

# THE PRENATAL PRESCRIPTION

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## Prenatal Programming



The prevailing scientific consensus is that nutritional health during pregnancy imprints us for the rest of our life, and that the chronic diseases we may experience later, either begin or are prevented during prenatal life. This is known as the Barker Hypothesis, created by Dr. David Barker.

Barker states that our bodies are programmed by our experiences before birth. The events to which we are exposed as we develop in the womb can improve or worsen our blood pressure, cardiovascular health,

eating patterns, tendency to gain weight, emotional resilience, intelligence, susceptibility to cancer, and resistance to infection.

Overall, prenatal programming affects every aspect of our physical and mental health, at every stage of our lives.

Leading researchers studying prenatal life now believe that the nutritional quality of the womb environment is often a more important predictor for risk of heart disease than either genetic predisposition or post-birth influences like diet and

exercise. Studies show that blood pressure in mothers during pregnancy correlate directly with the blood pressure of their offspring in adulthood.

One example is newborns who have a disproportionate head-to-waist size, a hallmark of detrimental prenatal programming due to poor nutrition, and are more likely to develop elevated levels of cholesterol as adults.

## The Ten Principles of Prenatal Planning

1. There are critical periods of vulnerability to sub-optimal conditions for the fetus during development in the womb, occurring at different times for different organs in the body.

2. Programming has permanent effects that alter the body's responses in later life and can modify susceptibility to disease.

3. Fetal development is actively dependent. Normal development is dependent on the baby's

continuing normal activity in the womb.

4. Programming involves several different structural changes in important organs.

5. The placenta plays a key role in programming.

6. Compensation carries a price. In unfavorable environments, the developing baby makes attempts to compensate for deficiencies.

7. Attempts made after birth to

reverse the consequences of programming may have their own unwanted consequences.

8. Fetuses react differently to sub-optimal conditions than do newborn babies or adults.

9. The effects of programming may pass across generations by mechanisms that do not involve changes in the genes.

10. Programming has different effects in males and females.

## Nutrition During Pregnancy



**Prenatal growth is a crucial part of fetal development that can impact your child later in**

Your nutritional status before conception is probably as important as your nutrition during pregnancy. The mother's nutritional status during pregnancy is the single most important factor in the baby's growth. Nutrient deprivation during pregnancy can take generations to overcome. The effects of poor nutrition vary according to the trimester in which problems occur.

Over the whole course of prenatal development, the kind of nutrients your child gets before birth can affect his life-long weight, blood pressure, blood sugar profile, and cardiovascular health.

Components of a healthy diet that are vital to pregnancy include: Iron, Calcium, Chromium, Zinc, Folic acid, Vitamin A, Vitamin B6, Vitamin B12, and Vitamin C.

**Iron** is needed for a proper blood supply to increase and help the baby build his/her own blood supply. The recommendation is to take 30 to 60 mg per day during pregnancy. Iron

is commonly found in red meat (especially liver), eggs, and dried beans.

**Calcium** is the main building block of bones and teeth. It is critical for the proper function of nerve cells and muscles. The recommendation is for 1200 to 1500 mg daily during pregnancy. Calcium is found in dairy products, greens, legumes, and tofu.

**Chromium** helps insulin to keep blood sugar at the right level. An intake of 50 and 200 mg per day is recommended while pregnant. It is found in whole grains, meats, and brewer's yeast.

**Zinc** is important for tissue growth and the reproduction of genes in DNA. At least 15 mg a day is recommended during pregnancy. Zinc can be found in whole grains, nuts, dried beans, meat, and eggs.

**Folic Acid** is vital for the synthesis of DNA. Every cell in your baby's body and the placenta need an adequate supply of folic acid. The recommended intake is 400 mcg daily during pregnancy. Folic acid can be found in enriched flours, fresh

fruit, and green vegetables.

**Vitamin A** helps build key components of the baby's skin, eyes, and other tissues. The recommendation is to consume 800 IU daily during pregnancy. It can be found in fruits, meats, vegetables, and dairy.

**Vitamin B6** helps your baby create new tissue, especially the brain. An intake of 2.2 mg daily during pregnancy is recommended. It can be found in eggs, whole grains, lean meat, oatmeal, nuts, dried beans, peas, and bananas.

**Vitamin B12** plays a central role in the production of new DNA every cell needs as cells multiply. An intake of 2.0 to 2.2 mcg daily during pregnancy would be required. It can be found in meat, fish, eggs, and cheese.

