HUMAN DONOR MILK 2020

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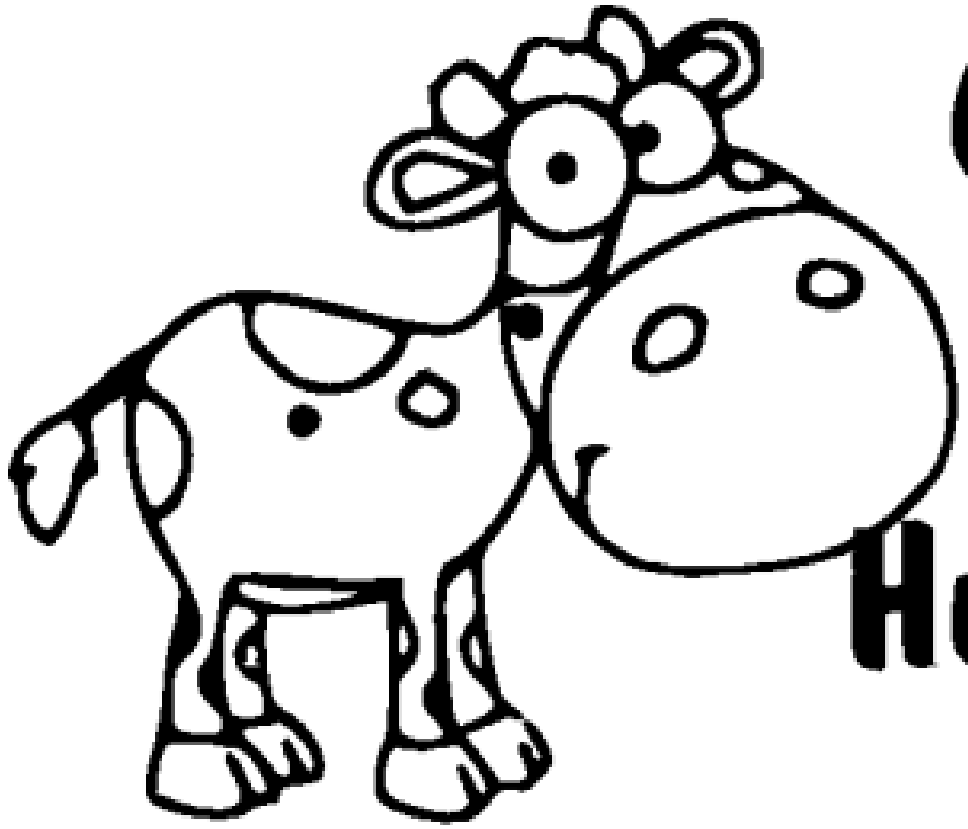
Disclosure

I have no relevant financial relationships with commercial interest to disclose.

This presentation will include discussion of commercial products and or services.



Cow Milk is for
Cow Babies
Human Milk is for
Human Babies

DONOR MILK: AN INTRODUCTION

- Not a new idea
- Wet-nursing being a common practice for all of recorded history
  - Code of Hammurabi (1770 BC) outlines punishment for wet-nurses whose charges die
  - Soranus laid out ideal attributes for wet nurses in first century
- Milk banking began in France in the 1800s
- First human milk bank (US) 1912 in Boston
- Dionne quintuplets (1934) were fed an estimated 237 L of donor milk

DONOR MILK: AN INTRODUCTION

- 1943 AAP developed formal guidelines regarding the operation of milk banks
- 1953 AABB Guidelines
- CDC/ FDA and Advisory Board provides current data and resources for specific screening and procedural advice
- 1985 Human Milk Banking Association of North America (HMBANA) Guidelines
- AAP Breastfeeding Policy (2012)
  - Pasteurized DM, appropriately fortified, should be used if mother's own milk is unavailable or its use is contraindicated.
- Human Milk Banking Association of North America (HMBANA)
  - 6 banks 2003
  - 29 banks 2020
  - Currently dispensing ~ 64,470 L per year (up from 32,530 L 2007)
- Donor milk is also available commercially from Prolacta Bioscience

BENEFITS OF PROVIDING HUMAN MILK FOR PREMATURE INFANTS

- *Gastrointestinal effects*
  - More rapid gastric emptying
  - Improved lactase activity
- *Metabolic effects*
  - Lower rates of metabolic syndrome
  - Associated with lower blood pressures and low-density lipoprotein concentrations as well as a lower risk of insulin resistance in adolescence

