

Save the Neonate-Africa

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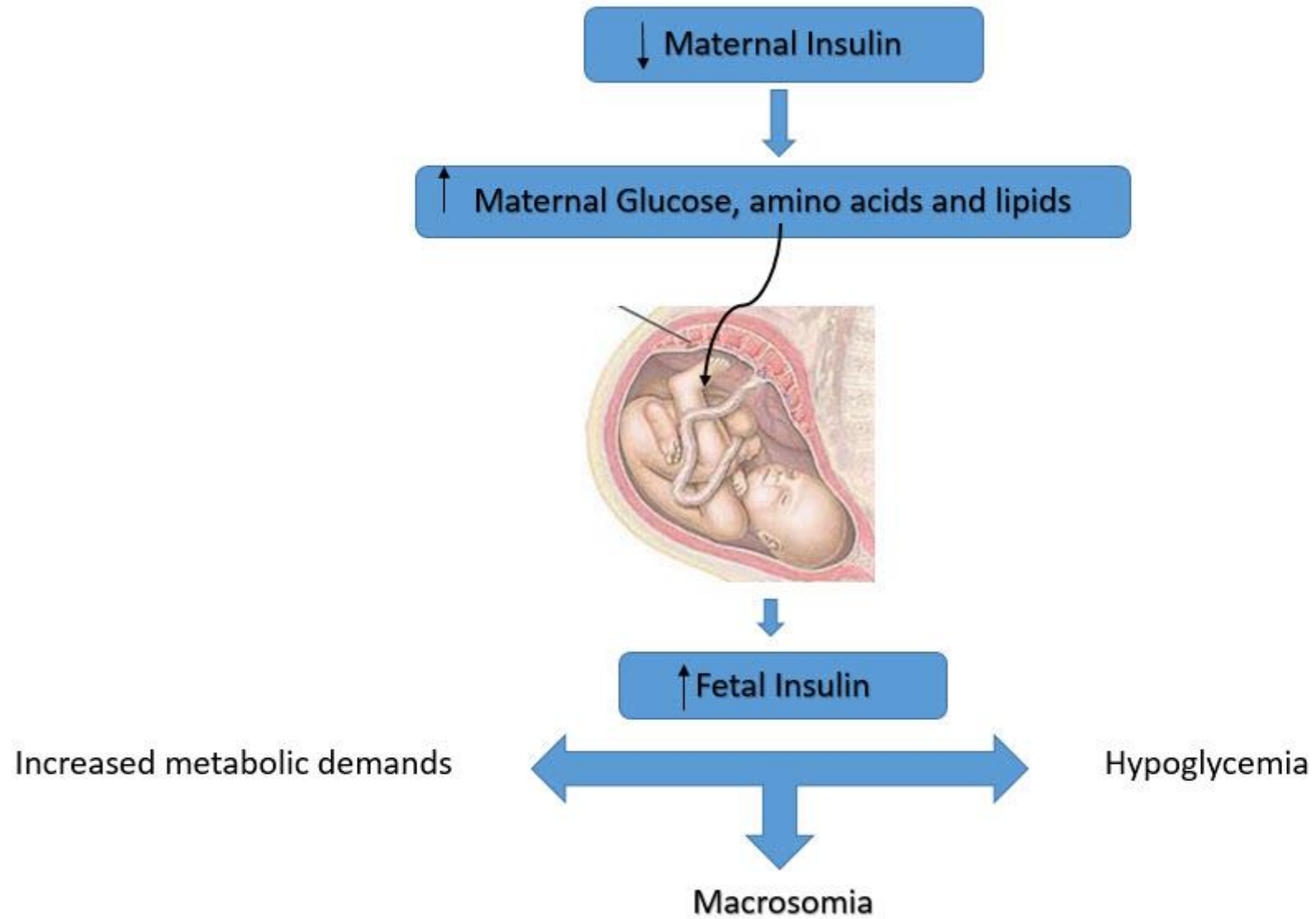
The background features a layered, organic design. A large, light beige circle on the right side contains the text. To the left, there are flowing, wavy bands of orange, green, and brown. In the bottom left corner, there is a white line-art illustration of a monstera leaf.

