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### Nutrition Management

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Dr Wernerman reviews the limited current-day evidence to guide nutrition management for ICU patients.

#### Does Good Nutritional Management Make a Difference?

Evidence for nutritional interventions in the ICU is unfortunately rather weak. Although there are many studies on nutrition in the ICU reported in the literature, most are of a poor quality or are inconclusive. This is not unique to nutrition, however, as demonstrated in a recent literature review by an expert panel in the Surviving Sepsis Campaign (Dellinger et al. 2004). This report demonstrated that very few modalities had sufficient scientific evidence for use. Many well established treatments, that are taken for granted, do not rest upon sufficient scientific evidence. So in clinical practice we are left with expert opinions and local traditions etc. Concerning nutritional management, it was therefore revealing when the evidence for an improved outcome following tight glucose control was published (Van den Berghe 2001). This single centre study demonstrated that tight glucose control using intensive insulin therapy resulted in improved mortality outcome. This study from Leuven, Belgium, has been discussed extensively ever since. Although not everyone regards the result as conclusive, and some find it controversial, the impact upon clinical practice has been tremendous. At present, in most European countries, avoiding hyperglycaemia or keeping blood sugar between 5 and 8, has become a general routine. So for this particular aspect, good nutritional management has made a difference.

#### Controversies

Over the last 20 years there has been a very antagonistic controversy over the administration route for feeding ICU patients. In particular, spokesmen in favour of enteral nutrition point out that parenteral nutrition to ICU patients is expensive and dangerous (Marik and Pinsky 2003). The evidence for this standpoint, however, is not impressive. In the recently published Canadian guidelines (Heyland et al. 2003), a meta analysis reveals a difference concerning ICU morbidity in favour of enteral nutrition, and no difference in ICU mortality. However, most of the studies covered in the meta-analysis are small and dated. The most important quantitative evidence provided is from another metaanalysis which combined subgroups of patients from earlier studies during the 80's (Moore et al. 1992). A recent high quality study focuses on patients for whom functioning of the gastro-intestinal tract is uncertain (Woodcock et al. 2001). Although the number of randomised patients is small, the study clearly points to the principal difficulties. The enterally fed group was heavily underfed and had a higher mortality, although not statistically significant. The parenterally fed group was fed for a longer period of time, and the complication rate was related to the length of nutritional treatment. This finding is universal; the longer the feeding, the more complications, regardless of the route of feeding.

Another controversy is when to start feeding ICU patients. There is a strong trend, supported by evidence, that early enteral feeding promotes more successful feeding following elective surgery. This is particularly true for the enteral route. This notion has been adopted in the ICU without any solid evidence. Today's trend in both Europe and North America, therefore, is to start feeding ICU patients earlier, preferably by the enteral route. This practice needs to be substantiated by prospective studies concerning the risks and possible benefits.

#### Protocols

It has become more and more evident that a practical and strict protocol is needed to achieve successful feeding in the ICU, particularly by the enteral route. Prospective studies to document the beneficial effects of such a strict protocol are very problematic from a methodological point of view. Although not conclusive, there are studies, usually with historical controls, that report a lower mortality when such a protocol is in use (Martin et al. 2004). However, it is well known, from a large number of studies, that the success of enteral feeding is very low, due to supply of

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only 60-70% of the prescribed amount. This level of underfeeding is of course problematic, as there are also publications suggesting that a cumulative energy deficit in ICU patients is a pathogenetic factor for morbidity and even mortality (Barlett et al. 1982; Singer et al. 2004). For this reason, adherence to a rather strict nutritional protocol is advocated by most experts currently, although the evidence for this recommendation is not very solid.

### **Specific Nutrients**

A few years ago reports of advantageous effects from the use of immuno-nutrition in postoperative patients spilled over into the ICU. There are at present a large number of studies with elective surgery patients showing a lower rate of complications when immuno-nutrition is used. Immuno-nutrition here means an enteral feed supplemented with excessive amounts of arginine, omega-3 fatty acids and nucleotides. The recommendation is substantiated by several meta-analyses (Beale et al. 1999; Heyland et al. 200; Heys et al. 1999). However, there is no evidence to substantiate this for ICU patients. One meta-analysis even shows that there may be dangers involved in administering such formulas to ICU patients (Heyland et al. 2001). Overall there is no metaanalysis demonstrating any difference in mortality or morbidity in ICU patients. There are, however, attempts to find subgroups of ICU patients where the use of enteral immuno-nutrition may be recommended, in spite of the marginal benefit documented (Proceedings from Summit on Immune-Enhancing Enteral Therapy 2000). The place for these immune enhancing feeds in the ICU is not established and remains controversial.

Another nutritional additive in ICU nutrition is glutamine. Conventional intravenous formulas do not contain glutamine, since glutamine is unstable in aqueous solution. As the dipeptide technique has now overcome this difficulty, the addition of glutamine supplementation to intravenous feeding has resulted in prospective clinical trials. These show a clinical benefit in terms of mortality for ICU patients (Goeters et al. 2002; Griffiths et al. 1997; Novak et al 2002) and there are now ongoing studies in larger patient populations. The present standpoint is that intravenous glutamine supplementation may be advantageous, it is expensive, but it is not associated with harmful effects. Addition of enteral glutamine is less well supported by evidence, but may be useful in subgroups of patients.

### **Conclusion**

Nutritional management in the ICU should follow a strict routine in the individual units. Most centres use the combination of enteral and parenteral feeding to reach the nutritional target, which is usually the estimated energy

expenditure of the patient. Today calorie intake tends towards the low side, rather than high. These routines should also contain registration of all nutrition related complications, to minimise complications and avoid outweighing the beneficial effects of nutrition. Good hygiene routines for venous lines and feeding tubes are essential and elementary. This should be combined with a tight glucose control to avoid hyperglycaemia and glutamine supplementation, at least for the group of patients dependent mainly upon parenteral nutrition.

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