from Environmental Health News , June 6, 2013. **Babies with two serious neural tube birth defects had higher levels of mercury in their placentas than babies without the birth defects, according to a study conducted in China.The infants with spina bifida and anencephaly were 12 times as likely to have higher-than-average mercury levels. The rural region studied has a high prevalence of neural tube defects and heavy pollution from coal-burning plants, a major source of mercury. However, the babies from this region did not have unusually high mercury exposures.**

Neural tube defects affect about 3,000 pregnancies in the United States each year, according to the March of Dimes . The birth defects of the brain and spine are some of the most serious congenital disorders.

During the first month of human development, the neural tube starts as a tiny, flat ribbon and turns into a tube. This tube eventually becomes the brain and the spinal cord.

Neural tube defects result if the tube does not close completely. The two most common defects are spina bifida and anencephaly.

Spina bifida is one of the most common birth defects in the United States. The condition affects about 1,500 babies each year. Spina bifida can occur when the protective vertebrae bones that make up the spine do not close entirely. Part of the spinal cord can stick out. Surgery may fix the spine, but nerve damage, leg paralysis, and bladder and bowel control problems may result.

In anencephaly , much of the brain does not develop. The baby is either stillborn or dies shortly after birth. In the United States, about 1,000 babies each year are born with anencephaly.

Experts are not sure what causes neural tube defects. Most likely it is a combination of genes and environmental factors, such as a lack of the B vitamin folic acid or exposure to organic solvents, pesticides and cigarette smoke.

Jin L, Z Le, Z Li, J-M Liu, R Ye and A Ren. **Placental concentrations of mercury, lead, cadmium, and arsenic and the risk of neural tube defects in a Chinese population**

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Reproductive Toxicology

http://www.sciencedirect.com/science/article/pii/S0890623812003188
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Animal studies find pre-birth exposures to mercury , lead, arsenic and cadmium can affect spinal cord development. The limited number of human studies on the topic are inconclusive.

What did they do?

In this human case control study, scientists examined whether babies born with neural tube defects had more pre-birth exposure to mercury, lead, arsenic and cadmium than babies born without neural tube defects.

Researchers enrolled 36 cases of anencephaly, 44 cases of spina bifida and 50 healthy babies as controls from a rural region of Shanxi Province in northern China.

At delivery or pregnancy termination, scientists measured the levels of total mercury, lead, arsenic and cadmium in the placenta. Demographic information was collected in face-to-face interviews within a few weeks of delivery.

The region has a health surveillance system that regularly collects information on babies born with birth defects. This area of Shanxi Province has a high prevalence of neural tube defects and much pollution from burning coal.

What did they find?

Babies with anencephaly or spina bifida had higher placental mercury levels as compared to babies without these neural tube defects.

Median mercury levels were 2.25 nanograms per gram (ng/g) for neural tube defects, 2.19 ng/g for anencephaly and 2.44 ng/g for spina bifida. Median mercury concentration for the controls

was 1.19 ng/g.

After accounting for other risk factors including previous history of birth defects and fever during early pregnancy, babies with neural tube defects were 12 times as likely to have above average levels of mercury as compared to babies without the birth defects.

There was little association between diagnosis with a neural tube defect and levels of the other metals.

For both the birth defect cases and the non-birth defect controls, the mercury levels in the placentas were about average when compared to other studies in locations with no known mercury contamination.

What does it mean?

Neural tube defects in newborns were associated with higher levels of mercury in the placenta when compared to levels from babies without the defects.

The Chinese study found the risk of spina bifida and anencephaly increased as the mercury concentrations increased.

This study agrees with some of the associations between metal exposure and neural tube defect previously observed in animals. In those studies, exposures to methylmercury early in development increased the risk of neural tube defects in mice and decreased the rate of neural tube cell growth in zebrafish.

The average mercury levels measured in this Chinese population were within ranges found in previous studies. They were similar to levels in areas with no known mercury sources. The concentrations were lower than levels reported in prior human studies from areas with known sources of mercury pollution.

However, the study has some limitations. First, the authors did not look for the sources of the mercury. Generally, human exposure occurs through food, water and air. Second, they also report only total levels of mercury, rather than the more harmful methyl mercury.

Neural tube defects are challenging to study in humans because the neural tube develops very early in pregnancy, often before a woman realizes she is pregnant.