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Donald R. Mattison, M.D.  
Medical Director

August 1, 2000

Dear Colleague:

Research about the benefits of the B vitamin folic acid in the prevention of neural tube defects (NTDs) is not new. The earliest study was published in 1981, and clearly definitive evidence was published in 1992. Yet, despite additional confirming studies and considerable media coverage, results of a 2000 Gallup/March of Dimes survey found that only about 1 in 3 women ages 18 to 45 takes a daily multivitamin containing folic acid. *In a recent study published in the Canadian Family Physician, 71% of women counseled by their health care providers took folic acid, compared with only 17% of those not counseled.*

NTDs are among the most serious, common and preventable birth defects that occur in the United States. The Centers for Disease Control and Prevention (CDC) estimates that, if all women of childbearing age in the U.S. were to consume 400 mcg of folic acid every day, up to 70 percent of these devastating NTDs could be prevented. Each year, an estimated 2,500 babies are born with NTDs, and many additional affected pregnancies result in miscarriage or stillbirth. NTDs originate in the first four weeks following conception, usually before a woman knows she is pregnant. With more than half of all pregnancies in the U.S. not planned, all providers who counsel women of childbearing age should discuss supplementation with folic acid and the importance of a healthy diet.

*You are the link between science and healthy babies.* To help you deliver the folic acid message, the March of Dimes has developed this Folic Acid Resource Kit, that includes:

- **Folic Acid and NTDs: A Quick Reference Card for Health Care Providers.** A laminated card citing folic acid research and providing an illustration of NTDs
- **Pregnancy Wheel.** Pregnancy calculator with a reminder to tell your patients to take folic acid
- **Folic Acid Tear-Off Pad.** A note pad with the folic acid message on one side and patients' frequently asked questions about folic acid on the other
- **Patient Education Materials.** Samples in English and Spanish, and an order form for free materials

Your patients listen to you. Urge all of your patients who could become pregnant to take a multivitamin with 400 mcg of folic acid every day. Tell them to include foods rich in folic acid such as orange juice, fortified breakfast cereals, enriched grain products and green leafy vegetables as part of a healthy diet. For more information about the March of Dimes Folic Acid Campaign, call 888-MODIMES or visit [www.modimes.org](http://www.modimes.org).

Sincerely,

Donald R. Mattison, M.D.  
Medical Director  
March of Dimes

# Folic Acid

Folic acid is a B vitamin that can help prevent birth defects of the brain and spinal cord called neural tube defects (NTDs). Folic acid works to prevent these birth defects only if taken before pregnancy and in the first few weeks of pregnancy.

Since NTDs originate in the first month of pregnancy, before many women know they are pregnant, it is important for a woman to have enough folic acid in her system before conception. Folic acid is recommended for all women of childbearing age because 50 percent of pregnancies in this country are unplanned.

Here's what women should know about this crucial nutrient.

## Why should women of childbearing age take folic acid?

Studies show that, if all women consumed the recommended amount of this vitamin, beginning before conception and continuing into the first month of pregnancy, up to 70 percent of all NTDs could be prevented.

The neural tube is the embryonic structure that develops into the brain and spinal cord. This structure, which starts out as a tiny ribbon of tissue, normally folds inward to form a tube by the 28th day after conception. When this process goes awry and the neural tube does not close completely, defects in the brain and spinal cord can result. About 2,500 babies are born with NTDs each year, and many other affected pregnancies end in miscarriage or stillbirth.

The most common NTDs are spina bifida and anencephaly. Spina bifida, often called open spine, affects the backbone and, sometimes, the spinal cord. Children with the severe form of spina bifida have some degree of leg paralysis and bladder and bowel control problems. Anencephaly is a fatal condition in which a baby is born with a severely underdeveloped brain and skull.

Studies also suggest that folic acid may help prevent some other birth defects as well, including cleft lip and palate.

## How much folic acid does a woman need?

The March of Dimes recommends that all women who can become pregnant take a multivitamin that contains 400 micrograms of folic acid every day and eat a healthy diet. This is the only sure way a woman can get all the folic acid and other vitamins she needs. Most women get less than half of the recommended amount of folic acid daily.

The Institute of Medicine also recommends that women eat a diet rich in foods that contain folate or folic acid. Folate is the natural form of folic acid that is found in foods. Orange juice, other citrus fruits and juices, leafy green vegetables, beans, peanuts, broccoli, asparagus, peas, lentils and whole grain products all contain folate. Synthetic (manufactured) folic acid is added to certain grain products, including flour, rice, pasta, cornmeal, bread and cereals. These foods are considered "fortified" with folic acid.

The body more readily absorbs folic acid from vitamin supplements and fortified foods than folate from food. It is estimated that 50 percent of food folate is absorbed by the body, while approximately 85 percent of folic acid in fortified foods and 100 percent of the folic acid in a vitamin supplement are absorbed. Cooking and storage also destroy some of the folate in foods. The body cannot distinguish the origin of the vitamin, however; once in the bloodstream the biological function is the same.

Numerous studies have shown that the synthetic form of folic acid helps prevent NTDs. This is why the March of Dimes, the Centers for Disease Control and Prevention (CDC), and the Institute of Medicine recommend that women who could become pregnant consume 400 micrograms a day of the synthetic form. This is the amount contained in most multivitamins. A few breakfast cereals contain this amount in one bowl, but most contain only 25 percent of the recommended amount, so it is important to check the label on the box.

## Do some women need more folic acid?

The Institute of Medicine recommends that women increase their intake of synthetic folic acid to 600 micrograms a day once their pregnancy is confirmed. Most doctors recommend a prenatal vitamin that contains at least this amount of folic acid. However, women should not take more than 1,000 micrograms (or 1 milligram) without their doctor's advice.

If a woman already has had a baby with an NTD, she should consult her doctor before her next pregnancy about the amount of folic acid she should take. Studies have shown that taking a larger dose of folic acid daily (4 milligrams), beginning at least one month before pregnancy and in the first trimester of pregnancy, reduces by about 70 percent the risk of having another affected pregnancy.

Women with diabetes or epilepsy also are at increased risk of having a baby with an NTD. Women with these disorders should consult their doctors prior to pregnancy to see whether they should take a larger dose of folic acid.

## How much folic acid is in fortified foods?

Since January 1, 1998, the U.S. Food and Drug Administration (FDA) has required the addition of 140 micrograms of folic acid per 100 grams of grain to cereals, breads, pastas and other foods labeled "enriched." This makes it a little easier for women to obtain folic acid from their diets. However, the amount added to these foods is small, and most women cannot obtain enough folic acid from their diet alone. It is estimated that the addition of 140 micrograms of folic acid to foods will prevent only about 5 to 20 percent of folic acid-preventable NTDs.

The FDA did not require that more than this amount of folic acid be added to these foods because of the concern that high levels of folic acid might mask a vitamin B-12 deficiency. This potentially dangerous condition is called pernicious anemia and is seen mainly in elderly people. Very high doses of folic

acid (over 1,000 micrograms a day) could possibly correct the anemia caused by the vitamin deficiency, but not the deficiency itself, and cause its diagnosis to be delayed. Left untreated, the vitamin B-12 deficiency can cause irreversible neurologic damage. Some health organizations, including the March of Dimes, feel that the level of fortification can be safely increased without risk to the public's health. Research currently is under way to examine this possibility.

