

Breast Milk

Composition of Breast Milk

Knowledge of the biological composition and constituents of breast milk are critical to the dietitian, because they form the rationale for effective practice in both clinical and non-clinical settings (Riordan & Auerbach, 1999).

Understanding of the nutritional and immunological characteristics of breast milk will allow the dietitians to make informed decisions about the growth and development of infants.

Breast milk contains over 200 nutritional, as well as functional, components. The fundamental composition of breast milk includes, protein, salt, and sugar, which are all contained in a fat suspension. In addition to those nutrients breast milk also provides the infant with immune factors, growth and hormone factors, and enzymes. In all women the basic components are the same, however, during each stage of lactation the level of milk constituents change from the beginning of the feeding to the end, day to day, and diurnally (every 24 hours) (Kretchmer & Zimmermann, 1997).

Two to three weeks postpartum changes in breast milk composition occur. The alveolar cells evolve resulting into a mature milk secretion. The mammary secretion changes from a milk solution high in electrolytes and protein, and low in lactose and fat, to a mature milk solution that is lower in electrolytes and protein, and high in fat and lactose (Kretchmer & Zimmermann, 1997).

Colostrum

Colostrum is the fluid secreted the first three to seven days postpartum. Compared to mature milk, colostrum is slightly yellow, more viscous, and thicker (as indicated in the picture below). The noticeable yellow coloring of this fluid is due to the high amount of carotenoids, which is higher than in mature milk. Colostrum is lower in calories, contains less sugar than mature milk. However, colostrum does contain more protein, electrolytes, and ash. Immunoglobulin A (IgA) is the principal protein found in colostrum. IgA helps protect the infant from gastrointestinal tract infections (Kretchmer & Zimmermann, 1997).



Transitional Milk

One week postpartum colostrum changes into transitional milk. Transitional milk is between colostrum and mature milk, it is composed of more protein and less fat and less lactose than mature milk. Fully mature milk is produced at about three weeks postpartum, but this rate may vary from mother to mother. For instance, a mother who has breastfed previously is more likely to produce mature milk sooner, than a mother who is breastfeeding for the first time (Kretchmer & Zimmermann, 1997).

Composition of Mature Breast Milk

The following table presents a comparison of colostrum (1-5 days postpartum) and mature milk (more than 30 days postpartum) in terms of the amount of various components present in 100 ml of breast milk. In addition to the components presented below, breast milk also includes a variety of amino acids, fatty acids, other minerals and trace minerals, and nitrogen (Kretchmer & Zimmermann, 1997).

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
Lactoferrin	330 mg	167 mg
α -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
(Kretchmer & Zimmermann,1997)		

Micronutrient (per 100mL)	Colostrum	Mature Milk
<i>Vitamins</i>		
Vit. A	189 µg	60 µg
β-carotene	112 µg	23 µg
Vit. E	1280 µg	315 µg
Vit. D	0 µg	0.05 µg
Vit. K	0.23 µg	0.21 µg
Ascorbic Acid	4.4 mg	4.0 mg
Thiamin	1.5 µg	14 µg
Riboflavin	25 µg	35 µg
Niacin	75 µg	150 µg
Folic Acid	0 µg	8.5 µg
Vit. B-6	12 µg	18 µg
Biotin	0.1 µg	0.6 µg
Pantothenic Acid	183 µg	240 µg
Vit. B-12	200 ng	45 ng
<i>Minerals</i>		
Ca	23 mg	28 mg
P	14 mg	15 mg
Na	48 mg	18 mg
Mg	3.4 mg	3.0 mg
K	74 mg	58 mg
<i>Trace Minerals</i>		
Fe	45 µg	40 µg
I	12 µg	11 µg
Se	0 µg	2.0 µg
Zn	540 µg	120 µg
(Kretchmer & Zimmermann, 1997)		

Re: Lauric acid composition of mother's milk

From: research@lauric.org

Category: Category 1

Date: 11/10/99

Time: 3:35:40 PM

Comments

The level of lauric acid in human milk can range from 3 to 21% depending on the diet of the mother.

Regarding soy milk, there is no lauric acid in the fat in whole soy, which is what is used to produce soy milk. Additionally, as some soy infant formulas do not contain a source of lauric acid (i.e., coconut oil), it is best to read the list of ingredients to determine the fat source.

