What's New in the Use of Parenteral Lipids and Fatty Acids in the Nutrition of Low-Birth-Weight Infants?

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Case Presentation

A 25-4/7-wk preterm male was admitted to your NICU. "Starter TPN" was hung within 4 hours of admission, which included amino acids, dextrose, and Intralipid 20%. Trophic feeds of human milk or preterm formula were begun on day of life 3.

A patent ductus arteriosus was found. The neonatology team decided to treat with indomethacin. The infant was made NPO, because the policy of the hospital is to make the patient NPO during treatment.

After treatment with indomethacin, the infant was restarted on trophic feeds and was tolerating well until day of life 14, when he developed green gastric residuals and emesis. He was again made NPO and continued on TPN. X-ray suggested an intestinal perforation. He was taken to the operating room where a diagnosis of ileal perforation was confirmed. The surgeon created an ostomy with the hope of reconnecting his bowel in the future.

Currently he is day of life 30. He is tolerating minimal enteral feeds but attempts at advancement or fortification of enteral feedings result in high ostomy output. Therefore, the majority of his calorie and protein needs are met with TPN. Growth has been minimal these past few weeks and he has developed cholestasis.

Discussion Items

- Assuming our facility has access to newer generations of IV lipids, which emulsion or emulsions would you recommend for this infant?
- What are some of the possible benefits of switching this infant to a newer generation IV lipid?
- What IV lipid emulsions are readily available at our institution?
- What are we currently doing to reduce our rate of TPN cholestasis?
- What health benefits have been seen in preliminary trials of SMOFlipid?
- How can we access Omegaven?
- According to Dr. Uauy's talk, what are some of the benefits of assuring adequate DHA intake for premature infants?
- Is there a role for DHA in the prevention of necrotizing enterocolitis?
- Which infants at our institution are at highest risk for inadequate DHA intake?
- What strategies are we using at our institution to ensure they receive adequate DHA intake?

Suggested Readings and Resources

1. US Food and Drug Administration. How to request Omegaven for Expanded Access Use. http://www.fda.gov/Drugs/DevelopmentApprovalProcess/HowDrugsareDevelopedandApproved/ApprovalApplications/InvestigationalNewDrugINDApplication/ucm368740.htm Accessed April 9, 2017.
2. Kim HY et al. Inhibition of neuronal apoptosis by polyunsaturated fatty acids. *J Mol Neurosci.* 2001;16:223-227.
3. Pawlik D et al. Fish-oil fat emulsion supplementation reduces the risk of retinopathy in very low birth weight infants: a prospective, randomized study. *JPEN J Parenter Enteral Nutr.* 2013; 38:711-716.
4. Skouroliakou M et al. Cholestasis, bronchopulmonary dysplasia, and lipid profile in preterm infants receiving MCT/ω-3-PUFA-containing or soybean-based lipid emulsions. *Nutr Clin Pract.* 2012;27:817-824.
5. Vlaardingerbroek H et al. Growth and fatty acid profiles of VLBW infants receiving a multicomponent lipid emulsion from birth. *J Pediatr Gastroenterol Nutr.* 2014; 58: 417-427.
6. Park HW et al. Parenteral fish oil-containing lipid emulsions may reverse parenteral nutrition-associated cholestasis in neonates: a systematic review and meta-analysis. *J Nutr.* 2015;145:277-283.
7. SMOFlipid. http://fresenius-kabi.ca/en/wp-content/uploads/sites/2/2013/06/SMOFLipid-PM.pdf Accessed April 9, 2017.
8. Senterre T, Rigo J. Optimizing early nutritional support based on recent recommendations in VLBW infants and postnatal growth restriction. *J Pediatr Gastroenterol Nutr.* 2011; 53:536-542.
9. Makrides M et al. Neurodevelopmental outcomes of preterm infants fed high-dose docosahexaenoic acid: a randomized controlled trial. *JAMA.* 2009; 301:175-182.