### How does folic acid prevent birth defects?

How folic acid prevents NTDs is not well understood. Most studies suggest that it may correct a nutritional deficiency, while others suggest that supplemental folic acid helps some people compensate for inborn errors in how the body processes folates.

For example, a 1997 study found that as many as one in seven people may carry a genetic mutation (change) that causes them to have a deficiency in folic acid, even if they are consuming a diet that contains the recommended amount of folates. These people have problems breaking down folates found in food to forms of folic acid the body can use, resulting in lower folic acid levels in the blood. Most mothers of babies with NTDs don't have this gene mutation; but studies suggest that women who do may be at increased risk of having a baby with an NTD. However, taking folic acid raises levels of the vitamin in the blood, which can reduce the risk of having an affected baby. A new study also suggests that women with this mutation may have an increased risk of placental problems, such as placental abruption (when the placenta peels away from the wall of the uterus before delivery). This risk may be reduced by taking folic acid throughout pregnancy.

Besides helping to prevent certain birth defects, folic acid plays other important roles during pregnancy. A pregnant woman needs extra folic acid to help her to produce the additional blood cells she needs. Folic acid also is crucial to support the rapid growth of the placenta and fetus. This vitamin is needed to produce new DNA (genetic material) as cells multiply. Without adequate amounts of folic acid, cell division could be impaired, possibly leading to poor growth in the fetus or placenta. One study found that women who were deficient in folic acid were more likely to have a baby who was premature and of

low birthweight (less than 5-1/2 pounds). Another recent study found that low levels of folate may be a risk factor for repeated early miscarriages.

### Does folic acid have other health benefits?

In recent years, doctors have come to realize that folic acid is very important for everyone in maintaining health. It has long been known that folic acid plays an important role in the production of normal red blood cells, and that individuals who were deficient in folic acid sometimes developed a form of anemia called megaloblastic anemia (characterized by a reduced number of red blood cells).

More recent studies suggest that folic acid also may help prevent heart disease and stroke. It appears that individuals who have a high level of a substance called homocysteine in their blood have an increased risk of heart disease and stroke. When these people take folic acid, the level of homocysteine in their blood drops, possibly decreasing their risk of cardiovascular diseases. (Researchers also are looking at the role of high homocysteine levels in causing birth defects.) Other studies suggest that folic acid also may help prevent certain cancers, especially colon cancer. While these studies have not proven a protective effect, they suggest that many people, besides women of childbearing age, may benefit from taking folic acid.

### Is the March of Dimes conducting research on folic acid?

The March of Dimes has several research grantees who are seeking to improve understanding of how folic acid prevents NTDs. Because NTDs may be caused by a combination of genetic and environmental factors (particularly deficiency of folic acid), other grantees are trying to identify genes that increase a woman's risk of having a baby with an NTD. One of these researchers is focusing on five genes that play a key role in how the body utilizes food folates, to see if mutations in any of these genes increase the risk of spina bifida. Another researcher is looking at how folic acid is transferred from the placenta to the fetus, and trying to identify any factors that could interfere with this process. These studies could lead to ways to identify women who are at increased risk of having a baby with an NTD, and to improved ways to treat these women during pregnancy, with the goal of preventing even more NTDs than currently is possible.

## References

- Berry, R.J., et al. Prevention of neural tube defects with folic acid in China. *New England Journal of Medicine*, volume 341, number 20, November 11, 1999, pages 1485-1490.
- Botto, L.D., et al. Neural tube defects. *New England Journal of Medicine*, volume 341, number 20, November 11, 1999, pages 1509-1510.
- Centers for Disease Control and Prevention. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. *Morbidity and Mortality Weekly Report*, volume 41, number RR-14, September 11, 1992.
- Molloy, A., et al. Thermolabile variant of 5,10-methylenetetrahydrofolate reductase associated with low red-cell folate: implications for folate intake recommendations. *The Lancet*, volume 349, May 31, 1997, pages 1591-1593.
- Nelen, W.L.D.M., et al. Homocysteine and folate levels as risk factors for recurrent early pregnancy loss. *Obstetrics & Gynecology*, volume 95, number 4, April 2000, pages 519-524.
- Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine. *Dietary Reference Intakes: Folate, Other B Vitamins, and Choline*. Washington, D.C., National Academy Press, April 7, 1998.
- Vander Molen, E.F., et al. A common mutation in the 5, 10-methylenetetrahydrofolate reductase gene as a new risk factor for placental vasculopathy. *American Journal of Obstetrics and Gynecology*, volume 182, number 5, May 2000, pages 1258-1263.
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# Ácido fólico

El ácido fólico es una vitamina B que puede ayudar a prevenir defectos de nacimiento en el cerebro y la médula espinal denominados defectos del tubo neural (*Neural Tube Defects*—NTD) cuando se ingiere antes del embarazo y durante las primeras semanas del mismo.

Dado que los NTD se originan durante el primer mes de embarazo (generalmente antes de que la madre sepa que está embarazada) es importante que la mujer tenga suficiente ácido fólico en su sistema antes de quedar embarazada. Es recomendable que toda mujer que se encuentre en edad de tener hijos ingiera ácido fólico, puesto que, en este país, el 50 por ciento de los embarazos no son planificados.

Aquí se explica lo que toda mujer debe saber acerca de este nutriente fundamental.

## ¿Por qué deben tomar ácido fólico todas las mujeres en edad de procrear hijos?

Los estudios demuestran que las mujeres que consumen la cantidad recomendada de esta vitamina desde antes de la concepción y durante el primer mes de embarazo reducen el riesgo de tener un bebé con ciertos defectos de nacimiento en el cerebro y la médula llamados defectos del tubo neural (NTD).

El tubo neural es la estructura embrionaria que al desarrollarse se convierte en el cerebro y la médula espinal. Esta estructura, que se origina como una capa plana de células, por lo general se pliega para formar un tubo antes del día 29 de gestación. Cuando el tubo neural no se cierra completamente, el bebé padece un defecto del tubo neural. Cada año nacen aproximadamente 2.500 bebés con NTD, y muchos otros embarazos afectados por esta enfermedad acaban en abortos espontáneos o en nacimientos de niños sin vida.

Los NTD más comunes son la espina bífida y la anencefalia. La espina bífida es una de las causas más importantes de la parálisis infantil. Los niños afectados padecen grados diversos de parálisis en la parte inferior del cuerpo y problemas de control de esfínteres. La anencefalia es una condición fatal por la cual el bebé nace con el cráneo y el cerebro seriamente subdesarrollados.

Los estudios también sugieren que el ácido fólico puede ayudar a prevenir algunos otros defectos de nacimiento, como el labio leporino y la fisura palatina.

## ¿Cuánto ácido fólico debe tomar una mujer?

March of Dimes recomienda que todas las mujeres susceptibles de quedar embarazadas consuman un compuesto multivitamínico que contenga 400 microgramos de ácido fólico por día, además de ingerir una dieta saludable que incluya alimentos ricos en ácido fólico. Esta es la única manera segura de que una mujer reciba todo el ácido fólico y demás vitaminas que necesita. La dieta diaria de la mayoría de las mujeres sólo contiene alrededor de 200 microgramos de ácido fólico.

