

## Thursday

### **Automated vowel articulation features during natural speech as markers of bulbar motor disease in ALS**

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**State-of-the-art:** This study tested a novel, automated digital speech analysis tool as a clinical marker for screening and tracking bulbar motor disease in amyotrophic lateral sclerosis (ALS). We hypothesized that vowel acoustic measures proxying tongue articulation during natural speech will be sensitive and specific to bulbar disease in ALS, compared with a non-motor neurodegenerative control group (behavioral variant frontotemporal dementia; bvFTD) and healthy controls (HC).

**Methodology:** We automatically tagged vowels based on word pronunciation and calculated articulatory-acoustic measures of tongue movement speed and size. We compared vowel measures between 83 ALS, 34 bvFTD, and 80 HC, and between ALS subgroups with and without bulbar motor disease (53 ALS+bulbar vs. 28 ALS-bulbar). We tested their diagnostic performance, and relations with bulbar motor and cognitive clinical scores, structural MRI cortical and white matter atrophy of motor speech areas, and plasma NfL levels. We tracked change over time within individuals (n=17).

**Results:** Speed was reduced in ALS vs. bvFTD and HC; correlated with lower bulbar motor scores, grey matter volume of ventral precentral gyrus, and corticospinal tract anisotropy; and worsened longitudinally only in patients with ALS+bulbar at baseline. Speed and size measures were both reduced in ALS+bulbar vs. ALS-bulbar, and together discriminated them with area under the curve=.86. All measures were lower with lower plasma NfL levels. None were affected in bvFTD, nor were associated with cognitive scores.

**Conclusion:** Automated vowel acoustic features of natural speech are sensitive independent markers of bulbar motor disease in ALS spectrum disorders.

### **Conflicts of interest**

The authors don't have any conflicts of interest to disclose