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THE POTENTIAL EFFECTS OF ANTIDEPRESSANTS IN ATTENUATING SYNAPTIC DEGENERATION IN DEPRESSION AND ALZHEIMER'S DISEASE

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Depression is a highly prevalent psychiatric disorder. Furthermore, it is one of the most common neuropsychiatric presentations in Alzheimer's disease (AD). Common underlying neuropathological processes appear to exist between these conditions. Synaptic degeneration has been implicated in AD pathogenesis, while its role in depression is not well understood.

Objectives: This study aims to investigate synaptic degeneration as a possible underlying mechanism for depression and whether antidepressants could alleviate the stated pathology.

Methods: Primary rodent hippocampal neurons treated with corticosterone were used as an in vitro model of depression. Toxicity of corticosterone was determined through the lactate dehydrogenase and caspase-3 activity assays. Immunocytochemical analysis of synaptic proteins was employed to investigate effects of corticosterone on synapses.

Results: Neurotoxicity was observed in hippocampal neurons after treatment with corticosterone (10μM) for 24 hours. Aggregations of synaptotagmin and synaptophysin were observed 24 hours after treatment with corticosterone (10μM). Similar effects were observed after sub-lethal treatments with corticosterone (0.5μM and 1μM) for 48 and 72 hours. Pre-treatment for 1 hour with imipramine and escitalopram (20μM and 40μM for both agents) were able to alleviate these toxic effects.

Conclusions: These results suggest the involvement of synaptic degeneration in corticosterone-induced toxicity and that commonly used antidepressants are able to alleviate synaptic derangements. Taken together, synaptic degeneration could be a common pathway for neuronal demise occurring in AD and depression, which can be attenuated by antidepressant administration. Future research to elucidate the precise mechanism for the synaptic protective effect of antidepressants is warranted.

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