Hypoglycemia

Before Birth

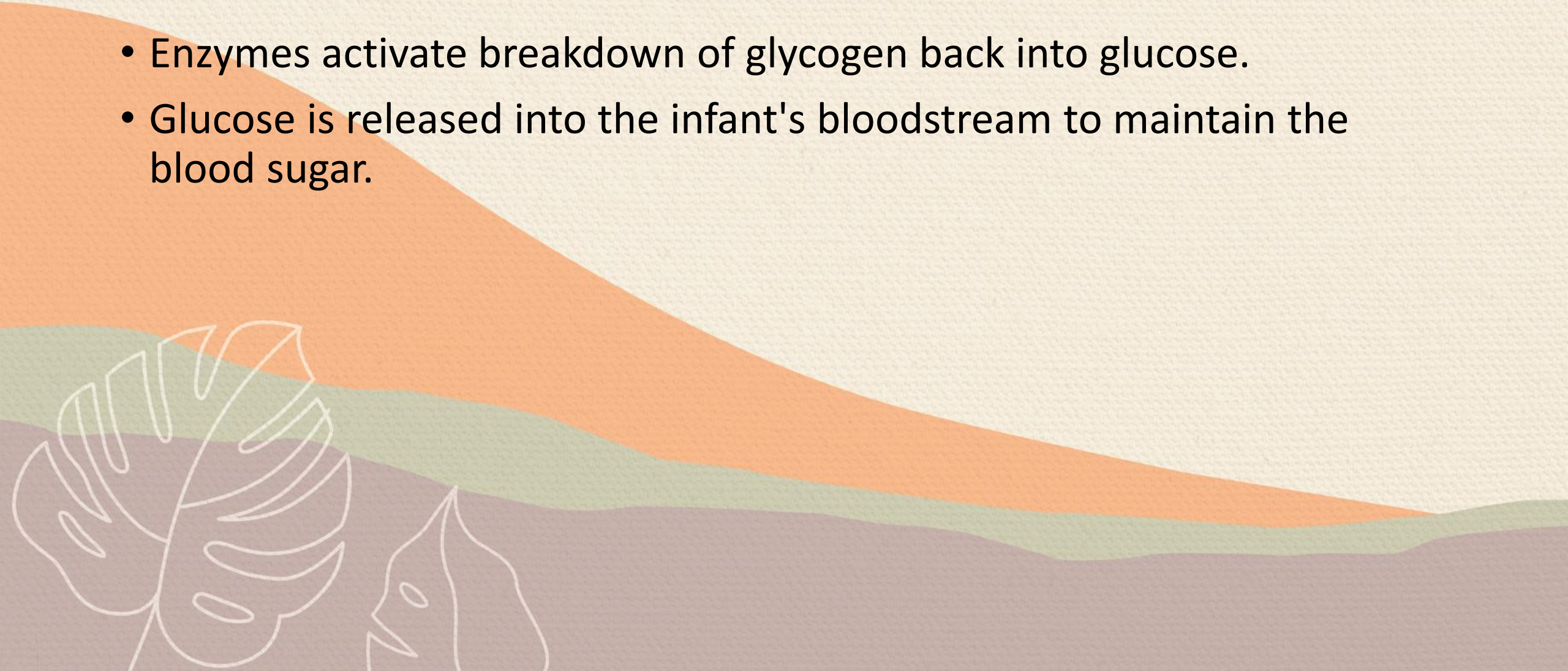
- In utero the fetus relies primarily on the placental transfer of glucose and nutrients from the mother to meet energy requirements
- Fetal glucose values are approximately 70-80% of the maternal values
- Fetal glucose in the form of glycogen is stored during the 3rd trimester-especially the last month