Entre los alimentos naturalmente ricos en ácido fólico se encuentran el jugo de naranja, otras frutas y jugos cítricos, los vegetales con hojas verdes, los frijoles y habichuelas, el maní, el brócoli, el espárrago, las arvejas, las lentejas y los productos de granos enteros. Los complejos multivitamínicos, los cereales enriquecidos para el desayuno y los productos de granos enriquecidos contienen una forma sintética de ácido fólico que el cuerpo puede absorber con más facilidad que el ácido fólico en su forma natural (que el cuerpo debe descomponer para poder hacer uso de él). Aún no se sabe si el consumo de 400 microgramos del ácido fólico que se encuentra naturalmente en algunos alimentos proporciona el mismo nivel de protección contra los defectos de nacimiento que 400 microgramos de ácido fólico en su forma sintética. Esto se debe a que la cocción y el almacenamiento puede destruir parte del ácido fólico del tipo natural que se encuentra en algunos alimentos, y la cantidad de ácido fólico útil que el cuerpo puede obtener de comidas diversas varía considerablemente.

El cuerpo puede absorber casi el 100 por ciento del ácido fólico en su forma sintética. Es por esta razón que March of Dimes, los Centros de Prevención y Control de Enfermedades (*Centers for Disease Control and Prevention*—CDC) y el Instituto de Medicina recomiendan que las mujeres susceptibles de quedar embarazadas consuman 400 microgramos por día de la forma sintética. Dado que algunos cereales de desayuno fortalecidos contienen 400 microgramos de ácido fólico en una porción, una mujer puede ingerir la cantidad de ácido fólico sintético recomendada por día de esta manera o tomar un complejo multivitamínico. Sin embargo, una encuesta realizada por March of Dimes en 1997 reveló que sólo el 30 por ciento de las mujeres toman un complejo multivitamínico que contiene ácido fólico antes del embarazo.

El Instituto de Medicina también recomienda que una mujer aumente su consumo de ácido fólico sintético a 600 microgramos por día una vez que ha confirmado que está embarazada. La mayoría de los doctores recomienda una vitamina prenatal que contiene por lo menos esta cantidad de ácido fólico. Sin embargo, no deben ingerirse más de 1.000 microgramos (o un miligramo) sin que el médico así lo autorice.

Si una mujer ya ha tenido un bebé con un NTD, debe consultar a su médico antes de su siguiente embarazo en cuanto a la cantidad de ácido fólico que debe ingerir. Los estudios han demostrado que la ingestión de una dosis mayor de ácido fólico por día (4 miligramos) comenzando por lo menos un mes antes del embarazo y durante el primer trimestre del mismo reduce el riesgo de tener otro embarazo afectado en aproximadamente un 70 por ciento.

## ¿Cuánto ácido fólico contienen los alimentos fortalecidos?

A partir del 1 de enero de 1998, la Secretaría de Alimentos y Drogas de los EE.UU. (U.S. FDA—*U.S. Food and Drug Administration*) exige que se añadan 140 microgramos de ácido fólico por cada 100 gramos de cereales, panes, pastas y otros alimentos denominados “enriquecidos”. (Sólo unos pocos cereales contienen 400 microgramos por porción). Esto hace un poco más fácil que las mujeres ingieran ácido fólico en sus dietas. Sin embargo, la cantidad añadida a los alimentos enriquecidos es pequeña, y la mayoría de las mujeres no podrá obtener suficiente ácido fólico exclusivamente a partir de sus dietas. Se estima que esta añadidura de ácido fólico a las comidas enriquecidas servirá para prevenir sólo entre el 5 y el 20 por ciento de los NTD que pueden prevenirse mediante la ingestión de ácido fólico.

La FDA no exigió que se añadiera más ácido fólico a los alimentos debido al temor de que el ácido fólico pudiera encubrir un signo de una condición potencialmente peligrosa llamada anemia perniciosa, que se observa predominantemente en personas ancianas. Dado que la anemia podría corregirse con dosis elevadas de ácido fólico, el diagnóstico de los graves síntomas neurológicos que la acompañan podría quedar postergado. Se considera que el nivel de fortalecimiento que la FDA exige en la actualidad es seguro para todos.

## ¿Cómo previene el ácido fólico los defectos de nacimiento?

No se sabe muy bien cómo el ácido fólico previene los NTD. Algunos estudios sugieren que puede corregir una deficiencia nutricional, mientras otros indican que el suplemento de ácido fólico ayuda a compensar por los errores innatos en la manera en que el cuerpo procesa el ácido fólico natural.

Por ejemplo, en un estudio reciente se determinó que hasta una de cada siete personas puede portar una mutación genética (cambio en los genes) que provoca una insuficiencia de ácido fólico en ellos, aun cuando consuman una dieta que contenga la cantidad recomendada de ácido fólico natural. Estas personas tienen problemas para descomponer la forma de ácido fólico que se encuentra naturalmente en los alimentos y convertirlo en formas de ácido fólico que el cuerpo puede utilizar, lo que resulta en niveles más bajos de ácido fólico en la sangre. Los estudios sugieren que las mujeres con esta mutación de genes pueden correr un mayor riesgo de tener un bebé con un NTD. Sin embargo, parece ser que la ingestión de ácido fólico incrementa el nivel de la vitamina en la sangre y por lo tanto reduce la probabilidad de dar a luz un bebé enfermo.

Además de contribuir a la prevención de ciertos defectos de nacimiento, el ácido fólico cumple otra función importante durante el embarazo. Una mujer embarazada necesita ácido fólico adicional para ayudarle a producir los glóbulos sanguíneos adicionales que necesita. El ácido fólico también es fundamental para permitir el rápido crecimiento de la placenta y del feto. Esta vitamina es necesaria para producir ADN nuevo (material genético) a medida que se multiplican las células. Sin las cantidades adecuadas de ácido fólico, la capacidad de división de las células podría verse afectada y posiblemente provocar un crecimiento pobre del feto o de la placenta. En un estudio se descubrió que las mujeres a quienes les faltaba ácido fólico tenían mayores probabilidades de dar a luz un bebé prematuro y de peso bajo al nacer (menos de 5 1/2 libras, o sea 2 1/2 kg).

## ¿Tiene el ácido fólico otros beneficios en cuanto a la salud?

En años recientes, los médicos se han dado cuenta de que el ácido fólico es muy importante para el mantenimiento de la salud de todos. Se sabe desde hace mucho tiempo que el ácido fólico cumple un rol importante en la producción de glóbulos rojos y que a veces los individuos con deficiencias de ácido fólico desarrollan un tipo de anemia llamada anemia megaloblástica (caracterizada por una cantidad reducida de glóbulos rojos).

Estudios más recientes sugieren que el ácido fólico también puede prevenir enfermedades cardíacas y ataques apopléticos. Parece ser que los individuos que poseen una cantidad elevada de una sustancia llamada homocisteína en la sangre tienen mayor riesgo de enfermedades cardíacas y ataques de apoplejía. Cuando estas personas ingieren ácido fólico, el nivel de homocisteína de su sangre disminuye, posiblemente reduciendo su riesgo de enfermedades cardiovasculares. (Los investigadores también están estudiando la incidencia de cantidades elevadas de homocisteína como causa de defectos de nacimiento.) Otros estudios sugieren que el ácido fólico también puede ayudar a prevenir ciertos cánceres, especialmente el cáncer de colon. Si bien estos estudios son preliminares, sugieren que muchas personas, además de las mujeres en edad de tener hijos, pueden beneficiarse al tomar ácido fólico.

