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DEPARTMENT OF  
PEDIATRICS

**USDA**

**Texas Children's  
Hospital**

## Case Study: Exclusive Human Milk-Based Diet

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# Case Study

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**Do you routinely use pasteurized donor human milk for infants  $\leq$  1500 grams?**

- Yes
- No

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**Have you ever used donor human milk-derived fortifier (Prolacta®, Humavant) for premature infants?**

- Yes
- No




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**Background**

- Former 26 5/7 week, 972 g preterm male
- Dx: PDA medically managed, mild BPD with persistent requirement of nasal CPAP, oxygen, and fluid restricted
- Feeds:
  - Started on trophic feeds (20 mL/kg/day) of donor human milk on DOL 1
  - Advanced feeds as tolerated
  - Fortified with donor human milk derived fortifier at +6 when feeds were at 60 mL/kg/day on DOL 5
  - TPN discontinued on DOL 7 and feeding volume advanced to 100 mL/kg/day with +6 donor human milk-derived fortifier
  - Weight: 1050 grams




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**Feeding Guidelines ≤ 1250 g BW**

Day of Feed	Human Milk [EBM or Donor] kcal/oz	Feeding Volume (mL/kg/d)	TPN (mL/kg/d)	Lipids (mL/kg/d)	Total Fluids = Enteral + TPN + IL (mL/kg/d)
1	20	20	90-100	5-10	120
2	20	20	95-105	10-15	130
3	20	20	115-120	15	150
4	20	40	95	15	150
5	26 (with donor human milk-derived fortifier +6)	60	75	15	150

EBM = expressed breast milk; IL = intravenous lipid; TPN = total parenteral nutrition.

Baylor College of Medicine, Section of Neonatology, Department of Pediatrics. *Guidelines for Acute Care of the Neonate*. 27th Ed. 2019-2020.




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### Feeding Guidelines ≤ 1250 g BW

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6	26	80	55-70	15 or Off Lipids	150
7	26	100	50	0	150
8	26	120	Off TPN	0	120 Off TPN or IV fluids
9	26	140	0	0	140
10	26	160	0	0	160 Full enteral feeds

\*After 3 days of full fortified feeds, may add cream depending on growth

Baylor College of Medicine, Section of Neonatology, Department of Pediatrics. Guidelines for Acute Care of the Neonate. 27th Ed. 2019-2020.

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### Background

Feeds:

- Reached goal feeds of 150 mL/kg/day with +6 donor human milk derived fortifier on DOL 10 (130 kcal/kg/day, 3.6 g/kg/day protein)
- On DOL 34, weight 1570 g, weight gain was 19 g/kg/day
  - Baby had increased respiratory rate and treated with fluid restriction to 140 mL/kg/day, fortifier increased to +8 to provide 131 kcal/kg/day and 4.1 grams protein/kg/day
- On DOL 61
  - Further fluid restriction to 120 mL/kg/day so fortifier increased to +10 to provide 120 kcal/kg/day and 4.2 grams protein/kg/day

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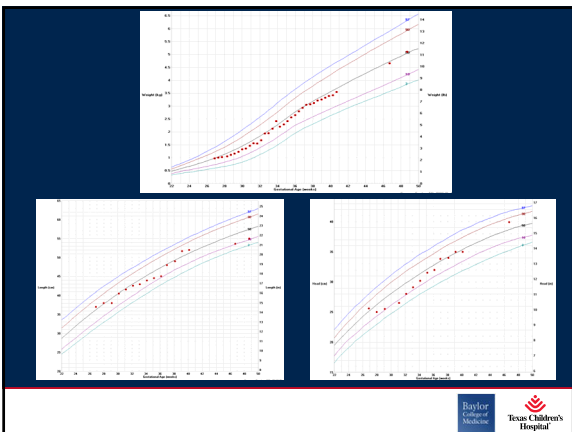
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### Add cream

