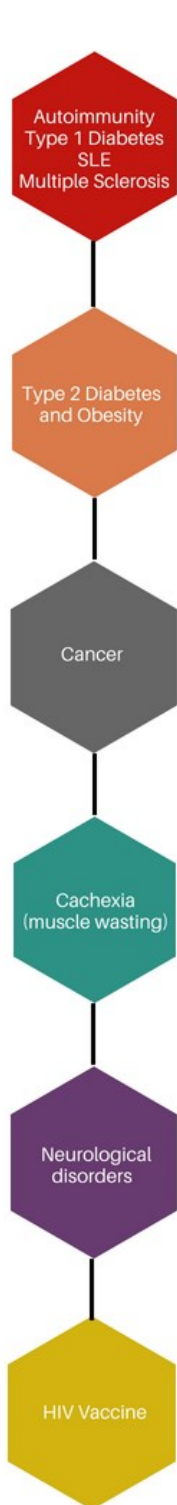


The Bench and Beyond



Taking a closer look Type 2 Diabetes and Obesity

Obesity is a major health issue because it can lead to Type 2 Diabetes (T2D), heart disease, stroke, arthritis and cancer In this newsletter we focus on the link between obesity and T2D. According to the World Health Organization, in 2016, more than 1.9 billion adults 18 years and older, were overweight. Of these over 650 million were obese. In the United States, 9.3% of the population is affected by diabetes, and by 2050 the prevalence of diabetes is expected to increase to 25%. T2D is also on the rise in children. There are a number of serious health issues associated with having T2D including, loss of vision, kidney failure, nerve damage, heart attack, stroke and blood vessel blockages in the legs.

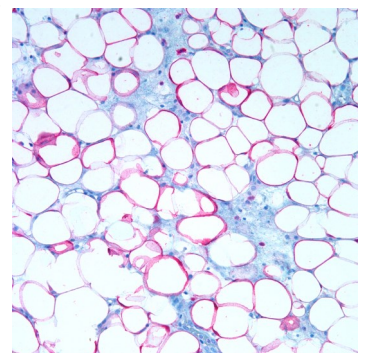
There are two easy calculations that allow us, and our physicians, to determine whether we are obese. The calculations, shown below, give us our Body Mass Index, or BMI. The World Health Organization defines obesity as having a BMI greater than 30. When using feet and inches to measure height and pounds to measure weight, calculation number 1 below should be used to calculate BMI. When using meters to measure height and kilograms to measure weight calculation number 2 should be used. This is how BMI is calculated:

Calculation 1 using feet, inches and pounds - Let's say you are 5 feet and 10 inches tall (a total of **70 inches**), and you weigh **220 pounds**. First you multiply your height by itself (70×70), which is **4900**. Then you divide your weight (**220**) by **4900**, which is **0.0449**. Then, you multiply **0.0449** by the number **703** to get your BMI, **31.6**. When using this calculation you always have to multiply by the number 703 at the end, no matter how tall or heavy you are.

Calculation 2 using meters and kilograms - Let's say you are **1.85 meters** tall and you weigh **86.3 kilograms**. First you multiply your height by itself (1.85×1.85) and get **3.42**. Then you divide your weight (**86.3**) by **3.42** to get your BMI, in this case, **25.23**. When using this calculation you do not multiply by the number 703.

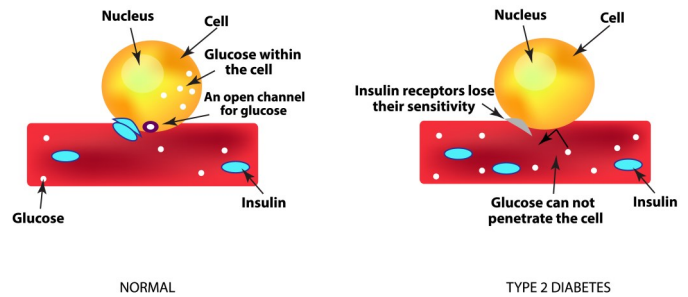
Obesity research at SDBRI Research in the Samad lab is focused on understanding how obesity increases the risk for developing T2D by identifying changes in the fat tissue that are critical for the development of T2D. Over the past two decades, the Samad research group has identified several proteins and other molecules that do not work properly in the obese adipose tissue and demonstrated that several of these changes contribute to T2D.

The work done by the Samad group highlights the fact that fat tissue, also called adipose tissue, is not intrinsically bad tissue. In fact, it is important that adipose tissue is protected from damage because the adipocytes, or fat cells, store our energy as fat. Yes, some fat is necessary for our bodies to stay healthy. The photo on the right is of healthy adipose tissue made up of adipocytes, or fat cells. The ultimate goal of this research is to design new drugs that block these critical changes and stop the development of T2D.



Frequently Asked Questions!

How does obesity lead to diabetes? People with obesity have a lot of extra fat, particularly around the waist-line. This excess abdominal fat can release chemicals, called inflammatory mediators, that make the body less able to use insulin. This is a problem because the hormone insulin (produced by the pancreas) is needed to maintain normal levels of blood glucose. The decreased ability by the body to use insulin is called insulin resistance. This condition of insulin resistance is usually present for several years before a person is diagnosed with T2D. If over the years the body cannot use insulin effectively, blood sugar levels get uncontrollably high, also known as hyperglycemia, an indication of diabetes. Diabetes that is caused by insulin resistance is T2D. Over time the pancreas makes less insulin and controlling blood glucose levels becomes even more difficult.



Does obesity always lead to Type 2 Diabetes? No, it doesn't. There are some people who are obese but metabolically healthy, i.e. they do not get T2D. This has to do with several factors, including the distribution of fat tissue in the body and "heathy vs non-healthy" fat. Excess fat around the abdomen is considered unhealthy, and, measure of waist circumference is now considered an important risk factor for T2D. We don't understand T2D development well enough yet to know all the reasons why some obese people do, and others don't become diabetic.

Can people who are not overweight develop Type 2 Diabetes? Yes, they can. Some people are genetically more susceptible to developing T2D. As a result, some people can become diabetic even if they exercise regularly and eat a healthy diet. Also, genetic or acquired conditions where people are unable to produce and maintain healthy fat tissue (a condition known as lipodystrophy) can also lead to T2D.

Are there any other disorders that are linked to obesity? Yes, people who are obese are more at risk of developing certain cancers, including liver, pancreas, colorectal, endometrial, bladder, breast and cancers of the blood. They are also more prone to developing a condition called nonalcoholic fatty liver disease (NAFLD), which if left untreated can lead to the more serious nonalcoholic steatohepatitis (NASH), cirrhosis and cancer.

What is the difference between Type 1 Diabetes and Type 2 Diabetes? Type 1 Diabetes is an autoimmune disease. It is caused by the destruction of insulin-secreting cells by the body's own immune system. T2D develops when the body stops responding normally to the insulin that it makes. Eventually, the amount of insulin made by people with T2D is reduced.

How is Type 2 Diabetes treated? In some cases, T2D can be treated with medications to control the blood sugar level. However, while on these medications it is possible to overshoot the ideal blood glucose level and end up with a blood glucose that is too low, a condition called hypoglycemia. This can be very dangerous and lead to hospitalization. **The good news is**, in many cases, Type 2 Diabetes can be reversed and controlled by regular moderate exercise and a healthy diet. For more information on healthy living with diabetes see www.diabetes.org and www.diabetes.org.uk.

Next Issue:


Taking a closer look at Cachexia (muscle wasting)

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