## ¿Se encuentra March of Dimes realizando investigaciones acerca del ácido fólico?

March of Dimes tiene varios becarios de investigación que están procurando entender mejor el modo en que el ácido fólico previene los NTD. Como se cree que la mayoría de los NTD son causados por una combinación de factores genéticos y medioambientales (lo que incluye factores de nutrición como el ácido fólico), otros becarios están tratando de identificar genes que incrementan el riesgo de una mujer de tener un bebé con un NTD. Uno de estos investigadores se está concentrando en 5 genes que cumplen un rol fundamental en el modo en que el bebé descompone el ácido fólico natural para determinar si las mutaciones de cualquiera de alguno de estos genes incrementa el riesgo de espina bífida. Otro investigador está estudiando el modo en que se transfiere el ácido fólico desde la placenta al feto e intentando identificar factores que podrían interferir en este proceso. Estos estudios podrían permitir obtener maneras de identificar mujeres con mayor riesgo de tener un bebé con un NTD y mejores maneras de tratarlas, con el objetivo de prevenir aun más defectos del tubo neural de lo que es posible en la actualidad.

## Referencias

Centers for Disease Control and Prevention. Knowledge and use of folic acid by women of childbearing age—Estados Unidos, 1997. *Morbidity and Mortality Weekly Report*, Volumen 46, Número 31, 8 de agosto de 1997, pág. 721–723.

Centers for Disease Control and Prevention. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. *Morbidity and Mortality Weekly Report*, Volumen 41, Número RR-14, 11 de septiembre de 1992.

Locksmith, G.J., y Duff, P. Preventing neural tube defects: the importance of periconceptional folic acid supplements. *Obstetrics and Gynecology*, Volumen 91, Número 6, Junio de 1998, pág. 1027–1034.

Molloy, A., et al. Thermolabile variant of 5,10-methylenetetrahydrofolate reductase associated with low red-cell folate: implications for folate intake recommendations. *The Lancet*, Volumen 349, 31 de mayo de 1997, pág. 1591–1593.

Schwarz, R.H., and Johnston, R.B., Jr. Folic acid supplementation—when and how. *Obstetrics and Gynecology*, Volumen 88, Número 5, Noviembre de 1996, pág. 886–887.

Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine. *Dietary Reference Intakes, Other B Vitamins, and Choline*. Washington, D.C., National Academy Press, 17 de abril de 1998.

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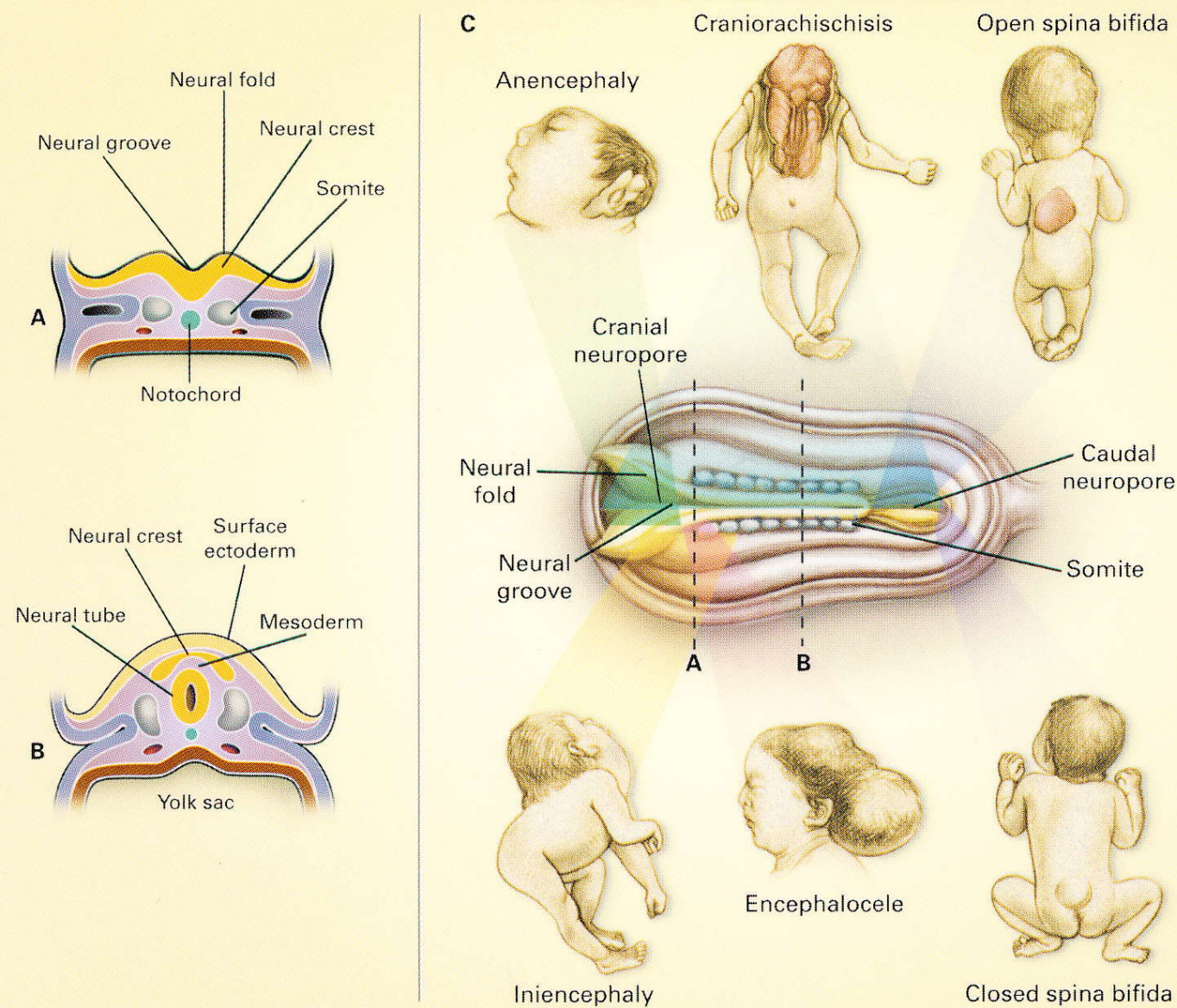
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## Features of Neural Tube Development and Neural Tube Defects



Panel A shows a cross section of the rostral end of the embryo at approximately three weeks after conception, showing the neural groove in the process of closing, overlying the notochord. The neural folds are the rising margins of the neural tube, topped by the neural crest, and demarcate the neural groove centrally. Panel B shows a cross section of the middle portion of the embryo after the neural tube has closed. The neural tube, which will ultimately develop into the spinal cord, is now covered by surface ectoderm (later, the skin). The intervening mesoderm will form the bony spine. The notochord is regressing. Panel C shows the developmental and clinical features of the main types of neural-tube defects. The diagram in the center is a dorsal view of a developing embryo, showing a neural tube that is closed in the center but still open at the cranial and caudal ends. The dotted lines marked A and B refer to the cross sections shown in Panels A and B. Shaded bars point to the region of the neural tube relevant to each defect.

