

## ***Mitochondria: Recharging Your Batteries***

What is aging? Don't you love it when health articles start with a question? It creates this air of mystery, as if some simple truth you hold is about to become not so simple anymore, or that the curtain is about to be pulled back to reveal the answer to the riddle of life.

No one has solved the riddle of life. If they did, I am sure they wouldn't stick around to tell us! The important thing for now, until someone does solve the great riddle, is to make the lives we have as joyful, pleasant and meaningful as we can, for as long as we can. Fortunately for us, breakthroughs are occurring all the time in this field.

I want to introduce you to a health topic that has the possibility of creating a new paradigm in increasing longevity. It works on the principle of energy. In order for anything to survive, it must have the energy to function. For humans, that energy is ATP. Many of you may hear the faint and distant ring of high school chemistry where you most likely first heard of the great energy molecule Adenosine 5' - TriPhosphate. It is the molecule that powers nearly every biochemical process in the body. Without it, our bodies are like cars with empty tanks, still, motionless, dead.

What is ATP and how do I get more of it? Every cell in the body has its own "power station" where ATP is manufactured from nutrients in the blood stream that come from the digested foods you consume. These power stations are called *mitochondria*. While the nucleus and the DNA may be the like the driver in

the car that controls where it goes, the mitochondria are the engine that powers the vehicle and gets it where it wants to go.

As we get older, the mitochondria in our cells have a tendency to become weaker, inefficient and fewer. You don't have to have a PhD in biochemistry to imagine what can happen to a body that has a more difficult time producing energy. It gets slower, tired, things don't work properly; more mental tasks become stressful and complicated. Most of us call this aging, but new research tells us that aging is actually the deterioration of mitochondrial function. That means that if the quantity, efficiency and functionality of our mitochondria can be restored or improved, we could potentially reverse the aging process and prevent many of the medical conditions associated with age like cardiovascular disease, diabetes, obesity and Alzheimer's.

So if the critical issue of aging is the health of the mitochondria, what is the solution? The cells in your body have a process for building new mitochondria called *Mitochondrial biogenesis*. It's a complicated process that involves more than 1,000 genes. There are a number of ways to increase the rate of mitochondrial biogenesis. The two most common methods are Caloric Restriction (CR) and aerobic exercise.

Caloric restriction has been a very heavily researched subject ever since Professor Clive M. McCay performed the first experiment on laboratory rats in 1935. He fed a group of rats a diet with 30-40% fewer calories than another group that was allowed to eat freely. The restricted rats live an average of 33% longer. Since then,

studies have been done on other organisms in the animal kingdom including yeast, fruit flies, spiders, dogs, fish and even some species of primates, all with similar results: caloric restriction improves lifespan. Why?

While it is still a debated topic, the most widely accepted theory is that caloric restriction reduces the damage done to mitochondria and mitochondrial DNA from free radicals and reactive oxygen species (ROS).

Mitochondria are particularly vulnerable to free radical damage, unlike other parts of the cells that have protections and mechanisms to even repair damage from oxidative stress molecules. Mitochondrial DNA, once damaged, can inhibit the function of the mitochondria and can produce generations of similarly damaged mitochondria that have impaired functionality and contribute to the downward spiral known as aging.

The other method of improving mitochondrial biogenesis is, of course, aerobic exercise. Any doctor, or any health conscious person for that matter, can tell you that exercise is an excellent way to improve your overall health. If you were in the gym exercising next to a seasoned athlete (assuming you are not one), the disparity between the physical performances would be immediately obvious. Less obvious would be the observable differences between yours and their muscles under a microscope. One of the easiest things that would be noticeable is that the muscle fibers are jam packed with mitochondria, most likely far more than yours. This quantity of mitochondria allow for greater energy to be transferred to the

muscles at a higher rate and for longer periods of time.

Unfortunately, most of us are not seasoned athletes. Many of us lack the resources, time, and dedication to developing our mitochondria to the level of an elite athlete in order to get the health benefits of basic exercise.

Likewise, caloric restriction is a difficult discipline to maintain, especially during holidays, family gatherings, birthdays, work parties and so on.

Luckily, groundbreaking research has found the particular nutritional elements that can give you the benefits of caloric restriction and exercise for your mitochondria.

Three specially formulated supplements, when used in conjunction, create a unique combination that improve mitochondrial biogenesis and increase the metabolic performance of the existing mitochondria as well as possessing powerful anti-oxidant properties that help prevent further damage to the mitochondria and work to restore and improve their function to optimum levels.

**Nitric Oxide** - Often referred to as the “foundation” of cardiovascular health, is a tiny molecule that is a vasodilator responsible for controlling blood flow to the entire body, supporting healthy blood pressure, and promoting the health of the endothelium - the inside lining of blood vessels. The most effective way of producing nitric oxide in the body is by consuming L-Arginine, a semi-essential amino acid that is the primary building block for nitric oxide production. L-arginine is more effective when taken with alpha-ketoglutaric acid (AKG), which plays a

vital role as an intermediate in the production of ATP. People with a history of cold sores, or other manifestations of Herpes Simplex virus, however, should avoid consuming L-arginine.

**M-Reservatrol** - is a complete bioflavonoid complex containing resveratrol, quercetin, and pterostibene to take advantage of three antioxidants that synergize well. These compounds are being extensively studied in the areas of cardiovascular health, cell replication, capillary integrity and aging.

**Alpha-Lipoic Acid with Biotin** - is a powerful, whole body, multi-functional antioxidant that helps create and maintain healthy, well-functioning cells. It neutralizes free radicals at the moment they are created before they can cause damage to your cells. It also has the ability to destroy free radicals in both water-based and lipid-based cells, making it the ideal whole-body antioxidant. Also, it replenishes levels of the body's own master detoxifier (glutathione). In addition, it "regenerates" other consumable antioxidants, such as vitamin C and E, and CoQ10, giving them the ability to continue fighting free radicals for extended periods of time.

While taking these supplements together gives one an incredible ability to improve and increase mitochondrial biogenesis, as well as mitochondrial performance, nothing replaces proper diet, caloric restriction and adequate exercise. These supplements, however, can dramatically increase the effectiveness of the above activities.

Using all of the information in this article, you can:

- Increase your energy level
- Increase your metabolism
- Reduce free radical damage and oxidative stress
- Increase exercise performance
- Reduce body fat
- Increase lean muscle mass
- Prevent age-related deterioration
- Possibly even increase your lifespan

It is all achievable by concentrating on improving the quality and quantity of the mitochondria in your body. The exact mechanisms are complex, but thanks to modern science, the solution is simple. By reinvigorating and regenerating the source of your body's energy, the effects are obvious and easily experienced.

So what is aging? If you focus on your mitochondrial health, it's something you won't have to worry about.



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