

# Folic Acid: At Work for You!



*Folic Acid*  
**EVERY DAY**



## *Worksite Wellness Program*

### *Program Guide*

Gail P. A. Kauwell, PhD, RD, LDN

Lynn B. Bailey, PhD

Gail C. Rampersaud, MS, RD, LDN

SaraMarie J. Sargent

University of Florida  
Institute of Food and Agricultural Sciences  
Food Science and Human Nutrition Department

## ***Welcome to the “Folic Acid: At Work for You” Program!***

Folic acid, or folate, is a B vitamin that, if taken before and during early pregnancy, may help dramatically reduce the risk of one of the most serious and potentially preventable types of birth defects, called neural tube defects. Folic acid also may play a role in helping to reduce the risk for other birth defects and chronic diseases such as cardiovascular disease, certain cancers and diseases affecting mental function. This is important health information that everyone—men and women of all ages—needs to know.

While folic acid has important benefits for people of all ages, it is particularly important for women of childbearing age. As highlighted in the *Purchaser’s Guide to Clinical Preventive Services*, a guide for employers on clinical preventive service benefit design (Campbell et al. 2006), the economic impact of folic acid preventable birth defects is substantial, and the cost of this care is ultimately shared by parents, employers and communities. Less than half of women of childbearing age in the United States take a multivitamin containing folic acid on a daily basis, a habit that ensures adequate intake of this important vitamin.

You are in a unique position to serve as an influential source of this relevant information about folic acid to your employees, particularly women of childbearing age. We encourage you to use this program and its accompanying educational tools to implement a folic acid awareness campaign at your worksite. This is a great opportunity to enhance the health of all of your employees and their families.

**A note about terminology:** The terminology surrounding folic acid can be confusing. Folic acid is usually the term used to describe the synthetic form of the vitamin. The form of the vitamin found naturally in certain foods may be referred to as food folate, naturally occurring folate or folate. The terms folate or folic acid also can be used in a general sense to refer to all forms of the vitamin.

In this program, generally folic acid is used to denote the synthetic form, food folate is used for the form found naturally in food, and folate is used to denote all forms or total folate from synthetic and natural food sources. However, you may find that other resource materials use these terms in different ways.



©2008 University of Florida

This program was funded by a community grant from the March of Dimes Florida Chapter.

This material is for information purposes only and does not constitute medical advice.

The opinions expressed in these materials are those of the author(s) and do not necessarily reflect the views of the March of Dimes Foundation.

## **Program Contents**

This program includes materials and resources to assist you in educating yourself, other worksite-based health and wellness professionals, and your employees about the health benefits of folic acid.

### ***Program Guide***

This guide provides the information and tools you and other health and wellness professionals can utilize to educate your employees. It includes:

- Information you need to know about the health benefits of folic acid (Section 1)
- Suggested activities to teach about folic acid in the workplace, including a scripted PowerPoint® presentation (Sections 2 and 3)
- Strategies for working with diverse audiences (Section 2)
- Strategies for working with diverse cultural/ethnic groups (Section 2)
- Additional detailed information in the form of frequently asked questions (Section 4)
- Resource list for additional information or materials (Section 5)

### ***CD-ROM***

Electronic versions of supporting materials for program lessons and activities:

- PowerPoint® presentation in English and Spanish
- Handouts/activity sheets in color PDF format, in English and Spanish
- Cut-and-paste information you can use for newsletters, emails, or other employee communication sources

### ***DVDs***

DVD-video resources for educating yourself and your staff, employees and volunteers:

- DVD-1
  - “Prevention of Neural Tube Defects with Folic Acid: You Can Make a Difference” (21 minutes)—developed to teach health professionals about folic acid and related topics
  - “Folic Acid Every Day” (10 minutes; has automatic loop/repeat capability)—developed for consumers
- DVD-2
  - “The Story of Three Sisters” video novella (6 minutes), in Spanish and English—specifically developed for Hispanic audiences

### ***Other Materials (some available in Spanish)***

- Handouts
- Brochures
- Posters

## Program Implementation Guide

Use this chart to identify and locate toolkit materials or other resources based on the desired level of program implementation at your worksite.

<b>Activity</b>	<b>Where to find materials/resources</b>	<b>Program guide section reference</b>
<b>Minimal Implementation</b>		
Display posters	Posters (folded) in toolkit box	Section 5 to order more posters or brochures
Provide brochures	Brochures in toolkit box	
<b>Moderate Implementation</b>		
<i>Minimal Implementation (above)</i>	<i>Above</i>	<i>Above</i>
Send email or voicemail messages about folic acid	CD-ROM for samples	Section 2
Include folic acid information as part of company/ employee newsletter, Web site or video display	CD-ROM for samples	Section 2
<b>Maximum Implementation</b>		
<i>Moderate Implementation (above)</i>	<i>Above</i>	<i>Above</i>
Lunch and Learn group presentation (optional case study activity)	CD-ROM for PowerPoint® presentation in English and Spanish; presentation script in Section 3 of the guide; handouts and case study sheets in plastic folder and on CD-ROM in toolkit box; brochures in toolkit box	Section 2; Section 5 to order more posters or brochures
Individual counseling	Brochures and posters (folded) in toolkit box; handouts in plastic folder and on CD-ROM in toolkit box	Section 2; Section 5 to order more posters or brochures
Health fair or information table	Brochures and posters (folded) in toolkit box; handouts in plastic folder and on CD-ROM in toolkit box	Section 2; Section 5 to order more posters or brochures

## **Table of Contents**

### **Section 1:**

#### ***The Health Benefits of Folic Acid: What You Need to Know . . . . . Page 5***

Introduction . . . . .	Page 6
Birth Defects and Folic Acid . . . . .	Page 7
Health Benefits of Folate for Everyone . . . . .	Page 10
Getting Enough Folate . . . . .	Page 12
Other Issues . . . . .	Page 15
Folic Acid and your Employees . . . . .	Page 16
References and Additional Reading . . . . .	Page 17

### **Section 2:**

#### ***Teaching about Folic Acid in the Workplace . . . . . Page 21***

Ideas for Promoting Folic Acid in the Workplace . . . . .	Page 22
Reaching All Employees . . . . .	Page 24
Socioeconomic Status . . . . .	Page 26
Education and Literacy Level . . . . .	Page 26
Cultural and Ethnic Diversity . . . . .	Page 26

### **Section 3:**

#### ***PowerPoint® Presentation . . . . . Page 29***

Presentation Instructions . . . . .	Page 30
Presentation Script . . . . .	Page 31
Case Study Activity . . . . .	Page 54

### **Section 4:**

#### ***Frequently Asked Questions . . . . . Page 55***

Detailed information to help answer employee questions

### **Section 5:**

#### ***Resources . . . . . Page 63***

Health, nutrition, pregnancy and folic acid resources available from other organizations and agencies

# **Section 1**

## ***The Health Benefits of Folic Acid:***

### ***What You Need to Know***

## ***Introduction***

This program promotes the role of folic acid in overall good health and the public health recommendations concerning folic acid in helping to reduce the risk of birth defects of the brain and spine. The United States Public Health Service (USPHS) and the Institute of Medicine (IOM), as a result of compelling scientific evidence, recommend that all women of childbearing age consume **400 micrograms of folic acid every day** in order to help reduce their risk of having a baby with a neural tube defect (NTD). Healthy People 2010, a set of health objectives for the nation established by the Centers for Disease Control and Prevention (CDC), as well as the Health Resources and Services Administration, include two goals related to folic acid and birth defects: 1) have 80 percent of nonpregnant women aged 15-44 years consuming at least 400 micrograms of folic acid every day from fortified foods or dietary supplements and, 2) reduce the occurrence of spina bifida and other NTDs by 50 to 70 percent. These recommendations are supported by a number of professional organizations, including the National Council on Folic Acid, the American Academy of Pediatrics and the American Medical Association.

Folic acid has other health benefits and is needed by the body on a daily basis. Therefore, people of all ages need to make sure they get enough of this essential vitamin every day. The workplace offers a unique opportunity to extend folic acid education efforts to all employees, particularly women of childbearing age. Women of childbearing age represent a particularly vulnerable group because lack of adequate folic acid prior to and during the first trimester of pregnancy increases the risk of having an NTD-affected pregnancy. As a health and wellness professional, you are a qualified, reliable and trusted source of information for women of various economic and social groups who may not be aware of the health benefits of this vitamin.

According to a national survey conducted by the March of Dimes Foundation, only about one-quarter of women who were aware of folic acid said that they learned about it from their health care provider (March of Dimes and The Gallup Organization 2006). This clearly illustrates the urgent need for all health care professionals, including worksite-based health and wellness professionals, to educate women about the importance of taking folic acid every day to help reduce their risk for having a baby with an NTD, as well as making women and men of all ages aware of the additional health benefits of this vitamin.

**As a health and wellness professional, you have a unique opportunity to educate, influence, motivate and support women of childbearing age and other employees in making lifestyle changes that can protect their health and the health of future generations.**

### **Neural Tube Defects**

Neural tube defects, or NTDs, are a group of congenital birth defects that affect the central nervous system, particularly the brain, spinal cord and spine of the baby. When the neural tube does not form properly, a serious birth defect can develop that can result in defects of the spinal cord, the brain or both. In the United States, about 3,000 pregnancies per year—the equivalent of more than eight babies and their families every day—are affected by NTDs (CDC 2004).

The most common NTDs are spina bifida and anencephaly. Spina bifida occurs when the lower portion of the neural tube (spine) does not form properly and parts of the spinal cord protrude outside the baby's body.



Anencephaly

Anencephaly occurs when the upper portion of the neural tube does not form properly. It is a fatal condition involving severe malformation of the brain and may include facial abnormalities and absence of the skull. Many anencephaly-affected pregnancies result in miscarriage. Infants who are born with this condition die soon after birth.



Spina Bifida

**NTDs occur very early in pregnancy, even before most women know they are pregnant.**

### **Risk Factors Associated with NTDs**

As a health and wellness professional, it is important to know that **all** women of childbearing age who are capable of becoming pregnant are at risk for having an NTD-affected pregnancy. In fact, 90 to 95 percent of babies born with spina bifida are born to parents with no family history of spina bifida (Aitken 2002). However, there are other known or suspected risk factors that may put women at higher risk (CDC 1998):

- Previous NTD-affected pregnancy or family history of NTDs
- Hispanic origin, particularly Mexican-American women born in Mexico
- Use of certain antiseizure and anticonvulsant medications before and during pregnancy
- Lower socioeconomic status (e.g., income)
- Obesity
- Insulin-dependent diabetes mellitus
- Exposure to excess heat (e.g., hot tub, sauna, prolonged fever) before and during early pregnancy



## **Impacts on Children and Families**

Complications resulting from spina bifida include many levels of disability, including leg paralysis, learning disabilities, loss of bowel or bladder control, and hydrocephalus (a build-up of fluid around the brain). Approximately 90 percent of infants born with spina bifida survive into adulthood, and along with their families, must learn to manage the complications associated with this condition (SBAA 2006). These can place extensive economic, emotional and physical burdens on affected



children and their families, making this one of the most serious types of birth defects. The average lifetime medical costs associated with the treatment of an individual born with spina bifida have been estimated to be over \$635,000 (Waitzman et al. 2005), and for many individuals, can exceed \$1 million. Secondary conditions related to spina bifida include learning disabilities, problems with movement, depression, gastrointestinal disorders, tendonitis, obesity, skin breakdown,

sensitivity or allergy to latex, and social and sexual issues. Additionally, a child's emotional and social development can be hindered by the physical limitations associated with an NTD. Although advances in medicine have enabled many affected individuals to lead long and productive lives, the complications associated with NTDs impact children and their families for a lifetime.

## **Folate and Folic Acid**

Folate, or folic acid, is a water-soluble B vitamin. This vitamin can be found naturally in certain foods (this form is usually called food folate or naturally occurring folate). The synthetic form of the vitamin (called folic acid) can be manufactured and added to vitamin supplements or enriched foods. Many times the generic term "folate" is used to describe both forms of the vitamin. The body absorbs synthetic folic acid more readily than it does food folate; however, once in the blood stream, the biological function is the same.

## **The Association Between Folic Acid and Birth Defects**

Based on several research studies, intake of supplements containing folic acid was associated with a reduced risk for NTDs. The positive effects of folic acid supplementation were observed only with periconceptual use of folic acid. Periconceptual refers to the time beginning at least one month



before conception and continuing through the first trimester of pregnancy. Therefore, **folic acid must be taken before a woman becomes pregnant** to help reduce the risk for having a baby with an NTD. Folic acid can not prevent all NTD cases since genetic factors account for some; however, it is estimated that if all women of childbearing age consumed adequate folic acid, 50 to 70 percent of NTDs could possibly be prevented.

Research studies report that folic acid may help reduce the risk for other birth defects, including heart defects, orofacial clefts (e.g., cleft lip and cleft palate), and urinary tract defects. There are some data supporting a role for folic acid in reducing the risk of limb defects. Adequate folate intake, or blood folate status, may help improve pregnancy outcomes, such as reducing the risk for preterm birth and low birth weight. Because folate is essential for the rapidly dividing tissues of the fetus, a multivitamin or folic acid supplement is recommended as part of standard prenatal care for women; however, women still need to take folic acid before pregnancy to help reduce their risk for NTDs.

