Insulin Resistance Revisited

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I What is the Metabolic Syndrome?

Dr. Gerald Reaven of Stanford University first defined the term Syndrome X. The ability of insulin to dispose of glucose varies widely among individuals. This individual variability and how individuals compensate to these variations are of great importance in the development of western diseases. In simple terms, the body has a difficult time shuttling glucose in the cells because the receptors on the cells [which can be likened to key holes] are plugged up. This in term causes the Beta cells in the pancreas to create more insulin in a further attempt to getting glucose into cells. Overtime this compensatory hyperinsulinemia leads to the development of a cluster of abnormalities. These are the classic findings of Metabolic Syndrome as they relate to insulin resistance. [Also note the term MSX is used to denote Metabolic Syndrome, the X was retained to give credit to Dr. Reaven.]

- IGT >110 mg/dl
- Hypertension +>130/85
- Elevated Triglycerides >150
- Decreased HDL <40 in Men and < 50 in Women
- Elevated VLDL levels
- Increased levels of PAI –1 [Plasminogen Activator Inhibitor 1]
- Hyperurecemia

II Other conditions linked to MSX

- Elevated homocysteine
- Gout
- Sleep Apnea
- Colorectal and breast cancer
- PCOS [polycystic ovarian syndrome] and other reproductive disorders
- Nutrient imbalances
- Elevated CRP [C-reactive protein, an inflammatory marker]
- Elevated ferritin levels which can lead to heart diseases
- Microalbuminuria

III Incidence of MSX

Twenty four percent of Americans are considered to have MSX. However other studies show that if we look at the prevalence of how many adults are free of all features of this syndrome, it is estimated that only 30% of adults have none of the characteristics of MSX. Therefore it would appear that ~70% of the population exhibit some aspect of this syndrome.

IV What is the significance of all this?

The importance of being able to apply this information is that we can prevent DMII and CHD with diet, exercise, supplements, stress management and insulin sensitizers. Insulin resistance causes IGT [impaired glucose tolerance]. This means that the body cannot dispose of glucose [blood sugar] in a timely manner. Diagnosis of IGT requires a 3-hour GTT with fasting insulin levels. Patient the patient has his/her blood drawn then he/she will consume 75gms of pure glucose. The patient will then have blood drawn every hour on the hour for 3 hours. What do we look for? A reading of 140-199mg/dl on the second hour is diagnosed as impaired glucose tolerance [IGT]. A reading of 200 mg/dl on the second hour is considered frank diabetes.

Long term prospective studies show that 10-15% of the populations with a fasting plasma glucose of 126mg/dl or greater develop retinopathy with ten years. Further studies show that one third of individuals with IGT eventually develop diabetes [DMII].

Therefore based on this information it is important to know your risk factors. If you have a family history of diabetes, have abdominal obesity, bouts of hypoglycemia, eat a poor diet, are sedentary, it is highly recommended that you get a GTT. This test can detect diabetes 5-7 years before it will ever show up on a typical 8-hour fasting glucose that most patients get during their annual exam.

V. What is wrong with a little elevated blood sugar?

The WHO [World Health Organization] has predicted that the number of diabetes will double from 143 million in 1997 to 300 million in 2005. These statistics only take into account adult onset diabetes [DMII]. However adult DMII is no longer applicable as DMII is becoming a disease of the youth. In our centers we are diagnosing children with DMII.

Let's take a look at some US statistics:

- 17 million individuals with DMII
- 6 million are undiagnosed
- 2200 are diagnosed daily
- 1 million new cases daily
- 5th leading cause of death
- 210,000 deaths in 1999
- Adults between 30-40 have a 70% increase risk of acquiring diabetes

So what is wrong with a little elevated blood sugar? A lot. Blood sugar is a very tightly controlled mechanism. Once these regulations are lost the amount of glucose in the blood stream will increase and attach itself to proteins creating damage to vital organs and therefore changing and impeding their function. Remember sugar is a sticky substance, and it is that stickiness that sticks to retinas, nerves, kidneys and other vital organs leading to some of the most severe complications associated with diabetes.

Diabetic complications are termed macro vascular and micro vascular. Macro vascular [associated with: heart attack, stroke, peripheral vascular disease]. Micro vascular complications associated with: [retinopathy, nephropathy and neuropathy].

- Retinopathy is the leading cause of blindness in adults and it accounts for 24,000 cases of blindness every year.
- Nephropathy is the leading cause of end-stage renal disease [ESRD] and it accounts for 28,000 new cases every year. Once the nephrons are damaged, dialysis is required to sustain life.
- Neuropathy/peripheral vascular disease, is the leading cause of non traumatic amputations which accounts for 67,000 limbs lost per year.
- Myocardial infarctions and stroke risk is increase 2-4 fold and accounts for 60-70% of all diabetes related deaths.

The cost of treating diabetes and its related complications cost in excess of 100 billion dollars per year and accounts for 1 out of every 7 health care dollars spent.
The good news is that with life style changes these can all be prevented.

VI Treatment

Of course prevention is key in any disease state. That is the importance of early diagnosis. Diet is of key importance. There are patients who are resistance to change and therefore think they can take a pill and continue with a poor diet. Unfortunately as the patient continues in this manner the medication will eventually stop working which will then require 3-4 oral agents and eventually insulin therapy.

Exercise improves glucose uptake into the muscle. Therefore it is important to get started on an exercise regimen with the approval of your doctor. Lifting lite weights is a great form improving glucose metabolism. The easiest exercise is walking. It is important to test blood sugar

before and after exercise especially if one is on insulin therapy.

Nutrients are key in improving glucose metabolism and preventing further diabetic complications. Nutrients for prevention, management and treatment will be discussed in detail in our next issue.

Stress reduction is important as stress increases blood sugar levels. Therefore making lifestyle changes or learning to respond differently to a stressful situation will prevent blood sugar spikes and lows.

VII Conclusions

MSX is a cluster of abnormalities of which insulin resistance is thought to be the underlying cause. IR is a disease in itself that leads to IGT and DMII. Complications of DMII are severe and life threatening, which include micro vascular, and macro vascular defects that lead to CHD [coronary heart disease], kidney, eye and nerve damage. The key is to get tested and to make the necessary lifestyle changes to prevent diabetes or further complications.