Nutrition Support of a 30-week Preterm Infant with Severe Intrauterine Growth Restriction in the Neonatal Intensive Care Unit

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**Introduction**

Intrauterine growth restriction (IUGR) is poor growth of a baby while developing in utero, with maternal, fetal, or placental etiology. Depending on when it occurs, a baby may be symmetrically small, or have a normal head with smaller body 1.

**Short Term Increased risk of:**
- Stillbirth & perinatal mortality
- Hypoglycemia
- Respiratory distress syndrome
- Depleted fat/glycogen stores
- Infection/sepsis
- Necrotizing Enterocolitis (NEC)

**Long Term Increased risk of:**
- Type 2 diabetes
- Hypertension, cardiovascular disease
- Cognitive disabilities
- Behavioral issues
- Short stature

**Parenteral Nutrition in the NICU**

PN usually initiated in preterm infants at birth to maximize caloric and protein intake because immature GI tract and critical illness often delays enteral or oral feedings 5.

Estimated Needs (parenteral, ELBW, preterm)
- 90-110 kcal/kg/day
- 3.5-4 g/kg/day protein
- 3 g/kg/day lipids
- Dextrose Infusion Rate (DIR) goal: 10-12 mg/kg/min

**Considerations:**
- Total fluids (including meds)
- Central vs Peripheral access
- Electrolyte trends
- Calcium and phosphorus solubility
- Trace element shortages (copper, molybdenum, chromium)

**Case Description & Anthropometrics**

Patient was delivered early at 30 weeks 4 days gestational age through emergent C-section for breech position, fetal distress and severe IUGR to 37 yo Spanish-speaking mother with multiple complications including pregnancy induced hypertension. Upon birth, patient was intubated for respiratory distress and possible sepsis.

Birth:
- 304 weeks
- 0.541 kg
- 30 cm
- 21 cm

**PES statement:** Underweight r/t SGA/IUGR AEB birth weight <3%ile

**Discussion**

The nutritional management of critically-ill preterm infants is complicated by frequent changes in fluid status, electrolyte and glycemic imbalances, delayed enteral feeding and the need for increased nutrients to fuel catch-up growth. The implications of IUGR requires additional considerations and daily monitoring and adjustment in parenteral nutrition is necessary.

**Hypoglycemia and Hyperglycemia**

**Hypoglycemia**
- Inadequate glycogen/fat stores
- Diminished liver gluconeogenesis
- Decreased counter-regulatory hormone response
- Hyperinsulinism/increased insulin sensitivity

**Hyperglycemia**
- Inappropriate insulin response in response to glucose infusion
- Sepsis/stress response
- Neonatal diabetes (rare)

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**Hypoglycemia** can result after birth due to:
- Inadequate glycogen/fat stores
- Diminished liver gluconeogenesis
- Decreased counter-regulatory hormone response
- Hyperinsulinism/increased insulin sensitivity

**Hyperglycemia** is common in extremely low birth weight (ELBW) 4
- Inappropriate insulin response in response to glucose infusion
- Sepsis/stress response
- Neonatal diabetes (rare)

**References:**
4 Chan SW and Stark AR. Neonatal hyperglycemia.. UpToDate June 2013.