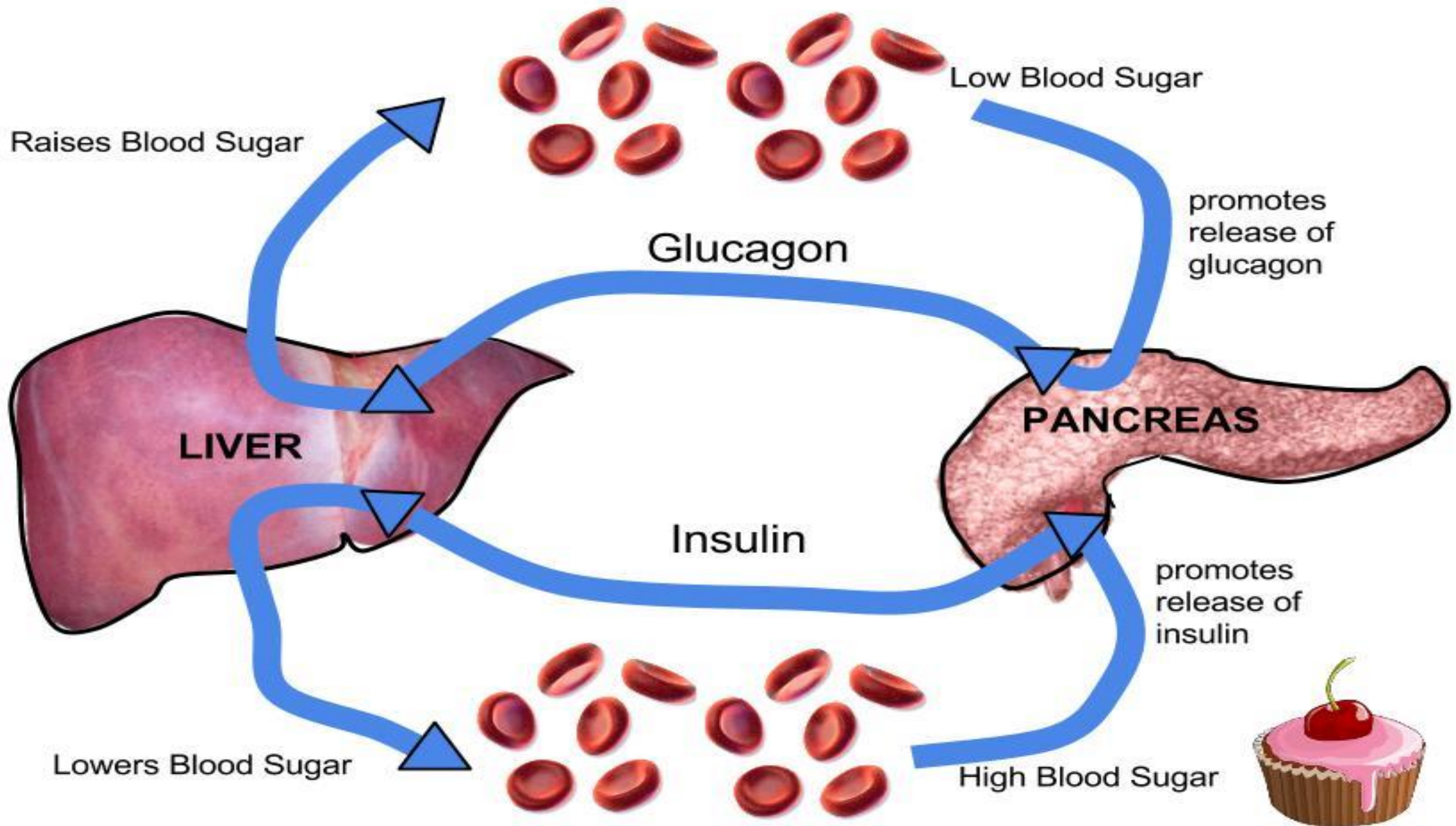




After Birth

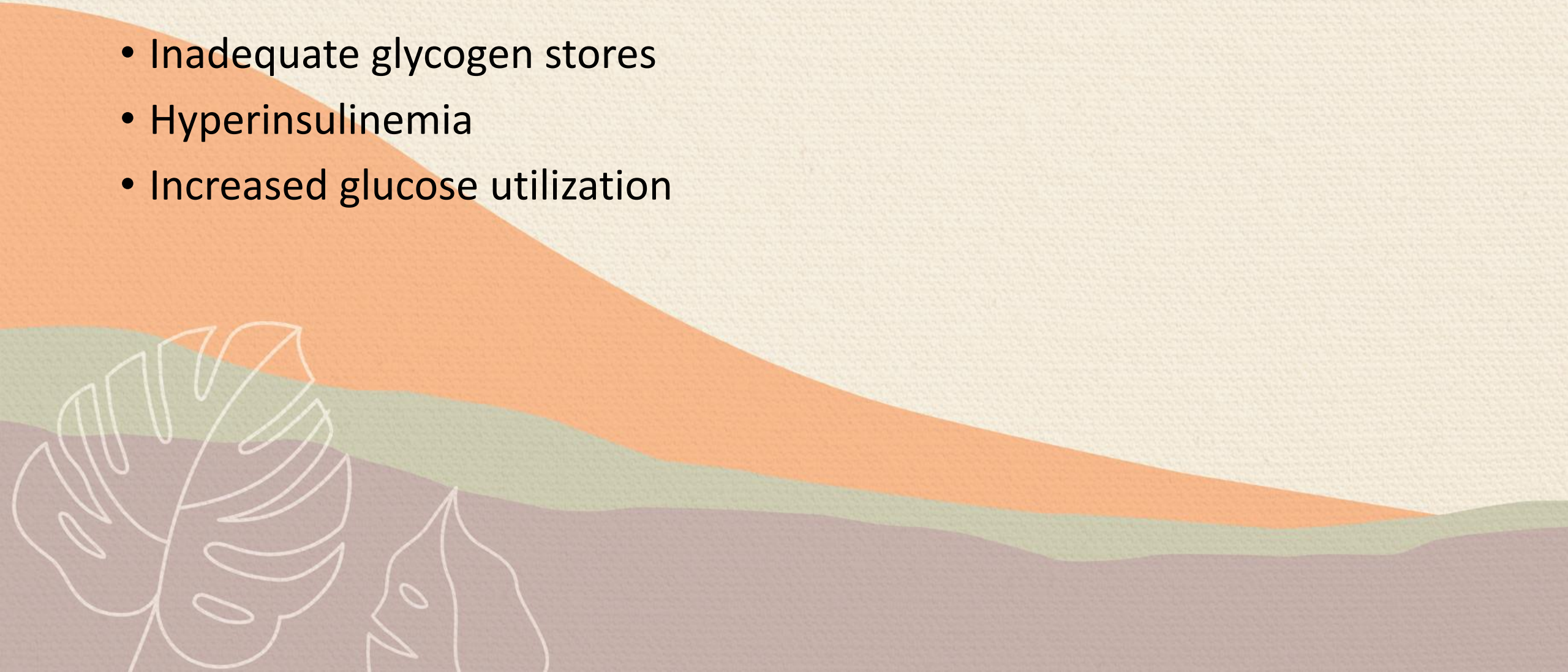
- Enzymes activate breakdown of glycogen back into glucose.
- Glucose is released into the infant's bloodstream to maintain the blood sugar.





