

Enzyme error behind neural tube defects

Women who supplement their diet with folic acid from the time they conceive through the first few months of pregnancy reduce the risk that their baby will develop a devastating neural tube defect. A new study shows why this B vitamin may work and suggests how to identify some of the women who need it most.

The brain and spinal cord develop from a single pancake of cells that first folds into a tube. If this neural tube does not fuse completely during the first 3 to 6 weeks of human life, the brain may fail to develop fully (anencephaly), certain protective structures may fail to shield the spinal cord (spina bifida) from paralyzing and potentially lethal injury, or both.

Recent studies have also linked neural tube defects to mothers deficient in another vitamin, B₁₂, notes James L. Mills of the National Institute of Child Health and Human Development in Bethesda, Md. Only one chemical reaction in the body requires both B₁₂ and folic acid. This reaction recycles an amino acid that does not go into proteins (homocysteine) into one that does (methionine). Mills and his coworkers reasoned that a defect in the enzyme driving this transformation might underlie neural tube defects.

They now offer confirmatory evidence of this from a study of pregnant women in Dublin, where the incidence of neural tube defects is nearly double that in the United States. Most of the 81 women whose babies suffered such defects had significantly higher concentrations of homocysteine in their blood than did mothers of 323 healthy babies born in the same hospitals.

Moreover, blood tests indicated that most women whose babies developed the neural tube defects were not deficient in either folic acid or B₁₂. The group published its findings in the Jan. 21 LANCET.

This study "is the first to really suggest a mechanism" for neural tube defects, notes Norman W. Klein of the University of Connecticut in Storrs. It also points out the value of someday screening women for a defect in homocysteine metabolism, he says.

Mills and his colleagues say their data reinforce the idea of supplementing women of child-bearing age with folic acid and probably vitamin B₁₂. Klein argues instead that "what [women] need is methionine" — an essential amino acid most abundant in animal proteins. For now, the Food and Drug Administration is reviewing plans to ensure that women receive enough folic acid by requiring — perhaps as early as this year — that manufacturers add the vitamin to all "enriched" grain-based products.

— J. Raloff