

# Pregnancy Nutrition



## THE 3 GOALS

During pregnancy, the foods you feed your child through your own diet should serve three main goals:

1. Feed the Brain
2. Feed the Gut
3. Feed the Genes

Let's look at each of these in more detail

### *The First 1000 Days*

The First Thousand Days refers to the period of life from conception through the baby's second year. This period is recognized as the most important for setting the stage for a child's lifelong health.

Especially during pregnancy, good nutrition is vital to support proper growth and development of the baby during their first thousand days.



## 1. *Feed The Brain*

Pregnancy and the first thousand days represents the most rapid period of brain growth in a child's life. By age 3, the brain is 85% of its adult size! The right nutrients need to be supplied to your child to ensure development of a healthy brain.

Iron, zinc, folate, choline, protein, omega-3 fats, vitamin B12, iodine and vitamin D are especially important to that rapidly growing brain. Several of these nutrients are commonly low in pregnant women, and these deficiencies can potentially lead to problems. A good prenatal vitamin, starting even prior to pregnancy is beneficial. However, prenatals cannot supply all the essential nutrients needed by the baby and mothers should pay attention to their diet to make sure it contains nutrient dense foods that feed the baby's brain! Calcium, magnesium, choline, omega-3 fats, and protein are not typically supplied in adequate amounts in any prenatal. Refer to the handout at the end of this newsletter for a list of where to find these brain building nutrients.

## 2. Feed The Gut

The first thousand days is also the time during which your child's intestinal (gut) microbiome develops. The gut microbiome refers to the trillions of bacteria that live in our intestines and act like one of our organs—helping with our digestion and metabolism, our immune system, even our brain development! Research over the past 10 years is highlighting how important the gut microbiome is to our health. Imbalances in the gut microbiome are now associated with a host of diseases, ranging from Autism and ADHD to autoimmune disease, obesity, and type 2 diabetes. The microbiome is passed on from mother to child during the birthing process and breastfeeding. A well-nourished mother will pass on a healthy microbiome to her child, which is then nurtured with prebiotics found in breastmilk and fiber rich whole foods. Pregnant moms should emphasize vegetables, whole fruit and whole grains to support their microbiome, avoiding excessive sugar and highly processed foods which can damage the microbiome. Probiotic foods such as yogurt, kefir and sauerkraut are also great ways to support a healthy maternal microbiome.

## 3. Feed The Genes

Pregnancy and the first thousand days is the most sensitive period for influencing your child's gene expression. While we cannot change the DNA (genes) we are born with, we can effect whether those genes are expressed (turned on) or silenced (turned off). This process is called **Epigenetics**. Nutrition during pregnancy is a huge epigenetic influence. A diet with excessive calories, sugar, and highly processed junk food will program the baby for future development of obesity and type 2 diabetes. Interestingly, a pregnancy diet without enough calories or protein also programs the child for development of these diseases. Gestational diabetes (GDM) is on the rise, and children born to moms with GDM are at increased risk of obesity and type 2 diabetes later in life. Do your best to minimize sugar/fructose intake by avoiding soda, sweetened drinks, candy and highly processed snacks and foods. Choose 100% whole grains. Make vegetables and fruits a priority. Get adequate high quality protein. Try to avoid many of the food additives that come with highly processed foods. Not only will these choices reduce your risk of GDM and the negative epigenetic programming in your child, they will also help your child to accept healthy foods as a toddler by setting their taste preferences while still in the womb!



### Reminder

Pregnancy is a time of high nutrient demand on the mother. Nutrient dense foods are those that contain high concentrations of multiple pregnancy nutrients. Meat, poultry, fish, eggs and dairy are concentrated sources of various essential nutrients necessary for the baby's brain and growth. Examples include: iron, zinc, calcium, choline, protein, B12, iodine, omega-3 fats.

While plant-based foods like vegetables, nuts and legumes do contain these nutrients (with the exception of B12 and omega-3 DHA), they are in lower concentrations or in forms that are less well absorbed by the body. This needs to be taken into account by mothers following a plant-based diet. In order to deliver the proper amounts of crucial nutrients to their child and avoid deficiency, significant care must be taken and supplementation of at risk nutrients is recommended for vegetarian/vegan mothers.



