

# Non invasive treatment for atrial fibrillation

## Abstract

**Introduction:** In 2005 we developed a non invasive method of treating the atrial fibrillation using radiation, based on the concept of producing cellular apoptosis.

**Methods:** Initially we enrolled atrial fibrillation patients with prior catheter ablation for AF. In AF patients, CT was used to delineate atrial anatomy and targets. Planning software was used to design delivery of uniform, transmural ablative energy to the targets (cardioplan, Cyberheart Inc., Mountain View, CA); Radio ablation was performed with assistance from radiation oncologists and physicists (Cyberknife, Accuray, Inc., Sunnyvale, CA). Patients were monitored with interrogation, ambulatory monitoring, ECG, echo, chest X-ray, and clinical follow up. All patients were treated under approved IDE and IRB approvals. Four patients were treated at the moment

**Results:** The patients tolerate the procedure the average doses was 25Gy.

**Conclusion:** Our initial results in Humans after an extensive animal experimentation are promising. More cases and follow up of the patients are needed to confirm these initial observations.

**Keywords:** radio surgery for arrhythmia, ablation non invasive of atrial fibrillation, radiation for non invasive treatment of atrial fibrillation

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## Introduction

Atrial fibrillation is the most frequent arrhythmia in clinical practice. Your diagnosis is electrocardiographic. It is defined as the replacement of P waves by rapid oscillations f waves; that vary in time of appearance form and size and are associated with an irregular ventricular response. It represents more than 10% of the hospitalizations. It carries a high morbidity and mortality and a very large increase in medical expenditure.<sup>1-3</sup> Cox et al.<sup>4</sup> on the basis of multiple re-entrant circuits created the technique of Maze; is very efficient but difficult to reproduce and requires a great operation. This has led to develop other alternatives after knowing the role of pulmonary veins and posterior wall of left atrium as sources of origin and maintenance of atrial fibrillation. Several sources of power were originally used.<sup>5,6</sup> Radio frequency or not with cryoablation is currently the most frequent used by either catheterization or surgery;<sup>7</sup> but also involves an invasive treatment.

In 2005 we developed a non invasive method of treating the atrial fibrillation using radiation, based on the concept of producing cellular apoptosis,<sup>8</sup> Cyberheart system was create for this purpose.<sup>9,10</sup> Basically the system is a software that use an specific planning with 4D imaging of anatomic targets and tracking and compensate for movements the heart and patient with minimally radiation exposure to perform ablation of atrial fibrillation using a variety of radio surgery platforms.

## Methods

Initially we enrolled, atrial Fibrillation patients with prior catheter ablation for . In AF patients, CT was used to delineate atrial anatomy and targets. Planning software was used to design delivery of uniform, transmural ablative energy to the targets (cardioplan, Cyberheart Inc., Mountain View, CA); Radio ablation was performed with assistance from radiation oncologists and physicists (Cyberknife, Accuray, Inc., Sunnyvale, CA). Patients were monitored with interrogation, ambulatory monitoring, ECG, echo, chest X-ray, and clinical follow up. All patients were treated under approved IDE and IRB approvals. Four patients were treated at the moment

## Results

The patients tolerate the procedure the average dosis was 25Gy.

## Conclusion

Atrial fibrillation is the most common arrhythmia and is associated with poor prognosis ; because of the aging of the population the number of patients will increase by 2,5 times by the year 2050 Apart from the medical treatment. Radiofrequency catheter ablation and surgical technique are the most common invasive treatment today. Strategies to deal with the huge worldwide burden of atrial fibrillation will include a wider application of non-pharmacological therapies as well as a big investment in basic and clinical research. New and more effective antiarrhythmic drugs also are needed. For sure genetic studies will help in understanding the therapy of atrial fibrillation CyberHeart is the first non invasive system designed to ablate the atrial fibrillation using radiation. Our initial results in Humans after an extensive animal experimentation are promising more cases and follow up of the patients are needed to confirm these initial observations.

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## Conflicts of interest

The authors declare there is no conflict of interest.

## References

1. Peters NS, Schilling RJ, Kanagaratnam P, et al. Atrial fibrillation: Strategies to control, combat, and cure. *Lancet*. 2002;359(9306):593–603.
2. Ryder KM, Benjamin EJ. Epidemiology and significance of atrial fibrillation. *Am J Cardiol*. 1999;84(9A):131R–138R.
3. Benjamin EJ, Wolf PA, D'Agostino RB, et al. Impact of atrial fibrillation on the risk of death: the Framingham Heart study. *Circulation*. 1998;98(10):946–952.

4. Cox JL, Canavan TE, Schuessler RB, et al. The surgical treatment of atrial fibrillation. II. Intraoperative electrophysiologic mapping and description of the electrophysiologic basis of atrial flutter and atrial fibrillation. *J Thorac Cardiovasc Surg.* 1991;101(3):406–426.
5. Haïssaguerre M, Jaïs P, Shah DC, et al. Spontaneous initiation of atrial fibrillation by ectopic beats originating in the pulmonary veins. *N Engl J Med.* 1998;339(10):659–666.
6. Mazzitelli D, Park CH, Park KY, et al. Epicardial ablation of atrial fibrillation on the beating heart without cardiopulmonary bypass. *Ann Thorac Surg.* 2002;73(1):320–321.
7. Pasic M, Bergs P, Müller P, et al. Intraoperative radiofrequency maze ablation for atrial fibrillation: the Berlin modification. *Ann Thorac Surg.* 2001;72(5):1484–1490.
8. Benetti F, Vivian J, Pankrat M. *Method for Non Invasive Heart Treatment.* US Patent N° 6,889,695 B2. 2005.
9. Gardner EA, Sumanaweera TS, Blanck O, et al. *In vivo* dose measurement using TLDs and MOSFET dosimeters for cardiac radiosurgery. *J Appl Clin Med Phys.* 2012;13(3):3745.
10. Loo BW Jr, Soltys SG, Wang L, et al. Stereotactic ablative radiotherapy for the treatment of refractory cardiac ventricular arrhythmia. *Circ Arrhythm Electrophysiol.* 2015;8(3):748–750.