New England Donor Milk Macronutrient Analysis
Laura Madore, MD, Karen Ricci, MPH, Jeffrey Shenberger, MD

BACKGROUND:
• Human breast milk (BM) is the AAP-recommended form of nutrition for preterm infants
• The nutritional qualities of BM can vary significantly, especially with human donor breast milk (DBM)
• Human DBM is pooled, pasteurized BM that many preterm infants receive when mother’s own BM is unavailable
• Little is known about the nutritional content of the DBM from our local HMBANA-accredited milk bank, Mothers’ Milk Bank Northeast, which serves most of the area NICUs

OBJECTIVE:
• Describe the nutritional content of different batches of pooled, pasteurized DBM purchased from Mothers’ Milk Bank Northeast
• Compare these results to the published standards1 both with and without nutritional fortification

METHODS:
• Thirty (n=30) different pooled, pasteurized, frozen batches of DBM were thawed and a small aliquot (9ml) was removed from each batch
• Each aliquot was warmed, homogenized, and then immediately analyzed in triplicate
• Analysis occurred via a mid-infrared instrument (Miris Human Milk AnalyzerTM) per manufacturer’s recommendations
• Each batch’s macronutrient content was recorded and averaged
• To determine the total macronutrient content with fortification, we computed the addition of our unit’s standard fortification, and compared to published standards1

RESULTS:
• Mean total energy: 19.87 ± 2.02 kcal/oz (range 16.5 - 24.9); 33% of samples were above the standard
• Mean fat: 3.19 ± 0.70 g/dl (range 1.99 - 4.89); not a statistically significant difference compared to the standard of 3.4 g/dl; however, 63% of batches were below the standard
• Mean carbohydrate: 8.12 ± 0.36 g/dl (range 7.69 - 8.30); all samples were above the standard
• Mean total energy: 19.87 ± 2.02 kcal/oz (range 16.5 - 24.9); 33% were below the standard of 19 kcal/oz, and half of batches were less than 20 kcal/oz, which is the assumed caloric starting-point for fortification; 16% of batches were above 22 kcal/oz.

FORTIFIED RESULTS (DBM + Similac HMF)
• The mean protein content + fortification was 2.31 ± 0.11 g/dl, which is statistically well below the preterm protein goal of 3.0 g/dl (See Figure 1)
• The mean fat content + fortification was 3.36 ± 0.58 g/dl which is statistically below the preterm fat goal of 4.4 g/dl (See Figure 2)
• The mean total energy + fortification was 22.96 ± 1.63 kcal/oz, or 76.52 ± 5.42 kcal/oz; 77% were below the assumed goal
• The mean Protein/Energy ratio + fortification was 3.03 ± 0.22 g/100kcal; half were below the preterm goal of 3.0 g/100kcal.

CONCLUSIONS:
• This study adds to the growing body of literature that most DBM batches fall below the assumed nutritional standards of human BM, especially in regards to fat and protein, and there is a large degree of variability among different DBM batches
• This may be due to a variety of factors including the extensive DBM processing, maternal factors, milk maturity, etc.
• Even with nutritional fortification, DBM from our local milk bank fails to meet the standard fat & protein goals for preterm infants
• This nutritional deficit, especially in those fed exclusive DBM, has been shown to impact growth as well as neurodevelopment
• Nutritional labelling and/or targeted fortification of DBM may help to alleviate these nutritional deficits.

REFERENCES: