

# **Nutritional care of preterm infants**

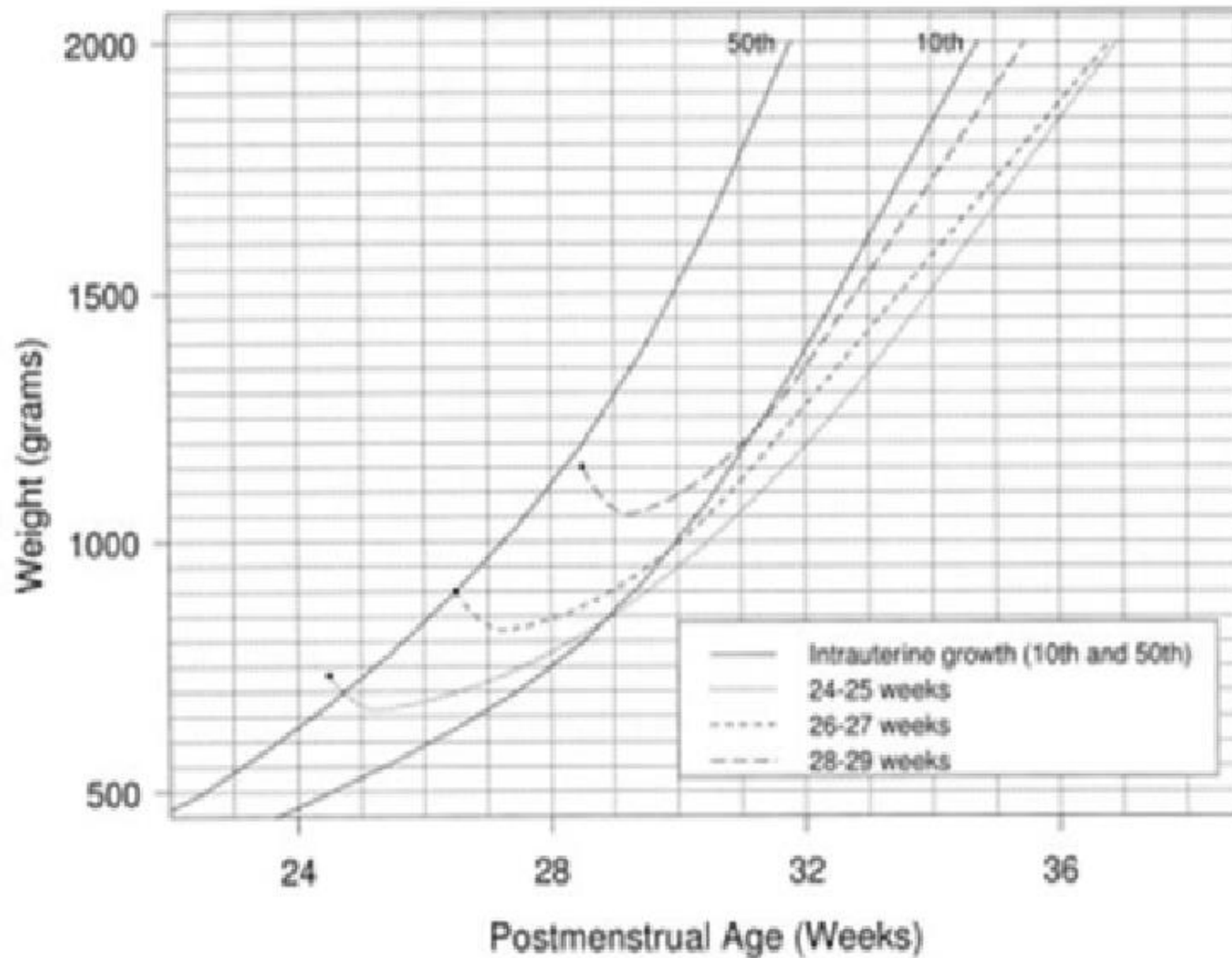
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# Preterm infants

- **↑ Risk for nutritional compromise**
- **↓ Nutrient accretion and reserves**
- **Immature metabolic pathways**
- **↑ Nutrient demands**
- **Medical and surgical conditions**

## **Goal:**

- **Goal: achieve a postnatal growth rate near to a normal fetuses with same GA.**
- **Early nutrition can improve both short- and long-term outcomes**



Average body weight compared to intrauterine growth

# Expected growth after return to birthweight

## Anthropometry:

- Weight: 15-20 g/kg/d
- Length: 0.75-1 cm/week
- Head circumference: 0.75-1 cm/week

