

List of Projects 2023-24

Name of the Supervisor	Area(s) of research?	Brief Description
Mohammed Uddin	Neurogenetics Single-cell OMICs Algorithm Development Gene therapy CRISPR	Our lab conduct research on to understand the brain genetics and how it relates to human intelligence and diseases. We apply various techniques (i.e. Genomics, Transcriptomics, CRISPR, gene therapy, artificial intelligence) to decipher the complexities around brain genetics.
Abiola Senok	Microbiology Infectious Diseases Antimicrobial Resistance	<p>Molecular Epidemiology of Antimicrobial resistance (AMR): We use a multiomics approach to map the evolution and transmission of AMR pathogens. We utilize DNA microarray, whole genome sequencing, proteomics and metabolomic approaches to characterize AMR pathogens specifically methicillin resistant <i>Staphylococcus aureus</i> (MRSA) and carbapenemase producing <i>Enterobacterales</i>.</p> <p>Microbiome studies: We investigate the impact of microbiome dysbiosis on health and disease. Areas of research include the characterization of human, animal and environmental microbiome as well as translational work on microbiome replacement strategies</p> <p>Microbial biofilms: Biofilms play a role in clinical and environmental microbiology with a significant role in the emergence of AMR. We use in vitro biofilm models to investigate gene expression and antibiofilm effect of novel agents.</p>
Saif Alqassim	Structural Biology Biophysics Protein Biochemistry	Proteins are the macromolecules that carry out the majority of life functions in our cells, and their dysfunction directly leads to disease. We are interested in understanding protein structure and function at a molecular level, using structural, biophysical, and biochemical approaches with purified proteins. Current and potential projects include: 1) Proteins encoded by intracellular pathogens that target the cellular actin cytoskeleton during infection (e.g. <i>Rickettsia Sca2</i>). 2) Studies on ZC4H2, a zinc-finger protein of unknown function, which when mutated causes a rare neurodevelopmental disease (ZARD). A molecular-level understanding of the function and mechanism would enable rational development of therapeutics.
Fahad Ali	Cancer Biology	My research focuses on defining neurological and breast tumors' genomic and molecular features. I am particularly interested in characterizing the super-enhancer landscape of the tumor cells enriched in post-therapy and identifying super-enhancer-associated transcription factor networks that may alter the epigenetic landscape and shape intratumoral heterogeneity and drug resistance. We utilize molecular (genome editing), genomic (sequencing), and proteomics (mass spectrometry) approaches in patients' primary tumour samples alongside cell lines and animal

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		<p>models to better understand tumors heterogeneity and mechanisms of resistance to therapy. We aim to translate our understanding of cancer-promoting transcriptional programmes events into the identification and characterisation of crucial, potentially druggable targets to subsequently exploit for therapeutic intervention, to help towards advancing more personalised therapies, and identifying markers that can help predict patients' response to treatment.</p>
Stefan Du Plessis	Male Reproductive Research	<p>Male factor infertility ranged from 20% to 70% across different regions and population. Unfortunately, no studies have reported the prevalence of male infertility in the UAE.</p> <p>According to the World Health Organization (WHO), the first-line diagnostic criteria for male infertility should include an initial finding of basic semen analysis such as azoospermia, oligozoospermia, asthenozoospermia, teratozoospermia, or combinations thereof.</p> <p>However, since male infertility is caused by diverse pathophysiological disorders, studies have implicated systemic diseases, endocrine abnormalities, congenital abnormalities, acquired testicular damage, varicocele, formation of anti-sperm antibodies, male accessory gland infection, metabolic diseases, such as obesity and both types of diabetes (type I and type II) as some of the underlying cause of male infertility.</p> <p>Diabetes represents a global health problem, and its prevalence keeps increasing. In the UAE, the Ministry of Health and Prevention reported that 11.81% of people between the ages of 20 and 79 were affected with diabetes during 2020. Whereas in 2016, the WHO reported that 8% of the total UAE population were affected with diabetes, depicting 3.8% absolute, and 48% actual increase in four years. Although several studies have implicated both types of diabetes as a contributing factor to male infertility, to the best of our knowledge, no studies are available from the UAE. Therefore, this study aims to bridge the gap in the knowledge of the effect of diabetes and the resulting implication on male fertility in the UAE. This study also aims to carve a path towards achieving personalized medicine in diabetes induced male infertility care.</p> <p>Therefore, this study will conduct an initial retrospective study on the effect of both types of diabetes on male fertility in the UAE population; and then evaluate the status of genes specific to diabetes and sperm function in diverse semen abnormalities of men with diabetes. Additionally, this study aims to investigate the occurrence of any variants in genes specific to diabetes and sperm function. Findings from this study will help to integrate the</p>

