Proceedings of the Nutrition Society (2008), **67 (OCE)**, E150 doi:10.1017/S0029665108007829

Malnutrition Matters, Joint BAPEN and Nutrition Society Meeting, 27–28 November 2007

Can biochemical markers be used to predict the rate of achieving tight glycaemic control in critically ill adults?

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Critically ill patients often become hyperglycaemic due to insulin resistance and increased gluconeogenesis that occurs as part of the inflammatory response. There is strong evidence that controlling this hyperglycaemia with intensive insulin therapy to maintain blood glucose levels between 3 and 6 mmol/l reduces morbidity and mortality[(1)]. It may be useful to identify the patients in which tight glycaemic control is likely to be difficult to achieve so that they can be closely monitored, their energy and carbohydrate provision optimised and overfeeding avoided.

A study of all consecutive admissions to a mixed surgical and medical intensive care unit (ICU) over an 8-week period was undertaken to see if biochemical indices of inflammation correlated with mean insulin dose and time to achieve glycaemic control defined as two blood glucose readings between 4 and 8 mmol/l. Patients were included in the study if they received artificial nutritional support for more than 48 h. Twenty-two males and eighteen females were recruited, with 62.5% receiving enteral feeding, 7.5% parenteral and the remainder both. Biochemical parameters measured within 24 h of admission to the ICU (see Table) were C-reactive protein (CRP) as a marker of inflammation, Zn, Se and prealbumin as negative acute phase reactants and Cu as a positive acute phase reactant. BMI, total energy and energy from carbohydrate were also recorded as these may affect glycaemic control.

Reason for Admission to ICU	Males	Females	Total
Respiratory failure (RF)	11	8	19
Surgery	5	8	13
Trauma + RF	0	1	1
Pancreatitis	4	–	4
Surgery + RF	–	1	1
Others	2	–	2
Total	22	18	40

The mean BMI was 28 kg/m^2. There was no correlation between time to achieve glycaemic control and CRP (r 0.06), Zn (r −0.34), Se (r −0.06), prealbumin (r 0.28), Cu (r −0.07), BMI (r −0.13), total energy intake (r 0.29) and energy from carbohydrate (r 0.27). Similarly there was no correlation between total insulin dose to achieve glycaemic control and CRP (r −0.069), Zn (r 0.190), Se (r 0.096), prealbumin (r −0.179), Cu (r 0.28), BMI (r −0.129), total energy intake (r 0.351) and energy from carbohydrate (r 0.118).

This small study would suggest that it is not possible to predict the rate of achieving tight glycaemic control using biochemical markers or BMI.

1. Van den Burghe G, Wouters P, Weekers F, Verwaest C, Bruyninckx D, Schetz M, Vlasselaers D, Ferdinande P, Lauwers P & Bouillon R (2001) *New Engl J Med* **345** (19), 1359–1367.