Health Benefits of Pyrroloquinoline Quinone (PQQ)

What is PQQ?

Over the last several decades, science has taken innovative healthcare to a whole new level with the discovery of pyrroloquinoline quinone (PQQ), a water-soluble and heat stable organic molecule that was first discovered in bacteria back in the late 1970’s and thought to be a component of interstellar dust. It wasn’t until the 1990’s and early 2000’s, however, that scientists really began to study the effects of PQQ, discovering that it’s a supplemental nutrient that actually stimulates and creates new mitochondrial growth, which is a major factor in overall health. With the wide range of benefits that have been uncovered, from anti-aging to increased mental functioning and even reversal of heart muscle damage after a heart attack, it’s no wonder PQQ is becoming more popular in the field of science and medicine.

Mitochondrial Health

Mitochondria are the little organelles that are the powerhouses of the body’s cells. They carry in them their own specific DNA molecules and functions. Mitochondria convert food and oxygen into energy all throughout our body. This extensive job of the mitochondria is why they are so susceptible to degeneration and oxidative stress. Mitochondrial dysfunction is thought to be a primary cause of age-related diseases such as cognitive decline (i.e., Alzheimer’s) and cardiovascular disease.

PQQ stimulates the growth of new mitochondria and can reverse cellular aging


Beta-blocker medications like metoprolol (given after a heart attack to repair heart muscles) can help enhance the function of mitochondria, but never to create new mitochondria. Humans cannot naturally make PQQ, so the only way to create new mitochondria was long-term calorie restriction and excessive vigorous exercise – not at all viable options for the elderly or ill. However, PQQ is the first supplement that has been able to stimulate the creation of new mitochondria.

Neurological Health Benefits of PQQ

The most significant and astonishing benefit of PQQ is the effect it has on the brain. It’s important to note here that PQQ is still in its early stages of study in humans, but they are quite profound in the few human studies that have been done in recent years. First noted in animals, PQQ was found to reverse cognitive impairment that was caused by aging. It was also shown to block harmful antimicrobial molecules that are known to damage neurons (nerve cells that transmit information throughout the body and responsible for a variety of conditions).

Since PQQ is able to stimulate the production of new mitochondria, the studies are showing vast beneficial effects on major diseases that are caused by mitochondrial degeneration and dysfunction such as Alzheimer’s disease, Parkinson’s disease, cardiovascular conditions, and other age-related diseases. PQQ has been shown to help prevent the protein, alpha-synuclein, from developing, which is a protein associated with the development of Parkinson’s Disease. Furthermore, PQQ was shown to prevent amyloid-beta molecular structure formation and protect the neurons from the oxidative pressures that come with this particular protein. The amyloid-beta protein is a major cause of Alzheimer’s disease.
How does it actually help with major, deteriorating diseases like Alzheimer’s and Parkinson’s? PQQ provides a protection “layer,” so to speak, over existing and new mitochondrial cells so that the harmful toxins that cause these diseases are not able to attack the cells, thereby providing an effective barrier around them. That’s not the only thing PQQ does for these conditions, however. The fresh mitochondria produced by PQQ rejuvenates brain functioning, increasing memory, cognition, and learning abilities.1,3-7

The nerve growth factor (NGF) is what helps nerve cells and all their branches grow. NGF is essential for repairing damage caused by episodes of stroke and heart attack, where blood and oxygen flow are interrupted and muscle and tissue are damaged. PQQ actually stimulates the production of NGF and has helped reverse damage done in these episodes. It in this aspect, scientists have called PQQ superior to metoprolol (a beta-blocker given to people after a heart attack to help rebuild muscle strength).1,3-5,7

**Other Health Benefits of PQQ**

**Heart Health**

As noted above, PQQ has been found to be able to reverse damage done to heart muscles after a heart attack. The age-related mitochondrial degeneration that happens in every living body, both humans and animals, is thought to be a primary cause of atherosclerosis (hardening of the arteries, which can lead to heart attack). While there are certainly other risk factors involved with heart conditions such as obesity and smoking, a 2010 study found that the major pump portion of the heart (the left ventricle) had 40% less mitochondrial function and 25-80% reductions in DNA-encoded proteins, suggesting that dysfunction of mitochondrial plays a pivotal role in heart failure.2,3,6

**Sleep and Stress**

In 2012, researchers in Japan did a human study using PQQ supplementation to test its effects on stress, fatigue, and sleep. A variety of psychological and laboratory tests were used to gauge body and mind reactions throughout an eight-week long study. Participants filled out surveys before starting PQQ supplementation, several times during the study, and then at the end. Cortisol levels were tested because this is a body steroid that is associated with sleep and stress conditions. In the short time of eight weeks, the participants showed more regulated cortisol levels, significant improvement in sleep quality, stress levels, vigor, and overall quality of life.3,3,6

**Immunology**

Proper immune system function, as we all know, is essential to overall well being. It protects the body against a plethora of bacteria, viruses, and harmful toxins. Animal studies show that decreased levels of PQQ result in compromised immune function and reduction in IL-2 levels (a chemical that is naturally made in the body in response to an infection). IL-2 is unique in that it helps create a memory against the bacteria or infection.6 PQQ is absolutely needed for proper function of the immune system. Without it, the body’s immune system fails increasingly fast, as is often seen in aging individuals whose nutrition is lower and their ability to create new rejuvenating mitochondrial cells is gone. In this aspect, PQQ is up to 5000 times more potent than vitamin C in immune protection.3,4,6,7 Additionally, the antioxidative effects of PQQ are phenomenally robust. Where nutrients like green tea extract, vitamin C, and quercetin provide ample antioxidant benefit, performing about 800 cycles of oxidation/reduction (mitochondrial protection), a single molecule of PQQ goes through approximately 20,000 cycles before it dies out. The ability of PQQ to clear the system of harmful toxins is profoundly impressive and should be considered when adding supplements to your daily diet.1,3,4,6,7

**Cancers**

Several studies have shown that mitochondrial dysfunction and degeneration are a major cause in tumor growth and cancer metastases. A decrease in mitochondrial function promotes increased free radicals which cause mutations in mitochondria. This process
Dosing and Side Effects

The optimal dosage suggested for humans is 20 mg per day divided in two daily doses of 10 mg each. When purchasing PQQ supplements, be sure to choose a quality product manufactured in the United States in order to avoid buying a contaminated product.

General remark

It is of no value to live longer if we cannot enjoy our live, or at least function properly, as we get older. Therefore, it’s better to start PQQ supplementation sooner rather than later for to reap all the benefits PQQ can provide as early in your adult life as possible.

By Rachael Allen, supplement research reporter | May 21, 2014

References:


These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure or prevent any disease.