



Institute of Technology

Ciência sem Fronteiras / Science Without Borders

Postgraduate Project Template

Institution:	Institute of Technology Sligo
Title of Postgraduate Opportunity: (include level of study)	Developing blood mitochondrial markers for athletic performance, optimal training and effective recovery regimes (PhD)
PI Name & Contact Details:	Dr James Murphy +353 71 9155 239 murphy.james@itsligo.ie
Department/School:	Dept of Life Sciences
Research Centre /Group:	Mitochondrial Biology & Radiation Research
Research Centre/Group website:	http://itsligo.ie/mbrr
Brief Summary of PI research / research group /centre activity <p>The PI along with MBRR researchers has a strong track record in Mitochondrial Biology as well as Radiation Biology particularly non-ionising radiation. Ongoing research includes determining subtle changes in mitochondrial dynamics, as well as mitochondrial function and mitochondrial DNA in skin cells at an in vitro and in vivo level. Outcomes will include the development of a new mitochondrial diagnostics platform for sensitive and predictive dermatological analysis. The group is also evaluating and developing the potential of radiowave radiation as both a stand-alone cancer therapy and also as an adjunct therapy. In addition, researchers are evaluating exciting new anti-tumour drug hybrids using novel analytical platforms. The Mitochondrial Biology and Radiation Research (MBRR) Group was formed in early 2009, following the awarding of an SFI Stokes Lectureship to the head of MBRR, Dr James Murphy. The research team is in the Dept of Life Sciences in IT Sligo and it has research offices and over 70m² of state-of-the-art research space in the Innovation Centre on campus. MBRR is currently funded by Science Foundation Ireland, IT Sligo seed funding, Invest NI, Irish Research Council and the Radiowave Therapy Research Institute.</p>	
Brief Description of Masters or PhD Project <p>Developing blood mitochondrial markers for athletic performance, optimal training and effective recovery regimes. This project will run in collaboration with researchers in ORRECO Ltd (http://orreco.com). ORRECO provide biomarker analysis for world leading athletes, federations and professional franchises. They provide bespoke solutions to monitor players, optimise training response and protect against excessive fatigue and overtraining. Their clients include multiple World and Olympic Champions, World Cup and Major Winners. The study will develop mitochondrial markers for athletic performance and the optimisation of training regimes. The research will be</p>	

conducted in 2 phases. In phase 1, muscle and blood will be collected from 4 groups of pre conditioned rats: Control; Trained; Overtrained and Recovered Overtrained. Muscle and white blood cell total DNA (nDNA + mtDNA) will be isolated and analysed for a wide range of mitochondrial markers including dynamics, fusion/fission, biogenesis, function, mass and mtDNA damage. The ratio of muscle markers to white blood cell markers will also be determined. Phase 2 will involve the recruitment of human volunteers to the study who will give a muscle micro-biopsy and a small blood sample. The key indicators of performance, overtraining and recovery will then be validated on human volunteers from the following 4 groups (also restricted to similar age, same sex and non-smokers): Leading a sedentary lifestyle; Trained, in a controlled manner in the recent past; Overtrained in the recent past and Recovered from overtraining in the recent past.

Key Attributes of Project for Brazilian Postgraduate Students

The world leading expertise to be provided by the industry partner along with their unique access to human samples is truly unique to this research proposal. Furthermore the unique mitochondrial diagnostics platform to be evaluated in this study has not been used heretofore in the analysis of athletic performance.

Name and contact details for project queries, if different from PI named above:

As above

Please indicate graduate disciplines which are eligible for application:

Molecular Biology, Life Sciences, Biomedical Sciences

Alignment with Science Without Borders Priority Areas:

Engineering and other technological areas	
Pure and Natural Sciences (e.g. mathematics, physics, chemistry)	
Health and Biomedical Sciences	✓
Information and Communication Technologies (ICTs)	
Aerospace	
Pharmaceuticals	
Sustainable Agricultural Production	
Green Chemistry	
Oil, Gas and Coal	
Renewable Energy	
Minerals	
Biotechnology	
Nanotechnology and New Materials	
Climate Change	
Biodiversity and Bioprospection	
Marine Sciences	
Productive Inclusion and Social Technologies	
Housing and Sanitation	