

# Study shows how cocaine impairs fetal brain development

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Exposure of the developing brain to cocaine can cause neurological and behavioral abnormalities in babies born to mothers who use the drug during pregnancy. In a study research published in this week's *PLoS Medicine*, Chun-Ting Lee and colleagues at the U.S. National Institutes of Health— who note that cocaine use occurs in several hundred thousand pregnancies per year in the United States alone — investigated the mechanism of cocaine's effect on fetal brain development.

They found that a byproduct of cocaine metabolism inhibits the development of nerve cells by interfering with a specific protein, cyclin A, which regulates cell division. The researchers found that this interference occurred because cocaine metabolism caused oxidative stress within the endoplasmic reticulum, part of the cellular apparatus for producing proteins.

They also showed that treatment of pregnant rats with cimetidine, a drug used to reduce stomach acid secretion and interferes with the enzymes that metabolize cocaine, counteracted the inhibition of neural cell development caused by cocaine exposure in the rat fetuses. These results suggest the possibility that treatments to block the effect of cocaine on cyclin A may provide a way to protect fetal brain development when a pregnant woman is unable to stop using cocaine.

Further research would be necessary to determine whether such an approach could be safe and effective in human pregnancies, the researchers say

In a related perspective on the implications of the research, Steven Hyman of Harvard University, who was not involved in the study, says the findings are exciting but also notes "the complexity of factors that might contribute to cognitive and emotional abnormalities in children exposed to cocaine and other dangerous drugs in utero."

Citation: Lee C-T, Chen J, Hayashi T, Tsai S-Y, Sanchez JF, et al. (2008) A mechanism responsible for the inhibition of neural progenitor cell proliferation by cocaine. PLoS Med 5(6): e117. --  
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