

Novel Approaches to Oral Feeding Readiness Assessment in the Newborn

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Case Presentation

At 35 weeks postconceptual age, efforts are made to transition a 2300-g, 42-cm preterm female infant from well-tolerated enteral feeding to breastfeeding. The infant does not wake independently for feeding, but grows briefly alert with care and handling. There is no change in her tone with waking, and she exhibits no hunger behaviors such as bringing hands to mouth or taking a pacifier. Once feeding starts, she nipples with a weak, inconsistent suck.

Discussion Items

- Would you consider this infant ready for oral feeding? What signs would indicate yes or no?
- What subjective signs do you use to assess infant readiness for oral feeding?
- How do you transition infants from enteral to oral feedings? Is there a protocol or algorithm in use at your institution?
- How do you approach infants who are at an appropriate age for oral feeding but cannot take full oral feedings?
- Do you use saliva-based biomarkers for other assessments? If so, how do you collect it?
- What are the obstacles to widespread use of saliva-based biomarkers?
- Do you agree that there is a need for objective markers of infant readiness to feed orally?
- Does your institution use any objective markers to determine infant readiness to feed orally?
- Are you familiar with the research into using genetic biomarkers for assessing infant readiness to feed orally?
- What are the obstacles to identifying and using objective markers of infant readiness to feed orally?

Suggested Readings and Resources

- 1. Barkai G, Ari-Even Roth D, Barzilai A, et al. Universal neonatal cytomegalovirus screening using saliva Report of clinical experience. *J Clin Virol*. 2014 Aug;60(4):361-6.
- 2. Barnett CP, van Bon BW. Monogenic and chromosomal causes of isolated speech and language impairment. *J Med* Genet. 2015 Nov;52(11):719-29.



- 3. Crowe L, Chang A, Wallace K. Instruments for assessing readiness to commence suck feeds in preterm infants: effects on time to establish full oral feeding and duration of hospitalisation. *Cochrane Database Syst Rev.* 2012 Apr 18;4:CD005586.
- Johnson S, Matthews R, Draper ES, et al. Eating difficulties in children born late and moderately preterm at 2 y of age: a prospective population-based cohort study. *Am J Clin Nutr.* 2015 Dec 30. pii: ajcn121061. [Epub ahead of print]
- 5. Lau C. Development of infant oral feeding skills: what do we know? *Am J Clin Nutr.* 2016 Jan 20. pii: ajcn109603. [Epub ahead of print] Review.
- Le Fevre AK, Taylor S, Malek NH, et al. FOXP1 mutations cause intellectual disability and a recognizable phenotype. *Am J Med Genet A*. 2013 Dec;161A(12):3166-75. doi: 10.1002/ajmg.a.36174. Epub 2013 Sep 24.
- 7. Ludwig SM, Waitzman KA. Changing feeding documentation to reflect infant-driven feeding practice. NAINR. 2007;7(3):155-160.
- 8. Maron JL, Hwang JS, Pathak S, Ruthazer R, Russell RL, Alterovitz G. Computational gene expression modeling identifies salivary biomarker analysis that predict oral feeding readiness in the newborn. *J Pediatr.* 2015 Feb;166(2):282-8.e5.
- 9. Maron JL, Johnson KL, Dietz JA, Chen ML, Bianchi DW. Neuropeptide Y2 receptor (NPY2R) expression in saliva predicts feeding immaturity in the premature neonate. *PLoS One.* 2012;7(5):e37870.
- 10. Maron JL. Bringing salivary diagnostics into the 21st century. *Clin Ther*. 2015 Mar 1;37(3):496-7. doi: 10.1016/j.clinthera.2015.02.007. Epub 2015 Mar 5.
- 11. Maron JL. The Neonatal Salivary Transcriptome. *Cold Spring Harb Perspect Med.* 2015 Dec 18. pii: a026369.
- 12. McCain GC, Gartside PS, Greenberg JM, Lott JW. A feeding protocol for healthy preterm infants that shortens time to oral feeding. *J Pediatr*. 2001 Sep;139(3):374-9.
- 13. McIntyre JC, Titlow WB, McClintock TS. Axon growth and guidance genes identify nascent, immature, and mature olfactory sensory neurons. *J Neurosci Res.* 2010 Nov 15;88(15):3243-56.
- 14. Mignone A, González-Gil T. Early discharge with home support of gavage feeding for stable preterm infants who have not established full oral feeds. *Int J Evid Based Healthc*. 2016 Jan 5. [Epub ahead of print]
- 15. Mizuno K, Ueda A. Neonatal feeding performance as a predictor of neurodevelopmental outcome at 18 months. *Dev Med Child Neurol*. 2005 May;47(5):299-304.
- 16. Nudel R, Newbury DF. FOXP2. Wiley Interdiscip Rev Cogn Sci. 2013 Sep;4(5):547-560.
- 17. Pagliaro CL, Bühler KE, Ibidi SM, Limongi SC. Dietary transition difficulties in preterm infants: critical literature review. *J Pediatr (Rio J*). 2016 Jan-Feb;92(1):7-14.
- 18. Preuss TM. Human brain evolution: from gene discovery to phenotype discovery. *Proc Natl Acad Sci* U S A. 2012 Jun 26;109 Suppl 1:10709-16. doi: 10.1073/pnas.1201894109. Epub 2012 Jun 20. Review.
- 19. Romano-Keeler J, Wynn JL, Maron JL. Great expectorations: the potential of salivary 'omic' approaches in neonatal intensive care. *J Perinatol*. 2014 Mar;34(3):169-73.
- Simmer K, Kok C, Nancarrow K, Hepworth AR, Geddes DT. Novel feeding system to promote establishment of breastfeeds after preterm birth: a randomized controlled trial. *J Perinatol.* 2015 Dec 10. doi: 10.1038/jp.2015.184. [Epub ahead of print]
- 21. Tsai SW, Chen CH, Lin MC. Prediction for developmental delay on Neonatal Oral Motor Assessment Scale in preterm infants without brain lesion. *Pediatr Int.* 2010 Feb;52(1):65-8.
- 22. Watson J, McGuire W. Responsive versus scheduled feeding for preterm infants. *Cochrane Database Syst Rev.* 2015 Oct 13;10:CD005255.