UNIVERSITY OF LEICESTER

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LifeMap®: Assessing the Risk of Sudden Cardiac Death

An ECG based tool used to assess an individual's risk of sudden cardiac death.

Please note, header image is purely illustrative. Source: Mick Lissone, Public Domain Pictures, CC0.

IP Status

Patented

Seeking

Commercial partner, Licensing, Development partner

About **University of Leicester**

The University of Leicester works hand in hand with industry to generate business growth and find real applications for its leading innovation and research.

Background

Worldwide 3 million people a year die from sudden cardiac death (SCD), when the ventricles stop due to an arrhythmia. Those assessed to be at high risk of SCD are often surgically given an implantable cardioverter defibrillar (ICD), which can prevent death by reactivating the heart with automatically applying a suitable electrical shock. However, it has been acknowledged by the National Institute of Clinical Excellence (NICE) that current procedures for assessing risk of SCD require considerable improvement. Most people that suffer SCD are not found to be at high risk by currently used risk markers. Also, it has been estimated that 40% of individuals with ICDs never actually require them to be activated within the first 4 years of implant. Therefore, a more sensitive and specific method of identification of those requiring an ICD would be better for patients as well as saving the NHS considerable costs. Implanting ICDs is expensive, costing about £15k each. NICE calculates a cost of £40 - £80k per quality adjusted life year added by an ICD. Currently, ventricular stimulation tests are used to risk stratify patients. This is a crude test that involves passing a wire up the femoral vein into the right ventricle and delivering a pacing protocol; if the heart goes into arrhythmia the test is positive, if not, it is negative. Therefore, a market opportunity exists in developing a more sophisticated and patient friendly tool that enables better risk stratification of patients at risk of SCD.

Tech Overview

LifeMap: This is an ECG based tool used to assess an individual's risk of SCD. Work at the University of Leicester has determined ECG based algorithms which can be used to better risk-stratify patients for developing ventricular arrhythmia and hence their risk of SCD. These algorithms incorporate 2 key parameters:

1) the heterogeneity of readings given by the 12 leads normally used for such measurements;

2) a measure of the intensity of the action potential duration.

These algorithms are patent protected and have been shown to improve by 60% the ability to predict patients at risk of SCD and hence requiring an ICD (Figure 1). Furthermore, LifeMap is relatively inexpensive compared to current methodologies and has the potential for development into an assessment tool for use in the general population. It is proposed that initially LifeMap be developed to use with patients who have already suffered some sort of cardiac event. All the necessary ECG information needed for LifeMap calculations can be recorded by standard equipment in cardiology units.

Figure 2 - Comparison of ECGs of patients where SCD prevented by ICD and follow up examinations where no heart rhythm problems were found.

Winner of the following awards:

- Da Vinci Health Technology Innovation Network 'Clinical Impact Award' 2010

- Heart Rhythm Congress 'Young Investigator Prize' 2010
- Medical Futures Innovation Award for Cardiology 2011
- Cardio Rhythm 'Young Investigator Award' 2011
- East Midlands Engineering and Science Professional 'Master Prize' 2011
- Heart Research UK, Novel and Emerging Technologies Award 2015
- European Heart Rhythm Association Innovation Prize 2016

Benefits

- Improves ability to predict risk of SCD by 60% compared to currently used testing procedures.
- Has the potential for development into a test for use in the general population.
- Relatively inexpensive technique.

Applications

Prediction of patients at risk of sudden cardiac death and hence those most in need of an ICD. The largest market would be development of the technique for use in the general population.

Opportunity

Very good retrospective and prospective outcomes of trial work undertaken in Leicester. The project has recently secured funds from Heart Research UK, Novel and Emerging Technologies Award for undertaking a multi-site trial. LifeMap is available for exclusive licensing or co-development with a suitable industry partner.

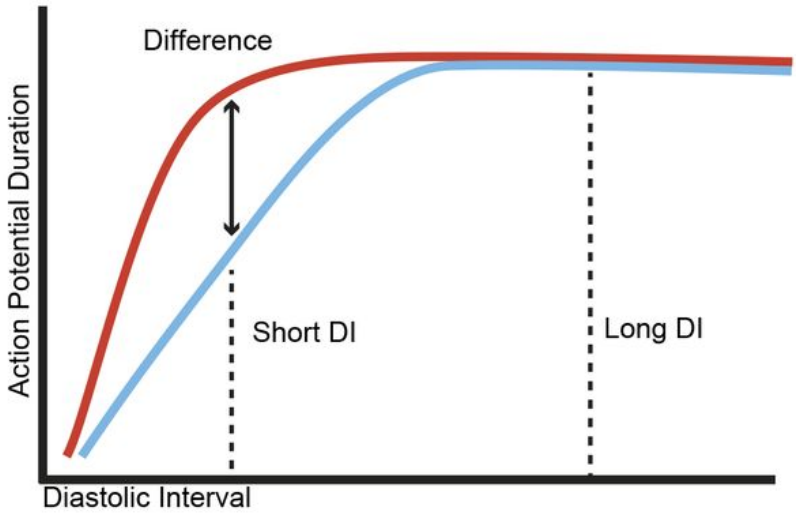
Patents

- LifeMap technology is protected by two patent families

Appendix 1

Figure 1

Effect of change of Diastolic interval (DI) on action potential duration.



Appendix 2

Figure 2

Comparison of ECGs of patients where SCD prevented by ICD and follow up examinations where no heart rhythm problems were found.