

Acute psychological stress: effects on hippocampal neurogenesis and the role of microglia

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Abstract

Among all the factors that can contribute to the onset of psychopathological disorders, stress is the main environmental factor. The hippocampus is one of the most sensitive regions to the harmful effects of stress, in which the neurogenic process is impaired. On the other hand, under stress situations, microglia are also affected and can trigger a proinflammatory response, acting as anti-neurogenic cells and releasing cytokines and other proinflammatory molecules. Knowing what happens in the early stages of stress may be relevant to investigate the temporal aspects of the development of stress-associated psychopathological disorders, and even their possible treatment. Therefore, after subjecting C57BL/6J mice for 2 hours to an acute and intense stress procedure called WIRS (water immersion restraint stress), data were analyzed to study microglia, cell proliferation and neuronal maturation. In addition, a mediation analysis study was conducted for data integration. The results revealed that the applied acute stress is sufficiently intense to induce an increase in the number of microglia, accompanied by morphometric changes, as well as negatively affecting the neuronal maturational process. Furthermore, these data suggest that effects on the neurogenic process mediate the microglial response to an intense acute stressor. This leads to the conclusion that this may be the initial mechanism for any intense stress response, or may even be the first steps in the development of the response to a chronic stressor.

Funding

- *Ministerio de Ciencia e Innovación – Plan Nacional I+D+i* from Spain: PID2020-117464RB-I00 to C. Pedraza and M. Pérez-Martín

- *FEDER/Ministerio de Ciencia e Innovación – Agencia Estatal de Investigación* from Spain: PSI2017-83408-P to C. Pedraza

- *FEDER/Junta de Andalucía – Proyectos I+D+I en el marco del Programa Operativo FEDER Andalucía 2014-2020: UMA20-FEDERJA-112 to C. Pedraza and M. Pérez-Martín*
- *Consejería de Conocimiento, Investigación y Universidades, Junta de Andalucía: P20_00460 to C. Pedraza*
- *Contract in charge of the project P20_00460 to P. Chaves-Peña*
- *Ministerio de Universidades from Spain: FPU16/05308 to A. Nieto-Quero and FPU19/03629 to M.I. Infantes-López*
- *I Plan Propio de Investigación, Transferencia y Divulgación Científica (convocatoria 2021) from University of Malaga: predoctoral fellowship to J. Muñoz-Martín*