# **Phases of nutritional support**

- Phase 1: Parenteral nutrition - Gut priming (Trophic or minimal enteral feedings)**
- Phase 2: Transition feeding, Enteral phased in, parenteral phased out**
- Phase 3: Enteral (late)**
- Phase 4: Post-discharge**

# Gut priming (Trophic feeding)

1. Human milk
2. Day 1 or 2
3. Does not increase risk of NEC
4. ↓ Sepsis
5. Very small volume: 10-20 mL/kg/day
6. Obtain donor milk if the mother's milk supply is insufficient
7. Intestinal maturation
8. Do not contain sufficient calories
9. ↓ liver dysfunction
10. ↑ Feeding tolerance

# Rate of Advancement of Enteral Feeds

- 15 to 25 mL/kg/day in ELBW (<1000g)
- 20 to 30 mL/kg/day in VLBW (<1500g)



## **Total energy intake**

- 110 to 135 kcal/kg per day.

# Parenteral nutrition (early intense nutritional support)

## **glucose:**

- Dextrose (D-glucose)
- Carbohydrate source in IV solution
- 3.4 kcal/g.
- Peripheral veins be limited to  $\leq 12.5\%$  dextrose (osmolarity)
- Higher concentrations: central venous infusions.
- ECMO may require up to 40% dextrose
- Preterm: (higher brain/body weight ratio) 4 to 8 mg/kg/m

# Amino acids(aa):

- aa should be given immediately after birth to provide 3.5 g/kg/day
- Trophic as soon as possible
- Crystalline solutions
- 4 kcal/g
- ESPGHAN: 

$\leq 1000$	4 – 4.5 g/kg/day
1000- 1800g	3.5 – 4 g/kg/day

# lipids

- Started at 3 g/kg/day in first day
- EFA deficiency within 72 h after birth
- deficiency avoided with 0.5-1 g/kg/day of intravenous lipid
- Infused over 24 h (optimal clearance)
- Debate: CLD and bilirubin toxicity (displacing bilirubin)
- Infusion rates: > 0.25 g/kg/h associated with decreases in oxygenation
- Maintain TG level < 200 mg/dL
- Carnitine
- 20% emulsions are preferred over 10%

## **Minerals (Ca, P, mg)**

- peak of mineral accretion occurs during the 3th trimester
- Difficult to provide an adequate amount of minerals in TPN
- Diuretics and corticosteroids
- limited solubility
- Recommended: Ca 120 to 200 and P 60 to 140 mg/kg/day
- Ca: P ratio should be 2: 1

- **Calcium: 25-40 mg/kg/d in the first days of life; 65-100 mg/kg/d on the 7th day of life**
- **phosphorus: 20-35 mg/kg/d in the first days of life; 50-80 mg/kg/d on the 7th day of life**
- **Magnesium: 3 mg/kg/d in the first days; 6-12 mg/kg/day on the 7th day**

## Trace elements (zinc, ...)

- Zinc, copper, selenium, manganese, chromium, molybdenum, fluoride, and iodine (peditrace 1cc/kg and neotrace 0.2cc/kg)
- Stores of trace elements primarily during 3th trimester
- Consensus: zinc should be included early in TPN (400 µg /kg/day)
- Not needed until 2 WKs

Na and K

Vitamins and iron

# **Human milk(HM)**

- **First choice**
- **Second choice: donor pasteurized human milk**
- **Reduced incidence of NEC**
- **Improves neurodevelopmental outcomes**

## **Lactose:**

- **Hydrolyzed to glucose and galactose in the small intestine (lactase)**
- **Intestinal lactase activities at 34 weeks' GA are 30% of term**



# Human milk fortifiers (HMF)

- Human milk: 1/3 of the protein and only a fraction of most other nutrients
- Provide: 1-1.5 g/dL of protein, up to 1 g/dL of fat, and up to 3.4 g/dL of carbohydrates
- HMF 24 kcal/oz
- All breast milk fed infants <2000 g (<34 weeks)
- 2000 – 2500 g if SGA and poor growth.
- Human milk does not completely meet the nutritional needs

