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Nutrition, Growth, and Feeding Problems in Preterm Infants

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Abstract

Background Nutrition and growth in the preterm infant are fundamentally intertwined. Nutrition plays an important role in the care of the preterm infant, and especially so in the extremely preterm (EPT) infant. EPT infants have a high risk of malnutrition and poor growth, known to be associated with adverse outcomes. It is therefore important to study the nutrient intakes, factors affecting growth and other outcomes in this population of infants. Infants born preterm are at risk for developing iron overload due to erythrocyte transfusions. It is established that infants born preterm are at an increased risk of developing feeding difficulties in later childhood, but the underlying mechanisms remain unclear. **Methods** Three cohorts of infants born preterm were studied in this thesis. In *Paper I* (macronutrient intakes), data from a cohort of EPT infants born at two Swedish hospitals between 2011 and 2021 were collected. *Paper II* (transfusion and iron overload) used data from a cohort of very low birth weight infants (VLBW; <1500 g) treated at Umeå University Hospital born between 2010 and 2013. *Papers III* (catch-up growth) and *IV* (feeding problems after discharge) used data from the national EXTremely PREterm infants in Sweden Study (EXPRESS) between 2004 and 2007. Data collection for the three study populations included parenteral and enteral nutritional intakes, all anthropometric measurements during the hospitalisation, results of laboratory analyses, perinatal data, and neonatal morbidity. **Results** *Paper I*: Energy intakes between gestational weeks (GA) 29+0 and 33+6 were significantly different between the two studied hospitals. There were no differences regarding the intake of protein or carbohydrates, but intake of fat from lipid supplements was significantly higher at the hospital with higher energy intake, where a lower proportion of mother's own milk was noted as well. There were no differences in growth between the two hospitals during the study period. *Paper II*: Almost all (91%) of the infants received erythrocyte transfusions, and a majority received multiple transfusions. Serum ferritin was significantly correlated with the total transfusion volume. Almost two thirds of the infants met criteria for iron overload. No effects on longitudinal growth could be found in relation to the erythrocyte transfusion dose. *Paper III*: Catch-up growth ≥ 1 SD was found in 67% of the EPT infants, with a mean increase of 1.9 standard deviation scores in z-weight during the catch-up growth. Infants that started a catch-up period had a higher enteral energy percentage from protein. *Paper IV*: Feeding problems diagnosed before 2 years of age and/or underweight at 2.5 years of age was found in 19% of the EPT infants in the cohort. The strongest risk factor for feeding problems was found to be longer duration of mechanical ventilation (≥ 10 d) during the neonatal period. **Conclusions** There was no difference in growth between the two hospitals although the energy and fat intakes were significantly different, suggesting that the lipid supplements may have limited absorption in general and when given with donor milk in particular. Almost two-thirds of VLBW infants had serum ferritin levels indicating iron overload, however, no association to longitudinal growth could be shown. A majority of EPT infants showed a period of catch-up growth in weight during the initial hospital stay. Infants with catch-up received a higher energy proportion from enteral protein during the week of catch-up growth initiation. Moreover, post discharge feeding problems are common in EPT infants, and the strongest perinatal risk factor was treatment with mechanical ventilation.

Keywords

Catch-up growth, energy intake, enteral nutrition, erythrocyte transfusion, feeding problems, human breast milk, human milk fortification, iron overload, postnatal growth, preterm infants, serum ferritin, and underweight.

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