### **Other Pregnancy Outcomes**

Folic acid has been associated with other pregnancy outcomes. There have been several studies that report an association between adequate folate intake or status and a reduced risk for preterm birth or low birth weight (Siega-Riz et al. 2004, Shaw et al. 2004, Ronnenberg et al. 2002). Folic acid also has been associated with increasing the risk of multiple births (Czeizel et al. 1994), although most studies do not support such an association, including a large study conducted in China (Li et al. 2003). Studies have reported a small but significant increase in miscarriage in women taking a multivitamin containing folic acid during the periconceptional period (Hook et al. 1997); however, other large intervention trials conducted in China (Gindler et al. 2001) and the United Kingdom (Wald et al. 2001) did not find an association. On the contrary, several studies have associated low folate status with a higher risk for miscarriage (Nelen et al. 2000, George et al. 2002).



### **Recommended Folic Acid Intake for Women Capable of Becoming Pregnant**

In 1992, the USPHS recommended that all women of childbearing age who are capable of becoming pregnant consume **400 micrograms (mcg) of folic acid every day** to help reduce the risk of having an NTD-affected pregnancy (CDC 1992). Women with a prior NTD-affected pregnancy should consult their health care providers for advice and may require higher doses. The USPHS recommendation was supported by the 1998 National Academy of Sciences' IOM recommendation,

which states that all women capable of becoming pregnant consume 400 mcg per day of synthetic folic acid from supplements or fortified foods, in addition to consuming food folate from a varied diet (IOM 1998).



There are two key points to remember:



- The recommendations apply to **all women of childbearing age** who are capable of becoming pregnant (including adolescents, teenagers and possibly younger girls), even if they are not trying to get pregnant or don't want to become pregnant.



- Folic acid must be taken **every day and before pregnancy**. This will help ensure that a woman has enough folic acid in her system in case she becomes pregnant.



Why do women need to take folic acid every day? There are two reasons. First, the neural tube develops during the first month of pregnancy when many women do not realize they are pregnant. Unfortunately, intake of folic acid following development of the neural tube does not reverse defects that may have already occurred, so women need to have enough folic acid in their system before they become pregnant. Second, approximately 50 percent of adult pregnancies and 82 percent of pregnancies of teens age 15 to 19, in the United States, are unplanned or mistimed (i.e., occur earlier than desired) (Finer 2006). Therefore, it is essential that all women of childbearing age who are capable of becoming pregnant, regardless of their pregnancy intentions, get 400 mcg of folic acid every day and eat a healthy diet that includes sources of food folate.

### ***Health Benefits of Folate for Everyone***

Folate has other potential health benefits. Folate is needed by the body on a daily basis and is essential for the duplication of DNA for proper cell division and healthy tissues. Adequate folate ensures proper formation of red blood cells. Diets low in folate can result in a certain type of anemia. Low blood folate may lead to high blood levels of homocysteine, a product of the body's metabolism. High levels of homocysteine have been identified as a possible risk factor for



cardiovascular disease. Although more research needs to be done, folate deficiency also may increase the risk for certain types of cancers, such as cervical and breast cancer (Rampersaud et al. 2003). For these cancers, the risks are higher when low folate status is coupled with other risk factors for disease, such as family history or higher-than-moderate intake of alcohol for breast cancer, or infection with human papillomavirus (HPV) for cervical cancer.

## **Folate and Colon Cancer**

In the past, epidemiologic data have reported protective effects of folate on the risk for colorectal cancer and adenomas. However, two studies published in 2007 call into question this protective association. In the first study (Mason et al. 2007), the researchers observed an increased risk for colorectal cancer in the United States and Canada that coincided with the implementation of folic acid fortification of cereal grains. The increase was surprising because it occurred during a steady, downward trend in colorectal cancer rates observed in both countries since 1985 and could not be accounted for by an increase in cancer screening rates or other factors. Following the increase, the downward trend for colorectal cancer cases has resumed and continues to decline over time.



In the second study (Cole et al. 2007), individuals were randomized to receive either a 1 milligram per day dose of folic acid or placebo tablet. Subjects were screened twice by colonoscopy, once at 3 years and again at 3 or 5 years later. Folic acid did not reduce adenoma risk in study subjects who had previously been diagnosed with adenoma. However, the researchers did report an observed trend for an increased risk for recurrence of adenoma with folic acid use.

Clearly, more research is needed. Individuals who may be at higher risk for colorectal cancer or adenomas because of their age, family history or previous diagnosis of adenomas or colorectal cancer, should consult their health care provider to discuss having regular screenings for detection of adenomas, a practice that can reduce their chances of developing colorectal cancer.

The results of these studies in no way affect the public health recommendations for folic acid and women of childbearing age—recommendations that are strongly supported throughout the world. **All women of childbearing age should consume 400 mcg of folic acid daily as part of a healthy diet that includes folate-rich foods.**



## Getting Enough Folate

### How Can Adults Get Enough Folate?

To be sure adults get enough folate, they must be educated about:

- selecting multivitamins or other supplements containing the recommended amount of folic acid in addition to identifying and overcoming barriers associated with daily multivitamin use
- identifying and selecting foods enriched or fortified with folic acid
- identifying and selecting foods rich in naturally occurring food folate

#### **Supplement Facts**

#### **Serving Size 1 Tablet**

<u>Folic Acid</u>	<u>400 mcg</u>	<u>100% DV</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

### Multivitamins and Other Supplements



Taking a multivitamin every day is the **best way** to ensure one gets the recommended amount of folic acid. Folic acid also can be found in single vitamin (e.g., folic acid) supplements.

Multivitamins are widely available and can be purchased from grocery stores, drug stores, health food stores, chain discount stores, through home shopping television networks or over the Internet. Many national brands, as well as store brands (private label), are available. Most multivitamins contain 400 mcg (0.4 milligrams) of folic acid, which is the daily amount for helping reduce the risk for NTDs. Check the Nutrition or Supplement Facts panel on the multivitamin bottle and look for 400 micrograms (mcg) or 100% of the Daily Value for folic acid. In addition to the direct health benefits associated with folic acid, consumption of a multivitamin containing folic acid also can provide the body with other vitamins and minerals that may not be obtained in adequate amounts from the diet.

Folic acid supplements are readily available in pill form and generally provide 400 or more mcg of folic acid per pill. Unless under the care of a health care provider, adults should be encouraged to avoid exceeding the Upper Tolerable Level of intake for synthetic folic acid (i.e., 1,000 mcg per day) (IOM 1998).

## Myths and Barriers

There are several myths and barriers associated with multivitamins that may affect employees' willingness or ability to take a multivitamin every day. Here are some common barriers along with suggestions and motivators for overcoming them:



- **Barrier: It is difficult to remember to take a multivitamin every day.**

Put the bottle in a visible location that is out of the reach of a child. If that is not an issue, put it near something that is used every day. For example: with other medications, next to birth control pills, on the kitchen counter, next to the coffee maker, or on the nightstand. Stress that **all medications**, including multivitamins and folic acid supplements, must **always** be kept out of the reach of children!

- **Barrier: Swallowing multivitamins is difficult.**

Take a folic acid supplement instead. It is much smaller than a multivitamin pill and easier to swallow. Consider adult chewable or dissolvable vitamins. (Consult your pharmacist about their availability in your area.)

- **Barrier: Multivitamins are expensive.**

Consider store brand multivitamins that tend to be less expensive compared to name brands. Suggest store brand folic acid supplements, which can be purchased for as little as a penny per pill.

- **Myth: Multivitamins aren't needed when we eat a healthy diet.**

We usually don't eat right every single day. Because only certain foods contain folate, it may be difficult to get the proper amount from foods alone. Taking a multivitamin containing folic acid every day can ensure that a woman receives the adequate amount.

- **Myth: Multivitamins increase appetite, causing weight gain.**

There is no evidence to suggest that taking multivitamins results in weight gain. In fact, daily use of a multivitamin can provide key nutrients to help employees maintain their health and vitality.



- **Barrier: Multivitamins can cause stomach upset.**

Sometimes the iron contained in multivitamins can cause stomach upset. Suggest taking a multivitamin after eating a meal or just before bedtime to reduce the chance of stomach upset. Suggest taking a multivitamin without iron unless a health care provider has advised otherwise. Taking a folic acid supplement instead of a multivitamin may reduce the chance of stomach upset.

## **Fortified and Enriched Foods**

Folic acid is added to cereal grain products that say “enriched” on the label. These foods include enriched bread, rolls and buns; flour (standard and self-rising); corn grits; corn meal; farina; rice;



macaroni products; nonfat milk macaroni products and noodle products (FDA 1996). Other food products affected by fortification include mixed dishes, which are combination foods containing fortified grain products (e.g., instant rice dishes and soups containing enriched noodles), and many snack foods, including crackers, cakes, and cookies. To know whether a product contains folic acid, check the ingredient list. The term “folic acid” or “folate” will be listed along with any other vitamins added to the product.

An important category of fortified foods is ready-to-eat breakfast cereals. Many ready-to-eat cereals provide between 100 and 400 mcg of folic acid per serving, or 25 to 100 percent of the Daily Value (check the Nutrition Facts panel on the cereal box). Fortified breakfast cereals and other folic acid fortified foods are good choices for women who cannot or will not take a multivitamin or folic acid pill on a daily basis. However, women who choose this approach will have to pay close attention to their total daily intake of these foods to ensure that they get enough folic acid every day.

Since 1998, when grain fortification with folic acid began, the reduction in the number of NTDs reported in the United States has been approximately 25 percent (CDC 2000, CDC 2004). While this is significant and encouraging, it is far short of the estimated reduction in NTD incidence of at least 50 percent based on studies of women taking supplements containing folic acid. This finding indicates the continued need to promote the intake of multivitamins or other supplements containing folic acid.

## **Food Folate or Naturally Occurring Folate**

In addition to taking a multivitamin every day, individuals also should eat a healthy diet that includes food sources of folic acid (see “Fortified and Enriched Foods” section above) and food folate. Food folate is not widespread in the food supply and is found in significant amounts only in certain foods. It may help to remember that folate is primarily found in foods of plant origin.



Folate-rich food sources include:

- Orange juice, strawberries, oranges and avocados
- Legumes such as dried beans (black, navy, kidney, pinto), dried peas (black-eyed), lentils and peanuts
- Dark green leafy vegetables such as spinach and other greens (mustard, collard, turnip)
- Asparagus, okra, broccoli and Brussels sprouts



Meat and dairy products generally do not contain high amounts of food folate. Folate-rich foods are often good sources of other vitamins and minerals, and fiber, so they are healthy foods to include in any diet. Because folate is a water soluble vitamin, it is easily lost from food into cooking water, so grilling, broiling, steaming or microwaving vegetables is better than boiling them in water. Canned or frozen fruits and vegetables are convenient and affordable alternatives to fresh fruits and vegetables and can make a significant contribution to folate intake.

## ***Other Issues***

### **Interactions Between Folate and Drugs**



Certain medications may interfere with how the body handles folate. These include antiseizure medications, certain antibiotics, medications used to treat rheumatoid arthritis or cancer and certain anti-inflammatory medications (refer to Section 4 for a list of medications that may cause a problem). Individuals taking medications of these types may need more folate on a daily basis and should check with their health care provider about potential interactions. Excessive alcohol intake may displace other nutrients from the diet, including folate, and may interfere with the way the body uses folate. Therefore, chronic alcohol users may have increased folate needs.



## ***Folic Acid and Your Employees***

Folic acid has health benefits for everyone! Here's a summary of the benefits of folic acid:

- Everyone—men, women, and children of all ages—need folate on a daily basis for overall health and body function.
- Folic acid may help reduce the risk of certain chronic diseases, including cardiovascular disease, certain cancers and diseases that affect cognitive function (dementia, Alzheimer's disease).
- Especially important, all women of childbearing age who are capable of becoming pregnant should consume 400 mcg of synthetic folic acid every day as part of a healthy diet that includes foods containing naturally occurring food folate. The best way to meet this recommendation is to take a multivitamin or supplement containing folic acid on a daily basis and eat a healthy diet.

### **Your Mission**

- Discuss folic acid as part of a health and wellness promotion program at your worksite.
- Address barriers associated with daily consumption of a multivitamin.
- Help employees identify food sources of folic acid and food folate.



Helping your employees understand the health benefits of folic acid may help reduce the risk for NTDs and other birth defects and the associated serious, long-term and costly health issues. Folic acid can help your employees maintain day-to-day health and possibly reduce their risk for serious chronic diseases. Since the average lifetime medical costs of a baby with spina bifida are estimated to be over \$636,000 (Waitzman et al. 2005), preventing just one case of spina bifida could result in a substantial savings in health care costs.

