

Childhood adversity increases susceptibility to addiction via immune response

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Childhood adversity permanently alters the peripheral and central immune systems, increasing the sensitivity of the body's immune response to cocaine, reports a study by researchers at the IRCCS Santa Lucia Foundation and University of Rome "La Sapienza", Italy.

The study, published in *Biological Psychiatry*, showed that exposure to psychosocial stress early in life altered the structure of [immune cells](#) and inflammatory signals in mice and led to increased drug-seeking behavior. Exposure to early psychosocial stress in mice, or a difficult childhood in humans, increased the [immune response](#) to cocaine in adulthood, revealing a shared mechanism in the role of immune response in the effects of [early life](#) stress on cocaine sensitivity in mice and humans.

The findings help explain why as many as 50 percent of people who experience [childhood maltreatment](#) develop addiction problems. The results in mice and humans suggest that exposure to adversity during childhood triggers activation of the immune system, leading to permanent changes that sensitize the immune system and increase susceptibility to the effects of cocaine in adulthood.

"This paper suggests the existence of an extraordinary degree of interplay between the neural and immune systems related to the impact of early life stress on later risk for cocaine misuse. It both highlights the complex impact of early life stress and suggests an immune-related mechanism for reducing later addiction risk," said John Krystal, MD, Editor of *Biological Psychiatry*.

After inducing psychosocial stress in 2-week-old mice by exposing them to a threatening male, first author Luisa Lo Iacono, Ph.D., and colleagues examined brain immune cells, called microglia, in adulthood. Early social stress altered the structure of microglia in the ventral tegmental area, a brain region important for the reward system and drug-seeking, and increased the response of microglia to cocaine. In the peripheral immune system, early social stress increased the release of inflammatory molecules from white blood cells, which was further amplified by exposure to cocaine, compared with control mice.

"Remarkably, pharmacologically blocking this [immune activation](#) during early life stress prevents the development of the susceptibility to cocaine in adulthood," said senior author Valeria Carola, Ph.D. Mice who received an antibiotic to prevent activation of immune cells during social stress did not have cellular changes or drug-seeking behavior.

The study also compared [immune system function](#) of 38 [cocaine addicts](#) and 20 healthy volunteers. Those who experienced childhood maltreatment had increased expression levels of genes important for immune system function. And the highest levels were found in [cocaine](#) addicts who had experienced a difficult childhood.

The findings add to the growing collection of evidence from the research group for the negative effects of early life trauma on brain development. "Our work emphasizes once again the importance of the emotional environment where our children are raised and how much a serene and stimulating environment can provide them with an extra 'weapon' against the development of psychopathologies," said Dr. Carola.

More information: Luisa Lo Iacono et al, From Traumatic Childhood to Cocaine Abuse: The Critical Function of the Immune System, *Biological Psychiatry* (2018). [DOI: 10.1016/j.biopsych.2018.05.022](https://doi.org/10.1016/j.biopsych.2018.05.022)

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