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Review article

Impacts of Stress on Reproductive and Social Behaviors

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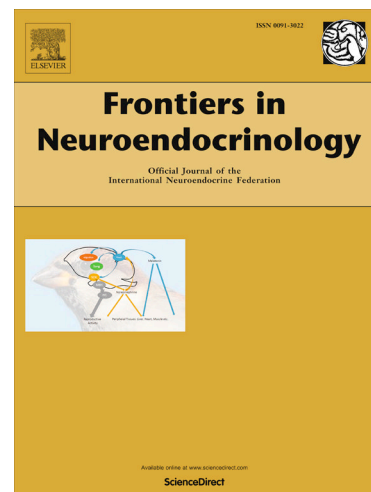
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Impacts of Stress on Reproductive and Social Behaviors.

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ABSTRACT: Impacts of steroid stress hormones on the brain have provided multiple opportunities for linking specific molecular phenomena to behavioral state. The negative impacts of stress on female reproductive biological processes have been documented thoroughly at the endocrine and behavioral levels. More recently, a ‘3-hit’ theory of autism has identified early stress as one of the hits. The multiple biochemical effects of endotoxin (lipopolysaccharide, LPS) indicated that it would serve as a powerful maternal immune activator. The prenatal exposure to LPS coupled with the other two ‘hits’ - an autism-related mutation and the Y chromosome - - heightened certain autism-like signs in mouse behavior.

Keywords: Autism, hippocampus, stress, stress hormones, behavior.

Bruce McEwen’s career in science has been remarkable in at least four of its aspects. First, his original research papers have been prolific and have had high impact in neuroendocrinology, specifically, and on neuroscience in general. Having published more than a thousand papers, he has covered a variety of stress-related subjects both during development and in the adult brain. For example, taking the phenomenon of postnatal neurogenesis in the dentate gyrus of the hippocampus (Altman, 1962), McEwen’s lab showed, using immunocytochemistry, that both the glucocorticoid receptor and the mineralocorticoid receptor are expressed in newly born cells, and they inferred that expression of the glucocorticoid receptor affects cell survival (Gould et al., 1992a). Along the same lines, Gould et al (1992b) reported that numbers of newly divided 3H-thymidine-labeled nerve cells were significantly increased following adrenalectomy. Taking the two studies together, one concludes that stress hormones must oppose postnatal neurogenesis, a phenomenon whose behavioral consequences are still being worked out. With respect to adult hippocampal CA3 pyramidal neurons, chronic psychosocial stress alters the structure of axo-dendritic synapses, as studied by Golgi impregnation (Magariños et al, 1996) and at the ultrastructural level (Magariños et al, 1997). Further work with mice haploinsufficient in Brain Derived Neurotrophic Factor (BDNF) showed both the role of BDNF in supporting the formation of CA3 dendritic arbors and, in turn, the permissive role of BDNF in the effect of chronic restraint stress (Magariños et al., 2011).

Second, in terms of intellectual scope, McEwen has repeatedly exhibited intellectual command of his field. His New England Journal of Medicine review (1998) has been cited thousands of times. And his Physiological Reviews (2007) paper covered both the short-term

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