Skilled Breastfeeding Support: An Interdisciplinary Approach to Assessment and Treatment of Breastfeeding

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Catherine Watson Genna, BS, IBCLC

Disclosure: Jamie Mahurin-Smith

Financial:

- Speaker honorarium
- Registration fee waived for this conference

Non-financial:

- Associate professor at Illinois State University,
- Researcher studying families' experiences with breastfeeding challenges

Financial Disclosure – Catherine Watson Genna

- Royalties on textbooks: Jones & Bartlett Learning, Praeclarus Press
- Translational Research Grant: Columbia-Coulter Foundation
- Speaker honoraria: This talk and other continuing education lectures throughout the world
- Registration waived for this conference
- Clinical Mentor

Non Financial Disclosure - Catherine

- Member of a research Collaborative with Columbia University and Tel-Aviv University Departments of Biomedical Engineering, studying infant sucking using ultrasound, nipple biomechanics, and suck:swallow:breathe coordination.
- Peer reviewer for various journals
- La Leche League Leader
- Consultant to student breastfeeding projects and breastfeeding product start-ups

Objectives
Participants will be able to:

- **identify three assessment strategies suitable for at-breast feeding evaluation.**
- **identify three ways to modulate milk flow during breastfeeding to accommodate infant deficits in suck/swallow/breathe coordination.**
- **identify four ways in which breastfeeding lays a foundation for future well-being across multiple domains. (feeding, cognition, language, speech, immunity)**

Why does it matter?

What does the research show?

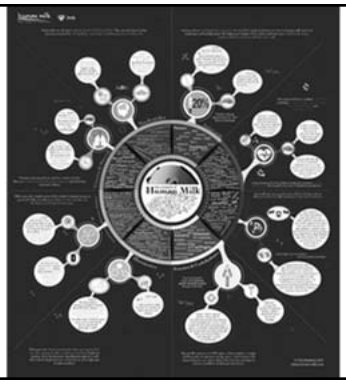
- Kramer et al., 2008. 7.5-point verbal IQ difference for children who received more human milk.
- Yang et al., 2018. 3.5-point verbal IQ difference for adolescents who received more human milk
- Vestergaard et al., 1999. Variegated babbling observed in 73.4% of 8-month-olds exclusively breastfed for 6 months, vs. 32% of their bottle-fed counterparts. Effects also observed for crawling, pincer grasp.
- Dee, Li, Lee, & Grummer-Strawn, 2007. Maternal concern about language and motor skills diminished with increasing breastfeeding duration.

What about language?

- Oddy, 2006. Stronger vocabulary observed in 10-year-olds breastfed exclusively for 6 months than in their bottle-fed counterparts.
- Gibson-Davis & Brooks-Gunn, 2006. Stronger vocabulary observed for breastfed low-income children.
- Tomblin, Smith, & Zhang, 1997. Protection against SLI.
- Boucher et al., 2017: Autism more prevalent in formula-fed children

Other effects

- Learning disabilities
- Subtle neurological impairment
- Developmental delay
- Enuresis
- Promotes psychological resilience
- Alcohol-related hospitalization
- Multiple sclerosis
- Schizophrenia
- Stuttering



How do you build a brain?

- Long-chain polyunsaturated fatty acids (DHA/AA)
- Choline
- Cholesterol
- Thyroxin
- Nerve growth factor
- Carnitine
- Lactose -> galactolipids -> healthy CNS development
- Cytokines
- Sialic acid
- …and many others

Breastfeeding and Immunity

- Immune system immature at birth
- Innate (microbiome dependent) vs. Adaptive
- Immunoglobulins – antibodies, adult levels around age 3 years
- **sIgA** – Protects ports of entry: mucous membranes, respiratory passages, GI tract, saliva and tears - **Most abundant in breastmilk**
- 80% of lymphatic tissue is in the gut (Enteromammary Pathway)
- Responsive Immunity: infant saliva enters breast, immunomodulators appear in milk (reduces inflammation unless baby is getting ill).

Why not just pump?

Exclusive pumping: the worst of both worlds

What's our strategy?

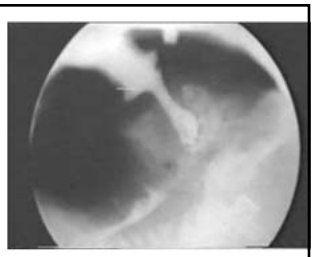
1. Feed the baby
2. Protect the milk supply
3. Keep something happening at the breast

Mahurin-Smith Jamie & Genna Catherine Watson. (2018). Assisting the Breastfeeding Dyad: A Guide for Speech-Language Pathologists. *Perspectives of the ASHA Special Interest Groups*, *3*(13), 47–57. https://doi.org/10.1044/persp3.SIG13.47

Breastfeeding and Bottle feeding: DIFFERENT

- O^2 sats and T (CHD, <1800g) (Chen 2002, Hammerman & Kaplan 1995, Marino 1995)
- Muscle activation (Inoue 1995, Tamura 1998, Gomes 2009, Franca 2014, Ratnovsky 2013, Matsubara 2019)
- Tongue Kinematics (Genna 2021)
- Modulation of sucking pressures (Chen 2018, Mizuno & Ueda 2006)
- Tongue kinematics less organized (Genna 2021)
- Flow rate, respiratory time, bolus size (Taki, 2010)
- Onset of burst/pause patterning (Meier & Anderson, 1987)
- Swallow Breathe Coordination (Goldfield 2006, Mizuno 2002)
- Energy expenditure (Berger 2009, Lubetsky 2003)
- Growth of vulnerable infants (CHD) (Combs & Marino, 1992)

Ardran, G. M., Kemp, F. H., & Lind, J. (1958). A cineradiographic study of breast feeding. *The British journal of radiology*, *31*(363), 156-162.