COMPARISON OF HUMAN MILK AND FORMULA

NUTRIENT FACTOR	BREAST MILK CONTAINS	FORMULA CONTAINS	COMMENT
Fats	<ul style="list-style-type: none">• Rich in brain-building omega 3s, namely DHA and AA• Automatically adjusts to infant's needs; levels decline as baby gets older• Rich in cholesterol• Nearly completely absorbed• Contains fat-digesting enzyme, lipase	<ul style="list-style-type: none">• No DHA• Doesn't adjust to infant's needs• No cholesterol• Not completely absorbed• No lipase	Fat is the most important nutrient in breastmilk; the absence of cholesterol and DHA, vital nutrients for growing brains and bodies, may predispose a child to adult heart and central nervous system diseases. Leftover, unabsorbed fat accounts for unpleasant smelling stools in formula-fed babies.
Protein	<ul style="list-style-type: none">• Soft, easily-digestible whey• More completely absorbed; higher in the milk of mothers who deliver preterm• Lactoferrin for intestinal health• Lysozyme, an	<ul style="list-style-type: none">• Harder-to-digest casein curds• Not completely absorbed, more waste, harder on kidneys• No lactoferrin, or only a trace• No lysozyme	Infants aren't allergic to human milk protein.

	<ul style="list-style-type: none"> antimicrobial Rich in brain-and-body- building protein components Rich in growth factors Contains sleep-inducing proteins 	<ul style="list-style-type: none"> Deficient or low in some brain-and-body-building proteins Deficient in growth factors Does not contain as many sleep-inducing proteins. 	
Carbohydrates	<ul style="list-style-type: none"> Rich in lactose Rich in oligosaccharides, which promote intestinal health 	<ul style="list-style-type: none"> No lactose in some formulas Deficient in oligosaccharides 	Lactose is considered an important carbohydrate for brain development. Studies show the level of lactose in the milk of a species correlates with the size of the brain of that species.
Immune Boosters	<ul style="list-style-type: none"> Rich in living white blood cells, millions per feeding Rich in immunoglobulins 	<ul style="list-style-type: none"> No live white blood cells-or any other cells. Dead food has less immunological benefit. Few immunoglobulins and most are the wrong kind 	When mother is exposed to a germ, she makes antibodies to that germ and gives these antibodies to her infant via her milk.
Vitamins and Minerals	<ul style="list-style-type: none"> Better absorbed, especially iron, zinc, and calcium Iron is 50 to 75 percent absorbed. Contains more selenium (an antioxidant) 	<ul style="list-style-type: none"> Not absorbed as well Iron is 5 to 10 percent absorbed Contains less selenium (an antioxidant) 	Vitamins and minerals in breast milk enjoy a higher bioavailability-that is, a greater percentage is absorbed. To compensate, more is added to formula, which makes it harder to digest.
Enzymes and Hormones	<ul style="list-style-type: none"> Rich in digestive enzymes, such as lipase and amylase Rich in many hormones: thyroid, prolactin, oxytocin, and more than fifteen others Varies with mother's diet 	<ul style="list-style-type: none"> Processing kills digestive enzymes Processing kills hormones, which are not human to begin with Always tastes the same 	Digestive enzymes promote intestinal health. Hormones contribute to the overall biochemical balance and well- being of baby. By taking on the flavor of mother's diet, breastmilk shapes the tastes of the child to family foods.



Paediatric Nutritional Products

SIMILAC ADVANCE / SIMILAC ADVANCE WITH IRON

Milk-Based term formula for infants up to 12 months of age.



Similac Advance contains the Advance System, an innovative blend of fat, protein and [nucleotides](#) to modulate the development of an infant's immune system. A unique fat blend delivers excellent calcium and fat absorption. Appropriate levels of linoleic and linolenic acid ratio for better visual, mental and psychomotor development. Fortified with taurine and iron for optimal brain and retinal development.

Composition: Lactose, nonfat cow's milk, high oleic acid safflower oil, coconut oil, soy oil, vitamins and minerals.

Similac Advance: 4.6 mg iron/liter;
Similac Advance with iron: 12 mg/liter

Pack size : 400gm and 900gm



SIMILAC ADVANCE EYEQ/ SIMILAC ADVANCE EYEQ WITH IRON

Similac Advance EyeQ / Similac Advance EyeQ with Iron is an infant formula for infants from birth to 12 months old.

It is formulated with a combination of essential nutrients that are important for infants.

Features & Benefits

Similac Advance EyeQ / Similac Advance EyeQ with Iron support overall development as closer to breastfed babies. It provides

- a) EyeQ System to promote optimal cognitive, visual and psychomotor development
 - i) Unique Oil Blend (High oleic safflower oil, coconut oil and soy oil)
 - Provides optimal level of omega 3 (DHA & linolenic acids) and Omega-6 (AA & linoleic acids) - Provides 98% fat absorption
 - ii) Patented antioxidant system (beta-carotene, vitamin E and ascorbyl palmitate)
 - Preserve brain cells membrane from getting damages by free radicals to conduct synaptic communication efficiently
 - iii) High biologic value protein
 - Supports normal growth and development of new brain cells

- b) Advance System to promote optimal growth and development
 - i) Unique Oil Blend (High oleic safflower oil, coconut oil and soy oil)
 - Provide greater calcium absorption for strong bone and teeth development
 - ii) Nucleotides
 - Found in all cells including immune cells which can strengthen the immune response
 - iii) High biologic value protein - Provide similar plasma amino acids as breast milk
 - Supports normal growth and development

Indication of Usage

Similac Advance EyeQ contains 4.6mg / liter iron. Similac Advance EyeQ with Iron contains 12.0mg/l iron. Both infant formulas are recommended to infants from birth to 12 months old.

