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EDITORIAL

Adjustable fortification of human milk fed to preterm infants

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In adults, as protein intake increases, so does blood urea nitrogen (BUN), unless significant protein accretion is occurring and/or hepatic function; that is urea synthetic capacity, is compromised. When protein intake is low BUN is also low, unless renal or fluid status is compromised.[1] In children, BUN changes rapidly with protein intake, assuming adequate hydration.[2] Indeed, protein content of the diet can be directly related to the BUN; for example, if 8% of energy is protein then the BUN will be ~8 mg/dl in the otherwise normal infant.[2]

The situation has been less clear-cut in preterm infants. It takes time to establish adequate energy intakes during early life in sick immature infant,[3] protein is catabolized and BUN increases, irrespective of protein intake or renal function. At the same time, urea synthetic capacity[4,5] and/or renal excretory[6–8] may be limited in the immature infant. Thus, early studies suggested BUN is not a valid measure of protein intake in preterm infants.[4,9–11]

More recent studies, one by this group,[12] suggest otherwise in the clinically stable preterm infant.[13] In the latter study, the relationship between nitrogen accretion and growth fed two levels of protein intake, 3.0 and 3.6 g/100 kcal, was assessed. Nitrogen intake varied widely but intake and absorption were linearly related to changes in BUN (see Figure 1).[13] These data coupled with the findings in this study support the idea that, as in older children and adults, BUN is a valid measure protein intake in preterm infants.

The findings of this study, therefore, have important implications for feeding preterm infants. Protein requirements are not well established in preterm infants.[14] Requirements will also vary depending upon (a) nutritional status at birth; that is, AGA and SGA infant, (b) sex; that is, boys accrete more lean mass and grow faster than girls,[15] (c) level of maturity; that is, protein:energy needs change with advancing gestation[16] and (d) previous nutritional intake; that is, requirements for 'recovery' will vary.[3] One formulation, therefore, is unlikely to meet the protein needs of all infants.

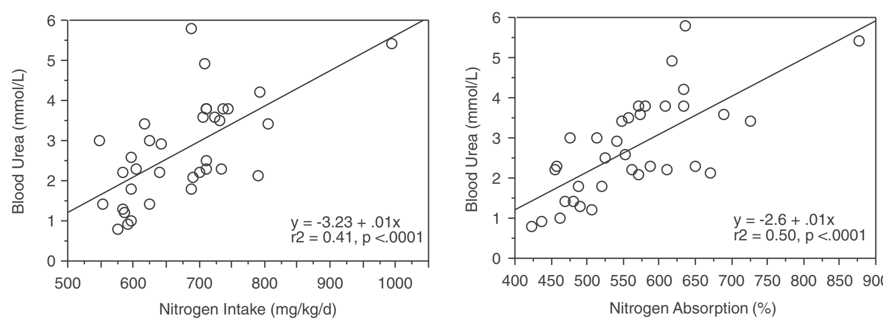

Figure 1 Relationship between BUN and nitrogen intake and nitrogen absorption.

An additional consideration in this study is the wide variation in protein content of human milk[17–20] that is rarely measured for individual mother–infant pairs. Irrespective of whether an infant is fed human milk or a preterm formula the idea that intake is 'tailored' to meet individual needs and is monitored to ensure efficacy, better growth and safety is a critical concept. The Arslanoglu *et al* paper in the current issue demonstrates that BUN determinations are an excellent index for adequacy of protein intake. This is a commonly overlooked, but important, message for day-to-day nutritional care in the neonatal intensive care setting.

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