Gestational Exposure to Oxycodone Affects Later Socio-communication Behaviors in Mice

Abstract:
An increasing number of women are consuming opioids while pregnant. The use of opioids during pregnancy can lead to neonatal opioid withdrawal syndrome (NOWS). Birth outcomes associated with OUD include preterm birth, poor fetal growth, low birthweight, and possible birth defects. Even if they do not demonstrate outright problems at birth, OUD newborns may be plagued with health consequences. Oxycodone is one of the primary opioids overprescribed for pain, including in pregnant women. We hypothesize that as an opioid, oxycodone may have direct effects on fetal brain development that will lead to behavioral problems later on in life. To test this hypothesis, we exposed 12 female CD1 mice to 1.5mg/mL oxycodone and 12 female CD1 mice to 0.9% saline. Doses were calculated as 5mg/kg of the mouse bodyweight. Each group was exposed for two weeks prior to pairing and throughout gestation. Treatments ceased after each mouse gave birth. At weaning (PND21), one male and one female were randomly selected from each litter for behavioral analysis, including examining for socio-communication and cognitive deficits and anxiogenic behaviors. Pups were tested in the Crawley's three-chambered social test and then recorded in an Ultrasonic Vocalization (USV) chamber. In the three-chambered social test, male offspring exposed developmentally to oxycodone demonstrated social impairments by spending less time investigating novel individuals and either more time alone or with a habituated individual ($p \leq 0.05$). Offspring exposed to oxycodone were more likely to communicate in the ultrasonic range (> 20 kHz) compared to controls ($p = 0.02$) Findings suggest oxycodone mice show deficiencies in social behaviors and changes in vocalization patterns, which raises the concern that similar behavioral disruptions may occur in children exposed in the womb to this drug