Parkinson's Disease Society

Information Sheet

Coenzyme Q10

What is Coenzyme Q10?

Coenzyme Q10 (or CoQ10) is a substance present in every cell of the body. A coenzyme is a very small molecule that enhances the function of enzymes, particularly in the mitochondria of cells. Enzymes are proteins that speed up chemical reactions in cells. The '10' in Coenzyme Q10 refers to a portion of its chemical structure.

CoQ10 is essential for efficient energy production in cell mitochondria. Mitochondria are like the 'batteries' of cells and are responsible for converting nutrients to energy. They produce energy-containing molecules that supply energy to chemical reactions in cells.

Previous work has noted a significantly reduced activity of CoQ10 in the cells of people with Parkinson's disease. Research funded by the Parkinson's Disease Society (PDS) into the cell mitochondria of people with Parkinson's has also found an impairment in their function. Impaired mitochondrial function can lead to an increase in free radicals – reactive molecules that cause damage to cells and which have been implicated in the progression of Parkinson's. CoQ10 is known to have potent antioxidant properties, meaning that it is able to neutralise the effects of these radicals and reduce the damage they might cause. For further information, see the PDS information sheet *Antioxidants and Parkinson's.*

CoQ10 is naturally present in very small amounts in a wide variety of foods, but is particularly high in organ meats (such as heart, liver and kidney) as well as in beef, soya oil, sardines, mackerel and peanuts. It is also available as a supplement. The levels of CoQ10 in food are relatively low compared with the amounts available in supplement form.

Can it affect people with Parkinson's?

A study in 2002 was carried out by the Parkinson's Study Group, a group of Parkinson's experts working in the USA and Canada. It involved 80 participants in ten centres around the USA. Participants had been diagnosed with Parkinson's within five years of beginning the trial and had received no drug treatment for their symptoms up to that point. The researchers were concerned that they should not attribute a symptomatic benefit to CoQ10 when it might in fact be coming from another drug or treatment.

Participants were randomly selected to receive a placebo (an inactive pill given to compare the effects of those receiving treatment with those who are not), or doses of 300, 600 or 1200mg of CoQ10 daily. They remained in the trial for a maximum of 16 months, or until such time as they required drug treatment.

The study was designed to measure the progression of Parkinson's. This was done by measuring movement difficulty or disability. Participants were measured according to a commonly used scale known as the Unified Parkinson's Disease Rating Scale (UPDRS), prior to and at regular intervals during the study. This scale measures motor abilities, mental function, mood and independence in activities of daily living, such as dressing, feeding or washing. A higher score on the UPDRS means a greater amount of difficulty in performing tasks, and can be assumed to imply an accelerated progression of the condition.

In the study, differences in scores between the four groups of participants began to emerge clearly after eight months. Those people who were receiving doses of 300mg or 600mg had

scores that were equivalent to or lower than those who were receiving a placebo.

However, the scores for people receiving doses of 1200mg were significantly lower than the placebo group, implying a significantly slower rate of progression. This pattern of disability reduction continued until the end of the study.

Benefits were seen for people receiving large doses of CoQ10 primarily in mental function, mood and activities of daily living, while the beneficial effect on motor function was not significant. The researchers estimated a 44% reduction in disability among these people, compared with the placebo group. They argue that CoQ10 could not be merely having a beneficial effect on the symptoms of Parkinson's, as this would have been seen in the initial check-ups given to participants after the first month.

If any side effects were reported, these were mostly mild and none of the participants required a reduction in their dose. Occasional mild stomach upsets occurred, but these were usually alleviated by taking CoQ10 with meals. The number of people reporting side effects was not significantly different in any of the groups, including the placebo group.

What are the implications of this study, and what does the future hold?

The researchers involved in this study have warned that they would not be able to recommend CoQ10 as a treatment for Parkinson's based on these results alone. A group of 80 people is not enough for any definite conclusions to be drawn on the effects of this supplement. Also, the people involved in the study were not taking any medication for their Parkinson's. Because of this, they do not know what interactions CoQ10 may have with people already taking anti-Parkinson's medications.

The researchers also warn that their claims for a slowing in the rate of progression are based on their observations of the function of participants. They have not been able to investigate whether the people receiving CoQ10 actually had less damage to the cells affected.

A subsequent study involving 28 patients who were taking anti-Parkinson's medication also showed an improvement, primarily in the non-motor aspects of the disease. This suggests that anti-Parkinson's medication does not appear to interfere with the actions of CoQ10.

The results of this small study are encouraging and the researchers felt that there is enough evidence to continue the research, to broaden their understanding of the effects of CoQ10 on Parkinson's. They are currently carrying out a further study, involving a much larger number of participants over a longer period of time, in order to assess the true effects of the compound. They want to assess the effects of even larger doses of CoQ10, up to 3000mg daily. With evidence from a larger study, they hope to be better able to draw some conclusions.

CoQ10 offers the possibility of changing the natural progression of Parkinson's. So far, all available treatments are aimed at modifying the symptoms. Research into CoQ10 and other compounds, therefore, represents a new and exciting field of research into Parkinson's.