# Premature formulas

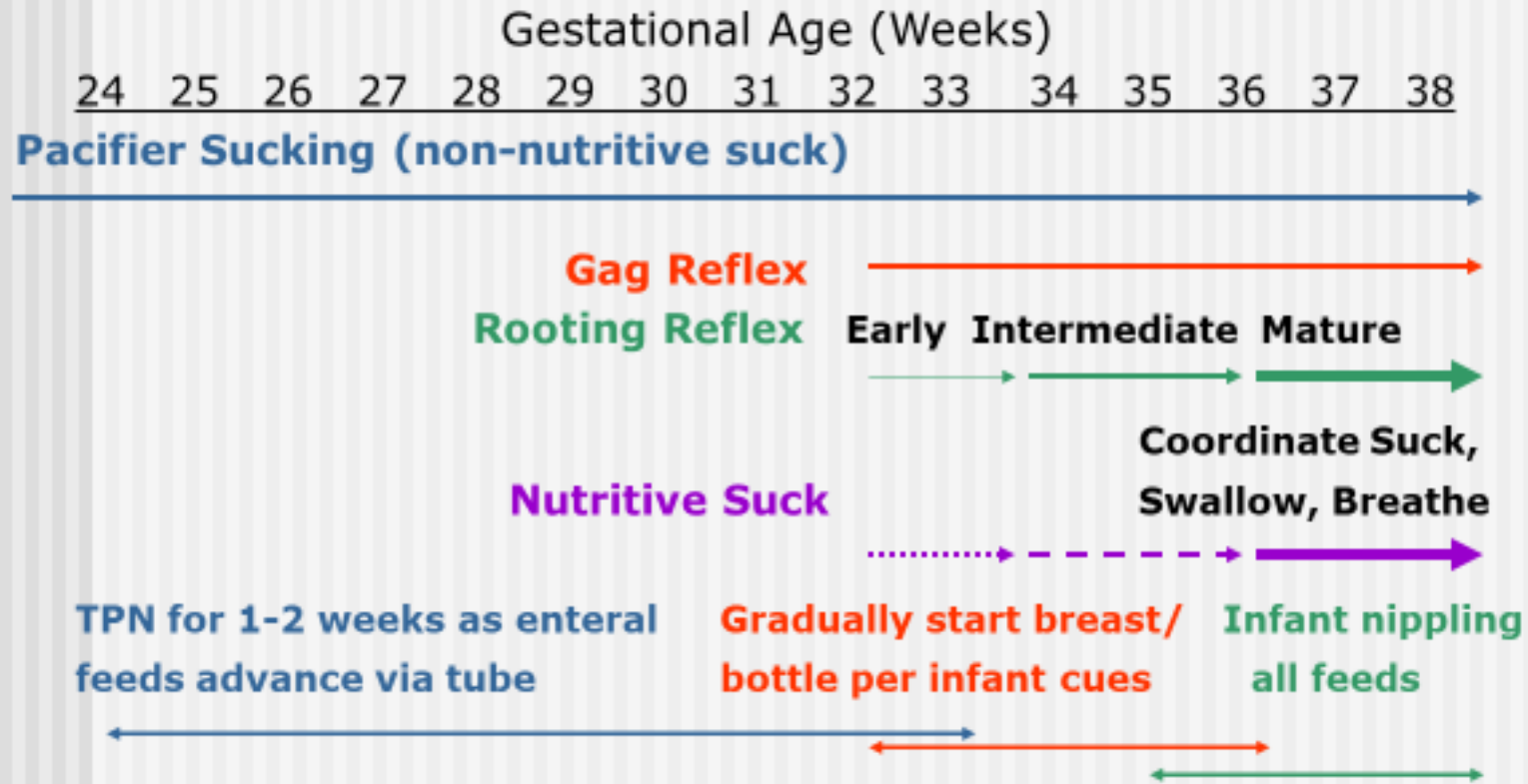
- <1800–2000 g and <34 w
- Calorie: 80 kcal/dl
  - Protein: 3.0 or 3.3g/100 kcal
  - Lipid: 20% - 50% MCT (↓ intestinal lipase and bile salts), DHA, ARA
  - Carbohydrate: 40% lactose, 60% glucose polymers (↓ intestinal lactase activity)
  - Minerals: Ca 165, P 83 (Ca and P ↑)
- Glucose polymers: low osmolality ( $\leq 300$  mOsm)
- Fat content: 4.4 -6.4 g/100 kcal
- linolenic and linoleic acid
- “High protein” formulas 3.3 to 3.6 g/100 kcal (<1000g)
- ↑ Whey predominant

continue...

## **Glucose polymers:**

- **Significant source of carbohydrate in preterm formulas**
- **Digested by  $\alpha$ -glucosidases (70% of adult activity at 26-34 w)**
- **Salivary and mammary amylases: glucose polymer digestion.**
- **↑ Caloric density without a rise in osmolality**
- **Enhance gastric emptying.**

# Typical Feeding Progression



Thank you  
for listening  
to my story

