UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Computational Biology and Complex Systems Research Group

Training program in *Computational Biophysics*

TFG offer

Novel mechanism for sudden cardiac death due to calcium release deficiency syndrome

Sudden cardiac arrest is an emergency where the heart stop beating because electrical activity in the heart that becomes chaotic (fibrillates). If not corrected within minutes with cardiopulmonary resuscitation or a defibrillator, it leads to sudden cardiac death. The reasons behind this malfunction are different, but normally associated with a high level of arrhythmias. A previous infarction, a dilated heart or previous coronary diseases are highly correlated with these arrests. One of the most recent lines of research tries to understand why some cardiac arrests happen in family clusters without previous heart diseases nor detection with exercise stress testing. It has been shown that these families have a genetic profile that leads to the loss of function (LOF) of a protein key in releasing calcium inside the cytosol of cardiomyocytes: the Ryanodine Receptor (RyR). The normal electric beat of the heart leads to the heart contraction because an increase in calcium in the cytosol triggers it. A deficiency in this release alter not only the contraction but electrical behavior. **The goal of this project is to reproduce the experimental protocol that leads to sudden cardiac arrests in genetically modifies mice that present a Ryanodine Receptor with a Loss of Function developed by collaborators in the University of Calgary.**

TFG proposal

The proposal for 2022/2023 consists on (1)Understand the physiology of sudden cardiac arrest and the protocols applied to animal models to check loss of function effects on calcium dynamics and voltage; (2) Learn the basic structure of a mice in-silico model and be able to change its structural parameters; (3) Look for changes in the structure of calcium cycling that can reproduce the differences observed in experiments.

Director/a TFG: Blas Echebarria and Enric Alvarez

Candidate profile: Last course in Data Science and Engineering, Engineering Physics o Biomedical Engineering in the Universitat Politècnica de Catalunya.

Center: Escola d'Edificació de Barcelona EPSEB (Barcelona).

***Applications*:** Send CV (including grades) and a motivation letter to the head of the program **before the 30th of setembre** (Clara Prats, clara.prats@upc.edu)

Financing: Research group BIOCOM-SC will offer an INIREC contract to the three best candidates that want to carry out any of the TFG associated with this training program in *Computational Biophysics* in the course 2022-2023.