Factors Impacting Glucose Levels

- Inadequate glycogen stores
- Hyperinsulinemia
- Increased glucose utilization



Inadequate Glycogen Stores

- Preterm (less than 37 weeks gestation)
- Small for gestational age with asymmetric and symmetric growth
- Term SGA infants are at an increased risk for hypoglycemia
- Preterm infants who are SGA are at a **MARKEDLY** increased risk for hypoglycemia



Small for gestational age infants (SGA)

Fetal Factors

- Chromosomal abnormalities
- Genetic abnormalities
- Syndromes
- Metabolic disorders
- Intrauterine infections
 - CMV, Syphilis, Malaria, Rubella
- Multiple gestation

Maternal factors

- Nutritional factors
- Chronic illness
- Uterine factors
- Impaired placental function
- Ingestion of drugs
- Prescription medicines
- Genetic and familial factors
- Chronic psychological stress

Intrauterine Growth Retardation



Hyperinsulinemia

Infants of a diabetic mother

Elevated maternal glucose levels lead to increased amounts of glucose crossing the placenta which causes increased fetal insulin production

After the umbilical cord is cut the insulin levels remain elevated leading to a drop in the infant's blood glucose -> hypoglycemia

Insulin is a major growth hormone which caused fetal macrosomia (birthweight >4000 grams).

Large for Gestational Age Infant (LGA)

Birthweight >90th percentile for gestational age

Causes:

- Ethnic
- Genetic
- Increased maternal glucose levels during pregnancy
- Undiagnosed maternal diabetes