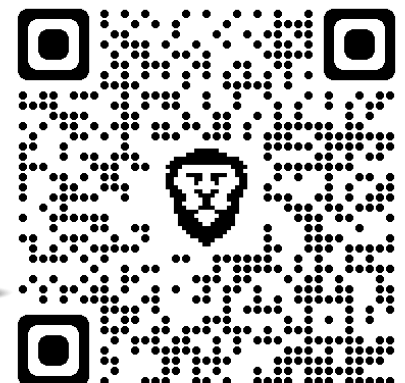
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# Pregnancy Nutrition

Nutrient	Facts	Examples	How Much	What does it do
<b>Choline</b>	Majority of moms (90%) are not getting enough choline for optimal brain support	Eggs (1 egg- 150mg) Liver (3oz- 400mg) Meat (6 oz- 220 mg) Salmon (4 oz- 120 mg) Tofu (6oz- 150mg)	RDA = 450 mg  Up to 900 mg daily may have benefits	Works with folate Prevents birth defects Important for brain growth
<b>Iron</b>	-40% of moms iron deficient <b>even if not anemic</b> -Blood test is a <b>ferritin level</b> -Pregnancy RDA hard to meet, may need extra iron. *Plant-based iron not well absorbed, ↑ requirements	Beef (6oz- 6mg) Liverwurst (3 slice-9mg) Poultry(dark) (4oz-2mg) Black Beans*(1 C-5 mg) Spinach* (1 C- 4mg)	RDA = 27 mg  <b>Ferritin level &lt; 15 indicates deficiency.</b> <b>Target ferritin = 30-45</b>  High or Low ferritin discuss w OB/midwife	Important for brain growth Immune system function Blood cell formation
<b>Zinc</b>	-80% moms not getting enough zinc worldwide *Plant sources are not as well absorbed as meat sources	Oysters (1oz- 25 mg) Red meat (6oz- 15mg) Poultry(dark)(4oz-3mg) Pumpkin Seeds*(1oz-2mg)	RDA = 11 mg	Immune system function Growth and development Digestive and other enzymes
<b>Folate</b>	-Deficiency more common prior to food fortification with folic acid. -Moms with certain MTHFR genes metabolize folate differently. May need more folate/L-methylfolate	Spinach (1 C- 260mcg) Lentils (1C- 360mcg) Broccoli (1 C-100 mcg) Liver (3oz- 215mcg)  All prenatal vitamins should have 400-600 mcg	RDA = 600 mcg	Prevents spina bifida and other birth defects Growth and development DNA repair and expression Blood cell formation
<b>Omega-3 (EPA/DHA)</b>	-Majority of moms are not getting enough DHA for optimal brain support *Plant source omega-3 (ALA) is not the form used by the baby. Conversion is inefficient	Salmon (3oz- 1200mg) cod liver oil(1tsp-1100mg) Sardines (3oz-1000mg) DHA eggs (variable) Algae source DHA *Flaxseed oil- No DHA	No RDA yet.  500 mg EPA/DHA recommended daily (min. 200mg DHA)	Brain and eye development Anti-inflammatory
<b>Protein</b>	-Recent studies revised needs during pregnancy. *Plant proteins are lower quality and need to be balanced. Requirements may ↑ on plant-based diet. Consider protein supplement	Meat/Poultry (6oz-50gm) Fish (3oz-20gm) Greek yogurt (1C- 20gm) Eggs (3eggs- 21 gm) *Combine beans/grains (1 C beans-20gm) (1C quinoa- 8gm)	1.2-1.5 gm/kg/day  For a 70kg mother, daily protein needs are <b>85-100 grams</b>	Growth and development Brain growth
<b>Calcium</b>	-Absorption decreased with use of reflux medications (as are iron and zinc) -High dairy intake or calcium supplements can block iron so take separately from iron.	Greek yogurt (1 C- 450mg) Cooked greens (1C- 200mg) Fortified milk alternatives (1C- 300mg) Tofu (1/2 C- 430mg)	RDA = 1000 mg	Skeletal growth Help prevent preeclampsia Help prevent hypertension Help prevent prematurity
<b>Magnesium</b>	-Most Americans not getting sufficient magnesium. -May be decreasing in the food supply from over-farming and over-processing.	Nuts/Seeds (1oz- 150mg) Beans (1C- 120mg) Quinoa (1 C- 120 mg) Brown Rice (1C- 90mg)	RDA = 400 mg	Used in 300+ enzymes Helps prevent hypertension May ↓ gestational diabetes May ↓ premature birth Brain protective/calming
<b>Vitamin D</b>	-Made in the body when exposed to adequate sunlight. -Deficiency common (70%) especially in northern latitudes + mothers of color. <u>Blood test is 25-OH vitamin D.</u>	Milk (8oz-100 IU) Salmon (3oz- 450 IU) Fortified cereal(1C- 50 IU)	RDA = 600 IU (15ug)  Endocrine society recommends testing <b>Target 25-OH-Vit D level of 30-60 ng/ml</b>	Calcium absorption Immune development and regulation Neurodevelopment

