Enteral nutrition in the preterm

Bolus versus Continuous tube feeding

• Significantly lower feeding intolerance and superior weight gain in the bolus fed group;
• Early full feeds with bolus feeding;
• Early full feeds, earlier discharge and faster weight gain with a possible increased occurrence of apnea in ELBW infants with bolus;

Schanler RJ, Shulman RJ. Pediatrics 1999
Dolberg S, Kuint J. J Am Coll Nutr 2000
Premji S. Cochrane Database Syst Rev 2003
Enteral nutrition in the preterm

Conclusion on Bolus versus Continuous EF:

• **Bolus** feeding should be preferred;

• In very preterm babies (< 1000g) *continuous feeding* maybe a safer approach (*less apnea*);
Enteral nutrition in the preterm

Which formulation on Enteral Feeding?
Human Milk compared with PT Formula:

• Significant decreases Mortality, NEC, Late sepsis, allergy;
• Increases intestinal mass and DNA synthetic rates;
• > 50% of HM, less days of PN and Catheter, earlier FEF;

Lucas A, Lancet 1990
Lucas A, BMJ 1990
Hylander et al, Pediatrics 1998
Sisk PM. 2008
Donor pasteurised milk versus PT Formula

(only one study with fortified milk)

- Significant **decrease** in NEC and Food Intolerance;
- Significant **decrease** in the short term Weight gain, Lenght and Head Circunference growth;
- **At 18 months, no difference in** Weight, Lenght, Head Circunference neither neurodevelopment;

*Catherine AB. Meta-analysis 2007*

*Quigley M. Cochrane Syst. Ver. 2007*

*Schanler RJ. RCT 2005*

*McGuire. Systematic review 2003*
Human milk alone does not meet the increased nutritional needs of the very preterm baby;

Slower growth is a marker of inadequate nutrition;

Inadequate nutrition can adversely affect neurodevelopmental outcome;

Montanha-Rojas EA. Nutr Neurosci, 2005
Uauy R. Nutrition and brain, 2001
Grantham-McGregor SM. Nutrition and brain, 2001
• Commercially available fortifiers contain:
  – Protein,
  – Electrolytes,
  – Trace minerals,
  – Vitamins,
  – Source of energy.
Enteral nutrition in the preterm

Fortification of HM in VLBW infants

• Start when EF 80-100 ml/kg/day;
• Begin with ½ dose for 2-3 days, then full dose;

• Monitor tolerance:
  – Neither significant gastric residuals nor abdominal distension,
  – Normal bowel sounds and stools,
  – No tenderness....
Enteral nutrition in the preterm

Increasing evidence that

Individualized Fortification (protein) is needed in VLBW infants

- Even with HMF, VLBW infants growth slower then desired;
- Human milk has a highly variable composition;
- Standard HM Fortification provides 2.3 to 2.6 g/kg/day of protein;
- Protein undernutrition is the primary nutritional factor for postnatal slow growth of VLBW infants.

Carlson SJ, Ziegler EE. J Perinatol 1998
Embleton NE. Pediatrics 2003
Arslanoglu S, Moro GE, Ziegler EE. J Perinatol 2006
**Enteral nutrition in the preterm**

**Individualized Fortification:**

Two methods available

- **TARGETED FORTIFICATION**
  - Individualization depending on *Milk Analysis*;
  - **Fortifier** (eventually + *protein*) is added to reach a desired target;

- **ADJUSTABLE FORTIFICATION**
  - Individualization Based on a BUN levels (2x / week);
  - **Fortifier** (eventually + *protein*) is adjusted to reach a BUN level of 9-14 mg/dl;

*Arslanoglu S, Moro GE & Ziegler EE. J Perinatol 2006*

*Polberger S, Moro GE. JPGN 1999*

*Moro GE & Ziegler EE. JPGN 1995*
**Enteral nutrition in the VLBW**

**Probiotic supplementation**

- **Significant decrease** in NEC and Mortality;
- **Neither increase in** Late Sepsis nor Days on TPN;
- “Enteral supplementation of probiotics prevents severe NEC and all cause mortality in preterm infants.
- Available evidence supports a change in practice.
- More studies are needed to assess efficacy in ELBW infants and assess the most effective formulation and dose to be utilized”.

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Despande G. Meta-analysis 2007
Alfaleh K. Cochrane Syst Rev. 2011
Enteral nutrition in the VLBW

For how long fortify HM?
Enteral nutrition in the VLBW

For how long to fortify HM?

• Until Weight $\geq 2000 - 2500$ g
  or
• $> 34$-35 wks and growing well on breastfeeding;
Enteral nutrition in the VLBW

Feeding after discharge?
Enteral nutrition in the VLBW
Feeding after discharge

• **Weight ≥ 2000-2500 g:**
  – Exclusive breastfeeding;

• **Weight < 2000 g:**
  – Exclusive breastfeeding if growing well;
  – Consider PDF (preterm discharge formula) if on PT Formula,
  – or MM supplementation until 2000-2500 g;
1. Start early feedings in the first few days of life (day 1 to 3) at ≤ 24 ml/kg/d or 1 ml/kg/h;
2. Increases may be done by ≤ 20 ml/kg/d if gastric residuals are minimal and no other adverse signs are present;
3. For infants with cardiovascular instability, keep 1-2 ml/meal, preferably every 2-3 hours and increase slowly after 5 to 7 days;
4. Use the “slow bolus” tube technique (intermittent feedings lasting 30 minutes to 1-2 hours);

5. Initial feeding intervals should be longer (4-6h), decreasing to every 2-3 hours once feedings are advanced;

6. Preference order:
   - Raw / Freezed mother milk;
   - Donor human milk;
   - PT Formula.
7. At 80-100 ml/kg/day of EF, start 
Fortification of human milk 
(1/2 strenght for 2-3 days, then full strenght);

8. Fortification should be done after HM 
warming to 37ºC and administered 
immediatly;

9. Use ≤ 2 h at room temperature.
Thank you for your attention!