Ardran, G. M., Kemp, F. H., & Lind, J. (1958). A cineradiographic study of bottle feeding. *The British journal of radiology*, *31*(361), 11-22.

Mizuno & Ueda 2006

Table 1. *Suckling parameters (breast-feeding versus bottle-feeding and NNS versus NS)*

	NNS	NS	*p* Value
Suckling pressure (mm Hg)			
• Breast-feeding	97.6 +/- 10.7	74.5 +/- 6.9	0.01
• Bottle-feeding	27.6 +/- 10.4	88.6 +/- 26.0	0.01
p Value*	0.001	0.06	
Suckling frequency (sucks/min)			
• Breast-feeding	100.8 +/- 10.1	78.2 +/- 7.4	0.001
• Bottle-feeding	96.8 +/- 23.6	70.6 +/- 7.8	0.001
p Value*	0.5	0.005	
Duration of each suck (s)			
• Breast-feeding	0.49 +/- 0.05	0.64 +/- 0.06	0.001
• Bottle-feeding	0.47 +/- 0.09	0.79 +/- 0.08	0.001
p Value*	0.09	0.001	

* *p* Value in comparison between breast-feeding and bottle-feeding.

Bottle feeding Reduces Milk Transfer and Number of Breastfeedings

Hren et al, (2009)

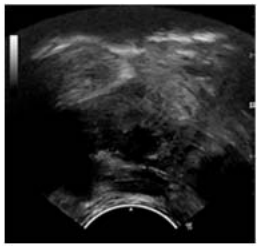
- Most babies took 20% less breast milk over the first month of bottle supplements
- Only 7/22 infants took 10% more breast milk after

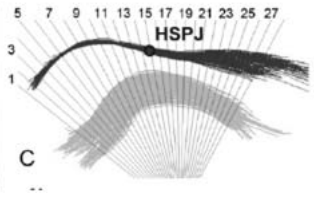
Moral et al (2010)

- Number of breastfeedings decreased over 3-4 months in mixed fed infants

Normal Suck: Breastfeeding

- Tongue forms and grooves around the teat.
- Anterior tongue depresses with mandible
- Tongue moves downward in wavelike manner from A to P – subatmospheric pressure – milk flows
- Anterior tongue rises with mandible
- Wavelike upward movement follows from A to P – increased pressure
- Airway closure/swallow completed

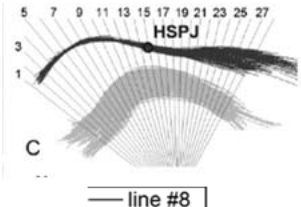


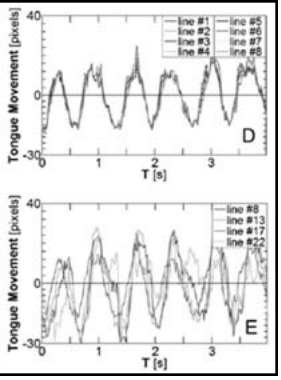


Tongue Kinematics: Normal Sucking and Swallowing

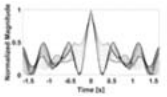
Elad, D., Kozlovsky, P., Blum, O., Laine, A. F., Po, M. J., Botzer, E., Dollberg, S., Zelicovich, M., & Sira, L. B. (2014). Biomechanics of milk extraction during breast-feeding. *Proceedings of the National Academy of Sciences*, *111*(14), 5230–5235.

Elad 2014

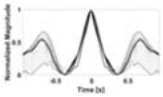


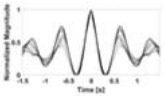


Autocovariance of Sucking Movements

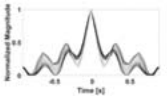


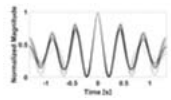
Tongue tie, before & after frenotomy

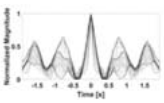




Torticollis breastfeeding & bottle







Genna CW, Saperstein Y, Siegel S, Laine AF, Elad D (2021). Quantitative Imaging of Tongue Kinematics During Infant Feeding and Adult Swallowing Reveals Highly Conserved Patterns. Physiological Reports. DOI: 10.14814/phy2.14685

Tongue Kinematics in Feeding

- Smoothness/reproducibility of up/down tongue movements from anterior to posterior important in feeding
- Absent peristalsis in tongue-tied infants is restored with frenotomy
- Anterior tongue holds breast, works as stiff body
- Adult swallow is exactly like breastfeeding swallow except full peristalsis of anterior tongue as well
- Difference is need for anterior tongue to hold onto breast.
- Dysphagia was associated with lack of peristalsis (n=1)

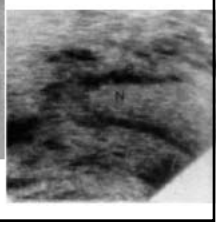
Genna CW, Saperstein Y, Siegel S, Laine AF, Elad D (2021). Quantitative Imaging of Tongue Kinematics During Infant Feeding and Adult Swallowing Reveals Highly Conserved Patterns. Physiological Reports. DOI: 10.14814/phy2.14685

Muscle Activation Breast vs. Bottle

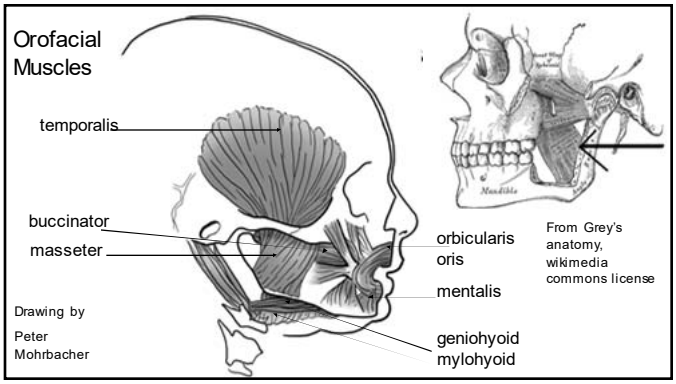
- Buccal fat pads support tongue grooving
- Buccinators support cheek in bf
- Overused in bottle feeding

Gomes, C. F., Thomson, Z., & Cardoso, J. R. (2009). Utilization of surface electromyography during the feeding of term and preterm infants: a literature review. *Developmental Medicine & Child Neurology*, *51*(12), 936-942.

