

# Infant Feeding & Growth

## High-Yield Review for Pediatrics Final

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### 1. Normal Growth Parameters

Growth follows predictable milestones. Any deviation from these curves warrants investigation.

#### Weight

- **Birth Weight:** ~3.5 kg.
- **Neonatal loss:** Loses up to 10% in the 1st week (fluid shifts). Regains birth weight by **2 weeks**.
- **Expected Gain:**
  - 1–3 months: 200g/week
  - 4–6 months: 150g/week
  - Older children:  $(Age + 4) \times 2 =$  approximate weight in kg.

#### Brain Hack / Mnemonic

##### Rule of Multiples for Weight:

*"Double at 4, Triple at 12, Quad at 24"*

- **4 months: Double** birth weight
- **1 year: Triple** birth weight (~10 kg)
- **2 years: Quadruple** birth weight (~14 kg)

#### Length & Head Circumference (OFC)

- **Length:** Birth (~50 cm) → 1 year (+25 cm = 75 cm) → **4 years (Double = 100 cm)** → 13 years (**Triple = 150 cm**).
- **Head Circumference (OFC):** Reflects brain growth. Birth (~35 cm).
- **OFC Velocity:** +12 cm in 1st year (Total ~47-48 cm at 1 yr), then slows dramatically (+6 cm in 2nd year).
- **Upper/Lower Segment Ratio:** 1.7 at birth → **1.0 at 7 years**.

### 2. Breastfeeding & Lactation

The AAP and WHO recommend **exclusive breastfeeding for the first 6 months**, with continuation alongside complementary foods up to 2 years or beyond.

## Physiology

- **Prolactin:** Produced in anterior pituitary. Initiates/maintains milk *production*. Inhibited by Dopamine. Surges during deep sleep.
- **Oxytocin:** Produced in posterior pituitary. Causes milk *ejection* (let-down) and uterine contraction.

## Composition: Breast Milk vs. Cow's Milk

- **Colostrum (Days 1-5):** Yellowish, thick. High in **IgA, protein, and macrophages**. Lower in fat/carbs. Acts as a laxative to clear meconium (lowers bilirubin).
- **Mature Milk:** Foremilk (watery, high lactose) vs. Hindmilk (high fat for satiety/energy).
- **Whey/Casein Ratio:** Breast milk is whey-predominant (**60:40**), making it highly digestible. Cow's milk is casein-predominant (20:80), causing tough curds.
- **Minerals:** Breast milk has *less* total iron, but it is **highly bioavailable**. Low sodium (protects immature kidneys).

### High-Yield MCQ Pearl

Cow's milk is contraindicated in infants < 1 year because:

- High protein & renal solute load (Na<sup>+</sup>) dehydrates the infant.
- Deficient in Vitamin C, Iron (causes microcytic anemia), and Essential Fatty Acids.
- Causes occult GI bleeding.

### 3. Contraindications to Breastfeeding

These are incredibly common MCQ topics. You must distinguish between absolute contraindications and situations where *expressed* milk is safe.

#### Brain Hack / Mnemonic

##### Contraindications to Breastfeeding: "HE HAS Galactosemia"

HIV (in developed countries)

Ebola

HTLV-1 and 2

Abuse of Drugs (Cocaine, PCP, Amphetamines)

Simplex (HSV) active lesion on the breast

+ **Galactosemia** (Absolute infant contraindication)

#### Pump and Feed (Expressed Milk is SAFE)

- **Active Untreated TB:** Isolate mother from baby, but *pumped milk is safe*. Resume direct feeding after 2 weeks of maternal treatment.
- **Active Varicella:** If developed 5 days before to 2 days after delivery. Isolate, but expressed milk is safe.
- **Active HSV:** If lesions are strictly on the breast, mother can pump or feed from the *unaffected* breast.

**NOT Contraindicated:** Hepatitis B (Give infant HBIG + Vaccine within 12h), Hepatitis C, Smoking, Alcohol (wait 2 hours per drink).

### 4. Infant Formulas

Tailored to specific metabolic or allergic conditions.

- **Soy Formulas:**
  - *Indications:* Classic galactosemia, congenital lactase deficiency, vegan preference.
  - *Contraindications:* **Premies** < 1800g (increases risk of osteopenia/rickets due to phytates blocking Ca/Phos absorption). Infants < 6 months with Cow's Milk Protein Allergy (CMPA) due to high cross-reactivity.
- **Casein Hydrolysate (Extensively Hydrolyzed - eHF):**
  - *Indications:* **First-line treatment for Cow's Milk Protein Allergy (CMPA).**
- **Amino Acid-Based Formulas (Elemental):**
  - *Indications:* Severe CMPA (anaphylaxis, FTT, enteropathy) or failure to improve on eHF.
- **MCT (Medium-Chain Triglyceride) Formulas:**
  - *Indications:* Impaired lymphatic drainage (**Chylothorax**), biliary atresia, short bowel syndrome. MCTs bypass the lymphatics and absorb directly into the portal vein.

## 5. Cow's Milk Protein Allergy (CMPA)

Most common food allergy in young children (2-6%). Presents mostly < 6 months of age.

- **Pathology:** Can be IgE-mediated (urticaria, anaphylaxis) or Non-IgE-mediated (proctocolitis, enteropathy, FPIES).
- **Clinical:** GI symptoms dominate → Diarrhea (often with mucous/blood), vomiting, colic, FTT. Eczema is common.
- **Diagnosis:** Oral Food Challenge (Gold Standard).
- **Prognosis:** Excellent. Resolves in 56% by 1 yr, 87% by 3 yrs, 92% by 5 yrs.

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#### Diagnostic Traps in CMPA:

- Endoscopy/Histology is *neither sensitive nor specific* for CMPA (used to rule out other things).
- **Determination of IgG antibodies to CMP has NO ROLE in diagnosis** and is not recommended. (Don't fall for this in an MCQ).
- If infant is breastfed, DO NOT stop breastfeeding! **Maternal restriction** of dairy/soy is the primary management.

## 6. Complementary Feeding (Weaning)

Introduction of solid foods.

- **Timing:** Start around **6 months** (Never before 4 months due to immature kidneys, immature GI tract, and extrusion reflex).
- **Developmental Cues:** Sits with minimal support, good head control, diminishing tongue-thrust reflex.
- **Key Dietary Rules:**
  - **No Honey** < 1 year: Risk of infant botulism (spores → flaccid paralysis).
  - **No Cow's Milk** < 1 year. (Yogurt and cheese are okay in small amounts).
  - **Avoid Choking Hazards:** Grapes (must be quartered), hot dogs, popcorn, whole nuts.

### Brain Hack / Mnemonic

#### Allergy Prevention Update:

Old dogma said delay allergenic foods. **New Guidelines:** Early introduction of highly allergenic foods (like **eggs and peanuts**) between 4–6 months actually **prevents** the development of food allergies.