

Louisiana Drug Utilization Review (LADUR) Education

The Importance of Folic Acid in Pregnancy

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Issues...

- When taken in recommended daily dosages, folic acid can help prevent neural tube defects (NTDs) by up to 70 %.
- In order to achieve full potential, women of childbearing age must supplement with folic acid before and during pregnancy.
- Most women are unaware of the benefits of folic acid and lack the recommended daily amount required before and during pregnancy in order to prevent NTDs.

Introduction

According to a report by the U.S. Department of Health and Human Services, approximately 2,500 to 3,000 babies are born with a neural tube defect (NTD) each year. Among the most common NTDs are spina bifida and anencephaly. Although no one knows exactly what causes NTDs, it has been proven that folic acid consumption before and during early pregnancy significantly decreases the risks.

Findings from a study conducted in 2002 by the Cochrane Pregnancy and Childbirth Group demonstrated a 3-fold decreased risk of a first neural tube defect in children whose mothers consumed the recommended daily value of folic acid during pregnancy. Reports from the Centers for Disease Control (CDC) have also concluded that women who take the recommended daily dose of folic acid starting one month before they conceive and throughout the first trimester reduce their babies' risk of birth defects up to 70 %. However, according to a 2002 survey conducted by the Gallup Organization, on behalf of the March of Dimes, only 33% of non-pregnant women between the ages of 18 and 45 receive folic acid supplementation on a daily basis.

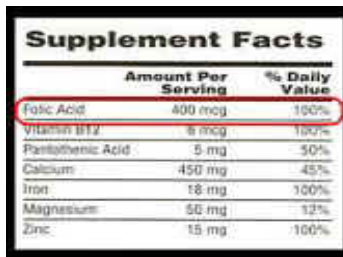
What is folic acid?

Folic acid (also known as vitamin B9 or folate) is a vitamin that dissolves in water and is not stored in the body in large amounts. Therefore, water-soluble vitamins like folic acid must be eaten or taken every day to ensure that the body has enough to function properly. Folic acid is available in two forms. The first is a synthetic form supplied by vitamins and the second is a natural form called folate,

which can be found in certain foods. In recognition of the benefits of folic acid, the Food and Drug Administration (FDA) requires food manufacturers to fortify enriched grain products, such as breakfast cereals, bread, pasta, and rice, so that each serving contains at least 20% of the recommended daily requirement.

The following values are approximate rates of folic acid absorption by the body according to the Institute of Medicine (IOM):

- 50% rate of absorption from food folate,
- 85% rate of absorption from folic acid fortified foods,
- 100% rate of absorption from vitamin supplements.



	Amount Per Serving	% Daily Value
Folic Acid	400 mcg	100%
Vitamin B12	8 mcg	100%
Pantothenic Acid	5 mg	50%
Calcium	450 mg	45%
Iron	18 mg	100%
Magnesium	50 mg	12%
Zinc	15 mg	100%

Studies have attempted to determine the most beneficial method for folic acid consumption (i.e., diet, supplementation, fortification). Currently study results are conflicting, but when comparing the forms of folic acid, the IOM, the CDC, and the March of Dimes recommend that women who could become pregnant consume folic acid in the form of a multivitamin supplement to ensure adequate absorption.

Some pregnant mothers are unable to consume daily vitamins due to sickness associated with the pregnancy; therefore, dietary supplementation may be a better option. Please keep in mind that, based on rate of absorption, it may require double the amount of folate to ensure the daily recommended amount of folic acid.

Folic acid through nutritional food source

When selecting folate rich foods, dark leafy greens are almost always a good source of folate, but other sources include the following:

- 1 cup boiled collard greens: 177mcg,
- 1 medium papaya: 115mcg,
- 4 spears steamed or boiled asparagus: 88mcg,
- ½ cup steamed broccoli: 52mcg,
- 1 cup strawberries: 40 mcg,
- 1 medium orange: 39 mcg.

For those patients who may be unable to obtain the foods needed to maintain a healthy diet, several states, including Louisiana, offer programs that provide nutritious food, at no cost, to qualifying pregnant women. The foods are not only

nutritious, but could be a very valuable source of folic acid supplementation for the mothers that can not supply their folic acid needs through vitamins. Table 1 lists some examples of those foods and their potential folate (natural folic acid) content. *These values do not serve as a substitute for nutritional information found on the product label.*

FOOD LIST		
<i>Food Type</i>	<i>Serving Amount</i>	<i>Approximate Folate content per serving amount</i>
Cheese: American, Mild Cheddar, Medium Cheddar, Mozzarella	3.5 ounces	9 to 18 mcg
Eggs: Large, White	3.5 ounces	30 mcg
Peanut Butter: Smooth, Crunchy or Whipped	3.5 ounces	240 mcg
Dried Beans/Peas: Peas: chick, black-eyed, split, lentils	3.5 ounces	149 to 570 mcg
Beans: Black, Navy, Pinto, Kidney, Soy, Lima		
Fruit Juice: Apple, Grape, Grapefruit, Orange, Pineapple, V-8	3.5 ounces	0 to 37 mcg
Cereal: General Mills™-Cheerios, Corn Flakes, Kaboom	3.5 ounces	150 to 1343 mcg
Jim Dandy™-Dandy Enriched Quick Grits		
Kellogg's™-Complete Bran Flakes, Corn Flakes, Product 19		
Malt O Meal™-Quick		
Nabisco™ -Cream of Wheat		
Post™ -Premium Bran Flakes		
Quaker™-Instant Grits, Instant Oatmeal, King Vitamin, Life, Toasted Oatmeal Squares		

Figures obtained from product labels and calculated using www.CalorieCounter.net

Patients may not be aware of the nutritional value that may be lost in food preparation. Counseling your patients on food preparation methods may help them maintain maximum nutritional value.

