

## Media backgrounder

# Cardiac Arrhythmia and Catheter Ablation Technique

### Cardiac arrhythmia – when the heart falls out of rhythm

Cardiac arrhythmias (CA) represent a group of conditions with an abnormal heart rhythm or heart rate. This may involve the heart beating too fast (over 100 bpm), too slow (less than 60 bpm) or irregularly.<sup>1</sup> Arrhythmias are often caused by problems with the electrical system that regulates the steady heartbeat and can originate in the lower chambers of the heart (ventricles) or in the upper chambers (atria).<sup>2</sup> There are various types of arrhythmia; the most common forms include atrial fibrillation (AF), atrial flutter and atrioventricular nodal re-entrant tachycardia. Noticeable warning symptoms include fluttering in the chest, shortness of breath, fatigue, chest pain, dizziness or fainting.<sup>3</sup>

Many people experience irregular heartbeats at some point in their lives. Most of the time they are harmless, especially when not associated with other heart conditions. However, some arrhythmias can be serious and even life-threatening if left untreated. For example, atrial fibrillation is the most common cardiac arrhythmia and an independent contributor to mortality, morbidity and impaired quality of life.<sup>4,5</sup> According to data from the long-term, ongoing Framingham heart study, AF is associated with a 1.5- to 1.9-fold higher risk of death. This is in part attributed to the strong association between AF and thromboembolic events (where the blood in the heart can clot).<sup>6</sup> Overall, AF is estimated to be responsible for approximately 15 percent of all strokes<sup>7,8,9</sup> and 20 percent of all ischemic strokes.<sup>10</sup>

### Cardiac arrhythmia – a growing global burden

- Anyone can develop arrhythmias, even young adults without previous heart problems. Nonetheless, the condition is most common in people over 65 years of age with a weak or damaged heart.<sup>11</sup>
- Risk factors include high blood pressure, coronary artery disease and other heart and lung conditions. Furthermore, emotional stress, alcohol abuse and excessive tobacco consumption are associated with arrhythmias. Sometimes the condition occurs without any known cause (idiopathic).
- In developed countries about one percent of the population is affected by cardiac arrhythmia, which corresponds to approximately eleven million people in Europe.<sup>12</sup> Currently over six million Europeans suffer from AF alone.<sup>13,14</sup>
- Due to a growing and aging population, the prevalence of cardiac arrhythmia is estimated to increase strongly in the future and is expected to remain a growing burden for patients, physicians and healthcare systems.

### Catheter ablation is the first-line treatment for tachycardias

There are various forms of cardiac arrhythmias and symptoms may differ over time and vary between patients, so consequently therapy options are multi-faceted. Treatment options to control a patient's heart rhythm can vary depending on the underlying cause; this may include lifestyle changes, medication, cardioversion and surgery (invasive and non-invasive). The treatment decision is dependent upon a variety of factors including a patient's current health, the severity of symptoms and individual

circumstances.<sup>15</sup> The current European Society of Cardiology Guidelines recommend catheter ablation therapy as an alternative to medication for first-line treatment of rhythm control in certain patients with AF. This is due to its improved outcomes and a good safety-performance profile.<sup>16</sup> Pharmacological treatments can also be used to control the arrhythmia and associated symptoms, however potential side effects and long term use should be taken into consideration when balancing the treatment options.<sup>17,18</sup>

Catheter ablation aims to stop the heart beating irregularly by removing the abnormal tissue responsible for causing the arrhythmia. It is a minimally invasive procedure, which is usually performed under local anesthesia. During the procedure, one or more flexible thin tubes (called catheters) are threaded through blood vessels directly into the heart, usually from a vein in the groin or elsewhere. These catheters record the heart's electrical activity and target the tissue responsible for the arrhythmia. Localised radiofrequency electrical energy is then transmitted through the tip of one of the catheters to disrupt the non-vital tissue and thus restore the normal heart rhythm. Following the procedure, patients usually only need to be monitored overnight.

