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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 is a natural, fat-soluble nutrient present in virtually all cells. CoQ10 also is known as ubiquinone (existing everywhere there is human life). CoQ10 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 requires lots of ATP to meet its high energy needs, CoQ10's function in heart health is well understood. 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 also is 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 tiny structures called mitochondria. Mitochondria are referred to as cell powerhouses because they produce cellular energy. Depending on what each

cell's job is, there can be several thousand mitochondria in one cell. If a cell needs a lot of energy, 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 CoQ10 exerts such a powerful influence on heart cells in ATP production, it was a natural progression for scientists to wonder how it affects brain cells. Brain and nervous system research led to the conclusion that the same intracellular principles apply. CoQ10 is produced in the body to assist in ATP production. Without it, ATP cannot be produced.

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.

**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 extremely close 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. Only substances with certain solubilities or those that have a transport system 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 such as Micosolle®.

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 significantly reduce CoQ10 levels in the body.<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 recent 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, 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 respected type of 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.

***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 is an early feature of the disease.<sup>25</sup> Free-radical damage also is a feature of Alzheimer's.<sup>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 B<sub>6</sub> 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 experi-

enced 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. Can taking CoQ10 prevent neurodegenerative disease?***

**A.** To date, there have been no studies or research examining whether CoQ10 can prevent these diseases.

Alzheimer's disease prevention is being clinically investigated. Researchers have determined that people who take certain anti-inflammatory medications seem less likely to develop the illness. A large, multi-centered trial is studying this connection.<sup>30</sup>

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

**A.** Depending on your family history of neurological disease and your disease experience, studies show benefits at doses of 100 to 200 mg of CoQ10 daily. Some studies used doses of up to 1,200mg per day.

CoQ10's safety has been evaluated. To date, no toxicities have been reported.<sup>31</sup> Mild stomach upset may occur. Taking CoQ10 with meals usually alleviates this rare effect.<sup>31</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, keep looking. Once you have found a candidate, examine the product's safety and efficacy record for neurodegenerative diseases—if the product has not been proven to be safe and effective, keep looking. Good products exist; however, caveat emptor.

***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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