

Title: Early Life Morphine Exposure Alters Microglial Activation and Immune Response in Adult Rats

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Introduction: In the United States, 13 percent of pregnant women use illicit substances during pregnancy; 19 percent abuse opiates, amounting to approximately one opiate abuser out of every 50 pregnant women. Prenatal exposure to opiates increases the risk of neonatal abstinence syndrome (NAS) due to the sudden discontinuation of prolonged opioid exposure. NAS is characterized by increased irritability, excessive crying, tremors, and dysregulation of sleep-wake states as these infants undergo the complications of opiate withdrawal. NAS infants are at a higher risk of developing neuropsychiatric and behavioral disorders later in life.

Microglia are the critical neuroimmune cells of the CNS, and we have previously shown that rats who received morphine on the day of birth, in the absence of pain, had significantly elevated levels of microglial activation as adults in the midbrain periaqueductal gray (PAG). Elevated levels of activated microglia are associated with a central neuroimmune response, suggesting that these animals may be more vulnerable to inflammatory disease states.

Methods: To test this hypothesis, animals were administered either morphine or saline on the day of birth. In adulthood (postnatal day 60-90), animals were implanted with Thermicron iButtons to monitor body temperature and 7 days later, injected with lipopolysaccharide (LPS) to elicit an immune response. At the end of the experiment, animals were sacrificed and brain tissue stained immunohistochemically to examine density and activation levels of microglia.

Results: Data have been collected and are currently being analyzed for treatment-dependent changes in body temperature and microglia expression.

Conclusion: We predict that animals that received morphine on the day of birth will show an augmented febrile response to LPS and elevated levels of microglia activation, suggesting that early life morphine exposure results in long-term changes in central immune function.