

TYPE: Invited lecture

PRESENTER: Narine Sarvazyan, PhD

TITLE: Imaging arrhythmia sources across different scales and imaging modalities

DATE: November 4, 2024

DETAILS: 13.30-14.00pm

VENUE: The International Conference “Solving Nature’s Mysteries Using Advanced Bioimaging Approaches”, Yerevan, Armenia

LOCATION: Congress Hotel, Large Hall, Yerevan, Armenia



ABSTRACT: The talk will highlight different imaging modalities that the speaker’s lab has used to study the origins of arrhythmias and the ways to eliminate them. These techniques include confocal imaging, in silico modeling, optical mapping, and hyperspectral imaging. The earlier work involved in vitro and in silico experiments that led to a novel concept of an ectopic nexus. This refers to a functional state of injured cardiac tissue in which multiple poorly coupled ectopic sources form a transient breeding microenvironment for slowly propagating ectopic waves. These waves develop from individual cells and are confined to the area of injury. Excitation waves originating from the surrounding healthy tissue fail to invade the ectopic nexus, allowing slow ectopic waves to coexist side by side with normal propagation patterns. Relief of conditions that support an ectopic nexus results in the escape of ectopic waves, leading to an arrhythmia. These in vitro studies were followed by dual optical mapping of excised hearts to visualize waves originating from the boundary of the ischemic border or from grafted stem cells. The second part of the talk will focus on the use of hyperspectral imaging to improve surgical procedures for ablating arrhythmogenic sources in patients with atrial fibrillation. This includes the use of hyperspectral imaging to visualize radiofrequency ablation lesions made on the surface of highly collagenous human left atria. The concept of and the use of 4D hyperspectral imaging using examples from ongoing studies will also be covered.

