###### KHP Summer Research Studentships 2022 – Project Catalogue

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| **Title** | Quantification of drug delivery into brain tumours following focused ultrasound treatment |
| **Background** | Brain tumours such as glioblastoma multiforme (GBM) and diffuse intrinsic pontine glioma (DIPG) have limited treatment options, with poor outcomes. The median survival for GBM patients is 15 months and the 5-year survival rate is less than 6%. Systemically administered chemotherapies, such as temozolomide (TMZ), in combination with radiotherapy are the gold standard for GBM patients. However, only a limited amount of the chemotherapy reaches the tumour, due to the presence of the blood-brain/blood-tumour barrier (BBB/BTB), which blocks most drugs with molecular weight larger than 400 Da. The only method to non-invasively and locally increase the delivery of chemotherapeutics into brain tumours is the combined used of focused ultrasound (FUS) and circulating microbubbles. FUS forces microbubbles to vibrate within brain vessels. These vibrations exert mechanical stresses onto the vascular walls, temporarily disrupting the BBB/BTB and allowing passage of chemotherapy into the tumour. Finally, microbubble vibration produce their own acoustic emissions, which can be passively captured and analysed to estimate the microbubble behaviour within the vasculature. |
| **Aims of the project** | The aim of this project is to confirm the efficacy and safety of FUSmediated carboplatin delivery into the brain of wild-type and GBM mice. The students will be trained in FUS experiments and will shadow in vivo treatments in mice. Animals treated with FUS and carboplatin will be sacrificed and their brains will be extracted. The students will perform post-mortem analysis of the brain tissue, to confirm and quantify carboplatin delivery through liquid chromatography massspectrometry (LCMS). A subset of the murine brains will be sectioned in a cryostat and then stained with hematoxylin & eosin (H&E) and Iba1/CD68 to evaluate microglia activation. Stained brain sections will be imaged with bright-field and fluorescence microscopy to evaluate the safety of FUS treatments. The final aim will be to correlate passive acoustic measurements, i.e. microbubble behaviour, with drug delivery and microglia activation. |
| **Objectives** | • Measure carboplatin concentration in FUS-treated mouse brains using LCMS and compare it with the contralateral hemisphere, used as an internal control  • Perform cryosectioning and H&E-Iba1/CD68 staining of brain sections  • Analyse passive acoustic measurements and correlate them with carboplatin concentration and microglia activation |
| **Skills to be acquired**  (e.g. Data analysis, ELISA, PCR, Literature review, etc.) | Students will be first trained in FUS experiments and passive acoustic monitoring techniques. They will be trained in brain extraction, brain tissue lysis, liquid chromatography mass-spectrometry (LCMS), cryosectioning, H&E staining, immunohistochemistry, and brightfield/fluorescence microscopy. Finally, the will work on data analysis and perform a literature review to include in their final report. |
| **Supervisor Contact Details** | Dr. Antonios Pouliopoulos  Lecturer in Therapeutic Ultrasound  Email: [antonios.pouliopoulos@kcl.ac.uk](mailto:antonios.pouliopoulos@kcl.ac.uk)  Phone: +44 (0)207 848 9645  Address: Department of Surgical & Interventional Engineering Office 10 (South), Floor 5, Becket House 1 Lambeth Palace Rd, London SE1 7EU |

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| **Title** | **Using Transcranial Magnetic Stimulation To Modulate Brain Connectivity In Healthy Individuals** |
| **Background** | Transcranial magnetic stimulation (TMS), a form of non-invasive brain stimulation, has been used for the past 35 years to investigate brain function in health and disease, with a particular focus on the neurophysiological mechanisms underlying the control of movements.  TMS is applied via a small magnetic induction coil on the scalp of an individual and generates a very brief (1 millisecond) magnetic field which painlessly induces a focal (10 millimetres) and transient electric field in the underlying cortical tissue, capable of depolarizing cortical neurons. When applied over an individual’s motor cortex, TMS can briefly depolarize motor cortical neurons, which in response generate a descending volley of action potentials towards the spinal cord and peripheral nerves, leading to measurable motor activity in the targeted muscle (a small muscle twitch) through electromyography recordings.  