

Aga Khan University- FHS-PhD Programme
List of funded projects for potential PhD Candidates

Biological Sciences Stream						
Sr. No.	Name, Email address and Department of Primary Supervisor	Supervisory Team	Title of Project/ Source of funding	Research Funding available	Funds available until	Key Objectives of research project
1	Dr Ambrin Fatima ambrinfatima@aku.edu Asst. Prof, Dept. of Biological and Biomedical Sciences	Drs Zafar Iqbal, Afsar Mian, Shahnaz Ibrahim and Aysha Habib	Combining Genomics and Functional Approaches to Understand Rare Neurodevelopmental Disorders	PKR 20 million	Dec 2026	The key objectives are to: <ul style="list-style-type: none"> • Identification and clinical characterization of families segregating rare neurodevelopmental disorders (NDDs) in Pakistani population • Identify disease-causing gene variants/candidate gene variants in clinically identified families, each family segregating at least two or more cases with similar neurodevelopmental features • Validate candidate homozygous or compound heterozygous variants for pathogenicity using established bioinformatic tools and segregation analysis • Studies of candidate genes/variants in patient derived fibroblast, iPSCs, neurons and brain organoids to unravel neuropathophysiological mechanisms
Pre-requisites of PhD candidate applicants (graduate qualification requirement): MPhil in Biological Sciences, Biotechnology, Genetics						
2	Dr Fawad Ur Rehman rehman.fawad@aku.edu Assistant Professor, Centre for Regenerative Medicine and Stem Cells Research/BBS	Drs Afsar Mian, Syed Ather Enam, Irfan Khan and Meng Zheng	CRISPR-Cas9 Nanotherapy for IDH1 and IDH2 Mutations in Brain Cancer	USD 10,000 per annum	December 2028	The key objectives are to: <ul style="list-style-type: none"> • Design a CRISPR-Cas9 gene editing system for IDH1 and IDH2 via in silico studies by applying AI tools. • Fabricate and characterize nanoscale materials for the nanotherapy of GBM. • Evaluate the nanotherapy targeting ability of GBM cells across the BBB. • Evaluate the CRISPR-Cas9 loaded nanomedicine's anticancer effects. • Prepare GBM 3D spheroids and in vivo PDX models to evaluate nanotherapy effects
Pre-requisites of PhD candidate applicants (graduate qualification requirement): MPhil in Biological Sciences, Biotechnology, Genetics						

3	Dr Sheerien Rajput sheerien.rajput@aku.edu Assistant Professor, Department of CRM	Drs Hammad Hassan, Kulsoom Ghias, Azhar Hussain and Syed Ather Enam	Decoding Drug Resistance in Triple-Negative Breast Cancer: Using Patient-Derived Organoids and Cell Lines for Precision Oncology	Department funding available	--	The key objectives are to: <ul style="list-style-type: none"> Establish patient-derived TNBC organoids. Characterize the molecular and phenotypic diversity of developed TNBC organoids and compare it with the patient's biopsy to identify potential targets through proteomic and transcriptomic analyses. Evaluate the functional response of breast organoids to standard and novel treatment regimens.
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Pre-requisites of PhD candidate applicants (graduate qualification requirement): MPhil in Biological Sciences, Biotechnology, Genetics and Hands-on experience with cell and tissue culture Molecular biology technique.

4	Dr Irfan Khan Irfankhan.ban-gash@aku.edu Assistant Professor, Department of CRM	Drs Afsar Mian, Karim Damji, Fawad ur Rehman and Salim Mahar	Harnessing Stem Cell for Vision Restoration	USD 30,000	Dec 2027	The objectives are to: <ul style="list-style-type: none"> The project aims to investigate the therapeutic potential of stem cells for glaucoma and optic neuropathy. We will focus on: To optimizing methods for efficiently differentiate iPSCs organoids into functional RGCs differentially expressing axons and dendrites. To formulate the combinations of growth and differentiation factors along with signaling pathway modulators responsible for RGC differentiation, evaluated with RGCs markers expression, single cell RNA sequencing, and STR analysis. To functionally assess the RGCs by measuring electrophysiological parameters with patch clamp and calcium channel imaging for impulse transmission. To evaluate the efficacy and safety of RGCs in animal models of glaucoma established through microbeads injection or optic nerve crush model for functional vision recovery. To optimize the cellular dose of RGC for transplantation, their integration with synapse generation, and explore the immune regulatory role of microglial cells in the retina for short- and long-term survival of RGC, evaluated by live cell imaging, inflammatory cytokines storm analysis, histological analysis, and gene expression dynamics. To perform anatomical and electrophysiological assessments, behavioral tests like visual acuity and contrast sensitivity for functional vision recovery.
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Pre-requisites of PhD candidate applicants (graduate qualification requirement): MPhil in Biological Sciences, Biotechnology, Genetics

5	Dr Irfan Khan Irfankhan.ban_gash@aku.edu Assistant Professor, Department of CRM	Drs Karim Damji, Haroon Tayyab and Abdul Sami Memon	From Bench to Retina: Extracellular Vesicle-Based Treatment for Dry Age-Related Macular Degeneration	USD 100,000	Submitted a funding application to the granting agency	<p>The objectives are to:</p> <ul style="list-style-type: none"> Optimize methods for the efficient isolation of exosomes from human umbilical cord-derived MSCs obtained from healthy young donors, characterize them, and optimize cryopreservation techniques to maintain their integrity, biological function for long term storage. Develop an in vitro model of RPE injury induced by oxidative stress (OS), using sodium iodate (SI) or hydrogen peroxide (H₂O₂), to closely mimic the pathogenesis of dry AMD and to evaluate the therapeutic potential of exosomes in mitigating this damage. Develop in vivo dry-AMD rat model, using SI to evaluate the pathological features of dry AMD, including OS, RPE degeneration, drusen formation, and outer retinal atrophy. Evaluate the tolerability, retinal penetration, retention time, biological activity, safety, and therapeutic efficacy of exosomes capable of crossing the ILM and delivering their cargo to retinal cells in a dry AMD rat model, by assessing improvements in retinal structure and function, along with reductions in inflammatory and OS markers.
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Pre-requisites of PhD candidate applicants (graduate qualification requirement): MPhil in Biological Sciences, Biotechnology, Genetics

6	Dr Najia Ghanchi najia.ghanchi@aku.edu Associate Professor, Department Pathology and Laboratory Medicine	Dr Erum Khan	Genomic Variations across Dengue Serotypes and Host miRNA Interactions Driving Disease Severity in Pakistan	USD 1.2 million	Dec 2028	<p>The objectives are to:</p> <ul style="list-style-type: none"> To perform genomic characterization of dengue serotype circulating in Pakistan To generate the profile of microRNAs expression level across dengue disease severity spectrum To correlate serotype phylogenetics, miRNA dysregulation, and clinical parameters for early severity risk stratification.
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Pre-requisites of PhD candidate applicants (graduate qualification requirement): MPhil in Biological Sciences, Biotechnology, Genetics and Basic Molecular techniques and clinical and field experience