

Offspring of female rats given folic acid supplements develop more breast cancer

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The daughters of rats who took folic acid supplements before conception, during pregnancy and while breast-feeding have breast cancer rates twice as high as other rats, according to a new study.

They also had more tumours and developed them at a faster rate, according to the study led by Dr. Young-in Kim, a gastroenterologist at St. Michael's Hospital in Toronto.

Kim stressed more research needs to be done to determine whether the findings also apply to humans. While there are similarities in [breast cancer](#) in rats and humans, there are differences in how rats and human metabolize folic acid. "We don't want pregnant women to panic," he said.

The amount of folic acid to which fetuses are exposed has increased dramatically in North America in the past decade. Women are routinely advised to take [folic acid supplements](#) before becoming pregnant and while pregnant to prevent neural tube [birth defects](#) such as spina bifida. Since 1998, the Canadian and U.S. governments have required food manufacturers to add folic acid to white flour, enriched pasta and cornmeal products as a way of ensuring women receive enough of the B vitamin. In addition, up to 40 per cent of North Americans take folic acid supplements for possible but as yet unproven health benefits.

A diet rich in natural folate, found in grains and dark, leafy vegetables, may help prevent cancer. But Kim's study, published in the February

issue of the journal *Cancer Research*, adds to a growing body of evidence that high folate intake through supplements may promote some cancers- and prevent others.

In Kim's animal study, half the rats were given folic acid supplements -- equivalent to what [pregnant women](#) in North America take in addition to the mandatory fortification in some foods - three weeks before mating and throughout the pregnancy and lactation. After weaning, half the female pups received the same amount of folic acid supplement as the pregnant rats.

Both the rats whose mothers took folic acid supplements and those who ate a folic acid supplemented diet had a twofold increase in rates of mammary tumours than the control groups. They also had more tumors and faster-growing tumors.

The folic acid supplements given to pregnant rats seemed to have a more profound tumour-producing effect than the supplements given to infant rats, suggesting that folic acid has more impact on a developing fetus than babies, Kim said.

Folate helps to make DNA and help it replicate. Kim said the folic acid supplements appear to decrease DNA methylation - how genes are turned on and off - and this likely plays a role in promoting tumors.

Previous studies have shown that folic acid supplements taken before conception can either increase or decrease certain pediatric cancers in offspring. Some of these small, observational studies have linked folic acid to a decrease in neuroblastomas, leukemia and some brain tumours, but others have shown an increase in brain tumours. Kim presented research last year showing maternal folic acid supplements decreased colon cancer in offspring by about 65 per cent.

"This means the impact of folic acid supplements may be organ-specific," Kim said. "It may decrease some cancers but promote others."

Provided by St. Michael's Hospital

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