This fascinating technique has been used to quantify causal changes in brain activity during different types of movement and cognitive behaviours, amongst others leading to the definition of a detailed brain map underpinning each particular aspect of human behaviour.  Importantly, this offered neurologists and neurorehabilitation a unique picture for understanding the symptomatology of patients suffering from a variety of neurological conditions (e.g. stroke).  In my laboratory, we recently pioneered a novel paired-pulse TMS protocol for probing physiological interactions between pairs of brain regions involved in the control of skilled upper limb and hand movements. These physiological interactions are a biomarker of the transfer of neural information within the brain, a key component for the control and guidance of hand movements in an ever-changing sensory environment. Interestingly, it has recently been found that these cortical connections can be modulated, i.e. up- or down-regulated, using the same TMS protocol. This is an important finding as the technique could be further applied to restore brain function and connectivity in stroke patients.  The current project will therefore investigate how physiological interactions between two key cortical areas underlying the control of hand movements can be modulated. |
| **Aims of the project** | ***Week #1:***  - Lab setup, familiarisation and piloting of TMS protocols for the measure of cortico-cortical interactions during hand movements (involving a well-established object grasping task).  ***Week #2-4:***  - Study of baseline cortico-cortical interactions during hand movements, - Testing whether modulation of these baseline cortical interactions leads to causal and measurable effects on the performance of hand movements.  ***Week #5-6:***  - Signal processing, data and statistical analysis and report write-up. |
| **Objectives** | Learning objectives:  - How to use TMS to study brain function, in particular the motor cortex. - How to measure electromyography (EMG) and interpret EMG signals. - How to design an experiment in a neurophysiological setting.  The deliverables will be: - Study of physiological interactions between 2 key cortical areas underlying the control of hand movements. - Testing whether modulation of these physiological interactions leads to changes in hand movement performance. - Characterising the relationship between cortical connectivity changes and behavioural effects on movement performance. |
| **Skills to be acquired**  (e.g. Data analysis, ELISA, PCR, Literature review, etc.) | - Electromyography (EMG): setup, recordings, interpretation of EMG signals, signal processing and data analysis.  - The use of transcranial magnetic stimulation (TMS), a form of non-invasive brain stimulation, to stimulate the primary motor cortex, cortical mapping techniques via cortical anatomical markers localised through neuronavigation software.  - The use and adaptation (under supervision) of available Matlab code/scripts for data analysis of neurophysiological biomarkers. |
| **Supervisor Contact Details** | Dr. Marco Davare Senior Lecturer, Department of Population Health Sciences, School of Life Course and Population Sciences, King’s College London. [marco.davare@kcl.ac.uk](mailto:marco.davare@kcl.ac.uk) |

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| **Title** | **Advancing UCOE-based lentiviral gene therapy vectors** |
| **Background** | Gene therapies frequently require therapeutic genes to be inserted into the target cell genome. In addition, a long term and effective therapy requires reproducible and stable therapeutic gene expression, which can be difficult to achieve due to insertion site position effects and silencing of expression. Ubiquitous chromatin opening elements (UCOEs) offer one solution to these problems. UCOEs are methylation-free CpG islands spanning single or dual divergently transcribed promoters of housekeeping genes and confer high, reproducible, and stable transgene expression. The UCOE from the human *HNRPA2B1-CBX3* locus (A2UCOE) has been shown to provide unprecedented reproducible and stable therapeutic gene expression from lentiviral gene therapy vectors (LVs), including stem cell populations boding well for potential future gene therapy applications. However, capacity of LVs is limited. Thus, it is necessary to keep the size of incorporated UCOEs to a minimum to allow maximum space for the therapeutic gene cassette. We have recently demonstrated that a 500bp UCOE core fragment from the murine *Rps3* gene (500Rps3 UCOE) possesses comparable function from within LVs to the fully functional 1.5kb A2UCOE. This makes 500Rps3 the smallest high activity UCOE tested to date.  **Reference:** Neville JJ et al. (2017) Ubiquitous Chromatin-opening Elements (UCOEs): Applications in biomanufacturing and gene therapy. *Biotechnol Adv*. **35**: 557-564. |
