

Neuroimaging Advances Relevant to Epilepsy: A Cortical Cartographer's Perspective

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An alternative and accessible version of this presentation is available at 3:50 pm in the [Videocast of Day One](#)

1. Imaging human cortical development

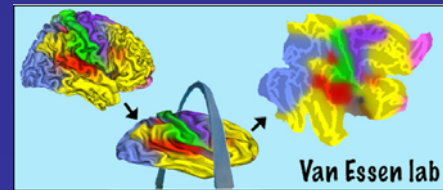
- Folding abnormalities as biomarkers?

2. Functional connectivity analysis (resting-state fMRI)

- Abnormal functional connectivity as biomarker?

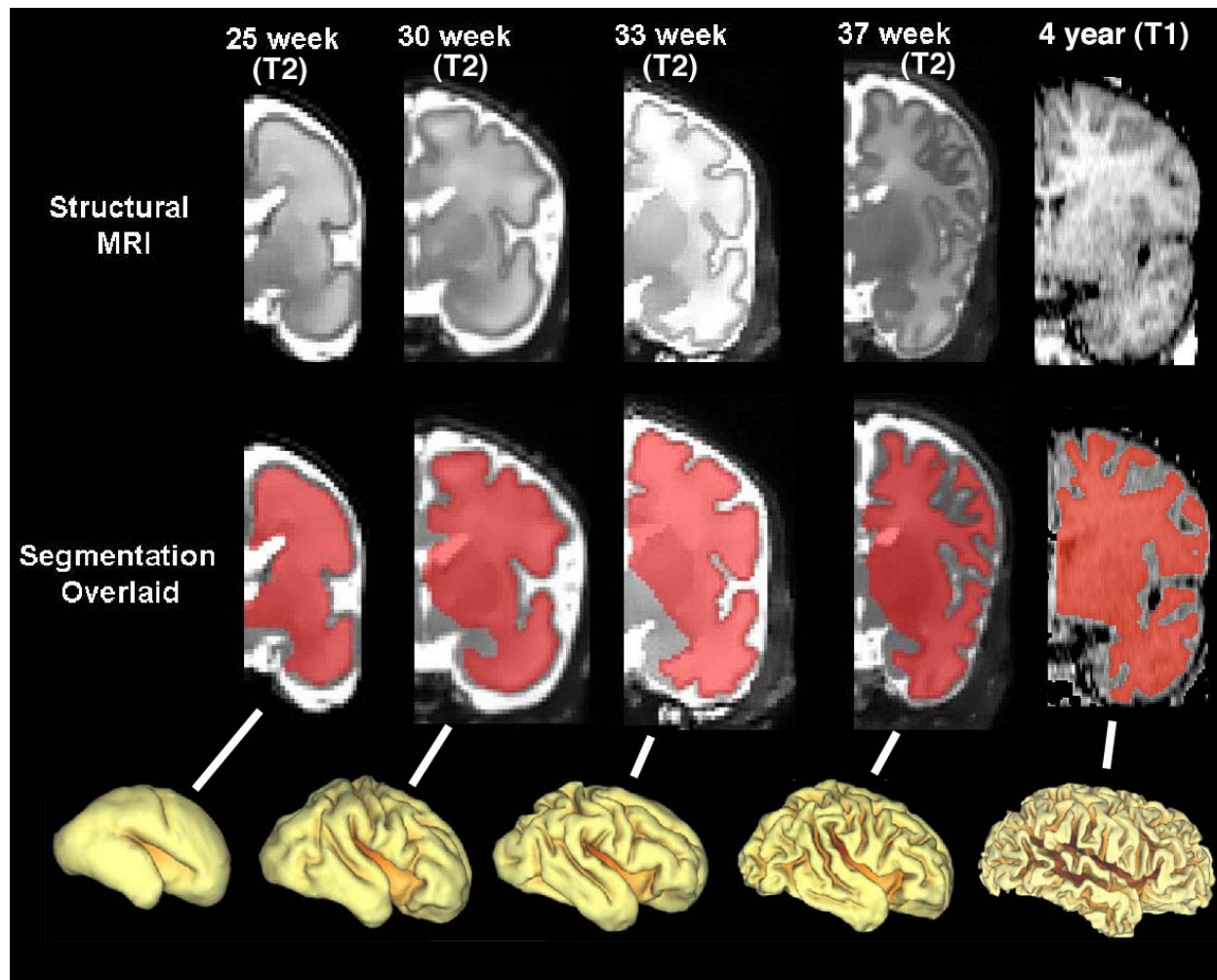
3. Cortical atlases for functional localization

- Human PALS atlas
- Probabilistic maps of structure and function
- Available via SumsDB database



