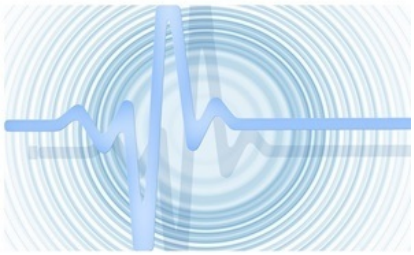
HealthManagement.org
Promoting Management and Leadership

Beams of Light Could Replace Electric Shocks for Arrhythmias



A study published in the Journal of Clinical Investigation suggests that epicardial illumination could replace implantable defibrillators and thus eliminate pain and heart tissue damage in patients with ventricular arrhythmias.

The field of optogenetics, a biological technique involving the use of light sources to control cells in living tissue, may now provide a new solution to arrhythmia management. Researchers from Johns Hopkins and the University of Bonn have been working towards optical defibrillation of the heart, where light sources will be used to restore normal cardiac rhythm without causing pain or tissue damage in patients experiencing cardiac arrest.

The University of Bonn team tested the method in mice, whose cardiac cells had been genetically modified to express proteins which have the ability to react to light and alter electrical activity in the organ. When ventricular fibrillation was applied to the hearts of mice, a light pulse of only one second was sufficient to restore normal cardiac rhythm. This is the first time an experimental study shows that light can be used for the defibrillation of heart arrhythmia.

Subsequently, the team at Johns Hopkins performed an experiment on a computer model of a human heart in order to find out if this technique would help human patients. The model had been derived from the MRI scans of a patient who had experienced myocardial infarction and was consequently at risk of arrhythmia. In this experiment, red light was used to stimulate cardiac cells instead of blue light used in mice. Red light has a longer wavelength and is more effective in virtual human tests as blue light is not powerful enough to penetrate human heart tissue. The simulation revealed that the light pulse to the heart of the patient stopped the arrhythmia.

The current study has demonstrated the feasibility of optogenetic defibrillation in arrhythmia termination as well as the importance of computational modelling in the development of therapeutic applications for cardiac optogenetics. Further research is required until the promising light treatment becomes commonplace and replaces painful and harmful implantable defibrillators.

Source Credit: [The Journal of Clinical Investigation]

Published on : Mon, 10 Oct 2016