

Growth Concerns in Young Children

HEALTHY GROWTH IS THE FOUNDATION FOR OVERALL DEVELOPMENT¹

Contributes to...

Organ formation and function¹

Strong immune system¹

Physical health¹

Supports early brain development^{2,3}

90%
of brain development occurs BEFORE age 5

10%
of brain development occurs AFTER age 5

Early life is a critical foundational period to **establish the basis for lifetime brain function**³

GROWTH FALTERING IS A CONCERN WHEN THERE IS A PATTERN OF SLOWER GROWTH THAN EXPECTED AGE-APPROPRIATE GROWTH^{4,5}

Defined as a downward trajectory of growth velocity with the resultant growth curve crossing percentiles^{5,6}

Examples of growth faltering trajectories

Consequences of poor growth

Impact on brain development^{3,7,8}

Short adult height^{8,9}

Reduced intellectual development⁷

Increased morbidity and mortality from infections⁹

The most common cause of growth faltering is **inadequate intake of energy, protein, and micronutrients**¹⁰

BY PROVIDING THE RIGHT NUTRIENTS AND CORRECTING DEFICITS, GROWTH CAN BE IMPROVED—OFTEN REFERRED TO AS CATCH-UP GROWTH¹¹

Clinical evidence shows that energy and nutrient dense supplements support catch-up growth¹²⁻¹⁷

Several studies demonstrated **weight and/or height gain** through the use of a nutritional supplement and dietary counseling in nutritionally at-risk children

Formulations studied had:

- Energy density of 0.87–1.0 kcal/mL
- Protein-energy ratio of 3–3.5 g/100 kcal
- Micronutrients

Nutrients that support physical growth

Calories and protein Intakes need to be optimized to improve growth, taking into account age-based requirements and need for supplemental calories¹⁸

Iron Helps deliver oxygen to the body’s cells, which the body needs during periods of growth¹⁹

Vitamin A Plays an essential role in growth, vision, maintenance of epithelial cellular integrity, and immunity¹⁹

Zinc Plays a role in cellular growth, cellular differentiation, and metabolism¹⁹

Nutrients that support brain development

Protein Adequate levels are necessary for optimal cognitive development³

DHA Important for the developing brain, as it is a major structural component²⁰

Phospholipids Critical for processes that promote fast and efficient connections in the brain²¹

Other key nutrients Zinc,³ iron,³ choline,^{22,23} and lutein²⁴

Deficits resulting from inadequate nutrition can be corrected by providing key nutrients not just at the **right level**, but also of the **right quality** for digestibility and absorption^{1,11,25,26}

Initiating nutritional assessment and treatment early in young children with growth concerns is critical to preventing adverse consequences^{10,18}

References: 1. Piwoz E, et al. *Adv Nutr.* 2012;3(2):234-41. 2. AAP. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents.* 4th ed. 2017;77-113. 3. Prado EL, et al. *Nutr Rev.* 2014; 72(4):267-84. 4. McAlpine J, et al. *Clin Pediatr.* 2019;2:1012. 5. Gonzalez-Viana E, et al. *BMJ.* 2017;358:j4219. 6. Haymond M, et al. *Acta Paediatrica.* 2013;102(8):787-96. 7. Kar BR, et al. *Behav Brain Funct.* 2008;4:31. 8. Prendergast AJ, et al. *J Paediatr Child Health.* 2014;34(4):250-65. 9. De Onis M, et al. *Matern Child Nutr.* 2016;12:12-26. 10. Sullivan PB, et al. *Eur J Clin Nutr.* 2010;64(Suppl 1):S1. 11. Golden MH. *Food Nutr Bull.* 2009;30(3):S267-342. 12. Ghosh AK, et al. *J Int Med Res.* 2018;46(7):2615-32. 13. Huynh DTT, et al. *J Nutr Sci.* 2016;5(e20):1-11. 14. Huynh DTT, et al. *J Hum Nutr Diet.* 2015;28(6):623-35. 15. Sheng X, et al. *Nutr Metab Insights.* 2014;7:NMI-S15097. 16. Alarcon PA, et al. *Clin Pediatr.* 2003;42(3):209-17. 17. Akram DS, et al. *JMPA.* 2000;50:377. 18. Marchand V, et al. *Paediatr Child Health.* 2012;17(8):447-50. 19. WHO. *Vitamin and mineral requirements in human nutrition.* 2nd ed. 2004. 20. Lauritzen L, et al. *Nutrients.* 2016;8(1):6. 21. Deoni S, et al. *Neuroimage.* 2017. pii:S1053-8119(17)31080-7. [Epub ahead of print]. 22. Zeisel SH, et al. *Ann Rev Nutr.* 1994;14:269-96. 23. Zeisel SH. *J Am Coll Nutr.* 2000;19(5 Suppl):528S-31S. 24. Alves-Rodrigues A, et al. *Toxicol Lett.* 2004;150(1):57-83. 25. Arsenaault JE, et al. *Nutr Rev.* 2017;75(9):699-717. 26. Rivera JA, et al. *J Nutr.* 2003;133(11):4010S-20S.