Storing and preparation to preserve folate:

- Whenever possible, eat raw vegetables.
- Refrigerate fresh fruits and vegetables, but do not keep them long. The longer they are stored, even in the refrigerator, the more folate will be lost.
- Cooking water destroys folate. Steam or stir-fry vegetables instead of boiling them.
- Dried beans and peas, even when cooked for a long period of time, are good sources of folate.

Birth Defects

The March of Dimes defines a birth defect as an irregularity of structure, function, or metabolism present at birth that results in physical/mental disability or causes death.

Birth defects are generally grouped into three major categories:

- Structural/metabolic
- Congenital infections
- Other conditions

Structural/metabolic abnormalities occur when some part of the body is missing, is not shaped or working properly, or when the body is unable to metabolize certain substances due to an inborn genetic error. Neural tube defects (NTDs) are grouped into the structural/metabolic category of birth defects.

Neural Tube Defects

Neural tube defects occur when the brain and spinal cord do not form properly. The neural tube is the embryonic structure that develops into the brain and spinal cord. This structure starts out as a small ribbon of tissue that normally folds inward to make a tube by the 28th day of the pregnancy.

When this process does not work properly, the neural tube does not close completely and the brain and spinal cord may not develop normally. In cases where the brain and spinal cord do not develop properly, the pregnancy sometimes ends in miscarriage or stillbirth.

Ninety-five percent of NTD-affected births are to women with no personal or family history of NTDs. These defects occur between the 17th and 30th day after conception. Generally, this is before most women even realize that they are pregnant. The most common neural tube defects are as follows.

Spina Bifida

Often called "opened spine"; the bony spinal column and soft tissue layer over the spine do not form properly, leaving the spinal cord exposed. According to the Spina Bifida Association of America (SBAA), there are an estimated 70,000 people in the United States currently living with this defect. The SBAA also reports that children with a severe case of spina bifida may have bladder and bowel control problems, learning disabilities, and paralysis in their legs. The average total lifetime health care cost for each infant born with spina bifida ranges from \$532,000 to over \$1 million dollars per child. Although the exact cause is unknown, the SBAA is dedicated to reviewing the current research and, based on the findings of that research, advises women of childbearing age to consume the recommended daily amount of folic acid to reduce their risk of giving birth to a baby with spina bifida. Spina Bifida is the most frequently occurring and permanently disabling of all birth defects.



Anencephaly

A fatal birth defect that happens when the neural tube does not fully close at the top. As a result, part of the skull and brain are missing. Babies with anencephaly die before or shortly after birth.

Encephalocele

A condition resulting in abnormal closure of the skull where a portion of the brain is contained in a sac outside the skull.

Unplanned pregnancies occur every day. In fact, about half of all pregnancies are unplanned, which is why it so important for women to have enough folic acid in their body both before and during pregnancy. By the time most women find out they're pregnant, the baby's brain and spine have already formed.

How much folic acid does a woman need?

The U.S. Public Health Service, the Florida Folic Acid Council, the SBAA sponsored by the March of Dimes, and countless other organizations recommend that women of childbearing age need to consume at least 400 micrograms of folic acid daily before getting pregnant and continue taking it into the first month of pregnancy. Doing so can prevent up to 70% of birth defects of the brain and spinal cord. Typically, most women receive less than the recommended amount of 400 mcg of folic acid on a daily basis.

Folic acid's role in preventing birth defects

How folic acid prevents defects of the brain and spinal cord is not well understood. Most studies suggest that it may correct a nutritional deficiency,

while others suggest that supplemental folic acid helps some people compensate for errors in how the body processes folates. Although, the exact mechanism of action is unknown as to how folic acid prevents NTDs, studies have shown that the following people are at an increased risk of having an NTD affected pregnancy:

- Caucasians with English/Irish ancestry
- People who do not eat well-balanced diets
- Couples who have already had other NTD affected pregnancies
- Women who have low folic acid levels before they become pregnant and during the earliest weeks of pregnancy.

Conclusion

An estimated 60 million women of childbearing age do not consume the recommended value of folic acid on a daily basis. How do we combat this problem? The answer is patient education. A folic acid campaign and evaluation study based in southwestern Virginia determined that in highly motivated women, education does appear to influence behavior changes. A telephone survey of women ages 18 to 45 conducted by the Gallup Organization in 2002 showed that many women would be willing to change their behavior and take folic acid if the advice came from a healthcare professional. While yet another study by de Weerd et al, published in 2002, concluded that preconception counseling provided to women planning pregnancy did improve folic acid intake and decreased the risk of NTDs.

In summary, increased folic acid intake significantly decreases neural tube defects and folic acid education has the potential to promote its use. As healthcare professionals we can impact the battle against birth defects by educating women of childbearing age of the benefit of consistent folic acid supplementation.