Wellcome Trust Biomedical Vacation Scholarship Scheme at King's College London

Project Catalogue

Summer 2023

PROJECTS listed under [Wellcome Trust Discovery Research Funding Remit](#) categories

Burden of disease and its determinants, where this brings new and transformational knowledge

Complexities of human health and disease, including clinical and population-based approaches

Development of methodologies, conceptual frameworks, technologies, tools or techniques that could benefit health-related research

Fundamental processes that underpin biology, to understand more about how life works

Social, cultural, political and historical contexts of human health and disease

2023_01 Investigating the genetic architecture of orofacial granulomatosis

Supervisor:	Dr Natalie Prescott	natalie.prescott@kcl.ac.uk
Website:	https://www.kcl.ac.uk/research/ibd-and-complex-genetics-group	
Affiliated Lab:	Prescott lab/IBD and complex genetics group	
Campus:	Guy's;	

Aims and Research Questions of the Project:

Our aim is to characterise OFG at a genetic level to help understand its link with CD, to better classify the disease and improve treatment. We have so far used whole exome sequencing (WES) in 240 OFG patients and identified novel and potential pathogenic variants in several candidate genes at known CD loci as well as monogenic infantile IBD loci, and genes involved in the innate immune response. We will validate and replicate these variants in patient DNA samples and explore the likely implications of each variant on pathogenicity via bioinformatic tools.

Prerequisite Skills or Academic Background Required:

Molecular Genetics

2023_02 Infective endocarditis: Exploring links between the oral microbiome and culprit microorganisms at a tertiary centre.

Supervisor:	**Dr Vanessa Sousa**
Website:	https://kclpure.kcl.ac.uk/portal/en/organisations/centre-for-host-microbiome-interactions(c6aa9205-9362-4a3e-9ae9-513f4daf6ade).html
Affiliated Lab:	Vanessa Sousa - Host-Microbiome Interactions
Campus:	Guy's;St Thomas';

Aims and Research Questions of the Project:

Infective endocarditis is an infection of the endocardium of the heart that affects approximately 1 in 10,000 people. Infection is often caused by microorganisms originating from the oral or respiratory tract or, less commonly, the gastrointestinal or genitourinary microbiota, which can circulate through the bloodstream to cardiac tissue. Culprit microorganisms damage surrounding tissue and cause vegetations or abscesses, leading to inflammation of the heart and potentially life-threatening complications, such as valvular failure or emboli to the brain, lungs, or kidneys. This study will aim to investigate the associations between culprit microorganisms and the oral microbiome in infective endocarditis patients.

Prerequisite Skills or Academic Background Required:

None listed

complexities of human health and disease, including clinical and population-based approaches

2023_03 In vivo assessment of novel cell therapies for peripheral vascular disease

Supervisor:	Mr Alexander Kerr
Website:	https://www.kcl.ac.uk/scmms/our-themes/vascular
Affiliated Lab:	PhD student developing novel advanced therapies for the treatment of peripheral vascular disease, with Dr Ashish Patel
Campus:	St Thomas';

Aims and Research Questions of the Project:

An exciting new field of regenerative medicine is cell and gene therapies, or 'Advanced Therapies', and the Academic Department of Vascular Surgery, St Thomas' Hospital, has been developing novel cell therapies for the treatment of blocked arteries for over 15 years. The aim of these 'living medicines' is to grow new blood vessels within the limbs of patients for whom surgical options have been exhausted.

In a pre-clinical in vivo model of limb ischaemia, we inject different candidate ATMPs into the ischaemic limbs of mice. The purpose of this Scholarship is to assess the success of these therapies by quantifying the growth of new blood vessels in the lower limb muscles of mice, and will involve the following techniques: cryosectioning of frozen muscle biopsies; immunohistochemical staining; imaging using fluorescence/confocal microscopy; use of specialist software to analyse the images for new blood vessel growth; statistical analysis and presentation of the data.