In anencephaly, the absence of the brain and calvaria can be total or partial. Craniorachischisis is characterized by anencephaly accompanied by a contiguous bony defect of the spine and exposure of neural tissue. In open spina bifida, a bony defect of the posterior vertebral arches (in this case, the lower thoracic vertebrae) is accompanied by herniation of neural tissue and meninges and is not covered by skin. In iniencephaly, dysraphia in the occipital region is accompanied by severe retroflexion of the neck and trunk. In encephalocele, the brain and meninges herniate through a defect in the calvaria. In closed spina bifida, unlike open spina bifida, the bony defect of the posterior vertebral arches (in this case, the lumbar vertebrae), the herniated meninges, and neural tissue are covered by skin.

**YOU** are the link between science and healthy babies.

Help your patients **Get the “B” Attitude.** That's **B**  
for the **B vitamin folic acid.**

Tell them about folic acid  
because:



March  
of Dimes®  
*Saving babies, together®*

Folic acid works to prevent neural tube defects only if taken before and during the first few weeks of pregnancy when the neural tube is developing into the brain and spinal cord<sup>1</sup>.

<sup>1</sup>Czeizel AE, Dudas I. Prevention of the first occurrence of neural tube defects by periconceptional vitamin supplementation. *N Eng J Med* 1992; 327:1832-5.

Women who could become pregnant should take a multi-vitamin with 400 mcg of folic acid every day in addition to eating a healthy diet<sup>2</sup>. This should include foods rich in folic acid such as orange juice, fortified breakfast cereals, enriched grain products and green leafy vegetables.

<sup>2</sup>Institute of Medicine. Dietary Reference Intake for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline. Washington, DC. National Academy Press, 1998.

Women at high risk for an NTD-affected pregnancy (such as those with a prior NTD-affected pregnancy, with epilepsy or with diabetes) may need a higher dose of folic acid. Based on the MRC study, the CDC recommends 4.0 mg of folic acid daily — ten times the dose for low-risk women<sup>3</sup>.

<sup>3</sup>MRC Vitamin Study Research Group. Prevention of neural tube defects: results of the Medical Research Council Vitamin Study. *Lancet* 1991; 338:131-7.

**Need more information?**

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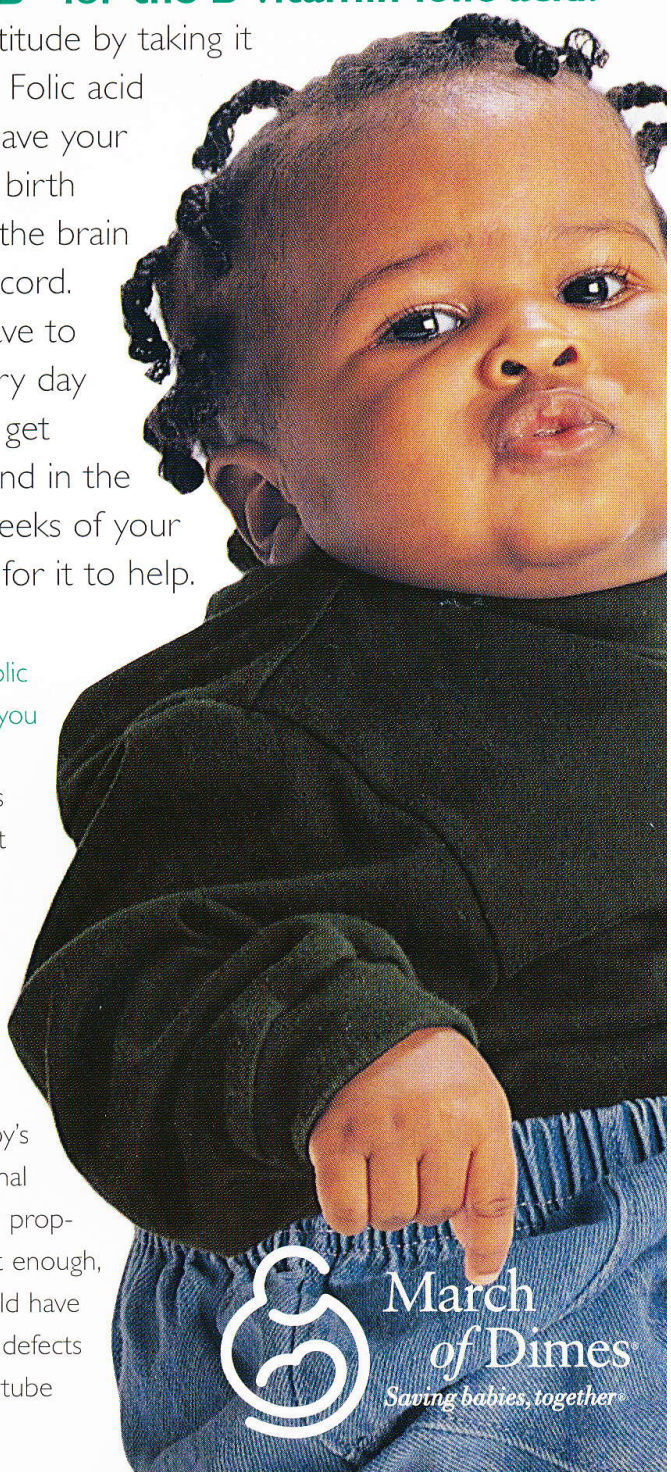
# Get the “B” Attitude

**That’s “B” for the B vitamin folic acid.**

Get the attitude by taking it every day. Folic acid may help save your baby from birth defects of the brain and spinal cord. But you have to take it every day *before* you get pregnant and in the first few weeks of your pregnancy for it to help.

## **B vitamin folic acid** — Why you need it

A baby needs folic acid right after it’s conceived, *before* you even know you’re pregnant. Folic acid helps the baby’s brain and spinal cord develop properly. Without enough, the baby could have serious birth defects called neural tube defects.



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## **Be** informed — What are neural tube defects

About 2,500 babies are born with neural tube defects each year. They include spina bifida, which could mean the baby will never be able to walk; and anencephaly, which means the baby's brain and skull don't develop fully and the baby dies.

Research shows that, if all women in the United States took enough folic acid every day throughout their child-bearing years, up to 70 percent of these birth defects could be prevented. The key is to take folic acid *before* getting pregnant.

## **Both** of you need it

Folic acid's good for *your* health, too. Some studies suggest it may help fight heart disease, and colon and cervical cancers.

## **Best** ways to get it

You need to get 400 micrograms (0.4 milligram)\* of folic acid every day. The best way to get it is to take a multivitamin every day and eat a healthy diet that includes foods rich in folic acid like orange juice, fortified breakfast cereals and leafy green vegetables.

## **Begin** right now

Because folic acid is so important, you should begin taking it right away. If you need help remembering to take a vitamin every day, try to connect it with something you already do each day. Start taking your multivitamin at the same time as you:

- brush your teeth
- put on your perfume
- make coffee
- put in or take out your contacts
- drink your orange juice
- eat lunch
- listen to the news.

It won't be long before you don't even have to think about it anymore.

## **Get the "B" attitude**

Take folic acid today and every day. For your baby's health and for yours.

\* Because some women may need more folic acid, the March of Dimes recommends that all women see their doctors before pregnancy. If you have diabetes, epilepsy or a family history of neural tube defects, talk to your doctor about folic acid before you plan for your next baby.



