Folic Acid and the Reduction of Neural Tube Defects

OHIO DEPARTMENT OF HEALTH
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# Table Of Contents

Executive Summary ................................................................. ii
Introduction ................................................................................... 1
What are Neural Tube Defects? ....................................................... 2
What Causes Neural Tube Defects? ................................................ 2
When Do Neural Tube Defects Occur? .............................................. 2
What is the Rate of Neural Tube Defects? ....................................... 3
Who is at Risk for Having a Baby with a Neural Tube Defect? ........ 3
What is Folate? ................................................................................ 4
What are the Important Public Health Issues Concerning NTDs? .... 4
What are the Costs Associated with NTDs? ................................... 5
When Do Women Need Folate? ..................................................... 5
  Recommendation #1: For Women with a Prior NTD-Affected Pregnancy . 5
  Recommendation #2: For Women of Childbearing Age .................. 5
How Can Women Consume Sufficient Folate? ............................... 6
  1. Dietary Increase of Folate-Rich Foods .................................... 6
  2. Vitamin Supplementation ...................................................... 6
  3. Food Fortification ................................................................... 7
What are the Other Health Benefits of Folate? ................................ 8
What are some Approaches in Ohio to NTD Reduction? .................. 8
  Possible Strategies for State-Level Partners ................................. 8
  Possible Strategies for Local Agencies and Partners ..................... 9
Priority Populations ....................................................................... 10
References ..................................................................................... 12
ODH Folate and Prevention Work Group Members ....................... 13
Agency Resources for Birth Defects Prevention Activities ............... 14
Ohio Regional Comprehensive Services Network ......................... 15
Foods Rich in Folate ..................................................................... 16 & 17
Selected Folate Education Resources ......................................... 18
EXECUTIVE SUMMARY

Neural tube defects (NTDs), such as spina bifida and anencephaly, are birth defects that affect approximately 2,500 babies, or 1 out of every 1,000 births, in the United States every year. The rates are similar for Ohio. NTDs occur when the embryonic neural tube does not close properly. Normally the tube which ultimately forms the spinal cord and brain closes by 28 days after conception. Therefore, women cannot wait until after they learn of their pregnancy to begin preventive efforts.

The causes of NTDs are not completely known but may include genetics, chromosomal abnormalities, maternal hyperthermia, insulin dependent diabetes, maternal obesity at time of conception, or prenatal exposure to coumadin, valproic acid or carbamazepine. Folic acid deficiency has also been implicated as a contributing factor in the occurrence of neural tube defects. A woman who has had one NTD-affected pregnancy has a 3 to 5 percent risk of a recurrence in subsequent pregnancies.

Folic acid is a B vitamin that may reduce the incidence of neural tube defects by as much as 50 percent when taken one month before conception and during the first trimester of pregnancy. The U.S. Public Health Service has issued two specific recommendations regarding folate:

1. **RECOMMENDATION #1: FOR WOMEN WITH A PRIOR NTD-AFFECTED PREGNANCY**
   The recommendation for women who have had a prior pregnancy affected by a neural tube defect and who are planning to start a new pregnancy is a consumption of 4.0 mg daily dose of folic acid from at least one month prior to conception through the first three months of pregnancy. This dosage cannot reasonably be achieved through diet. It requires supplementation. Doses of this level may be associated with other health risks and should be taken only under the supervision of a physician.

2. **RECOMMENDATION #2: FOR WOMEN OF CHILDBEARING AGE**
   All women who are capable of becoming pregnant should consume 0.4 mg (400 mcg) of folic acid per day to reduce their risk of having a pregnancy affected with spina bifida or other neural tube defects.

Toxicity of folic acid is unknown but intake beyond recommended levels can complicate the diagnosis of vitamin B12 deficiency. Consumption of high levels of folic acid, or any vitamin, are not recommended.

The Ohio Department of Health recommends various strategies for state and local partners to address the reduction of neural tube defects in Ohio. A complete outline of approaches can be found on pages 8-11 in this document. An accompanying document, “Ideas on Educating Ohioans About the Importance of Folic Acid” provides further ideas on folic acid education.
Folate is a B vitamin that occurs naturally in a variety of foods. Folic acid, the synthetic form of folate, is added to some processed foods and most vitamin and mineral supplements. Folate has been shown to be an important nutrient during periods of rapid growth, particularly infancy, childhood, pregnancy and breastfeeding. Current research suggests that an intake of 0.4 mg of folic acid per day can reduce the incidence of the neural tube defects by as much as half; protect against epithelial cell cancers, particularly those of the cervix and colon; and, along with other B vitamins, protect against heart disease and stroke.

A 1997 Gallup survey to assess knowledge about folic acid showed that 66 percent of women ages 18-45 responding to the survey had heard or read anything about folic acid. Of this group, only 22 percent were aware of its importance in reducing the occurrence of neural tube defects. Current consumption levels for folate also appear to be inadequate. Data from the 1988-91 National Health and Nutrition Examination Survey III indicate that only 8 percent of women of childbearing age meet the recommended dietary goal of 0.4 mg per day for folate. The use of vitamin supplements which contain the recommended amount of folic acid also appears to be well below an optimal level. Data from the 1986 National Health Interview Survey indicate that only 27 percent of nonpregnant females ages 18 to 44 took a folic acid-containing supplement at least once in the two weeks prior to the interview.

Clearly, much needs to be done to assure that women consume folic acid recommended protective levels throughout their childbearing years. One responsibility of health professionals is to promote increased consumption of foods rich in folate as well as emphasize the need for appropriate vitamin supplements when dietary intake may not be optimal. This nutrition guidance is particularly important for certain vulnerable populations of women such as those who are economically disadvantaged; use oral contraceptives; limit food selection by stringent dieting; or are drug users, alcohol abusers, or smokers.

This Position Paper provides current information about folic acid and its role in the reduction of neural tube defects. This document was developed by an interdisciplinary team of health professionals at the Ohio Department of Health, in cooperation with health professionals from a variety of community settings, to assist you in working with women of childbearing age.