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## Neurological Health and CoQ10

Between 1946 and 1965, 78 million Americans were born, creating the largest number of children in U.S. history. This Baby Boom generation has greatly influenced the makeup of American society and undoubtedly will continue to do so. Thanks to good nutrition and health care, Baby Boomers are aging well and have an excellent life expectancy. For the first time in history, we have more people turning 60 every day, and record numbers of adults reaching their seventh decade.<sup>1</sup> As a result, neurological diseases associated with aging, such as Parkinson's disease, are becoming major health care concerns. The good news is CoQ10 has applications for neurological diseases, in addition to its better known use for cardiovascular diseases.

### **Q. What is CoQ10?**

**A.** CoQ10, also known as ubiquinone (existing everywhere there is human life), is a natural, fat-soluble nutrient present in virtually all cells. This important nutrient, which is naturally produced by the body, is vital to the production of adenosine triphosphate (ATP). ATP is the energy rich compound used for all energy requiring processes in the body.<sup>1</sup>

### **Q. Isn't CoQ10 a supplement for heart health?**

**A.** Yes, it is. Because the heart beats 24 hours a day, 365 days a year, it requires a lot of energy. This means that it needs a lot of ATP and therefore lots of CoQ10. Numerous clinical studies have demonstrated that when individuals with heart disease take CoQ10, their symptoms improve, sometimes quite dramatically. Supplemental CoQ10 improves the heart's pumping ability, improves blood circulation, increases tolerance to exercise, and improves the heart's muscle tone.<sup>2,3</sup> CoQ10 is also a powerful antioxidant and protects heart tissue from free-radical damage.<sup>4,5</sup>

### **Q. How does CoQ10 affect brain health?**

**A.** CoQ10 works in the brain the same way it works elsewhere in the body: it's essential to ATP production. Nearly all human cells contain energy producing factories called mitochondria. These tiny structures are sometimes referred to as cell 'powerhouses' because they produce cellular energy. Depending on the energy requirements of

specific cells, you can have anywhere from several hundred to several thousand mitochondria. If a cell needs a lot of energy, then it will have more mitochondria. This explains why heart cells contain so many mitochondria; the continual pumping of blood requires continual ATP production.<sup>6,7</sup>

The brain also requires huge amounts of uninterrupted energy to regulate, integrate, and coordinate ongoing nervous system transmissions. To meet this need, ATP production within the mitochondria of brain cells is vital.<sup>8</sup>

Since clinical research had shown repeatedly that CoQ10 exerts a powerful influence on heart cell energy production, it was a natural progression for scientists to think that it might do the same in brain cells. Follow up brain and nervous system research led scientists to conclude that CoQ10 also played a vital role in energy production within the cells of the nervous system including the brain. In other words, energy cannot be produced in brain cells without the presence of CoQ10.

The most important discovery regarding CoQ10 and the brain is that CoQ10, when formulated with certain ingredients, can cross the blood-brain barrier and enter the brain's mitochondria. If large amounts of CoQ10 can get into the brain cell's mitochondria, its ability to make ATP is greatly enhanced. This is a very important fact to remember when using CoQ10; make sure it is a CoQ10 that has been clinically validated to cross the blood brain barrier.

**Q. What is the blood-brain barrier and why is it important?**

**A.** The blood-brain barrier is a unique anatomical structure. The cells that make up the blood vessels that provide blood to the brain are held tightly together. This greatly restricts what can leave the bloodstream and enter the brain. While the blood-brain barrier protects the brain and spinal cord from potentially toxic substances, it also can be a significant obstacle to therapy of central nervous system disorders. Therefore, only substances with certain solubilities or special types of transport systems can cross the blood-brain barrier to a significant degree.<sup>9-11</sup>

Obtaining optimal absorption of CoQ10 is difficult. The CoQ10 molecule is large and inflexible. The easiest and least expensive way to increase absorption levels is with the use of harsh solvents such as propylene glycol. However, at higher doses, these types of chemicals are considered dangerous (neurotoxic) to the person with a serious neurodegenerative disease. It is more difficult, as well as more expensive (considering raw materials, research, and proper manufacturing methods) to promote absorption with less harmful alternatives. However, reputable companies ensure that their products are safe for all their customers. Look for CoQ10 products formulated with vitamin E and other safe ingredients.