**FOLIC ACID NOW**

## **QUESTIONS?**

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# Get the “B” Attitude

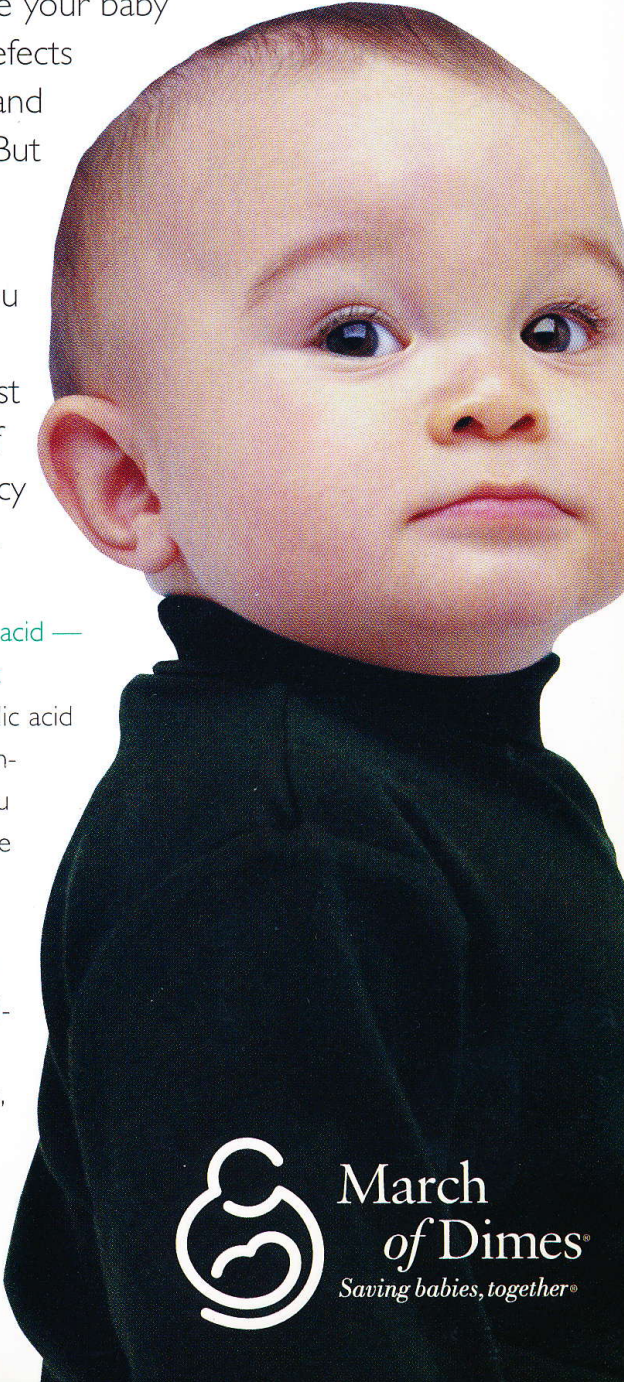
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### **QUESTIONS?**

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# Tome ácido fólico

## EL ácido fólico es una vitamina B.

Acostúmbrase a tomarlo todos los días. El ácido fólico puede proteger a su bebé de defectos de nacimiento en el cerebro y en la columna vertebral.

Pero para que tenga efecto, debe tomarlo todos los días *antes* de quedar embarazada y durante las primeras semanas de su embarazo.

## ¿Por qué es necesario tomar ácido fólico?

El bebé necesita ácido fólico inmediatamente después de ser concebido, aún *antes* de que usted sepa que está embarazada. El ácido fólico ayuda al cerebro y a la columna vertebral del bebé a desarrollarse en forma adecuada. Sin una cantidad suficiente, el bebé puede nacer con serios defectos, llamados defectos del tubo neural.



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### Los defectos del tubo

**neural.** Todos los años nacen cerca de 2.500 bebés con defectos del tubo neural como la espina bífida y la anencefalia. La espina bífida puede ser la causa de que un bebé nunca pueda caminar. La anencefalia es la falta de desarrollo del cráneo y el cerebro del bebé. La anencefalia siempre causa la muerte.

Las investigaciones han comprobado que, si todas las mujeres de los EE.UU. tomaran suficiente ácido fólico todos los días durante sus años fértiles, podría evitarse hasta el 70% de los casos de estos defectos congénitos. La clave es tomar ácido fólico *antes* de quedar embarazada.

### La mamá y su bebé lo necesitan.

El ácido fólico es bueno para *su propia* salud también. Algunos estudios sugieren que puede ayudar a combatir las enfermedades del corazón, el cáncer del colon y el cáncer cervical.

### La mejor manera de

**tomarlo.** Usted necesita 400 microgramos (0,4 miligramos)\* de ácido fólico todos los días. Para estar segura de consumir la cantidad necesaria, lo mejor es tomar una multivitamina diaria y consumir alimentos saludables. Los alimentos ricos en ácido fólico incluyen los cereales enriquecidos, el pan, el jugo de naranja y los vegetales de hojas verdes.

### Comience ahora mismo.

Debido a que el ácido fólico es muy importante, le conviene comenzar a tomarlo desde ahora. Para recordar que debe tomar su vitamina todos los días, hágalo junto con alguna actividad que hace todos los días, por ejemplo:

- cepillarse los dientes
- ponerse perfume
- preparar el café
- ponerse o quitarse los lentes de contacto
- tomar jugo de naranja
- almorzar
- escuchar el noticiero

En poco tiempo será parte de su rutina diaria.

### Tome ácido fólico

Comience a tomar ácido fólico todos los días desde hoy mismo. Hágalo por la salud de su bebé y por la suya.

\* Debido a que algunas mujeres pueden necesitar más ácido fólico, March of Dimes recomienda que todas las mujeres consulten a sus médicos antes del embarazo. Si usted padece de diabetes, o de epilepsia o si tiene antecedentes familiares de defectos del tubo neural, consulte a su médico antes de planificar su próximo embarazo.



