

Relationship Between Electrical Conductivity and Diffusivity in the Aging Brain

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- Conductivity is strongly linked to diffusion.
- Tissue microstructure influences conductivity.
- Conductivity negatively correlated with MMSE scores

Introduction;

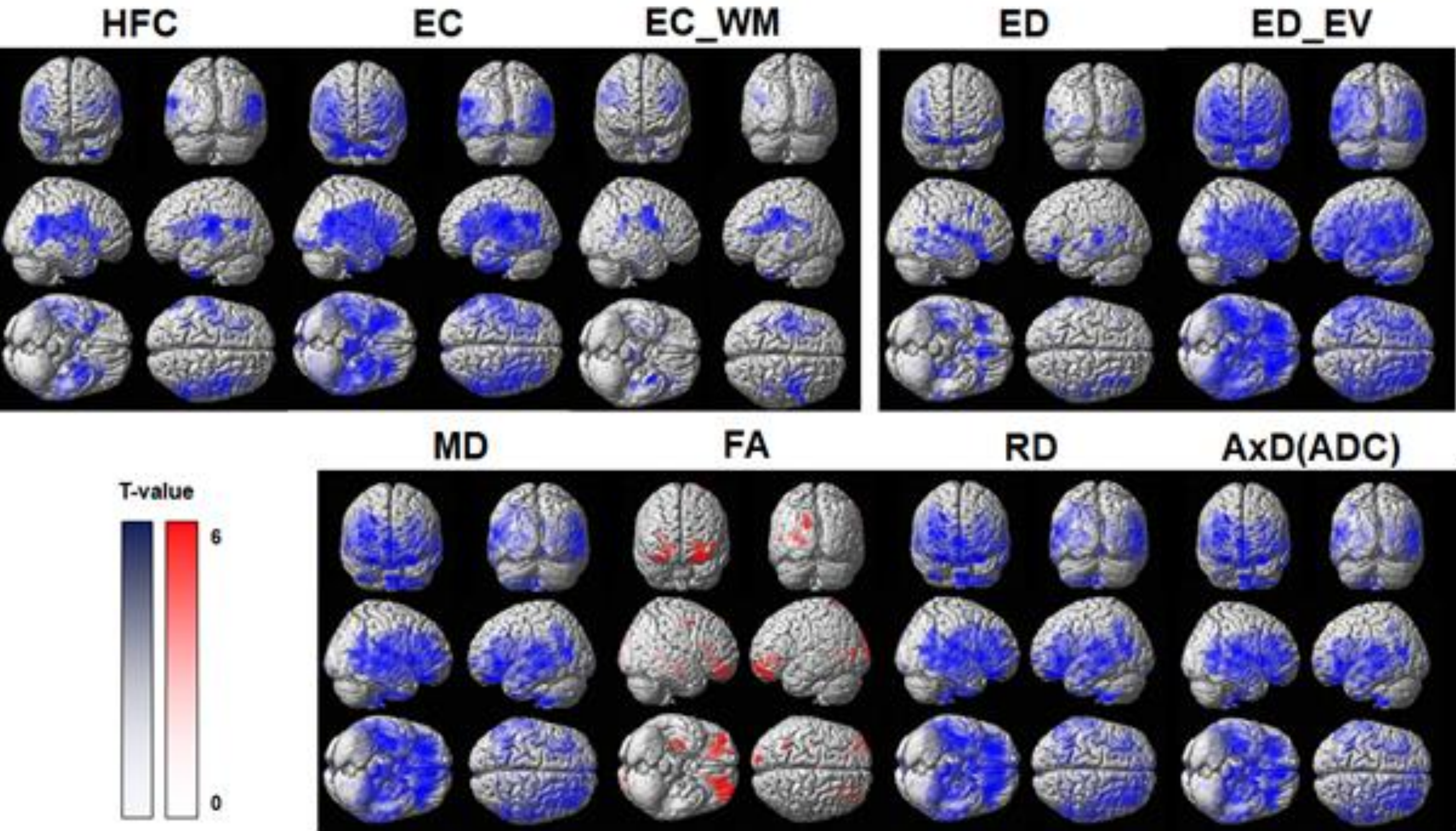
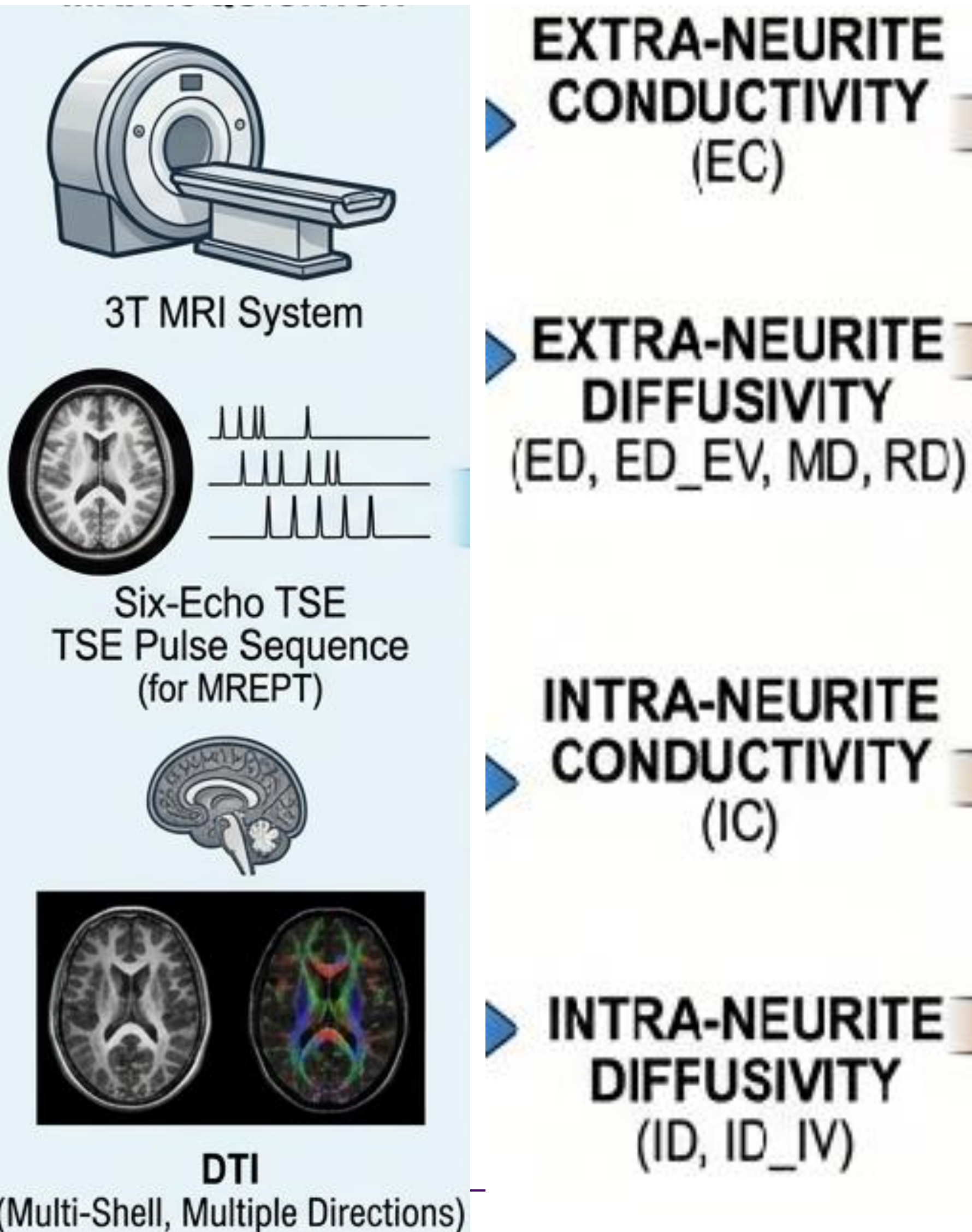
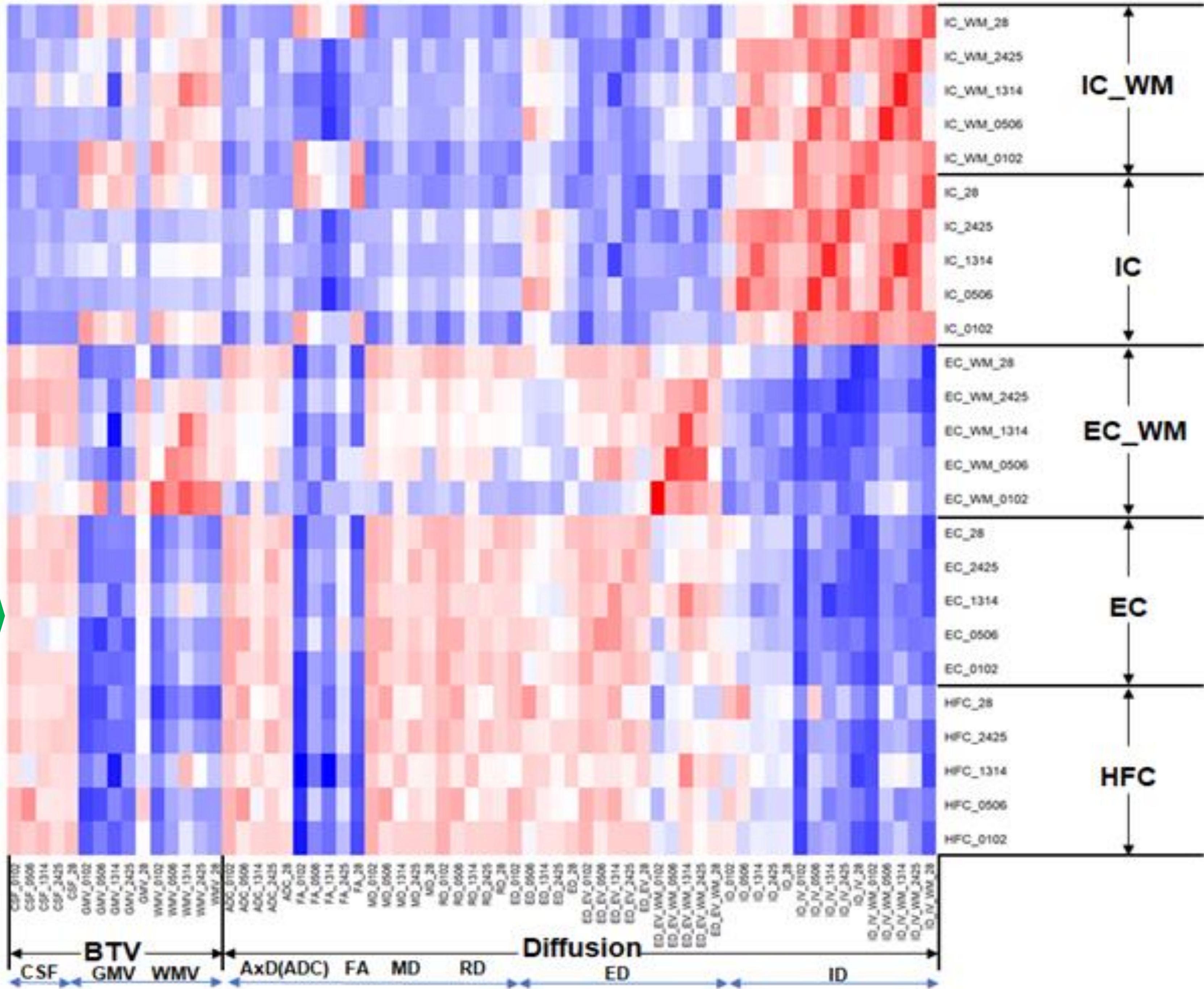
Electrical or ionic conductivity escalates with increasing ion concentrations and ionic mobility. Magnetic resonance electrical properties tomography (MREPT) is a noninvasive technique for mapping conductivity. Diffusion probes the mobility of protons, whereas electrical conductivity probes the mobility of charged ions under the influence of electric fields.

Purpose; To explore the relationships between electrical conductivity, diffusivity, and brain tissue volume in the aging brain.

Methods: This cross-sectional and prospective study encompassed a cohort of 77 older individuals, aged 74.9 ± 5.8 years (mean $\pm$ standard deviation), with a male-to-female ratio of 24:53.

- Both IC_WM and IC exhibited positive correlations with diffusion indices.
- EC and HFC had positive correlations with diffusivity indices, including ED_EV, ED, RD, MD, and AxD.

- ✓ A significant negative correlation was found with MMSE scores for the following conductivity metrics.



Conclusion; MREPT-derived measurements primarily reflect ion mobility and caution that clinical interpretations should consider the direct relationships between conductivity and diffusion changes.

Reference

Quant Imaging Med Surg
2025;15(5):4669-4688