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EEG better than MEG

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TANGENTIAL COMPONENT: MEG: great

(Cohen and Cuffin, 1987; Leahy et al., 1998; Huizenga et al., 2001; Goncalves' et al., 2003a)

Not all sources appear equally in the MEG
- A dipole tangential to the skull produces a strong magnetic field outside the head.
- A radial source may be missed in the MEG

Radial: MEG can't see it!!

EEG is sensitive to both the tangential and radial components

EEG depends on precise knowledge of the source location and conductivity profile of the head tissues, particularly the skull (Pohlmeier et al., 1997; van den Broek et al., 1998; Ollikainen et al., 1999)
MEG localization accuracy:
4- 8 mm

(Barth et al., 1986; Weinberg et al., 1986; Janday and Swithenby, 1987; Yamamoto et al., 1988),

Human skull phantom study using 32 dipoles reported that MEG localization accuracy: 3 mm (Leahy et al., 1998),

EEG localization accuracy:
8–10 mm

(Henderson et al., 1975; Leahy et al., 1998)
MEG and EEG are comparable if both use the same source model and similar number of recording leads!

Indeed, MEG is not better than EEG to find the spike source

Spike source localization between MEG and EEG
No differences were found between the 46 temporal and the 54 extratemporal lobe epilepsy patients.

Combining EEG and MEG improves the localization accuracy

- HR-EEG and MEG constitute non-invasive and complementary examinations
- HR-EEG and MEG often yield significant additional data that are complementary
MEG:

- Limited recording time, inadequate sampling of spike and ictal events
- Very expensive!!!!

EEG:

- Long term recording
- Multiple spikes for averaging and more accurate localization
- Recording of multiple ictal events and video correlation
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