Prerequisite Skills or Academic Background Required:

No restrictions, all backgrounds welcome

complexities of human health and disease, including clinical and population-based approaches

2023_04 The relationship between Nutritional Therapies and Neurodegenerative Disorders – A Systematic Review

Supervisor:	**Dr Yemisi Latunde-Dada**
Website:	https://www.kcl.ac.uk/people/yemisi-latunde-dada
Affiliated Lab:	Principal Investigator - Iron Nutrition and Metabolism
Campus:	Waterloo;

Aims and Research Questions of the Project:

Studies have suggested that nutritional factors or components have benefits for neurodegenerative disorders. However, the reported outcomes are conflicting and inconsistent. The study aims to search the literature to understand what type of nutritional components/ therapies are shown to improve the neurodegenerative disorders patients' health. It intends to synthesize the literature on available nutritional treatment and the risk of neurodegenerative disorders by conducting a systematic review. This will employ the PRISMA and Cochrane Review guidelines for systematic reviews and meta-analyses. It will involve online database searches (e.g., Medline, PubMed, Mendeley etc), selection of relevant studies, data extraction into an Excel spreadsheet, assessment of the quality of the studies, and data synthesis and statistical analysis using appropriate software such as the Review Manager. The study will therefore consolidate available evidence and propose recommendations on nutritional intervention study designs to inform future trials to improve the health of patients with neurodegenerative disorders.

Prerequisite Skills or Academic Background Required:

This project will only be suitable for Nutrition, Biochemistry, Biomedical or Medical students

complexities of human health and disease, including clinical and population-based approaches

2023_05 Public Mental Health – views of the stakeholders

Supervisor:	**Dr Mariana Pinto da Costa**
Website:	https://kclpure.kcl.ac.uk/portal/mariana.pintodacosta.html
Affiliated Lab:	Senior Lecturer - Public Mental Health
Campus:	Denmark Hill;

Aims and Research Questions of the Project:

The aim of this study is to explore the public mental health understanding, understanding, engagement, practice, key barriers and opportunities, and training, in order to inform discussions and future planning, according to different key stakeholder groups (mental health professionals, policymakers, public health professionals, primary care practitioners and people with lived experience of mental illness).

The current mixed-methods study has two primary objectives:

1.   To investigate the extent of public mental health work, opportunities, barriers, and training

2.   To identify key public mental health work opportunities and barriers for people from different parts of the world

Prerequisite Skills or Academic Background Required:

This project will be suitable for medicine, psychology and social sciences undergraduates. Knowledge on statistics and/or on qualitative research would be recommended.

complexities of human health and disease, including clinical and population-based approaches

2023_06 Genetic dissection of red blood cell traits in health and disease

Supervisor:	**Dr Oyesola Ojewunmi**
Website:	https://www.kcl.ac.uk/research/red-cell-haematology;
	https://www.kcl.ac.uk/people/stephan-menzel
Affiliated Lab:	Post-doctoral Fellow in Dr. Stephan Menzel's Red Cell Haematology Lab
Campus:	Denmark Hill;

Aims and Research Questions of the Project:

Haemoglobin disorders such as sickle cell disease (SCD) and thalassaemia present with diverse clinical manifestations, often with a devastating impact on their quality of life. There are some known genetic and non-genetic modifiers of disease severity, however, variability in complication profiles suggest that many more modifiers are to be discovered. We therefore want to study blood cell traits (in two large public datasets) as surrogates for disease-relevant biological processes such as erythropoiesis, to detect the genetic variants across the human genome which are associated with SCD-relevant blood count parameters.

Prerequisite Skills or Academic Background Required:

This project will be suitable for Genetics or Biomedical Science undergraduates

2023_07 Prevalence, profile, and risk factors of cognitive impairment in late-life depression: systematic review and meta-analysis

Supervisor:	**Dr Mariia Bocharova and Mr Lingfeng Xue**
Website:	https://www.kcl.ac.uk/academic-psychiatry/about/departments/old-age
Affiliated Lab:	Post-doctoral researcher within Professor Dag Aarsland's Depression-Dementia Research Group in DOAP
Campus:	Denmark Hill;

Aims and Research Questions of the Project:

The overarching goal of this project is to better understand the major challenge of cognitive impairment among individuals with depression in later life. Specifically, the project addresses following questions:

a) What is the prevalence and severity of cognitive impairment among individuals with late-life depression?

b) Which cognitive domains, such as memory or executive functioning, are vulnerable to impairment in late-life depression compared to healthy individuals?

c) What are the potential risk factors associated with cognitive impairment in various domains?

