B vitamins in mother's diet reduce colorectal cancer risk in offspring

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Mice born to mothers who are fed a diet supplemented with B vitamins are less likely to develop intestinal tumors, report scientists at the Jean Mayer USDA Human Nutrition Research Center on Aging (USDA HNRCA) at Tufts University.

Previous research in humans and mice suggests that B vitamins, particularly folate, play a role in the prevention of colorectal cancer. Using a mouse model of naturally occurring colorectal cancer, the USDA HNRCA scientists examined whether a mothers' B vitamin intake impacts her offspring's cancer risk. Mothers were fed diets containing supplemental, adequate or mildly deficient quantities of vitamins B2, B6, B12 and folate prior to conception through weaning after which all of the offspring received the same adequate diet.

"We saw, by far, the fewest intestinal tumors in the offspring of mothers consuming the supplemented diet," says Jimmy Crott, PhD, senior author and a scientist in the Vitamins and Carcinogenesis Laboratory at the USDA HNRCA. "Although the tumor incidence was similar between offspring of deficient and adequate mothers, 54% of tumors in the deficient offspring were advanced and had invaded surrounding tissue while only 18% of tumors in the offspring of adequate mothers displayed these aggressive properties."

The results were published online June 9 in the journal *Gut*.

Crott and colleagues associated the tumor suppression seen in the

offspring of supplemented mothers with a protection against disruptions to the 'Wnt' signaling pathway, a network of genes commonly altered in colorectal cancer.

"The strongest expression of tumor-suppressing genes in the Wnt pathway was in the offspring of supplemented mothers and the weakest was in the offspring of the mildly deficient mothers," says first author Eric Ciappio, a PhD candidate at the Friedman School of Nutrition Science and Policy at Tufts.

"We attribute these differences in gene expression to epigenetics, modifications of DNA which are sensitive to environmental factors such as diet," Ciappio continues. "In this case, changing maternal B vitamin intake had lasting epigenetic effects in offspring and may explain the differences in tumor incidence and aggressiveness we observed".

It remains unclear whether maternal consumption of the four B vitamins could impact tumor development in humans. ""While evidence is beginning to accumulate to suggest that maternal consumption of supplements containing folate may afford some protection against childhood cancers in offspring, we don't yet have the ability to determine whether the same holds true for cancers that normally present in the mid to late decades of life," explains Crott, who is also an assistant professor at the Friedman School.

Crott adds, "Aside from the known protective effect of maternal folate against neural tube defects such as spina bifida, our results suggest that mothers consuming supplemental quantities of these B vitamins may also be protecting her children against colorectal cancer."

More information: Ciappio ED, Liu Z, Brooks RS, Mason JB, Bronson RT and Crott JW. "Maternal B vitamin supplementation from preconception through weaning suppresses intestinal tumiorgenesis in

Apc+/1638N mouse offspring." Gut. Published online June 9, 2011.
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