Drugs, Pregnancy and Lactation

Prenatal Vitamins and Reducing Pediatric Cancer Risk

There is some evidence that the use of vitamins in general and folic acid in particular may inhibit the development of some types of cancer in adults, although the data are not from randomized trials and are debated. There are also several studies suggesting folic acid may protect against certain pediatric cancers, and a recently reported metaanalysis conducted by Motherisk found prenatal vitamin use during pregnancy was associated with a reduced risk of some pediatric cancers.

Several years ago, we reported the results of a study in Ontario that found an association between folic acid fortification of flour and a 50% decrease in the prevalence of pediatric neuroblastoma, an apparent protective effect.

We conducted this study after the Pediatric Oncology Group in Ontario asked us if we could identify an environmental explanation for the fewest cases of neuroblastoma in children in Ontario, a trend they first noticed in the late 1990s.

The only factor we could identify was that in 1997 and 1998, folic acid fortification of flour became compulsory in Canada, as in the United States. We were able to show that indeed, year by year, with the introduction of folic acid fortification of flour, there was a parallel decrease in the number of neuroblastomas diagnosed in young children in Ontario (Clin. Pharmacol. Ther. 2003;74:288-94).

Intrigued by these results, we looked into whether other investiga tors had arrived at similar observations about multivitamin supplement and pediatric cancers. We conducted a metaanalysis of all eight case-control studies published between 1994 and 2005 of prenatal multivitamin supplementation and pediatric cancer rates, comparing the rates of cancer in children with matched controls whose mothers did not use supplements. The studies were conducted between 1976 and 2002; all were either conducted in the United States, or included U.S. sites. These results were presented by In grid Koh, a graduate student in Motherisk, at the American Society of Clinical Pharmacology and Ther apeutics meeting in March 2006.

We found that for several prominent pediatric cancers—brain tumors, early-age leukemias in the first year of life, and neuroblastomas—tumors that are believed to start in utero—the rates were substantially lower among the children of women who took prenatal vitamins containing folic acid during pregnancy. The risk of leukemia was reduced by 36%, the risk of pediatric brain tumors was reduced by 35%, and the risk of neuroblastoma by 57%; all statistically significant reductions.

The metaanalysis has limitations, including the retrospective design of the studies, and likely variations in the composition of multivitamins; it is possible that another characteristic of women who are motivated enough to take multivitamins could contribute to the lower cancer rates. Therefore, at present, these studies show a trend and an association, but are not necessarily proof of causation.

Still, as far as we know, this is the first systematic review that has investigated such a protective effect for the use of multivitamins by pregnant women, and provides the first evidence suggesting that prenatal vitamins may have a protective effect in reducing the risk of pediatric cancer and that it may be possible to reduce the risk of certain childhood cancers in utero. This is important because for the most part, not much is known about how to prevent pediatric cancers.

These findings may also contribute to the understanding of the etiology of cancer. Folic acid, for example, is involved in many intracellular processes, and it has been hypothesized that folic acid deficiencies and cancers in children may be related to partially altered DNA methylation and impaired DNA synthesis and repair.

Presently, we can’t separate what constituents in the multivitamin are responsible for the protective effect; this will be much more difficult to sort out. Despite the limitations of the studies in the metaanalysis, they represent another level of evidence for physicians and women that highlight the importance of prenatal supplementation with a multivitamin containing folic acid.

Dr. Koren is professor of pediatrics, pharmacology, pharmacy, medicine, and medical genetics at the University of Toronto. He heads Research Leadership in Better Pharmacotherapy During Pregnancy and Lactation at the Hospital for Sick Children, where he is director of the Motherisk Program, a teratogen information service (www.motherisk.org). Dr. Koren holds the Chair in Toxicology at the University of Western Ontario.