| **Aims of the project** | The question being asked in this project is do 500Rps3 LVs perform as well as the fully functional 1.5kb A2UCOE construct in a range of different cell types?  The efficacy of the 500Rps3 UCOE in LVs has to date been demonstrated only in P19 murine teratocarcinoma cells. The aim of this project is to evaluate 500Rps3 UCOE LV function in a range of different cell types, including induced pluripotent stem cells and their differentiated progeny, that would be a better indicator of potential future gene therapy applications. The different cell types will be transduced with 500Rps3 UCOE-based LVs alongside 1.5kb A2UCOE LVs as a reference and assessed over a one-month period for percentage of eGFP positive cells, mean fluorescence intensity, percentage coefficient of variation and average vector copy number per cell.  **NOTE: the student will be part of a small team addressing the above experimental aims but will have their own distinct component of the project work.** |
| **Objectives** | The overall objective of this project is the advancement of UCOE-based LV design for greater safety as well as more efficacious gene therapy applications. If the 500Rps3 UCOE is found to perform as well as the fully functional 1.5kb A2UCOE construct, then this objective will have been met. |
| **Skills to be acquired**  (e.g. Data analysis, ELISA, PCR, Literature review, etc.) | Techniques and skills that the student will acquire includes mammalian cell tissue culture, production of LVs, LV transduction of mammalian cell lines, analysis of eGFP by flow cytometry, DNA extraction and RT-qPCR (for determination of LV copy number per cell). |
| **Supervisor Contact Details** | Dr Michael Antoniou, Head: Gene Expression and Therapy Group, King's College London, Faculty of Life Sciences & Medicine, Department of Medical and Molecular Genetics, 8th Floor, Tower Wing, Guy's Hospital, Great Maze Pond, London, SE1 9RT    Tel: +44 (0)20 7848 8175  Email: [michael.antoniou@kcl.ac.uk](mailto:michael.antoniou@kcl.ac.uk) |

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| **Title** | Apical periodontitis and systemic health |
| **Background** | Apical periodontitis – a dynamic sequel to root canal infection is a polymicrobial infection, and the diversity of the endodontic microbiome and its host interactions presents not only a unique challenge to treatment, but also a potential risk for systemic diseases in other parts of the body. It can contribute to a persistent low-grade systemic inflammation which might impact patient’s systemic health  The research project will be part of biobank project and will involve working in both clinics and research laboratory.  The project will involve recruitment of patients with apical periodontitis from endodontic consultant clinic at Guy’s Hospital according to the inclusion/exclusion criteria. The student will get the opportunity to carry out courses on “Human Tissue Act and Consent Training” and “Good Clinical Practice for (non-CTIMP) research” organised by King’s College London and King’s Health Partners Clinical Trials Office. On the clinics, the fellow will be trained to take informed consent from the patient, carry out detailed clinical examination, data entry into the appropriate excel files. The fellow will also be involved in collection of patient samples including saliva, gingival crevicular fluid and subgingival plaque. With the help of trained phlebotomist, blood samples will also be collected from the patient.  The fellow will learn how to safely transport these samples to the Centre of Host Microbiome laboratory on floor 17, Guy’s Hospital. In the laboratory, working alongside other researchers including laboratory managers, Master’s and PhD students and Post docs, the fellow will learn how to aliquot these samples while working in class II biological safety cabinet and placing them in designated HTA freezers for future biobank projects. In the laboratory, they will also learn methods of Multiplex Luminex and ELISA while doing preliminary analysis on certain inflammatory biomarkers. Overall, the students will work in a dynamic environment and will get a deep insight of how to carry out clinical research along with gaining experience of working in the wet-lab and learning new methodologies. |