Pack Size : 400 gm, 900gm



SIMILAC SPECIAL NEO

Similac Special Neo is a post-discharge enriched formula designed for premature and low birth weight babies.

It is also a formula for babies who need catch-up growth due to poor weight gain. It is recommended from birth to 12 months old. Intensive nutritional management is given during hospital stay. Looking at the economic reason, the premature babies are discharged earlier. Therefore, they are still growth retarded and leaving the hospital with preexisting nutritional problem. The post-discharged nutrition is crucial not only for short term but long term development. However, nutrition after leaving hospital always has been neglected. Premature babies need special nutritional care after discharge to support optimal growth. Studies had shown premature babies fed on post-discharge formula were significantly heavier, longer and have greater head circumference. Therefore, there is a role for post-discharge enriched formula to promote catch-up growth in premature babies.

Features & Benefits

Similac Special Neo is a post-discharge enriched formula. As compared to standard term formula, Similac Special Neo provides

- 22 calories per fl oz - Meet the higher energy requirement
- Higher calcium and phosphorus - Meet the need of rapid skeletal growth and bone mineralization
- A mixture of 25% medium chain triglycerides (MCT) and vegetable oils - Well absorbed and thus the energy available to the babies
- Higher protein - Maintain steady growth
- Nucleotides - Found in all body cells including immune cells that produce antibodies
- Omega 3 and Omega 6 (Linoleic and Linoleic acids) - Essential fatty acids which cannot be produced in the body. They are the precursors of DHA and AA

Indication of Usage

Infants who are premature or low birth weight and failure to thrive.

Pack Size : 370gm

ISOMIL

A soy based infant formula from birth to 12 months old

Features & Benefits

Isomil provides

a) Soy protein isolate

- Excellent source of protein that provides all essential amino acids which can't be produced by our body
- Provides optimal level of amino acids for tissue building especially when diarrhea happens

b) Dual carbohydrate system (Corn syrup and Sucrose)

- Enhances carbohydrate absorption to spare protein for tissue repairing and building
- Decrease possibility of having diarrhea again

c) Unique Oil Blend

(High oleic safflower oil, coconut oil and soy oil)

- Provide greater fat and calcium absorption

d) Omega 3 and Omega 6 fatty acids



(Linolenic and linoleic acids)

e) Promote optimal cognitive, visual and psychomotor development

- Vitamins and Minerals - Support normal growth and development

Indication of Usage

Infants from 0 to 12 months old with cow's milk protein allergy and lactose intolerance. Soy formula is also suitable for vegetarian and whoever believes soy is good.

Pack Size : 400gm, 900gm



ISOMIL PLUS

A soy based growing-up formula for children from 1 year and above

Features & Benefits

Isomil Plus provides

a) Soy protein isolate

- Excellent source of protein that provides all essential amino acids which can't be produced by our body
- Provides optimal level of amino acids for tissue building especially when diarrhea happens

b) Dual carbohydrate system (Corn syrup and Sucrose)

- Enhances carbohydrate absorption to spare protein for tissue repairing and building
- Decrease possibility of having diarrhea again

c) Unique Oil Blend

(High oleic safflower oil, coconut oil and soy oil)

- Provide greater fat and calcium absorption

d) Omega 3 and Omega 6 fatty acids

(Linolenic and linoleic acids)

- Promote optimal cognitive, visual and psychomotor development

e) Vitamins and Minerals

Support normal growth and development

Indication of Usage

Children from one year and above with cow's milk protein allergy and lactose intolerance. It is also suitable for vegetarian and whoever believes soy is good.

Pack Size : 400gm, 900gm



SIMILAC LF

Similac LF is a lactose free, milk based formula designed for use by babies with lactose intolerance and symptoms attributed by lactose intolerance, for example diarrhea, flatulence and colic. Similac LF can be used as a replacement for infant formula when infants have lactose intolerance.

Features & Benefits

Similac LF provides

a) Dual carbohydrate system (corn syrup and sucrose)

Enhance carbohydrate absorption to spare protein for tissue building and repairing

b) Adequate level of protein

Provides essential amino acids to build and repair body tissues especially when diarrhea occurs

c) Omega 3 and Omega 6 (Linolenic and lenoleic acids)

Essential fatty acids which cannot be produced by our body. They are the precursors of DHA and AA

d) Unique oil blend (High oleic safflower oil, coconut oil and soy oil)

Allows optimal calcium absorption for strong bones and teeth development

Indication of Usage

Infant from 0 to 12 months old who is lactose intolerance.

Pack Size : 397 gm