Nearly all CoQ10 supplements enter the bloodstream. But, only CoQ10 supplements with special formulations have been scientifically shown to enter the mitochondria and cross the blood-brain barrier.<sup>12,13</sup>

**Q. If CoQ10 is made in the body, why take supplements?**

**A.** While CoQ10 is synthesized in the body, these levels may be insufficient to meet the body's requirements. Researchers have discovered CoQ10 levels diminish with age and as a result of dietary inadequacies and various disease states.<sup>14-16</sup> They also have determined some medications can significantly reduce CoQ10 levels in the body. For example, people taking cholesterol lower medication, specifically statin drugs, have reduced CoQ10 production capabilities.<sup>17,18</sup>

Although CoQ10 exists in some dietary sources, it may not be realistic to obtain CoQ10 through food alone. For example, it would take approximately 3 pounds of sardines, 7 pounds of beef, or 8 pounds of peanuts to equal 100 mg of supplemental CoQ10.<sup>19</sup>

**Q. How does CoQ10 help people with Parkinson's disease?**

**A.** CoQ10 seems to have several beneficial actions in the illness. Researchers have looked at mitochondria in brain cells and determined people with Parkinson's disease have reduced activity of Complex I in the electron transport chain. Recent research has proposed the reduced activity of Complex I interferes with the brain-signaling chemical dopamine. Stored and newly synthesized dopamine is depleted. The dopamine depletion causes nerve cell degeneration.<sup>20</sup>

A clinical study involved 80 patients with Parkinson's disease (both men and women).<sup>21</sup> The researchers first evaluated all the participants to establish scores for basic motor skills (measuring the ability to control physical movements such as walking), mental status (whether the person was depressed or experiencing memory loss) and the activities of daily living (whether the person was experiencing difficulty with handwriting, dressing themselves, using utensils such as knives and forks, and so on). This scale is known as the Unified Parkinson's Disease Rating Scale (UPDRS). This process is known as establishing "baseline values," that is, the condition of the patient before receiving any treatment.

Participants were divided into 4 groups. Each group received either 300 mg, 600 mg, or 1200 mg of the special form of CoQ10 (shown to cross the blood brain barrier), or a placebo. The researchers observed the participants for 16 months.

The results of the study showed that all the participants who received CoQ10 had smaller declines in function compared to the placebo group, but the smallest decline was experienced by the group taking the highest amount of the special form of CoQ10.

The most significant results were noted specifically in the activities of daily living scores by the people taking 1200 mg of CoQ10 daily. These people retained better ability to feed and dress themselves, speak, walk, and bathe or shower by themselves. They maintained greater independence for a longer time. Parkinson's disease, as with other neurodegenerative diseases, robs the sufferer of their ability to control the movements of their own body and care for themselves. Supplementation with CoQ10, while not a cure, is the first intervention that showed a slowing in the progressive deterioration of function associated with this disease.

**Q. What were the results of clinical research on Huntington's Disease?**

**A.** A randomized, double-blind, placebo controlled study, was conducted at the University of Rochester. All of the 347 Huntington's disease (HD) patients were experiencing some HD symptoms, but were still in the early stages of the disease. The patients (who did not know which drug they were receiving) were randomly assigned to four different treatment groups: 25 percent received Remacemide, 25 percent received CoQ10, 25 percent received both, and 25 percent received a placebo, or sugar pill. The researchers, who also did not know which patients got which drug, watched and recorded their progress for two and one-half years.<sup>22</sup> Remacemide is a new drug made by Astra Zeneca that blocks the neurotransmitter glutamate in the brain, that has long been suspected of contributing to the death of brain cells in Huntington's disease.

Unfortunately, in the CARE-HD study, remacemide had no effect on the progression of the disease in patients in the early stages.<sup>22</sup> However, the individuals who received 600 mg of CoQ10 per day experienced some slowing of the disease progression. They were able to manage daily activities, such as meal preparation, housekeeping tasks, and personal care longer than those not on CoQ10. They were also able to focus their attention better and were less depressed and irritable. The portion of the studied patients receiving 600 mg of CoQ10 per day experienced a 15 percent decline in the progression of HD. According to the researchers conducting the study, a 15 percent decline in the progression of HD would roughly translate into approximately one more year of independence for patients. This is the very first study from more than a dozen Huntington's disease patient trials that showed any modification of the course of the illness.