BENEFITS OF PROVIDING HUMAN MILK FOR PREMATURE INFANTS

- *Neurodevelopment*
  - Improved long-term cognitive development
    - Higher mental, motor and behavior ratings at ages 18 months and 30 months
    - Higher Intelligence tests, white matter and total brain volumes
    - Best neurodevelopmental and motor outcomes in very low birth weight infants (VLBWI) fed with fortified breast milk occur during the first year of corrected age despite reduced growth of these infants occurring in this period of life (O'Connor)
  - 'Intention' to breastfeed may also influence outcome by positive health behaviors in the mothers
  - Improved visual function, decreased retinopathy of prematurity
  - Protective effect against atopic disease in infants at high risk

BENEFITS OF PROVIDING HUMAN MILK FOR PREMATURE INFANTS

- *Host defense benefits*
  - Lower incidence of infections
  - Decreased Necrotizing Enterocolitis (NEC)
  - Decreased diarrhea and urinary tract infections
  - Decreased otitis media
  - sIgA, lactoferrin, lysozyme, oligosaccharides, nucleotides, cytokines, growth factors, enzymes, antioxidants, and specific amino acids may all contribute to the improved host defense

NECROTIZING ENTEROCOLITIS (NEC)

- Incidence 7% to 11% of VLBW infants (< 1500 grams 3 lbs 5 ozs)
- First description 1823
- 1965 Necrotizing Enterocolitis termed
- Surgical approach 1970s
- Bell et al 1978 Three Stages of NEC
- Mortality 20-40%
- Costs/Charges
  - Surgical NEC charge $400,000 - $500,000

FORMULA VERSUS DONOR BREAST MILK FOR FEEDING PRETERM OR LOW BIRTH WEIGHT INFANTS

- **Cochrane Database of Systematic Reviews 2019**
  - Moderate-certainty evidence indicates that feeding with formula compared with donor breast milk, either as a supplement to maternal expressed breast milk or as a sole diet, results in higher rates of weight gain, linear growth, and head growth and a doubling of the risk of developing necrotising enterocolitis.
  - The trial data do not show an effect on all-cause mortality, or on long-term growth or neurodevelopment.

HUMAN MILK FOR PREMATURE INFANTS

- Must be fortified to meet the unique nutritional requirements of preterm infants (growth and bone mineralization)
- Kuschel and McCormick (Cochrane Review)
  - Fortification of HM with more than one nutritional component is associated with short-term improvements in weight gain, and linear and head growth
  - Despite the lack of data on long-term outcomes, it is unlikely that further studies evaluating fortification of HM versus no supplementation will be performed
- Fortifications
  - Low protein intake has been proven to be the primary limiting factor responsible for growth failure in preterm infants

Table. Composition of preterm transitional, mature preterm, and term mature milk

Nutrient (units/L)	Preterm* transitional 6-10 d	Preterm mature 22-30 d	Term mature ≥30 d
Macronutrient			
Total protein, g	19 ± 0.5	15 ± 1	12 ± 1.5
Energy, kcal	660 ± 60	690 ± 50	640 ± 80
Fat, g	34 ± 6	36 ± 4	34 ± 4
Carbohydrate, g	63 ± 5	67 ± 4	67 ± 5
Minerals			
Calcium, mmol	8.0 ± 1.8	7.2 ± 1.3	6.5 ± 1.5
Phosphorus, mmol	4.9 ± 1.4	3.0 ± 0.8	4.8 ± 0.8
Magnesium, mmol	1.1 ± 0.2	1.0 ± 0.3	1.3 ± 0.3
Sodium, mmol	11.6 ± 6.0	8.8 ± 2.0	9.0 ± 4.1
Chloride, mmol	21.3 ± 2.2	14.8 ± 2.1	12.8 ± 1.5
Potassium, mmol	13.5 ± 2.2	12.5 ± 3.2	13 ± 2.0
Trace elements			
Iron, mg	23	22	22
Zinc, μmol	58 ± 13	33 ± 14	15-46
Copper, μmol	9.2 ± 2.1	8.0 ± 3.1	3.2-6.3
Manganese, mmol	6 ± 8.9	7.3 ± 6.6	3-6
Iodine, μmol	-	1.25	-
Vitamins			
Vitamin A, IU	500-4000	500-4000	600-2000
Vitamin D, IU	40	40	-
Vitamin E, mg	2.9-14.5	2.9-14.5	2-3
Vitamin K, μg	0.7-5.3	0.7-5.3	1.2-9.2
Folate, mg	33	33	1.8

*Values are mean ± SD.
Adapted from Schanler RJ and Atkinson SA in Tsang et al.[6]

NOT ALL MILKS ARE CREATED EQUAL

USAGE

- Infants < 1500 g birthweight (primary decision)
- No guidelines when to discontinue but most use 32-36 weeks (past time of NEC)
- Other Intestinal Diseases
  - Abdominal wall defects
  - Congenital Heart Disease

THANK YOU

WHERE DO WE GO FROM HERE?