Neonatal nutrition: the long road travelled only partially so

One of the exciting possibilities of this new journal, coming as it has at the beginning of a new millennium, is to provide a focus and a forum for evaluation of neonatal nutrition and its importance in the successful development of the individual. As a neonatologist, I have witnessed the development of the subspecialty of paediatrics involved specifically in the care of the newborn. From the late 1960s to the early 1970s the discipline has matured such that the successes being seen at the beginning of this millennium could hardly have been imagined 30 to 40 years ago. Those of you who are approaching and or have reached their sixth decade, as I have, and who have been involved in the care of the neonate, certainly remember that prior to the 1970s 80% of the neonates born between 1000 and 1500 g birth weight died within a period of 30 days or so. Within a short 10-year period or so later, not only had the mortality rate been reversed so that only 20 percent or so of neonates in this birth weight category died, but major successes were being recorded in neonates born less than 1000 g birth weight. The 1980s recorded significant successes with the neonate born weighing > 750 g and the 1990s witnessed significant successes with the neonate born weighing < 750 g. Whether the limit of viability is at the 23rd, 24th or 25th week of gestation is an open question since the literature reports the survival of neonates born at the latter end of the second trimester, and the beginning of the third trimester. In effect, currently, it is possible to suggest that neonates born at a birth weight of 600 g or greater have a better than 50% chance of survival.

Clearly the above successes are due to a multiplicity of factors, but surely include enhanced understanding of the specific disease processes that affect the neonate, especially one born prematurely. Obviously, the first disease among equals is respiratory distress syndrome, the pathological equivalent of which is hyaline membrane disease. Not only do neonatologists understand the basic etiopathogenesis of the disease but they are able to treat the disease with

a number of modalities, some of which are designed to prevent the condition altogether. With the help of molecular biological techniques, families are being reported who are missing specific components of the substance whose presence or absence defines the occurrence of the disease itself surfactant.

Yet, all the specific knowledge about particular disease processes would matter little if corresponding advances had not occurred in our understanding of how to nourish the neonate. When such neonates were dying very early after birth, it was unnecessary to have as great an understanding of how to feed the newborn for the long-term. Advances in our understanding of the metabolism of the three basic substrates of carbohydrates, proteins and lipid along with the development of parenteral alimentation and specific premature infant formulas have materially assisted in the global advances noted in the survival and development of the neonate, especially one who is born before term. Research in the specific area we have been interested in, namely glucose metabolism of the neonate, has progressed so far that some of the most sophisticated techniques from adult medicine research, including the euglycemic hyperinsulinemic clamp technique when combined with the utilization of stable non-radioactive isotopes such as ^{13}C and $^2\text{H}_2$, have materially increased our understanding of the transitional nature of neonatal glucose metabolism (Farrag *et al.*, 1997). Clearly neonatal glucose metabolism is sandwiched between the complete dependence of the fetus for maternal transfer of glucose and the complete independence of the mature non-diabetic, non-pregnant adult. This topic and others in parallel have been the focus of at least one textbook exploring the principles of perinatal and neonatal metabolism extensively (Cowett, 1998).

So have we come at the end of the road? Hardly! With the assistance of journals such as *Maternal and Child Nutrition* and others there is now and will continue to be forums to evaluate some of the major issues that exist today in the field of maternal and

child nutrition. Three of the most important readily come to mind relative to the latter: the first is further clarification of the metabolism of the basic substrates mentioned above specifically in the neonate; the second is the issue of the fetal origin of adult disease and the third is the epidemic of obesity that prevails in the most advanced Western countries, especially the United States. While a great deal of understanding exists relative to the metabolism of basic substrates in the neonate, a great deal more is required. This is because of the frequency of abnormalities that exist during the nutritional support of the neonate. A retrospective review of nutritional support of the neonate born < 1000 g birth weight indicated that there are frequently abnormalities of hyperglycemia, for instance, during the normal nutritional support of this high risk group of neonates (Cowett *et al.*, 1997). The second issue, involving the postulate of Barker, initially published in the late 1980s hypothesized that components, especially nutrition, programme the fetus for the subsequent of chronic conditions noted primarily in adulthood. To this day few data exist on the importance of maternal nutritional status during pregnancy relative to diseases subsequently noted much later in life. Even less data has been published relative to the role of nutritional status of the neonate, especially the neonate born prematurely, on those conditions manifesting later in the childhood and adolescent periods of life to say nothing of the effect on morbidity appearing in the adult.

An even more confounding issue is that involved with what many have called the epidemic of obesity existing in many if not all Westernized countries. The simplistic equation of caloric intake in excess of

the metabolic needs of the individual equals an increase in body weight fails to take into account the many factors in modern society which result in the presence of obesity and the resultant increase incidence of type II diabetes and or the metabolic syndrome.

While it would be short sighted to place all the ills/eggs of the world in the single basket of maternal and child nutrition, it is important to pay the neonatal nutritional component its just dessert. The above areas for further investigation simply touch the surface of issues that require cogent hypotheses, data collection, clarification and subsequent publication. That certainly is the hope of this journal and its reason for existence.

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