To achieve these aims, this project will conduct a systematic review or meta-analysis of previous studies employing both clinical and cognitive measures for elderly individuals with depression. This project will consider studies with different designs, such as community-based studies, longitudinal cohorts, and clinical trials. By synthesizing previous findings, this project seeks to provide a comprehensive understanding of the challenges of cognitive impairment in later life depression.

Prerequisite Skills or Academic Background Required:

This project is suitable for undergraduates with Psychology, Medicine, Neuroscience, Health and Social care or other related background. Training in necessary skills for literature review and meta-analysis will be provided.

2023_08 Effort and Reward Processing in Bipolar Depression

Supervisor:	**Prof Mitul Mehta, Dr Lilla Porffy**
Website:	https://www.kcl.ac.uk/people/mitul-mehta | https://www.kcl.ac.uk/neuroscience/about/departments/neuroimaging
Affiliated Lab:	Principal Investigator - Human and pharmacolgical neuroimaging | Postdoctoral Research Associate - Cognition and neuroimaging in mental health
Campus:	Denmark Hill;

Aims and Research Questions of the Project:

A feature of bipolar depression is a difficulty exerting effort. It is related to anhedonia and impacts daily functioning and quality of life. The mechanisms of these difficulties and their similarities to unipolar depression are not known. This project aims to explore the mechanisms underlying the unwillingness to exert effort for rewards in mood disorders. The student will investigate the differences in behaviour and brain activation between people with bipolar disorder and healthy controls during effort-based tasks to better understand the impairment in reward processing. The project has two components, comprising a meta-analytic review of the literature with the aim to elucidate the common neural pathways involved in anticipatory anhedonia, and analysing data from the Effort Expenditure for Rewards Task (EEfRT). The student will have the opportunity to gain an understanding of neuroimaging concepts through conducting a meta-analysis and contribute to behavioural data collection and analysis of the EEfRT.

Prerequisite Skills or Academic Background Required:

This project is suitable for Psychology and Neurosience undergraduates.

2023_09 Investigating the role of titin missense variants in muscle disease

Supervisor:	Dr Martin Rees and Dr Ay Lin Kho
Website:	https://www.kcl.ac.uk/research/gautel-group
Affiliated Lab:	Research associates within Professor Mathias Gautel's molecular cardiology laboratory
Campus:	Guy's;

Aims and Research Questions of the Project:

Mutations in the final domain of the sarcomeric protein titin can cause muscle disease, or myopathies. These disease-linked variants have previously been shown to reduce the stability of the domain in vitro using various biochemical and biophysical assays. We have been provided with 19 new missense variants from this domain that were found in patients with a myopathy, and are investigating whether these variants are also likely to be disease-causing or not.

To help answer this question, we aim to (i) express the individual wild-type and variant domains in bacteria, purify them and measure their thermal stability using differential scanning fluorimetry (DSF) and (ii) transfect the wild-type and variant domains tagged with green fluorescent protein into mammalian cells and observe their expression pattern.

This project will introduce students to various laboratory techniques such as PCR, cloning, protein expression and purification, DSF, microscopy and cell culture.

Prerequisite Skills or Academic Background Required:

This project is only suitable for Biochemistry and Biomedical Science undergraduates

development of methodologies, conceptual frameworks, technologies, tools or techniques that could benefit health-related research

2023_10 A user interface for Fluid intake quantification

Supervisor:	**Dr Ernest Kamavuako**
Website:	https://www.kcl.ac.uk/people/ernest-kamavuako
Affiliated Lab:	BioSignals and Sensors
Campus:	Strand;

Aims and Research Questions of the Project:

The main scope of this project is to develop a system that will be capable of accurately quantifying the daily fluid intake of adults aged 65 and over automatically, thus lifting the burden for nurses and carers who will not need to rely on manual methods, that are often prone to misreporting, while also allowing them to rapidly intervene before dehydration occurs. To accomplish this, the plan is to develop a user interface for the collection of physiological data and real-time processing