**ÁCIDO FÓLICO AHORA**

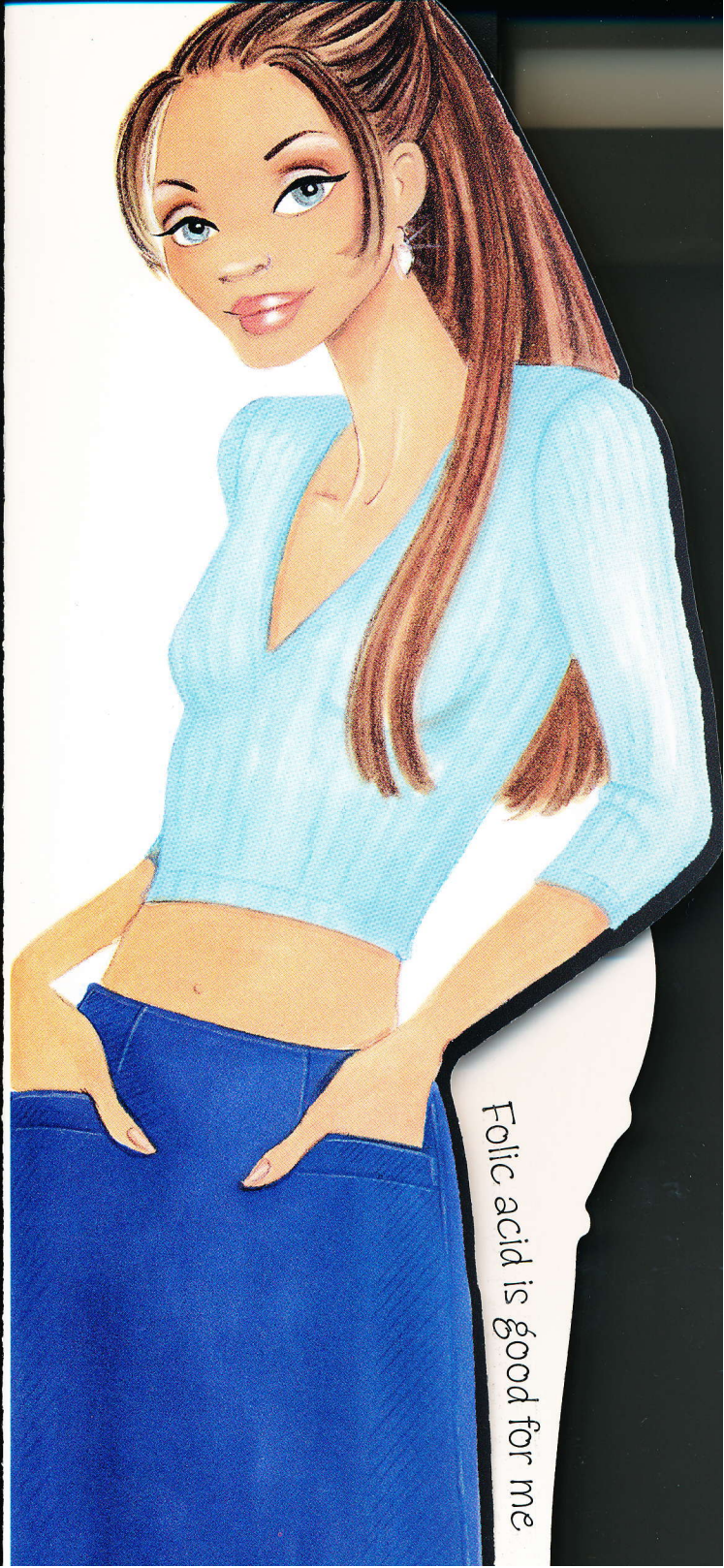
### ¿ALGUNA PREGUNTA?

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Folic acid is good for me.

Folic acid is good for us

I take folic acid every day. Do you?

### Why?

Because folic acid is so good for you! Some research suggests that folic acid, a B vitamin, may help protect you from heart disease, cervical and colon cancer, and possibly, breast cancer. If you take folic acid before and during early pregnancy, it may help reduce your baby's risk for birth defects of the brain and spine (called neural tube defects). Some studies suggest that folic acid may also help protect your baby from other birth defects of the heart, limbs and face. Who knew a vitamin could do so much?

### When?

Now! Begin taking folic acid today, and take it every day. It is never too soon to begin protecting your own health. And, waiting until you find out you are pregnant could be too late for the health of your baby.

### How much?

The March of Dimes recommends taking 400 micrograms of folic acid every day as part of a healthy diet. You can get enough by taking a multivitamin or a folic acid supplement, or by eating a fortified breakfast cereal that contains 100% of the recommended daily amount of folic acid (400 mcg). Take folic acid for yourself now and for your future baby later.

### Find out more

visit [www.marchofdimes.com](http://www.marchofdimes.com)

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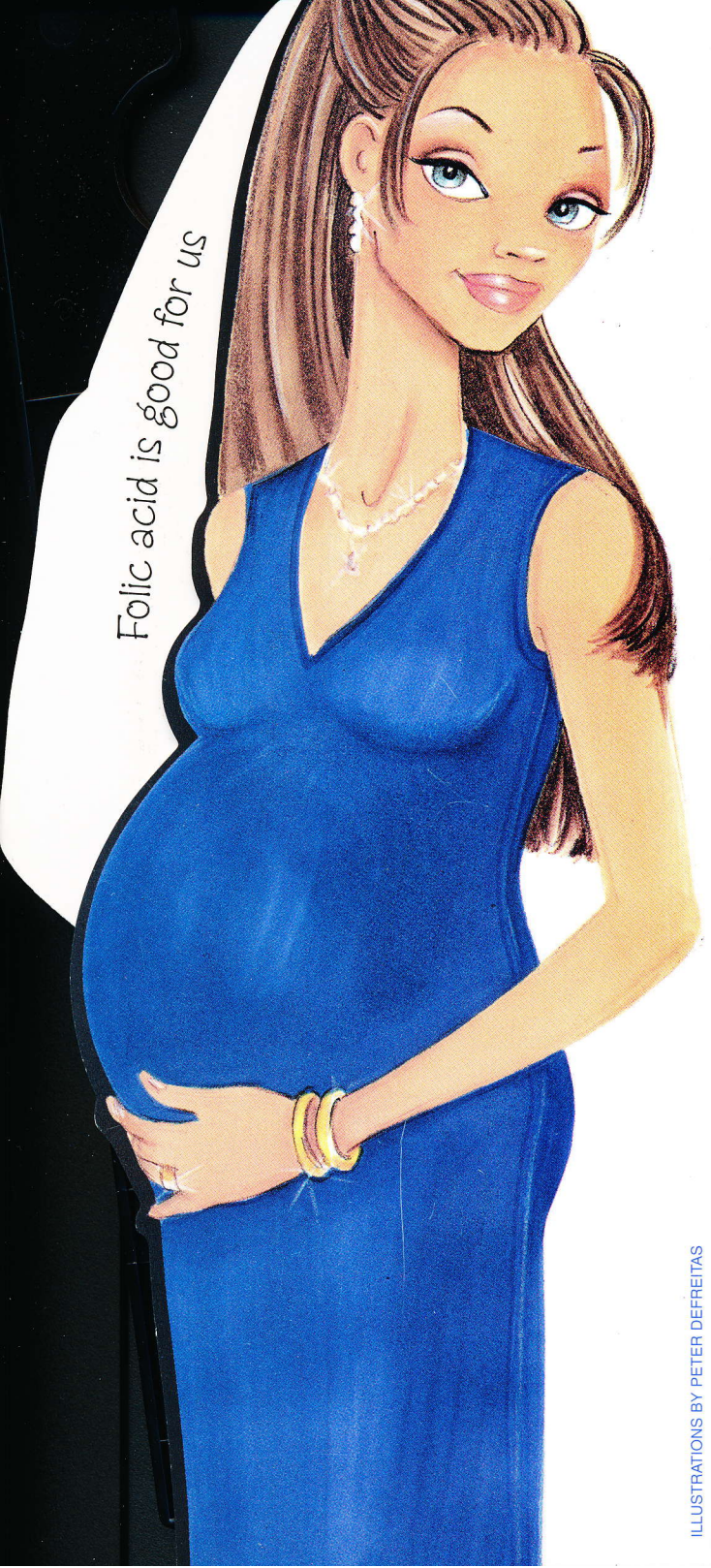
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Folic acid is good for me



Folic acid is good for us

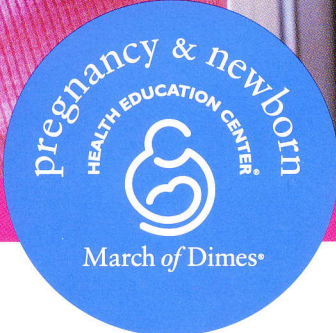
ILLUSTRATIONS BY PETER DEFREITAS



# eating for two



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# a healthy diet for baby and you

You need 300 extra calories per day to support your baby's growth. So eat smart and make healthy food choices. Try to eat foods from each of

the five food groups every day. They provide important nutrients that you and your baby need.

