Title:	Postdoc Researcher in Neurobiology: Single cell Analysis of the effects of small non-coding RNA in hyperexcitation and epilepsy
Department:	RCSI Centre for Systems Medicine/SFI Future-Neuro Research Centre/Dept of Physiology and Medical Physics
Location:	St. Stephen's Green, Dublin
Term:	24 month fixed-term
Reporting to:	Prof Jochen Prehn or nominee
Salary:	In line with IUA Researcher's Salary Scales.

As a **University of Medicine and Health Sciences**, the **Royal College of Surgeons in Ireland** (RCSI) is a degree-awarding health sciences institution specialising in medical and health sciences education, surgical training and research. As a global institution with undergraduate medical programmes in Dublin, Bahrain and Malaysia; Schools of Medicine, Pharmacy and Biomolecular Sciences, Physiotherapy, Postgraduate Studies and Nursing and Midwifery; and Leadership Institutes in Ireland and Dubai, RCSI has a broad international reach and the ability to unlock significant advancement for patient safety and clinical outcomes worldwide.

RCSI recognises that excellence in research is critical to the quality of its educational activities, its credibility, and, overall, to its mission to enhance human health. Recently, RCSI has implemented a new research strategy that will build upon its strength in translational biomedical and clinical research to deliver transformational, high impact changes in health care. Targeting both Irish national and EU funding, along with increased collaboration with industry, is a major part of the RCSI research strategy. Forging increased collaboration between RCSI PIs and industry is of critical importance to achieving success in this area. RCSI is also committed to provide its researchers with the supports and developmental opportunities to enable them to continuously grow and support their overall career development.

FutureNeuro is a Science Foundation Ireland (SFI) Research Centre focused on developing new technologies and solutions for the treatment, diagnosis and monitoring of chronic and rare neurological diseases. Based at RCSI, FutureNeuro is a collaborative research partnership operating between academic partners at Trinity College Dublin, Dublin City University, NUI Galway, University College Dublin, University College Cork and Waterford Institute of technology, clinicians and industry. The research activities of the Centre span molecular and cell biology, preclinical models, pharmacology, imaging, behaviour and clinical studies.

The mission of the **Centre for Systems Medicine** is to provide a translational research centre which identifies genes, proteins and metabolites implicated in human disease. The Centre utilizes bioinformatics, systems biology and machine learning approaches to develop new prognostic tools for the treatment of cancer, neurological and metabolic disorders and to develop more targeted therapies for patients.

Project background:

There remain urgent and unmet needs for the treatment of neurological diseases. Epilepsy is a serious, chronic brain disease characterized by recurrent seizures. Epilepsy is one of the most common serious neurological conditions, affecting about 1% of the population, *i.e.*, about 60 million people globally (6 million in Europe). The end result of PRIME is a software design tool for designing engineered cells that compute, diagnose, and produce therapeutic molecules capable of preventing seizures. The design tool is governed by Artificial Intelligence (AI) integrated with Molecular Communication simulations that utilize Biophysical and Statistical Mechanics modelling. This trans-disciplinary project aims to approach a serious neurological problem through a solution bringing together synthetic biology, computer science, communication engineering, nanomedicine, bioengineering and material science. This vision of implanting programmable synthetic cells that mimic electronic computing circuits is not limited to managing epileptic seizures but may extend to many other neurological diseases.

Objectives of post:

PRIME (http://fet-prime.eu/) capitalizes on a breakthrough discovery from our laboratory that transfer RNA (tRNA) fragments, a novel class of noncoding RNA, increase in patients in advance of when a seizure occurs. We propose to engineer human cells to respond to tRNA fragment elevations as the trigger for pre-emptive release of glial-derived neurotrophic factor (GDNF), a seizure-suppressing and disease-modifying treatment.
Transfer RNAs (tRNAs) are a major class of noncoding RNA. Stress-induced cleavage of tRNA is highly conserved and results in tRNA fragments. We found that specific tRNA fragments in plasma are associated with epilepsy. Small RNA-Seq of plasma samples collected during video EEG monitoring of patients with focal epilepsy identified significant differences in 3 tRNA fragments (5'GlyGCC, 5'AlaTGC, and 5'GluCTC) compared with samples from healthy controls. The levels of these tRNA fragments were higher in pre-seizure than in postseizure samples, suggesting that they may serve as biomarkers of seizure risk in patients with epilepsy (Hogg *et al.*, 2019, *J Clin Invest* 136: 2946-2951).