**Women have indicated that they are more likely to make the necessary dietary and lifestyle changes when their health care provider recommends them.**

**You CAN make a difference — take every opportunity to share the folic acid message with your employees!**

## References

- Bailey LB, Berry RJ. Folic acid supplementation and the occurrence of congenital heart defects, orofacial clefts, multiple births, and miscarriage. *Am J Clin Nutr* 2005;81(suppl):1213S-1217S.
- Bailey LB, Moyers S, Gregory III J. Folate. In: *Present Knowledge in Nutrition*, 8<sup>th</sup> edition. International Life Sciences Institute, Washington, DC, 2001.
- Cabrera RM, Hill DS, Etheredge AJ, Finnell RH. Investigations into the etiology of neural tube defects. *Birth Defects Research (Part C)* 2005;72:330-344.
- Campbell KP, Lanza A, Dixon R, Chattopadhyay S, Molinari N, Finch RA, editors. *A Purchaser's Guide to Clinical Preventive Services: Moving Science into Coverage*. Washington, DC: National Business Group on Health; 2006.
- [CDC] Centers for Disease Control. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. *MMWR* 1992;41:1-7.
- [CDC] Centers for Disease Control and Prevention. Surveillance for pregnancy and birth rates among teenagers, by State—United States, 1980 and 1990. *MMWR* 1993;42(SS-6):1-27.
- [CDC] Centers for Disease Control and Prevention. Folate status in women of childbearing age—United States, 1999. *MMWR* 2000;49(42):962-965.
- [CDC] Centers for Disease Control and Prevention. Spina bifida and anencephaly before and after folic acid mandate—United States, 1995-1996 and 1999-2000. *MMWR* 2004;53:362-365.
- Cole et al. Folic acid for the prevention of colorectal adenomas. *JAMA* 2007;297(21):2351- 2359.
- Czeizel AE, Dudas I, Metneki J. Pregnancy outcomes in a randomised controlled trial of periconceptional multivitamin supplementation. Final report. *Arch Gynecol Obstet* 1994;255:131-139.
- Czeizel AE, Metneki J, Dudas I. Higher rate of multiple births after periconceptional vitamin supplementation. *N Engl J Med* 1994;330:1687-1688.
- David Aitken, Jennifer A Crossley and Kevin Spencer, "Prenatal screening for neural tube defects and aneuploidy," *Emery and Rimoin's Principles and Practice of Medical Genetics*, Vol. 1, 4th ed. ed. David Rimoin, et al. (London: Churchill Livingstone, 2002), pp 763-771.
- [FDA] Food and Drug Administration. Food Standards: "Amendment of the Standards of Identity for Enriched Grain Products to Require Addition of Folic Acid. Final Rule." (Codified at 21 CFR Parts 136, 137, and 139.) 61 Federal Register 8781-8807. 1996.
- Finer LB, Henshaw SK. Disparities in Rates of Unintended Pregnancy in the United States, 1994 and 2001, *Perspectives on Sexual and Reproductive Health* 2006; 38(2):90-96.
- George L, Mills JL, Johansson AL, Nordmark A, Olander B, Granath F, Cnattingius S. Plasma folate levels and risk of spontaneous abortion. *JAMA* 2002;288:1867-1873.
- Gindler J, Li Z, Berry RJ, Zheng J, Correa A, Sun X, Wong L, Cheng L, Erickson JD, Wang Y, Tong Q. Folic acid supplements during pregnancy and risk of miscarriage. *Lancet* 2001;358:796-800.
- Hook EB, Czeizel AE. Can terathanasia explain the protective effect of folic-acid supplementation on birth defects? *Lancet* 1997;350:513-515.

- [IOM] Institute of Medicine, National Academy of Sciences. *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline*. National Academy Press, Washington, DC, 1998.
- Li Z, Gindler J, Wang H, Berry RJ, Li S, Correa A, Zheng JC, Erickson JD, Wang Y. Folic acid supplements during early pregnancy and likelihood of multiple births: a population-based cohort study. *Lancet* 2003;361:380-384.
- March of Dimes and The Gallup Organization. *Folic Acid and the Prevention of Birth Defects. A National Survey of Pre-pregnancy Awareness and Behavior Among Women of Childbearing Age. November 2006*. 2006.
- Mason et al. A temporal association between folic acid fortification and an increase in colorectal cancer rates may be illuminating important biological principles: a hypothesis. *Cancer Epidemiol Biomarkers Prev* 2007;16(7):1325-1329.
- Nelen WL, Blom HJ, Steegers EA, den Heijer M, Thomas CM, Eskes TK. Homocysteine and folate levels as risk factors for recurrent early pregnancy loss. *Obstet Gynecol* 2000;95:519-524.
- Rampersaud GC, Kauwell, GPA, Bailey LB. Folate: A key to optimizing health and reducing disease risk in the elderly. *J Am Coll Nutr* 2003;22:1-8.
- Ronnenberg AG, Goldman MB, Chen D, Aitken, IW, Willett WC, Selhub J, Xu X. Preconception homocysteine and B vitamin status and birth outcomes in Chinese women. *Am J Clin Nutr* 2002;76:1385-1391.
- [SBAA] Spina Bifida Association of America Web site. [www.sbaa.org](http://www.sbaa.org). Accessed March 2006.
- Shaw GM, Carmichael SL, Nelson V, Selvin S, Schaffer DM. Occurrence of low birthweight and preterm delivery among California infants before and after compulsory food fortification with folic acid. *Public Health Rep* 2004;119:170-173.
- Siega-Riz AM, Savitz DA, Zeisel SH, Thorp JM, Herring A. Second trimester folate status and preterm birth. *Am J Obstet Gynecol* 2004;191:1851-1857.
- [USDHHS] U.S. Department of Health and Human Services. Healthy People 2010. Volume II(2<sup>nd</sup> edition), 2000. <http://www.healthypeople.gov/Publications/> Accessed March 2006.
- Waitzman NJ, Romano PS, Grosse SD. Half-life of cost of illness estimates: the case of spina bifida. In: Wyszynski DF, ed. *Neural Tube Defects: From Origin to Treatment*. Oxford University Press. 2005.
- Wald NJ, Hackshaw AK. Folic acid and miscarriage: an unjustified link. *Am J Med Genet* 2001;98:204.

## **Additional Reading**

- B-Vitamin Treatment Trialists' Collaboration. Homocysteine-lowering trials for prevention of cardiovascular events: a review of the design and power of the large randomized trials. *Am Heart J* 2006;151:282-287.
- Bailey LB, Berry RJ. Folic acid supplementation and the occurrence of congenital heart defects, orofacial clefts, multiple births, and miscarriage. *Am J Clin Nutr* 2005;81(suppl):1213S-1217S.
- Botto LD, Moore CA, Khoury MJ, Erickson JD. Neural-tube defects. *New England Journal of Medicine* 1999; 341:1509-1519.
- Canfield MA, Collins JS, Botto LD, Williams LJ, Mai CT, Kirby RS, Pearson K, Devine O, Mulinare J. Changes in the birth prevalence of selected birth defects after grain fortification with folic acid in the United States: findings from a multi-state population-based study. *Birth Defects Research (Part A)* 2005;73:679-689.
- Daly S, Cotter A, Molloy AE, Scott J. Homocysteine and folic acid: implications for pregnancy. *Semin Vasc Med* 2005;5(2):190-200.
- Geisel J. Folic acid and neural tube defects in pregnancy: a review. *J Perinat Neonatal Nurs* 2003;17(4):268-279.
- Hall JG, Solehdin F. Folic acid: it's good preventive medicine. *Contemporary Pediatrics* 1998;15:119-120,130,132,135,136.
- Havens DH, Leven BR. Good news for women and babies: folic acid prevents birth defects. *J Pediatr Health Care* 1999;13:255-258.
- Iqbal MM. Prevention of neural tube defects by periconceptional use of folic acid. *Pediatrics in Review* 2000;21:58-66.
- Lumley J, Watson L, Watson M, Bower C. Periconceptional supplementation with folate and/or multivitamins for preventing neural tube defects (Cochrane Review). *Cochrane Database of Systematic Reviews* 2001;3:CD001056.
- McCully KS. Homocysteine, vitamins, and vascular disease prevention. *Am J Clin Nutr* 2007;86(suppl):1563S-1568S.
- Morrow JD, Kelsey K. Folic acid for prevention of neural tube defects: pediatric anticipatory guidance. *J Pediatr Health Care* 1998;12:55-59.
- Schultz AW. Improving child and family health through primary prevention of neural tube defects. *Pediatric Nursing* 1999;25:419-422.
- Tamura T, Picciano MF. Folate and human reproduction. *Am J Clin Nutr* 2006;83(5):993-1016.
- Tinkle MB, Sterling BS. Neural tube defects: A primary prevention role for nurses. *Journal of Obstetric, Gynecologic, and Neonatal Nursing* 1997;26:503-512.
- Vozenilek GP. What they don't know could hurt them: increasing public awareness of folic acid and neural tube defects. *J Am Diet Assn* 1999;99(1):20-22.
- Williams JL, Abelman SM, Fassett EM, Stone CE, Petrini JR, Damus K, Mulinare J. Health care provider knowledge and practices regarding folic acid, United States, 2002-2003. *Matern Child Health J* 2006;10(5 Suppl):S67-S72.

## **Relevant Research Studies**

- Berry RJ, Zhu L, Erickson JD, Song L, et al. Prevention of neural tube defects with folic acid in China. *The New England Journal of Medicine* 1999;341:1485-90.
- Bower C, Stanley FJ. Dietary folate as a risk factor for neural-tube defects: evidence from a case-control study in Western Australia. *Med J Aust* 1989;150:613-619.
- Czeizel AE, Dudas I. Prevention of the first occurrence of neural-tube defects by periconceptional vitamin supplementation. *The New England Journal of Medicine* 1992;327:1832-5.
- Daly, L, Kirke P, Molloy A, et al. Folate levels and neural tube defects: implications for prevention. *JAMA* 1995;(27)21:1698-1702.
- Laurence KM, James, N, Miller MH, et al. Double-blind randomized controlled trial of folate treatment before conception to prevent recurrence of neural-tube defects. *Br Med J* 1981;282:1509-1511.
- Mills J, Rhoads GG, Simpson JL, et al. The absence of a relation between the periconceptional use of vitamins and neural tube defects. *New England Journal of Medicine* 1989;321: 430-5.
- Milunsky A, Jick H, Jick SS, et al. Multivitamin/folic acid supplementation in early pregnancy reduces the prevalence of neural tube defects. *JAMA* 1989;262:2847-52.
- MRC Vitamin Study Research Group. Prevention of neural tube defects: Results of the Medical Research Council Vitamin Study. *Lancet* 1991;338:131-127.
- Mulinare J, Cordero JF, Erickson JD, et al. Periconceptional use of multivitamins and the occurrence of neural tube defects. *JAMA* 1988;260:3141-5.
- Shaw GM, Schaffer D, Velie EM, et al. Periconceptional vitamin use, dietary folate, and the occurrence of neural tube defects. *Epidemiology* 1995;6:219-226.
- Smithells RW, Nevin NC, Seller MJ, et al. Further experience of vitamin supplementation for the prevention of neural tube defect recurrences. *Lancet* 1983;1:1027-31.
- Vergel RG, Sanchez LR, Heredero BL, et al. Primary prevention of neural tube defects with folic acid supplementation: Cuban experience. *Prenat Diagn* 1990;10:149-152.
- Werler MM, Shapiro S, Mitchell AA. (1993): Periconceptional folic acid exposure and risk of current neural tube defects. *JAMA* 1993;269:1257-1261.

# **Section 2**

## ***Teaching about Folic Acid in the Workplace***

## ***Ideas for Promoting Folic Acid in the Workplace***

This section provides ideas, suggestions and strategies for promoting the folic acid health message at your worksite. Refer to the Program Implementation Guide on page 3 for additional information.



### **Health and Wellness Professional Education**

The first step is for you, the worksite health and wellness professional, and your staff to learn about this important issue. You can use Section 1 of this guide and view the DVD-video “Prevention of Neural Tube Defects with Folic Acid: You Can Make a Difference” (21 minutes). To get more detailed information about specific topics, refer to Section 4.

### **“Lunch and Learn” or “Break and Learn”**

Conduct a “Lunch and Learn” or “Break and Learn” program at your workplace:

- Use the PowerPoint® presentation file on the enclosed CD-ROM along with the script in Section 3. You also can post the presentation on your company’s Web site or Intranet for self-directed learning.
- Bring some props to your session (bottles of multivitamins, foods) and be prepared to answer questions (refer to the list of Frequently Asked Questions in Section 4).
- If resources permit, consider serving a folate-rich lunch or snack to employees. Examples of foods you could serve include spinach salad, citrus fruits and orange juice, strawberries, peanuts, or other foods (refer to Section 1 for a list of foods rich in folate or use the recipes included in the toolkit).
- Show the DVD-videos “Folic Acid Every Day” (10 minutes) or “The Story of Three Sisters” (6 minutes) for Hispanic audiences (both videos can be found on the DVDs included in the toolkit).



### **Health Fair**

Set up a display table with information about folic acid at a company-wide health fair. Include handouts, brochures and posters (see the Program Implementation Guide on page 3, and Section 5). People love to test themselves, so include a “Test Your Folic Acid Knowledge” quiz as part of your activities (refer to the CD-ROM for sample quiz questions). Include small prizes for correct answers.



