

The second of a multi-part series on Adult-onset (type II) Diabetes, the disease that is quickly reaching epidemic proportions throughout the developed world.

## TYPE II DIABETES:

# The Epidemic of the New Millennium

## PART II: Insulin Resistance - the Silent Stalker

Silently, assuredly it moves, never revealing its true identity until its unsuspecting victim has succumbed. More than 70 million Americans have it, most without any knowledge of the fact. Syndrome X - the Silent Stalker - is the dark force behind Adult-onset (type II) Diabetes, the epidemic of the new millennium.

Also known as Insulin Resistance Syndrome or Metabolic Syndrome, it is a clinical manifestation of Type II Diabetes and is believed to affect up to 25 percent of the adult population in North America. The syndrome is a constellation of metabolic changes that begin with excess insulin production (hyperinsulinemia), followed by the development of insulin resistance within the body. This, in turn, leads to a further increase in insulin production and the entrenchment of a vicious and damaging cycle.

First identified in 1988 by Dr. Gerald Reaven of Stanford University Medical School, the onset of the disease is characterized by the development of a host of related symptoms, including:

- high blood pressure (hypertension)
- elevated blood triglycerides (fats)
- elevated LDL (bad) cholesterol
- reduced HDL (good) cholesterol
- accelerated hardening of the arteries
- proliferation of cells in the arterial walls
- development of abdominal obesity
- adverse changes in blood lipids (glycosylation)

The symptoms can lie undetected, often until irreversible damage is done. If left unchecked, the cycle of steadily increasing hyperinsulinemia will eventually announce itself as full-blown type II diabetes. Although not everyone who exhibits insulin resistance will develop diabetes, virtually everyone who develops Adult-onset Diabetes started with insulin resistance.

The association is clear and the consequences alarming. People with Insulin Resistance Syndrome have triple the risk of heart disease; of those who develop frank diabetes, 80 percent will die from cardiovascular complications. Clearly, early detection of the disease - before it reaches its end stage - is paramount.

## The Onset of Syndrome X - Lifestyle and Diet are Critical Factors

The development of insulin resistance is determined much more from diet and lifestyle than from genetic predisposition. For reasons not fully understood, the cells of the body shut down their insulin recognition systems, with a consequent onset of hyperglycemia (abnormally high levels of blood glucose) and hyperinsulinemia (abnormally high levels of blood insulin).

The syndrome is strongly associated with central body obesity. In fact, one of the best predictive markers for insulin resistance is excess body weight, in particular weight over the belt, such as a pot-belly. However, the central issue of whether obesity causes insulin resistance, or whether insulin resistance causes obesity, remains unclear. According to Slagle, excess insulin production leads to the deposition of excess body fat, with consequent weight gain, especially around the waist. This view is supported by others, (Strand), but it is not universally accepted. Dr. Gerry Reaven, Stanford University School of Medicine, argues that there is no reason to believe that insulin resistance causes obesity. According to Reaven, "Insulin resistance means that the insulin isn't acting correctly. So, if you don't have enough insulin, or if your cells aren't responding to insulin, you can't deposit glucose into the cells. If anything, you would lose weight."

Whether it's the chicken or the egg, one thing is clear. Four out of five diabetics are obese; excess abdominal fat, or the lifestyle factors that contribute to obesity, also appear to contribute to insulin resistance.

Chronic stress is also a predictive marker for the onset of Syndrome X. Stress induces a hormone cascade as the body responds physiologically to a perceived threat. This, in turn, leads to elevated blood sugar levels, followed by an elevation of blood insulin

levels. Other risk indicators include: a lack of regular exercise, high blood cholesterol, thirst and frequent urination, a craving for sugar, and elevated blood pressure in excess of 140/90.

Research shows that regular vigorous exercise, combined with a low glycemic diet, is the best and most immediate way to overcome insulin resistance. Exercise improves cardiovascular function and the body's ability to metabolize glucose. Loss of weight, through exercise and diet, correlates to a return to normal levels of insulin resistance. According to Grieger, "Weight loss is the single most effective approach to the treatment of Syndrome X and the reduction of the probability of developing full blown, Adult-onset Diabetes."

While the mechanism is not clear, weight loss makes the body more sensitive to insulin. It is suggested that exercise-induced weight loss may stimulate the production of additional insulin receptor sites on the cell membranes of the muscle tissue, or simply re-activate those sites already present. This would, in turn, enhance the body's ability to utilize the insulin present and reduce chronic hyperglycemia. Normalization of blood sugars would, in turn, normalize insulin levels.

Whatever the mechanism, it's clear that people suffering from Syndrome X need to take a serious look at their lifestyle. Getting off the couch and eating a sensible, low glycemic diet offers the best and most natural means to recovery - before the damage is done.

Let's investigate the sequence of events that kick-starts the process of insulin resistance and leads so many unsuspecting 'couch potatoes' toward that slippery slope of Adult-onset Diabetes and a host of related degenerative diseases.

## The Onset of Insulin Resistance

We know that excess calorie intake and a sedentary lifestyle are partners in crime, setting the Silent Stalker on its course. Attempts to finger a high fat diet have not proved successful. In fact, there is evidence that low fat diets may actually aggravate the effects of insulin resistance. Diets low in saturated fat (less than 10%) and with a moderate fat intake, consisting of polyunsaturated fats, may, however, prove beneficial.