This post-doctoral position will contribute to the PRIME project by experimentally evaluating the effect of tRNA-derived fragment and miRNA on neuronal function, excitability and epilepsy development. This work will employ molecular and cell biology techniques including primary cell culture, RNA silencing, single cell RNA sequencing, spatial transcriptomics, viral transduction, neuronal biochemistry, confocal imaging, image processing and data analysis. The successful candidate will benefit from the multi-disciplinary expertise of the academic and industry partners of PRIME and FN with an aim to thoroughly characterise the function of tRNA-derived fragments, and identify novel disease biomarkers and innovative therapeutic targets for epilepsy and other hyperexcitation disorders

Specific duties:

- Perform molecular biochemical and imaging studies to characterise the effect of tRNA-derived fragment and miRNA on neuronal function in epilepsy.
- Single RNA sequencing
- Contribute to successful interdisciplinary research by liaising closely with both experimental and computational researchers within the consortium.
- Keep excellent records, submit research for publication in peer reviewed journals, and contribute to internal and external reporting.
- Present research findings at international scientific conferences and at consortium meetings.
- Assist with teaching activities and supervision of graduate students and technical staff as required.
- Compliance with statutory legislation and implementation of College rules and requirements in furtherance of your own and general staff welfare and safety.
- Undertake programmes of training and development as required.
- The candidate must represent the best interests of the Department and RCSI at all times.

Person Specification:
The successful candidate should be able to demonstrate the following:

- Highly motivated, passionate candidate with the ability to independently plan and conduct research while integrating into an interdisciplinary research environment.
- Must have a Ph.D. (or submitted Ph.D. thesis) in Biochemistry, Molecular Biology, Cell Biology or similar discipline, ideally in the field of neuroscience.
- Research experience in primary cell culture and/or confocal imaging, and demonstrated research accomplishments and experience documented by publications and/or awards are of advantage.
- Flexibility to work irregular hours on occasion.
- Have a good knowledge of Health and Safety Legislation and its application in a laboratory environment.
- Excellent interpersonal skills as well as excellent verbal and written communication skills.
- Attention to detail and thoroughness in work practices.

Note: this Job Description may be subject to significant change to reflect the evolving requirements of the College in delivering the RCSI Noble Purpose and Vision

Qualifications:

The candidate should have a Ph.D. (or submitted Ph.D. thesis) in Biochemistry, Molecular Biology, Cell Biology or similar discipline, ideally in the field of neuroscience.

Skills & Competencies:

- **Communication Skills:** Proven ability to communicate complex ideas
- **Project Management Skills:** Ability to ensure that project plans are communicated and that all timelines are met
- **Self-starter with the ability to work as part of a team:** Ability to operate effectively as part of a team – is cordial, tolerant and willing to help others, is co-operative and patient; shares work and information; establishes rapport, can influence and develop effective networks
- **I.T. skills:** Knowledge of MS Office suite.
- **Conscientious**: Have a pro-active approach to work, anticipating and resolving problems in advance; have keen attention to detail - from anticipating and addressing issues in advance to understanding requests and delivering quality work with minimal errors.
- **Flexibility**: Can operate flexibly within a busy environment; can shift focus when required.
- **Customer Focus**: Have strong customer service skills. Be able to communicate with a high level of initiative, tact, diplomacy and confidentiality.
- **Motivated**: Display a 'can-do' attitude, be committed to RCSI ORI and its development; demonstrate enthusiasm and passion for the role.

Application Process

Please apply online no later than 5pm on the closing date with your CV and Covering Letter.
For informal enquiries please contact jprehn@rcsi.ie Please click here to read our Recruitment and Selection Policy for Researchers.

Please Note:

This job description may be subject to change to reflect the evolving requirements of the Department and RCSI in developing healthcare leaders who make a difference worldwide.

Similar vacancies that arise in the next 6 months may be filled from the pool of applicants that apply for this position.

Employees are required to undertake 6 months service in their current role before applying for other internal opportunities, unless agreed in advance by the SMT representative.

RCSI is proud to be an equal opportunity employer and welcome applications from all suitably qualified persons regardless of their gender, civil status, family status, sexual orientation, religion, age, disability or race.

If you have any particular requirements for your interview, please notify the Human Resources Department at your earliest convenience.