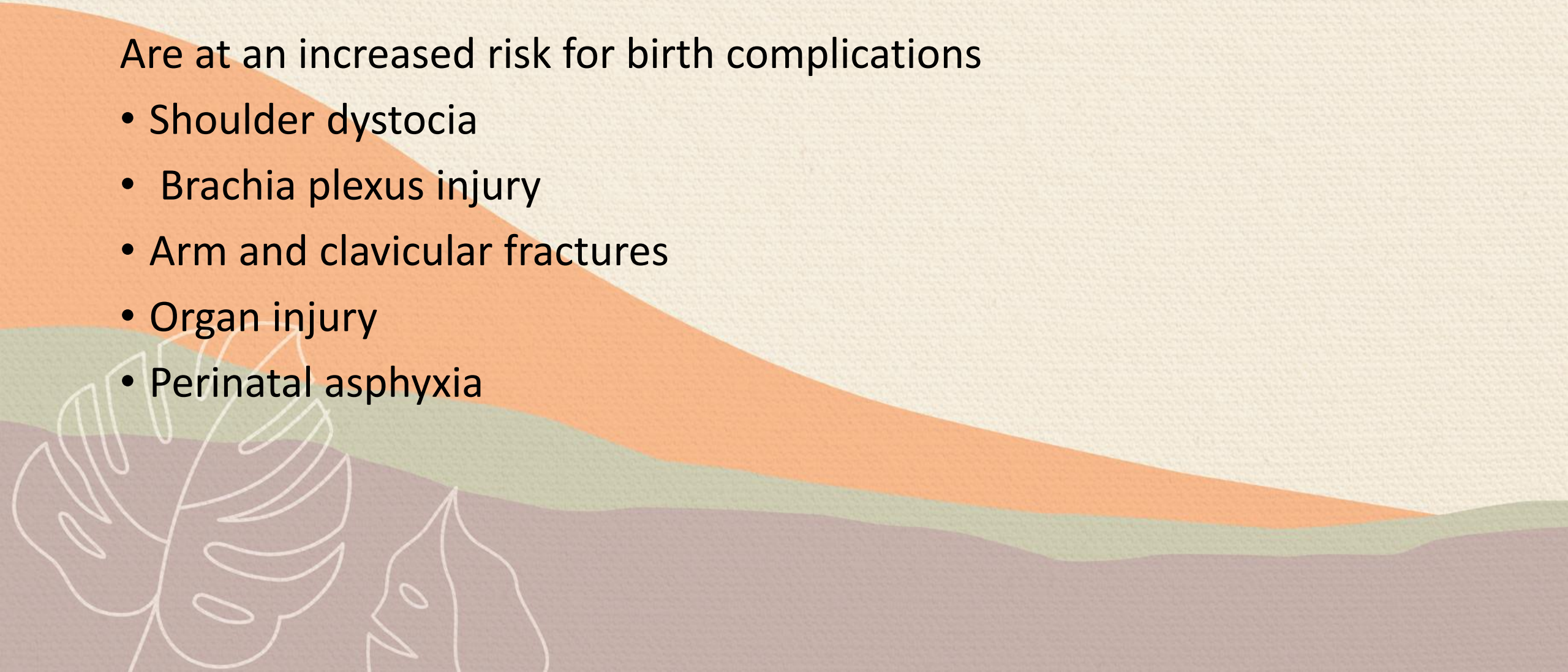
Are at an increased risk for birth complications



Macrosomia

Are at an increased risk for birth complications

- Shoulder dystocia
- Brachia plexus injury
- Arm and clavicular fractures
- Organ injury
- Perinatal asphyxia



Increased utilization of glucose

- Sick infants
- Preterm and SGA
- Infection
- Shock
- Respiratory disease
- Cardiac disease
- Hypothermia
- Hypoxia



