardiovascular health and more. Over 60 million Americans have "insulin resistance," a form of unhealthy blood sugar metabolism that frequently goes unrecognized, but can often progress to the point where signs of significant health deterioration appear.

It's never too early or too late to learn how you can achieve and maintain healthy blood sugar metabolism and experience the benefits of sustained health. With your healthcare provider, you can take the necessary steps to achieve and enjoy the long-lasting benefits of healthy blood sugar metabolism.

Healthy Blood Sugar Metabolism

The illustration on the reverse depicts the importance of eating a healthy, nutrient-rich diet containing unrefined carbohydrates from whole foods. Through normal, healthy digestion, unrefined carbohydrates are progressively broken down to smaller sugars, which are then absorbed through the intestine into the blood. This sugar absorption stimulates the pancreas to secrete an appropriate quantity of insulin into the blood, which facilitates the delivery of sugar into cells throughout the body.

When insulin binds to insulin receptors embedded in the cell membrane, a signal is sent to sugar transport channel vesicles inside the cell. These vesicles respond to the insulin signal by carrying sugar transport channels ("sugar entryways") to the surface membrane of the cell. The vesicles then fuse with the cell membrane, flatten out and position their sugar transport channels to facilitate effective sugar delivery from the blood into the cell. The sugar then enters the cell and is used for energy production by the mitochondria (the energy factories of the cell), or is stored for future use. The response of the cell to insulin binding, and the resultant insulin signal, is critical to healthy blood sugar metabolism.

Factors That Lead to Unhealthy Blood Sugar Metabolism

Obesity, lack of exercise and an unhealthy diet are considered major contributors to developing poor blood sugar metabolism. When we consume excess sweets and refined or processed foods, the simple sugars they contain are absorbed very quickly and can cause a rapid and dramatic increase in our blood sugar levels. Carbohydrates that cause such an increase are classified as having a high glycemic index; the higher the GI of a food, the higher its potential for elevating blood sugar.

With a high concentration of sugar in the blood, the pancreas responds by producing a proportionally high surge of insulin in an effort to help the sugar gain entrance to the cell. In unhealthy blood sugar metabolism, the cell may be unresponsive or insulin resistant and sugar delivery into the cell can be reduced. The pancreas then tries to compensate by producing even more insulin. Over time, these high levels of insulin can lead to a host of problems, including increased triglyceride levels, decreased HDL ("good") cholesterol levels, high blood pressure, other cardiovascular manifestations and hormone disruption.

This insulin resistance may occur because, along with excess sweets and refined carbohydrates or high GI foods, an unhealthy diet is often deficient in nutrients necessary to support healthy cell membranes, insulin receptors and a strong insulin signal. Unhealthy insulin receptors can result in poor binding of insulin and, in concert with other factors, a diminished insulin signal, thereby reducing sugar delivery into the cell. These other factors include the negative effects of specific enzymes and cytokines, such as phosphotyrosine phosphatases, nuclear factor-kappaB (NF-kappaB) and tumor necrosis factor alpha (TNF-alpha).

An unhealthy diet may even alter the way the genetic information within our cells influences blood sugar metabolism. Appropriate gene expression is important for healthy blood sugar metabolism because it stimulates sugar utilization by the mitochondria of the cells, producing energy and—in effect—clearing sugar from the blood.

Taken as a whole, excess weight, lack of exercise and an unhealthy diet can reduce the "sensitivity" of your cells to insulin and even impact their genetic expression. Without effective insulin binding and signaling, the sugar transport channel vesicles remain static and unable to travel to and fuse with the cell membrane. As a result, the number of sugar transport channels is reduced, leading to poor cellular sugar absorption and utilization, excess blood sugar and insulin, low energy and a host of other possible manifestations of deteriorating health.

Steps to Promote Healthy Blood Sugar Metabolism

Incorporating lifestyle changes that focus on effective weight control, a program of regular exercise and specific dietary guidelines are very important to promoting healthy blood sugar metabolism.

The dietary guidelines should focus on two primary goals: 1) choosing foods that have a moderate effect on raising blood sugar, referred to as low-GI foods, and 2) choosing foods that improve the body's ability to support the effect of insulin, functionally reducing insulin resistance. With the guidance of your healthcare provider, this can be an easy process that results in a healthy and delicious dietary plan.

Nutritional supplementation may also offer great benefit. Your healthcare provider may recommend that you supplement your diet with a combination of macronutrients that include soy protein, special fibers and a low-GI starch known as high-amylose starch. These help support healthy carbohydrate absorption and blood sugar metabolism.

Supplementing your diet with various fatty acids and micronutrients may also be very helpful. These include the essential fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) to support healthy cell membranes, conjugated linoleic acid (CLA) to promote the insulin signal and gene expression for improved utilization of sugar by the mitochondrion, alpha-lipoic acid (ALA) to further support the insulin signal and sugar utilization by the mitochondria, green tea catechins (EGCG) to protect the insulin-secreting pancreatic islet cells, and bioactive cinnamon compounds to enhance insulin sensitivity. Include vitamin E, inositol and the minerals vanadium, chromium and magnesium to provide additional support to the insulin signal. And to further promote sugar utilization by the mitochondria, supplement with biotin. Other herbs and accessory nutrients may also be helpful.

Take the first step to achieving healthy blood sugar metabolism. Ask your healthcare provider to recommend a program that is right for you.