Brestfeeding

Hormones involved

- **Oxytocin**: for breast development and Milk ejection
- **Prolactin**: for milk production

- **1-Dopamin** has inhibitory effect on prolactin production so if breast milk isn't produced enough , we give **Metoclopramide – dopamine antagonist** -to increase prolactin production > increase beast milk production

- **2-TRH (released from hypothalamus)** increases the prolactin production so in hypothyrodism , decreased T4 leads to loss of negative feedback of TSH and TRH production , so high TRH leads to increase prolactin production and this may cause galactorrhea\ \ as a clinical manifestation of hypothyroidism)

Duration recommendation

Minimal Duration for **exclusive breast feeding is 6 months**, then Continue to breastfeed after that, in combination with appropriate complementary foods, **until the age of 2 years or beyond**

Contents

Macronutrient

Content	Protein	Carbohydrate	Fat
Calories	4 kcal/gram = 3-4gm/kg/ day 10% of calories at the needs	4 kcal/gram = 40-50% of calories	9 kcal/gram = 40-50% of calories >20 6-12
Content	Whey:Casein (60:40) Whey: soluble and easy to digest	Lactose	LCT and MCT Essential fatty acids
Other contents	IgA Lactoferrin Growth factors		lipase

Micronutrients

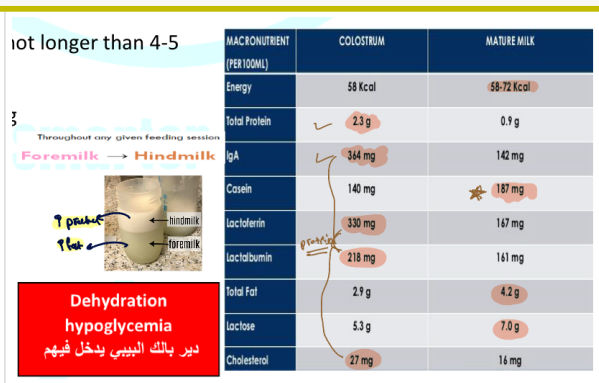
- Water: 90%
- Minerals:
  - Iron
  - Vitamen D
  - Ca : Phosphorus ; human milk 2:1 cow's milk 1:1

Iron : low content in breast milk **but** easily digestable and bioavailability of absorbtion is high \\ so **babies have enough iron from breast milk up to 4 months of age**

Vitamen D low content so **every new born should be supplied by vit D (400 IU\day = 1 drop \day)** since birth

Brest milk composition stages

Feature	Mature Milk	Transitional Milk	Colostrum
Time	> 2 weeks	3 days – 2 weeks	First 2–5 days
Appearance	Thinner, watery	Less thick	Yellow, thick
Protein	Low	Lower	High مع الوقت حيقل
Fat	High	Higher	Low مع الوقت يزيد
Carbohydrates	Present (lactose)	Higher	Low
IgA	Present but lower	Moderate	High
Minerals	High bioavailability (Fe, Zn)	Lower minerals	Low Na
Sodium	Low	—	Low
Special effects	Lactose → ↑ Ca absorption	—	Laxative, helps meconium, ↓ bilirubin



MACRONUTRIENT (PER100ML)	COLOSTRUM	MATURE MILK
Energy	58 Kcal	58-72 Kcal
Total Protein	2.3 g	0.9 g
IgA	364 mg	142 mg
Casein	140 mg	187 mg
Lactoferin	330 mg	167 mg
Lactalbumin	218 mg	161 mg
Total Fat	2.9 g	4.2 g
Lactose	5.3 g	7.0 g
Cholesterol	27 mg	16 mg

Assessment of adequate brestfeeding

Enough or not?