# Feeding Our Children

# Infant Formula Guide



## THE 3 GOALS

Aside from supporting overall growth of the baby, breastmilk and formula feeding serve three main goals:

1. Feed the Brain
2. Feed the Gut
3. Feed the Genes

Let's look at each of these in more detail

## *The First 1000 Days*

The First Thousand Days refers to the period of life from conception through the baby's second year. This period is recognized as the most important for setting the stage for a child's lifelong health.

During the First Thousand Days, good nutrition is vital to support proper growth and development of the baby. Breastmilk is the perfect food for infants and is the benchmark that all infant formulas strive to replicate. If you cannot breastfeed, or need to supplement your breastmilk, choose a formula that tries to closely mimic mother's milk and best supports your child in their First Thousand Days.

## *1. Feed The Brain*

The first thousand days represents the most rapid period of brain growth in a child's life. By age three, the brain is 85% of its adult size! The right nutrients need to be supplied to your child to ensure development of a healthy brain. The milk of a well-nourished mother is perfectly designed to support optimal brain growth in the baby. Do your best to choose a formula that has all the brain building properties of mother's milk.

Easy-to-digest whey protein supports body and brain growth, and constitutes the main protein in breast milk. Early breast milk is 80% whey and only 20% casein, the opposite of cow's milk! A good formula should have more whey than casein. Healthy fats like omega-3 DHA, medium chain triglycerides (MCT) and a mix of saturated and unsaturated fats supply the rapidly growing brain. Amounts of DHA in formula can vary, so choose a formula with the higher amounts recommended by nutrition experts. DHA needs to be balanced with omega-6 ARA in the formula. The B-vitamin choline and the amino acid taurine support brain growth in several ways and should optimally be contained in formula in roughly the amounts they are in mother's milk.



## 2. Feed The Gut

The first thousand days is the time during which your child's intestinal (gut) microbiome develops. The gut microbiome refers to the trillions of bacteria that live in our intestines and act like one of our organs- helping with our digestion and metabolism, our immune system, even our brain development! Imbalances in the gut microbiome are now associated with a host of diseases, ranging from Autism and ADHD to autoimmune disease, obesity, and type 2 diabetes. The microbiome is historically passed on from mother to child during the birthing process and breastfeeding. Breastmilk contains multiple species of healthy probiotic bacteria as well as prebiotics to support the infant gut microbiome.

If your child was born by C-section and you are formula feeding, discuss with your pediatrician whether to add an infant probiotic to your formula. A good quality infant probiotic should supply multiple Lactobacillus and Bifidobacteria species that may have health benefits to the baby and support development of a healthy microbiome.

Given that the third largest component of breastmilk is actually food for the probiotic bacteria (prebiotics), it makes sense to choose a formula that also supplies prebiotics such as HMO and other oligosaccharides. Without prebiotics, the healthy bacteria will have a harder time growing in the infant intestine, potentially leading to problems down the line.