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Is there any information about how much CoQ10 a person would need to take to get some therapeutic benefit? How often would it need to be taken? Would they need to reduce their intake of anti-Parkinson's drugs as a result?
In the absence of more conclusive research in this area, it is impossible to answer these questions. Some websites give prescriptive information of this nature, but the PDS cannot endorse or recommend this in the absence of research to back up these claims. There is no evidence to suggest that CoQ10 can allow a reduction in the intake of anti-Parkinson's drugs.

Is treatment with CoQ10 a more natural treatment than drug treatment?
There is an assumption that 'natural' means better for you. This is not always the case. Many drugs are made from plant extracts and even when they are synthetic it does not mean that they are inferior to natural products.

In fact, any licensed drug has to go through an extensive series of trials before obtaining a licence. This is to ensure that it is safe and effective and to ascertain what side effects there may be.

Products such as CoQ10 have not gone through these tests and it is therefore difficult to know how effective they are or the extent of the side effects that people who take them are likely to experience.

Can CoQ10 be taken as an alternative to my anti-Parkinson's drugs?
No. There is no evidence to suggest that this supplement can replace any existing medication. As was stated before, the people involved in the initial study were not taking any medication for their Parkinson's, and there is no information available to suggest that CoQ10 will have the same effect as other drugs. CoQ10 is not a drug treatment, and on the basis of the present study cannot be considered as an alternative to any existing drug regime you may have. The PDS does not recommend that anyone takes CoQ10 without first consulting their GP or Parkinson's specialist.

Can a doctor prescribe CoQ10?
No. CoQ10 is not classed as a drug and cannot be prescribed. Nor is it currently available on the NHS.

Is it available now?
CoQ10 supplements are readily available from health food stores. Because CoQ10 is a supplement, and not classed as a drug, it is not subject to the same restrictions and regulations that drugs must be put through before they can be sold. Because of this, there is likely to be a lot of difference between the various brands available. There is no guarantee that the form of CoQ10 available in the shops is the same as that used in the study.

If you are thinking of taking this supplement, you should be cautious about the brand you choose. CoQ10 supplements can be quite expensive, and you should think about the additional cost before you begin to take it. If you are thinking of taking CoQ10, you must discuss this with your GP or Parkinson's specialist.

The US Food and Drug Administration's Center for Food Safety and Applied Nutrition has produced a guide for people who are interested in supplementing their diet with vitamins, herbal remedies and other complementary medicines. The guide, entitled Tips for the

Savvy Supplement User, is available at the following website: www.cfsan.fda.gov/~dms/ds-savvy.html

When will CoQ10 be available as a treatment?
CoQ10 is not yet recommended as a therapeutic option for Parkinson's. It is still in the early stages of research, and a much larger trial is needed to assess the safety of the treatment. Although such a trial is currently being planned by the authors of the present study, it will be a number of years before research can determine whether CoQ10 can be recommended for people with Parkinson's.

Can CoQ10 be used as a treatment for other forms of parkinsonism, such as MSA?
Parkinsonism is an umbrella term for a number of conditions that share many of the symptoms of Parkinson's, such as multiple systems atrophy (MSA), progressive supranuclear palsy (PSP), or dementia with Lewy bodies. The present study, however, only looked at the effects of CoQ10 on people with Parkinson's. Unfortunately, no evidence is available from these results to suggest that CoQ10 might be useful for the treatment of these other conditions.

Are you aware of any research taking place in the UK on the effects of CoQ10 on Parkinson's?
To our knowledge, there is no research being carried out on the effects of CoQ10 on Parkinson's in the UK. However, researchers in the UK (as well as the PDS) are paying close attention to the progress of the US trials. Also, research on CoQ10 is being carried out in the UK, and although this work is not specifically related to Parkinson's, it is hoped that it will improve researchers' understanding of its nature and function, and contribute directly to further and more specific research.

Research is being carried out in the area of antioxidants and Parkinson's more generally, as it is felt by some scientists that the damage caused by free radicals plays a significant role in the progression of the condition. For further information, see the PDS information sheet *Antioxidants and Parkinson's.*

How can I be kept up to date with research into Parkinson's?
Each year the PDS spends more than £3million on funding research into the cause, cure and prevention of Parkinson's, and improvements on available treatments. Further information on current PDS-funded projects is available from the Research Department at research@parkinsons.org.uk. Updates on research will be available on the PDS website: www.parkinsons.org.uk

The PDS quarterly magazine, *The Parkinson*, has a regular feature on research developments and is available to all PDS members. The Society also produces *Progress*, a twice-yearly magazine about PDS-funded research.

Further information
The studies referred to in this information sheet have been published in academic journals. A review of the effects of CoQ10 and its therapeutic potential has also been prepared. The PDS is unable to supply copies of this research, but your local or college library should be able to advise you on how to obtain a copy:

Shults CW et al (2002) 'Effects of Coenzyme Q10 in Early Parkinson Disease: Evidence of Slowing of the Functional Decline' *Archives of Neurology*; 59:1541–1550.

Muller T et al (2003) 'Coenzyme Q10 supplementation provides mild symptomatic benefit in patients with Parkinson's disease' *Neuroscience Letters*; 341:201–204

Shults CW (2005) 'Therapeutic role of coenzyme Q10 in Parkinson's disease (review)' *Pharmacology & Therapeutics*; 107:120–130

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