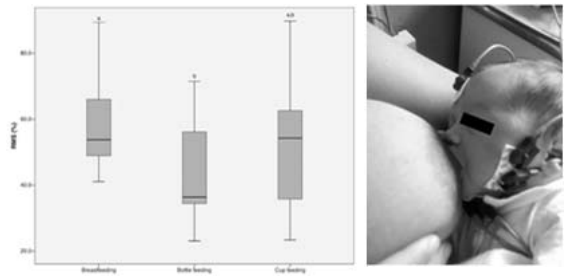
Smith, W. L., Erenberg, A., Nowak, A., & Franken Jr, E. A. (1985). Physiology of sucking in the normal term infant using real-time US. *Radiology*, *156*(2), 379-381.



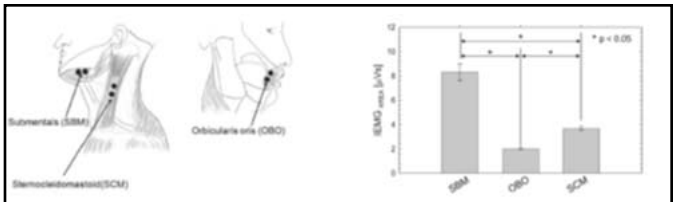
Orofacial Muscles



EMG



França, E. C., Sousa, C. B., Aragão, L. C., & Costa, L. R. (2014). Electromyographic analysis of masseter muscle in newborns during suction in breast, bottle or cup feeding. *BMC Pregnancy and Childbirth*, *14*(1), 1–7.



- Sublingual muscles create much of the force for subatmospheric sucking pressure
- Sternocleidomastoid is accessory respiratory muscle

Ratnovsky, A., Carmeli, Y. N., Elad, D., Zaretsky, U., Dollberg, S., & Mandel, D. (2013). Analysis of facial and inspiratory muscles performance during breastfeeding. *Technology and Health Care*, *21*(5), 511-520.

Depth of Latch Determines Muscle Activation

Optimal Latch

Colson, S. D., Meek, J. H., & Hawdon, J. M. (2008). Optimal positions for the release of primitive neonatal reflexes stimulating breastfeeding. *Early Human Development*, *84*(7), 441-449.

Scanning and Rooting

Tongue Contact with Breast: Salient Stimulus for Latch

Ensure baby doesn't only grasp nipple

Practicing Latch (Note Effect of Stability!)

Infants Use their Hands at Breast

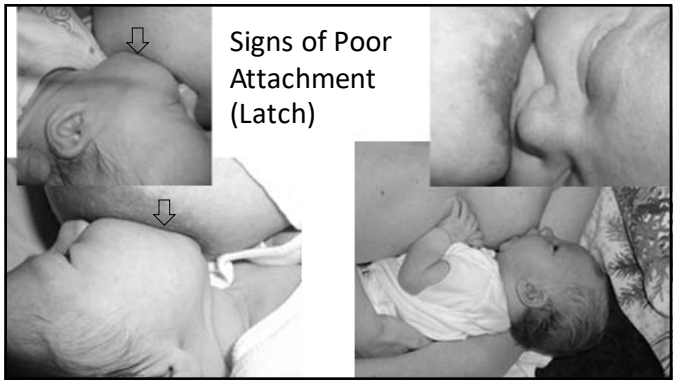
- Communicate
- Orient
- Stimulate oxytocin release
- Modulate State
- Stabilize
- Support movement (crawl)
- Shape/move breast

Genna CW and Barak D (2010) Facilitating Autonomous Infant Hand Use During Breastfeeding *Clinical Lactation* 1(1) 15-20

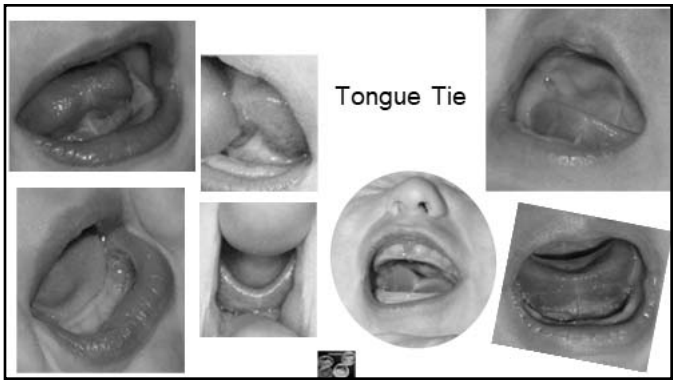
Breast Shaping

Positive Pressure to Increase Milk Flow

Signs of Poor Attachment (Latch)



Tongue Tie



Histology & Functional Anatomy

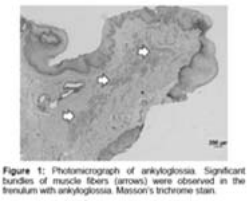
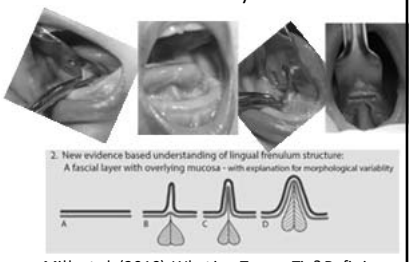