**Remember:**  
Fatty foods like doughnuts and chips, and sweets like sodas, cookies and candy, don't give your baby enough of what it needs to grow.

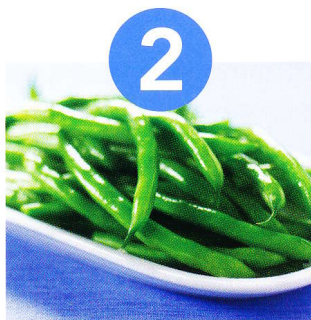
## watch your serving sizes; follow these guidelines



1

**Grains**  
6 to 11 servings a day  
Sample of one serving

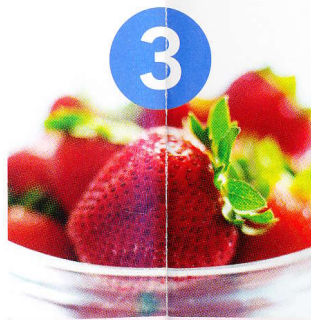
- 1 cup cold cereal
- 1 slice bread
- 1/2 cup cooked pasta or rice
- 1 small pancake
- 1 small tortilla



2

**Vegetables**  
3 to 5 servings a day  
Sample of one serving

- 1/2 cup vegetables
- small baked potato
- 3/4 cup vegetable juice



3

**Fruits**  
2 to 4 servings a day  
Sample of one serving

- 1/2 cup fruit
- 1 apple, orange or pear
- 3/4 cup fruit juice



4

**Milk Products**  
3 to 4 servings a day  
Sample of one serving

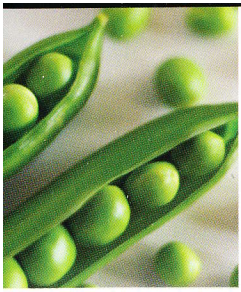
- 1 cup milk
- 1 cup yogurt
- 2 1" cubes of cheese



5

**Proteins**  
3 to 4 servings a day  
Sample of one serving

- 2 ounces meat, poultry or fish
- 1/2 cup dried or cooked beans
- 2 tablespoons peanut butter



## take folic acid

Folic acid is a B vitamin that helps prevent birth defects of the brain and spinal cord (called neural tube defects). All women of childbearing age should take a multivitamin with 400 micrograms of folic acid every day before pregnancy and during early pregnancy, as part of a healthy diet.

Your healthy diet should include foods that are good sources of folic acid and folate, the form of folic acid that occurs naturally in food, such as:

- Fortified breakfast cereals
- Enriched grain products
- Beans
- Leafy green vegetables
- Orange juice



## healthy eating hints

1

**Meals:** Eat four to six smaller meals a day instead of three bigger ones to help relieve the heartburn and discomfort you may feel as the baby grows bigger.

2

**Snacks:** Cheese, yogurt, fruit and vegetables are good, healthy snacks. Peanut butter and nuts are also good — if you are not allergic to them.

3

**Liquids:** Drink at least six to eight glasses of water, juice or milk every day.

4

**Vitamins:** Take a multivitamin or prenatal vitamin every day. Ask your health care provider if you need to take an iron or calcium supplement, too.

5

**Caffeine:** Limit the amount of caffeine you consume to 300 milligrams a day, the amount in about two 8-ounce cups of coffee. Some studies suggest that drinking too much coffee may make it more difficult to become pregnant and may increase the risk of miscarriage. Tea, some soft drinks, chocolate and some non-prescription drugs also contain caffeine.



## foods to avoid

Some foods can make you and your baby sick. Avoid these foods that can cause food poisoning or contain harmful chemicals:

- Swordfish, shark, king mackerel and tile fish. Also avoid any fish you or your family catch until you check its safety with your local health department. Limit tuna to no more than 6 ounces of albacore (white tuna) per week because it has a higher mercury level than light tuna.
- Raw or undercooked meat, poultry, seafood and hot dogs. Deli meats (such as ham and bologna) occasionally can cause food poisoning. Avoid them or reheat them before eating.

## weight gain

Women of average weight-for-height before pregnancy should gain about 25 to 35 pounds. Most women gain 3 to 5 pounds in the first trimester, and then a pound a week in the second and third trimesters. Your health care provider will tell you what's right for you.



Never eat nonfood items like clay, starch, paraffin or coffee grounds. Eating these things can cause problems for you and your baby.

- Raw fish, especially shellfish
- Soft-scrambled eggs and foods made with raw or lightly cooked eggs
- Unpasteurized soft cheeses such as brie, feta, Camembert, Roquefort and Mexican-style
- Unpasteurized milk and any foods made from it
- Unpasteurized juices
- Raw sprouts, especially alfalfa sprouts
- Herbal supplements and teas

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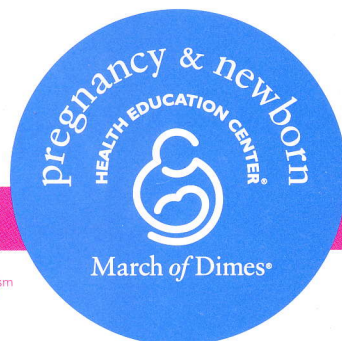
Our Web site is packed with information about pregnancy and newborn health. For answers to your questions, e-mail: [askus@marchofdimes.com](mailto:askus@marchofdimes.com)



## learn the signs of preterm labor

Preterm labor can happen to any woman. Call your health care provider right away if you have any of these warning signs:

- Contractions (your abdomen tightens like a fist) every 10 minutes or more often
- Change in vaginal discharge (leaking fluid or bleeding from your vagina)
- Pelvic pressure — the feeling that your baby is pushing down
- Low, dull backache
- Cramps that feel like your period
- Abdominal cramps with or without diarrhea



pink or blue...

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Eating for Two, item #09-219-00 6/04

Spanish version: Teresa come para dos, item #09-672-00

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**1**

Call March of Dimes Fulfillment Center at **1-800-367-6630**.

**2**

Give the operator Materials Code **HPK00**.

**3**

Place your order.

**Materials**

Item #	Description	Count Per Unit	Unit Cost
53-1381-01	<b>Folic Acid Tear-Off Pad (English)</b> Give patients personalized instructions and the folic acid message. The 4-1/4" x 7" pad has your patients' frequently asked questions about folic acid on the other side. Available in Spanish in October 2000.	4 pads, 25 sheets per pad	\$1.50
53-1245-99	<b>"B" Attitude Flyer (English)</b> (White/Hispanic baby) Single sheet, double-sided 3-3/4" x 8" flyer. Fits neatly into POP Display. Provides the basics about folic acid.	100	FREE
53-1303-99	<b>"B" Attitude Flyer (English)</b> (African-American baby)	100	FREE
53-1280-99	<b>Tome ácido fólico Flyer (Spanish)</b> Similar to English version.	100	FREE
53-1440-00	<b>Point-of-Purchase (POP) Display</b> (holds 100 flyers) Can be used to display "B" Attitude Flyers. Perfect for countertops or reception desks.	1	FREE
09-1144-98	<b>Folic Acid Fact Sheet</b> Provides information in a Q & A format.	50	\$3.50
09-1211-99	<b>Ácido fólico Fact Sheet</b> Written in Spanish, provides information in a Q & A format.	50	\$3.50

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