

# Neural Tube Defects & Obesity

**A**bout 10% of expectant mothers are obese—and the number is rising. In addition to obesity’s known health consequences, recent research indicates these women face greater risks for birth defects. This study by the California Birth Defects Monitoring Program confirms that neural tube defects are more common in pregnancies to obese women.

**OBESITY DOUBLES RISK**

In this study, we used a woman’s self-reported height and weight before pregnancy to calculate her body mass index (*see inset*). We applied the Institute of Medicine’s criterion for obesity: a body mass index greater than 29 kg/m<sup>2</sup>.

Compared to women whose body mass index was 29 or less before pregnancy, obese women were nearly 2 times as likely to have fetuses or infants with neural tube defects. The increased risk was not due to other known risk factors such as the mother’s age, race/ethnicity, education level, or lack of vitamin use. The risk was more pronounced for spina bifida (open spine) than for anencephaly (absence of the brain).

Extremely thin women—those whose body mass index was 19 or less—did not have a greater risk for neural tube defects.

**BIOLOGICAL MECHANISM UNKNOWN**

The link between obesity and neural tube defects is not yet understood. We considered a number of nutritional and other factors, but found that none of these explained the study’s findings:

- **Folic acid intake:** On the average, women who take vitamins containing folic acid around conception are less likely to have offspring with neural tube defects. However, taking vitamins did not mitigate the higher risk associated with obesity. Women who were obese—whether or not they used vitamins—still had a greater risk than non-obese women for neural tube defects.

**OBESITY DEFINITION**

The *body mass index*—widely used to judge weight relative to height—is calculated using this formula:

$$BMI = \text{weight in kilograms} \div (\text{height in meters})^2$$

This table lists heights and weights at the Institute of Medicine’s cutpoint for obesity in women—a body mass index greater than 29 kg/m<sup>2</sup>:

5'0"	.....	.149 pounds
5'2"	.....	.159
5'4"	.....	.169
5'6"	.....	.180
5'8"	.....	.191
5'10"	.....	.202
6'0"	.....	.214

- **Weight reduction diets:** Obese women who dieted in the months just before or after conception did not have a higher risk.
- **Diabetes:** Mothers with insulin-dependent diabetes are more likely to have pregnancies affected by neural tube defects. Excluding diabetics from our analysis did not change the findings.
- **Prenatal diagnosis:** Ultrasound examination of the fetus during pregnancy can be more difficult if the mother is overweight. It is unlikely this would diminish our ability to identify cases for the study, however, as we included diagnoses made prenatally or after birth.

## RECOMMENDATIONS

Will losing weight eliminate the extra risk seen among obese women? Not necessarily. There may be an underlying factor—nutritional, metabolic, or even genetic—linked to both obesity and neural tube defects; if so, weight loss alone might not correct this factor.

We caution women to consult their physicians before attempting to lose weight—an unsupervised diet could actually increase risk by eliminating nutrients such as folic acid. We advise *all* women to follow current recommendations regarding folic acid use: take 0.4 milligrams daily.

## COMPREHENSIVE STUDY DESIGN

Testing a number of hypotheses about possible causes and risk factors, this is the most extensive case-control interview study of neural tube defects.

- **Participants:** A very high proportion of mothers contacted—88%—agreed to be interviewed: 538 mothers of infants/fetuses with neural tube defects and 539 mothers of infants without birth defects. All deliveries occurred in 1989-1991.
- **Diagnostic information:** Abstracted from hospital medical records, including surgical and autopsy reports.
- **Interview:** Conducted in the mother's home by a trained interviewer, in English or Spanish, 3-6 months after the baby's due date. The 2.5-hour structured survey asked about events and exposures before and during pregnancy, family history, and demographics.
- **Size:** Self-reported prepregnancy height and weight, wearing light clothing without shoes.
- **Nutrient intake:** Estimated from questions about vitamin/mineral supplement composition and frequency of use. We assessed dietary consumption separately in over 1000 women who completed a detailed food frequency questionnaire. They reported eating habits and serving sizes for 100 foods.

*REFERENCE: Shaw GM, Velie EM, Schaffer D. Risk of neural tube defect-affected pregnancies among obese women. Journal of the American Medical Association 1996;275(14):1093-1096.*

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