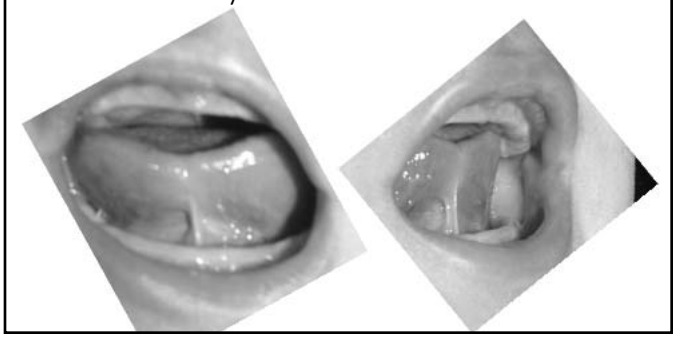
Figure 1: Photomicrograph of ankyloglossia. Significant bundles of muscle fibers (arrows) were observed in the frenulum with ankyloglossia. Masson's trichrome stain.

Martinelli et al (2014) Histological Characteristics of the Altered Lingual Frenulum *Intl J of Peds and Child Health 2*, 6-9

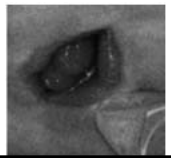


Mills et al, (2019). What is a Tongue Tie? Defining the anatomy of the in-situ lingual frenulum. Clinical Anatomy. 32(6),749-761.

Elasticity is the Vital Parameter



FTT Exacerbated by Scheduled Feeds (q3h)



6-18 feeds/day, night feeds important, infant intake and maternal "storage" capacity drive feeding pattern

CONCLUSIONS. "Breastfed infants should be encouraged to feed on demand, day and night, rather than conform to an average that may not be appropriate for the mother-infant dyad."

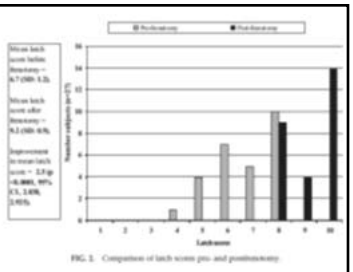
Kent, J. C. (2006). Volume and Frequency of Breastfeedings and Fat Content of Breast Milk Throughout the Day. *PEDIATRICS*, *117*(3), e387–e395.

Effect of Frenotomy

TABLE 2 Characteristics of the Breastfeed Infants Monitored Before and At 7 Days After Frenulotomy

Variable	Prefrenulotomy	Postfrenulotomy
Milk intake	503 ± 291 g	691 ± 319 g*
Milk transfer, mL/min	5.6 ± 3.0 g	10.5 ± 5.5 g*
LATCH score	7.9 ± 1.4	9.4 ± 0.8*
Pain score	3.6 ± 3.0	0.5 ± 1.2*
Nipple shield, n/N	4/24	1/24

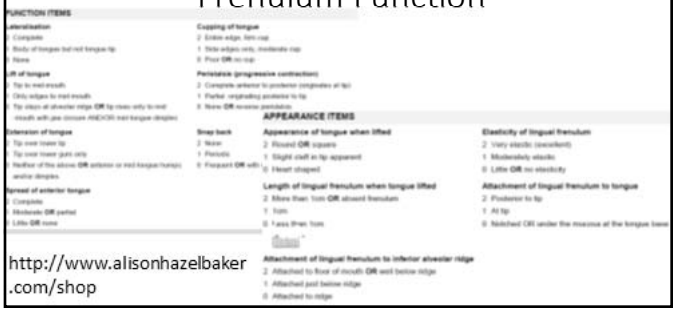
*P < .05.
†P < .05.



Geddes, D. T., Langton, D. B., Gollow, I., Jacobs, L. A., Hartmann, P. E., & Simmer, K. (2008). Frenulotomy for breastfeeding infants with ankyloglossia: effect on milk removal and sucking mechanism as imaged by ultrasound. *Pediatrics*, 122(1), e188-e194.

Srinivasan, A., Dobrich, C., Mitnick, H., & Feldman, P. (2006). Ankyloglossia in breastfeeding infants: the effect of frenotomy on maternal nipple pain and latch. *Breastfeeding medicine*, 1(4), 216-224.

Hazelbaker Assessment Tool for Lingual Frenulum Function



FUNCTION ITEMS

Lateralisation
- Complete
- Body of tongue but not tongue tip
- None

Lift of tongue
- Tip to mid mouth
- Only edges to mid mouth
- Tip stays at alveolar ridge OR tip rises only to mid-mouth with jaw closure AND/OR mid tongue dimples

Extension of tongue
- Tip over lower lip
- Tip over lower gum only
- Neither of the above OR anterior or mid tongue hump(s) and/or dimples

Spread of anterior tongue
- Complete
- Moderate OR partial
- Little OR none

Cupping of tongue
- Entire edge, firm cup
- Side edges only, moderate cup
- Poor OR no cup

Peristaltic (progressive contraction)
- Complete anterior to posterior (originates at tip)
- Partial originating posterior to tip
- None OR reverse peristalsis

Strap back
- None
- Periods
- Frequent OR with

APPEARANCE ITEMS

Appearance of tongue when lifted
- Round OR square
- Slight cleft at tip apparent
- Heart shaped

Length of lingual frenulum when tongue lifted
- More than 1cm OR absent frenulum
- 1cm
- Less than 1cm

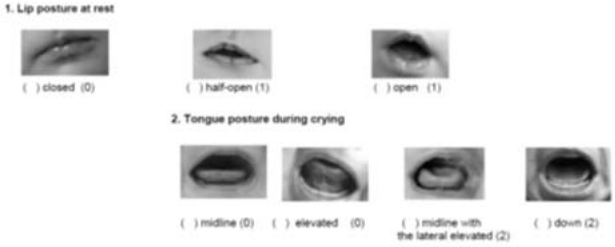
Attachment of lingual frenulum to inferior alveolar ridge
- Attached to floor of mouth OR well below ridge
- Attached just below ridge
- Attached to ridge