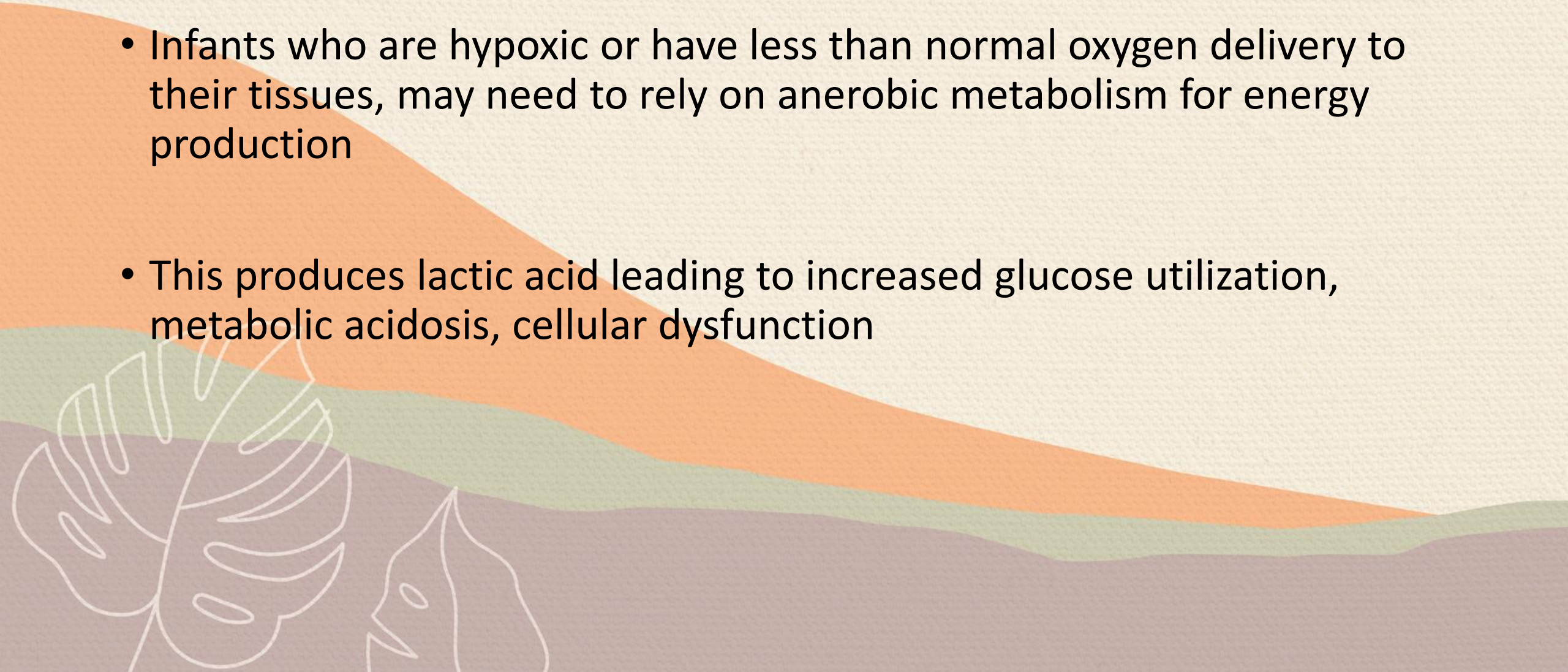
Why

- When there is sufficient oxygen in the blood to satisfy tissue needs glucose will be metabolized into energy
- Infants who are stressed or sick have higher energy needs than well newborns and may rapidly deplete their glycogen stores



Why

- Infants who are hypoxic or have less than normal oxygen delivery to their tissues, may need to rely on anerobic metabolism for energy production
- This produces lactic acid leading to increased glucose utilization, metabolic acidosis, cellular dysfunction

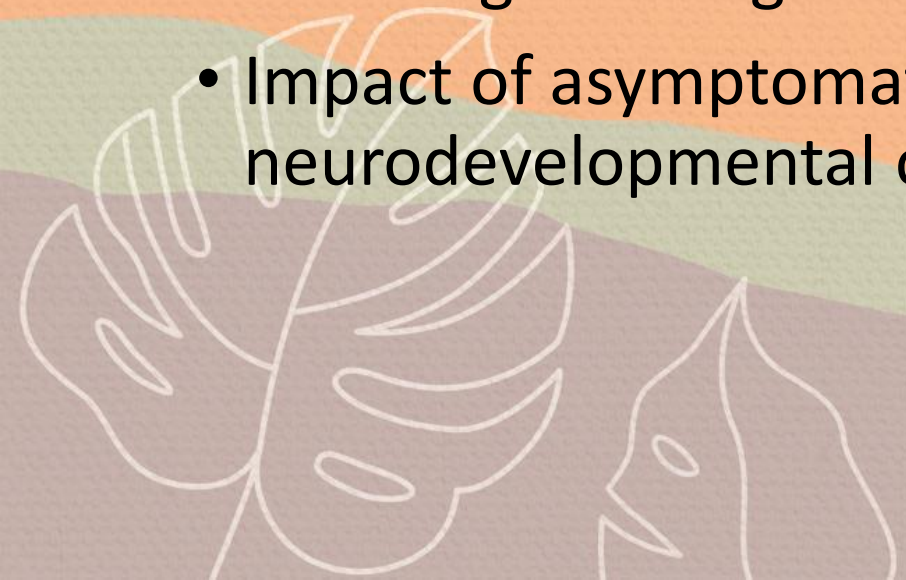


Definition of Hypoglycemia

- Glucose delivery or availability which is inadequate to meet glucose demands

Lack of definite evidence:

- Which glucose value and under what conditions neurologic damage occurs
- Impact of asymptomatic hypoglycemia on neurodevelopmental outcomes



Signs and Symptoms of Hypoglycemia

- General

Abnormal cry- weak

High pitched cry

Poor feeding-poor suck swallow coordination

Hypothermia

Diaphoresis



Signs and Symptoms of Hypoglycemia

Neurologic

- Tremors
- Jitteriness
- Irritability
- Hypotonia
- Lethargy
- Seizures

Cardiorespiratory

- Tachypnea
- Respiratory depression
- Apnea
- Cyanosis

Target levels of Hypoglycemia

For sick infants who require transfer or intensive care and to improve margin of safety

- Maintain blood glucose:
 - 50-110mg/dl
 - Or
 - 2.8-6.0 mmol/L

Glucose Utilization

Approximately 4-6mg/kg/min

D₁₀W without electrolytes can provide this

80 ml/kg/day delivers a glucose dose of about 5.5 mg/kg/min



Calculating fluids

Weight in Kg

Multiplied by 80

Divide by 24 (hours)

Provides ml/hour for IV rate.

