Pediatric Nutrition
CONTINUING EDUCATION FOR CLINICIANS

SUPPLEMENT

Nutrition and the Developing Brain

Miami Neonatology 2016 – Annual International Conference

Learning Objectives

At the conclusion of this activity, participants should be better able to:

- Examine how the timing of nutrient deficiencies affects brain development
- Recognize early correction of nutritional deficiencies after birth is essential to protect the developing brain

Faculty

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Case Presentation

A 37-year-old African American woman presents 7 weeks after her last menstrual period, and after a positive home pregnancy test, for a prenatal exam. At her last checkup 1 year ago, her BMI was 26, she was borderline hypertensive (124 systolic/82 diastolic), and prediabetic (fasting glucose 118 mg/dL). She stopped smoking during her first pregnancy, which ended when she delivered a healthy, term, baby 5 years ago.

Discussion Items

Informed by the video content, reflect individually or discuss as a group the following questions related to this case and your clinical practice:

- What nutritional risks would you consider this fetus to be at risk for during the prenatal period? What risks would this infant be at during the post-natal period?
- Do you have a plan for managing obesity in pregnant women?
- Do you have a plan for controlling hypertension or diabetes/prediabetes discovered during pregnancy?
- What criteria do you use to evaluate pregnant women for possible micronutrient deficiencies?
- Do you have a protocol for assessing and correcting nutritional deficiencies that are specific for preterm infants?
- What nutritional supplements do you plan on providing for preterm infants who cannot be breast-fed?

Why Nutrition of the Preterm Matters

Long-Term Consequences of Adverse Early Nutrition and Growth

Suggested Readings and Resources

1. Cusick SE, Georgieff MK, Nutrient supplementation and neurodevelopment: timing is the key. *Arch Pediatr Adolesc Med.* 2012;166(5):481-482.
2. Georgieff MK. The effect of maternal diabetes during pregnancy on the neurodevelopment of offspring. *Minn Med.* 2006;89(3):44-47.
3. Georgieff MK. Long-term brain and behavioral consequences of early iron deficiency. *Nutr Rev.* 2011;69(suppl 1):S43-48.
4. Georgieff MK, Brunette KE, Tran PV. Early life nutrition and neural plasticity. *Dev Psychopathol.* 2015;27(2):411-423.
5. Hay WW Jr. Care of the infant of the diabetic mother. *Curr Diab Rep.* 2012;12(1):4-15.
6. Hernell O, et al. Summary of current recommendations on iron provision and monitoring of iron status for breastfed and formula-fed infants in resource-rich and resource-constrained countries. *J Pediatr.* 2015;167(suppl 4):S40-47.
7. Jabes A, et al. Functional and anatomic consequences of diabetic pregnancy on memory in ten-year-old children. *J Dev Behav Pediatr.* 2015;36(7):529-535.
8. Lamberti LM, Fischer Walker CL, Black RE. Zinc deficiency in childhood and pregnancy: Evidence for intervention effects and program responses. *World Rev Nutr Diet.* 2016;115:125-133.
9. Makrides M, et al. Improving the neurodevelopmental outcomes of low-birthweight infants. *Nestle Nutr Inst Workshop Ser.* 2013;74:211-221.
10. Ode KL, et al. Decelerated early growth in infants of overweight and obese mothers. *J Pediatr.* 2012;161(6):1028-1034.
11. Petry N, et al. The effect of low dose iron and zinc intake on child micronutrient status and development during the first 1000 days of life: A systematic review and meta-analysis. *Nutrients.* 2016;8(12).
12. Ramel SE, Georgieff MK. Preterm nutrition and the brain. *World Rev Nutr Diet.* 2014;110:190-200.
13. Rao R, Georgieff MK. Iron therapy for preterm infants. *Clin Perinatol.* 2009;36(1):27-42.
14. Riggins T, et al. Consequences of low neonatal iron status due to maternal diabetes mellitus on explicit memory performance in childhood. *Dev Neuropsychol.* 2009;34(6):762-779.
15. Steinmacher J, et al. Randomized trial of early versus late enteral iron supplementation in infants with a birth weight of less than 1301 grams: neurocognitive development at 5.3 years' corrected age. *Pediatrics.* 2007;120(3):538-546.
16. Terrin G, et al. Zinc in early life: A key element in the fetus and preterm neonate. *Nutrients.* 2015;7(12):10427-10446.