Elasticity of lingual frenulum
- Very elastic (excellent)
- Moderately elastic
- Little OR no elasticity

Attachment of lingual frenulum to tongue
- Posterior to tip
- At tip
- Notched OR under the mucosa at the tongue base

http://www.alisonhazelbaker.com/shop

Martinelli Frenulum Inspection Protocol



1. Lip posture at rest

( ) closed (0) ( ) half-open (1) ( ) open (1)

2. Tongue posture during crying

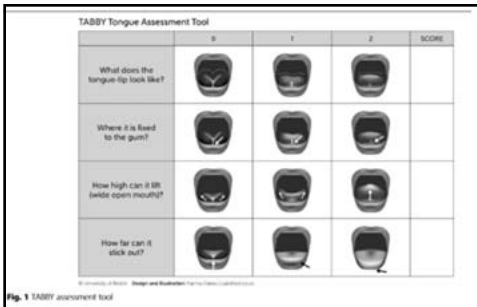
( ) midline (0) ( ) elevated (0) ( ) midline with the lateral elevated (2) ( ) down (2)

Martinelli, R. D. C., Marchesan, I. Q., & Berretin-Felix, G. (2012). Lingual frenulum protocol with scores for infants. *Int J Orofacial Myology*, *38,* 104-12.

BTAT: A Simple Algorithm

Bristol Tongue-tie Assessment Tool	Score		
	0	1	2
Appearance of tongue tip	Heart shaped	Slight cleft/ notched	Rounded
Attachment of frenulum to lower gum edge	Attached at top of gum ridge	Attached to inner aspect of gum	Attached to floor of mouth
Lift of tongue wide mouth wide (crying)	Minimal tongue lift	Edges only to mid-mouth	Full tongue lift to mid-mouth
Protrusion of tongue	Tip stays behind gum	Tip over gum	Tip can extend over lower lip
	Total score of 0–3 indicates severe reduction of tongue function		

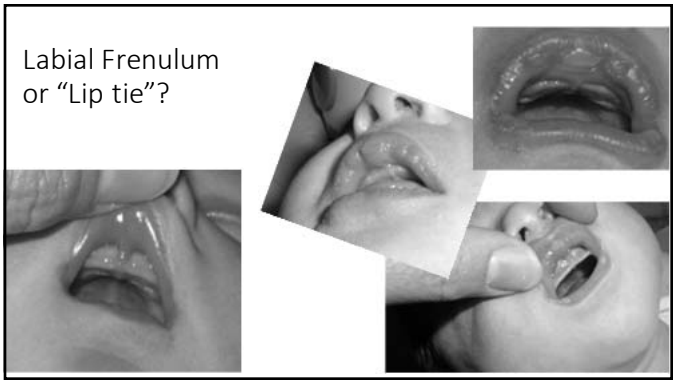
Ingram, J., Johnson, D., Copeland, M., Churchill, C., Taylor, H., & Emond, A. (2015). The development of a tongue assessment tool to assist with tongue-tie identification. *Archives of Disease in Childhood-Fetal and Neonatal Edition*, *100*(4), F344-F349.



TABBY <= 4: Treatment recommended

Ingram, J., Copeland, M., Johnson, D., & Emond, A. (2019). The development and evaluation of a picture tongue assessment tool for tongue-tie in breastfed babies (TABBY). *International breastfeeding journal*, 14(1), 31.

Labial Frenulum or "Lip tie"?



Most newborns have prominent labial frenula

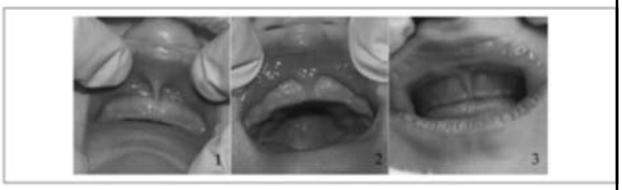
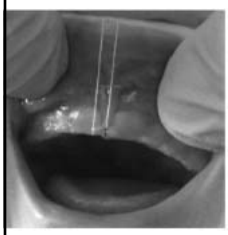


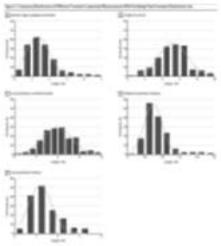
Figure 1. Stanford superior labial frenulum classification. Type 1: Insertion of the frenulum is near the mucogingival junction. Type 2: Insertion is along the mid attached gingiva. Type 3: Insertion is along inferior margin at the alveolar papilla, and can continue to the posterior surface.

Santa Maria, C.… & Messner, A. (2017). The Superior Labial Frenulum in Newborns: What Is Normal? *Global Pediatric Health*, *4*, 2333794X17718896.