## **Have Materials Available**

Display posters or put brochures in employee-frequented areas, such as break rooms, the cafeteria, meeting rooms or other appropriate areas. Use the materials in this toolkit (see the Program Implementation Guide on page 3, and Section 5).

## **Folate Foods to Choose**

Team up with your cafeteria management and staff to identify foods (using signs, etc.) that provide folate. Offer a lunch or dinner special that features folate-rich foods or a folate-rich recipe. Include the following individual foods or combinations of foods:

- Grains (enriched bread, pasta, rice)
- Legumes such as dried beans (black, navy, kidney, pinto), dried peas (black-eyed), lentils, and peanuts
- Dark green leafy vegetables such as spinach and other greens (mustard, collard, turnip)
- Oranges and orange juice
- Strawberries



## **Individual Counseling**

Take the opportunity to discuss the health benefits of folic acid with your employees during personal interactions you have with them about other health and wellness topics. Provide handouts and/or brochures.

## **Video Display/Kiosk**

Include a PowerPoint® display of pertinent folic acid information as part of your company-wide video or kiosk information center (refer to the CD-ROM for sample messages).

## **Newsletter**

Run a story about folic acid in your company newsletter (refer to the CD-ROM for information you can cut and paste directly into your newsletter format).

## **Web Site**

Include folic acid health information on your company's Web site or Intranet (refer to the CD-ROM for sample text). You also can include a link to the Florida Folic Acid Coalition's Web site ([www.FolicAcidNow.net](http://www.FolicAcidNow.net)).





### **E-mail or Voice Mail Messages**

Include a message or series of messages about folic acid as part of company e-mail or voice mail that focuses on health or other issues (refer to the CD-ROM for sample messages).

### **Recipe Contest**

Hold a folic acid recipe contest. Challenge employees to submit a recipe that includes ingredients that are rich in folate (see “Folate Foods to Choose” above).

### **Repeat the Message**

Don't forget to repeat the folic acid health message every year to employees. Key opportunities include:



- **January** for Folic Acid Awareness Week (refer to the National Council on Folic Acid's Web site at [www.folicacidinfo.org](http://www.folicacidinfo.org) for exact dates) and National Birth Defects Prevention Month (see the March of Dimes Web site at [marchofdimes.com](http://marchofdimes.com))
- **March** for National Nutrition Month (refer to the American Dietetic Association's Web site at [www.eatright.org](http://www.eatright.org))
- **May** for National Women's Health Week (refer to [www.womenshealth.gov/whw/](http://www.womenshealth.gov/whw/))
- **October** for Spina Bifida Awareness Month (see the Spina Bifida Association of America's Web site at [www.sbaa.org](http://www.sbaa.org))

Take the opportunity to convey the health benefits of folic acid as part of any health and wellness program that focuses on women's health.

### **Incentives**

Everyone likes to receive recognition for jobs well done. Consider hosting drawings for something of particular value to your employees or providing shirts or other giveaways to all program participants. Host a team challenge where the team signing up the most employees to participate in a workshop or other event are awarded something special. The use of positive incentives to promote and improve desired outcomes of programs is usually “rewarded” with a successful program.



## ***Reaching All Employees***

Employee characteristics, such as age, education level, socioeconomic status and family planning status can affect the degree of motivation or indifference toward learning new information or changing health-impacting behaviors. Because of this, it is important to reach employees in a variety of ways, which may include using brochures, posters, information kiosks, information tables or

other opportunities. Women who are considering becoming pregnant or actively trying to become pregnant may be more highly motivated to take folic acid. For other women, they may think the message does not apply to them.



**Men also need folate** on a daily basis for overall good health and to reduce their risk for certain chronic diseases. Folate also may be important for men’s reproductive health. Encourage men to share information about the importance of folic acid to overall health and birth defect risk reduction with the women in their lives—their wives, daughters, granddaughters, sisters, aunts, nieces and friends—to support adequate folic acid intake on a daily basis.

***Here are some ways to share the folic acid message:***

- Focus on the other health benefits of folate, such as prevention of anemia and the potential for lowering the risk for cardiovascular disease, some cancers and cognitive diseases like Alzheimer’s disease, dementia or depression. Chronic disease risk reduction may be particularly important to older adults.
- Many younger women are not contemplating pregnancy and, therefore, do not perceive themselves as needing to take folic acid on a daily basis. Focusing only on birth defects prevention may completely “turn them off” to the message. Be sure to emphasize the other health benefits.



- Men may link folic acid to women-only issues, such as healthy pregnancy; however, everyone needs folic acid daily and can gain from its many health benefits.
- Stress to women capable of becoming pregnant that even though they may not be planning to become pregnant, their bodies may be ready. Therefore, encourage them to maintain a healthy body so that when they begin to plan for a pregnancy they have a good start. Relate this issue to things that they care deeply about, such as the impact of an NTD-affected pregnancy on friends and family.
- Stress the importance of taking a multivitamin containing folic acid as part of a daily routine to ensure getting needed nutrients on a daily basis. Discuss and dispel myths and barriers associated with taking multivitamins.
- Make employees aware that many folate-rich foods are heart healthy and generally low in fat, calories and cholesterol. These foods provide other nutrients and food components, such as vitamin C, potassium, fiber and phytonutrients that contribute to good health.

- Women, especially younger women, may be motivated to take multivitamins so that they may look and feel their best. To many women, this means having more energy, not feeling tired, feeling better physically and emotionally, or being happy and content. Although there may be little or no scientific evidence supporting these benefits, they may serve as motivators for many women to take a multivitamin every day.
- Young women, including adolescents, will likely gain satisfaction by making decisions that impact their lives. Emphasize that they can be actively involved in the solution for NTD risk reduction and that they have some control over their destiny regarding this issue.

### ***Socioeconomic Status***



Income may affect the employee's ability to obtain items, such as multivitamins or certain foods. Take this into consideration when recommending vitamin or food sources of folate. There are federal government nutrition assistance programs, such as the Federal Food Stamps Program and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), that can assist people who need help. When appropriate, refer employees to their local health department for more information.

### ***Education and Literacy Level***

Your employee's education and literacy level also may affect how well they understand and respond to the verbal instructions or written materials you provide to them. For employees with low literacy levels, focus on the picture representations in the handouts and use a highlighter pen to direct attention to pictures, graphics or key words and phrases. Use native language materials, i.e. Spanish, Creole, etc., when appropriate and available.

### ***Cultural and Ethnic Diversity***

An important aspect of interacting with employees is recognizing, understanding and appreciating their ethnic and cultural diversity. It is important that you be aware of how employees view their world and what may or may not motivate them to incorporate behavior changes in their lives. We are all influenced by our ethnic and cultural backgrounds, values and beliefs. Common characteristics, values and beliefs shared by the mainstream or majority culture in the United States include:

- high value placed on individualism
- action oriented (must always act in a situation)



- subscribes to the Protestant work ethic (i.e., hard work brings success)
- future oriented (i.e., plan for the future)
- believes in cause and effect relationships
- believes the nuclear family is the ideal social unit
- adheres to rigid time (time is a commodity)
- believes man must master and control nature and the environment
- believes all humans are more or less equal



Reading through the above list, you may recognize the extent to which these beliefs are integrated into our health care system. For instance, we encourage employees to be proactive in preventive health care practices. This is both action oriented and future oriented; however, the mainstream health care process for individuals from non-mainstream cultures may be partly or completely ineffective. This is because many cultures may not assign high values to the beliefs that generally characterize the mainstream culture in the US. Here are a few strategies to help you learn more about an employee's worldview (i.e., one's outlook on life based on beliefs and values):

- Ask an employee about his or her cultural beliefs and values. A few pertinent questions might include:
  - *What is your cultural or ethnic background?*
  - *How long have you lived in the United States?*
  - *Do you follow the traditions of your cultural group? What are these traditions?*
  - *Do you follow any particular health or dietary customs based on culture, religion or both? What are these customs?*
- Look for nonverbal cues (body position, eye contact) to indicate whether the employee is comfortable with the interaction.
- Show respect through patience, effective listening and sincerity.

One of your goals as a health and wellness professional is to assist the employee with enhancing his or her health within the context of their existing worldview. There is no all-encompassing strategy for interacting with all cultural or ethnic groups. Seeking information directly from an employee through open and respectful dialogue is the best way to evaluate their worldview, health beliefs and practices. Few people are offended when asked about their beliefs, but be alert for cues that they may be uncomfortable with your questions and respond accordingly. Refer to Section 5 for a list of resources for obtaining more information related to cultural diversity and minority health issues.

## ***Sources***

Maibach E & Parrott RL (eds.). *Designing Health Messages*. Sage Publications, Thousand Oaks, CA, 1995.

Penny G, Bennett P & Herbert M. *Health Psychology: A Lifespan Perspective*. Harwood Academic Publishers, Victoria, Australia, 1994.

# **Section 3**

***PowerPoint® Presentation***

## **PowerPoint® Presentation and Lesson Instructions**

**Number of slides:** 23

**Estimated time to complete:**

15-20 minutes (may vary depending on level of interaction with participants)

**Following this lesson, participants will be able to:**

- Describe neural tube defects (NTDs).
- State the public health recommendations for women of childbearing age to help decrease the risk for having a baby with an NTD.
- Understand who is at risk for having a baby with an NTD.
- List other health benefits of folic acid.
- Describe ways to obtain adequate folic acid on a daily basis.
- Describe barriers to multivitamin consumption and strategies to overcome these barriers.
- State food sources of folic acid and food folate.

**Materials or equipment required:**

- CD-ROM with PowerPoint® presentation (contained in toolkit)—also available with a Spanish translation
- Computer with LCD projector
- Script (follows)
- Handouts/brochures as needed

**How to use the presentation:**

- A picture of each slide follows, along with a presentation script that you can use.
- “Fast Facts!” boxes are included with some slides to provide additional information about the slide topic.
- “Conversation Starters” or “Presentation Props” are included with some slides to facilitate active participation and discussion by participants and to give you ideas for incorporating props or other activities into your presentation. Use of conversation starters and props is optional based on the time available for the presentation.
- Distribute handouts (black and white copies are enclosed in the toolkit and color versions are on the CD-ROM in PDF format) or brochures as supplemental information.
- Show the DVD-video “Folic Acid Every Day!” (10 minutes) or, for Hispanic audiences, “The Story of Three Sisters” (6 minutes; available in English and Spanish).
- If time permits, complete the optional case study activity (found at the end of the lesson script) as a group or individually.



# ***Folic Acid Every Day***

***Protect Your Health  
for a Lifetime!***

1

Today we are going to discuss the many health benefits of the vitamin folic acid, also called folate.



# What is folic acid or folate?

- > Water-soluble **B vitamin** that everyone needs every day
- > Needed for new cells

**Folic acid:** synthetic, or man-made, form found in supplements and “enriched” grains

**Food Folate:** natural form found in certain foods

**Folate** is a general term used for all forms

2

## ***Fast Facts!***

- You lose up to 40,000 dead skin cells every minute of the day.
- You shed 50 to 100 strands of hair each day.
- Your body replaces cells in your small intestine about every 5 days. That's about 17 billion new cells your body makes every few days!

Folic acid or folate is a water-soluble B vitamin that everyone – men, women and children of all ages – need on a daily basis.

Folic acid is needed for new and developing cells. No matter your age, you are continually making new cells, like skin, blood, hair and intestine.

There are two major forms of this vitamin. The man-made, or synthetic, form is known as folic acid and is the form added to vitamin supplements and certain foods.

The natural form of the vitamin, found in certain foods, is called “food folate” or “naturally occurring folate”.

The general term “folate” is used to describe both forms.

## **Conversation Starters**

- *Has anyone ever heard of folic acid or folate?*
- *What have you heard or what do you know about folic acid?*

## **Presentation Props**

- *To reinforce the information in the presentation, distribute the handouts provided in the toolkit (photocopier-ready black and white copies are included and color PDF copies are on the CD-ROM).*

## Health benefits of folate

- > **Healthy tissues**
- > **May help lower risk for**
  - Birth defects
  - Heart disease
  - Certain cancers
  - Cognitive (brain) diseases
- > **Improve overall health and vitality**
- > **Good for everyone**



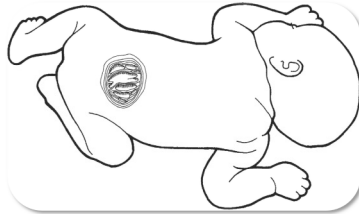
3

There are several health benefits of folate. It helps maintain healthy tissues and can help prevent anemia. Scientists also think that folic acid may help lower the risk for birth defects, as well as heart disease, certain cancers and diseases that affect the brain or mental function, such as Alzheimer's disease, dementia and depression.

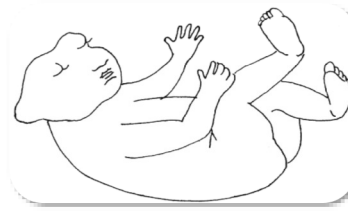
Folate is a vitamin that can help contribute to maintaining your overall health and vitality. Everyone needs it every day!

We are going to start by talking about how folic acid may help reduce the risk for birth defects. This is an important topic even if you're not thinking about pregnancy or you're a man, because each of you probably know women and young girls that you care about and with whom you can share this important information. Later, we will talk about how folate may help protect against other health conditions.

