Lecture 4

- Overview of methods
- Neuroanatomy and Neurology
- Neurophysiology & optogenetics
- EEG, MEG and ECOG
- PET
- fMRI and fNIRS
- TMS
- Behavior

Methods for recording brain activity
Neuroanatomy

- Advantages
    - Clearly centrally important
    - Provides very rich data
    - Many different measures possible
- Disadvantages
    - No functional information (just structure)
    - Spotty/partial coverage
    - Large individual variability
    - Few noninvasive methods

Neurology

- Advantages
    - Unique data source
    - “Natural lesion experiments”
    - Data from humans
- Disadvantages
    - “Experiment” is uncontrolled
    - Lesions may affect multiple areas
    - Difficult to interpret results
    - Difficult to generalize

Brain injuries have many different causes

- Stroke
- Glioma (tumors to myelin)
- Meningioma (tumors of meninges)
- Tumor
- Alzheimers

Neurophysiology

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Utah array: 10x10 silicon electrodes
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- Advantages
    - Clearly centrally important
    - Relatively easy to interpret
    - Many options for measurement

- Disadvantages
    - Small sample size
    - limited recording time
    - Usually limited to animal studies

Optogenetics

- Advantages
    - Directly affects neuronal activity
    - Affects specific identified neurons
    - Also permits neuronal recording
- Disadvantages
    - Still a bit difficult/complicated
    - Not all neuron types accessible
    - **Only available in animal models**