Normal Distribution of Labial Frenum Measures



Gingival insertion to alveolar edge was less than 2 mm



Ray, S., Golden, W. C., & Walsh, J. (2019). Anatomic distribution of the morphologic variation of the upper lip frenulum among healthy newborns. *JAMA Otolaryngology–Head & Neck Surgery*, *145*(10), 931-938.

courtesy of Chiara Toti

Grey's Anatomy; Wikimedia Commons license

Articular Disc Stabilization

Cheek Traction Position

DanCer Hand

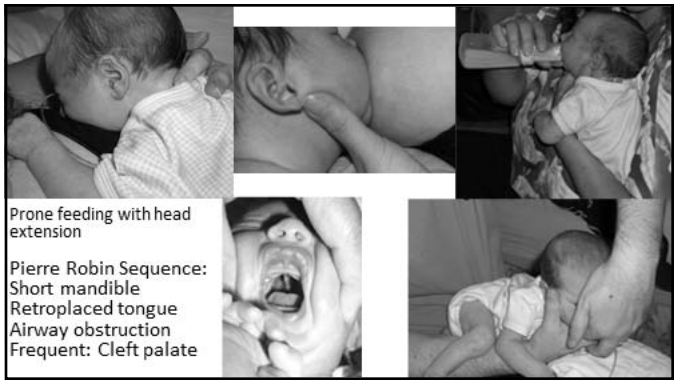
Jaw Traction

Jaw Support

Micrognathia

- Short mandibular 'lever' to support tongue movements
- Smaller airway

Position with head extension



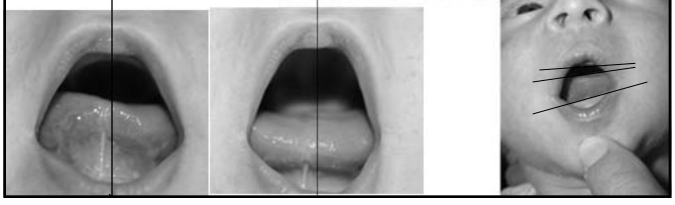
Prone feeding with head extension

Pierre Robin Sequence:
Short mandible
Retroplaced tongue
Airway obstruction
Frequent: Cleft palate

Torticollis affects tongue range of motion, base of support (mandibular asymmetry), floor of mouth elasticity and respiratory capacity

Wall and Glass (2006) *Journal of Human Lactation* 22(3), 328-334

Genna (2015). *Journal of Human Lactation*, *31*(2), 216-220.
Genna 2021



Sublingual Pressure

- Improves base of support
- Draws tongue/hyoid into normal position
- Supports sublingual muscles

Effect of Palate Development on Nasal Airway

Prehistoric Skull – breastfed in infancy, wide palate, no tooth decay, wide choanae

1940s Skull – high narrow palate, narrow choanae

Courtesy of Brian Palmer
BrianpalmerDDS.com

Photo courtesy of Esther Grunis

Spoon or Cup Feed until Baby can Breastfeed

Supplement at Breast

Reducing Supplements

- Milk production increases more rapidly earlier postpartum
- Ensure baby is taking milk from breast
- Reduce 7-14 ml (1/4-1/2 oz) per feeding per day
- Watch diaper output/satiety signs/weight

Faster Supplement Reduction may be Possible

8 week old formula fed, ill infant:

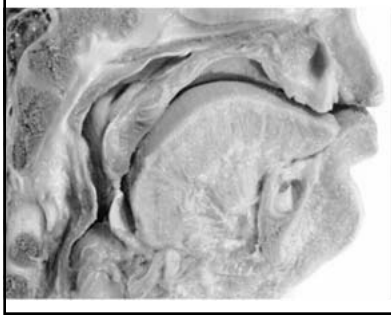
Started with 150 ml/kg;

Reduced 30ml/d starting on day 3 (mother expressing drops of milk);

Full lactation in 8 days

Kayhan-Tetik, B., Baydar-Artantaş, A., Bozcuk-Güzeldemirci, G., Üstü, Y., & Yılmaz, G. (2013). A case report of successful relactation. *The Turkish journal of pediatrics*, *55*(6), 641.

Newborn Anatomy Minimizes Aspiration Risk



Protective Anatomy:

High, forward tongue position

Deep vallecula

Soft palate & epiglottis touch or overlap

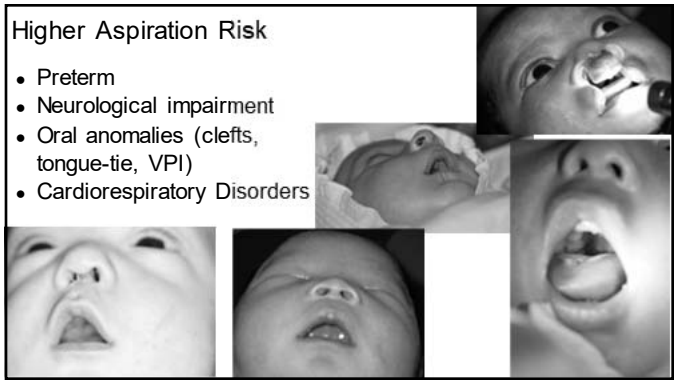
Epiglottis near larynx

Larynx tucks under tongue

Courtesy Brian Palmer DDS

Higher Aspiration Risk

- Preterm
- Neurological impairment
- Oral anomalies (clefts, tongue-tie, VPI)
- Cardiorespiratory Disorders



Suck:swallow:breathe Coordination: Red Flags

- Little interaction
- Closed eyes from beginning of feed
- Fussy about feeding position
- May feed best at night or sidelying in darkened bedroom
- Hard swallow sounds
- Wet vocal quality
- Nasal flaring
- Brief stridor (laryngeal penetration)
- Stressed body language

Cardiorespiratory Issues

- High Respiratory rate (RR)
  - Downscaled swallow kinematics, aspiration risk
- Work of respiration
  - Fatigue, inefficient feeding
- Ability to maintain oxygenation for the work of feeding.
  - Rapid swallowing depresses respiration – hypoxia
  - Anxiety, stress, faster RR

Cardiorespiratory Disorders

Breastfeeding compatible with respiratory physiology

Better blood oxygenation in CHD (Marino 1995)

Faster gastric emptying – less stress on lungs and diaphragm (Langston 2011)

Langston, S., et al, (2011). Bridging the Divide Breastfeeding Infants With Congenital Heart Defects. *ICAN: Infant, Child, & Adolescent Nutrition*, *3*(3), 140-144.