## Birth Defects Neural Tube Defects



**Spina bifida**



**Anencephaly**

4

### ***Fast Facts!***

There are 3 types of spina bifida:

#### **Meningocele**

[*muh-ninja-seel*] – occurs when the baby is born with a sac made of spinal fluid and meninges (spinal cord membrane) that protrudes from the baby's back.

#### **Myelomeningocele**

[*My-low-muh-ninja-seel*] – the most severe type of spina bifida that occurs when the sac (on the outside of the body) is filled with meninges, spinal fluid, spinal cord, and spinal nerves.

**Spina bifida occulta** – the least severe type. Most people who have it are unaware of the defect.

One of the most important health benefits of folic acid is that it may help reduce the risk for a category of birth defects called neural tube defects or NTDs. NTDs affect the central nervous system.

The picture on the left depicts a baby with spina bifida [*spy-nah bif-i-duh*], the most common type of NTD. You can see that the baby's back doesn't look normal. There is a sac that looks like a large bubble (balloon) pushing out from the backbone. This occurs because the spinal cord has not formed properly and parts of it are exposed outside of the body.

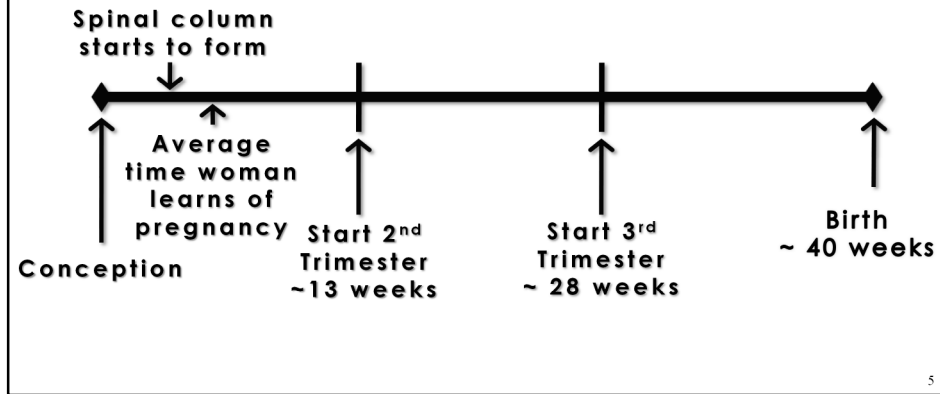
Babies born with spina bifida may have paralysis (can't walk or need leg braces in order to walk); limited or no bladder or bowel control; water on the brain (also called hydrocephalus [*hy-drow-sef-uh-las*], which can lead to learning disabilities); and breathing complications. These problems occur because the spinal cord nerves have been damaged.

The baby on the right has anencephaly [*an-en-sef-uh-lee*]. This is where the brain does not form properly. Anencephaly is a fatal condition.

### ***Conversation Starters***

- *Does anyone know a person or family affected by NTDs?*
- *If so, what has been your experience with this person or family?*

## NTDs occur early in pregnancy



An NTD occurs when the neural tube (the spinal column) fails to develop properly. The neural tube forms very early in pregnancy, beginning the 3<sup>rd</sup> week after conception. Women may not even know they are pregnant until the 5<sup>th</sup> or 6<sup>th</sup> week of pregnancy, after the neural tube has already started to form, so getting enough folic acid before pregnancy is important.

# **ANYONE can have an NTD-affected pregnancy!**



The reality is, **any woman** who is capable of becoming pregnant could have a baby with a neural tube defect. In fact, 95 percent of babies born with spina bifida are born into families that have no history of neural tube defects.

## ***Conversation Starters***

- *How does it make you feel to know that you or women you know may be at risk for having a baby with an NTD?*
- *What does the phrase “all women who can become pregnant” mean to you?*
- *Do you think it only pertains to women who are planning to get pregnant?*
- *What age groups does this represent?*



## Hispanic/Latina women have a higher risk of having a baby with an NTD

7

### ***Fast Facts!***

- Women from Northern China, Northern Ireland, and the United Kingdom also have higher rates of NTDs compared to other women.
- According to surveys conducted by the Centers for Disease Control and Prevention, Hispanic/Latina women have less knowledge about the health benefits of folic acid and are less likely to take a multivitamin containing folic acid on a daily basis.

Studies have shown that Hispanic/Latina women, especially those of Mexican-American descent, may have a higher risk for having a baby with an NTD than other women, so it's extra important for them to make sure they get adequate folic acid every day.

# How can you get the folate you need?

- Eat folate-rich foods
- Eat enriched grain products or fortified cereals
- Take a multivitamin with folic acid or a folic acid pill



8

**Folate benefits everyone** and is simple to get. Choose foods that are rich in food folate and foods enriched with folic acid like breads and pastas. Most multivitamins contain folic acid or you can take a folic acid supplement.

## Recommended Dietary Allowance (RDA)



- **400 micrograms (mcg)**
- **Age 14 and older**
- **Males and females\***

\*females capable of becoming pregnant have a special recommendation

9

Everyone needs folate for good health. The Recommended Dietary Allowance (RDA) for folate is 400 micrograms daily for men and women 14 years and older. You can meet this recommendation by consuming folate-rich foods, enriched or fortified foods, or supplements.

However, there is a special recommendation for women who are capable of becoming pregnant.



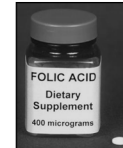
## Recommendation for women capable of becoming pregnant



- 400 micrograms of synthetic folic acid every day
- Eat a healthy, varied diet
- Supported by:
  - U.S. Public Health Service*
  - Institute of Medicine*
  - Various organizations*



Multivitamin



Folic acid pill

### ***Fast Facts!***

The recommended level of folic acid intake for women who have previously had an NTD-affected pregnancy is 4,000 micrograms per day. This is **10 times** the amount recommended by the Institute of Medicine for women with no history of NTDs. This amount should only be taken under a health care provider's supervision.

The U.S. Public Health Service and the Institute of Medicine recommend that **all women** of childbearing age, whether they are teenagers or adult women in their 40s or older, who can become pregnant, consume 400 micrograms of synthetic folic acid every day from supplements, enriched foods or both, in addition to getting food folate from eating a nutritious and varied diet.

Taking 400 micrograms of synthetic folic acid every day could decrease the incidence of NTDs by 50 to 70 percent. This recommendation is supported by the March of Dimes, the Centers for Disease Control and Prevention and professional medical associations such as the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics.

### ***Conversation Starters***


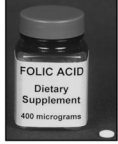
- *Do you feel like this recommendation applies to you? Why or why not?*

**Women who can become pregnant, should...**

**TAKE 400 MICROGRAMS OF FOLIC ACID EVERY DAY**

**even if they are not planning a pregnancy!**

***Almost half of U.S. pregnancies are unplanned or mistimed***

Folic acid pill

11

### ***Fast Facts!***

Studies show that 82 percent of pregnancies of teens between the ages of 15-19 in the United States are unplanned.

There are two reasons why folic acid must be taken before a woman gets pregnant:

**First**, the neural tube forms early during pregnancy—during the first month—before many women even know they are pregnant.

**Second**, in the United States, more than half of all pregnancies are unplanned or mistimed (occur earlier than desired).

So the “take home” message is that all women who can become pregnant, including teenagers and possibly younger girls, should take 400 micrograms of synthetic folic acid every day. Women should take folic acid **regardless of whether they are planning a pregnancy.**

### **Conversation Starters**

- *Do only women who are thinking about or actively planning a pregnancy need to consider taking folic acid? Why or why not?*
- *How many of the women here (of childbearing potential) take folic acid every day?*
- *Were you aware of the folic acid recommendations?*
- *Do you feel motivated to make sure you get plenty of this vitamin every day?*

## How can women and teenage girls get the folic acid they need?

The best way is through multivitamins with folic acid or folic acid pills



### Supplement Facts Serving Size 1 Tablet




**folic acid**  
**400 micrograms (mcg)**  
**OR 100% Daily Value**

12

### ***Fast Facts!***

The Institute of Medicine recommends that individuals get no more than 1000 micrograms per day of folic acid from vitamins and/or fortified foods unless they are under the care of a health care provider.

The best way for women and teenage girls to get the folic acid they need is through a multivitamin containing folic acid **or** a folic acid pill. Taking a multivitamin can help to ensure they get the right amount. Always check the label on the bottle to see how much folic acid is in the product. Look on the back of the bottle for the “Supplement Facts” label. Then look for “Folic Acid” (some labels may say “Folate”) to see how much folic acid is in each tablet. Choose a product with **400 micrograms** of folic acid per tablet, or 100% of the Daily Value, or DV. You should take no more than one pill per day.

### ***Conversation Starters***

- *How many of you take a multivitamin every day? Do you know if it contains folic acid?*
- *Will everyone check their vitamins when you get home to see if your vitamin contains folic acid and if it does, the amount it contains?*

### ***Presentation Prop***

- *Pass around bottles of multivitamins.*

There are other good reasons to take a multivitamin. The truth is, we don’t always eat right every day. Healthy cells make a healthy body, and all cells in the body need folic acid every day. Remember that many pregnancies are not planned, so teenagers and women who can get pregnant need to have adequate folic acid every day.

## Simple ways to remember to take your multivitamin

*Put your multivitamins or folic acid pill...*



Next to your birth control pills or other medications



Next to your toothbrush



Next to your coffee pot

13

Many people buy vitamins with good intentions, but forget to take them. Here are some ways to remember to take your vitamins. Put your multivitamins or folic acid pills in a place where you will see them every day, or next to an object that you use every day. This could be:

- ◆ With your birth control pills or other medications that you take every day
- ◆ Next to your toothbrush where you can see them when you brush your teeth
- ◆ Next to the coffee pot where you can see them when you are making coffee or fixing breakfast or other meals.

Other places may work better for you. If you watch TV every day, play a sport or have a hobby, you can put your vitamins near items associated with these activities. The best place for you is any place where you will see the bottle every day! Always remember to keep your vitamins out of the reach of children!

### **Conversation Starters**

- *For those of you who take a vitamin every day, what are some of your strategies for remembering to take one?*
- *What are some other ways you can think of to remember to take a vitamin every day?*

## Folic acid plus a healthy diet!



In addition to taking a multivitamin with folic acid or a folic acid pill...



### **Eat a healthy, varied diet**

- Foods fortified with folic acid
- Foods naturally rich in folate

14

Along with getting 400 micrograms folic acid every day, women and teenage girls should eat a healthy, varied diet that includes foods fortified with folic acid and foods that are naturally rich in food folate. This may help reduce their chance of having a pregnancy affected by a neural tube defect if they become pregnant, as well as promote overall good health.

## Other sources of folic acid?

### Folic acid fortified foods



15

### ***Fast Facts!***

Synthetic folic acid is more bioavailable (or readily absorbable) than food folate.

Folic acid is added to enriched cereal grain products and fortified foods, such as fortified breakfast cereals.

Examples of the amount of folic acid in these foods will be presented shortly.

## Fortified breakfast cereals

- Many provide from 100 to 400 micrograms of folic acid per serving
- Check the label!
- Look for 100% of the Daily Value (DV) for folic acid or folate



16

Fortified breakfast cereals are a great way to get more folic acid into your diet! Many fortified cereals provide from 100 to 400 micrograms folic acid in one serving (25 to 100 percent of the Daily Value).

Check the label to see how much folate or folic acid your favorite cereal contains. To get 400 micrograms of folic acid, look for a cereal that provides 100 percent of the Daily Value for folic acid or folate.

If teenagers and women who are capable of becoming pregnant can't take a multivitamin or folic acid supplement every day, eating fortified breakfast cereals can provide the folic acid they need. Eating a fortified breakfast cereal containing 400 micrograms of folic acid every day is especially important for these women.

### **Presentation Prop**

- *Pass around several boxes of cereals that contain folic acid.*

## Enriched grain foods



- **Enriched bread, white**  
2 slices = 30 micrograms  
(8% Daily Value)
- **Enriched flour tortilla, 10 inches**  
1 each = 80 micrograms  
(20% Daily Value)
- **Enriched spaghetti, cooked**  
1 cup = 90 micrograms  
(23% Daily Value)
- **Enriched rice, cooked**  
1 cup = 95 micrograms  
(24% Daily Value)

17

### ***Fast Facts!***

The Food and Drug Administration approved folic acid fortification to help women increase their intake of this vitamin with the goal of reducing their risk of having a baby with an NTD. Some foods that may not be fortified include whole-grain products (which are typically not enriched) and some imported foods. Check the ingredients list to see if folic acid has been added.

Foods that are fortified with folic acid include cereal grain foods that have the word “enriched” on the label. This includes:

- ◆ Enriched breads and rolls. Two slices of enriched bread have 30 micrograms of folic acid.
- ◆ Foods made from enriched flour, such as flour tortillas. A 10-inch flour tortilla has 80 micrograms of folic acid.
- ◆ Enriched pasta, noodles and macaroni. One cup of enriched cooked spaghetti has 90 micrograms of folic acid.
- ◆ Enriched rice. One cup of enriched cooked rice has 95 micrograms of folic acid.

