Brain Source Localization

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Epilepsy:
• Affects 2.5 Million Americans
• 75% have 1st Seizure in Childhood
• 20-30% will ultimately be poorly controlled with drug therapy

Surgical Interventions:
• A last resort in refractory cases
• Resection of lesional tissue can completely eliminate seizures
• Requires accurate identification of the seizure focus.
Scientific Goals

Current Standard:
• Pre-operative MRI
• Invasive Electrocorticography
  • Involves Significant Risk
  • Only performed on the most promising surgical candidates

Non-invasive Screening w/ EEG
Source Localization:
• Can be performed on ALL patients
• Need to demonstrate equal or greater accuracy than electrocorticography
Three Clinical Goals:

• Increase the number of refractory epilepsy cases who receive curative surgery

• Decrease the number of unsuccessful surgeries performed

• Introduce screening for surgical potential as standard clinical care, to offer surgical interventions earlier in disease progression.
3D Mesh Generation:
• Automated generation from segmentations

Visualization:
• Examination of 3D Models
  • Anisotropic Conductivities
• Inverse Solutions
  • Multi-Modal Visualization
• Volumetric Rendering
Future Role of CIBC

Full 3D Model Generation:
• Mesh Generation
• Bioelectric Propagation using FEM

Visualization:
• Spatiotemporal evolution of source activity
• Enhanced interpretation of multi-modality data

Novel inverse problem solvers:
• Spatiotemporal source localization
• Novel regularization approaches