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ATRIAL FIBRILLATION TREATMENT WITH PATIENT-SPECIFIC MODEL TO DESIGN ABLATION LESIONS

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Technology Description

This technology is a patented method aimed at increasing the success rate of atrial fibrillation (AF) treatment by designing customized, patient-specific cardiac ablation lesion sets.

AF, the most common sustained cardiac arrhythmia, has traditionally been treated with a maze surgical procedure focused on encircling anatomical landmarks. Because this approach is not successful for all patients (particularly those with large atria), Dr. Ralph Damiano and colleagues at Washington University developed a minimally-invasive technique that replaces the anatomic-based approach with a new procedure based on electrophysiological and geometrical characteristics of the atrial tissue in each individual patient. This approach analyzes information from preoperative tissue imaging and the patient's effective refractory period to generate a mathematical model for determining the precise set of linear lesions expected to create a "fibrillation-proof" atrium.

Stage of Research

The inventors used canine isolated atrial preparations to develop a quantitative model of the relationship between geometric and functional electrophysiological variables of AF in the atrium. This model was used to extrapolate the probability of AF, information that could be used to design more effective interventional procedures.

Publication:

Byrd, G. D., Prasad, S. M., Ripplinger, C. M., Cassilly, T. R., Schuessler, R. B., Boineau, J. P., & Damiano Jr, R. J. (2005). Importance of geometry and refractory period in sustaining atrial fibrillation: testing the critical mass hypothesis. *Circulation*, 112(9_supplement), I-7.

Applications:

- **Cardiac ablation:**
  - design lesion sets for individualized treatment for atrial fibrillation, particularly for patients with enlarged atria
  - technique is compatible with catheter-based or surgical intervention

Key Advantages:

- **Customized procedure**:
  - individualized set of lesions is based on patient's specific atrial geometry and electrophysiology with goal to achieve 100% operation success
  - model is clinically relevant regardless of underlying heart pathology
- **Minimally-invasive** through port access

Patents: Method and associated system for the interventional treatment of atrial fibrillation (U.S. Patent No. 7,918,847)

Related Web Links: Damiano Profile