- 1.8 kg
- $1.8 \text{ kg} \times 80 \text{ ml/kg} = 144 \text{ ml}$
- $144 \text{ ml} \div 24 \text{ hours} = 6 \text{ ml/hr.}$
- 6 ml/hr. IV rate

Treatment

Early feedings

Frequent feedings

Encourage breast feeding

Skin-to-skin contact



Infants who should not be fed

- Those with a risk for aspiration
 - Respiratory distress
 - Easily fatigued
 - At risk to develop an ileus
 - Delayed gastric emptying
 - Vomiting
- Impaired blood flow to bowel with hypoxia and/or shock
- Any infant who is sick

Treatment for Hypoglycemia

D₁₀W

2ml /kg IV over 2 minutes

Example:

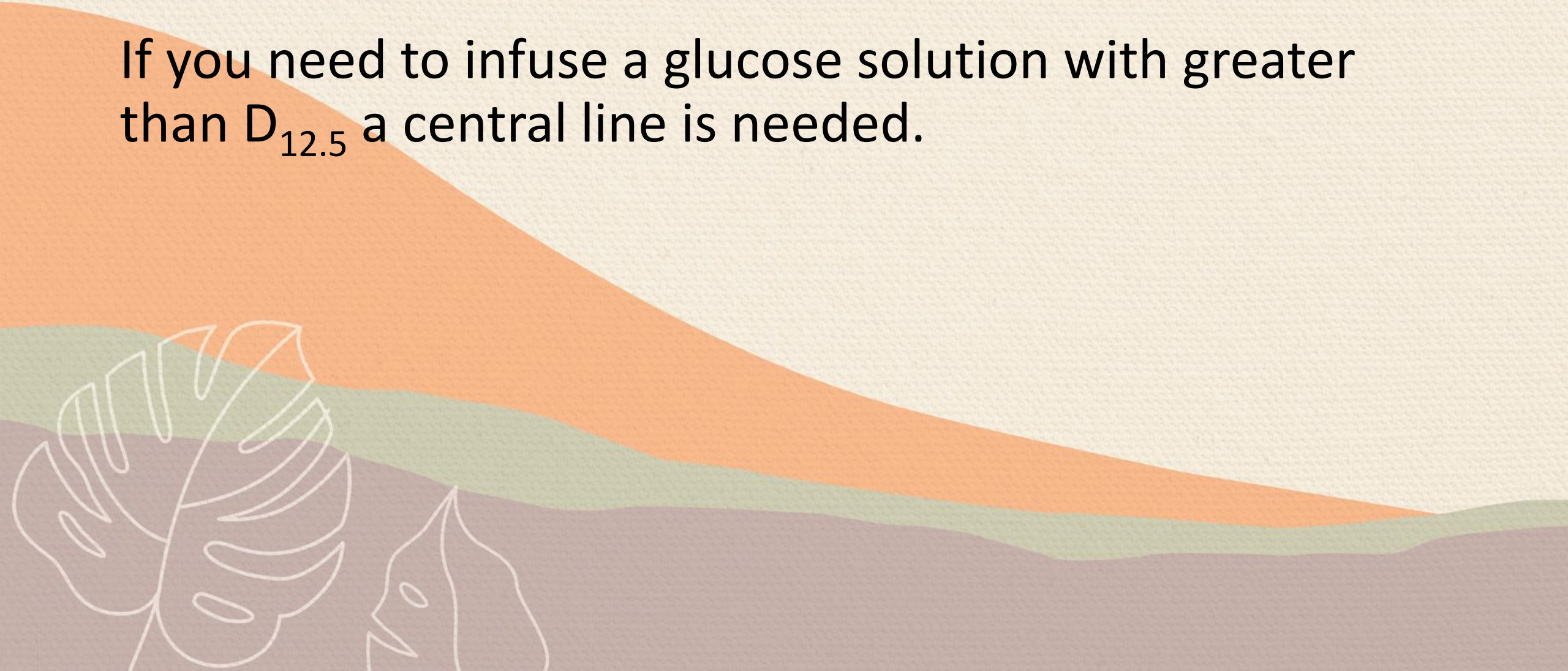
Weight 1.8 kg

1.8 Kg x 2- 3.6 ml D₁₀W

Give IV bolus of 3.6 ml of D₁₀W over 2 minutes

Cautions

If you need to infuse a glucose solution with greater than $D_{12.5}$ a central line is needed.