## 3. Feed The Genes

Infancy is also a time when the child is especially sensitive to negative programming that can turn on harmful genes that code for later disease development (epigenetics). By choosing a formula with better ingredients, parents can avoid some of the items that could program the baby for future development of obesity, fatty liver, and type 2 diabetes.

Breastmilk does not contain sucrose (table sugar) or any appreciable amounts of fructose. This would suggest that these ingredients would be better avoided in your baby's formula. European formulas are not allowed to contain sucrose or fructose, but unfortunately you can still find sugar in some American formulas. Lactose is the preferred carbohydrate for babies and should be contained in the formula. Lactose feeds the microbiome. Since a healthy microbiome may act to protect the child and help prevent some of the negative programming for future disease, a formula with lactose and prebiotics to support microbiome growth is important.



### Reminder

Premature infants have special nutritional needs and may require more iron, zinc, calcium, phosphorus, choline and DHA. If you have a baby that was born early, work with a pediatric dietician who understands these needs and can recommend the proper formula.

Some babies do not tolerate cow's milk based formula, and may have increased spitting up, rashes, colic, or major constipation. This is typically not lactose intolerance, it is often a reaction to the protein in cow's milk (typically casein). Work with their provider on choosing a less allergenic formula, potentially one that is whey-based and/or hydrolyzed (broken down). Soy formula has a high crossover allergy with cow's milk and may not be the best choice for a sensitive baby.

Review the formula breakdown in this handout for more information on individual formulas. I have made every effort to post accurate updated ingredients and nutrient content, but some errors may exist. Check with the manufacturer for fully updated formula information. This is not a complete list of available formulas and information on European formulas is not provided.



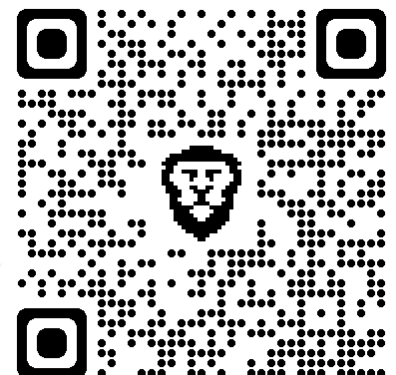
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## *Infant Formula Checklist*

Everyone can agree that the job of infant formula is to nourish the baby and provide nutrition that is as close to mother's milk as possible. What are things to look for in a formula that might make it a better choice? As you go about choosing a formula, consider the following questions.

- What is the protein source? Remember that early breastmilk is 80% whey/20% casein. After 4-6 months, breastmilk is 60% whey/40% casein. A formula striving to mimic breastmilk should mirror this ratio and have more whey than casein.
- Is my baby showing signs of formula intolerance? Significant reflux, projectile vomiting, rashes, constipation or major colic could all be signs that the baby is not tolerating the formula. Talk to their pediatrician or primary provider about this. They may recommend a trial of an easier to digest, hydrolyzed or hypoallergenic formula.
- What is the source of carbohydrate? Lactose is the main carbohydrate source in breastmilk. There is no sugar (sucrose) or fructose in healthy breastmilk. A formula should mirror this, and Europe requires some lactose and absolutely no sucrose (sugar) be contained in their standard formulas. Don't worry about lactose intolerance in a baby, it is very rare.
- Are there prebiotics/HMO? The third largest component of breastmilk is prebiotics which feed the developing microbiome. If mother nature puts prebiotics in high amounts in her formula (mother's milk), logic would dictate they are important and should be in formula.
- Are DHA/ARA fats contained in the recommended amounts? Research suggests that these fats are important for brain growth and should be contained in a formula. Expert recommendations are to have at least .32% of fats in formula be omega-3 DHA (about 60mg/day). European recommendations are higher, recommending at least 0.5% of fats be DHA (20-50mg per 100 calories or 100+ mg per day). It is also recommended that DHA be balanced with omega-6 ARA. US formulas are not required to meet these recommendations and some formula may contain less DHA than others.
- Does it have the recommended amount of choline? Choline is important for brain growth and is contained in breastmilk at levels of about 25mg/100 calories or 125 mg per day. Check to see if the formula approximates this.

