

Cross-talk of intracellular calcium stores in the response to neuronal ischemia and ischemic tolerance

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Ischemic/reperfusion brain injury (IRI) is very severe event with the multiple etiopathogenesis. Ischemic preconditioning (IPC) is the phenomenon of adaptation of CNS to ischemic insult. An altered cross-talk between intracellular Ca^{2+} stores is presumed in the mechanisms of IRI. We show here that IRI leads to the inhibition of mitochondrial respiratory complexes I and IV, however Ca^{2+} uptake rate is not significantly depressed. IPC acts at the level of initiation and execution of mitochondrial apoptosis and activates inhibition of p53 translocation to mitochondria. [1] In addition, IRI initiates a time dependent differences in endoplasmic reticular (ER) gene expression of the key UPR proteins which is affected by preischemic treatment by the expression of Ca^{2+} binding GRP78 and ATF6 proteins. The expression pattern of the secretory pathways Ca^{2+} pump (SPCA1) after IRI is remarkably affected by IPC and IPC leads to partial recovery of depressed SPCA activity. [3] Functional alterations of mitochondria, ER and SP contribute to the understanding of cross-talk between neuronal Ca^{2+} stores in ischemia and ischemic tolerance and might suggest for targets of therapeutic interventions to enhance recovery after stroke.

[1] Račay et al. (2007) Neurochem. Res. 32, 1823-1832

[2] Lehotský et al. (2009) Cell. Mol. Neurobiol. 29, 917-925

[3] Pavlíková et al. (2009) Cell. Mol. Neurobiol. 29, 909-916

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