| **Aims of the project** | This clinical and lab-based project is aimed to collect the samples and investigating the dynamic associations between apical periodontitis, endodontic treatment, and systemic health by investigating serum inflammatory biomarker profile.  This research will be part of biobank project where patients with apical periodontitis will be recruited in the study, specific samples will be collected from these patients which become part of biobank and along with using them for investigating serum inflammatory biomarker profile they will be used for subsequent metagenomics, metabolomics or metatranscriptomics future studies. |
| **Objectives** | This project will have the following objectives and many benefits for the fellow:   1. By doing courses on “Human Tissue Act (HTA) and Consent Training” and “Good Clinical Practice for (non-CTIMP) research”, the students will understand the rationale behind HTA, when does the HTA apply, about research governance and College and NHS Research Ethics Committees, process of informed consent and research legislation. These courses will also enable them to recruit patients and handle patient samples. 2. On the clinic, learning how to recruit patient and collect data/samples from them will give the fellow a unique opportunity to learn how to conduct clinical research and how to safely handle patient samples. 3. Working in the research laboratory while working with other researchers, the fellow will learn how to use the software to store samples in the HTA freezers. They will also get to observe and learn other technique like ELISA, Luminex, measuring HbA1C and total cholesterol, High-density lipoprotein, Low-density lipoprotein, triglycerides and TC/HDL levels using specific machine A1cNow+ , CardioChek PA blood analyser machine. 4. Analyses of samples collected in future studies will lead to generation of data for publication in peer-review scientific journals and oral/poster presentation at national international conferences. |
| **Skills to be acquired**  (e.g. Data analysis, ELISA, PCR, Literature review, etc.) | Courses on “Human Tissue Act (HTA) and Consent Training”  “Good Clinical Practice for (non-CTIMP) research”.  learn how to conduct clinical research and how to safely handle patient samples and store in the HTA freezers.  Student will also learn molecular technique like ELISA and Luminex, measuring HbA1C and cholesterol levels etc. |
| **Supervisor Contact Details** | Dr. Sadia Niazi, BDS Endodontics Lead  Department of Endodontics  Centre of Oral Clinical & Translational Sciences  Faculty of Dentistry, Oral & Craniofacial Sciences, King's College London  Room 33, Floor 17 Tower Wing Guy's Hospital  London SE1 9RT  Tel: +44 (0) 2071887459 |

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| **Title** | Does nonadherence to antiepileptic medication in the perinatal period affect pregnancy outcomes and seizure rates? |
| **Background** | Epilepsy involves seizures caused by abnormal brain activity as a result of injury, tumour, infections, or unknown cause. Antiepileptic drug (AED) treatment is the most common way to control seizures (1). But, their use is more complicated in the perinatal period with some AEDs linked to anatomical and neurodevelopmental abnormalities in the foetus (4). Conversely, some studies have indicated that patients who chose not to use their prescribed medication may be at an increase risk of seizures, sudden unexplained death and other adverse outcomes during the perinatal period. It would be expected that these adverse outcomes may also affect pregnancy outcomes. However, there is limited research exploring links between AED nonadherence and outcomes in the perinatal period. This project will use routinely collected data (available via BadgerNet) and blood samples to evaluate whether medication use is associated with outcomes for pregnant patients with epilepsy and their children in the perinatal period.  The project is based within the Centre for Adherence Research and Education, and will benefit from links with colleagues in pharmaceutical medicine, biostatistics and clinicians in practice at Guy’s and St Thomas’s Hospital. |