**Vitamin C** is crucial for cell repair after injury and for the development of new tissues. At least 70 mg per day during pregnancy would be sufficient. It can be found in fruits (esp. citrus) and dark green, leafy vegetables.

*"The mother's nutritional status during pregnancy is the single most important factor in the baby's growth."*



**Embrace the beauty of the bridge between you and your child.**

## Nutrition Throughout the Trimesters

During the *first trimester*, a weight gain of one pound a month is recommended, which means that an increase in calories is not yet necessary. Iron is crucial for the expansion of the blood supply. Meeting folic acid requirements is very important in the first trimester because this is when the spinal cord is being created. If morning sickness leads to vomiting, extra fluids and salts like potassium will be required. Consuming some sports drinks during this phase would replenish the electrolytes lost; however, they should

not be the main sources of fluid since they contain a lot of glucose.

During the *second trimester*, an additional 300 calories more a day is recommended. Protein intake, along with iron and calcium are crucial. Even if you do not have gestational diabetes, you may have some episodes of hyperglycemia that are exacerbated by pregnancy. Eat small snacks more often and avoid fatty or oily foods because fats interfere with insulin activity. Concentrate on complex carbohydrates made with whole wheat, bran, or other fiber sources.

During the *third trimester*, calcium continues to be important. The baby is much more physically demanding and he/she is growing rapidly and needs more nutrients daily. Frequent small meals are still important. A gain of about a pound a week is normal, and if you do happen to be gaining more, never try to lose weight during the pregnancy. Wait until after pregnancy to go on a weight loss diet. Choosing to breastfeed can help in resuming normal weight and physical well being.



**Periodic visits to your gynecologist are recommended during pregnancy to ensure proper development of the fetus.**



*“Even if you don’t have gestational diabetes, you may have some episodes of hyperglycemia that are exacerbated by pregnancy.”*

## Exercise During Pregnancy

- If exercise was part of your normal routine prior to pregnancy, it is safe to continue even while pregnant.
- Exercise fosters growth of new blood vessels and increases cells metabolic efficiency.
- The body also learns to dissipate the heat better with regular challenges.

- When the woman exercises, she also provides small physical challenges for the baby, making the baby better able to handle stress later on in life.
- Also, stimulation of the baby in the womb helps aid brain development.

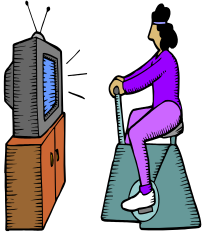
You Should NOT Exercise During Pregnancy if:

- You have a history of miscarriages
- Incompetent cervix
- Persistent bleeding
- Placental disease
- Poor fetal growth
- Premature labor
- Pregnancy-induced hypertension
- Ruptured membrane
- Twins or a multiples pregnancy



**Stimulation of the baby in the womb helps aid brain development**

## Conditions in Which Exercise During Pregnancy Isn't Recommended



There are some instances where pregnant women should not be exercising.

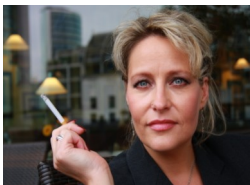
If any of the following conditions exist, a pregnant woman should probably not be exercising:

- Anemia
- Breech presentation after 28 weeks
- Early pregnancy bleeding
- Extremely overweight or underweight for your height
- History of poor fetal growth
- Palpitations or any other heart arrhythmia.
- Sedentary lifestyle prior to pregnancy

## Drinks, Pills, and Toxic Spills

- The fetus is very vulnerable. Substances can be toxic or challenging to the fetus in ways that these substances are not for adults.
- Smoking is bad for the fetus in many ways.
- Alcohol has clearly defined adverse effects on the embryo and fetus.
- Coffee, in high doses, can cause problems during pregnancy.
- Some over the counter medications can be very toxic.
- Health foods, nutritional supplements, and herbal teas can have ingredients that have adverse effects on the baby.

*“In 1968, scientists from France were the first to describe Fetal Alcohol Syndrome, in which babies are repeatedly exposed to alcohol while in the womb.”*



**When smoking during pregnancy, you reduce the amount of oxygen going to the baby, which also slows the growth of the placenta**

## The Negative Effects of Smoking & Alcohol Use

The fetus is more vulnerable to the effects of cigarettes than anyone else. Tobacco is a powerful drug which acts on the neurotransmitter system that controls the heart. It also causes constriction of blood vessels in the placenta, causing increased blood pressure and heart rate. When the mother smokes, she increases the concentration of carbon monoxide and reduces

oxygen levels to the baby. Smoking slows the growth of the placenta. It also disrupts the sleep of the baby and reduces REM sleep.

