

The preterm pig as a translational model to study the role of lipids in growth and development

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Preterm birth (<37 weeks) represents about 11% of live births and is the leading cause of infant death. Although survival, growth, and maturation of the preterm infant are dependent on adequate intake of energy and nutrients, the specific requirements of preterm infants remain poorly defined, though they are known to differ from those of term infants. This includes the amounts and types of lipids needed, with the perceived requirements considered to be higher, and understanding the importance of the route of delivery (oral *vs* parenteral). Of concern is the delayed provision of adequate lipids to many preterm infants. The greatest emphasis has been on the role of providing exogenous LCPUFA, and notably the LC omega-3FA in neurodevelopment, largely because endogenous synthesis is insufficient to meet rates of accretion. However, the growth and development of other developing organs (e.g., lungs, liver, kidneys) will also be responsive to the amounts and types of exogenous lipids. A limiting factor in understanding the roles of nutrition after preterm birth and establishing requirements has been the dependence on NICU patients as research subjects. Moreover, in addition to ethical considerations, the numerous confounding factors after discharge complicate interpretations of long term outcomes. The preterm pig is a translational animal model for understanding the consequences of preterm birth and for investigating the efficacy and safety of NICU protocols, including fluid and nutritional support. The large litters of genetically related and age-matched siblings allow for direct comparisons of treatments and the rapid growth and development permit evaluation of acute and long-term outcomes. Importantly, preterm pigs relevant to 24 – 30 week infants are compatible with chronic care using NICU procedures, including mechanical ventilation and nutrition support. The preterm pig provides an opportunity to better understand the roles of lipids in growth and development of a very sensitive and poorly understood patient population and for designing clinical trials that will advance nutrition support.