Prerequisite Skills or Academic Background Required:

programming in Matlab or Python or c++

development of methodologies, conceptual frameworks, technologies, tools or techniques that could benefit health-related research

2023_11 Automatic breast cancer palpation with an optical tactile sensor

Supervisor:	Dr Shan Luo
Website:	https://shanluo.github.io/, https://kclpure.kcl.ac.uk/portal/shan.luo.html
Affiliated Lab:	Principal Investigator – Robot Perception Lab
Campus:	Strand;

Aims and Research Questions of the Project:

It is a common practice to palpate the breast in order to detect masses and determine whether a mass is benign or malignant, which usually requires expertise knowledge of a doctor. However, automatic palpation using a portal device can help detect breast cancer earlier when it is easier to treat. The aim of this study is to palpate and diagnose breast cancer, without the help of a doctor, to contribute to detecting it in the early stage. The study consists of using an optical tactile sensor to palpate the soft tissue so as to determine the stiffness of the tissue. It will consist of three parts: the measuring instrument, the data collection, and the data analysis. The measuring instrument, i.e., the optical sensor, has one camera underneath a soft silicone layer to capture the deformation of the soft silicone when it is in contact with the breast tissue. The captured images by the camera can be used to analyse the stiffness of the breast tissue. Artificial Intelligence algorithms will be implemented to determine if a mass is benign or malignant. The research has a potential to enable patients to perform breast self-exam at home and help detect breast cancer early.

Prerequisite Skills or Academic Background Required:

This project will only be suitable for undergraduates who have experience in programming and data analysis.

development of methodologies, conceptual frameworks, technologies, tools or techniques that could benefit health-related research

2023_12 MRI-guided intervention assessment at low and high field magnetic resonance imaging scanners

Supervisor:	**Dr Özlem Ipek**
Website:	https://www.kcl.ac.uk/people/ozlem-ipek
Affiliated Lab:	PI- Magnetic Resonance Imaging Engineering
Campus:	St Thomas';

Aims and Research Questions of the Project:

New generation low-field Magnetic Resonance Imaging (MRI) systems such as the Hyperfine system (https://hyperfine.io) (0.065 Tesla) and Siemens Free Max (0.55 Tesla) can be ideal for MRI-guided interventions due to lower susceptibility artifacts for needle visualization. In addition, safe interventional MRI is well recognized to improve as the main magnetic field reduces, since the risk of radiofrequency heating and Lorenz forces both decreases. So far, MR-guided interventional procedures are well established for breast, prostate and MSK biopsies and thermal ablation at higher field strengths MRI. In this project, the student will evaluate the head and body coils for the safe and artifact-free MRI imaging at 0.55 Tesla, 1.5 Tesla and 3 Tesla MRI using electromagnetic field simulation software Sim4Life and design an experimental setup at the RF lab to validate the simulation results.

Prerequisite Skills or Academic Background Required:

student with engineering interest

development of methodologies, conceptual frameworks, technologies, tools or techniques that could benefit health-related research

2023_13 Increasing the transparency and robustness of speech-based analyses for remote health assessment

Supervisor:	**Dr Nicholas Cummins, Dr Judith Dineley** Both are members of the Precision Health Informatics Data Lab lead by Professor Richard Dobson
Website:	www.kcl.ac.uk/people/nicholas-cummins, phidatalab.org
Affiliated Lab:	1: Nicholas Cummins (PI), Lecturer in AI for Speech Analysis for Healthcare. 2. Judith Dineley, Postdoctoral Research Associate, Speech for Mobile Health Applications.
Campus:	Denmark Hill;

Aims and Research Questions of the Project:

Using mobile devices for recording, speech analysis has potential as a powerful convenient remote monitoring tool in health research. However, first, we need to understand and quantify factors that affect the reliability of speech-based systems. This project will help gain vital insights into sources of variability in speech recorded on mobile devices. These include recording devices, the acoustic environment and natural variations in our voices with the time of day. Our broader research aim is to identify speech parameters that are less sensitive to known sources of variation and assess their impact on machine learning predictions of health state. The student will gain hands-on research experience assisting in speech data pre-processing and the option of experience in other areas, such as machine learning, and learning new practical skills in speech recording and computational skills in speech processing and data analysis.