Of note, the effects of the CoQ10 had not abated at the end of the research study. That is, the benefit of using CoQ10, 600 mg per day, was still increasing; this suggests that the longer a patient supplements with CoQ10, the greater the decline in the progression of HD. The next phase of the CARE-HD research will test a higher dose of CoQ10 (1200 mg or more per day), with more patients (over 1000), for a longer period of time (approximately 5 years). This study should improve our understanding of the optimal dose and the total achievable decline in the progression of HD. The CoQ10 product used in

the CARE-HD study was designated an Orphan Drug by the FDA. The product utilizes a proprietary, patent-pending delivery mechanism, which is proven to be safe and tolerable at high doses for people suffering from neurodegenerative diseases, substantially improving brain tissue levels of CoQ10.

This is the only CoQ10 I recommend my patients use because it has been clinically studied to enter cells and cross the blood brain barrier.

***Q. What other diseases could benefit from CoQ10 supplementation?***

**A.** Studies show CoQ10 levels are greatly reduced in Alzheimer's patients.<sup>23</sup> Mitochondrial abnormalities also are noted; however, research has yet to determine how or why this occurs.<sup>24</sup> Some scientists believe damage to mitochondria, and free radical damage is an early feature of Alzheimer's.<sup>25,26</sup>

In a study of 27 Alzheimer's patients, subjects were given 60 mg of CoQ10, 150 mg of iron, and 180 mg of vitamin B6 daily. Each patient's mitochondria activity was effectively activated. All patients continued to experience gradual decline. However, researchers believed that with this combination, the progression was much slower and allowed the patients to experience 1 to 2 years of extended good health.<sup>27</sup>

ALS (also known as Lou Gehrig's disease) is a progressive, fatal, neurological disease. It occurs when the nerve cells in the brain that control voluntary movement gradually degenerate. Investigation of CoQ10 in individuals with ALS is just beginning. Researchers at the Eleanor and Lou Gehrig ALS Center at Columbia University recently conducted a small clinical pilot trial of CoQ10 in ALS. The study was an open label study, which means that everyone enrolled received CoQ10, 400 mg three times per day. Of the 16 patients originally enrolled, nine patients completed the study. Six of these nine patients experienced some benefits. The patients declined from 0 – 25 percent in functional scores, 6 percent in strength, and 10 percent in breathing ability. These scores reflect a positive trend compared to the 50 percent decline that is seen in the natural history of ALS over the same period of time (5 to 9 months).<sup>28</sup> Citing the need to conduct more studies of the effectiveness of CoQ10 for people with ALS as rapidly and efficiently as possible to get answers to patients and clinicians, another clinical trial is currently underway at the Gehrig ALS Center. This is a

pilot study to determine if CoQ10 has short-term effects on motor nerves in the brain using magnetic resonance spectroscopy (MRS). The researchers are going to try to "see" if CoQ10 can change the chemicals in the brain's upper motor nerves of people with ALS, an important next step of the investigation.<sup>29</sup>

***Q. How much CoQ10 should I take?***

**A.** This is really dependent on your own personal needs. For example, most people can benefit from 100 to 200 mg of clinically studied CoQ10 daily. If on the other hand you have a family history of neurological disease or may be suffering from a neurological disorder you should probably take higher dosages. Note some studies used doses of up to 3,000 mg per day.

CoQ10's safety has been evaluated. To date, no toxicities have been reported.<sup>30</sup>

***Q. What should I look for in a CoQ10 supplement?***

**A.** Use products which have a strong clinical research track record, supported by product-specific research from reputable institutions, and have been proven to be safe, tolerable and effective in treatment of neurodegenerative diseases. The CoQ10 product you choose should be proven to be absorbed, enter the blood stream, cross the blood brain barrier and increase mitochondrial levels of CoQ10. If the product you are considering does not have evidence to support these points, don't use it.

Always use the clinically studied CoQ10 that has a proven track record of efficacy.

***Conclusion***

CoQ10 supplementation for people with neurodegenerative diseases is supported by contemporary clinical research. CoQ10 is certainly not the only answer to the complex issues of management and treatment of these types of diseases. However, research indicates that it is a bigger piece of the puzzle than physicians and scientists ever imagined. As we continue to study this naturally occurring compound, we are finding more and more benefits to the body.

All CoQ10 is not created equal. For safety and overall effectiveness, use a CoQ10 product that is supported by product specific research from reputable institutions, which is proven to be safe, tolerable and effective at high doses; deviating from this set of criteria may do more harm than good for people with these serious illnesses. Choose clinically tested products from a well-respected company and increase the potential to achieve and maintain brain and neurological health. ■

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