The genesis of radiofrequency catheter ablation dates back to 1985. Since then the procedure has developed into an established, safety-proven and highly effective treatment option with success rates over 90 percent for certain arrhythmias. As with any surgery, procedure-related complications may occur and should be discussed with the physician upfront.<sup>19</sup> A recent medical database analysis of 4,156 patients, who underwent catheter ablation, demonstrated that only five percent experienced complications.<sup>20</sup>

### **Next-generation catheter and mapping technologies improve ablation practice**

According to the European Heart Rhythm Association (EHRA), there were approximately 38,000 ablation procedures performed in Germany and 16,000 in the United Kingdom in 2012.<sup>21</sup> In 2014, approximately 140,000 EU patients are estimated to receive catheter ablation with the number projected to increase to 200,000 by 2019.<sup>22</sup> This underlines the growing impact of cardiac arrhythmias and the need for state-of-the-art catheter and cardiac mapping technology to improve diagnosis and treatment of all types of rhythm disorders. For performing successful and safe ablation procedures, precise visualisation of catheter location, accurate tissue identification and information about the lesions are of pivotal importance.<sup>23,24</sup>

Previous catheters used to have bigger size electrodes, which can lead to less precise information regarding the ablation area. New catheters such as the IntellaTip MiFi™ XP Temperature Ablation Catheter by Boston Scientific with its unique MicroFidelity sensor technology are equipped with embedded mini electrodes on the tip. These provide high-resolution visualisation of the heart tissue, allowing the physicians to pinpoint the exact tip location of the catheter to precisely target the ablation and assess ablation effectiveness. This real-time feedback contributes to reducing total time for ablation delivery. Furthermore, the unique MicroFidelity technology helps to accurately differentiate viable and non-viable tissue due the higher specificity and sensitivity of the provided data, thus minimising the diagnostic part of the procedure and potentially offering significant benefits to patients, physicians and health care systems.<sup>25</sup>

Second-generation 3D mapping devices like the Rhythmia™ Mapping System enable electrophysiologists to create highly accurate anatomical and electrical maps of the heart. These high-resolution images may improve procedural efficacy and reduce the time needed to diagnose and deliver treatment. Using a hybrid technology of both impedance and magnetic catheter tracking location technologies, paired with

continuous and automatic mapping capabilities, the Rhythmia™ Mapping System is able to collect thousands of relevant data points in only a few minutes. High resolution and high density electrical maps of the heart are of key importance to facilitate confident clinical decisions for effective and safe treatment of cardiac arrhythmias.

For more information and the latest updates on product and technology innovations, please visit the Boston Scientific European Newsroom at [news.bostonscientific.eu](http://news.bostonscientific.eu).

## Media contact

Simonetta Balbi  
Media Relations and Corporate  
Communication Europe  
Boston Scientific Corporation  
+39 338 79 36 422 (mobile)  
[balbis@bsci.com](mailto:balbis@bsci.com)

Sharron Tansey  
Market Access, Health Economics &  
Government Affairs  
+44 7770 834 947  
[TanseyS@bsci.com](mailto:TanseyS@bsci.com)

## References

- <sup>1</sup> Heart Rhythm Society. <http://www.hrsonline.org/Patient-Resources/Symptoms-Diagnosis/Slow-Heartbeat#axzz34PoU7Zct> (Accessed: June 12, 2014).
- <sup>2</sup> Heart Rhythm Society. <http://www.hrsonline.org/Patient-Resources/Heart-Diseases-Disorders#axzz34VHXu5GZ> (Accessed: June 12, 2014).
- <sup>3</sup> Blomstrom-Lundqvist C et al. ACC/AHA/ESC Guidelines for the Management of Patients With Supraventricular Arrhythmias – Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines. *Circulation* 2003, 108: 1871-1909.
- <sup>4</sup> Thrall G, Lane D, Carroll D. et al. Quality of life in patients with atrial fibrillation: a systematic review. *Am J Med* 2006. 119:448.
- <sup>5</sup> Freestone B, Lip G Y H. Epidemiology and costs of cardiac arrhythmias. In: Lip GYH, Godfredsen J, eds. *Cardiac arrhythmias: a clinical approach* Edinburgh: Mosby, 2003;3–24.
- <sup>6</sup> Wolf PA, Abbott RD, Kannel WB. Atrial fibrillation as an independent risk factor for stroke: the Framingham Study. *Stroke*. Aug 1991;22(8):983-8.
- <sup>7</sup> Wolf CD, Rudd AG. The Burden of Stroke White paper: Raising awareness of the global toll of stroke-related disability and death.
- <sup>8</sup> World Health Organisation. The atlas of heart disease and stroke. [http://www.who.int/cardiovascular\\_diseases/resources/atlas/en](http://www.who.int/cardiovascular_diseases/resources/atlas/en) (Accessed: June 12, 2014)
- <sup>9</sup> Marmot MG, Poulter NR. Primary prevention of stroke, *Lancet* 1992;339:344-7.
- <sup>10</sup> World Health Organisation. Avoiding heart attacks and strokes: don't be a victim – protect yourself. Publications of the World Health Organisation, 2005. [http://www.who.int/cardiovascular\\_diseases/resources/cvd\\_report.pdf](http://www.who.int/cardiovascular_diseases/resources/cvd_report.pdf) (Accessed: June 12, 2014).
- <sup>11</sup> American Heart Association. What is Atrial Fibrillation (AFib or AF)? [http://www.heart.org/HEARTORG/Conditions/Arrhythmia/AboutArrhythmia/What-is-Atrial-Fibrillation-AFib-or-AF\\_UCM\\_423748\\_Article.jsp](http://www.heart.org/HEARTORG/Conditions/Arrhythmia/AboutArrhythmia/What-is-Atrial-Fibrillation-AFib-or-AF_UCM_423748_Article.jsp) (Accessed: June 12, 2014).
- <sup>12</sup> Harkcom WT, Abbott GW. Emerging concepts in the pharmacogenomics of arrhythmias. *Expert Rev Cardiovasc Ther*. 2010 Aug; 8(8):1161-73. doi: 10.1586/erc.10.89.
- <sup>13</sup> The Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC), Guidelines for the management of atrial fibrillation, *European Heart Journal* 2010 31, 2369-2429.
- <sup>14</sup> Camm JA et al on behalf of The Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC). Guidelines for the management of atrial fibrillation *European Heart Journal* doi:10.1093/eurheartj/ehq278.
- <sup>15</sup> Heart Rhythm Society. Treatment of heart rhythm disorders <http://www.hrsonline.org/Patient-Resources/Treatment#axzz34VHXu5GZ> (Accessed: June 12, 2014).
- <sup>16</sup> Camm JA et al. 2012 focused update of the ESC Guidelines for the management of atrial fibrillation. *European Heart Journal* 2012, 33:2719–2747. <http://eurheartj.oxfordjournals.org/content/33/21/2719.full.pdf> (Accessed: June 12, 2014).

