

Nutrition in Infancy

During the first 2 years of life: ...

Most infants who are genetically determined to be larger reach their **growth channel**, a curve of weight and length or height gain throughout the period of growth, at between 3 and 6 months of age. many infants born at or below the tenth percentile for length may not reach their genetically appropriate growth channel until 1 year of age; this is called **catch-up growth**. Infants who are larger at birth and who are genetically determined to be smaller grow at their fetal rate for several months and often do not reach their growth channel until 13 months of age. This phenomenon during the first year of life is called **lag-down growth**. Growth in infancy is monitored with the routine collection and monitoring of anthropometric data, including weight, length, head circumference, and weight-for length for age

PHYSIOLOGIC DEVELOPMENT

Infants may lose approximately 7% of their body weight (10-15% in preterm) ...

infants usually double their birth weight by 4 to 6 months of age and triple it by the age of 1 year.

Infants increase their length by 50% during the first year of life and double it by 4 years.

body fat :

body water:



Fat absorption varies in the neonate

fecal excretions of 20% to 48%

infant's lingual and gastric lipases, bile salt-stimulated lipase

enzymes responsible for the digestion of Disaccharides:

Pancreatic amylase, salivary amylase



شير گاو	شيرمادر	تركيبات
۲۰ کیلوکالری/اونس	۲۰ کیلوکالری/اونس	انرژی
۲.۲۰	°∕. ∀ −۶	پروتئين
۲.۲۰	`/ . &+	وى
.∀.	°∕. ۴ ∙	كازئين
	بيشتر	تورين و سيستين
·/.۳۰	% f Y	لاكتوز
7.0+	(جذب بیشتر)۵۰٪	چربی
7.1	۲ .۴	لينولئيک
mg/dl ነ۵−ነ۰	mg/dl ۲۰–۱۰	كلسترول
ب کافی، ث کم	بسته به دریافت مادر	ویتامین محلول در آب
کافی	کافی	ويتامين آ
	بيشتر	ويتامين E

شیر گاو	شيرمادر	ترکیبات
mg/l ۰/۳	mg/l ۰/۳	آهن
<7.1	۰ <i>.</i> ۵+	جذب آهن
	زیست دسترسی بیشتر	روى
۳ برابر		كلسيم
۶برابر		فسفر
۲ برابر		فلورايد
۳ برابر		سديم
۳ برابر		پتاسيم
بيشتر		بار محلول کلیوی و N دفعی
mosm/kg ۴۰۰	mosm/kg ۳۰۰	اسمولاليته

NUTRIENT REQUIREMENTS

- Energy:
- $(89 \times kg) 100 + (175 \text{ or } 56 \text{ or } 22 \text{ or } 20)$
- (0-3, 4-6, 7-12, 13-36 months)

• 108 (0-6 m) or 98 (7-12 m)× kg



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- Protein:
- 9.1 − 11 − 13 gr/d
- 1.52 1.2 1.1 gr/kg
- human milk is adequate for the first 6 months.
- Histidine
- tyrosine, cystine, and taurine

Lipids:

minimum of 30 g of fat per day.

skim-milk \times

Linoleic acid: 3% of energy intake or 4.4 – 4.6 – 7 gr/d (5% of human milk, 10% of infant formulas)

alpha-linolenic acid: 0.5 – 0.7 gr/d

The concentration of DHA in human milk varies.

Carbohydrates:

30% to 60% of the energy.

- 40% in human milk, 40%- 50% in formulas.
- Honey , corn syrup ×

Water:

- 0.7- 0.8 l/d
- 140-150 ml/kg
- **3-10 kg** » 100 ml/kg
- 11-20 kg » 50 ml/kg (?) + 1000
- >20 kg » 20 ml/kg(?) + 1500

Deficit, intoxication?

Calcium:

- retain 2/3 of their calcium intake.
- AI: 200- 260- 700 mg/d

• Fluoride:

- AI: 0.01- 0.5- 0.7 mg/d
- UL: 0.7- 0.9
- 0.7 ppm (0.7 mg/L) in water optimal for safety and caries prevention.
- Fluorosis: "purified," "demineralized," "deionized," "distilled," or "produced through reverse-osmosis," may decrease this risk.
- supplementation: 25mg/d (if > 0.3 mg of fluoride/L)

Iron:

Adequate up to doubling of birth weight. supplementation : 1 mg/kg/day .

- one serving of vitamin C-rich foods per day.
- Cow's milk, Formula?
- ID or IDA: 6 and 24 months
- IDA: poor cognition, developmental deficits, and behavioral performance.

Zinc:

AI; 2- 3- 3 mg/d

is better absorbed from human milk.

- Human milk and infant formulas provide adequate zinc (0.3 to 0.5 mg/100 kcal) for the first year of life.
- zinc deficient can exhibit growth retardation

Vitamin B12:

strict vegan diet?

 Symptoms of vitamin B12 deficiency include lethargy, hypotonia, developmental regression, vomiting, and diarrhea

Vitamin D:

- lactating mothers who were supplemented with anywhere from 2000 IU to 6400 IU of vitamin D per day achieved sufficient vitamin D status in their exclusively breast-fed infants without directly supplementing the infant.
- RDA for vitamin D for lactating mothers is 600 IU per day, and the tolerable upper limit is 4000 IU per day.

 All breast-fed infants need a vitamin D supplement of 400 IU per day. Formula-fed infants who consume less than 1000 ml of formula per day also need supplementation.

 up to 800 IU of vitamin D per day may be needed for infants at higher risk Excessive vitamin D can cause nausea and vomiting, loss of appetite, excessive thirst, frequent urination, constipation, abdominal pain, muscle weakness, muscle and joint aches, confusion, fatigue, or damage to kidneys

- Vitamin K:
- human milk :2.5 mcg/l, formula: 4 mcg per 100 kcal (20 times).
- AI; 2- 2.5- 30 ug/d
- This can be supplied by mature breast milk.
- Injection shortly after birth.

• Antiinfective Factors of human milk:

- Secretory immunoglobulin A (slgA)
- Lactoferrin
- Lysozymes
- peroxides and ascorbic acid
- bacterium *Lactobacillus bifidus*
- prebiotics in the form of oligosaccharides

• Soy-based formulas?

electrolytically reduced iron?

Do not add salt or sugar

Early childhood caries (ECC)