Divergent scalp-to-region distance alteration patterns in autism spectrum disorders, Parkinson's disease and Alzheimer's disease

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- An automatic pipeline enables scalp-to-region distance (SRD) measurement and facilitates brain stimulation planning.
- ASD patients show widespread SRD decreases, especially in the orbitofrontal cortex and adjacent regions.
- AD patients present increased SRD in the frontal gyrus and decreased SRD in the parahippocampal gyrus.

INTRODUCTION

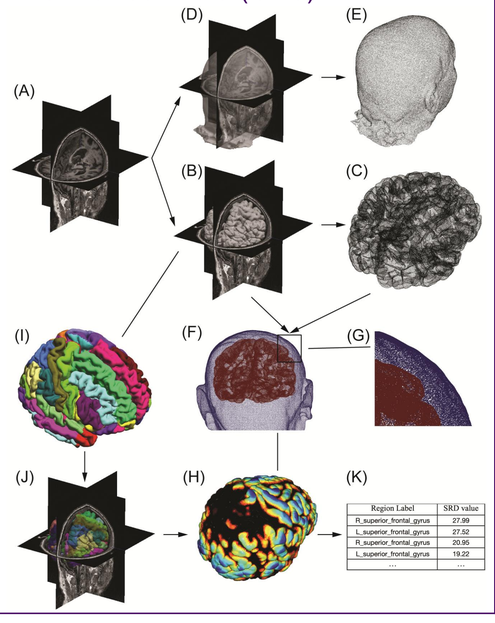
Brain stimulation is increasingly recognized as an effective therapeutic intervention for many brain diseases. Distance between the scalp and brain regions is pivotal for neurostimulation planning, but its alterations in brain diseases are largely unknown.

ABIDE	CN	ASD	p-value
N	381	313	
Sex (M/F)	337/44	258/55	0.024
Age (years)	15.88±6.34	15.7±5.69	0.6883
PPMI	**CN**	**PD**	**p-value**
N	84	225	
Sex (M/F)	55/29	144/81	0.8095
Age (years)	59.5±11.62	61.73±9.49	0.085
ADNI	**CN**	**AD**	**p-value**
N	224	155	
Sex (M/F)	114/110	75/80	0.6315
Age (years)	76.04±6.42	74.66±7.43	0.0534

We developed an automatic pipeline to calculate scalp-to-region distance (SRD) values from T1 MR images and applied

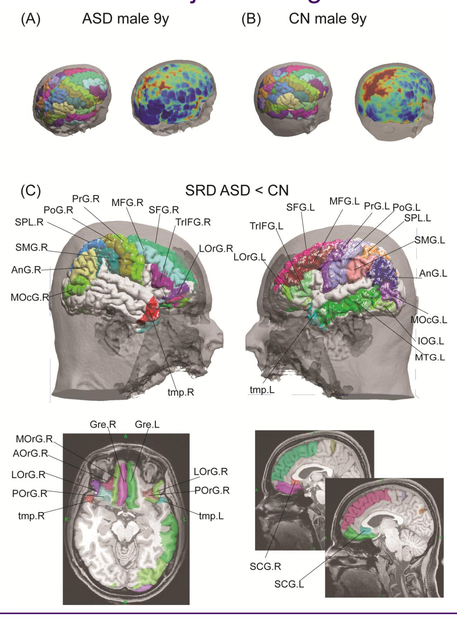
METHODS

it to 1382 participants, including patients with autism spectrum disorder (ASD), Parkinson's disease (PD), Alzheimer's disease (AD), and cognitively normal controls (CNs).

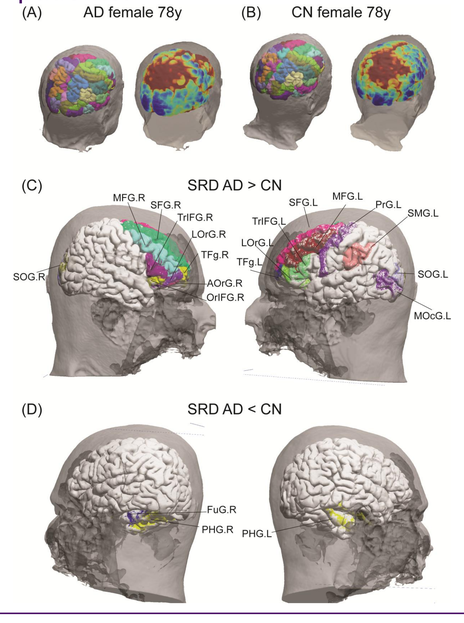


RESULTS

Compared with CNs, ASD patients showed widespread SRD decreases with prominent involvement of the frontal lobe, especially the orbitofrontal cortex and adjacent regions.



In contrast, in AD patients, significantly increased SRD values were observed in the frontal gyrus. No significant SRD alteration was found in PD patients.



CONCLUSIONS

The automatic SRD calculation pipeline and the different patterns of SRD alterations in these diseases may support future validation studies for neurostimulation planning.

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