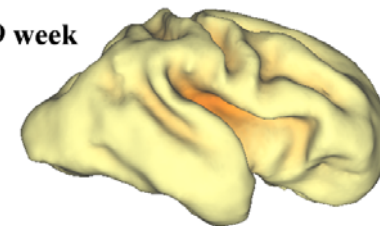
Human cortical development (pre-term infants)

Very premature birth: a risk factor for epilepsy

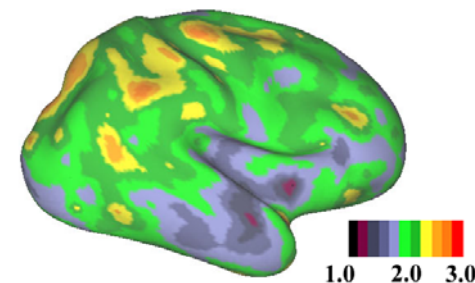
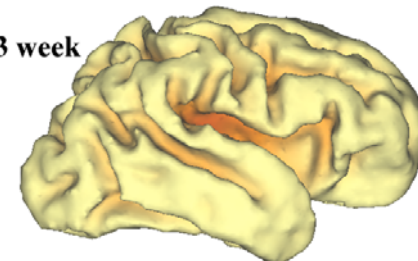


Individual preterm infant, longitudinal Analysis

29 week



33 week



Expansion in surface area
(viewed on inflated surface)

Hill, Knutsen, Inder, Neil, McKinstry, Warfield, Dierker, & Van Essen

Abnormal cortical folding and/or subcortical white matter: diagnostic relevance for epilepsy?

Functional Connectivity Analysis in Human Cerebral Cortex

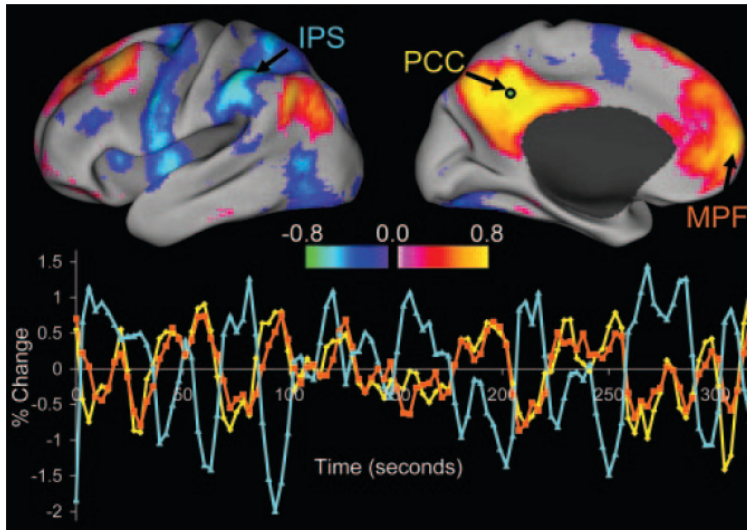


Fig. 1. Intrinsic correlations between a seed region in the PCC and all other voxels in the brain for a single subject during resting fixation.

- Spontaneous fMRI correlations during resting state reveal functional networks.
- Applicable to individual subjects.
- Applicable to disease conditions (He et al., 2007).
- Can functional connectivity analyses help in diagnosing and treating epilepsy?

