Epilepsy - Identifying Epileptical Sources in the Human Brain

Behavioral events

Abnormal brain signals

Epileptic activity is rather focal

70%

Traditional treatment

~20%

Drugs not effective

Where is the source of epilepsy for this specific patient?

Epileptic source localization using non invasive measurements

Magnetoencephalography (MEG)

Electroencephalography (EEG)

source under orange electrodes

Source localization result - surface EEG (red arrow)

vs. implanted electrodes (source under orange electrodes)

Case Study

- 11 year old boy
- medically intractable epilepsy
- tumor anterior to motor area

Source Localization Pipeline

Image acquisition & processing

Identification of structures

Tissue segmentation

Volume model (Meshing)

Source Localization

Magnetic resonance image (MRI)

Tetrahedral Mesh

Epileptic spike activity surface EEG

EEG raw data epileptic spikes marked

Electrode positions & Measurements

Source localization result localized close to tumor tissue