- ? Al **least 8 times/day** for neonates
- ? About **10-15 min per breast** each feed
- ? The infant should take **from each breast each feed**
- ? Feeding **every 2-3 hours, not longer than 4-5 hours**
- ? Feeling of breast emptying
- ? Sleeping after feeding
- ? Passing of **urine *6/ day**
- ? Passing of **stool *4 / day**
- ? **Increasing weight**

Frequency and Volume of Feeds

- ? Feed on demand
- ? Initially small frequent feeds
- ? Volumes increase, frequency decreases

Age	frequency/day	Volume (mL) per feed
Birth – 1 week	6-10	30-90
1 week–1month	7-8	60-120
1- 3 months	5-7	120-180
3-6 months	4-5	180-210
6-9 months	3-4	210-240
9-12 months	3	210-240

Protective effect of brestfeeding

Acute conditions	Chronic conditions
Acute diarrheal illnesses	DM
Otitis media	Celiac
UTI	Crohns disease
Botulism	Allergy
NEC	Obesity
	Lymphoma
	Leukemia

CID of brestfeeding

Do not breastfeed and do not feed expressed breast milk

- Infant has classic galactosemia
- Mother has HIV infection
- Mother is infected with HTLV I or II
- Mother is using illicit drugs
- Mother has suspected or confirmed Ebola virus disease

Temporarily do not breastfeed and do not feed expressed breast milk

- Mother has untreated brucellosis
- Mother is taking certain medications
- Mother has an active HSV infection with lesions on the breast

Temporarily do not breastfeed, but may feed expressed breast milk

- Mother has untreated active tuberculosis
- Mother has active varicella that developed between 5 days prior to delivery and 2 days following delivery

Contraindications

Absolute contraindication

- Galactosemia and congenital lactase deficiency
- Chemotherapy and radiotherapy

Relative contraindication

- HIV mother
- Tuberculosis infection

Temporary:

Active Herpes, or chicken pox

Not contraindicated:
Hepatitis B, C

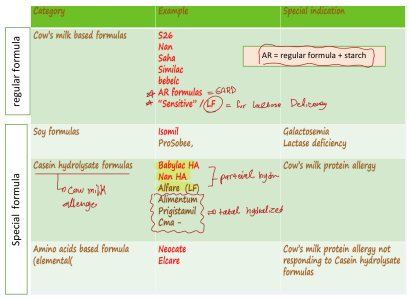
Smoking and alcohol

msa

Infant Formulas

Protein Content

Divided into 4 classes of formulas



Notes Soy formulas are not indicated in:

- ? Premature infants < 1800g (increases risk of osteoporosis and rickets)
- ? CF patients
- ? Infantile colic
- ? Patients with cow milk protein allergy frequently are as sensitive to soy protein and should not be given isolated soy protein-based formula routinely.

Soy Formulas – Nutritional Disadvantages

1. **Lower absorption of minerals and trace elements**
   - Due to **phytate content**.
2. **Presence of isoflavones**
   - Weak **estrogenic action** → may lead to **high serum concentrations** in infants.

When Soy Formula May Be Considered

1. **Infant with CMPA (Cow's Milk Protein Allergy)**
   - If **extensively hydrolyzed (eH) or amino acid (AA) formulas** are **not tolerated or accepted**.
2. **Older than 6 months**
   - When other hydrolyzed formulas are **not accepted or tolerated**.
3. **Cost considerations**
   - If **special formulas are too expensive** for the family.
4. **Parental preference**
   - For example, **vegan diet**.

Carbohydrate content

Main Types of Carbohydrates in Infant Formulas

1. **Lactose**
   - Found in most standard cow's milk formulas.
2. **Sucrose**
   - Found in some special formulas.
3. **Glucose polymers**
   - Often used in formulas for preterm infants or special metabolic needs.

Formulas Containing Sucrose

- **Examples:**
  - **Alimentum** (extensively hydrolyzed formula)
  - **Soy formulas**

Formulas for Galactosemia

- **Recommended: Soy formulas**
  - **Reason:** They **do not contain lactose**, so they prevent **toxic accumulation of galactose-1-phosphate**.

