

A role for reactive oxygen/nitrogen species and iron on neuronal synaptic plasticity

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A great body of experimental evidence collected over many years indicates that calcium has a central role in a variety of neuronal functions. In particular, calcium participates in synaptic plasticity, a neuronal process presumably correlated with cognitive brain functions such as learning and memory. In contrast, only recently, evidence has begun to emerge supporting a physiological role of reactive oxygen (ROS) and nitrogen (RNS) species in synaptic plasticity. This subject will be the central topic of this review. The authors also present recent results showing that, in hippocampal neurons, ROS/RNS, including ROS generated by iron through the Fenton reaction, stimulate ryanodine receptor-mediated calcium release, and how the resulting calcium signals activate the signaling cascades that lead to the transcription of genes known to participate in synaptic plasticity. They discuss the possible participation of ryanodine receptors jointly stimulated by calcium and ROS/RNS in the normal