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Pacertool - patient specific biofeedback implantation system for pacemakers and CRT

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Introduction
Cardiac resynchronization therapy (CRT) is effective in patients with left bundle branch Block and heart failure, but treatment lack efficiency. Multiple reasons have been proposed for the lack of response in selected patients, and empirical data point out certain characteristics that are associated with lack of response. However, no clinical parameter exist that can confirm the effect of an implanted CRT and tools to provide measurements during implantation are not readily available.

Purpose
To develop a system that can aid during implantation of pacemakers and CRT and give feedback on the efficacy of the applied therapy.

Methods
We have developed a vendor independent system that allows 1. visualization of segmented CT, MRI or 3D echo scans in fusion with fluoroscopy in multiple views patient. 2. Reconstruction of lead positions and coronary vein anatomy in 3D. 3. Placement of electrodes on the model. 4. Visualization of any measurement on the 3D heart model. 5. Utilize sensors and electrical measures to give feedback on therapy.

Results
We have tested the system in patients for both CRT implantation and parahisian pacing. The system provides a 12-channel ECG together with multiple electrograms and VCGs on demand, sensor data can be included and displayed. Visualization occurs in real time and mapping can be performed, either for locations (as the His potential) or for propagation (as in QLV). Imaging may include MRI LGE to allow for visualization of scars.

Conclusion
We have developed a full scale vendor independent tool to aid implantation of CRT and permanent parahisian pacing. The system has been tested in patients and is now ready for clinical trials.