

Seizure onset zone localization from ictal high-density EEG in refractory focal epilepsy

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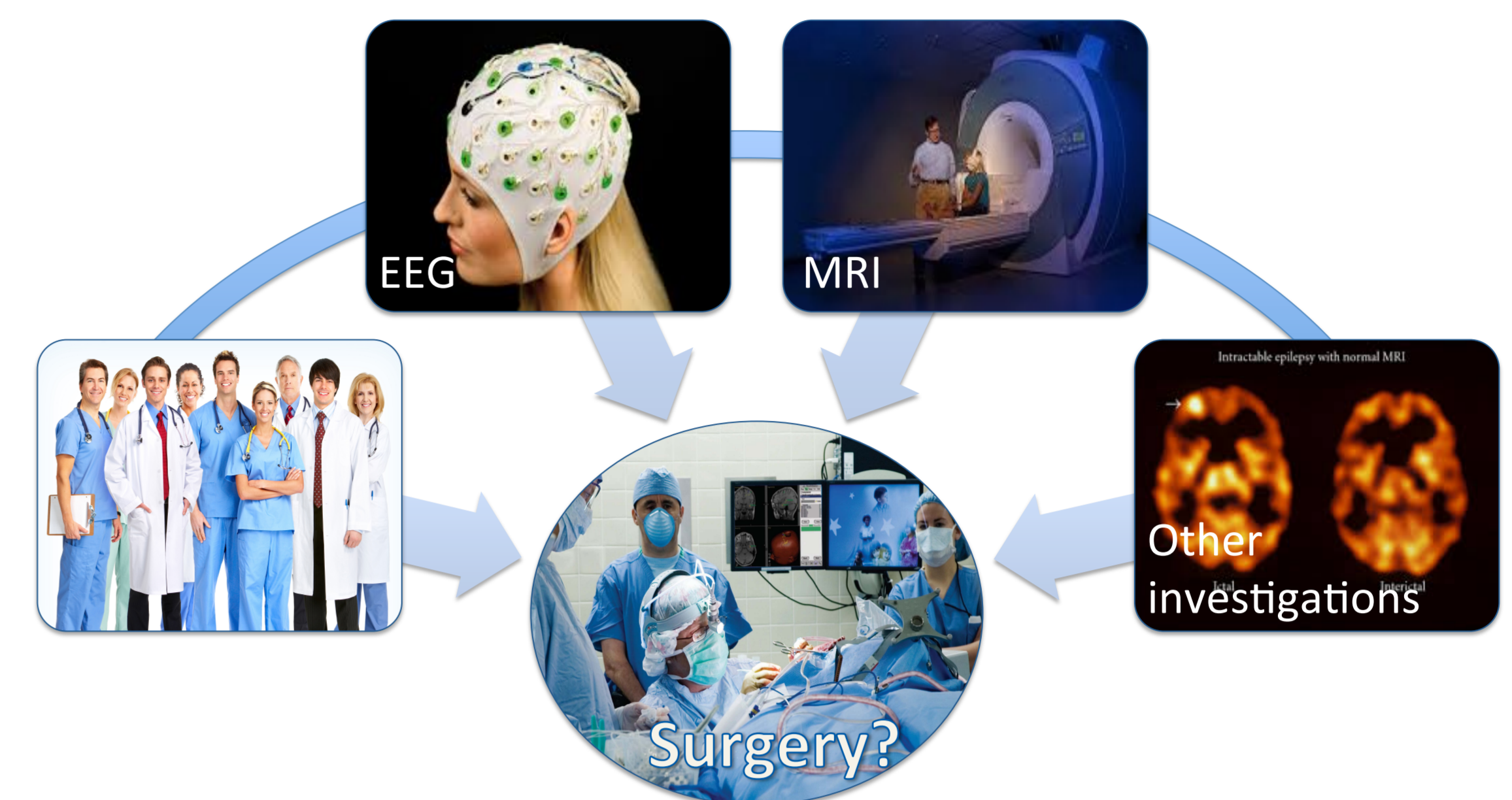
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It would be of high clinical value to be able to localize the SOZ based on non-invasive ictal EEG recordings