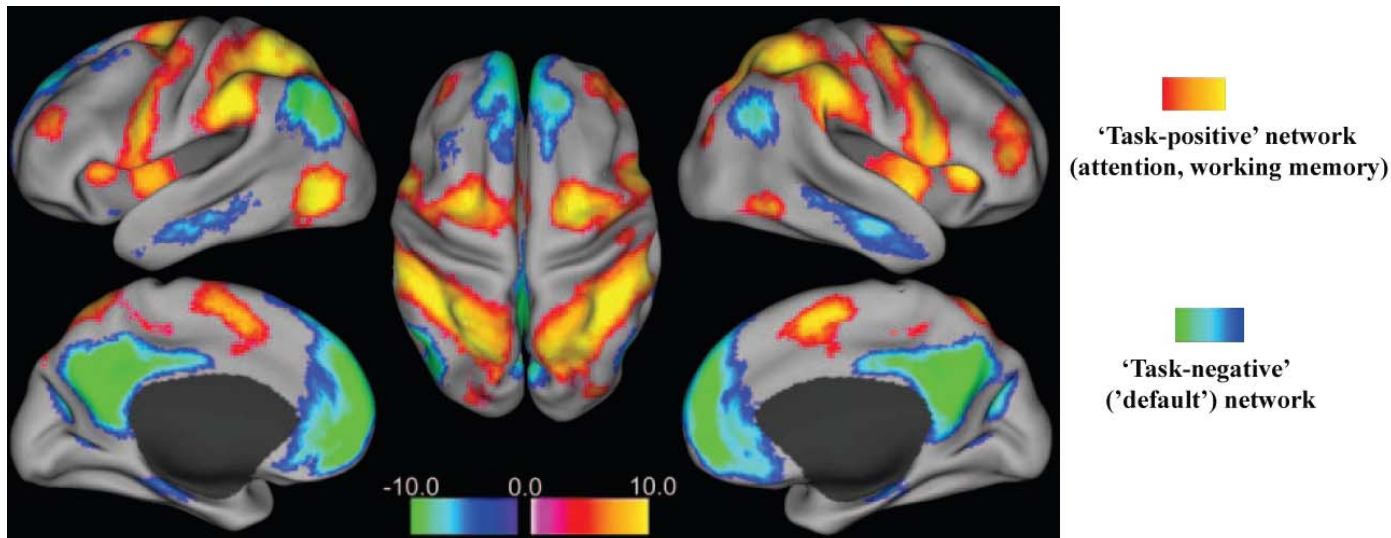
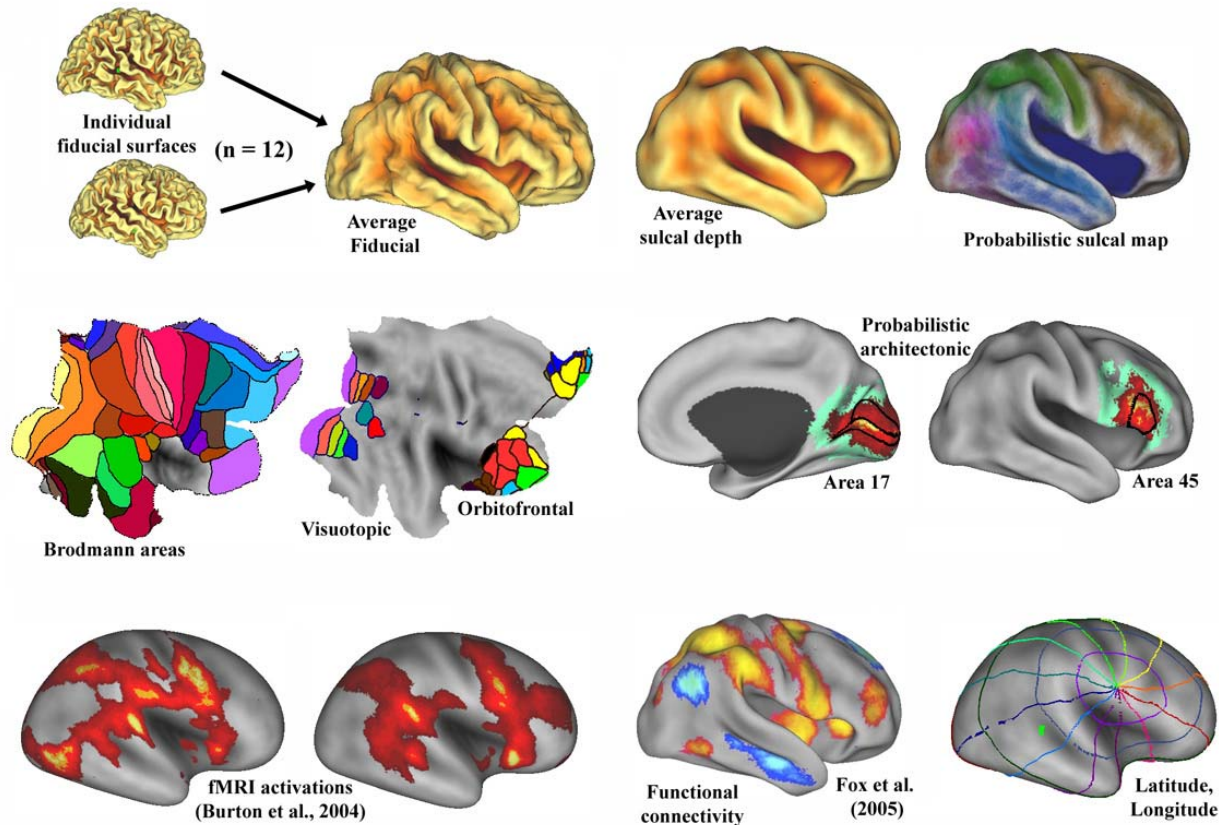


Fig. 3. Intrinsic defined anticorrelated processing networks in the brain.

Accessing Atlases Aids Analyses!

The PALS-B12 Human Cortical Atlas (Van Essen, 2005)



- Atlases provide information about functional localization that helps interpret seizure patterns and constrain options for surgical resection
- Surface-based probabilistic atlases (e.g., the human PALS atlas) and surface-based registration methods provide improved spatial fidelity
- The SumsDB database (<http://sumsdb.wustl.edu/sums/>) provides free access to atlas datasets.

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