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		diagnosis and treatment of diabetic men with associated male infertility.
Leonard Lipovich	<p>Genomics Non-coding RNA Precision Medicine Cancer Diabetes Bioinformatics</p>	<p>Major research interests: Leonard Lipovich, Ph.D.</p> <p>Leonard Lipovich studies the long non-coding RNA (lncRNA) biology of human disease. lncRNA genes are the most abundant, but the least well-understood, class of human genes. He completed postdoctoral training at the Genome Institute of Singapore, where he found that lncRNAs are not conserved in evolution, and discovered the first mammalian lncRNA functional in stem cell pluripotency. Subsequently, at Wayne State University, Prof. Lipovich was the first to empirically reveal unexpected ribosomal translation of short open reading frames from lncRNAs in human cells - with the international ENCODE (Encyclopedia of DNA Elements) Consortium. In 2014, he received a U.S. National Institutes of Health (NIH) Director's New Innovator Award. His current focus is on identifying, and validating, human lncRNAs, from genome-wide association studies and personalized genome sequencing, as novel causes of estrogen receptor positive breast cancer and type 2 diabetes, and targeting them with RNAi-based therapeutics for precision medicine.</p>
Riad Bayoumi	Diabetes	<p>Type 2 diabetes (T2D) is a common multifactorial disease that is influenced by genetics, environmental factors, and their interactions. T2D is suspected of comprising a mix of several subtypes but at present there is difficulty in differentiating disease heterogeneity from a clinical/research perspective. Therefore, current clinical management of T2D is based on the paradigm "one size fits all". Hence, there is an urgent need of better understanding of disease heterogeneity. Two different approaches have been used to deconstruct the heterogeneity of the disease: the phenotype versus the genotype.</p> <p>The phenotype approach suggested that T2D could be segregated into 3-5 subgroups, based on parameters such as age of onset of diabetes, BMI, insulin sensitivity (HOMA2-IR), insulin secretion (HOMA2-B) and severity index (HbA1c). This approach did not identify subgroups on mechanistic and/or pathophysiological basis; and subgroups greatly overlapped. In the genotype approach, common gene variants identified by GWAS could explain only about 15% of the total heritability, indicating that a large proportion of that is still unexplained. Subgroups were difficult to predict from the genotypes identified alone.</p>

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<p>Nandu Goswami</p>	<p>Cardiovascular Disease Diabetes Mellitus Spaceflight Clinical Research Hypertension in Pregnancy (pre-eclampsia)</p>	<p>Prof Goswami's lab focuses on the effects of various disorders - on the one hand in healthy humans, such as aging, space travel, prolonged bed rest or exercise, and on the other hand in diseases, such as lymphedema, preeclampsia, HIV, COVID-19, dyslipidemia and diabetes mellitus - on the cardiovascular system. Another area of interest is the vascular system and how it is affected by chronic stimuli and/or disease states. The broad methodological spectrum used here includes noninvasive measurements of endothelial and vascular function as well as blood biomarkers related to endothelial function and blood coagulation in healthy subjects. Our studies are based on data collection in healthy volunteers as well as on patient data and different disease models.</p> <p>The prospective student will be involved in any of the ongoing or planned projects in assessment of cardiovascular health in healthy persons and those with cardiovascular diseases, Diabetes mellitus, Spaceflight studies and/or clinical hospital-based research as well as Hypertension in pregnancy (pre-eclampsia)</p>
<p>Bakhrom Berdiev</p>	<p>Cancer biology</p>	<p>The most common primary and universally deadly type of the tumour of astrocytes or their progenitor cell, glioblastoma multiforme (GBM), accounts for approximately 70% of all brain gliomas. Despite aggressive treatment options, the median survival is only 12 to 15 months.</p>

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