Alcohol cuts the blood supply to the fetal brain and affects how nerves communicate. In 1968, scientists from France were the first to describe fetal alcohol syndrome (FAS), in which babies repeatedly exposed to alcohol in the womb are

born with mental retardation and physical abnormalities. Research shows that the likelihood of miscarriage in the first trimester is doubled in women who drink as little as one ounce of alcohol twice a week. Also, drinking as little as two drinks a week has shown increased agitation and stressful behavior in newborn babies.

## The Negative Effects of Caffeine

Caffeine is not eliminated as efficiently during pregnancy and the concentration can get high quickly. It speeds up cell activity

and acts as a stimulant. Caffeine seems to be safe in terms of miscarriage risk if you limit yourself to one or two cups of coffee a day. In high amounts,

coffee has been shown to potentially increase the risk of miscarriage, along with interfering with the baby's sleep patterns in the womb.



**During pregnancy, caffeine seems to be safe in terms of miscarriage risk if you limit yourself to one or two cups of coffee daily.**

## Premature Delivery

Babies born before 37 weeks gestation are considered premature. Premature birth often happens because the baby is under some sort of stress. It may be that when conditions in the womb environment become overly threatening to the baby's health, the child has a better chance of surviving outside the womb rather than it

would within it. The most common reasons for this are infection in the womb or birth canal, and stressful situations for either the mother or child. When the baby finds that there is no more room to grow or when there is a lack of food or oxygen, stress hormone concentrations in the baby's blood may rise, stimulating the production of estrogen

and the beginning of labor. If the mother is under enough stress, her increased production of androgen may cause the level of estrogen to rise far sooner than it should, initiating premature delivery. In order to prevent premature delivery you should avoid stress, treat all cuts and blisters promptly, brush and floss teeth regularly, and don't smoke.



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## Birth and Beyond Recommendations

The baby's environment after birth influences the quality of neural connections in the growing brain. The amount & quality of breast milk is directly related to the mother's diet and stress levels. Antibodies in breast milk beneficially change the baby's immune system. You should try to breast feed your child for at least the first three months.

Breastfeeding requires that the mother consume 500 more calories per day than the pre-pregnancy diet. Mothers will also need to eat more protein, calcium, iron, and fat. Alcohol, caffeine, painkillers, medications, and drugs pass through the breast and into the baby, so it is very important to follow your doctor's recommendations about

taking them.

It is recommended for new mothers to use stress reduction techniques in their daily life. Regular playing, hugging, touching, and talking with your baby creates the physical and mental foundation upon which he/she will build future security and happiness.



**Playing, hugging, touching, and talking with your baby creates the physical and mental foundation**





## About Pennington

The Pennington Biomedical Research Center is a world-renowned nutrition research center.

### Sources:

The Prenatal Prescription (2001) by  
Peter Nathanielz

Pennington Biomedical  
Research Center  
6400 Perkins Road  
Baton Rouge, LA 70808

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### Authors

Beth Kalicki

Heli J. Roy, PhD, RD

### Division of Education

Phillip Brantley, PhD, Director

Pennington Biomedical Research Center

Steven Heymsfield, MD, Executive Director

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### Mission:

To promote healthier lives through research and education in nutrition and preventive medicine.

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Clinical Obesity Research

Experimental Obesity

Functional Foods

Health and Performance Enhancement

Nutrition and Chronic Diseases

Nutrition and the Brain

Dementia, Alzheimer's and healthy aging

Diet, exercise, weight loss and weight loss maintenance

The research fostered in these areas can have a profound impact on healthy living and on the prevention of common chronic diseases, such as heart disease, cancer, diabetes, hypertension and osteoporosis.

The Division of Education provides education and information to the scientific community and the public about research findings, training programs and research areas, and coordinates educational events for the public on various health issues.

We invite people of all ages and backgrounds to participate in the exciting research studies being conducted at the Pennington Center in Baton Rouge, Louisiana. If you would like to take part, visit the clinical trials web page at [www.pbrc.edu](http://www.pbrc.edu) or call (225) 763-3000.

