

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	<p>The key objectives are:</p> <ul style="list-style-type: none"> 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:

- Benchwork with significant expertise in Stem cell biology, Immunology, and Molecular Biology.
- Cellular and Molecular Biology, including hands-on experience in Tissue Culture Individuals with hands-on iPSC culture will be preferred
- Proficiency in various laboratory methodologies, notably fluorescent and confocal microscopy qPCR, western blotting, and flow cytometry.
- Advanced Molecular Biology, such as gene cloning, qPCR, and CRISPR-Cas9 applications.

Technical Proficiency: Well-versed in using computers, with proficiency in Microsoft Office Suite, statistical analysis, and imaging software.

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	<p>The Key objectives are:</p> <ul style="list-style-type: none"> • Programming 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
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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	<p>The key objectives of research project are to:</p> <ul style="list-style-type: none"> • 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
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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	<p>The key objectives are to:</p> <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
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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	<p>The key objectives are to:</p> <ul style="list-style-type: none"> 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 sequelae using host immune and microbial signatures
Pre-requisites of PhD candidate applicants (graduate qualification requirement): A degree in biology, some lab experience or clinical post graduate qualification is required.						
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	<p>The key objectives are to:</p> <ul style="list-style-type: none"> 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 hPSC 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.
Pre-requisites of PhD candidate applicants (graduate qualification requirement): Experience in in vitro cell culture and background knowledge of intracellular pathways						
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	<p>The key objectives are:</p> <ul style="list-style-type: none"> 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	<p>The key objective is:</p> <ul style="list-style-type: none"> 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.						
12	Dr Junaid Iqbal junaid.iqbal@aku.edu Associate Professor, Department of Peads	Drs Asad Ali, Zehra Jamil, Azhar Hussain And Mohammad Nouman Mughal	Paternal Epigenetic Association with Infant Birth Weight	USD 1.5 million	July 2025 (Extension applied)	<p>The key objectives are:</p> <ul style="list-style-type: none"> Comparing the epigenetic profiles of fathers and neonates (LBW and NBW) by measuring DNA methylation. To determine the correlation between differentially methylated CpG islands of relevant genes and their gene expression profiles by analyzing DNA methylation status and mRNA sequencing of all available samples.
Pre-requisites of PhD candidate applicants (graduate qualification requirement):						
13	Dr Irfan Khan Irfankhan.bangash@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 2025	<p>The key objectives are:</p> <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.

