

A lighthouse costs less than shipwrecks.



Prevention costs less than disease.

## The National Insulin Resistance Council

A not-for-profit disease prevention organization

### Insulin Resistance: Too Much of a Good Thing

In one of nature's great ironies, when you are insulin resistant, you typically have *too much* insulin, even if you are diabetic. In effect, such people have too much of a good thing.

Every one knows that insulin is good. In fact, it is necessary for life. The simple view is that you need energy to live. We get energy when our body digests glucose from food we eat. We need insulin to use the glucose. When you have too much glucose, you are labeled as having diabetes. A relatively small number of people make no insulin themselves and need to inject insulin to survive. They have what is called Type One Diabetes. The rest of us make insulin as we need it to help us utilize glucose. But about one-in-ten people have genetic code that is turned on when some condition is met. That activated code makes their energy absorption inefficient, causing them to create more insulin than a healthy person would need. The inefficient energy absorption and the resulting messed up insulin response is called *insulin resistance*.

The onset of facial hair growth in boys is a good example of genetic code that is dormant for years and then becomes activated. Men's genetic instructions trigger facial hair growth sometime after puberty. The start is different for each individual, however, as is the pattern, thickness and rate of growth. By the late teens, some boys have to shave regularly while others have peach fuzz, if that. Whether it is a declining level of human growth hormone or rising levels of testosterone, or the balance between them, something triggers the genetic code that says "grow face hair." Insulin resistance seems to work the same way. The genes are there, but the condition is dormant until activated by something. One likely trigger is weight. The exact bio-chemical culprits are not fully identified, and for about 20% of affected individuals, the condition seems to be active at birth.

Multiple times a day after meals, a healthy person's insulin response to the rising presence of glucose is to make just the amount of insulin needed and to expel it once it has done its job of helping the body create energy. One reason we expel insulin is that it is a caustic chemical and attacks the inner lining of blood vessels and the outer wrapping of some nerve tissue, however gradually. Since it is the presence of glucose in our blood that signals the body to create insulin, when energy absorption doesn't happen efficiently for some reason, glucose levels remain elevated, and more insulin is created. So one effect of insulin resistance is that day by day, week after week, month after month, year after year, excess amounts of insulin that are present for much more of the time, slowly erode important blood vessel and nerve tissue.

The definition of diabetes is having too much glucose in the blood. While a type 1 diabetic makes no natural insulin, over 90% of diabetics are Type Two Diabetics. They have excess glucose, but generate their own insulin. After some time, often years, type 2 diabetics' insulin production abilities become exhausted. At that point, they may become insulin-dependent, meaning that external supplies of insulin are required. But, for most in this category,

they not only make their own insulin, but because they are insulin resistant, they make too much insulin. These people now have too much of a good thing.

So people with insulin resistance have too much insulin. Their metabolism may or may not also be defective to the point where they are also deemed diabetic.

Insulin has another role and another dramatic effect in conjunction with our liver. Glucose is the usable of body fuel for energy conversion. Glycogen is the storage form. The liver is, in addition to its many blood and digestive functions, our energy conversion factory. It converts glucose to glycogen so it can be stored for later use, perhaps when we have not eaten, but are in need of energy. It also converts glycogen back into glucose. Insulin is a signaling chemical for these processes. When insulin is present, the liver goes into storage mode. When it is absent, the liver can convert the stored form back into the usable form. If you have too much insulin too much of the time, your liver can only create glycogen, even if you need more energy. This explains three overlapping symptoms of fully developed insulin resistance. Fatigue is caused by not enough energy access, despite plenty of glucose. Obesity is caused by a liver in relatively constant fat-making mode. And the abnormal difficulty to lose weight is caused by a liver that cannot convert stored energy due to the near constant presence of insulin.

Other symptoms and problems caused by *insulin resistance* begin once it is active. Some are visible, some invisible except in blood tests. Their extent and severity are related to how much excess insulin is caused by the *insulin resistance*, a lifetime condition. Fortunately, it is a condition that can be tamed. That's accomplished by doing things that lower excessive insulin levels, sometimes with medication, but always with behavioral improvements.

Of course, we all want to make our own insulin, but none of should have too much of such a good thing.

The goal of the National Insulin Resistance Council (NIRC) is to *prevent* millions of non-infectious disease cases tied to *insulin resistance* including diabetes, heart failure, stroke and recently-linked Alzheimer's. It sponsors, operates, and collaborates with others on programs that lead to *early identification* of affected individuals and fosters targeted *active prevention* programs.