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<https://youtu.be/-LE8CCy7IPY>

Mitochondrial diseases

Mitochondria-an organelle found in large numbers in most cells, in which the biochemical processes of respiration and energy production occur. It has a double membrane, the inner part being folded inwards to form layers (cristae).

First, before we discuss mitochondrial dysfunctions or diseases, we need to understand what mitochondria are. It is a structure found in the cytoplasm of every cell in your body, covered by two thin membranes, the inner one corrugated, that generate most of the chemical energy needed to power the cell's biochemical reactions. It is an energy powerhouse. The word cytoplasm refers to the fluid that surrounds the cell nucleus. The chemical energy produced by these organelles is stored within the cells in a small molecule called adenosine triphosphate or ATP.

When your mitochondria function properly, storing energy in ATP, and using that energy to perform your daily activities, you can be considered a healthy energetic person. If you are tired during the day without much energy in you, you could be having an early mitochondrial dysfunction.

Your doctor will order a blood test called CRP to check whether there is some active disease process starting.

The mitochondria are responsible for creating more than 90% of the energy needed by the body to sustain support organ functions.

Now what are the roles of mitochondria?

1. Produces energy and stores ATP.

ATP is a complex organic chemical found in all forms of life and is often referred to as the molecular unit of currency because it powers metabolic processes.

2. Responsible for cell death
3. Stores calcium
4. Produces heat.
5. Regulates innate immunity.

Mitochondria are responsible for converting glucose into energy. People with diabetes have a degree of dysfunction in the mitochondria for glucose to produce energy fast. Normally such energy given by glucose is stored in ATP in the mitochondria. In short, ATP is energy. This stored energy is used for the functions of the body.

In diabetes, there is no luck to have sufficient stored energy from glucose, due to mitochondrial dysfunction. Diabetics do not secrete sufficient insulin for glucose to be stored in the mitochondria to produce energy stored as ATP.

Fatty acids from dietary fat are taken to the fat cells or adipocytes and the mitochondria store them as ATP for energy.

Likewise, blood glucose with the help of insulin enters fat cells by converting it into triglycerides in the liver.

So, repeating,

Excess glucose gets stored in the liver as glycogen or, with the help of insulin, converted into fatty acids circulated to other parts of the body, and stored as fat in adipose tissue. When there is an overabundance of fatty acids, fat also builds up in the liver.

So both glucose and fatty acids as triglycerides get stored in the liver as fat. That is how fatty livers are so common today among people globally.

What are the dangers of having a fatty liver?

Early-stage NAFLD does not usually cause any harm, but it can lead to serious liver damage, including cirrhosis if it gets worse. Having high levels of fat in your liver is also associated with an increased risk of serious health problems, such as diabetes, high blood pressure, and kidney disease.

So remember this serious man-made disease, so prevalent today in Sri Lanka, due to eating street and restaurant foods, and not home-cooked food.

So, diabetes can be defined as a disease or dysfunction in the mitochondria leading to decreased ATP production, resulting in insulin resistance. This explains why they have less energy production in the cells and most symptoms are related to this.

This situation leads to cell injury and cell death. Morbidity and mortality are high in diabetes due to mitochondrial dysfunction.

Mitochondrial diseases can affect any part of the body, including the cells of the nerves, muscles, Kidneys, heart, eye, brain, liver, and ears. Due to loss of energy in the organs in mitochondrial dysfunction, multiple organ cells die and lead to organ failure.

About 1 in 5000 individuals have a genetic mitochondrial disease.

How do you reverse mitochondrial damage?

There is no cure for mitochondrial disease. Certain supplements—thiamine (B1), riboflavin (B12), vitamin C, vitamin E, Lipoic acid, and coenzyme Q10—may help treat certain aspects of the disease. Avoiding stress may also help reduce symptoms.

Exercise for mitochondrial health?

Perform interval training to sustain fitness and optimize mitochondria. Training 2 to 4 days a week is ideal, with workouts such as brisk walking for 2-3 hours a day would minimize mitochondrial dysfunction.

Everyone knows that exercise is good for you. It is that one thing that has no downside. It makes you stronger, quicker, and smarter. It fixes your metabolism, protects your nervous system and other organs, and boosts your mood. What this all means is that dysfunctional mitochondria get back to their normal functions. Within you, every cell's mitochondria function well to store energy and provide it when required.

This is so true in diabetes. Walking daily alone with no medication can reverse diabetes type 2 and reverse mitochondrial dysfunction. Walking seems to make resistant insulin work more sensitively. In life, if you wish to lead a wholesome healthy life the best drugs are plant-based foods and daily brisk walks.

Hope this video article will help you to adjust your lifestyle, accordingly.

Stay safe and goodbye until we meet again.

You can improve your mitochondrial baseline through exercise. Research shows that working out is the best way to increase the number of mitochondria in the cells and it improves their quality.