\*For a deeper dive, see chapter 9 in [Feeding Our Children](#)



# Feeding Our Children

# First Foods Guide



## THE 3 GOALS

Aside from supporting overall growth of the baby, early infant foods serve 3 main goals:

1. Feed the Brain
2. Feed the Gut
3. Feed the Genes

Let's look at each of these in more detail

## *The First 1000 Days*

The First Thousand Days refers to the period of life from conception through the baby's second year. This period is recognized as the most important for setting the stage for a child's lifelong health.

During the First Thousand Days, good nutrition is vital to support proper growth and brain development of the baby, and to avoid programming the child for future disease. Baby foods are also known as complementary foods as they complement the nutrition found in breastmilk or formula, and are introduced between 5-6 months of age. These complementary foods serve an important role and should be chosen carefully. After 12 months of age, the child should be weaned onto mostly age appropriate table foods, adapted for their small size and choking risk, with less emphasis on breastmilk or formula. The following pages will act as a guide through this important phase of feeding your child.

## *1. Feed The Brain*

The first thousand days represents the most rapid period of brain growth in a child's life. By age three, the brain is 85% of its adult size! The right nutrients need to be supplied to your child to ensure development of a healthy brain.

Iron deficiency is common in children, even in the US. Iron is vital for proper brain development, and low levels can cause developmental delays and cognitive impairment that may not be reversible. Zinc is also important for brain and immune development and is commonly deficient worldwide. Breastmilk is low in iron and zinc by design, but this means that it is even more important for the breastfed baby to get iron and zinc rich foods (like meat) early on with complementary foods.

The ongoing need for omega-3 DHA in the rapidly developing brain does not stop with the young infant. Complementary and weaning foods should supply these important fats to the growing brain. The vitamins folate, B12 and choline are also important for the developing brain and need to be in adequate amounts in the early diet. Care should be taken to avoid exposure to chemicals and heavy metals that can damage the young brain. (see the quick tips later in the handout)





## 2. Feed The Gut

The first thousand days is the time during which your child's intestinal (gut) microbiome develops. The gut microbiome refers to the trillions of bacteria that live in our intestines and act like one of our organs- helping with our digestion and metabolism, our immune system, even our brain development! Imbalances in the microbiome (with too few probiotic bacteria) are associated with a host of disorders, ranging from Autism and ADHD to autoimmune disease, obesity, and type 2 diabetes. As they get older, your baby's microbiome needs ongoing support with **prebiotic fiber** in order to stay healthy and diverse. **Vegetables, legumes, whole grains, and fruits** all supply vitally important **prebiotic fiber** and help feed the gut! Conversely, highly processed foods and added sugar can impair or damage the microbiome, leading to potential problems.

In some cases, the microbiome may have already been altered to some degree by early antibiotics or C-section birth. Probiotic foods like high quality yogurt/sauerkraut for an older infant or a good quality probiotic supplement that contains multiple **Lactobacillus** and **Bifidobacteria** species may support development and restoration of a healthy microbiome. Discuss this with your child's primary healthcare provider.

Remember- without adequate fiber, the probiotic bacteria will starve, damaging the microbiome.

## 3. Feed The Genes

The First Thousand Days is also a time when the child is especially sensitive to negative programming that can turn on harmful genes that code for later disease development (epigenetics). By choosing whole foods and avoiding highly processed and sweetened foods with excessive fructose, parents can avoid some of the items that program the baby for future development of obesity, fatty liver disease, and type 2 diabetes.



### Reminder

It is recommended to introduce eggs and peanut butter in the first months of feeding solid foods, in an effort to decrease development of food allergies. As always, watch for concerning reactions such as rash, hives or vomiting with introduction of new foods. Bring any adverse reactions to the attention of their healthcare provider.

