Mother's Diet and Child's Health

The junk you eat during pregnancy may make your child susceptible to disease later in life

by Joan Arehart-Treichel

In recent years nutrition scientists have learned that what children eat early in life can have profound effects on their brain development, muscular coordination and behavior. They have also learned that diet is intimately linked with youngsters' resistance to disease. If newborns are not provided with the right nutrients, they are more sensitive to infectious agents. When more protein was added to the diets of a group of children, their susceptibility to rheumatic fever dropped a third. Burned children who were infected with pathogens overcame infections when their diets were supplemented with protein. Children, like adults, who are deficient in vitamin A are especially susceptible to respiratory and genitourinary diseases.

More recently, however, nutrition scientists have started discovering an even more disturbing relationship between diet and children's susceptibility to disease. It is that what a mother eats during pregnancy can impair her offspring's resistance to infection long after it is born. And a mother need not be severely deficient in a nutrient to produce such effects. Although the evidence largely derives from animal studies, it suggests that comparable problems exist among humans. Certainly investigators suspect that this may be the cause since nutritional surveys have revealed that American mothers, even from upper socioeconomic classes, often have far-from-adequate diets.

Much of the research underlying this disturbing relationship between maternal diet and offsprings' later susceptibility to disease has been conducted in the laboratory of Paul M. Newberne and his nutrition team at the Massachusetts Institute of Technology. In 1966 Newberne gave female dogs less than recommended quantities of protein before and during pregnancy. Another group of dogs got the recommended protein. The pups from both groups of mothers were exposed to a dose of canine distemper virus at six months of age. Twice as many pups whose mothers had been on a protein-deprived diet during pregnancy became paralyzed than did pups whose mothers had received sufficient protein during pregnancy. The paralysis was viral-caused.

In 1972 Newberne and R. B. Wilson fed female rats less than normal protein requirements prior to conception and during pregnancy. The offspring were fed good protein diets. A hundred days after birth they were injected with the pathogen *Salmonella*. The offspring succumbed to infection even though their diets had been adequate since birth. Further, the offspring showed underdeveloped thymuses, spleens and lymph nodes—those tissues that produce cells that fight pathogens. This finding shows that the mothers' diets during pregnancy had worked irreparable damage to their offspring's immune systems, hence making them vulnerable to infection.

In the March 23, 1973, NATURE, Newberne and Vernon B. Young reported that if mother rats were fed ample amounts of vitamin B_{12} during pregnancy, it increased not only total body protein in their offspring but also immune resistance in the offspring. When the offspring were injected with *Salmonella*, they cleared the bacterium from their bloodstreams more efficiently than control offspring did. There were also fewer deaths from *Salmonella* infections among the offspring whose mothers had received ample amounts of vitamin B_{12} during pregnancy.

Last April, Newberne and Betty Williams reported at the annual meeting of the Federation of American Societies for Experimental Biology that when mother rats were only marginally deprived of vitamin B_{12} and choline (one of the B vitamins), their offspring showed less developed thymuses, spleens and lymph nodes than did control offspring. The animals whose mothers had been deprived also had fewer T lymphocytes, those cells that fight infectious agents directly. Williams is now trying to find out when the fetus's immune system is most vulnerable to nutritional deprivation. The thymus is known to start developing in rat fetuses around the sixteenth day after conception, in human fetuses about three or four months after conception.

Within the past year, Newberne, with R. L. Gross, J. V. O. Reid, Barry Burgess, Richard Marston and Walter Hift, studied pregnant women whose anemia was due to a deficiency in folic acid. Folic acid is one of the B vitamins. They found that the deficiency depressed the action of the women's T lymphocytes and that this depression could be reversed by giving the women folic acid. These results, in press with the AMERICAN JOURNAL OF CLINICAL NUTRITION, suggest that nutritional deficiencies during pregnancy can impair the immune defenses not just of the fetus but of the mother, and that this immune damage can be reversed by improving the mother's diet.

These and other findings, then, reemphasize that pregnant women should be cautious about what they eat during pregnancy. "Particularly crucial," Newberne stresses, "are those nutrients that may be marginally present in the diet, yet needed by the fetus to develop its immune system. Even a subtle impairment in the immune system may open a child to disease later in life. The many unexplained illnesses in children, and the wide variation among children in their susceptibility to illness may very possibly be explained by what their mothers eat during pregnancy."

Meanwhile pregnant women would do well to eat lots of meat, chicken, fish, dairy products, fresh green vegetables and fruits. These foods are the major sources of the nutrients that women are usually deficient in during pregnancy. This advice comes from Williams, who is not only a nutritionist but the mother of three children. Spinach, turnip tops and liver are the best sources of folic acid—a fact, she says, that American women should keep in mind since two-thirds of them, especially those on birth control pills, are deficient in folic acid. □