Laryngomalacia

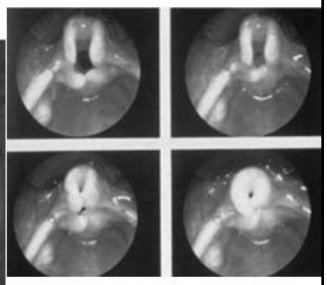
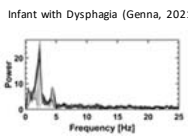
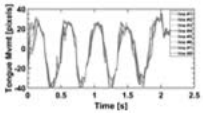


Photo courtesy of Joe Edmonds, MD

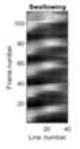
Infant with Dysphagia (Genna, 2021)



FFT signal of tongue motion

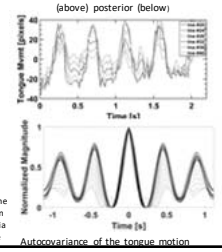


Time dependent tongue motion anterior (above) posterior (below)

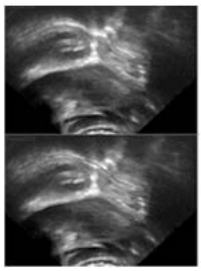


Time dependent motion across the tongue grayscale

Autocovariance of the tongue motion of an infant with dysphagia shown in grayscale



Autocovariance of the tongue motion



12 weeks old, fed by g-tube, dysphagia secondary to placental abruption, breastfed briefly twice a day for oral feeding practice from the left breast.

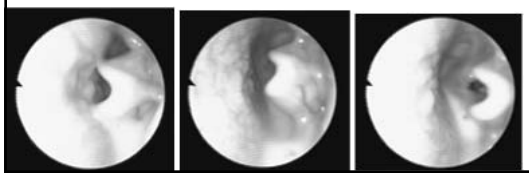
Strategies for Dysphagia

- Microaspiration of human milk less likely to cause pneumonia
- Pre-feeding breast massage
- Prone or semi-prone positioning (Mills 2020)
- Pressure on breast during MER
- Pre-expression increases milk production, but helpful with severe cases
- Thickening breast milk (Gelmix)
- Tracking with cervical auscultation or FEES
- Differences in bf and bof preclude firm conclusions with bof VFSS (Hernandez 2019)

Fiberoptic Endoscopic Evaluation of Swallowing (FEES)

Willette, S., Molinaro, L. H., Thompson, D. M., & Schroeder, J. W. (2016). Fiberoptic examination of swallowing in the breastfeeding infant. *The Laryngoscope*, *126*(7), 1681-1686.

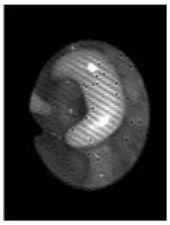
Armstrong, E. S., Reynolds, J., Sturdivant, C., Carroll, S., & Suterwala, M. S. (2020). Assessing Swallowing of the Breastfeeding NICU Infant Using Fiberoptic Endoscopic Evaluation of Swallowing: A Feasibility Study. *Advances in Neonatal Care*, *20*(3), 244–250.

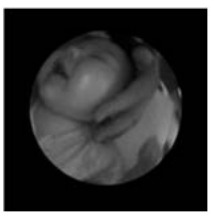


Courtesy of Nikki Mills MD

FEES during Breastfeeding

courtesy of Nikki Mills MD, ENT





Mills, N., Keesing, M., Geddes, D., & Mirjalili, S. A. (2020). Flexible Endoscopic Evaluation of Swallowing in Breastfeeding Infants With Laryngomalacia: Observed Clinical and Endoscopic Changes With Alteration of Infant Positioning at the Breast. Annals of Otology, Rhinology & Laryngology, 0003489420965636.

Positioning for Safest Swallowing

Pacing at Breast

- Swallow Safe Positioning
- Remove baby for breathing breaks if needed
- Reduce flow by obstructing surface ducts

Strategy from Carol Chamblin DNP, IBCLC

Preterm Infants

- Non-nutritive sucking at breast during gavage feeding (Fucile 2021)
- First oral feeding at breast (regardless of effectiveness) (Pineda 2011)
- Daily breastfeeding attempts (Briere 2016)
- Avoid bottles (Collins 2016)
- Fingerfeeding improves feeding progression vs. syringe feeding (Buldur 2020)

Photo courtesy of Kerstin Nyqvist PhD

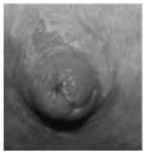
"More specifically, greater connectivity was observed between the insula and the feeding network when subjects sampled potentially nutritive tastes. Taken together, these results argue for a supramodal oral sensory system in the anterior ventral insula that preferentially interacts with areas orchestrating feeding behaviors and homeostasis when the oral stimulus is potentially nutritive."p.700

Rudenga, K., Green, B., Nachtigal, D., & Small, D. M. (2010). Evidence for an integrated oral sensory module in the human anterior ventral insula. *Chemical senses*, *35*(8), 693-703.

Oral Motor Facilitation

Harding, C., Frank, L., Van Someren, V., Hilari, K., & Botting, N. (2014). How does non-nutritive sucking support infant feeding?. *Infant Behavior and Development*, *37*(4), 457-464.

Fingerfeeding: Oral Motor Facilitation



Simultaneous sublingual pressure and posterior lingual pressure to reduce posterior tongue elevation during fingerfeeding

Fingerfeeding advances oral feeding in preterm infants

Buldur et al., (2020). Comparison of the Finger Feeding Method Versus Syringe Feeding Method in Supporting Sucking Skills of Preterm Babies. *Breastfeeding Medicine* *15*(11), 703-708.