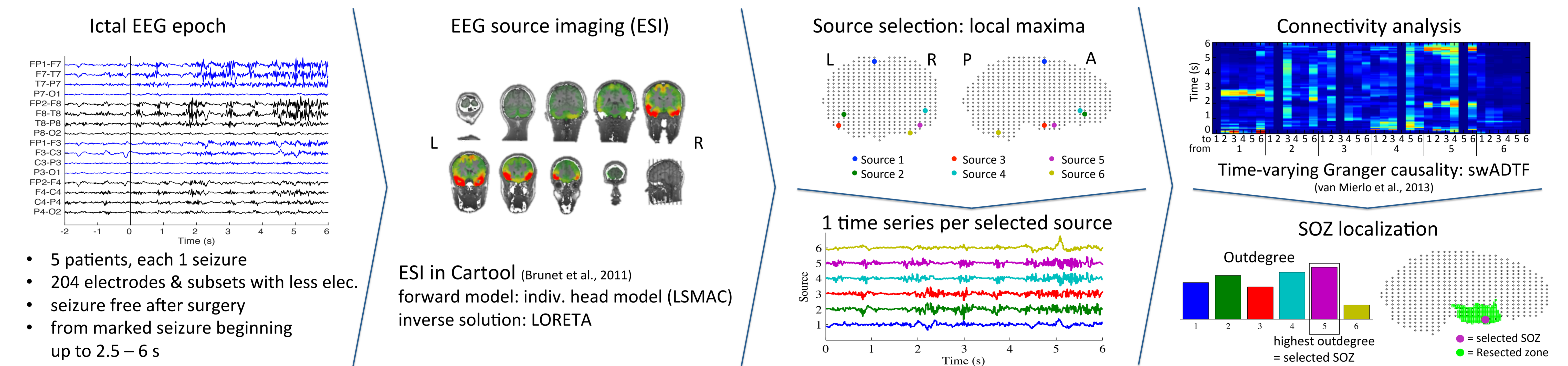
Of the 70 million epileptic patients worldwide, ± 30% cannot be helped with medication. They are referred to the presurgical evaluation: can they benefit from epilepsy surgery?

Up to now, neurologists inspect the EEG visually to localize the seizure-onset zone (SOZ)

- subjective
- labor intensive
- real onset or spread?
- sometimes invasive EEG needed: medical risks

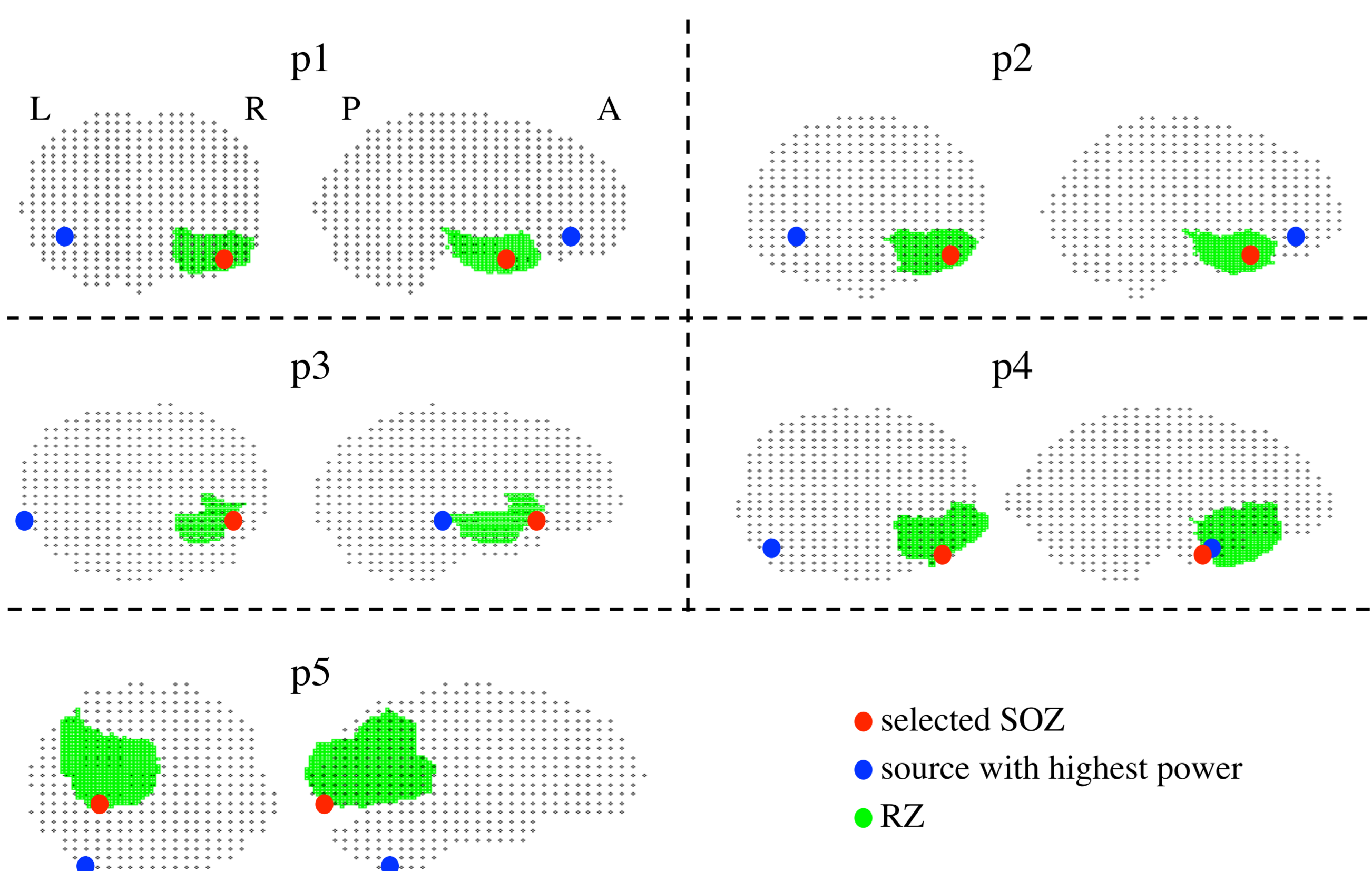


We propose an approach based on EEG source imaging followed by connectivity analysis



