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## Babies Born to Depressed Moms Have Higher Levels of Stress Hormones, Decreased Muscle Tone

*The cocktail of hormones cascading through depressed mothers' bodies may play an important role in the development of their unborn children's brains.*

A higher level of depression in mothers during pregnancy was associated with higher levels of stress hormones in their children at birth, as well as with other neurological and behavioral differences, a University of Michigan-led study found.

"The two possibilities are that they are either more sensitive to stress and respond more vigorously to it, or that they are less able to shut down their stress response," says the study's Lead Investigator, Delia M. Vazquez, M.D., a Professor of Psychiatry and Pediatrics at the University of Michigan Medical School.

The analysis, which appears online ahead of print publication in *Infant Behavior and Development*, examined links between maternal depression and the development of an infants' neuroendocrine system, which controls the body's stress response, as well as moods and emotions.

At two weeks old, researchers found that the children of depressed mothers had decreased muscle tone compared to those born to mothers who weren't depressed, yet they adjusted more quickly to stimuli like a bell, rattle or light -- a sign of neurological maturity.

"It's difficult to say to what extent these differences are good or bad, or what impact they might have over a longer time frame," says the study's lead author, Sheila Marcus, M.D., Clinical Director of U-M's Child and Adolescent Psychiatry Section.

"We're just beginning to look at these differences as part of a whole collection of data points that could be risk markers. These in turn would identify women who need attention during pregnancy or mother/infant pairs who

might benefit from postpartum programs known to support healthy infant development through mom/baby relationships."

The longer-term question for researchers is the degree to which the hormonal environment in the uterus may act as a catalyst for processes that alter infant gene expression, neuroendocrine development and brain circuitry -- potentially setting the stage for increased risk for later behavioral and psychological disorders.

While cautioning against alarm, the researchers recommended that mothers experiencing symptoms of depression during pregnancy talk to a therapist. They also noted that interventions aimed at mother-child bonding after birth can act as countermeasures, stimulating children's neurological development and lowering the possible effects of stress hormone production early in life.

Post-partum depression is one of the most common complications of pregnancy and up to 1 in 5 women may experience symptoms of depression during pregnancy.

Along with tracking the mothers' depressive symptoms throughout gestation, U-M researchers took samples of umbilical cord blood right after birth. They found elevated levels of Adrenocorticotropic Hormone (ACTH) in babies born to mothers with depression. ACTH tells the adrenal gland to produce the stress hormone cortisol. Cortisol levels, however, were similar in children of mothers with varying levels of depression, likely an indication of the high level of stress associated with the birth itself, the researchers note.

The impact of mothers' depression on fetuses and newborns has generated a considerable amount of research

in recent years. Previous studies have shown that babies born to women with severe depression may be more likely to be born prematurely or underweight, have diminished hand-to-mouth coordination and be less cuddly.

**Methodology:** The study was done on a population of 154 pregnant women, who were over the age of 20, had no plans to move in the 2-year study period, no adoption plans, no chronic medical conditions or medications that would impact the study, no substance abuse issues, no eating disorders and no bipolar illness. The mothers' depressive symptoms were assessed at 28, 32 and 37 weeks of gestation and again at birth. From their scores, the women were placed into three groups: low,

intermediate and high depression. Blood samples were taken from the infants' umbilical cords at birth to measure ACTH and cortisol levels. At two weeks, the infants were given a neurobehavioral evaluation that assessed items like response to stimuli, motor skills and response to stress. Statistical analyses were then done to look for patterns within and among the groups.

Sheila Marcus, Juan F. Lopez, Susan McDonough, Michael J. MacKenzie, Heather Flynn, Charles R. Neal Jr., Sheila Gahagan, Brenda Volling, Niko Kaciroti, Delia M. Vazquez. Depressive symptoms during pregnancy: Impact on neuroendocrine and neonatal outcomes.

**Source:** Infant Behavior and Development, 2010; DOI: 10.1016/j.infbeh.2010.07.002