It takes multiple offerings of some foods to get a child to accept the new taste. Persistence pays off. Be positive and encouraging with new foods without being forceful or coercive. Keep trying. Do not fall into the trap of offering sweetened foods early on to your baby. This makes it harder to get them to accept vegetables and other healthy foods. Even fruits should not be among the first foods until there is a good base of proteins and vegetables in their diet. Fruit is great as a 2nd line food.

If the child is 7-8 months and not accepting any solid foods, they need to be evaluated promptly by their PCP and potentially a feeding specialist.



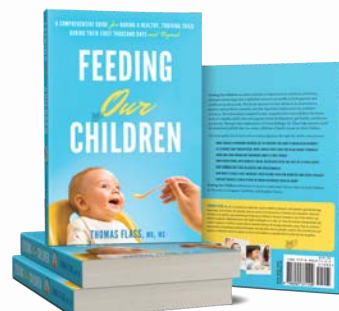
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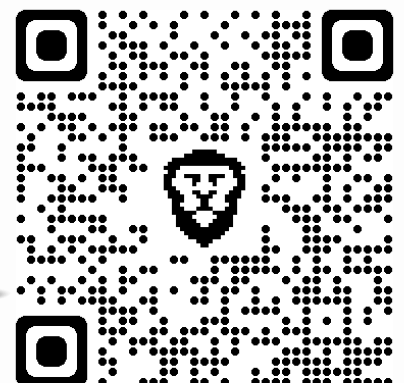
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The American Academy of Pediatrics along with the American Heart Association recommend **NO ADDED SUGAR** for children under age 2. That means if the sugar does not naturally occur in the food (natural fructose in fruits and lactose in milk/yogurt) it should not be given to infants and toddlers. Read labels!

Consider avoiding highly processed infant cereals, "kids" yogurt, and sweetened instant oatmeal and cereals. Limit products made from refined flour. Instead, try to choose more vegetables, meat/fish, and whole grain foods. These supply better nutrition and more prebiotic fiber, and help avoid the epigenetic programming for diabetes and obesity associated with highly processed foods and those with added sugar.



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## First Foods Checklist

Zinc & Iron Foods	Choline & B12 Foods	Omega-3 EPA/DHA Foods
Pureed Beef Pureed Game Meat Pureed Dark Meat Poultry Mashed Salmon/Trout Sardines	Pureed Beef Pureed Game Meat Pureed Chicken/Turkey Mashed Salmon/Trout Scrambled Eggs	Mashed Salmon/Trout Mashed Sardines DHA/Pastured Eggs
Prebiotic Fiber Foods	Folate Foods	Healthy Fats
<u>Vegetables*</u> Squash/Pumpkin Carrots Sweet Potato/Yam Peas Green Beans <u>Whole Grain Cereals</u> Oats or multigrain cereal Rice (low arsenic) Quinoa <u>Fruits (2nd line food)</u> <u>Beans/Lentils (2nd line)</u>	Avocado Spinach/Greens Broccoli Beets Beans/Lentils (2nd line)	Avocado Nut butters Olive oil and avocado oil

These foods should be added one at a time, starting with a few spoonfuls per meal around 5-6 months of age. Amounts and textures can be advanced as the baby grows & learns new feeding skills. (up to 4oz per feeding)

Consider making your own baby food!

Meats/Poultry can be slow cooked in a Crock Pot or pressure cooker with broth or stock then mashed/pureed.

Vegetables/Grains/Beans should be cooked until soft, then mashed/pureed with breastmilk or formula

\*Choose organic when possible to avoid harmful pesticide residues (especially the Dirty Dozen)

Consider mixing a vegetable with meat/chicken at mealtime.

Consider freezing batches of homemade baby food by using silicone ice cube trays. Defrost individual servings.

Do not microwave in plastic containers as this can release endocrine disrupting chemicals into baby's food.

\*\*Vegetarian weaning requires caution and extra care to get adequate iron, zinc, B12, choline and omega-3.

Fortified cereals and nutritional supplementation likely required. Medical guidance is recommended.

For a deeper dive into first foods, refer to Chapter 10 in "Feeding Our Children".

