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 Hammad Hassan hammad.hassan@aku.edu Asst. Professor, Dep Centre for Regenerative Medicine and Stem Cell Research	Drs Irfan Khan, Sheerien Rajput, Natasha Ali and Azhar Hussain	A Novel Approach of Generating Laboratory-grown Red Blood Cells (RBCs) using Synthetic mRNA based Reprogrammed Induced Pluripotent Stem Cells (iPSCs)	PKR 20 million	2027	The key objectives are: • To utilize unmodified synthetic reprogramming mRNA method (OCT4, SOX2, KLF4, cMYC, NANOG, and LIN28 [OSKMNL]) with immune evasion mRNAs (E3, K3, and B18R [EKB]) from vaccinia virus, to generate stable iPSC lines • Detailed characterization of the generated iPSC lines • Comparative Analysis with Existing RBC Production Methods: Compare the functionality and cost-effectiveness of the generated RBCs with those produced by other current methods, such as those derived from adult stem cells or donor blood and recently from immortalized progenitor cell lines, to highlight the advantages or identify areas for improvement • Genomic Stability Assessment: Examine the genomic stability of iPSC lines over extended culture periods, particularly looking for potential mutations or epigenetic changes that could occur due to the reprogramming and differentiation processes • Functional characterization of generated RBCs from iPSCs lines. • Optimization of RBC Maturation and Lifespan: Develop and test strategies for optimizing the maturation process and lifespan of the lab-grown RBCs, which is critical for their eventual practical use in transfusions • Metabolic Profiling: Conduct metabolic profiling of the generated RBCs to ensure that their metabolic activities are consistent with those of native RBCs, which could be critical for their functionality in oxygen transport and overall cell health

Pre-requisites of PhD candidate applicants (graduate qualification requirement):
Educational Background: Possession of a Master's/M.Phil. degree in Biological Sciences or a related research discipline.
Preferred Research Expertise: We welcome applicants with a background in:

2	Dr Afsar Mian afsar.mian@aku.edu Assoc. Professor, Dep Centre for Regenerative Medicine and Stem Cell Research	Drs Irfan Hussain, Fawad Ur Rehman and Irfan Khan	Molecular Therapeutic Approaches in Philadelphia Chromosome-Positive Leukemia	USD 75,000	2026	The Key objectives include: • Programing of the donor cells for the release of CRISPR-Cas9 and Helix2 peptides • Establishment of parental and mutated Ph+ leukemia in-vitro models • Editing of BCR-ABL gene in Ba/F3 cells using CRISPR/Cas9 pre-loaded exosomes • Evaluation of anti-leukemic activities of engineered exosomes and Helix-2 peptides and their inhibitory mechanisms • Investigating the role of therapeutic peptides and CRISPR-Cas9 loaded exosomes in in -vivo system

Pre-requisites of PhD candidate applicants (graduate qualification requirement): Master Degree with research experience in biological sciences

3	Dr Afsar Mian afsar.mian@aku.edu Assoc. Professor, Dep Centre for Regenerative Medicine and Stem Cell Research	Drs Salim Virani, Salman Kirmani, Fawad Ur Rehman and Irfan Khan	The Landscape of Next-generation Gene Editing Tools in Familial Hypercholesterolemia (FH)	USD 1.5 million	2026	The key objectives of research project are: • Profile the spectrum of LDLR, APOB, and PCSK9 founder pathogenic variants in the Pakistani FH cohort • Design and optimize next-generation gene editing tools like prime editing and Antisense Oligonucleotide for modulating LDLR, APOB, and PCSK9 expression in patients' cells and transgenic hypercholesterolemic mice for in-vitro and in-vivo assessment • Establish optimal delivery methods via existing viral vectors and develop a safe and novel nonviral-based delivery system using exosomes and nanoliposomes for both in-vitro and in-vivo settings

Pre-requisites of PhD candidate applicants (graduate qualification requirement): Experience in cell/molecular biology

4	Dr Ambrin Fatima ambrinfatima@aku.edu Asst. Prof, Dept. of Biological and	Drs Zafar Iqbal, Afsar Mian, Shahnaz Ibrahim and Aysha Habib	Combining Genomics and Functional Approaches to Understand Rare Neurodevelopmental Disorders	PKR 20 million	April 2026	The key objectives are: • 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

