

Issue 99

In a nutshell

Seriously ill patients on nutrition support have increased lipid peroxidation, but the clinical consequences remain unclear.

Some studies show a correlation between antioxidant status and clinical outcome in such patients. It may therefore be sensible to ensure that patients on nutrition support receive adequate antioxidant nutrition.

Antioxidants and enteral feeding

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LIVE LINKS

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NUTRITION RESEARCH REVIEW

Study one: Enteral solutions

Adding extra antioxidant vitamins to enteral feeding solutions improves LDL resistance to oxidative stress, according to recent research from Belgium. However, it does not change clinical outcome.

Subjects: 37 subjects requiring enteral feeding in an intensive care unit.

Method: Randomised, controlled trial in which patients were given 7 days of enteral feeding with either an antioxidant supplemented formula (vitamin A 67 µg/dL, vitamin C 13.3 mg/dL and vitamin E 4.94 mg/dL) or standard formula.

Results: The patients on antioxidant-enriched formula had significantly improved LDL resistance to oxidative stress (21% increase $p < 0.05$). The control group had no significant change. There was no significant difference in clinical outcome between the two groups.

Reference: Preiser JC et al. Enteral feeding with a solution enriched with antioxidant vitamins A, C, and E enhances the resistance to oxidative stress. *Crit Care Med* 2000;28:3828-3832

Study two: TPN solutions

Subjects: 33 patients undergoing major abdominal surgery who were to be given at least 5 days of total parenteral nutrition (TPN).

Method: Randomised controlled trial in which patients were assigned to receive either a soybean oil-based long chain triglyceride emulsion or a vitamin E enriched

solution containing a mixture of medium, long chain and omega-3-acid triglycerides.

Results: TPN resulted in a drop in total antioxidant capacity and levels of individual antioxidants (vitamin C, carotenoids, selenium) in both groups. Vitamin E levels dropped only in the group given the soybean oil-based formula.

No evidence was found of increased lipid peroxidation in either group.

Reference: Linseisen J et al. Antioxidant status of surgical patients receiving TPN with an omega-3-fatty acid-containing lipid emulsion supplemented with alpha-tocopherol. *Clin Nutr* 2000;19:177-184

Study three: Giving antioxidants to healthy subjects

Supplementation with vitamin E does not improve lipid peroxidation in healthy adults, according to American research.

Subjects: 30 healthy adult subjects.

Method: Randomised, placebo-controlled trial. Subjects were assigned to receive placebo or vitamin E (alpha-tocopherol) in a dose of 200, 400, 800, 1200, or 2000 IU/day for 8 weeks followed by an 8 week washout period

Results: Although there was a dose-dependent increase in vitamin E levels in these subjects, there were no significant changes in three indices of lipid peroxidation.

Reference: Meagher EA et al. Effects of vitamin E on lipid peroxidation in healthy persons. *JAMA* 2001;285:1178-82

Comments

It has been clear for some years that the kind of seriously ill patients we see in our surgical and intensive care wards are likely to have decreased antioxidant status.

This includes decreased status of vitamins A, C and E as well as selenium. The last two nutrients in particular are important in protecting against free radical formation from lipid peroxidation.

Why do these patients have decreased antioxidant status? It may be the direct consequences of their illness, for example an extra need for antioxidants to cope with excess free radicals produced, along with generally high levels of physiological stress.

At the same time, such patients usually have decreased dietary intake, and this will particularly affect those nutrients which the body cannot store for long periods (e.g. vitamin C).

One solution to impaired nutritional status in seriously ill patients is to offer nutrition support through parenteral or enteral feeding. However, there has been some concern that the high lipid content of some feeding solutions could lead to an even greater increase in lipid peroxidation. This in turn could lead to worse clinical outcome.

To counter this effect, it seems a simple idea to add extra antioxidant nutrients to the nutritional solution. But before we make this our standard clinical practice, we have to first prove that extra antioxidant supplementation will actually help the patient.

The first study summarised above suggests that such supplementation will help to reverse the increase in lipid peroxidation. The second study failed to find any effect of antioxidant levels on lipid peroxidation to begin with. The third study found no impact on lipid peroxidation from giving vitamin E supplementation to healthy subjects.

Are these results contradictory? It is worth noting that the third study only involved healthy volunteers, and so may not be so relevant to the kind of very sick patients we are talking about. It is also interesting that none of the three studies involved extra selenium being added as part of the study design. There has been a lot of interest in selenium status in these very sick patients (and we will review some of the more recent results in a later issue).

It would be fair to say that, at this moment, the clinical consequences of possible increased lipid peroxidation in seriously ill patients on nutrition support remain unclear.

Even so, there are some studies which show a correlation between antioxidant status and clinical outcome in seriously ill patients. For this reason we believe it is a sensible approach to ensure that all our patients on nutrition support receive adequate antioxidant nutrition.

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