

# Catheter and Method for Detecting Hierarchical Patterns during Fibrillation

## Introduction

Cardiac arrhythmias are a serious global health problem suffered by millions. One treatment option is ablation of the cardiac tissue. For a successful treatment it is vital that medical professionals detect and determine the nature and extent of cardiac arrhythmias. It can be done with various types of diagnostic catheters, for example ones that are based on the dominant frequency or fractioning of the cardiac signal. The downsides with those catheters are false detections and the need to locate the exact point in the cardiac tissue. This problem was addressed by a multidisciplinary team from Spain and the U.S. and consequently a new device and method were developed.

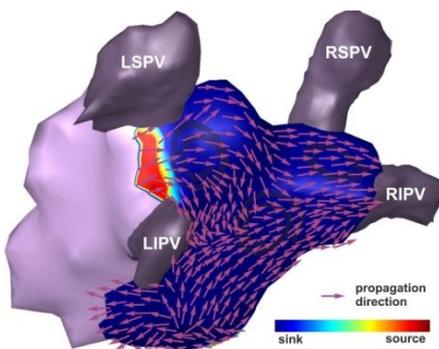
## Invention

The current invention is a system for detecting electrical activity in an organ comprising of a method and a device, with the main application being the detection of the original of cardiac arrhythmias.

The device is a catheter with a foldable structure in order to be inserted inside the organ. The distal end with electrodes is inserted and used to record the intracavitary signal.

The innovative aspect of the device is the catheter, specifically the layout of the electrodes.

The innovativeness of the technology is that the analysis is done locally and iteratively, without knowing all the signals in the whole tissue. The result is a reliable hierarchical organization pattern of the fibrillation activity at every registered point taking into consideration the different analysis done for different zones of the tissue.



**Hierarchical pattern (red to blue) and propagation direction (pink arrows)**

## State of Development

Proof of concept has been developed both in mathematical simulations and clinical recordings. Prototype development is underway. Clinical trials are not necessary for this device.

## Advantages

The advantages for the main application of auricular fibrillation detection are:

- Registers all the atrial activity and graphs it into one electroanatomical map showing the hierarchically propagation pattern during the atrial fibrillation and the dominant regions which are of interest for ablation.
- The results are easy to understand for clinicians and no extra training is necessary.
- Reducing the surgery room time:
  - It is not necessary to pass the catheter all over the atrial tissue.
  - Intuitive and quick analysis of the propagation pattern.
- The system is more stable than the current ones, but in the same price range.
- A higher success rate and therefore lowering the need for second interventions.

## Application

The main application of the device is characterization of atrial fibrillation. Other application areas are the detection of other arrhythmias and the detection of electro physical activity of muscles and nerve tissue.

## Market potential

The EU5 market (Germany, France, United Kingdom, Italy and Spain) of diagnostic catheters was valued at 154 MEUR in 2012 and expected to reach 278 MEUR by 2020. The North American market of diagnostic catheters is valued at 164 MEUR in 2012 is forecasted to reach 285 MEUR in 2020.

## IPR Position

Spanish Patent granted. Application number P201431315. Requested extension in Europe, China and USA.

## Inventors

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## Opportunity

The technology is available for licensing.

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