Babies at high risk for developing allergy

First degree relatives with either :

- Food allergy
- Asthma
- OR moderate to severe atopic dermatitis (AD).

Fat content

Main Types of Fats in Formulas

1. **Long Chain Triglycerides (LCTs)**
2. **Medium Chain Triglycerides (MCTs)**

Formulas Containing MCTs

MCT Content	Formula
33%	Alimentum
55%	Pregestimil
38%	Alfare
33%	Elecare
87%	Portagen
High	Enfaport
High	Monogen

When Are MCTs Beneficial?

- In cases of **impaired fat absorption**
- In **lymphatic abnormalities** (e.g., **chylothorax**)

"Other Milks"

? Cow's milk

- ? Has excessive protein, sodium
- ? Deficient in iron
- ? Allergy risk

? Goat's milk

- ? Deficient in B12 and folate
- ? Up to 50% of kids with cow's milk allergy also have goat's milk allergy

Supplemets

***Vitamin D**
***Iron**
***Fluride**

General Infant Feeding & Weaning Guidelines

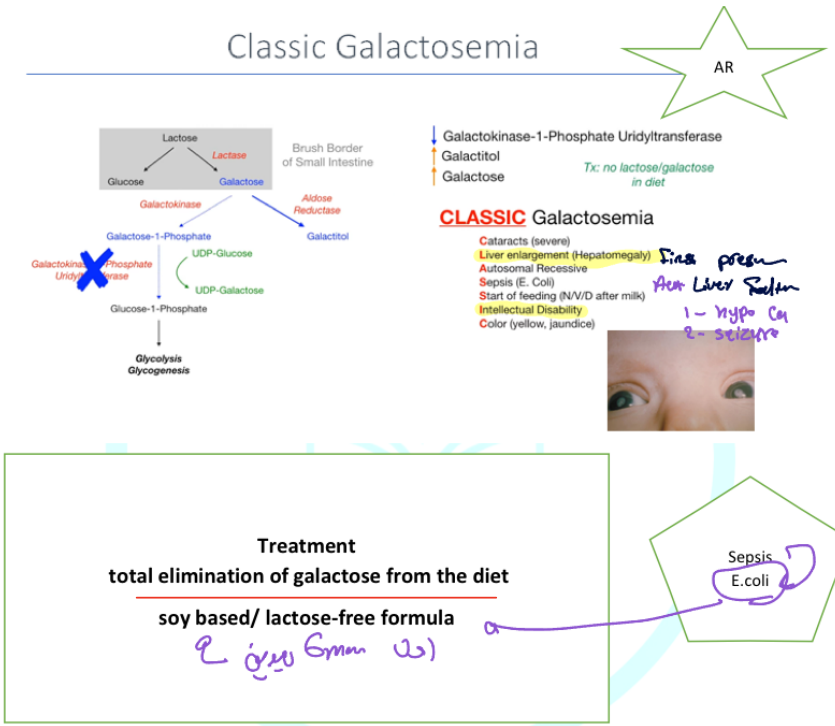
1. Weaning (Introducing Solids):
- Recommended to **start at 6 months**.
- **Not before 4 months** due to immature gut, poor coordination, and because milk meets all nutritional needs.
- By 6 months, the infant's nutrient stores (like Iron and Zinc) decrease, and solid foods aid in development.

2. Feeding Progression:
- 4-6 months:(experience new tastes) Introduce iron-fortified rice cereal.
- 6-7 months: (sits with minimal support) Add fruits and vegetables.
- 8-9 months: (improved pincer grasp) Add protein foods and finger foods.
- 10-12 months: (pulls to stand, reaches for food) Add soft table food, allow self-feeding.

3. Important "Do Nots":
- NO HONEY before 1 year (risk of botulism).
- NO cow's milk as a main drink before 1 year. Small amounts of cheese, cottage cheese, and yogurt are fine.
- ***Never put a child to bed with a bottle (causes tooth decay).***
- Avoid foods with added salt or sugar.
- Avoid choking hazards (grapes, nuts, hot dogs, popcorn, etc.).

