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Sex differences in affective disorders in adult rats after infantile immune stimulation

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It is known that an inflammatory challenge during the prenatal period results in permanent changes in glial cells and behavior in adulthood. However, it is unknown whether an inflammatory challenge during the infantile period may have permanent sex dimorphic effects in microglia and astrocytes in vivo, which in turn may be associated with sex differences in adult behavior. In this study we have evaluated whether postnatal injection of lipopolysaccharide (LPS; 250ug/kg, i.p. on postnatal day 14), induces depressive and anxiety-like behaviors, glial cell activation, pro-inflammatory cytokine (TNF alpha) secretion and sexually dimorphic responses in adulthood. Postnatal day 14 (P14) male and female rats received an intraperitoneal injection of LPS or PBS, Three months later, animals were tested in the open field (OF), the elevated plus maze (EPM) and the forced swimming test (FST) to assess the level of anxiety and depression. Hippocampal proinflammatory cytokine TNF alpha concentration and the number of astrocytes and microglia were estimated in the dentate gyrus, CA1 and CA3. Administration of LPS resulted in alterations in anxiety and depressive behaviors in male rats but not in female rats. LPS resulted in increased number of astrocytes in the hippocampus in both sexes, although the response was higher in females. Furthermore, LPS increased the number of microglia in the hippocampus, but only in females. These findings indicate that an immune challenge in infantile rats induces sex differences in affective behavior in adulthood, which may be the consequence of sex differences in the number of astrocytes and microglia in the hippocampus.

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