

Computational basis of decision-making impairment in multiple sclerosis

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Abstract

Background: Multiple sclerosis (MS) is commonly associated with decision-making, neurocognitive impairments, and mood and motivational symptoms. However, their relationship may be obscured by traditional scoring methods. **Objectives:** To study the computational basis underlying decision-making impairments in MS and their interaction with neurocognitive and neuropsychiatric measures. **Methods:** Twenty-nine MS patients and 26 matched control subjects completed a computer version of the Iowa Gambling Task (IGT). Participants underwent neurocognitive evaluation using an expanded version of the Brief Repeatable Battery. Hierarchical Bayesian Analysis was used to estimate three established computational models to compare parameters between groups. **Results:** Patients showed increased learning rate and reduced loss-aversion during decision-making relative to control subjects. These alterations were associated with: (1) reduced net gains in the IGT; (2) processing speed, executive functioning and memory impairments; and (3) higher levels of depression and current apathy. **Conclusion:** Decision-making deficits in MS patients could be described by the interplay between latent computational processes, neurocognitive impairments, and mood/motivational symptoms.

Keywords: Multiple sclerosis; cognitive impairment; computational modeling; decision-making.