| **Aims of the project** | To test for associations between AED use of pregnant AED patients in the perinatal period and outcomes for the patient and the pregnancy. |
| **Objectives** | * To use routinely collected blood tests to quantify rates of AED nonadherence in the perinatal period. * To test for associations between medication nonadherence and: rates of seizure, birth weight, premature birth and miscarriage. * To explore whether these associations are robust controlling for potential confounders such as smoking, reported mental health screening and previous pregnancy/birth. * To conduct sensitivity analyses to explore variability in these rates and associations by different drug class. |
| **Skills to be acquired**  (e.g. Data analysis, ELISA, PCR, Literature review, etc.) | - Literature review and project set-up (weeks 1-2)  - Analysis of blood test results to quantify AED nonadherence (weeks 3-5)  - Extraction and categorisation of patient characteristics and outcome (weeks 3-5)  - Statistical methods including inferential statistics and multivariable analysis methods for modelling associations between drug use and outcomes over time (e.g. Poisson regression) (weeks 6-7)  - Scientific writing and presentation skills. (weeks 7-8)  - Presentation to multidisciplinary audiences (weeks 7-8) |
| **Supervisor Contact Details** | Sarah Chapman, Institute of Pharmacy and Pharmacology  Sarah.Chapman@kcl.ac.uk |

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| **Title** | Comparison of 3D printed, milled and conventional cast metal crowns |
| **Background** | 3D printing has potential to enhance the production of metal crowns. However .there are many techniques to digitally produce crowns which have adnvantages and disadvantages, including the diffeebeds between 3D printed and milled patterns for subsequent casting. |
| **Aims of the project** | This project aims to compare 3D printed crowns with milled and conventially prepared crowns. |
| **Objectives** | · Use a common CAD file to print and mill burn out patterns  · Cast the subsequent patterns using a lost wax burn out procedure  · Scan the results and compare the outcome |
| **Skills to be acquired**  (e.g. Data analysis, ELISA, PCR, Literature review, etc.) | Students will be first trained in digital cadcam of dental restorations, and scanning and analysis for surface metrology. They will gain training in data analysis and writing manuscripts. |
| **Supervisor Contact Details** | Dr Rupert Austin  [Rupert.s.Austin@kcl.ac.uk](mailto:Rupert.s.Austin@kcl.ac.uk) |

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| **Title** | Determining the reaction of equine induced pluripotent stem cells and their derivatives to inflammatory cytokines |
| **Background** | Musculoskeletal injuries occur commonly in horses and are associated with a local inflammatory reaction to initiate tissue repair. However, persistent inflammation can have a damaging effect on tissues and prevent efficient tissue regeneration1. We have previously demonstrated that horse embryonic stem cells (ESCs) are resistant to inflammation2. Induced pluripotent stem cells (iPSCs) are produced by reprogramming an adult cell back into a pluripotent state. Although they share many properties with ESCs, it is not clear if they are also resistant to inflammatory cytokines, with data from other species showing conflicting results3-6. |
| **Aims of the project** | The aim of this project is to determine how horse iPSCs that have been differentiated into specific cell types respond to inflammation. |
| **Objectives** | Our specific objectives are to differentiate iPSCs into tendon and cartilage cells using established methods and:   1. Determine if key inflammatory pathways (NFκB, JNK, STAT1 and p38 MAPK) are activated following 1 h exposure to inflammatory cytokines (IL1-β, TNFα and IFNγ) using immunocytochemistry and image analysis to measure nuclear translocation. 2. Measure gene expression changes following 72 h of cytokine stimulation. This will include inflammatory associated genes, MMP genes and either tendon or cartilage genes respectively. |