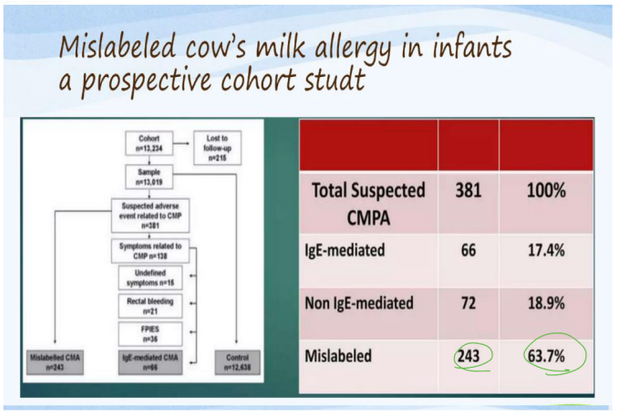
- **By age 1, most children are off the bottle**. If used, it should contain water only.

4. Prevention Tip:
- Early egg administration may help prevent allergy.



Summary of Infant Feeding & Cow's Milk Protein Allergy (CMPA)

Part 1: Understanding Cow's Milk Protein Allergy (CMPA)



1. What is CMPA?

· A food allergy where the immune system reacts to proteins in cow's milk.
· It's the most common food allergy in young children, affecting 2-6% of infants.
· Symptoms are often non-specific and can be confused with GERD or lactose intolerance.

2. Types of CMPA:

· ***IgE-Mediated:*** Rapid-onset symptoms (within 2 hours). Examples: anaphylaxis, urticaria (hives), angioedema.

· ***Non-IgE-Mediated:*** Delayed-onset symptoms (hours or days later). Examples: Food Protein-Induced Enterocolitis Syndrome (FPIES), proctocolitis (rectal bleeding), constipation, reflux.

· ***Mixed:*** Conditions like Atopic Dermatitis (Eczema) and Eosinophilic Gastrointestinal Disorders.

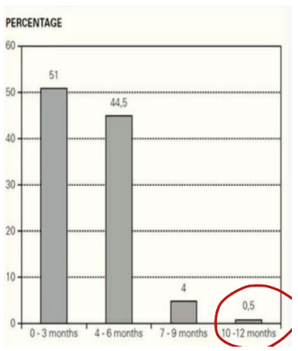
---

3. Epidemiology :

· ***Age***: 95% of infants show their first symptoms before 6 months of age.

·

· ***Prognosis***: It is often outgrown. Resolution rates are:
· 56% by 1 year
· 77% by 2 years
· 87% by 3 years
· 92% by 5-10 years
· 97% by 15 years

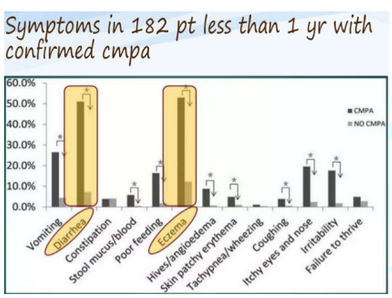


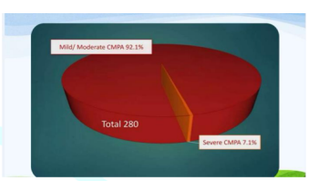
---

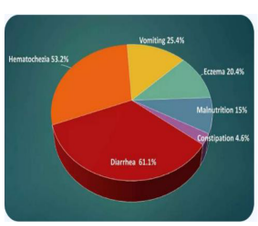
4. Symptoms:

Common Symptoms: The most frequent symptoms in confirmed CMPA cases under 1 year are diarrhea,
Gi sings & symptoms
• Due to inflammation, dysmotility , malabsorption or a combination of all : -