	Biomedical Sciences					• 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						
5	Dr Najia Ghanchi najia.ghanchi@aku.edu Asso. Prof, Dept of Pathology and Laboratory Medicine	Drs Asim Beg, Bilal Usmani and Erum Khan	Pathogen Mapping and Disease Modelling using Vector and Environment Data	USD 1.2 million	2028	The key objectives are: • Develop molecular techniques for detection of pathogens in vector and host animals and environment • Develop capacity for collection of optimum environmental data using digital databases • Identify risk factors for CCHF • Develop risk map to predict CCHF outbreaks
Pre-requisites of PhD candidate applicants (graduate qualification requirement): Molecular biology techniques and field epidemiology						
6	Dr Asim Beg masim.beg@aku.edu Professor, Dept of Pathology and Laboratory Medicine	Drs Erum Khan, Bilal Usmani, Najia Ghanchi and Rumina Hasan	Pathogen Mapping and Disease Modelling using Vector (mosquito) and Environmental Data	USD 1.2 million	2028	The key objectives are: • Develop new surveillance methods using molecular based techniques in detection of arboviruses using vector and wastewater samples • Develop mathematical modelling for predicting arbovirus outbreaks
Pre-requisites of PhD candidate applicants (graduate qualification requirement): Molecular biology techniques and field epidemiology						
7	Dr Zahra Hasan zahra.hasan@aku.edu Professor, Dept of Pathology and Laboratory Medicine	Drs Kiran Iqbal and Rabia Hussain	Biomarkers of Protection and Disease Severity for Assays for Prediction of Disease Outcomes in High-Risk Individuals	USD 50,000	2025	The key objectives are to: • Identify common biomarkers associated with protection and disease in acute viral infections as well as, tuberculosis • Understand variation in predictive biomarkers with increased risk of NCD such as diabetes • Design and validate rapid molecular assays that can be applied for disease-associated biomarkers
Pre-requisites of PhD candidate applicants (graduate qualification requirement): Masters/MPhil degree in Biochemistry, Biotechnology, Genetics, Cell biology or Microbiology with prior wet-lab experience of experimental science. Should have already worked on a research project.						

#	PI	Co-PIs	Project Title	Budget	Start Date	Objectives
8	Dr Najeeha Iqbal najeeha.iqbal@aku.edu Asso. Professor, Dept. of Biological and Biomedical Sciences	Drs Amber Palla, Imran Nisar, Kulsoom Ghias and Azhar Hussain	Post-Acute Viral Sequelae: Immunological and Microbial Interactions in Long-term Recovery	USD 70,000	April 2025	The key objectives are to: • Identify socio-demographic and host factors influence the long-term recovery of patients • Understand the effect of viral persistence on chronic inflammation and changes in microbial diversity • Develop a model to identify the risk of post-acute sequalae using host immune and microbial signatures
<td colspan="7">Pre-requisites of PhD candidate applicants (graduate qualification requirement): A degree in biology, some lab experience or clinical post graduate qualification is required.</td>
9	Dr Syed Ather Enam ather.enam@aku.edu Professor and Director; Department of Surgery	Drs Azhar Hussain, Fawad-ur-Rehman and Sheerien Rajput	Development of Confrontational Assay via 3D Cell Culturing for Personalized Anti-Cancer Medicine	USD 20,000	September 2028	The key objectives are to: • Develop a 3D Co-Culture System: Create an in vitro model using patient-derived glioblastoma tissue to replicate the invasive behavior of glioma stem cells (GSCs) in a brain-like microenvironment using hIPSC organoids. • Study GSC Biology: Investigate GSC interactions, invasion, proliferation, and resistance mechanisms within the 3D system. • Test Precision Therapies: Evaluate the efficacy of targeted treatments in the 3D model and compare with conventional methods. • Identify and Validate Biomarkers: Characterize tissue samples to identify biomarkers linked to glioblastoma progression and therapeutic responses.
<td colspan="7">Pre-requisites of PhD candidate applicants (graduate qualification requirement): Experience in in vitro cell culture and background knowledge of intracellular pathways</td>
10	Dr Najeeha Iqbal najeeha.iqbal@aku.edu Asso. Professor, Dept. of Biological and Biomedical Sciences	Drs Zahra Hoodbhoy, Erum Khan, Fazal Arain and Naila Nadeem	Exploring the Role of Zika Virus in Pregnancy Outcomes: Invitro model of Infection in Trophoblast cells and Role of Tight Junction Proteins in	USD 15,000	September 2025	The key objectives are to: • To determine the prevalence of Zika virus-specific IgG antibodies in a healthy population using the EDIII (Envelope domain III) antigen. • To explore invitro model of Zika Virus infection using trophoblast cell lines for upregulation of IFN gamma stimulatory gene/s (ISGs) in JEG cells lines derived from 1st and 3rd trimesters. • To relate the role of tight junction proteins (TJ) in infected cells/placenta for increased paracellular permeability.

			Placental Permeability			
Pre-requisites of PhD candidate applicants (graduate qualification requirement): A degree in biology, some lab experience or clinical post graduate qualification is required
11	Dr Junaid Iqbal junaid.iqbal@aku.edu Associate Professor, Department of Peads	Drs Jai Das, Zehra Jamil and Muhammad Nouman Mughal	Assessment of Placental Transcriptomics, Epigenomics, and Maternal Microbiome in Heat-Stressed Pregnancies	USD 200,000	August 2026	The key objective is to: • To compare stool microbiome, enteropathogenic prevalence and serum micronutrient levels in pregnant females exposed to HS while receiving supplementary food with a non-supplemented cohort and to study their placental transcriptomics and epigenomics.
Pre-requisites of PhD candidate applicants (graduate qualification requirement): The PhD candidate should have a strong background in molecular and cell biology.