# ROS scavenger

ROS scavengers are compounds capable of reacting with reactive oxygen species and other reactive free radicals. For example, ethanol is a very active ROS and free radical scavenger but is no antioxidant.

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Intracranial hypertension (IH) is a medical or surgical emergency that can be the common ending of various neurological disorders, such as traumatic brain injury, cerebral vascular diseases and brain tumors. However, the molecular mechanisms underlying IH-induced neuronal apoptosis have not been fully determined, and the treatments are symptomatic, insufficient and complicated by side-effects. In this study, a cellular model induced by compressed gas treatment in primary cultured rat cortical neurons were performed to mimic IH-induced neuronal injury in vitro. We found that compression induced cytotoxicity and apoptosis in cortical neurons in a dose- and time-dependent manner. Compression resulted in oxidative stress, which could be prevented by the ROS scavenger N-acetylcysteine (NAC). Compression produced mitochondrial oxidative stress, ATP loss and mitochondrial fragmentation. The results of western blot showed that compression differently regulated the expression of mitochondrial dynamic proteins, and the Drp1 inhibitor mdivi-1 partially reversed the compression-induced cytotoxicity. Compression significantly increased the expression of ER stress-associated factors in a time-dependent manner. The results of calcium imaging showed that compression induced intracellular calcium overload via promoting ER calcium release. Furthermore, the results using inhibitors of each signaling pathway demonstrated that ROS mediated the compression-induced ER stress and mitochondrial dysfunction in cortical neurons. In conclusion, our results demonstrated that compression induced apoptosis in primary cultured cortical neurons, which was associated with ROS mediated ER stress and mitochondrial dysfunction. Pharmacological compounds or agents targeting mitochondrial dysfunction and ER stress associated oxidative stress might be ideal candidates for the treatment of IH-related neurological diseases [1].

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Chen T, Zhu J, Wang YH, Hang CH. ROS-Mediated Mitochondrial Dysfunction and ER Stress Contribute to Compression-Induced Neuronal Injury. Neuroscience. 2019 Aug 16. pii: S0306-4522(19)30549-4. doi: 10.1016/j.neuroscience.2019.08.007. [Epub ahead of print] PubMed PMID: 31425734.