# Early maternal deprivation re-distributes Interleukin-1 receptor type I at the hippocampal synapse in a sex-specific manner

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Challenges experienced in early life cause an enduring phenotypic shift of immune cells towards a sensitized state that may lead to an exacerbated reaction later in life and contribute to increased vulnerability to neurological diseases. Peripheral and central inflammation may adversely affect neuronal function through cytokines such as IL-1. The extent to which an early life challenge induces long-term alteration of immune receptors organization in neurons has not been shown. We investigated whether a single 24-hour episode of maternal deprivation (MD) on the ninth post-natal day (PND) affects rat neuron ability to sense the inflammatory response later in life by studying: i) the synapse distribution of interleukin receptor type I (IL-1RI) together with subunits of NMDA and AMPA receptors; and ii) the interactions between IL-1RI and the GluN2B subunit of the NMDAR. The measurements were made in the hippocampus and pre-frontal cortex of male and female rats on PND 45. MD significantly increased IL-1RI levels and IL-1RI interactions with GluN2B at the synapse of male hippocampal neurons, without affecting the total number of IL-1RI or NMDAR subunits. Although GluN2B and GluN2A were unchanged at the synapse, their ratio was significantly decreased in the hippocampus of the male rats who had experienced MD; the levels of the GluA1 and GluA2 subunits of the AMPAR were also decreased. None of the observed alterations occurred in the hippocampus of the females or in the pre-frontal cortex of either sex. These data reveal a long-term, sex-dependent modification in receptor organization at the hippocampal post-synapses following MD. We suggest that this effect contributes to priming hippocampal synapses to the action of IL-1beta thus highlighting a novel molecular basis underlying the critical role of the immune response in the early-life programming of later-life brain.