Oral Motor Facilitation

Facilitating Wavelike tongue movements:

-Walking back on the tongue
-Slide back

Oral Motor Facilitation

Range of Motion

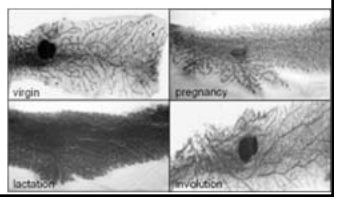
Stimulate transverse tongue reflex

Stimulate tongue protrusion in midline

Protect the Milk Supply

Lactational physiology 101:

- Lactogenesis 1 (Mammary Differentiation)
- Lactogenesis 2 (Secretory Activation)
- Galactopoiesis



Mouse mammary gland, courtesy of Torsten Stein, PhD - Div. of Cancer Sciences & Molecular Pathology University of Glasgow

Protect the Milk Supply

Takeaway #1: milk removal in week 1 predicts milk supply in month 6

Takeaway #2: when babies feed ineffectively early on, they are telling their mothers to make less food for them than they actually need

Protect the Milk Supply

- Pump early, pump often (and add manual expression)
- Use a rental-grade pump, not a retail double-electric pump
- Consider power-pumping (ultra frequent pumping)

Assessment Strategies

- Collect a history
- Observe the baby at rest
- Observe the baby during a feeding
- Consider instrumental assessment
- Make appropriate dyadic recommendations in consultation with other professionals

Counseling Considerations

- Goals vary, women vary: listen carefully and compassionately
- Make space for grief
- Support mothers in making the choices that work best for them and their families

Counseling Considerations

Promote resilience via self-compassion (Mahurin-Smith & Beck, 2021)

- Self-compassion significantly diminished the distress experienced by mothers dealing with infant feeding challenges
- Women with higher self-compassion often framed self-care as a more manageable undertaking

Learn more: http://self-compassion.org

Take Home Messages

- Breastfeeding is baby's first normal milestone (At breast feeding matters!)
  - Foundation of oral shape and function
  - Immune regulation and maturation
  - Co-regulation and executive functioning
- Infants with medical challenges to breastfeeding benefit from a team approach
- Most feeding problems can be addressed while continuing breastfeeding
- Babies with cardiorespiratory issues are usually safer and better feeders at breast (flow can be managed numerous ways).

Let's Work Together

Finding IBCLCs in Indiana:

Northern Indiana Lactation Consultant Association
https://ninlca.org/

Kentuckiana Lactation Improvement Coalition
https://klicbreastfeeding.org/

Indiana Breastfeeding Coalition
http://www.indianabreastfeeding.org/

How to learn more

Online resources:
- Lactnet
- Kellymom
- Global Health Media
- Baby Friendly USA
- KangarooMotherCare.com

Peer support:
- La Leche League
- Breastfeeding USA
- Rush Mothers' Milk Club

Professional support:
- ILCA
- USLCA
- Supporting Sucking Skills

Muscle Activation in Feeding

Inoue, N., Sakashita, R., & Kamegai, T. (1995). Reduction of masseter muscle activity in bottle-fed babies. *Early human development*, *42*(3), 185-193.

França, E. C., Sousa, C. B., Aragão, L. C., & Costa, L. R. (2014). Electromyographic analysis of masseter muscle in newborns during suction in breast, bottle or cup feeding. *BMC pregnancy and childbirth*, *14*(1), 154.

França, E. C. L., Albuquerque, L. C. A., Martinelli, R. L. de C., Gonçalves, I. M. F., Souza, C. B., & Barbosa, M. A. (2020). Surface Electromyographic Analysis of the Suprahyoid Muscles in Infants Based on Lingual Frenulum Attachment during Breastfeeding. *International Journal of Environmental Research and Public Health*, *17*(3), 859. https://doi.org/10.3390/ijerph17030859

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Ratnovsky, A., Carmeli, Y. N., Elad, D., Zaretsky, U., Dollberg, S., & Mandel, D. (2013). Analysis of facial and inspiratory muscles performance during breastfeeding. *Technology and Health Care*, *21*(5), 511-520.

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Tamura Y, Shigeru Matsushita DDS, P., Keiji Shinoda DDS, P., & Sadahiro Yoshida DDS, P. (1998). Development of perioral muscle activity during suckling in infants: a cross-sectional and follow-up study. *Developmental Medicine & Child Neurology*, *40*(5), 344-348.

Breastfeeding as basis for Respiratory Function

Limeira, A. B., Aguiar, C. M., de Lima Bezerra, N. S., & Câmara, A. C. (2013). Association between breastfeeding and the development of breathing patterns in children. *European journal of pediatrics*, *172*(4), 519-524.

Lopes, T. S., Moura, L. F., & Lima, M. C. (2014). Association between breastfeeding and breathing pattern in children: a sectional study. *Jornal de pediatria*, *90*(4), 396-402.

Normal Breastfeeding

Jacobs LA et al. Normal Nipple Position in Term Infants Measured on Breastfeeding Ultrasound. J Hum Lact 23, no. 1 (February 2007): 52-59.

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Elad, D et al. Biomechanics of Milk Extraction During Breastfeeding, *Proceedings of the National Academy of Sciences*, March 24, 2014, doi: 10.1073/pnas.1319798111.

Geddes DT, et al. Tongue movement and intra-oral vacuum in breastfeeding infants. *Early Hum Dev.* 2008;84:471-477.

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Wall V, Glass R. Mandibular Asymmetry and Breastfeeding Problems: Experience from 11 Cases. *J Hum Lact* 22, no. 3 (August 2006): 328-334.

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Collins, C. T., Gillis, J., McPhee, A. J., Suganuma, H., & Makrides, M. (2016). Avoidance of bottles during the establishment of breast feeds in preterm infants. *Cochrane Database of Systematic Reviews*, *10*. https://doi.org/10.1002/14651858.CD005252.pub4

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