Infant Feeding and Body Composition: Ultrasound Findings

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Infant feeding

Breastmilk is the undisputed choice of nutrition for infants and term infants are usually born with a mature suck-swallow-breathe reflex that allows them to suck effectively at the breast. Frequent breastfeeding and milk removal ensure the initiation of lactation and establishment of full milk production. In the case of preterm birth, however, development of the maternal breast is interrupted prematurely and the infant is often too weak and/or ill to feed at the breast. As a result the production of breastmilk in adequate volumes to support optimal growth is problematic. There are two theories that describe the way in which the infant removes milk from the breast. One proposes that a stripping action (compression/positive pressure) of the nipple by the infants tongue is the main mechanism of milk removal whereas the other states that vacuum (suction/negative pressure) is the predominant force in milk removal. More evidence is accumulating to support the vacuum theory in both term and preterm infants. We have recently investigated the tongue movement, intra-oral vacuum and suck-swallow-breathe characteristics of breastfeeding term infants feeding from an experimental teat that only releases expressed milk when the infant applied a vacuum. The infants in the study were able to successfully remove milk from the teat. Furthermore when the infant's tongue was lowered vacuum strength increased, nipple/teat diameters increased, the nipple/teat moved closer to the nipple hard soft palate junction and milk flowed into the infant's oral cavity. No marked peristaltic action of the tongue was observed in feeds from either the breast or teat. These results are consistent with our previous study of term breastfed infants and provide further evidence in support of the vacuum theory of milk removal.

Body Composition

Measurement of infants' body composition is often expensive, difficult and/or invasive. There are a number of different methods available that measure body composition and these include dual energy x-ray absorptiometry (DXA), isotope studies, bioelectrical impedance. More recently imaging techniques such as ultrasound and MRI as well as air displacement plethysmography (PEAPOD) have been used. Unfortunately not all of these methods are directly comparable or useful for large studies. Clinically anthropometric measurements of infant weight, height and head circumference are used routinely to assess infant growth although these do not correlate well with the body composition. While monitoring the growth of the infant is somewhat difficult and problematic it is necessary to enable both identification of growth disorders and assessment of the effect of nutrition on body composition. In particular antenatal and postnatal growth restriction of the preterm infant has been shown to have numerous detrimental effects on both short and long-term health. Despite every effort to achieve rapid short-term growth of the preterm with the goal of improving neurodevelopment outcomes many infants are still growth restricted at discharge. Furthermore preterm infants at term corrected age have a higher percentage of body fat compared to their healthy term counterparts. Higher levels of body fat have also been associated with long term health consequences such as increased risk of obesity, increased blood pressure, cardiovascular disease and increased insulin resistance. While there is a period of catch up growth in infancy preterm infants still display compromised growth in adulthood.

In view of the importance of early nutrition and the limitations of measurement of body composition in infants we conducted a study to investigate the development of ultrasound imaging as a method of assessing body composition of the preterm infant. The results of study will be presented and discussed in relation to nutrition of the preterm infant.

Dr. Donna Geddes DMU PhD

Donna is an experienced Diagnostic Ultrasonographer with 16 years experience in all aspects of ultrasound. She has studied for a Postgrad Dip (Sci) and PhD with Professor Peter Hartmann. Her research interest involves using ultrasound to image the lactating human breast. Breast anatomy, milk ejection and blood flow of the lactating breast have been the focus of her research. However, her most recent work investigates the infant GI tract and sucking dynamics (both normal and abnormal). Her work is innovative and has challenged many conventional theories stimulating more research into both basic physiology and clinical problems associated with lactation. Most recently she has received the Early Career Researcher Award from International Society for Research into Human Milk and Lactation in recognition of her achievements.