Prerequisite Skills or Academic Background Required:

This project is multidisciplinary and will be of particular interest to students in computer science, biomedical physics and engineering, and psychology. The supervisors and student will set the outputs at the start of their stay to ensure they are consistent with the expectations and competencies of the student. Familiarity in programming languages such as R or Python would be an advantage but is not a strict requirement.

	development of methodologies, conceptual frameworks, technologies, tools or techniques that could benefit health-related research

2023_14 Determination of Nanoparticle Drug Loading for Targeted Drug Delivery

Supervisor:	Ms Esmé Shepherd
Website:	https://www.surmanlab.com/ https://kclpure.kcl.ac.uk/portal/en/persons/esme-shepherd(bfb97eb2-efde-4710-81c2-237946355e75).html https://kclpure.kcl.ac.uk/portal/andrew.surman.html https://kclpure.kcl.ac.uk/portal/en/persons/rafael-t-m-de-rosales
Affiliated Lab:	PhD Student working in nanomedicine in Andrew Surman's supramolecular chemistry laboratory
Campus:	Guy's;

Aims and Research Questions of the Project:

Targeted drug delivery is an expanding research field aiming to administer drug molecules directly to a therapeutic target, such as a tumour, reducing side effects and increasing efficacy. Encapsulating therapeutics within nanoparticles is increasingly popular, avoiding metabolism and allowing functionalisation for site specific drug binding and tuning drug release triggers.

The Surman lab is collaborating with the Torres group at St Thomas's hospital to develop a new class of soft nanoparticles for targeted drug delivery, incorporating a library of potential therapeutics. The student will develop a method to determine the drug loading in these particles, which is vital for progression to biological testing and eventually clinical trials. The student will learn to synthesise nanoparticles and use a range of analytical techniques for characterisation. If the method is successfully developed and adapted for use across a number of different therapeutics, the student will have the opportunity to assist with optimisation experiments.

Prerequisite Skills or Academic Background Required:

A suitable student should have some experience of working safely in a chemical lab, or analogous lab experience which would allow them to join a chemical lab. As a result, typically students will come from a chemistry background, though students from othe

2023_15 How does cellular signalling act via RNA regulation?

Supervisor:	Prof. Jernej Ule
Website:	https://www.kcl.ac.uk/people/jernej-ule
Affiliated Lab:	RNA networks laboratory
Campus:	Denmark Hill;

Aims and Research Questions of the Project:

Disease-causing mutations often perturb signalling pathways that modify disordered regions of RNA-binding proteins, and some mutations affects the RNA-binding proteins themselves. This project will address question of how these mutations impact RNA regulation. This project will employ standard human cell lines containing such mutations, where the defects in RNPs assembly will be studied. In particular, we will study how the properties of RNAs and proteins determine the effects of mutations, and how these defects initiate the molecular cascades leading to disease.

Prerequisite Skills or Academic Background Required:

No skills are essential, but some experience in biochemistry, molecular and cell biology, and/or computation, will be welcome.

fundamental processes that underpin biology, to understand more about how life works	

2023_16 NMR kinase: mediator between force sensing and metabolism?

Supervisor:	Dr Mark Pfuhl
Website:	https://www.kcl.ac.uk/research/pfuhl-group
Affiliated Lab:	Structure, function, dynamics and interactions of proteins involved in muscle and kinase regulation
Campus:	Guy's;

Aims and Research Questions of the Project:

NMR kinases play an important role in NADH metabolism. While NMRK1 is expressed at the same level throughout NMRK2 expression responds very strongly to muscle activity. NADH in turn is an important metabolite which is also very important in signalling via polyADP ribose regulatory pathways. Dropping NADH levels are closely linked to end stage heart failure. NMRK is also hypothesised to bind to integrins and so offers the intriguing possibility that NADH metabolism and force sensing are directly linked. We want to study the enzyme directly in vitro to explore a possible interference of integral binding and enzyme function. To this end we will express and purify NMRK2 and study its enzymatic activity and integrin binding in vitro.