### ***Presentation Prop***

- *Pass around packages of enriched grain foods such as breakfast cereals, breads, bagels, crackers, pasta, and rice. Have participants check the ingredients list for folic acid.*

Other examples of foods made from enriched flour include breaded foods and snack foods, like crackers, cakes and cookies. Although these foods are fortified with folic acid, they might not be as healthy as other enriched foods. You must choose products that are **enriched** to get folic acid.



## Food folate

- Fruit: orange juice, oranges, strawberries, avocados
- Vegetables: dark green leafy vegetables (spinach, other greens), asparagus, broccoli
- Dried beans/peas: navy, black, pinto, kidney beans; lentils, peanuts



18

### ***Fast Facts!***

Because folate is a water-soluble vitamin, it can easily leach out into the water used to cook your foods. Steaming, roasting, grilling, or sautéing foods are good methods to use to preserve the folate contained in these foods. If you cook them in water, use as little water as possible or reuse the water for soups or stews to reclaim the folate lost during cooking.

### **Presentation Prop**

- *Provide fresh oranges or serve 100 percent orange juice to participants. Print and include a sticker on each orange that says "Don't forget your folate!"*

Eating foods that are good sources of food folate is a great way to help meet your needs for this vitamin.

Remember, sources of food folate include:

Fruit, including oranges, strawberries, cantaloupe and avocados. Orange juice is a good source of folate and can be bought fresh, ready-to-drink, or from frozen concentrate. Orange juice contains other nutrients and food components, such as vitamin C, potassium and phytonutrients. You also can buy orange juice that has added calcium, which can help maintain strong bones.

Dark green leafy vegetables, including spinach, other greens such as mustard, turnip and collard greens, asparagus, broccoli, Brussels sprouts and okra. These foods, especially when eaten uncooked or cooked in a small amount of water, are great sources of food folate!

Dried beans including black, kidney, navy and pinto, are great sources of food folate. Black-eyed peas, chickpeas (garbanzo beans), lentils and peanuts also are high in folate. These foods are generally inexpensive and very healthy.

## Foods rich in folate

- Low in calories
- Low in fat
- No cholesterol
- High fiber
- Rich in other vitamins and minerals



**Folate-rich foods are  
heart healthy**

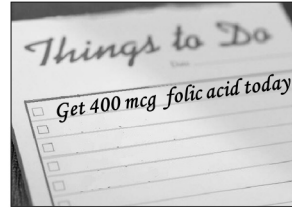
19

Another reason to include sources of food folate in your diet is that many foods rich in folate are “heart-healthy” foods. They are naturally low in calories and fat, have no cholesterol because they are plant foods, and are high in fiber. They also provide other vitamins and minerals needed for good health. These are just a few more great reasons to include folate-rich foods in your eating plan!

# Summary of recommendations

## ➤ **Women of childbearing age**

- 400 mcg of synthetic folic acid
  - Multivitamins or folic acid pills
  - Enriched grain foods
- Healthy diet that includes folate-rich foods



## ➤ **Everyone else (age 14 and older)**

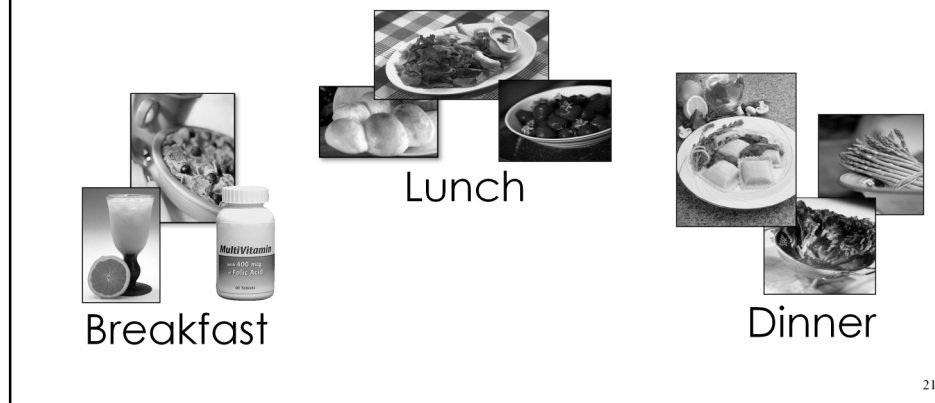
- Healthy diet that includes 400 mcg folate
  - Folate-rich foods
  - Enriched grain foods
  - Vitamin supplements

20

To summarize the recommendations, women of childbearing age need to consume 400 micrograms of folic acid on a daily basis. Women can take a multivitamin containing folic acid, a folic acid supplement, or eat a variety of enriched grain foods. This should be coupled with eating a healthy diet that includes folate-rich foods, such as orange juice, spinach, or dried beans.

Everyone else should consume a healthy diet that includes 400 micrograms of folate, which can be obtained from foods naturally rich in folate or foods enriched with folic acid. Vitamin supplements also are an option.

## Small changes to your diet can make a difference



Your goal is to feel confident that you can go home TODAY (TONIGHT) and get more folate in your diet. Here are a few suggestions to get you started. Don't think that you have to change all of your eating habits overnight. Begin by making small changes! For example, for breakfast, drink a glass of orange juice, or eat a serving of fortified cereal. And for women who can get pregnant - don't forget to take your multivitamin pill, too!

For lunch, try a green salad with some bread or rolls made with enriched flour. Include strawberries as a tasty snack.

For dinner, try adding asparagus or some dark greens to your pasta dinner. Many fortified and folate-rich foods naturally go together, like rice and beans and bean burritos (burritos made with fortified flour).



Protect your health...  
**Get the folate you need every day!**

22

Folate is important for your health, and it also may help reduce the risk for neural tube defects and chronic diseases, such as heart disease, certain cancers and Alzheimer's disease. You can be part of something important! Be sure to get enough folate every day to protect your health for a lifetime!

# Share the Message!



23

**It's important to share this important health information with others you know – your family, friends and colleagues.**

Share what you know about folate with the important people in your life, especially women of childbearing age... your wife, daughter, sister, granddaughter or niece.

**Remember, everyone can benefit from getting adequate folate every day!**

## **Presentation Prop**

- *Do the case study activity on the next page to reinforce the information presented.*

## Case Study Activity

### Materials required:

- Handouts: Case Study Sheets #1 through #5
- Case Study Question Sheet
- Case Study Question/Answer Sheet (for the educator)
- Pens/Pencils

### Instructions:

- Divide the participants into five or fewer groups, with at least two people in each group. Distribute one case study sheet to each group. Alternatively, make several copies of each case study and distribute one case study to each participant. Distribute a case study question sheet to each individual or group.
- Tell participants to read their case study and answer the questions.
- Ask someone from each group to volunteer to present their case study and discuss the questions and answers. Use the “Case Study Question/Answer Sheet” to assist with the discussion.
- As time allows, encourage group discussion.

# **Section 4**

***Additional Information and  
Frequently Asked Questions***



## ***What are neural tube defects?***

Neural tube defects, or NTDs, are a group of congenital birth defects. This type of defect occurs when the neural tube, which becomes the brain and spinal cord of the developing fetus, fails to form properly. If the lower portion of the neural tube forms improperly, the spinal cord is affected. If the upper portion of the neural tube forms improperly, the brain is affected. The severity of the birth defect depends on the type and location of the lesion.

## ***What are the types of NTDs?***

The two most common types of NTDs are **anencephaly** and **spina bifida**, which account for 90 percent of NTDs that occur. Anencephaly results when the upper portion of the neural tube does not form properly. This causes a malformation of the brain and may also cause facial and cranial defects. Anencephaly is a fatal condition; infants with this defect die before or shortly after birth. Spina bifida results when the lower portion of the neural tube does not form properly. The result is a protrusion of spinal cord components outside of the body. **Meningocele** is a less severe form of spina bifida where spinal fluid and meninges (the membrane that covers the spinal cord) protrude from a sac through the skin on the back. This form of spina bifida is less severe than others because the spinal cord nerves are not included in the protruded tissue. This reduces the chances that the spinal cord nerves are damaged. **Myelomeningocele** is a more severe form of spina bifida where the spinal cord nerves

protrude along with the meninges. Myelomeningocele is usually associated with damage to the spinal nerves and resulting complications. **Encephalocele** accounts for the remaining 10 percent of NTDs. Encephalocele is a defect where the brain protrudes outside the skull in a sac of skin. Children born with encephalocele usually live but often have mental disabilities.

## ***Who is at risk for having a child with an NTD?***

Every woman capable of becoming pregnant is at risk for having a baby affected by an NTD. In fact, 90 to 95 percent of all cases of spina bifida occur in families with no history of an NTD (Aitken 2002). The neural tube develops within the first month of pregnancy, before many women realize they are pregnant. In addition, over half of all pregnancies and 82 percent of teen pregnancies (ages of 15-19) in the United States are unplanned or mistimed (i.e., occur earlier than desired or expected) (Finer 2006). Although all women of reproductive age are at risk, some women may be at higher risk than others. Factors that can increase risk include (CDC 1998):

- A prior NTD-affected pregnancy or family history of NTDs
- Race/ethnicity (NTDs are more common among women of Hispanic origin, particularly Mexican-American women born in Mexico, and among women from northern China, Northern Ireland, and the United Kingdom.)
- Use of antiseizure medications
- Low socioeconomic status

- Maternal obesity
- Maternal insulin-dependent diabetes
- Maternal hyperthermia (e.g., hot tub or sauna use, elevated fever) during early pregnancy

### ***What complications are associated with NTDs?***

Complications range from mild to very severe, depending on the location and severity of the lesion (lesions located higher on the spinal column result in more severe complications). Common complications include hydrocephalus (also known as water on the brain, an accumulation of fluid in the cranial cavity that applies pressure on the brain and can affect mental function), paralysis, motility problems, variable loss of bladder and bowel control, and learning disabilities.

### ***What costs are associated with NTDs?***

The costs associated with spina bifida have been estimated to be over \$635,000 during the course of a lifetime (Waitzman et al. 2005) and may be well above \$1 million. These costs include ongoing medical care, surgeries for back closure and shunt placement (to relieve hydrocephalus), hospitalizations due to infection or other complications, and special equipment (e.g., leg braces, wheelchairs, catheters). There also are many physical and emotional tolls on affected families. Although many affected individuals may lead long and productive lives, the complications associated with NTDs impact children and their families for a lifetime.

### ***How can you tell if you have an NTD-affected pregnancy?***

The first step is to check maternal blood for the protein alpha-fetoprotein (AFP). This test is usually done 16 to 18 weeks after a woman's last menstrual period. Elevated AFP levels indicate that an NTD may be present; ultrasound is typically used to confirm the diagnosis. Many NTD cases are diagnosed without the mother having the AFP blood test and are found when women have a routine screening ultrasound. However, these techniques cannot identify all NTD cases.

### ***What happens if I find out I have an NTD-affected pregnancy?***

An NTD-affected pregnancy is considered a high-risk pregnancy, and you may be referred to a specialized hospital, clinic or health care provider. Genetic counseling is usually offered, and you may be able to speak with families affected by NTDs. A genetic counselor can assist you with medical decisions concerning your pregnancy.

### ***Is there a difference between folic acid and folate?***

Yes, there is a difference between folic acid and folate. **Folic acid** is the synthetic (man-made) form of the vitamin and is used in vitamin supplements and in fortified foods (enriched cereal grain products such as breakfast cereals, breads and rolls, pasta, and rice). This vitamin also is found naturally in

some foods. This form of the vitamin may be referred to as food folate or naturally occurring folate. Foods containing food folate include orange juice, strawberries, oranges, dark green leafy vegetables (spinach and other greens), broccoli, asparagus and dried beans and peas (pinto, kidney, black-eyed peas, lentils).

The chemical structure of synthetic folic acid and food folate are different and synthetic folic acid is more readily bioavailable (absorbed) than food folate. In fact, food folate is only about 50 percent bioavailable, whereas folic acid is approximately 100 percent bioavailable when consumed alone (such as taking a folic acid supplement on an empty stomach), and 85 percent bioavailable when consumed with other food (such as a breakfast cereal that is fortified with folic acid) (IOM 1998).

Be aware that the term “folate” may be used to describe food folate and folic acid. The term “folate” also is used when referring to blood or tissue concentrations of the vitamin. You may find that other resource materials use these terms in different ways.

### ***What can be done to possibly lower the risk of having an NTD-affected pregnancy?***

Research has shown that daily consumption of 400 micrograms folic acid during the periconceptional period, that is, one month prior to conception through the end of the first trimester, may help lower the risk for an NTD-affected pregnancy by 50 to 70 percent

(CDC 1992). Because other factors affect NTD risk, consuming folic acid may not eliminate all NTDs; however, the risk reduction is significant. In addition to consuming 400 micrograms folic acid, women should also consume food folate from a varied diet. All women capable of becoming pregnant **should consume 400 micrograms folic acid every day. Women need folic acid before conception.**

### ***How much folic acid do women of childbearing age need to take?***

The IOM recommends that all women of childbearing age consume 400 micrograms of synthetic folic acid every day, along with eating a varied diet that includes food folate, to help reduce their risk of having a baby with an NTD (IOM 1998). Folic acid can be obtained through vitamin supplements, fortified foods, or a combination of the two. Food folate can be obtained from foods such as orange juice, dark green leafy vegetables, broccoli, strawberries and dried beans and dried peas such as pinto and kidney beans and lentils.