When it comes to carbohydrates, research shows that it is the types of carbohydrates consumed that is the determining factor. Consumption of carbohydrates that have a high Glycemic Index rating appears to be a primary determinant in the establishment of insulin resistance. The Glycemic Index is a classification of carbohydrates, based on their potential for raising blood glucose levels. Foods such as white rice, potatoes, white bread etc., and processed foods containing refined sugars, have a high glycemic value and result in a rapid rise in blood sugar. Consumption of these foods causes a rapid spike in the level of insulin, the hormone secreted by the pancreas to reduce blood sugar levels.

It is believed that chronically high levels of blood sugars overtax the body's ability to produce insulin and, at the same time, reduce the body's sensitivity to the hormone. This sets the stage for hyperglycemia (high blood sugar) and hyperinsulinemia (high blood glucose) and the consequent onset of insulin resistance.

While the correlation is unclear, it is alarming to note that the prevalence of Syndrome X has increased significantly since the introduction of Aspartame, an artificial sweetener marketed under the name of Nutrasweet®. According to Kennedy, the average US citizen now consumes 67 kg (148 pounds) of artificial sweeteners per year, most of it as Aspartame.

The development of clinical symptoms of Syndrome X, and the cause for its progression, is the body's failing ability to use the insulin present. People who are insulin resistant have cells that respond sluggishly to the action of the hormone. As the muscle cells become less able to respond to the presence of insulin, blood sugar levels build and, in response, the pancreas compensates by pumping out more of the hormone. A vicious cycle ensues and builds, with devastating consequences to the unsuspecting victim.

But why does insulin resistance develop in the first place? To find out, let's take a quick look at the process of glucose metabolism.

## A Delicate Balance

Insulin is produced by highly specialized  $\beta$ -cells, inside the pancreas. The hormone is secreted into the blood in response to elevated blood sugar levels. This is a normal process, which takes place after food is digested. The insulin helps the body to utilize the blood sugar. It does so by binding with specialized receptor sites on the surface of the cells, much like a key fits neatly into a locked door. Once the insulin unlocks the receptor site, the glucose (a molecule too large to simply diffuse through the cell membrane) is transported through the cell membrane and into the cell. Once inside, it is used to power the cell as its main energy source, or it is stored for future use as glycogen (a form of animal starch) or converted to fat.

During times when blood sugar levels are low, glycogen is converted back to glucose in the liver by the action of a hormone called glucagon. The glucose is then released from the liver in order to maintain a constant and delicate balance of this important nutrient in the blood.

Insulin resistance develops when the normal levels of insulin are not able to unlock the cellular doors. The reasons for this remain unclear; however, two possible scenarios may provide a clue:

- It may be that, after a certain level of glycogen storage, feedback mechanisms within the cell de-sensitize the cellular receptors to prevent more glucose from entering.
- Alternatively, individuals who are sedentary and have low metabolic needs may exhibit a reduced number of cellular receptors on the surface of their muscle cells.

The fact that obesity and sedentary lifestyle aggravate insulin resistance gives merit to both the preceding arguments. People who are overweight show more signs of insulin resistance than those whose weight is normal. As well, lack of exercise is known to elevate serum triglycerides and decrease levels of HDL (good) cholesterol; both are indicators of the disease.

## Insulin Resistance - the End Game

Once the cycle has begun, a chronic diet of high glycemic foods and sedentary lifestyle will result in a slow but inevitable rise in the level of insulin as the pancreas continues to compensate. As long as it can continue to meet the demand, blood sugar levels - while high - can be controlled. However, chronic insulin resistance puts excessive stress on the pancreas and may lead to the development of abnormal  $\beta$ -cells, with the consequent loss of insulin production.

Once the balance is tipped, insulin production suddenly falls, blood sugar levels hit the roof and severe hyperglycemia gives way to full-blown, Adult-onset Diabetes. At this stage blood sugar levels exceed 126 mg/dL and the clinical indicators may include:

- obesity
- advanced cardiovascular impairment
- hypertension
- retinopathy (damage to the retina of the eye)
- nephropathy (kidney damage)
- neuropathy (nerve damage)

Unfortunately, most diagnoses and treatments occur far too late in the game. Medical intervention usually occurs only after the  $\beta$ -cells have sustained damage, often to the point of becoming totally dysfunctional.

It is critical that intervention occur as early as possible, once hyperglycemia becomes evident. Sadly, even with early intervention, most physicians treat the symptoms of Syndrome X, rather than the underlying cause. It is estimated that 50 percent of all prescriptions written today are, in fact, related to Syndrome X

In some cases, pharmacological intervention has actually been found to increase insulin levels and the consequent risk of cardiovascular disease. Anti-hypertensive drugs, such as diuretics,  $\beta$ -blockers and calcium channel blockers have been found to increase blood sugar levels, thereby confounding the treatment process.

## The Key to Disease Management

Controlling insulin resistance is the key to disease management. Rather than focus on the mitigation of blood sugar levels, effective treatment of Syndrome X must tackle the causative factors for insulin resistance - and this involves changes to both diet and lifestyle. Weight reduction through regular, aerobic and weight-bearing exercise, combined with a sensibly balanced diet, including low glycemic carbohydrates and polyunsaturated fats is essential.

## Disclaimer

This article was researched and compiled for educational purposes only. No person should use the information herein for self-diagnosis, treatment or justification for declining medical treatment. Any individual with a specific health problem referenced in this article should seek advice from a qualified medical practitioner.