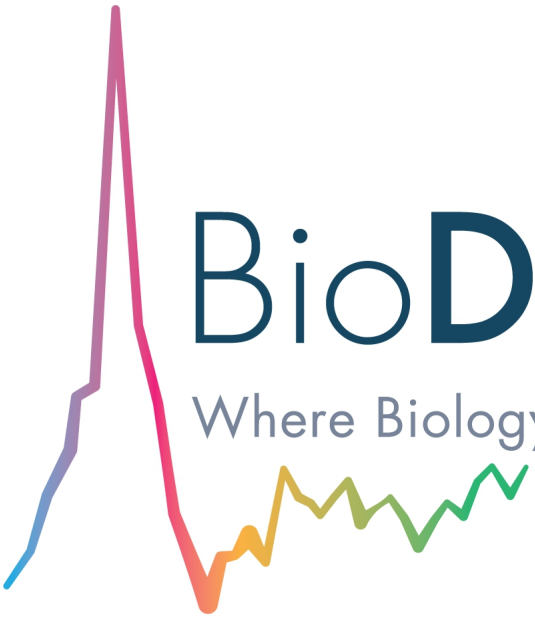

BioDynamics

Where Biology, Medicine & Mathematics meet

12th & 13th April 2018

Royal College of Physicians, London

Biodynamics 2018 Organising Committee:

Mark Richardson
Zoran Cvetkovic
Franca Fraternali
Kevin O'Byrne
Steven Niederer
Ivana Rosenzweig

PROGRAMME

Thursday 12th April

0800 - 0900	Registration + tea/coffee RCP lower foyer	
0900 - 0915	Welcome and opening remarks Seligman Lecture Theatre	

Motor Neuroscience

Chair: Professor Zoran Cvetkovic

Unravelling mechanisms of movement control and how they are disrupted in individuals with movement disorders requires holistic interdisciplinary approaches.
This session represents an overview of the field and recent research advances in computational motor control, motor neurophysiology, brain networks and clinical neurophysiology, aiming to spur some new synergies in this very complex and exciting field.

0915 - 1015	Keynote: How motoneurons work and what happens when they go wrong Kerry Mills, King's College London	
1015 - 1045	Architecture of a network in the cerebellum as a learning machine Reza Shadmehr, Johns Hopkins University	
1045 - 1115	Aberrant synchronisation in Parkinsons and Tremor; leveraging recent findings to develop more selective therapies Peter Brown, University of Oxford	
1115 - 1145	What determines when a movement starts? John Rothwell, University College London	
1145 - 1200	Highlighted oral	Title to be confirmed
1200 - 1300	Lunch + posters	Platt Room

Molecular Mechanisms and Modelling of Diseases

Chair: Professor Franca Fraternali

Progresses in Translational Medicine will have to proceed hand-in-hand with the discovery of the molecular mechanisms underlying the cell pathological states. Dissecting these, together with the introduction of molecular diagnostics into medical practice, will result essential in the annotation of disease pathogenesis and in the design of tailored and effective patient treatments.

This workshop will be dedicated to highlight some of the recent discoveries of molecular mechanisms playing a role in neurodegenerative disorders and cancer. We will highlight the importance of biophysical, analytical and computational tools in assessing and quantifying these mechanisms.

1300 - 1400	Keynote: Constitutional Dynamics of Prion Assemblies Human Rezaei, French National Institute for Agricultural Research
1400 – 1430	Talk title to be confirmed Bissan Al-Lazikani, Institute of Cancer Research, London
1430 - 1500	Building the global map of human protein complexes Kevin Drew, University of Texas
1500 - 1530	Protein homeostasis of a metastable subproteome associated with Alzheimer's disease Michele Vendruscolo, University of Cambridge
1530 – 1600	Break + refreshments + posters

Neural Oscillations in Health and Disease

Chair: Dr Ivana Rosenzweig

The emerging field of neuronal oscillations provides an exciting interdisciplinary platform that cuts across physics, neuroscience, neuromodulation, sleep medicine, psychology, biophysics, computational modelling and mathematics. Mammalian cortical neurons form oscillating networks of various sizes, and resulting neural oscillations are known to be phylogenetically preserved, and likely functionally relevant. This session will provide an overview of the recent research advances in understanding their physiological mechanisms and functions, as well as highlight some possible ground-breaking possibilities, which neuromodulation might provide for the diagnosis and treatment of brain disorders.

1600 - 1700	Keynote: Successful or unsuccessful interventions? The role of cortical oscillations Roi Cohen Kadosh, University of Oxford
1700 - 1730	Talk title to be confirmed Tonio Ball, University of Freiburg
1730 - 1800	Transcranial alternating current and random noise stimulation in healthy and disease Andrea Antal, University of Gottingen
1800 - 1830	Long-Range Temporal Correlations in Neuronal Oscillations Vadim Nikulin, Max Planck Institute, Leipzig
1830 - 1930	Drinks reception and posters

PROGRAMME

Friday 13th April

0830 - 0915	Registration + tea/coffee	RCP lower foyer
0900 - 0915	Welcome and opening remarks	Seligman Lecture Theatre

Stress and the Brain

Chair: Professor Kevin O'Byrne

Stress has deleterious effects on the brain including dynamic morphological changes that impact on various key functions including cognition and memory, mental health and fertility. This symposium will focus on mathematical modelling and function of dynamic glucocorticoid and reproductive hormone secretion, neuroplastic adaptations of stress neurocircuits, and the role of chemosensory communication in promotion of stress-adaptive behaviours that may aid our survival.

0930 - 1030	Keynote: No stress without rhythm; the world of oscillating hormones Stafford Lightman, University of Bristol	
1030 - 1100	Dynamics of Brain Stress Circuit Integration James Herman, University of Cincinnati	
1100 - 1130	Chemosensory communication of stress Bettina Pause, University of Dusseldorf	
1130-1200	Tuning the reproductive hormonal signals: insights from a mathematical model Margaritis Voliotis, University of Exeter	
1200 - 1215	Highlighted oral	Title to be confirmed
1215 - 1330	Lunch + posters	Platt Room

Patient Specific Modelling

Chair: Dr Steven Niederer

Computational models provide a mathematical framework for integrating data from an individual patient and interpreting it within the context of known physical laws and physiology. Patient specific models can then be used to analyse an individual patient to identify the mechanisms underpinning their pathology, to provide inferred measurements such as muscle stress or work, or to predict how a patient will respond to a therapy.

This session will provide a broad review exemplar applications of computational modelling across the fields of muscle-skeletal, cardiac, cardiovascular and drug delivery.

1330 - 1430	Keynote: The snowflake conundrum: lessons in paediatric musculoskeletal biomechanics Marco Viceconti, University of Sheffield
1430 - 1500	Patient specific modelling for planning treatment in congenital heart disease Silvia Schievano, University College London
1530 - 1600	Arrhythmogenic Cardiomyopathy: from Simulations to Patient Stratification Joost Lumens, Maastricht University
1600 - 1630	Physiologically-based modelling of bile-acid metabolism Lars Kuepfer, Rwth-Aachen University
1630	Closing remarks

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