- Could maximize protein at 4 g/kg/day and then add donor human milk-derived cream at 2 kcal/oz
- If add 2 kcal/oz cream
  - Provide 128 kcal/kg/day
- If add 4 kcal/oz cream
  - Provide 136 kcal/kg/day



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### TCH Cream Protocol

Table 3: Amount of Protein provided by Prolact+HMF based on volume of feeds

Volume (mL/kg/day)	Protein with +6 (g/kg/day)	Protein with +8 (g/kg/day)	Protein with +10 (g/kg/day)
130	3.12	3.77	4.55
140	3.36	4.06	4.9
150	3.6	4.35	-----
160	3.84	4.64	-----

\*Using mature human milk for calculations



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### TCH Cream Protocol

- Cream will be added to the 24 hour batch of feeds at a standard amount to provide an additional 2 kcal/oz

Caloric Content of Mother's Own Milk or Donor Milk		Volume of unfortified HM	Volume of Cream to Add to HM
Kcal/oz	Kcal/100 mL		
19-20	64-67.9	98 mL	2 mL
18-18.9	61-63.9	96 mL	4 mL
17-17.9	57-60.9	94 mL	6 mL
16-16.9	54-56.9	93 mL	7 mL



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### TCH Cream Protocol

- We maximize protein to 4 g/kg/day minimum before adding cream
- If growth is slow despite standard additive of cream at 2 kcal/oz,
  - Can consider adding cream at 4 kcal/oz
  - Can add cream to mother's own milk and donor human milk



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### Growth and Donor Human Milk

- Donor Human Milk is "term milk"
  - Calories may vary by site

	Houston Site	San Antonio Site
<b>Mother's Milk (kcal/oz)</b>	20 ± 5.6	17.6 ± 5.6*
<b>Donor Milk (kcal/oz)</b>	20.6 ± 1.5	19 ± 2.1*

Hair et al. J Pediatr. 2014



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### "Pump It Up"



- Make sure syringe tip is positioned "up" when giving feeds to all babies.
- Avoid using extension tubing when feasible.
- You can help our NICU babies grow by making sure they receive all the nutrients they can from syringe feedings.

Abdelrahman and Hair et al, 2019



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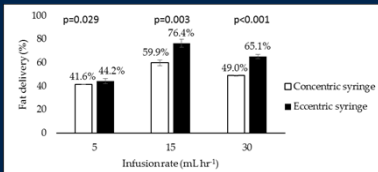
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### Enteral Feeding Systems

- Concentric vs Eccentric syringes
- Polyurethane tubing

Infusion rate (mL/hr)	Concentric syringe (%)	Eccentric syringe (%)
5	41.6%	44.2%
15	59.9%	76.4%
30	49.0%	65.1%

*Abdelrahman and Hair et al., 2019*

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### How long do you continue using pasteurized donor human milk for VLBW infants?

- 30 weeks PMA
- 32 weeks PMA
- 34 weeks PMA
- 36 weeks PMA
- 40 weeks PMA
- 1 month or 30 days
- Other

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### Baby is now 34 weeks PMA

- 34 weeks PMA, ready to transition off donor human milk products
- Transition off over 4 days
  - Day 1, add 1 formula/bovine HMF feeding
  - Day 2, add 2 formula/bovine HMF feedings
  - Day 3, add 4 formula/bovine HMF feedings
  - Day 4, all feeds formula/bovine HMF
- Transition to what?

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### Transition to?

- Baby is currently 1600 grams
- If plenty of mother's milk, then fortify to 24 kcal/oz with bovine human milk fortifier
- If no mother's milk, then 24 kcal/oz premature formula



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### Key points- 34 weeks PMA

- We transition babies off donor milk and donor milk products at 34 weeks PMA over 5 days
- If infants are < 1800 grams at 34 weeks PMA, we use either mother's milk + bovine human milk fortifier or premature formula
- If baby is close to going home and > 1800 grams, we transition to "discharge diet"
- We use liquid formula until 44 weeks PMA



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### Our Goal at NICU Graduation



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