Objectives

- State the blood glucose level at which intervention is required
- List 4 predisposing factors which put infants at risk for hypoglycemia
- List 5 signs and symptoms of hypoglycemia
- Describe the interventions required for infants with hypoglycemia
- Outline the screening procedure used for infants at risk for hypoglycemia

Glucose Metabolism

- During pregnancy, mother is primary source of fetal glucose
- Neonatal glucose levels fall to the lowest level within 1-2 hours of birth
- Normal plasma glucose level in the neonate ranges 40-60 mg/dl
Definition

- No absolute value distinguishes normal from abnormal blood glucose concentration for all infants.
- Threshold for intervention depends on clinical status, feeding status, other sources of stress.
- Intervention typically initiated for glucose levels ≤ 50 mg/dl.

Risk Factors for Hypoglycemia

- Premature infants
- IUGR & SGA infants
- Neonatal hypoxemia
- Respiratory distress
- Cold stress
- Infants of mothers receiving tocolytics
- Infants of diabetic mothers

Pathophysiology

- Inadequate glycogen synthesis and storage.
- Pre-term neonates due to missing much of the third trimester when brown fat is developed and glycogen stores are accumulated in the liver.
- SGA neonates due to nutrients channeled toward growth rather than glycogen storage.
- Multiple gestations
- Post-term neonates
**Pathophysiology**

- Rapid depletion of hepatic glucose
- Hypoxia/perinatal stress which mobilizes hepatic glucose stores
- Hypothermia/cold stress
- Neonatal sepsis
- Impaired Gluconeogenesis
- IUGR
- SGA

**Pathophysiology**

- Excessive Insulin Production Infant of a Diabetic Mother (IDM)
- Rh Incompatibility
- Beckwith-Wiedman Syndrome
- Neisoldioblastosis
- Islet cell adenomas

**Macrosomia**

- LGA
  - Birth weight > 4 kg or above the 90th percentile for gestational age
  - Occurs in 20-50% IDM
- Physical findings
  - Increased adipose tissue
  - Full face covered with vernix
  - Disproportionate head/shoulder ratio
  - Ptathonic
  - Large placenta & cord
- Complications
  - Birth trauma
  - Increased C-section rate

Which baby is appropriate for gestational age?
Hypoglycemia: Signs and Symptoms

**CNS**
- Jitteriness
- Stupor, Hypotonia
- Irritability or lethargy
- Abnormal or High pitched cry
- Seizures
- Poor sucking or feeding (Refusal to eat)
- Sweating

**Respiratory Distress**
- Rapid or irregular respirations
- Apnea
- Cyanosis

**Cardiovascular**
- Bradycardia or tachycardia
- Cardiomegaly
- Cardiac failure/arrest

**Neonatal Hypoglycemia**

**Tremors vs. Seizures**

**Tremors**
- Rhythmic limb movements
- Stop when contained or flexed
- Stimulus sensitive

**Seizures**
- Disrhythmic movements
- Do not stop when contained or flexed
- Not stimulus sensitive
- Associated with eye deviations or abnormal gaze
Neonatal Hypoglycemia Screening Protocols
- Screen all infants at risk on admission per hospital protocol
- Immediately screen any infant with signs and symptoms
- Obtain serum glucose level if screen is abnormal
- Reassess 15-30 minutes after treatment and then every 3-4 hours before feedings until stable.

Treatment
- If drawing STAT serum glucose, do not wait for results to treat
- Initiate therapy per hospital protocol
  - PO/OG feeding (usually 10 mL/kg minimum)
  - IV: D_{10}W 2 mL/kg IV slow push
  - Assess blood glucose by bedside screening method

Infant of a Diabetic Mother - Incidence
- 0.5-1.0% of all pregnancies are complicated by pre-existing diabetes
- 1-5% gestational diabetes
- 50-150,000 IDMs born annually
- Perinatal mortality: 20/1000 total births
Hypoglycemia occurs secondary to fetal neonatal overproduction of insulin. Severity of hypoglycemia depends on:
- How well-controlled the mother’s blood glucose
- How much glucose fetus exposed to during labor

**Birth Defects, Congenital and Chromosomal Anomalies**

- Associated with Diabetes
  - CNS
  - Cardiopulmonary
  - Skeletal
  - Mid-line facial defects
  - Ear and hearing
  - Third trimester cardiac hypertrophy
  - Numerical sex chromosomal anomalies
  - Multiple congenital anomalies

- Associated with Maternal Obesity
  - Neural tube defects
  - Heart defects
  - Ventral wall defects
  - Cleft lip +/− palate
  - Multiple congenital anomalies

**Diabetic Embryopathy – CNS, Cardio/Pulmonary Vascular, GI**
Diabetic Embryopathy – Skeletal Anomalies

Hypoplastic left heart, interrupted aortic arch, cervical vertebral anomalies and asymmetrically dysplastic ears

Caudal Regression Syndrome

Diabetic Embryopathy – Midfacial Defects

The End