Women with a previous NTD-affected pregnancy who are trying to get pregnant should be under the care of a health care provider and may need 4,000 micrograms (4 milligrams, or 10 times the normal recommended amount) of folic acid every day. This level of folic acid should be taken only under the supervision of a health care provider. Women should not get this amount of folic acid by taking multivitamins, since this could provide potentially harmful amounts of other vitamins or minerals (e.g., vitamin A).

### ***When do I need to take folic acid?***

To be effective in reducing the risk for NTDs, folic acid should be taken prior to and during the first trimester of pregnancy. This presents a problem because over half of all pregnancies are unplanned or mistimed, and many women do not know they are pregnant until after the neural tube develops. By the time a woman realizes she is pregnant, it may be too late. This is why it is recommended that **all women of childbearing age take folic acid every day throughout their reproductive years.**

### ***What is the easiest way to meet the folic acid intake recommendation?***

The **easiest and surest way** to meet the recommendation is to take a multivitamin or folic acid supplement containing 400 micrograms folic acid every day as part of a healthy diet. Folic acid also can be obtained from enriched cereal grain products. The easiest way to get folic acid through foods is to eat one serving each day of a fortified cereal that provides 400 micrograms folic acid, or 100 percent of the Daily Value (check the Nutrition Facts panel on the cereal box). Include folate-rich foods (dark green leafy vegetables, dried beans, dried peas, and orange juice) as part of a varied diet in addition to taking a folic acid supplement/multivitamin or eating folic acid fortified foods.

### ***Can I meet the public health folic acid intake recommendation just by eating foods rich in food folate?***

No. Research studies show that in order to help reduce the risk, you must consume 400 micrograms of folic acid, preferably from a vitamin supplement, in addition to folate from a varied diet (CDC 1992). Women need folic acid **before** conception to help reduce their risk of having a baby with an NTD.

### ***Is adequate folate intake beneficial for men, women beyond childbearing age, and children?***

Yes. Folate is not stored in the body in large amounts and must be eaten or taken every day so the body has enough to function properly. Folate helps make DNA and is needed to make healthy red blood cells. Folate is important for proper growth and development, helps the body replace cells on a daily basis, and is needed for many metabolic reactions.

### ***What is the RDA recommendation for folate across the lifespan?***

The Institute of Medicine has established the following Recommended Dietary Allowances (RDA) for folate for various age groups (see table on next page) (IOM 1998). Note that the IOM has a separate folic acid intake recommendation for women of childbearing age as described in the previous paragraphs. Dietary Folate Equivalents (DFE) are used to

<b>Age/Gender</b>	<b>RDA (micrograms DFE* per day)</b>
Infants (0-6 months)	65**
Infants (7-12 months)	80**
Children (1-3 years)	150
Children (4-8 years)	200
Children (9-13 years)	300
Teenagers (14-18 years)	400
Adults (≥19 years)	400
Pregnant women†	600
Lactating women	500
* DFE = dietary folate equivalents. ** Adequate Intake amount. † Women should continue to get 400 micrograms of folic acid from supplements or fortified foods until their pregnancy is confirmed and they begin prenatal care.	

designate the amount of folate needed since synthetic folic acid and food folate are absorbed at different rates by the body.

### ***Can I get too much folate or folic acid?***

Thus far, there is no toxicity associated with high intakes of food folate. The Upper Tolerable Level (UL) of intake established by the Institute of Medicine (IOM) is 1,000 micrograms per day of synthetic folic acid (from vitamins or fortified foods) (IOM 1998). This amount of folic acid is not associated with toxicity, but instead was established because high doses of folic acid may mask symptoms associated with a deficiency of vitamin B<sub>12</sub>. If left untreated, vitamin B<sub>12</sub> deficiency may lead to irreversible neurological damage. This UL does not include the folate obtained from

folate-rich food sources (i.e., food folate from nonfortified foods). A multivitamin containing 400 micrograms of folic acid taken once per day easily meets the IOM recommendations for reducing NTD risk.

### ***Are all grain foods fortified with folic acid? What about imported foods?***

Most whole grain foods are not enriched and are not required by the Food and Drug Administration (FDA) to have folic acid added to them. However, products containing whole grains may be enriched by food manufacturers. Foods imported from other countries may or may not contain folic acid. If manufacturers of imported products choose to enrich their products, they must follow FDA rules regarding fortification. To be sure, check the ingredients list on the food label to see if it includes folic acid.

### ***Why are foods fortified with folic acid?***

The FDA approved folic acid fortification of cereal grain products to assist women with meeting the folic acid intake recommendation for reducing NTD risk (FDA 1996). There was much discussion regarding the amount of folic acid to be added to foods. Much of the debate focused on the potential masking of a vitamin B<sub>12</sub> deficiency. There are some indications that the current level of fortification (140 micrograms folic acid per 100 grams consumed product) may not be high enough to ensure women meet the daily folic acid intake recommendation of 400 micrograms.

***Has food fortification helped women get more folic acid or reduced the number of babies born with NTDs?***

Folic acid fortification has improved folate status in the United States. Serum and red blood cell folate concentrations in women aged 15 to 44 years were reported to be substantially higher after fortification compared to prefortification (CDC 2000). This increase in folate status coincided with a 26 to 27 percent reduction in the number of NTDs in the United States (CDC 2004). Although this is a significant reduction, it is far short of the estimated reduction in NTD incidence of 50 to 70 percent based on previous studies (CDC 1992). Folic acid fortification also has been associated with significant reductions in NTD rates in Canada and Chile.

***What medications may interact with folate?***

Certain medications may interfere with folate absorption, metabolism or excretion. These include antiseizure medications, certain antibiotics, medications used to treat rheumatoid arthritis or cancer, and certain anti-inflammatory medications. The following table presents a list of medications that may have an interaction with folate. Individuals should be counseled to consult with their health care provider or pharmacist regarding whether they are taking a medication that may potentially interact with folate.

<b>Potential Drug Interactions with Folate</b>	
<b>Drug category or treatment</b>	<b>Examples*</b>
Antacids, Antiulcer	Histamine-2 blockers, proton pump inhibitors
Antibiotics	Combination of Trimethoprim and a sulfonamide (Bactrim®, Septra®)
Anticancer	Methotrexate, Aminopterin
Anticonvulsants, antiseizure	Phenobarbital, Phenytoin (Dilantin®), Carbamazepine (Tegretol®), Primidone (Mysoline®), Valproic acid (Depakene®)
Antihistamines	Cimetidine (Tagamet®)
Anti-inflammatory	Sulfasalazine (Azulfidine®)
Antimalarial	Pyrimethamine
Beta-blockers and calcium-channel blockers	Some medications used to treat high blood pressure or other heart conditions
Diabetes	Metformin
Diuretics	Triamterene
Hypercholesterolemia	Cholestyramine (Locholest®, Questran®)
Nonsteroidal antianflammatory drugs (NSAIDS)	Aspirin, Ibuprofen
Rheumatoid arthritis	Methotrexate
Sulfonamides	Sulfamethoxazole, sulfamethazine
*This list is not all inclusive.	

## References

- Bailey LB, Moyers S, Gregory III J. Folate. In: *Present Knowledge in Nutrition*, 8<sup>th</sup> edition. International Life Sciences Institute, Washington, DC, 2001.
- Cabrera RM, Hill DS, Etheredge AJ, Finnell RH. Investigations into the etiology of neural tube defects. *Birth Defects Research (Part C)* 2005;72:330-344.
- [CDC] Centers for Disease Control. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. *MMWR* 1992;41:1-7.
- [CDC] Centers for Disease Control and Prevention. Surveillance for pregnancy and birth rates among teenagers, by State—United States, 1980 and 1990. *MMWR* 1993;42(SS-6):1-27.
- [CDC] Centers for Disease Control and Prevention. *Preventing Neural Tube Birth Defects: A Prevention Model and Resource Guide*. 1998.
- [CDC] Centers for Disease Control and Prevention. Folate status in women of childbearing age--United States, 1999. *MMWR* 2000;49(42):962-965.
- [CDC] Centers for Disease Control and Prevention. Spina bifida and anencephaly before and after folic acid mandate—United States, 1995-1996 and 1999-2000. *MMWR* 2004;53:362-365.
- [FDA] Food and Drug Administration. Food Standards: “Amendment of the Standards of Identity for Enriched Grain Products to Require Addition of Folic Acid. Final Rule.” (Codified at 21 CFR Parts 136, 137, and 139.) 61 Federal Register 8781-8807. 1996.
- Finer LB, Henshaw SK. Disparities in Rates of Unintended Pregnancy in the United States, 1994 and 2001, *Perspectives on Sexual and Reproductive Health*, 2006; 38 (2):90-96.
- [IOM] Institute of Medicine, National Academy of Sciences. *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline*. National Academy Press, Washington, DC, 1998.
- Waitzman NJ, Romano PS, Grosse SD. Half-life of cost of illness estimates: the case of spina bifida. In: Wyszynski DF, ed. *Neural Tube Defects: From Origin to Treatment*. Oxford University Press. 2005.

# Section 5

## *Resources*



*This list includes sources of materials or additional information about neural tube defects, nutrition, women's health, or children's health.*

## Governmental Health Agencies

### **Centers for Disease Control and Prevention (CDC)**

National Center on Birth Defects and Developmental Disabilities

1600 Clifton Road, MailStop E-86

Atlanta, GA 30333

Phone: (404) 639-3311

Public Inquiries: (800) 311-3435

Fax: (404) 498-3550

[www.cdc.gov/ncbddd/folicacid/index.htm](http://www.cdc.gov/ncbddd/folicacid/index.htm)

Free fact sheets, publications, print ads, posters and public service announcements at:

[www2.cdc.gov/ncbddd/faorder/orderform.htm](http://www2.cdc.gov/ncbddd/faorder/orderform.htm)

### **National Institute of Child Health and Human Development**

Bldg 31, Room 2A32, MSC 2425

31 Center Drive

Bethesda, MD 20892-2425

Phone: (800) 370-2943

Fax: (301) 984-1473

[www.nichd.nih.gov](http://www.nichd.nih.gov)

### **National Institutes of Health (NIH)**

9000 Rockville Pike

Bethesda, Maryland 20892

Phone: (301) 496-4000

[www.nih.gov](http://www.nih.gov)

### **US Department of Agriculture (USDA)**

1400 Independence Avenue SW

Washington, DC 20250

Phone: (202) 720-6858

[www.usda.gov](http://www.usda.gov)

Food Composition Database:

[www.ars.usda.gov/ba/bhnrc/ndl](http://www.ars.usda.gov/ba/bhnrc/ndl)

### **USDA Center for Nutrition Policy and Promotion**

3101 Park Center Drive, 10<sup>th</sup> Floor

Alexandria, VA 22302-1594

Phone: (703) 305-7600

Fax: (703) 305-3300

[www.usda.gov/cnpp](http://www.usda.gov/cnpp)

### **USDA Food and Nutrition Service**

3101 Park Center Drive

Alexandria, VA 22302

Email: [webmaster@fns.usda.gov](mailto:webmaster@fns.usda.gov)

[www.fns.usda.gov/fns](http://www.fns.usda.gov/fns)

### **US Department of Health and Human Services (DHHS)**

Region IV (AL, FL, GA, KY, MS, NC, SC, TN)

Atlanta Federal Center

61 Forsyth Street, Room 5B95

Atlanta, GA 30303-8909

Phone: (404) 562-7888

Fax: (404) 562-7899

[www.hhs.gov](http://www.hhs.gov)

### **US Food and Drug Administration (FDA)**

5600 Fishers Lane

Rockville, Maryland 20857

Phone: (888) INFO-FDA (463-6332)

[www.fda.gov](http://www.fda.gov)

## Organizations

### **American Academy of Family Physicians**

11400 Tomahawk Creek Parkway  
Leawood, KS 66211-2672  
PO Box 11210  
Shawnee Mission, KS 66207-1210  
Phone: (800) 274-2237 or (913) 906-6000  
[www.aafp.org](http://www.aafp.org)

### **American Academy of Pediatrics**

141 Northwest Point Blvd.  
PO Box 927  
Elk Grove Village, IL 60007-1098  
Phone: (847) 434-4000  
Fax: (847) 434-8000  
[www.aap.org](http://www.aap.org)

### **American College of Obstetricians and Gynecologists**

409 12<sup>th</sup> Street SW  
PO Box 96920  
Washington, DC 20090-6920  
Phone: (202) 638-5577  
[www.acog.org](http://www.acog.org)

### **American College of Physicians**

190 N. Independence Mall West  
Philadelphia, PA 19106-1572  
Phone: (800) 523-1546 Ext. 2600  
[www.acponline.org](http://www.acponline.org)

### **American Dietetic Association**

120 South Riverside Plaza, Suite 2000  
Chicago, IL 60606-6995  
Phone: (800) 877-1600  
[www.eatright.org](http://www.eatright.org)

### **American Nurses Association**

8515 Georgia Avenue, Suite 400  
Silver Spring, MD 20910  
Phone: (301) 628-5000 or (800) 274-4262  
Fax: (301) 628-5001  
[www.nursingworld.org](http://www.nursingworld.org)

### **American Pharmacists Association**

1100 15<sup>th</sup> Street NW, Suite 400  
Washington, DC 20005-1707  
Phone: (202) 628-4410  
Fax: (202) 783-2351  
[www.pharmacist.com](http://www.pharmacist.com)

### **American Society for Nutritional Sciences**

9650 Rockville Pike, Suite 4500  
Bethesda, Maryland 20814  
Phone: (301) 634-7050  
Fax: (301) 634-7892  
Email: sec@asns.org  
[www.asns.org](http://www.asns.org)

### **Association of State and Territorial Public Health Nutrition Directors**

PO Box 1001  
Johnstown, PA 15907-1001  
Phone: (814) 255-2829  
[www.astphnd.org](http://www.astphnd.org)

### **Association of Women's Health, Obstetric, and Neonatal Nurses**

2000 L Street NW, Suite 740  
Washington, DC 20036  
Phone: (800) 673-8499  
Fax: (202) 728-0575  
[www.awhonn.org](http://www.awhonn.org)

### **March of Dimes Foundation**

1275 Mamaroneck Avenue  
White Plains, NY 10605  
Phone: (914) 428-7100  
Voicemail: (914) 997-4750  
[marchofdimes.com](http://marchofdimes.com)

Flyers, fact sheets, videos, booklets and other publications.