Prerequisite Skills or Academic Background Required:

basic general lab skills & curiosity

fundamental processes that underpin biology, to understand more about how life works

2023_17 Characterization of the differential protein interactomes of the critical transcription factor GATA1 and its GATA1short isoform associated with anemia, in murine fetal erythropoiesis

Supervisor:	**Ms Maria Eleni Psychogyiou**
Website:	https://www.kcl.ac.uk/research/red-cell-haematology
Affiliated Lab:	Red Cell Hematology Lab, Chair in Molecular Erythropoiesis: Professor John Strouboulis. Projects: 1. Molecular erythropoiesis (Professor John Strouboulis) , 2: Genetics of red blood cell traits and sickle cell disease severity (Dr Stephan Menzel), 3: Pathophysiology of sickle cell disease (Professor John Strouboulis and Professor David Rees)
Campus:	Denmark Hill;

Aims and Research Questions of the Project:

GATA1 is the master transcription factor regulating red blood cell differentiation (erythropoiesis) (PMID:15920471) . GATA1 mRNA expresses two isoforms, GATA1, and a shorter isoform called GATA1short. GATA1short has been associated with haematological human disorders including Diamond-Blackfan anemia (PMID:25621499). In mice, GATAshort expression results in severe anemia in fetal erythropoiesis (PMID: 15895080). It is hypothesized that the functional differences between GATA1 and GATA1short in fetal erythropoiesis are due to differential protein interactions of the two isoforms. To address this possibility, we used a metabolic biotinylation tagging approach in transgenic mice to purify protein complexes using streptavidin beads, followed by mass spectrometry. We identified a number of candidate differential protein interactions between GATA1/GATA1short during fetal liver erythropoiesis and we now aim to: i) validate the differential protein interactions by immunoprecipitations and ii) perform functional analysis for selected protein interactors by CRISPR/Cas9 knockout in Murine Erythroleukemia cells (MEL).

Prerequisite Skills or Academic Background Required:

No specific requirements

2023_18 Characterise muscle stem cell behaviour during regeneration in ageing zebrafish

Supervisor:	**Dr Julie Yue Yuan**
Website:	https://www.kcl.ac.uk/research/knight-group
Affiliated Lab:	Post-doctoral fellow within Dr Robert Knight's ageing and muscle regeneration laboratory
Campus:	Guy's;

Aims and Research Questions of the Project:

During development and regeneration, muscle stem cells (muSCs) generate muscle fibres. Some of these progenitor cells do not differentiate into myofibres after proliferation but become quiescent. How this choice is made is of intense interest as it may explain why muscle regeneration is ineffective in several diseases and in ageing. This project aims to visualise this process in a living animal using laser microscopy to track and characterise muSCs during muscle regeneration in both wild type and genetically modified zebrafish larvae showing pre-mature ageing phenotype. We will investigate impacted candidate signaling pathways control muSC fate choice and muscle formation using microscopy, molecular genetics, immunolabelling and pharmacological manipulations.

Prerequisite Skills or Academic Background Required:

This project would suit students interested in cell biology, microscopy and image analysis.

2023_19 Investigating DNA damage repair pathway inhibition in Primary Cutaneous T-cell lymphoma.

Supervisor:	**Dr Christine Jones, Dr Tracey Mitchell**
Website:	https://www.kcl.ac.uk/people/tracey-mitchell
Affiliated Lab:	PI (Tracey Mitchell) Molecular Genetics of Cutaneous T-cell Lymphoma; Post-doctoral fellow (Christine Jones) translational research scientist in the skin tumour unit molecular diagnostics laboratory.
Campus:	Guy's;

Aims and Research Questions of the Project:

Primary cutaneous T-cell lymphomas (CTCL) are a group of non-Hodgkin's lymphomas presenting in the skin. Currently there is an unmet clinical need for the development of personalised therapies in CTCL. The heterogeneous nature of CTCL renders challenges in management with most patients having only a partial response to current treatments and high rates of relapse. Genome instability is a key feature of CTCL and there is widespread evidence for aberrations in genes involved with genome maintenance and DNA repair, therefore, targeting of DNA damage repair (DDR) pathway presents a novel therapeutic strategy. Our preliminary work has shown that CTCL cells have increased sensitivity to the ATR pathway inhibitor AZD6738. The primary aims of this study are to (i) extend this work to interrogate a larger patient cohort and (ii) test the efficacy of novel ATR inhibiors. The work will be performed in vitro, using cell culture and molecular biology techniques.