- 
- <sup>17</sup> American Heart Association. Atrial Fibrillation Medications. [http://www.heart.org/HEARTORG/Conditions/Arrhythmia/AboutArrhythmia/Atrial-Fibrillation-Medications\\_UCM\\_423781\\_Article.jsp](http://www.heart.org/HEARTORG/Conditions/Arrhythmia/AboutArrhythmia/Atrial-Fibrillation-Medications_UCM_423781_Article.jsp) (Accessed: June 12, 2014).
- <sup>18</sup> Blomstrom-Lundqvist C et al. ACC/AHA/ESC Guidelines for the Management of Patients With Supraventricular Arrhythmias – Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines. *Circulation* 2003, 108: 1871-1909.
- <sup>19</sup> American Heart Association. Ablation for Arrhythmias. [http://www.heart.org/HEARTORG/Conditions/Arrhythmia/PreventionTreatmentofArrhythmia/Ablation-for-Arrhythmias\\_UCM\\_301991\\_Article.jsp](http://www.heart.org/HEARTORG/Conditions/Arrhythmia/PreventionTreatmentofArrhythmia/Ablation-for-Arrhythmias_UCM_301991_Article.jsp) (Accessed: June 12, 2014).
- <sup>20</sup> Shah RU et al. Procedural complications, rehospitalizations, and repeat procedures after catheter ablation for atrial fibrillation. *J Am Coll Cardiol* 2012;59:143–149.
- <sup>21</sup> European Heart Rhythm Association (EHRA). The EHRA White Book 2013. <http://www.escardio.org/communities/EHRA/publications/Documents/ehra-white-book-2013.pdf> (Accessed: June 12, 2014).
- <sup>22</sup> Estimates based on disease model calculation by Boston Scientific. Data on file.
- <sup>23</sup> Blomstrom-Lundqvist C et al. ACC/AHA/ESC Guidelines for the Management of Patients With Supraventricular Arrhythmias – Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines. *Circulation* 2003, 108: 1871-1909.
- <sup>24</sup> Camm JA et al. 2012 focused update of the ESC Guidelines for the management of atrial fibrillation. *European Heart Journal* 2012, 33:2719–2747.
- <sup>25</sup> Pre-clinical studies with the IntellaTip MiFi™ technology are ongoing. For further information please see: Price A et al. Novel ablation catheter technology that improves mapping resolution, and monitoring of lesion maturation. *Journal of Innovations in Cardiac Rhythm Management* 2012, 2:1-11. Avitall B et al. Determinants of atrial lesion maturation during radio frequency ablation using localized tissue electrograms. *Journal of Innovations in Cardiac Rhythm Management* 2014, 5:1574-1585.