**National Alliance for Hispanic Health** [formerly  
*National Coalition of Hispanic Health and Human  
Services (COSSMHO)*]

1501 16<sup>th</sup> Street NW  
Washington, DC 20036-1401  
Phone: (202) 387-5000  
Fax: (202) 797-4353  
[www.hispanichealth.org](http://www.hispanichealth.org)

**National Healthy Mothers, Healthy Babies  
Coalition**

2000 N. Beauregard Street, 6<sup>th</sup> Floor  
Alexandria, VA 22311-1732  
Phone: (703) 837-4792  
Fax: (703) 684-3247  
[www.hmhb.org](http://www.hmhb.org)

**National Organization for Rare Disorders, Inc.,  
(NORD)**

55 Kenosia Avenue  
PO Box 1968  
Danbury, CT 06813-1968  
Phone: (203) 744-0100  
Voicemail: (800) 999-6673  
Fax: (203) 798-2291  
[www.rarediseases.org](http://www.rarediseases.org)

**National Rehabilitation Information Center  
(NARIC)**

8201 Corporate Drive, Suite 600  
Landover, MD 20785  
Phone: (301) 459-5900 or (800) 346-2742  
Fax: (301) 459-4263  
[www.naric.com](http://www.naric.com)

**Organization of Teratology Information  
Specialists (OTIS)**

Phone: (866) 626-6847  
Email: OTISPregnancy@pharmacy.arizona.edu  
[www.otispregnancy.org](http://www.otispregnancy.org)

**Spina Bifida Association of America**

4590 MacArthur Boulevard NW  
Washington, DC 20007-4226  
Phone: (202) 944-3285 or (800) 621-3141  
Fax: (202) 944-3295  
[www.sbaa.org](http://www.sbaa.org)

**Teratology Society**

1821 Michael Faraday Drive, Suite 300  
Reston, VA 20190  
Phone: (703) 438-3104  
Fax: (703) 438-3113  
Email: tshq@teratology.org  
[www.teratology.org](http://www.teratology.org)

**US Department of Health and Human Services  
HRSA Information Center**

PO Box 2910  
Merrifield, VA 22116  
Phone: (888) ASK-HRSA (275-4772)  
Fax: (703) 821-2098  
[www.ask.hrsa.gov](http://www.ask.hrsa.gov)

**State of Florida**

**Florida Agency for Health Care Administration**

2727 Mahan Drive  
Tallahassee, FL 32308  
Phone: (888) 419-3456  
[www.fdhc.state.fl.us](http://www.fdhc.state.fl.us)

Information on health conditions at:  
[www.floridahealthfinder.gov](http://www.floridahealthfinder.gov)

**Florida Birth Defects Registry**

Bureau of Community Environmental Health  
4052 Bald Cypress Way  
Tallahassee, FL 32399-1712  
Phone: (850) 245-4444 ext. 2198  
Fax: (850) 922-8473  
[www.fbdr.org](http://www.fbdr.org)

**Florida Department of Agriculture and Consumer Services**

The Capitol  
Tallahassee, Florida 32399-0800  
Phone: (850) 488-3022  
[doacs.state.fl.us](http://doacs.state.fl.us)

**Florida Department of Health**

Division of Environmental Health  
4052 Bald Cypress Way, Bin # A08  
Tallahassee, FL 32399-1709  
Phone: (850) 245-4250  
[www.doh.state.fl.us](http://www.doh.state.fl.us)

**Family Health Line**

Phone: (800) 451-2229  
[www.doh.state.fl.us/family/mch/pdf/fhl.pdf](http://www.doh.state.fl.us/family/mch/pdf/fhl.pdf)  
Order brochures, posters and magnets at:  
[doh.stat.fl.us/environment/newsroom/brochures/index.html](http://doh.stat.fl.us/environment/newsroom/brochures/index.html)

**Florida Folic Acid Coalition**

Food Science and Human Nutrition Department  
University of Florida/IFAS  
PO Box 110720  
Gainesville, FL 32611-0720  
Phone: (352) 392-1978 Ext. 423  
Fax: (352) 392-1988  
[www.FolicAcidNow.net](http://www.FolicAcidNow.net)

**Florida Healthy Start**

Florida Association of Healthy Start Coalitions  
1311 N. Paul Russell Road, A101  
Tallahassee, FL 32301  
Phone: (850) 488-0288  
Fax: (850) 933-3622  
[www.healthystartflorida.com](http://www.healthystartflorida.com)

**University of South Florida**

Department of Pediatrics  
Birth Defects Center  
17 Davis Blvd., Suite 200  
Tampa, FL 33606  
Phone: (813) 259-8850  
Fax: (813) 259-8848

**Other Online Resources**

**Association of Asian Pacific Community Health Organizations**

[www.aapcho.org](http://www.aapcho.org)

**Association of University Centers on Disabilities (AUCD)**

Multicultural Council  
[www.aucd.org](http://www.aucd.org)

**Bureau of Primary Health Care**

[www.bphc.hrsa.gov](http://www.bphc.hrsa.gov)

**Department of Health and Human Services (DHHS)**

**Office of Minority Health Resource Center**  
[www.omhrc.gov](http://www.omhrc.gov)

**Diversity Rx**

[www.diversityrx.org](http://www.diversityrx.org)

**Health Resources and Services Administration (HRSA)**

[www.hrsa.gov](http://www.hrsa.gov)

**Indian Health Service**

[www.ihs.gov](http://www.ihs.gov)

**International Clearinghouse for Birth Defects Surveillance and Research**

[www.icbdsr.org](http://www.icbdsr.org)

**National Birth Defects Prevention Network**

[www.nbdpn.org](http://www.nbdpn.org)

**National Casa Project (Court Appointed Special Advocates for Children)**

[www.casenet.org/program-management/diversity/index.htm](http://www.casenet.org/program-management/diversity/index.htm)

## Genetics and Genetic Counseling

### **Diagnostic Testing**

10421 University Center Drive, Suite 100  
Tampa, FL 33612  
Phone: (813) 979-9442 or (800) 966-4440  
Fax: (813) 972-4632

### **GeneClinics**

University of Washington School of Medicine  
GeneTests Contact Information:  
9725 Third Avenue NE, Suite 602  
Seattle, WA 98115  
Phone: (206) 221-4674  
Fax: (206) 221-4679  
[www.geneclinics.org](http://www.geneclinics.org)

### **Genzyme**

1031 Ives Dairy Road, Suite 228  
N. Miami Beach, FL 33179  
Phone: (800) 245-4363  
[www.genzyme.com](http://www.genzyme.com)

### **National Human Genome Research Institute**

Communications and Public Liaison Branch  
National Human Genome Research Institute  
National Institutes of Health  
Building 31, Room 4B09  
31 Center Drive, MSC 2152  
9000 Rockville Pike  
Bethesda, MD 20892-2152  
Phone: (301) 402-0911  
Fax: (301) 402-2218  
Email: [webmaster@nhgi.nih.gov](mailto:webmaster@nhgi.nih.gov)  
[www.nhgri.nih.gov](http://www.nhgri.nih.gov)

### **Office of Genomics and Disease Prevention (CDC)**

4770 Buford Highway, Mailstop K89  
Atlanta, GA 30341-3724  
Phone: (770) 448-8510  
Fax: (770) 488-8336  
Email: [genetics@cdc.gov](mailto:genetics@cdc.gov)  
[www.cdc.gov/genomic](http://www.cdc.gov/genomic)

### **Regional Genetics Program**

University of Florida  
College of Medicine, Division of Genetics  
Box 100296, Health Sciences Center  
Gainesville, FL 32610-0296  
Phone: (352) 392-4104  
[www.peds.ufl.edu](http://www.peds.ufl.edu)

## Cultural Diversity and Minority Health Issues

### **American Medical Student Organization (AMSA)**

1902 Association Drive  
Reston, Virginia 20191  
Phone: (703) 620-6600  
Fax: (703) 620-5873  
[www.amsa.org/div/index.cfm](http://www.amsa.org/div/index.cfm)

### **The Center for Cross Cultural Health**

265 Oneida Street  
St. Paul, MN 55102  
Phone: (651) 209-8999  
Fax: (651) 209-8998  
[www.crosshealth.com](http://www.crosshealth.com)

### **Cross Cultural Health Care Program**

4700 42nd Ave SW, Suite 580  
Seattle, WA 98116  
Phone: (206) 860-0329  
Fax: (206) 860-0334  
Email: [administration@xculture.org](mailto:administration@xculture.org)  
[www.xculture.org](http://www.xculture.org)

### **The National Alliance for Hispanic Health**

1501 16<sup>th</sup> Street NW  
Washington, DC 20036  
Phone: (202) 387-5000  
Fax: (202) 797-4353  
[www.hispanichealth.org](http://www.hispanichealth.org)

### **National Center for Cultural Competence**

3300 Whitehaven Street NW, Suite 3300  
Washington, DC 20057  
Phone: (202) 687-5387  
Fax: (202) 687-8899  
[www.gucchd.georgetown.edu/nccc/](http://www.gucchd.georgetown.edu/nccc/)

### **National Clearinghouse for Alcohol and Drug Information**

[www.health.org/features/multicultural/](http://www.health.org/features/multicultural/)

### **National Society of Genetic Counselors**

[www.nsgc.org](http://www.nsgc.org)

### **National Society of Genetic Counselors**

[www.nsgc.org](http://www.nsgc.org)

### **Rhode Island Department of Health**

Office of Minority Health  
[www.health.ri.gov/chic/minority/index.php](http://www.health.ri.gov/chic/minority/index.php)

## Hospitals and Clinics

### **All Children's Hospital**

Spina Bifida Team  
801 6<sup>th</sup> Street South  
St. Petersburg, FL 33701  
Phone: (727) 898-7451  
[www.allkids.org](http://www.allkids.org)

### **Arnold Palmer Hospital for Women and Children**

92 West Miller Street  
Orlando, FL 32806-2036  
Phone: (407) 649-9111  
Fax: (407) 841-5136  
[www.arnoldpalmerhospital.org](http://www.arnoldpalmerhospital.org)

### **Medical College of Georgia**

Children's Medical Center  
Clinic for Children with Spina Bifida  
1446 Harper Street  
Augusta, Georgia 30912  
Phone: (706) 721-4262  
[www.mcg.edu](http://www.mcg.edu)

### **Miami Children's Hospital**

3100 SW 62<sup>nd</sup> Avenue  
Miami, FL 33155  
Phone: (800) 432-6837  
[www.mch.com](http://www.mch.com)

### **Nemours Children's Clinic**

*(Programs for children with spina bifida)*  
807 Children's Way  
Jacksonville, FL 32207  
Phone: (904) 390-3600  
Fax: (904) 390-3699

1717 S Orange Avenue  
Orlando, FL 32806-2944  
Phone: (407) 650-7000  
Fax: (407) 650-7016

[www.nemours.org](http://www.nemours.org)

Nemours health education:

[www.kidshealth.org](http://www.kidshealth.org)

### **Shands Children's Hospital at the University of Florida**

1600 SW Archer Road  
Gainesville, FL 32608  
Phone: (800) 749-7424 or (352) 265-8000  
Spina Bifida Clinic  
Phone: (352) 265-8250  
[www.shands.org/children](http://www.shands.org/children)

### **Shriners Hospitals for Children**

12502 North Pine Drive  
Tampa, FL 33612-9499  
Phone: (813) 972-2250 or (800) 237-5055  
Fax: (813) 978-9442  
[www.shrinershq.org](http://www.shrinershq.org)