| **Skills to be acquired**  (e.g. Data analysis, ELISA, PCR, Literature review, etc.) | The student will be trained in key molecular biology skills including cell culture, immunocytochemistry, RNA extraction, cDNA synthesis and qPCR. They will be responsible for accurate recording of their results and data evaluation to develop their analysis and troubleshooting skills. They will undertake literature reviews to understand the context of their results in the broader field.  The student will present their findings to the group in weekly research meetings. This project fits within the broader work being carried out in the group and the student will be well supported by the PI, two post-docs and two PhD students. |
| **Start Date and expected duration of the project** | Start date: 04/07/2022  Duration: 6 weeks |
| **How many students could you accommodate on this project?** | 1 |
| **Do you require provision for costs? (Max £250)** | £250 (to contribute towards reagents that the student will use). |
| **Supervisor Contact Details** | Dr Debbie Guest, PhD  Senior Research Fellow  Royal Veterinary College  Hawkshead Lane  North Mymms  Hatfield  Hertfordshire  AL9 7TA  +44 1707 669739  [djguest@RVC.ac.uk](mailto:djguest@RVC.ac.uk) |

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| **Title** | Predicting postpartum haemorrhage in parturients undergoing caesarean section |
| **Background** | Postpartum haemorrhage (PPH) is a major cause of maternal morbidity and mortality in the peripartum period. Management of PPH could be directed towards women at the highest risk of developing PPH. The incidence of PPH ranges from 0.8% to 33.7%, depending on the amount of blood loss used to define PPH.1 Several risk factors are reported, with corresponding weights of their contribution to risk estimated with logistic regression. We have used these reported factors to develop a PPH risk stratification tool for clinical practice.  However, this risk stratification tool has not been validated in women undergoing caesarean section. We therefore aim to assess the performance of this according tool using the Transparent Reporting of a multivariable prediction model for Individual Prognosis Or Diagnosis (TRIPOD) guidelines2 in a representative cohort of women undergoing caesarean section at St Thomas’ Hospital, before recommending its use more generally.  **References:**  1. Briley A, Seed PT, Tydeman G, Ballard H, Waterstone M, Sandall J, Poston L, Tribe RM, Bewley S. Reporting errors, incidence and risk factors for postpartum haemorrhage (PPH) and progression to severe PPH: a prospective observational study. BJOG 2014; 121: 876– 888.  2. Moons KGM, Altman DG, Reitsma JB, Ioannidis JPA, Macaskill P, Steyerberg EW, et al. Transparent Reporting of a multivariable prediction model for Individual Prognosis Or Diagnosis (TRIPOD): Explanation and Elaboration. Annals of Internal Medicine [Internet]. 2015 Jan 6 [cited 2016 Nov 24];162(1):W1. Available from: http://annals.org/article.aspx?doi=10.7326/M14-0698 |
| **Aims of the project** | 1. To validate the performance of a previously-developed PPH risk stratification tool in a representative cohort of women undergoing caesarean section |
| **Objectives** | 1. To obtain retrospective demographic and clinical data from women undergoing caesarean section at St Thomas’ Hospital over a 1-year period from 1 January – 31 December 2021. 2. To determine the estimated blood loss of women undergoing caesarean section from clinical notes. 3. To analyse the performance of our previously developed PPH risk stratification tool in terms of calibration, and discrimination, according to TRIPOD guidelines. |
| **Skills to be acquired**  (e.g. Data analysis, ELISA, PCR, Literature review, etc.) | The student will become familiar with data collection from paper and electronic clinical records, and will develop reliable data management practice. The student will develop data analysis skills, and be introduced to statistical techniques, including regression analysis, construction of calibration curves and receiver operating characteristic curve analysis. The work will be conducted in the R statistical computing language, and the student will be supported to become familiar with R coding by the end of the project. The student will also be involved in conducting literature review and manuscript preparation for dissemination of the project findings following the conclusion of analysis. |
| **Start Date and expected duration of the project** | 4 July – 2 September 2022 |
| **How many students could you accommodate on this project?** | 1 student |
| **Do you require provision for costs? (Max £250)** | £250 |
