Efficacy of coenzyme Q10 for improved tolerability of cancer treatments: a systematic review

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CRD summary
This review investigated the use of coenzyme Q10 (CoQ10) supplementation to reduce the adverse effects of cancer treatments. It concluded that CoQ10 may offer some protection against cardiotoxicity or liver toxicity but, because of the poor study quality, these results may be unreliable and further research is needed. The review methods were appropriate and its conclusions are likely to be reliable.

Authors' objectives
To summarise and critically evaluate the evidence available for oral supplementation with coenzyme Q10 (CoQ10) to improve the tolerability of cancer treatments.

Searching
AMED, British Nursing Index, CINAHL, DH-Data, EMBASE, MEDLINE and the Cochrane Controlled Trials Register were searched from inception to July 2003. The search terms were reported and no language restrictions were applied. Additional handsearches of bibliographies and departmental files were conducted. Manufacturers were also contacted for details of additional studies.

Study selection
Study designs of evaluations included in the review
Controlled trials were eligible for inclusion.

Specific interventions included in the review
Studies of monopreparations of oral CoQ10 given in addition to standard care were eligible for inclusion. The doses in the included studies ranged from 90 to 240 mg/day. With the exception of one study, in which patients were treated with lovastatin, standard care was anthracycline antibiotics in all studies.

Participants included in the review
Studies of patients with cancer who were receiving standard cancer care were eligible for inclusion. The included patients had been diagnosed with various types of cancer and were aged from 1 to 71 years.

Outcomes assessed in the review
The studies had to measure the clinical effects of CoQ10 supplementation, but details of the actual outcomes were not specified in the inclusion criteria. Studies measuring CoQ10 levels were excluded. The outcomes assessed were those which individual studies reported as primary outcomes: level of liver enzymes; myocardial function; cardiotoxicity (electrocardiogram (ECG) measurements of heart activity including QRS and QTc measurements); change in blood-pressure or heart rate; musculoskeletal toxicity; and changes in cholesterol.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Study validity was assessed using the Jadad score, which assigns points for methods of randomisation, blinding, and the reporting of drop-outs and withdrawals. The maximum possible score was five.

The authors did not state how many reviewers performed the validity assessment.
Data extraction
Two reviewers independently extracted the data from each study. Details of the study design, number of patients with each type of cancer, cancer treatment and dose, CoQ10 dose, outcome measures, and within- and between-group results were extracted.

Methods of synthesis
How were the studies combined?
The studies were individually described in a narrative, with minimal data synthesis.

How were differences between studies investigated?
Clinical heterogeneity was described narratively. Differences in patient populations, outcome measures, and doses and duration of cancer treatments meant that it was not possible to perform a meta-analysis.

Results of the review
Six studies were included: 3 randomised controlled trials (RCTs; n=140) and 3 controlled clinical trials (n=137; one was placebo-controlled, n=19).

The methodological quality and reporting of the included studies was poor. No study had a power calculation and the sample sizes were small (range: 19 to 88). Only one study was placebo-controlled and double-blind. All studies scored two points or less on the Jadad scale.

Three studies used ECG measurements to assess cardiotoxicity. One study reported statistically significant increases in QRS voltage and duration for the CoQ10 group compared with the control group. Another study reported statistically significant increases in the cardiothoracic ratio for the CoQ10 group. The third study did not report any between-group comparisons but found statistically significant increases in blood-pressure for the CoQ10 group; the ECG readings remained stable for more patients in this group than in the control group.

One study found no differences in hair loss or raised liver enzymes between the CoQ10 and control groups. One study reported that the percentage of left ventricular fractional shortening was statistically significantly lower for the CoQ10 group, but did not report any statistical results. One study reported that the administration of CoQ10 did not decrease the incidence of musculoskeletal toxicity, but resulted in a statistically significant reduction in its severity. No adverse effects of CoQ10 were reported in any of the studies.

Authors' conclusions
CoQ10 may provide some protection against the toxicity associated with cancer treatments, but this has not been tested by rigorous trials.

CRD commentary
This review had a clear research question and it specified study inclusion and exclusion criteria. The inclusion criteria specified eligible study designs and interventions but did not define specific outcomes, other than that the studies had to assess the clinical effects of CoQ10 supplementation. Several databases were searched and additional efforts to locate studies were made by searching references and departmental files and by contacting manufacturers. Studies were not restricted by language. Two reviewers independently extracted the data, which is good as this helps to minimise bias, although it was not clear whether two reviewers also screened the abstracts and performed the quality assessment. The studies were quality assessed using the Jadad scale which is used for assessing RCTs. However, the inclusion criteria did not specify that only RCTs were to be included, therefore the quality tool used may not have been the most appropriate for all of the included studies. Full details of the quality assessment were not provided for the individual studies, making it difficult for the reader to judge the quality of the studies for themselves.

The results of the studies were described narratively, which was appropriate given the clinical differences between them. Given the small number of studies found, and their poor quality, the authors' conclusions and recommendations
for further research are appropriate.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that further research is needed to determine whether CoQ10 supplementation can improve the tolerability of cancer treatments.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.