

# **OXFORD UNIVERSITY COMPUTING LABORATORY**

## **BBSRC funded position**

### **Grade 7 Post-Doctoral Research Scientist: Modelling Neural Control in the Heart**

#### **Further Details**

The Computing Laboratory has a vacancy for Post-Doctoral Research Scientists as part of a three year funded BBSRC funded research project “Modelling the cellular cardiac-neural axis in the control of myocardial excitability”. The work will focused on the development of a new model of neural control of cardiac excitability using novel gene delivery data collected in the Physiology Department at Oxford. This role will be developing spatially averaged models of the ionic regulation of the electrical activities of cardiac cell and include working with experimentalists on interpreting data and suggesting experiments.

#### **Project Background**

The heart is a remarkably efficient and effective electro-mechanical pump for supplying the continuous flow of blood that is fundamental for life. Disruption of the autonomic nervous system in heart, which regulates the rate and force for contraction, produces many life threatening changes to the mechanical and electrical properties of heart cells.

The recent development of novel experimental technologies is currently generating detailed and varied experimental data assaying the key biochemical regulatory mechanisms in autonomic control. These data add significant complexity to our understanding of cell to cell communication between the neuron and the myocyte and reassembling this signalling information into an integrative framework represents a major challenge. Computational modelling provides promising solution for detailed examination of just such a system.

Via tight integration between the modelling and experimental programs this project will iteratively develop and use a consistent model of the sympathetic regulation of pacemaking in the heart. The techniques employed to extend and develop the cellular components will follow the successful approach previously employed in both our group and the cardiac modelling field in general. Systems of ordinary differential equations will be fitted to represent the channel gating and flux of ionic concentrations across the cellular and intracellular organelle membranes. Parameter values in these models will be set by transparently linking direct measurement and experimental conditions with model fitting and sensitivity analysis techniques. The resulting model will be used iteratively to interpret experimental data, suggest experiments and then refine the modelling framework with the data that results.

The development of neural model models of NO regulation will be a completely new element that will map directly into the wider cardiac Physiome project. The model will also enable further developments including the ionotropic effects of NO and integration of the cellular response into anatomical models which include neural architecture.

#### **Main Duties and Responsibilities**

Main duties for this role will include:

- The development of a function neural control model and reparamterisation of existing cellular models of cardiac pace-making.
- Running model simulations and interpreting experimental data to identify the sensitivity of the system to experimental perturbations and the fundamental biophysical mechanisms which underpin control of excitability in the Heart.

## Selection Criteria

The successful applicant will have many, but not necessarily all, of the following skills:

- A PhD, graduate or equivalent qualification in the mathematical, physical or life sciences.
- Experience in cellular mathematical model development and in particular cardiac electrophysiology
- A good understanding of physiological systems and in particular the heart.
- A background in solving systems of coupled ordinary differential equations, stochastic modelling and parameter fitting.
- Good English language skills, both written and verbal;
- Good communication skills and willingness to interact with experimental project partners.

## Salary and Benefits

The post, which is a full-time fixed term appointment has a salary on the University grade 7 scale (currently £27,466 to £33,780 pa); includes membership of USS; has an annual leave entitlement of 38 days per year (pro-rata) inclusive of all public holidays and university closed periods, and is available for immediate start.

## Method of Application

Applications should be in the form of a *letter of application* relating the candidates skills to the post selection criteria, together with a full Curriculum Vitae and the names and addresses of two referees. **Candidates should state clearly which post they are applying for.**

The application should preferably be sent by email (most formats accepted) to: [job07@comlab.ox.ac.uk](mailto:job07@comlab.ox.ac.uk)

or by post to: The Administrator,  
Oxford University Computing Laboratory,  
Wolfson Building  
Parks Road,  
Oxford OX1 3QD.

Applications should be sent in time to arrive by 5:00 p.m. on **Thursday 5<sup>th</sup> June 2008**. Applications received after this time will not be considered.

Candidates must ask their referees to consider the further particulars and email the reference directly to [job07@comlab.ox.ac.uk](mailto:job07@comlab.ox.ac.uk) or, alternatively, post it to the above address (fax (+44 1865 283532) so that references arrive by the closing date.

**The policy and practice of the University of Oxford require that all staff are afforded equal opportunities within employment and that entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. Subject to statutory provisions, no applicant or member of staff will be treated less favourably than another because of his or her sex, marital status, sexual orientation, racial group, or disability.**