| **Supervisor Contact Details** | Dr Kariem El-Boghdadly ([kariem.elboghdadly@gstt.nhs.uk](mailto:kariem.elboghdadly@gstt.nhs.uk))  Dr Danny Wong ([danny.wong@gstt.nhs.uk](mailto:danny.wong@gstt.nhs.uk)) |

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| **Title** | Impact of ursodeoxycholic acid on lipid and glycaemic control in women with gestational diabetes mellitus and their neonates. |
| **Background** | Approximately 10% of pregnant women develop diabetes as a new diagnosis when pregnant, a condition called gestational diabetes mellitus (GDM), which greatly increases the risk of adverse outcomes for both mother and child. Aside from hyperglycaemia, GDM is further complicated by maternal dyslipidaemia, and is also associated with accelerated fetal growth and develop fetal dyslipidaemia, with increased free fatty acids and triglycerides in the umbilical cord blood.  At present 20% of women with GDM require insulin treatment and this results in increased hospital attendance and the need for needles, insulin therapy and regular monitoring of blood glucose concentrations by trained doctors and midwives, all of which are costly and use resources. In the UK, women with GDM are also offered metformin treatment. This improves maternal glycaemic control but does not improve rates of large-for-gestational age fetuses and is associated with increased adiposity in the children of women with GDM. Therefore new treatments are needed.  In women with the commonest gestational liver disease, intrahepatic cholestasis of pregnancy (ICP), the drug ursodeoxycholic acid (UDCA) improved insulin resistance and increased secretion of gut hormone glucagon-like peptide 1 (GLP-1), which is thought to be responsible for 70% of insulin release following meals.  The GUARDS trial treated women diagnosed with GDM between 24-28 weeks’ gestation with UDCA or placebo. Blood samples were collected at baseline, 32 weeks’ and 36 weeks’ gestation, alongside umbilical cord blood at birth. At 36 weeks’ gestation, women had blood taken fasting, and 30 minutes after a standardised mixed meal. |
| **Aims of the project** | This project will investigate the potential mechanistic responses to UDCA treatment, and their impact on glycaemic control in women with GDM and the impact of UDCA treatment on neonatal lipid parameters. |
| **Objectives** | **Objective 1: Determine whether UDCA improves incretin responses to a mixed meal comprising 40g fat, 80g carbohydrates**   * Multiplex assays to evaluate insulin, C-peptide, glucagon, GLP-1 and leptin concentration pre- and post-meal * ELISA to determine bile acid synthesis regulation by hormone FGF19   **Objective 2: Determine whether UDCA treatment improves maternal and neonatal lipid levels**   * Colourimetric assay to assess maternal (36 weeks’ gestation) and neonatal cord blood free fatty acid concentration   ***{Additional Objective if student completes work ahead of time: Determine whether UDCA treatment impacts the gut microbiome composition***   * *Isolation of bacterial DNA from maternal faecal swabs taken at 36 weeks’ gestation for 16S sequencing}* |
| **Skills to be acquired**  (e.g. Data analysis, ELISA, PCR, Literature review, etc.) | **Practical**:   * Training in good basic laboratory working practice. * Multiplex assays. * ELISA. * Colourimetric assays. * *{Bacterial DNA isolation}*   **Analytical:**   * Analysis of fasting and postprandial alterations in incretins and gut hormones in the serum of UDCA-treated women with GDM using paired t-test, alongside correlations with serum glucose and lipid concentrations. * Analysis of cord blood lipid data (total cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides) determined by Viapath hospital laboratories and free fatty acid concentrations determined by the student. These values will further be associated with clinical outcomes.   **Interpretative**:   * Student will be supported in identifying meaningful correlations between mechanistic data and clinical outcomes from the GUARDS trial * Preparation of graphs to represent results. |
| **Start Date and expected duration of the project** | 4th July 2022 – 6-8 weeks |
| **How many students could you accommodate on this project?** | 1 |
| **Do you require provision for costs? (Max £250)** | Yes |
| **Supervisor Contact Details** | Professor Catherine Williamson, Maternal and Fetal Disease Group, Women and Children’s Health.  [catherine.williamson@kcl.ac.uk](mailto:catherine.williamson@kcl.ac.uk) |