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Is the neuroptrophic role of lithium translatable into cognitive enhancement?

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Several neuropsychiatric disorders are characterized by cognitive decline with no available disease-modifying therapies. Palliative treatments offer progression delay at best, while high pricing burden state care. The economic crisis has forced psychopharmacological research towards assessing clinically established psychoactive agents for cognitive enhancement potential, a course followed by our laboratory. Specifically, our team was the first to report that chronic, low-dose lithium treatment enhanced working memory and long term recall, as long as task parameters were kept at the edge of normal performance. Concurrently, neurochemical data invested this low-cost agent with significant neuroprotective and neurotrophic properties. The combination of our behavioural observations with these results suggested that neurotrophic effects of lithium in the hippocampus may modify memory processes. The notion that lithium neuroprotection may be beneficial on cognitive impairment was not actually spelled out until a few years later. Our research addresses a significant gap in the investigation of lithium effects on executive functions such as cognitive flexibility which has been associated with prefronto-striatal circuitry, areas where lithium also appears to offer neuroprotection. We present our pilot results accessing this issue by a translational approach, employed in order to circumvent the difficulty of separating the cognitive from the therapeutic effects of lithium by investigating chronic lithium effects on cognitive flexibility (a) in bipolar patients, by means of the neuroscientifically informed CANTAB and (b) in normal rats, by means of an animal model approximating the CANTAB intra/extra-dimensional shift test. The effects are compared to those of the alternative mood stabilizer valproic acid.

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