WHAT DOES “DYSMETABOLIC SYNDROME” MEAN?
Dysmetabolic syndrome (also referred to as “syndrome X,” “insulin resistance syndrome,” and “metabolic syndrome”) is a condition in which a group of risk factors for cardiovascular disease (heart disease and stroke) and type 2 diabetes occur together. Dysmetabolic syndrome is important for four reasons. First, it is very prevalent in Western countries. Second, it is associated with an extremely high incidence of cardiovascular disease. Third, it is often unrecognized by patients who have it and sometimes even their doctors. Fourth, when it is recognized, treatment successfully reduces the risk of life-threatening complications.

Although it doesn't have a universally accepted definition, most health professionals would include the following as the principal features:
• Abdominal obesity (i.e. excess body fat in the region of the stomach)
• High blood pressure (also known as hypertension)
• Low blood levels of the “good” cholesterol, HDL
• High blood levels of the “bad” cholesterol, LDL
• High blood levels of triglycerides
• Insulin resistance (an impaired ability of the body's insulin to handle blood glucose)

There is also evidence that the dysmetabolic syndrome is related to two other conditions seen in adolescent and adult females. These two conditions are called polycystic ovarian syndrome (PCOS) and Stein Leventhal syndrome. Both of these conditions have many of the features of the dysmetabolic syndrome but also are characterized by abnormal menstruation, higher than normal male hormone levels, excess body hair and abnormalities of the ovaries.

WHAT DOES “INSULIN RESISTANCE” MEAN?
Insulin resistance is one of the major features of the dysmetabolic syndrome and is thought to be one of the major causes of adult onset type 2 diabetes mellitus. Insulin resistance means the body is resistant to the normal sugar metabolic effects of insulin and therefore needs to make increased amounts to keep the blood glucose (sugar) level normal. Eventually, over years, the pancreas can not continue to make these high levels of insulin and when the insulin levels drop, the glucose levels rise to levels causing diabetes. It is also thought that the very high levels of insulin needed to prevent diabetes also may worsen problems with excess weight gain and be associated with some of the menstrual and ovarian problems in women.
HOW COMMON IS DYSMETABOLIC SYNDROME?
Although its exact frequency isn't known, the condition is widespread among the adult population in developed nations, and increases in frequency with age. For example, a study in the United States found that about 7% of adults aged 20-29 years had dysmetabolic syndrome, while 43% of those in the age group 60-69 were affected. The condition is also afflicting an increasing number of children and adolescents as the worldwide epidemic of obesity spreads across the age groups. For example, a recent US study found that 20-25% of obese children and adolescents also exhibited insulin resistance, a key element of dysmetabolic syndrome and the condition that can lead to type 2 diabetes.

WHO GETS DYSMETABOLIC SYNDROME?
Both men and women can get the dysmetabolic syndrome. This condition is thought to run in families and thus it is important to consider this condition in children and adolescents if their parents have a history of the condition or its symptoms. The same families who have a history of type 2 diabetes are at risk for dysmetabolic syndrome. The family members at risk who actually go on to develop dysmetabolic syndrome are those who adopt sedentary lifestyles, and who become obese. In fact, dysmetabolic syndrome (like type 2 diabetes) can most often be prevented with exercise and weight loss.

WHAT ARE THE HEALTH IMPLICATIONS OF HAVING DYSMETABOLIC SYNDROME?
Each of the components of dysmetabolic syndrome acts to significantly increase the risk of developing one or more diseases. As examples, excess abdominal fat is associated with increased risk of type 2 diabetes and heart disease; hypertension is the most important risk factor for stroke; high blood LDL and low HDL increase the risk of heart disease; and insulin resistance can be the first step on the road to type 2 diabetes. In brief, having type 2 diabetes significantly increases the risk of developing heart disease, kidney disease and blindness, and also of having to undergo limb amputations (due to gangrene).
The rapid increase in incidence of dysmetabolic syndrome in children and adolescents represents a potential “time bomb” for the future adult populations of developed nations. Effective preventive measures are needed for the entire population, and ways of reducing the incidence of dysmetabolic syndrome are also urgently needed.

WHAT CAN BE DONE TO REDUCE MY RISK OF DEVELOPING DYSMETABOLIC SYNDROME, OR TO HELP OVERCOME THE SYNDROME IF I ALREADY HAVE IT?
Although the incidence of dysmetabolic syndrome is increasing, the situation is far from hopeless. Dysmetabolic syndrome is a reasonably recent phenomenon and its causes, although not entirely understood, include environmental factors. This means that something has changed in the environment to promote obesity, hypertension, insulin resistance and so on. Examples of environmental changes that may have contributed to the dysmetabolic syndrome include a
marked reduction (by most people) in physical activity, and an increase in the number of meals
eaten away from home (particularly foods that are rich in saturated fat and salt). Clearly, if the
environment can be changed in one direction, those changes are reversible and the dysmetabolic
syndrome can be overcome.

