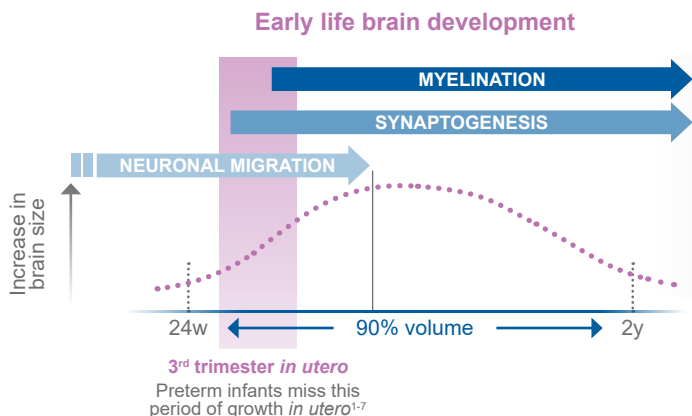


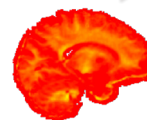
Preterm infants may have unique high nutritional needs vital for growth and rapid brain development

Preterm infants* miss an important period of fast brain growth and nutrient accretion and stores *in utero*¹⁻⁷

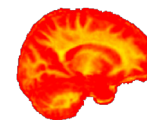
Rendering them more vulnerable to nutritional deficiencies (e.g., brain-development-relevant nutrients), feeding difficulties,⁹ neurological immaturity,¹⁰ and a low birth weight (LBW)^{11†‡}



Less myelin (yellow areas) than a term born child at 20 months of age



Preterm child



Term child

25%
Myelin water fraction
0%

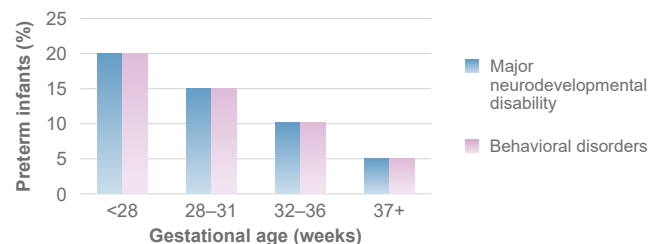
Images courtesy of Prof. Sean Deoni, PhD
Advanced Baby Imaging Lab, Rhode Island Hospital, USA
Department of Pediatrics, Warren Alpert Medical School at Brown University, USA

Structural and functional brain differences between preterm and term infants may persist into later life. Early support to optimize catch-up growth and other outcomes may, therefore, be important.

Amongst other factors, the degree of prematurity influences brain development¹²

Data shows that preterm infants at younger gestational ages had higher rates of major neurodevelopmental disability and behavioral disorders than those at older gestational ages¹³ (see graph)

Impact of prematurity on infant development¹³



Nutrition plays an important role in supporting healthy growth and brain development in preterm and LBW infants¹⁴

Studies show that certain nutrients can positively affect growth and brain development which has been shown to impact future cognitive, behavioral, and social-emotional outcomes^{15,16}

Protein¹⁷

- Adequate protein intake in newborns supports proper growth and is linked to neurodevelopment

Fatty acids including DHA¹⁷

- Fatty acid (e.g., **docosahexaenoic acid [DHA]**) supplementation is suggested to improve cognitive and visual development in preterm infants

Micronutrients¹⁷

- Vitamin A:** Preterm infants are often deficient in vitamin A due to limited liver stores
- Iron:** Iron-fortified nutrition in early life improves cognitive development in preterm infants

Human milk is the gold standard for infant nutrition,¹⁸ but preterm and LBW infants' greater nutritional needs can be supported by human milk fortifiers¹⁹⁻²¹ and protein-enriched formulas^{22,23}

*Preterm infants are defined as <37 weeks gestational age. †LBW infants are defined as <2500 g birth weight. ‡Preterm birth and being small for gestational age are the reasons for LBW.⁵

References: 1. Fenton TR, Kim JH. *BMC Pediatr.* 2013;13(1):59. 2. Ziegler EE, O'Donnell AM, Nelson SE, Fomon SJ. *Growth.* 1976;40(4):329-41. 3. Tudehope DI, Page D, Gilroy M. *J Paediatr Child Health.* 2012;48(9):768-76. 4. Cooke RJ. *Nestlé Nutr Workshop Ser Pediatr Program.* 2010;65:85-95. 5. Edmond K, Bahl R, World Health Organization (WHO). *Optimal feeding of low-birth-weight infants.* WHO; 2006. 6. Klein CJ. *J Nutr.* 2002;132(6)(suppl 1):1395S-577S. 7. Archie JG, Collins JS, Lebel RR. *Am J Clin Pathol.* 2006;126(2):256-65. 8. Agostoni C, Buonocore G, Carnielli VP, et al. *JPGN.* 2010;50(1):85-91. 9. Koletzko B, Poindexter B, Uauy R. *World Rev Nutr Diet.* 2014;110:1-314. 10. Ziegler EE. *Ann Nutr Metab.* 2011;58(suppl 1):8-18. 11. Agostoni C, Buonocore G, Carnielli VP, et al. *J Pediatr Gastroenterol Nutr.* 2010;50(1):85-91. 12. Alexander B, Kelly CE, Adamson C, et al. *NeuroImage.* 2019;185:654-63. 13. Msall ME, Sobotka SA, Mmowska A, Hogan D, Sullivan M. *Life Course Health Development Outcomes After Prematurity: Developing a Community, Clinical, and Translational Research Agenda to Optimize Health, Behavior, and Functioning.* In: *Handbook of Life Course Health Development.* Springer; 2017:321-48. 14. Uauy R, Koletzko B. *World Rev Nutr Diet.* 2014;110:4-10. 15. Ergenekon E, Soysal S, Hirfanoglu I. *Turk J Pediatr.* 2013;55(4):365-70. 16. Tanaka K, Hosozawa M, Kudo N, et al. *Brain Dev.* 2013;35(1):45-52. 17. Schneider N, Garcia-Rodenas CL. *Nutrients.* 2017;9:187. 18. WHO, UNICEF. *Global Strategy for Infant and Young Child Feeding.* WHO; 2003. 19. Ziegler EE. *World Rev Nutr Diet.* 2014;110:215-27. 20. Bhatia J. *Ann Nutr Metab.* 2013;62(suppl 3):8-14. 21. Kuschel CA, Harding JE. *Cochrane Database Syst Rev.* 2004;(1):CD000343. 22. Kwinta P, et al. Abstract submitted to: WCPGHAN; June 2020; Copenhagen, Denmark. 23. Teller IC, Embleton ND, Griffin IJ, van Elburg RM. *Clin Nutr.* 2016;35(4):791-801.