Prerequisite Skills or Academic Background Required:

Suitable for a undergraduates with in background biomedical and related sciences.

2023_20 Species specificity of foreign DNA silencing by a DNA sensor

Supervisor:	Dr Hataf Khan
Website:	https://www.kcl.ac.uk/research/malim-lab
Affiliated Lab:	Post-doctoral researcher within Professor Michael Malim's Virology Laboratory
Campus:	Guy's;

Aims and Research Questions of the Project:

Research question: Is foreign DNA silencing by the DNA sensor conserved across different species?
Aims: Test the DNA silencing activity of DNA sensors from different species by flow cytometry, PCR and RT-qPCR.

Prerequisite Skills or Academic Background Required:

This project will only be suitable for Biomedical Sciences, Biochemistry and Medicine undergraduates.

fundamental processes that underpin biology, to understand more about how life works	

2023_21 Investigating RNA splicing protein SRSF3 in neuronal development

Supervisor:	Dr Rachel Moore
Website:	https://devneuro.org/cdn/group-overview.php?groupID=16
Affiliated Lab:	Post-doctoral researcher within Professor Corinne Houart's Developmental Neurobiology Laboratory
Campus:	Guy's;

Aims and Research Questions of the Project:

We know that mRNAs (and protein synthesis) are found not only in neuronal cell bodies but also in axons and dendrites, and this is important for proper neuronal development. We also know that alternative splicing of mRNAs, which leads to production of various protein isoforms, regulates neuronal maturation and connectivity.

We have preliminary evidence that RNA splicing protein SRSF3 is present in axons during neuronal development. To investigate this, we will use zebrafish embryos as they are small and transparent so we can observe neurons easily. Zebrafish have two SRSF3 genes (SRSF3a and SRSF3b). We will use immunofluorescence to observe the protein in axons and identify whether SRSF3a or SRSF3b (or both) are localised to axons. We will inject embryos with fluorescently labelled SRSF3a or SRSF3b to observe RNA splicing protein dynamics in vivo, then dissociate embryos and perform neuronal cell culture to observe dynamics at higher resolution.

Prerequisite Skills or Academic Background Required:

None listed

2023_22 Mortality and cancer incidence in British military veterans exposed to chemical warfare agents

Supervisor:	**Dr Gemma Archer**
Website:	https://kcmhr.org/; https://www.kcl.ac.uk/research/kcmhr; https://www.kcl.ac.uk/research/portondownstudy
Affiliated Lab:	1: Professor Nicola Fear: Principal Investigator – Professor of Epidemiology; 2: Dr Gemma Archer: Post-doctoral researcher in Epidemiology within King's Centre for Military Health Research
Campus:	Denmark Hill;

Aims and Research Questions of the Project:

The 'Human Volunteer Programme' ran between 1941 and 1989 at the UK government research establishment, Porton Down, UK. During this time, military service personnel were involved in experiments that included exposure to chemical warfare agents.

Copies of the experiment books were obtained from the Ministry of Defence in order to assemble the Porton Down Veterans Cohort Study (PDVCS). Data on chemical warfare agent exposure has been abstracted and linked with NHS registry data. (https://kcmhr.org/the-porton-down-veterans-cohort-study-an-update/)

This project aims to examine whether there is a relationship between exposure to e.g. sulfur mustard, or riot control agents (e.g. CS gas and CR gas), and excess mortality or cancer incidence. The findings will be important to Porton Down military veterans, and other occupational and civilian groups at risk of exposure to these agents.

Prerequisite Skills or Academic Background Required:

The project would suit a student with experience of Stata and at least one type of regression modelling (e.g. logistic, linear).