- Vomiting
- Hematochezia
- Dysphagia, vomiting and regurgitation
- Anorexia and food refusal
- Diarrhea with or without malabsorption
- Rectal bleeding
- Failure to thrive

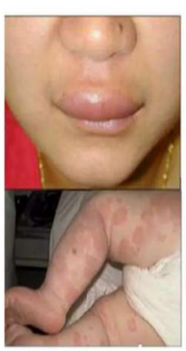


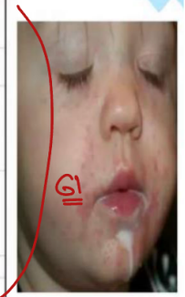




Presentation of cow's milk allergy

IgE mediated	Mixed IgE and non-IgE mediated	Non-IgE mediated
Anaphylaxis	Eosinophilic gastrointestinal disorders	Food protein-induced enterocolitis syndrome
Urticaria and angioedema	Atopic dermatitis	Food protein-induced proctitis/proctocolitis
Immediate oropharyngeal and gastrointestinal reactions		Food protein-induced enteropathy
Food-associated, exercise-induced anaphylaxis		Gastroesophageal reflux
		Colic
		Constipation
		Heiner syndrome (pulmonary hemosiderosis)





Part 2 Diagnosing CMPA

1. **First Step:** A thorough history and physical examination.

2. Gold Standard: Double-Blind, Placebo-Controlled Food Challenge (DBPCFC)
- requiring a longer time to perform,
- needing patient
- parants co-operation
- being expensive

An open food challenge is an alternative.

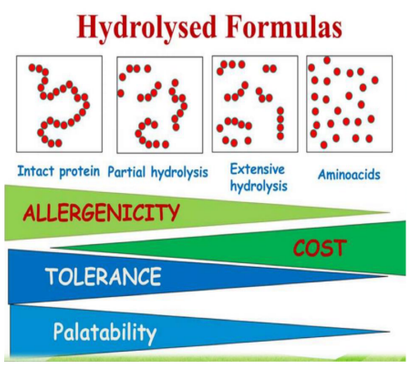
3. Elimination Diet: In most cases, diagnosis involves removing cow's milk protein from the diet (or the mother's diet if breastfeeding) to see if symptoms improve.

4. Tests:
· **Specific IgE Test**: Useful for IgE-mediated allergies. Often negative in gastrointestinal-mediated cases.
· **Warning:** Specific IgG testing against cow's milk protein is not recommended for diagnosis.
· **Endoscopy/Histology:** Not sensitive or specific for CMPA. Used to rule out other causes
- indication In patients with otherwise **unexplained significant and persistent gastrointestinal symptoms**, failure to thrive, or irondeficiency anemia,

Part 3: Managing & Treating CMPA

1. For Breastfed Infants:
· The mother should eliminate cow's milk, egg, fish, peanuts, and tree nuts from her diet.
· If unsuccessful, a hypoallergenic formula (extensively hydrolyzed or if allergic symptoms persist, a free amino acid-based formula) is used as an alternative to breastfeeding.

2. For Formula-Fed Infants:
· Allergenicity decreases as the protein chain gets shorter.



· **Mild-Moderate Allergy**: Start with an **Extensively Hydrolyzed Formula (eHF).** 90% of infants do well on this.

· **Severe Allergy / Non-Responders to eHF**: Use an **Amino Acid Formula (AAF)**, especially for infants with
- failure to thrive,
- severe enteropathy,
- multiple food allergie,
- Macronutrient deficiencies
- Any life-threatening symptoms

· **IgE-Mediated Allergy Only:** A **soy formula** can be considered,
- • It can be used first-line, or after 6 months if the infant was on a hypoallergenic formula.
- • These infants have lower risk of combined cow's-milk and soy allergy than those with non-IgE syndromes (enterocolitis, proctocolitis, malabsorption, esophagitis).
- • Improvement expected in 2–4 weeks.
- • Continue soy formula until 1 year of age or older