# Protection against cancer may begin during pregnancy

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There may be another reason for pregnant and nursing women to eat a nutritious diet that includes generous amounts of cruciferous vegetables like broccoli and cabbage – it could help protect their children from cancer, both as infants and later in life.

A new study by scientists from the Linus Pauling Institute at Oregon State University, done with laboratory mice, found that supplements of a key phytochemical found in certain vegetables provided a very high level of protection against leukemia and lymphoma in young animals, and also significantly protected against lung cancer during the rodent's equivalent of middle age.

The research, published in the journal Carcinogenesis, is one of the first of its type to demonstrate that diet may play a protective role in a fight against cancer that may begin – and could be won or lost – well before a person is ever born. And some of the protective benefits may last into adulthood.

"Research of this type is still in its infancy, but it's pretty exciting," said David Williams, an LPI researcher and director of the Marine and Freshwater Biomedical Sciences Center at OSU.

"There's strong epidemiologic evidence that infant cancers can be caused by exposure of the fetus to carcinogens, either during pregnancy or by nursing," Williams said. "Among all childhood deaths in the U.S., cancer is second only to accidents as the leading cause, and the fetus and

neonate are sensitive targets for toxic carcinogens. It would be important if we could affect this through maternal diet."

There are particular concerns about common environmental pollutants called polycyclic aromatic hydrocarbons, or PAHs, which can be produced by cigarette smoking or the combustion of organic materials such as wood, coal, cooking oil or diesel fuel. Exposure of a fetus to PAHs has been shown to cause DNA damage in newborns and is also associated with increased levels of childhood leukemia. It has also been shown that a significant portion of the total lifetime exposure to PAHs and other toxins, including PCBs and dioxins, is transmitted to the fetus across the placental barrier and during nursing.

In laboratory studies, researchers exposed pregnant mice to a single high dose of one PAH called dibenzopyrene, a potent carcinogen, and about 80 percent of their 100 offspring died early in life from an aggressive T-cell lymphoma. Of those that survived to the mouse-equivalent of middle age, 100 percent had lung tumors.

By comparison, in a group of pregnant mice given the same carcinogen but who also received the chemoprotective supplement Indole-3-carbinol, or I3C, deaths from lymphoma were cut in half, and the number of lung tumors later in life was significantly reduced.

"It's clear that in mice this supplement provided significant protection against lymphoma and, later on, lung cancer," Williams said. "It's also worth noting that none of the infant mice received the protective supplement later in their life, at any stage beyond breast feeding. The protective effect of the compound came solely from maternal intake during pregnancy and nursing, but lasted into the animal's middle age. This is somewhat remarkable."

Although lung cancer is the leading cause of cancer death in both men

and women, it's also true that only about one smoker in 10 gets lung cancer. It's possible, researchers say, that dietary and other factors in addition to smoking may predispose some smokers to get cancer while others don't. That this process may begin with carcinogens crossing the placental boundary – and might be affected by diet – is an area that has not been adequately studied, Williams said. In this study, both the exposure to carcinogens and the levels of Indole-3-carbinol given to pregnant mice through supplements were higher than those that would ordinarily be found in the environment or a normal diet, researchers said.

The scientists do not recommend that pregnant women take supplements of this compound, which is available in health food stores, because there have been questions about its possible role in causing birth defects when ingested at high levels in the first trimester of pregnancy. That topic needs further study, they said.

However, the amounts of this and other valuable phytochemicals that could be obtained in any normal diet rich in cruciferous vegetables should be safe and useful, they said. These vegetables include broccoli, cabbage, cauliflower, kale, radishes, turnips and other types of greens and cabbages.

Indole-3-carbinol is also being studied by scientists in other U.S. research programs for chemoprotection of women against breast cancer.

Cancer chemoprotection is one of the main research areas at the Linus Pauling Institute, a world leader in the study of vitamins, phytochemicals and other nutrients that may help prevent disease or provide optimum health.

Source: Oregon State University