STEPS YOU CAN TAKE TO REDUCE THE RISK (OR SEVERITY) OF
DYSMETABOLIC SYNDROME INCLUDE:

(1) Increase activity level
The 'diabetes epidemic' that is sweeping the Western world, and is increasingly affecting affluent
groups in developing nations, parallels the obesity epidemic that began a decade or so earlier.
Although being obese is the single most important risk factor for type 2 diabetes, it is also true
that being normal weight is not a guarantee of protection against diabetes. Some slim people also
develop insulin resistance, and a small proportion of these will progress to diabetes. Physical
activity can assist in reducing the risk (or severity) of dysmetabolic syndrome independently of
any effects of body weight by directly treating the insulin resistance (healthy trained muscles use
insulin much more efficiently).
This also means that, even if you are having trouble losing weight, increasing physical activity
will help to reduce your risk of developing heart disease or type 2 diabetes. This is the
cornerstone of the 'health at any size' movement.
You don't have to be extremely (or even very) active to gain substantial benefit. By taking part in
just 30 minutes of moderately-vigorous activity (such as brisk walking, cycling, swimming, light
weight-training and so on) daily, you can substantially reduce the risk (or severity) of
dysmetabolic syndrome.

(2) Improve health through better eating habits
It is also important to eat only sparingly foods that are high in saturated fats (such as full-fat
dairy products, fatty meats, biscuits, cakes, pastries, potato chips and most other fried takeaway
foods). Suitable replacements are whole-grain cereal foods, fruits and vegetables, foods rich in
monounsaturated and polyunsaturated fats, including those that provide high levels of 'omega-3'
fats. Fish (especially those with dark-flesh) is an excellent source of omega-3 fats. It is now
usually recommended that we eat two or three fish meals (preferably not fried or battered) per
week. Green leafy vegetables are also a good source.

(3) Lose some weight
Weight loss should result from increasing physical activity and making appropriate alterations to
diet, as recommended above. Weight loss has beneficial effects on several components of
dysmetabolic syndrome, including the risk of developing insulin resistance. Although only a
relatively small percentage of those with insulin resistance do progress to type 2 diabetes,
everyone who does develop type 2 diabetes did experience insulin resistance first, so it is an
indicator that you are 'at risk' of developing diabetes. Because developing insulin resistance
increases with increasing body fat levels, weight reduction should lower the risk of insulin
resistance. It has been reported that carrying as little as 11 kg of excess body fat during early adulthood increases the risk of later onset of type 2 diabetes twenty-fold. A reduction in body fat also almost invariably leads to improved blood pressure. So losing weight reduces the risk of stroke, because high blood pressure is the strongest individual risk factor for stroke.

Although regaining the 'healthy weight range' would be ideal, this is not essential for significant health benefits. Losing about 5-10% of your current weight (if you have substantial excess body fat) will have worthwhile effects on several aspects of dysmetabolic syndrome. Although 5-10% may not seem a lot, it can actually be quite a high percentage of your initial body fat level. For example, if you weigh 75 kg and have a body fat level of 33% (indicative of mild obesity), your body fat content is ~25 kg. Losing 10% (7.5 kg) of your body weight as fat means that you have lost about 30% of your body fat.

**MEDICATIONS**

There is no single medical treatment for the dysmetabolic syndrome. There are medications that can help with specific problems. Insulin resistance is a major component of the metabolic syndrome and some oral agents used to treat type 2 diabetes works by improving insulin action. Because many of these medications cause some weight gain, metformin, which does not cause weight gain, is generally used. This medication helps but does not cure insulin resistance.

With the dysmetabolic syndrome, menstrual irregularities are often a major problem and these can be associated with increased ovarian androgen (male hormone) secretion. In these instances the use of oral contraceptives can sometimes be of benefit. Antiandrogens (such as aldactone) to help lessen the cosmetic effects of the increased androgens are also used.

Other medications to treat elevated blood pressure and elevated triglycerides are also used when needed.

**SUMMARY**

Dysmetabolic syndrome is a constellation of metabolic disorders that all result from the primary disorder of insulin resistance. The tendency for insulin resistance is inherited, but in an individual who inherits this tendency, the actual development of dysmetabolic syndrome (and/or type 2 diabetes) usually requires obesity and a sedentary lifestyle. All the metabolic abnormalities associated with dysmetabolic syndrome can lead to cardiovascular disorders - when present as a group, the risk for cardiovascular disease and premature death are very high. Weight loss and exercise constitute the best treatment, but failing this, drug treatment aimed at each metabolic abnormality is essential for reducing the overall risk.
REFERENCES
Endocrine Abstracts 3 P90.