

Researchers find caffeine during pregnancy negatively impacts mice brains

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Caffeine treatment leads toGABAergic cell loss in adult offspring. Credit: *Sci Transl Med* 7 August 2013: Vol. 5, Issue 197, p. 197ra104 DOI: 10.1126/scitranslmed.3006258

(Medical Xpress)—A team of European researchers has found that mice who consume caffeine while pregnant give birth to pups with negative changes to their brains. In their paper published in the journal *Science*



Translational Medicine, the team reports on their findings after examining the brains of mice pups whose mothers were given caffeine during pregnancy.

Medical researchers have shown that drugs such as cocaine, heroin or even marijuana can have a negative impact on fetal development—in contrast most believe that moderate amounts of <u>caffeine consumption</u> during pregnancy is "safe" meaning it has little or no adverse impact on fetal development. This new study doesn't change that view, but it does suggest that perhaps more research needs to be done.

In their study, the researchers administered the equivalent of 4 or 5 cups of coffee a day to pregnant mice—afterwards they studied the brains of the pups that were born. In so doing, they found that GABA neurons didn't migrate during <u>brain development</u> to their proper location in the Hippocampus at the same rate as untreated mice. GABA neurons are responsible for controlling the flow of information in the brain. Subsequent tests found the treated pups to be more susceptible to seizures.

The team also found that if they allowed the treated pups to grow to adulthood, they tended to demonstrate problems with memory—instead of playing with new objects placed in their cages, for example, they were satisfied with playing with objects they already knew—a trait that is uncommon for mice. Autopsies of <u>adult brains</u> also showed fewer neurons in the Hippocampus.

The researchers point out that their results in mice are not necessarily applicable to humans and to reinforce that point another team of researchers also published a Focus piece in the same journal pointing out that there are significant differences in the developmental process of humans and mice fetuses and thus the study with mice has no real bearing on whether caffeine may or may not cause developmental



problems with human babies.

Still, the results do indicate that perhaps more research should be done to find out if caffeine does indeed have an unknown negative impact on human <u>fetal development</u>.

More information: Adenosine Receptor Antagonists Including Caffeine Alter Fetal Brain Development in Mice, *Sci Transl Med* 7 August 2013: Vol. 5, Issue 197, p. 197ra104 <u>DOI:</u> <u>10.1126/scitranslmed.3006258</u>

Abstract

Consumption of certain substances during pregnancy can interfere with brain development, leading to deleterious long-term neurological and cognitive impairments in offspring. To test whether modulators of adenosine receptors affect neural development, we exposed mouse dams to a subtype-selective adenosine type 2A receptor (A2AR) antagonist or to caffeine, a naturally occurring adenosine receptor antagonist, during pregnancy and lactation. We observed delayed migration and insertion of ?-aminobutyric acid (GABA) neurons into the hippocampal circuitry during the first postnatal week in offspring of dams treated with the A2AR antagonist or caffeine. This was associated with increased neuronal network excitability and increased susceptibility to seizures in response to a seizure-inducing agent. Adult offspring of mouse dams exposed to A2AR antagonists during pregnancy and lactation displayed loss of hippocampal GABA neurons and some cognitive deficits. These results demonstrate that exposure to A2AR antagonists including caffeine during pregnancy and lactation in rodents may have adverse effects on the neural development of their offspring.

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