Treatment for Hypoglycemia

Example:

Weight 2.5kg

Glucose is 1.5 mmol/L

- Start IV
- Give D₁₀W 2ml /kg IV over 2 minutes
 - $2.5 \times 2 = 5$ ml of D₁₀W
- Start IV fluids at 80 ml/kg/day
 - $2.5 \times 80 = 200$
 - $200 \div 24 = 8.3$ ml /hour
- Repeat glucose in 15-30 minutes
 - Repeat is 1.8 mmol/L

Treatment for Hypoglycemia

- Repeat glucose is 1.8 mmol/L

Repeat bolus
5.5 ml D₁₀W over 2 minutes

- Repeat glucose in 15-30 minutes.

Repeat bolus 2 ml/kg IV over 2 minutes.
Increase IV fluids to 100ml/kg/day
 $100 \times 2.5 = 250\text{ml}$
 $250 \div 24 = 10.4 \text{ ml /hr.}$

- Repeat glucose is 1.9mmol/L

- Repeat glucose in 15-30 minutes.

Be careful not to fluid overload the infant

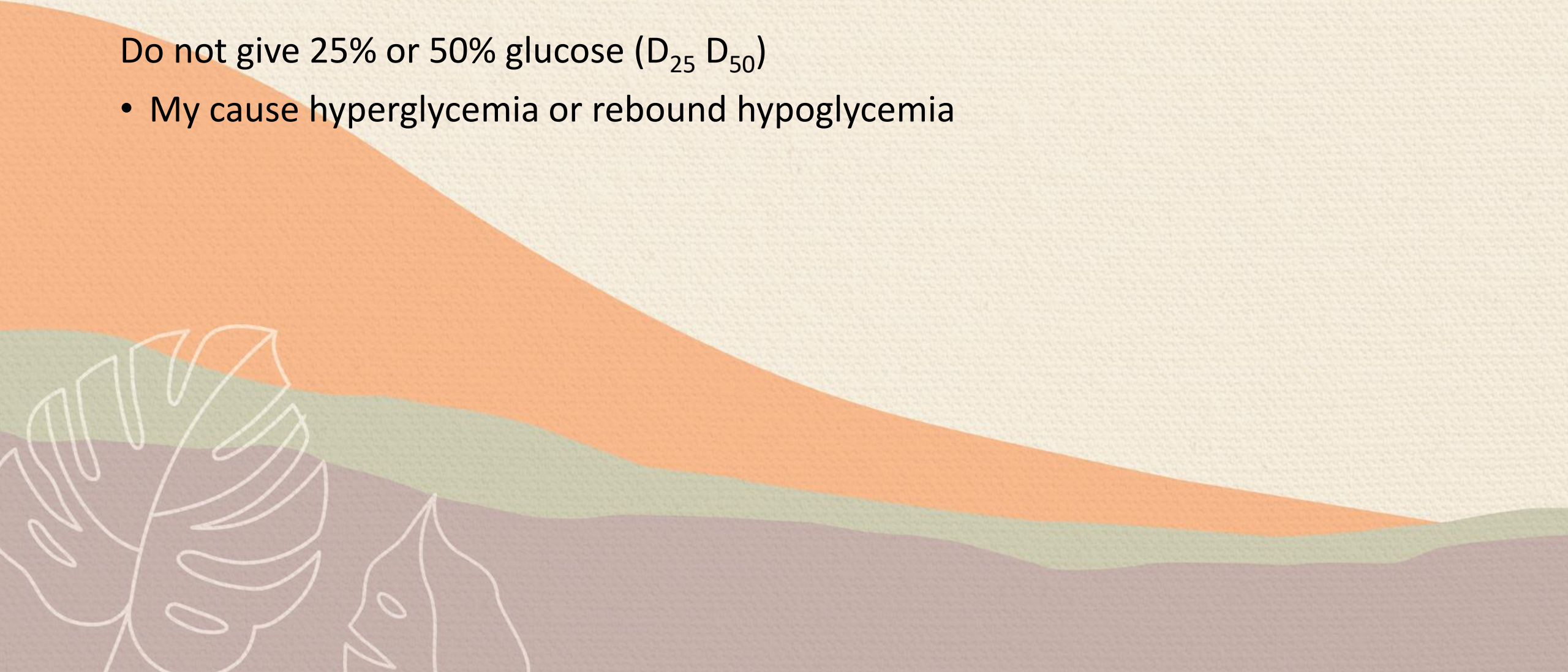
- Follow up glucose is still 1.9 mmol/L

Repeat bolus
Increase to D_{12.5}W

Precautions

Do not give 25% or 50% glucose (D_{25} D_{50})

- May cause hyperglycemia or rebound hypoglycemia



Recap



THE END





QUESTIONS??