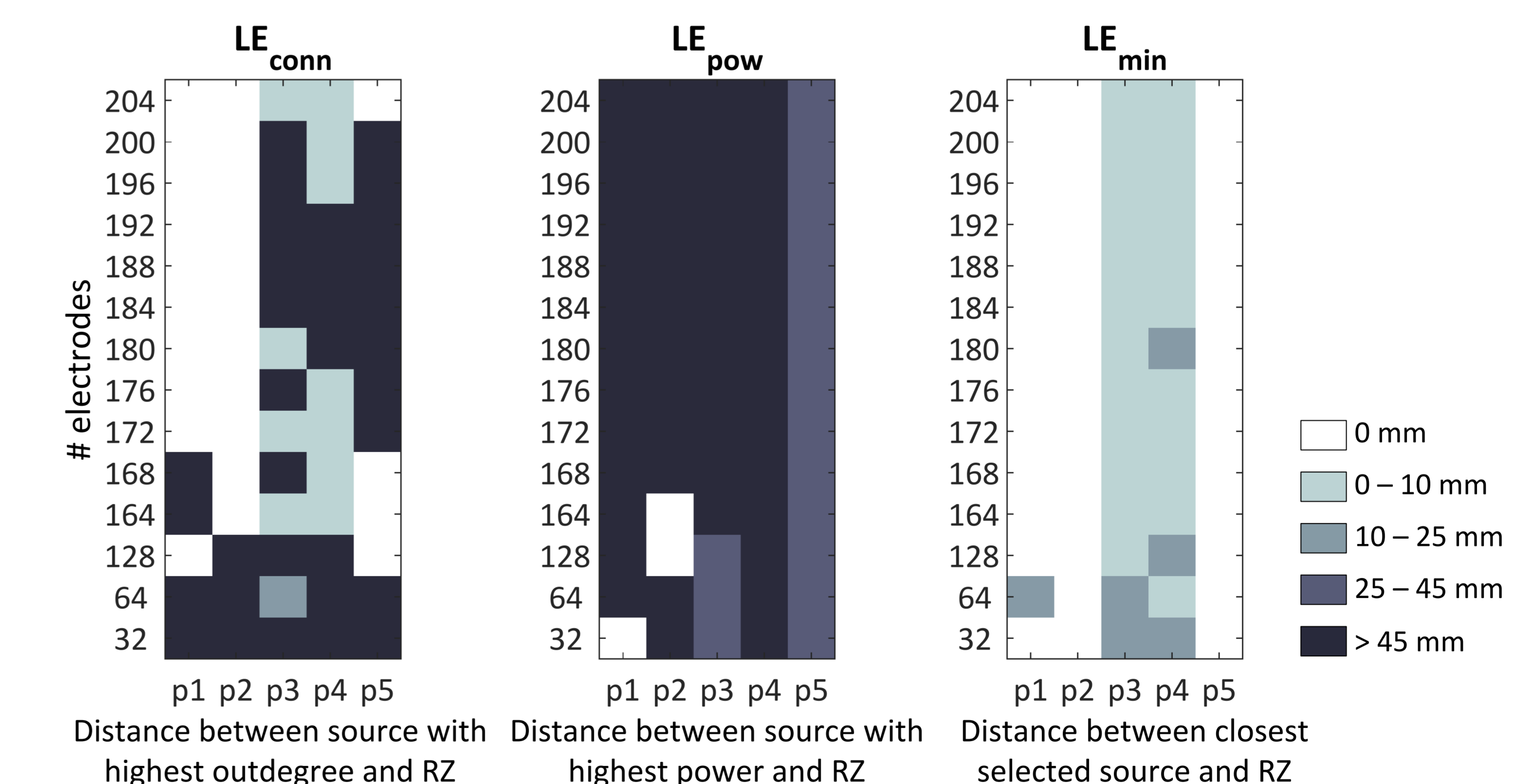
When using 204 electrodes, ESI + connectivity can localize the SOZ in (3/5) or within 1 cm (2/5) of the resected zone (RZ).

The source with the highest power (in 3-40 Hz band) after ESI does not coincide with the RZ in any of the patients (0/5).



Localization based on connectivity is preferred over power in 80% of cases. Performance drops when less electrodes are used.

Some fluctuations over the different setups → not very robust
Low minimal error → high potential of the method



Despite some limitations, our method that combines ESI followed by functional connectivity analysis outperforms localization based on power and shows high potential in localizing the SOZ from non-invasive ictal hd-EEG.