The fickle heart

Isaac Newton Institute Cambridge

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Short Report

Cardiac modelling and simulation is transitioning from exploring basic research questions to being a predictive tool. Recent applications include informing medical imaging and signal processing, assessing the safety of drug compounds in the pharmaceutical industry, and optimising patient treatment in hospitals, all of which directly affect patient safety. The aim of the Fickle Heart programme was to characterise sources of uncertainty in simulations and develop mathematical tools to provide estimates of our confidence in simulation predictions to enable informed decision making based on simulation results.

The programme consisted of three focused weeks of talks and discussions with 34 attendees. Throughout the programme participants engaged in an interactive challenge to choose, develop and test a mathematical model for a cardiac potassium current. Scientists at the Victor Chang Cardiac Research Institute in Australia ran experiments designed at the Isaac Newton Institute overnight and results were available for analysis the next morning.

The final week consisted of a software day, a Newton Gateway Open For Business day with 68 attendees, and a three day workshop with 85 attendees. The workshop set a record for the Isaac Newton Institute with 28 posters focused on early career researchers.

The programme brought together multi-disciplinary scientists from medical imaging, physiology, numerical analysis, computational modelling, data science, statistics, and uncertainty quantification. Attendees included practising clinicians and experimentalists as well as representatives from the medical device and pharmaceutical industries. Key to the success of this programme was the opportunity for researchers from different backgrounds to develop new collaborations.