CW17

The cognitive profile of motor neurone disease

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Literature Review

Systematic search of PubMed and PsycINFO

247 articles retrieved

54 selected; 193 excluded

- The profile of cognitive impairment in MND is heterogeneous.
- Executive dysfunction and language deficits are most prevalent in MND. However, small studies document impairment in social cognition, episodic memory, semantic knowledge and syntax.
- The identification of impairment in different cognitive domains suggests shortcomings in the consensus criteria for ALS-ci, which depend upon the presence of executive dysfunction.

Methods

Some MND patients exhibit impaired hand-motor function and/or dysarthria, which impact completion of cognitive tasks. For an ideal battery, individual tests should be adjusted accordingly or alternative versions included. Pilot data from 50 healthy controls indicated that a number of test scores should be standardised to z-scores depending on the response format (spoken versus written/pointing). These tasks are marked with *.

Participants

	MND patients (n=24)		Healthy controls (n=28)	
	Years Mean (SD)	*Range*	*Years Mean (SD)*	*Range*
Age	60.5 (11.6)	32-77	58.5 (9.1)	33-75
Education	14.4 (3.0)	11-20	15.1 (2.4)	11-20
	Female:Male		*Female:Male*	
Gender	7:17		13:15	

Measures

- Neuropsychological battery of 26 standardised tests
- Amyotrophic Lateral Sclerosis Functional Rating Scale (revised)
- Modified Neuropsychiatric Inventory

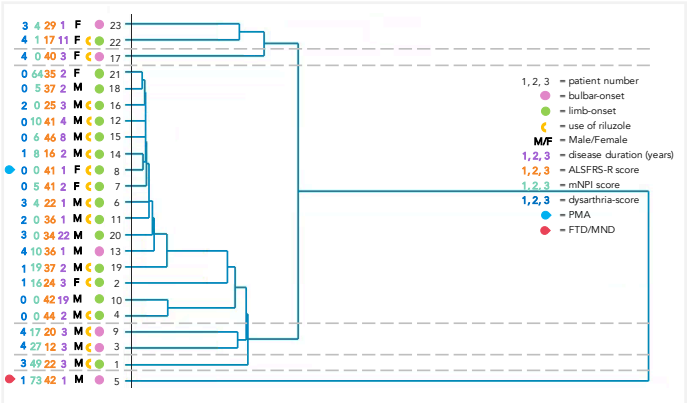

Figure 1. Characteristics of individual patients within each of the six clusters formed: site-of-onset, use of riluzole, gender, disease duration, disease severity and behavioural change. Clusters are segregated by dashed lines, in consecutive order from bottom = cluster 1 to top = cluster 6.

Results

Case-control comparisons

Mann-Whitney *U* tests revealed that patients scored significantly lower than controls on tests of executive function, social cognition, memory, language and visuospatial processing. The greatest difference was observed in the set-shifting domain of executive function ($p = 0.001$).

Cluster analysis of patient scores

Group comparisons hide individual variability in the patient scores. Cluster analysis (dissimilarity = 175) revealed six distinct clusters of cognitive performance. One patient was excluded from cluster analysis due to outlying noun naming performance secondary to language factors rather than a true naming deficit. Spoken language measures were also omitted to ensure clusters were based on cognitive not motor impairment.

Test	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
General intelligence						
Matrix reasoning	×	×	•	•	•	×
Executive function						
Sentence completion	×	×	⊗	•	×	×
Card sorting	×	•	×	×	×	×
Digit span backwards	•	•	•	•	•	×
Phonemic fluency*	×	⊗	×	•	⊗	×
Category fluency*	×	•	⊗	•	×	×
Social cognition						
Faux-pas test	×	×	•	•	•	•
Emotion recognition	×	•	×	•	×	⊗
Memory						
Digit span forwards*	×	•	×	•	⊗	×
Recognition - faces	•	•	•	•	•	•
Recognition - words	×	•	•	•	•	×
Associate learning	×	•	•	•	×	×
Language						
Graded naming test	×	•	×	•	×	×
Verb naming	×	•	•	•	•	•
Noun naming	×	•	×	•	×	×
Synonyms test	×	×	•	•	•	×
Sentence-picture	×	×	×	•	×	×
Spelling	•	•	•	•	•	⊗
Calculation						
Arithmetic	⊗	•	•	•	•	×
Visual processing						
Cube analysis	•	×	•	•	•	×
Fragmented letters	•	•	•	•	×	×
Face recognition	⊗	•	•	•	×	×

× = score >2 SDs below the mean; ⊗ = >1.65 but <2 SDs below the mean (below the 5th percentile); • = no significant impairment.

Post-hoc analyses

Fisher's exact and Kruskal-Wallis tests suggested cognitive subgroups did not differ in their distribution of gender, use of riluzole, age, education level, disease duration, disease severity or behavioural change (Figure 1).

Conclusion

Multidomain impairment suggests the cognitive profile of MND is more complex than previously thought. The current classification of CI is limited by an emphasis on executive dysfunction, which does not reflect the heterogeneity of cognitive profiles in MND.

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