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Overstimulation of glutamate signaling in hamster hippocampal neurons: what's new?

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It is known that ischemic complications arise from neuronal and glial dysfunctions occurring in almost all brain areas. Within some neuronal networks, an early excitatory/inhibitory circuit imbalance tends to account for premature neuronal damages especially during the initial stages of perinatal development. Interestingly, cellular conditions reported in ischemia were also detected during the different phases of hibernation cycle and above all arousal state. Hibernating animals are able to survive under these conditions without neurological damage, so their neuronal circuits present an opportunity to investigate molecular strategies involved in mammalian cell survival under unfavorable conditions. We reported a contextual alterations of both ionotropic and metabotropic Glutamatergic systems in perinatal hippocampal neurons in response to ischemic-like condition, according to their early activation during neuronal development (Giusi et al., 2009; Di Vito et a.l, 2012). In addition, an altered expression was also reported for specific PSD scaffold proteins, which regulate Glutamate receptors targeting (Al-Hallaq et al., 2007). From our preliminary results, we can suggest that specific alterations of glutamatergic receptors, which differ significantly from those reported in other rodent, could play a major role toward the correction of neuronal development aberrations linked to clinical disorders.

References

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Key words
Hamster hippocampal neurons, excitotoxicity, glutamate receptors, scaffold proteins.