

Noninvasive reconstruction of cardiac electrical activity

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Propositions accompanying the PhD-thesis

Noninvasive reconstruction of cardiac electrical activity Mathematical innovation, in vivo validation and human application

Matthijs Cluitmans, 29 September 2016

1. Epicardial electrograms that are noninvasively reconstructed with Electrocardiographic Imaging (ECGI) are on average accurate, but show considerable variability; consequently, a single reconstructed electrogram should be interpreted with care. *This thesis*
2. Spatial mismatch between recorded and reconstructed electrograms is a major cause for variable accuracy of reconstructed electrograms in ECGI. *This thesis*
3. Pursuing sparsity of cardiac source representations improves the accuracy of ECGI. *This thesis*
4. Local steep repolarization gradients form the vulnerable substrate for arrhythmias in some patients; these gradients can be detected with ECGI even when missed by the 12-lead ECG. *This thesis*
5. ECGI-guided ablation of premature ventricular beats, ideally supported by integration of multiple imaging modalities, will improve therapy outcome.
6. Translational research combining ECGI with *in vitro* and *in silico* cellular studies brings new insight in arrhythmia substrate and trigger mechanisms.
7. Incorporation of cardiac mechanics in ECGI is essential to further our understanding of arrhythmogenesis.
8. Studies with (large) animals are indispensable to advance science and medical care. Progress in science is currently limited by fear and miscommunication about animal studies.
9. Current funding policies are designed to select for perseverance, not scientific quality, and do not promote long-term planning.
10. Remain critical of your model – do not love it too much. *Rob MacLeod*
11. Laptop battery capacity is an ideal limitation of working hours during the weekend.