

## STAR PROJECT DESCRIPTION

<b>Institution/Dept:</b>	Royal College of Surgeons in Ireland
<b>Project Title:</b>	<b>Molecular Regulation of Intestinal Epithelial Transport</b>
<b>Suitable for teachers who teach any of the following subjects:</b>	Biology Physiology
<b>Project Description:</b>	<p>Epithelial cells line the internal surfaces of the body, such as the lungs and intestines, and serve as an inner skin protecting us from the entry harmful substances and regulating fluid movement to and from the body. Normally, absorption of fluid predominates but disease conditions can disrupt this finely-tuned balance to net fluid secretion, thereby causing diarrhoea. Diarrhoeal diseases are common, not only in developing countries but also in Western civilizations where they represent a huge burden to healthcare systems. With this in mind, the long-term goal of this laboratory is to develop our understanding of mechanisms that regulate intestinal transport in health and disease.</p> <p>Epithelial transport processes are highly energy dependent and are therefore influenced by alterations in tissue blood and O<sub>2</sub> supply. In disease conditions intestinal blood flow can be compromised, leading to tissue hypoxia and the ways in which epithelial cells adapt under these circumstances is still poorly understood. Hydroxylases are a family of enzymes that dependant on cellular O<sub>2</sub> for their activity. Their primary substrate is HIF-1<math>\alpha</math>, a critical regulator of cellular responses to hypoxia. When O<sub>2</sub> is present, hydroxylases act on HIF-1<math>\alpha</math> and target it for degradation, whereas when cellular O<sub>2</sub> levels are low hydroxylases are inactive and HIF levels increase, whereupon it initiates a programme of gene transcription to enables adaptation to altered O<sub>2</sub> supply. However, despite their pivotal role in regulating epithelial responses to hypoxia, there is still no information regarding the role that hydroxylases play in regulating epithelial transport. Thus, our STAR will participate in a project designed to investigate the role for hydroxylases in regulating epithelial secretion. Ultimately, it is our goal that by developing our understanding of epithelial transport processes, these studies will lead to the development of new approaches for treating intestinal diseases associated with abnormal ion and fluid transport.</p>
<b>The Role of the STAR &amp; benefits gained from participation in this project:<sup>1</sup></b>	Our STAR will be welcomed into a young and vibrant research group within the Molecular Medicine laboratories at the RCSI. S/he will learn basic laboratory techniques including how to grow and treat epithelial cells in culture. They will also learn how to measure ion transport across epithelial cells and using biochemical and imaging techniques how to visualise proteins within the cell that are important in regulating transport processes.
<b>Who will be working with you?</b>	Our STAR will work closely with Niamh Keating and Ferial Toumi, postgraduate reseachers in the group. S/he will also have access to expertise and support from the entire RCSI Molecular Medicine Dept. The STAR will participate in lab meetings and journal clubs will become a true member of the lab during his/her time with us.
<b>Short description of the group:</b>	The Molecular Medicine laboratories are located at in the RCSI Education and Research Centre at Beaumont Hospital. Currently we have 5 people in our group – Dr. Keely (the team leader/PI), 2 post-docs, 1 PhD student and 1 technician. Our group works within the Molecular Medicine Dept. which is currently staffed by an international group of postdocs, medics and students from Ireland, UK, France, Italy, Poland and Bahrain.
<b>Recommended Reading Material:</b>	
<b>Other information:</b>	

<sup>1</sup> ***This is an initial description of the role of the STAR teacher and it is liable to change following discussions between the investigators and the teachers. The final application to SFI does not have to be identical to the description at this initial stage.***

***Want to speak with a  
STAR who's worked  
with us before?  
Please contact:***

***For further details on  
this project please  
contact:***

<b>Name:</b>	Dr. Stephen Keely
<b>Phone:</b>	01 8093822
<b>E-Mail:</b>	<a href="mailto:skeely@rcsi.ie">skeely@rcsi.ie</a>
<b>Website:</b>	<a href="http://www.rcsi.ie/molmed">http://www.rcsi.ie/molmed</a>