

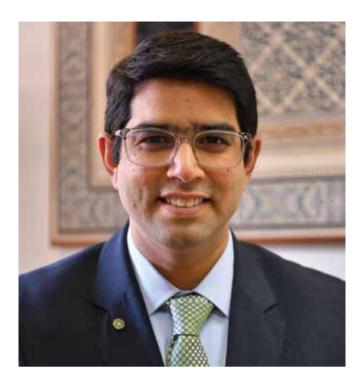
Annual Report 8

Department of Biological and Biomedical Sciences



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Message from the Dean

The Department of Biological and Biomedical Sciences at the Medical College is growing in impact and scope with a strong focus on research and teaching. As you'll see in this report, their work is meaningful and substantial, not just at a local level, but nationally and internationally. Despite the challenges faced due to the pandemic, our team responded with determination, adaptation and innovation. And I must acknowledge and applaud the commitment, work ethic and dynamism of the entire BBS team.

The five-year strategic plan outlined in 2019 is progressing well with activities and outcomes aligned with the expectations highlighted in the plan. Last year saw an emphasis on quality research objectives, including the department hosting its first ever Biological Sciences Research Symposium, an event that aimed to both showcase research work, connect researchers and serve as a learning opportunity for people within and outside the department. The biological and biomedical research enterprise is critical to understanding fundamental biological processes and mechanisms of human health and disease pathogenesis, and it is critical to developing solutions that prevent, diagnose, and treat diseases and conditions that afflict millions of people. The work being undertaken everyday furthers our mission of knowledge-sharing and increasing access to that science to those outside the walls of our great institution. The creation of research foci and hiring of post-doctoral fellows in research foci, a solid publication record and impressive grant work are some of the ways in which scientific discovery is being propelled forward slowly but surely.

We continue to make contributions to medical education by consistently producing innovations in our curriculum, pedagogy and assessment, and growing our MPhil programme. It is a proud moment for us to witness the successful completion of the programme by our first batch of students. Our faculty of superstars continue to impress with their long list of awards, fellowships and promotions, with many of the staff receiving higher education degrees in 2021 enhancing their skill set. This commitment to bettering ourselves at every level of the organization is what sets us up for greater success.

I wish the team the best of luck; under the leadership of Dr Kulsoom Ghias, Chair of BBS, Dr Satwat Hashmi, Vice Chair of Education and Dr Syed Hani Abidi, Vice Chair of Research, the department will continue to reach new heights. As you move towards higher levels of excellence, I along with the senior leadership of AKU are behind you every step of the way.



Message from the Chair

If asked to describe the Department of Biological and Biomedical Sciences (BBS) journey in the past year, three words come to mind - commitment, innovation and growth. Tasked with delivering research and teaching aligned with the institutional values of impact, quality, relevance and access, the focus of departmental faculty and staff has been unwavering, and that too in the face of unprecedented challenges. A roadmap for the department was set in 2019 with a comprehensive five-year strategic plan. The emphasis is on enhanced scholarship and research responsive to the needs of the country and the success of our students through transformative learning experiences. A wide range of activities across the department and beyond have ensured that we are consistently meeting our strategic targets.

With respect to research, BBS faculty submitted an impressive number of proposals for intramural and extramural funding while managing an existing portfolio of grants. The department maintained a solid publication record throughout the year, with articles in respected peer-reviewed journals. Research foci were created and hiring of post-doctoral fellows initiated to nurture an enabling environment for research, training and scholarship. The first ever Biological Sciences Research Symposium was held in December 2021; the symposium and the workshops that followed were offered through a virtual platform, engaging basic and biological science researchers from within the country and around the world.

On the education front, innovation and excellence in curriculum design, pedagogy and assessment was evidenced across programmatic levels. The faculty and staff's rapid and technology-supported response during the on-going pandemic was commendable and ensured continuity of undergraduate and graduate programs. As a matter of pride, students of the first cohort of the MPhil in Biological and Biomedical Sciences program successfully defended their thesis, and the program saw increase in enrollment. From the growth of its academic programs, the expansion of research activities, and the professional development of BBS faculty and staff, 2021 brought many successes. It is a pleasure to share the progress made over the past year through this annual report and I hope readers consider reaching out to connect, to collaborate, to give feedback.

I end with heartfelt gratitude to all members of the department – the contents of this report are a testament to their commitment and perseverance – and to the institutional leadership, particularly Dean Adil Haider, whose steadfast support and guidance make it all possible.

in Review



Research and Teaching Highlights

Housed in a research-led university, one of the driving goals of the BBS department is to provide enhanced scholarship and research responsive to the needs of the country. This year, the department continued to strive for its mission by investing in faculty and research infrastructure for conduct and dissemination of quality research aligned with the institutional themes through the following initiatives detailed below.

Integration of research foci

To strengthen research activities in the department, five thematic foci were created:

- 1. Cancer Biology
- 2. Cardiovascular and Respiratory Sciences
- 3. Endocrinology and Metabolic Disorders
- 4. Immunology and Infectious Diseases
- 5. Neurosciences

In addition, two new themes have been developed, wherein cross-thematic and collaborative research with institutes outside of AKU will be conducted. The cross-thematic groups are a combination of Cancer Biology and Immunology and Infectious Diseases, Neurosciences and Endocrinology and Metabolic Disorders and Cardiovascular and Respiratory Sciences with Endocrinology and Metabolic Disorders.

Two postdoctoral fellows have been appointed to the neuroscience, cancer virology (a combination of Cancer Biology and Immunology and Infectious Diseases foci) and endocrine metabolism streams and two more are expected to join in 2022.

Setting up a robust in-house grants administration office

In 2021, 26 extramural and 8 intramural grant proposals were submitted by the department. 8 proposals have been accepted so far, amounting to a total of 18 active grants during the year. The themes of the ongoing grants are:

- Cancer (5)
- Brain and Mind Sciences (5)
- Immunology and Infectious Diseases (3)
- Cardiovascular and Respiratory Diseases (2)
- Medical Education (2)
- Endocrinology and Metabolic Disorders (1)

The support system provided by the department led to a large number of publications in 2021, with the department publishing 79 papers, based on the themes of:

- Immunology and Infectious Diseases (26)
- Endocrinology and Metabolic Disorders (19)
- Brain and Mind Sciences (15)
- Medical Education (11)
- Cardiovascular and Respiratory Diseases (4)
- Cancer (2)
- Complimentary Medicine (2)

Publication highlights:

• Dr Najeeha lqbal was an author on an original research paper titled "Mucosal genomics implicate lymphocyte activation and lipid metabolism in refractory environmental enteric dysfunction" published in Gastroenterology journal in May 2021. The article analyzed the use of applied mucosal genomics to advance understanding of EED (Environmental Enteric Dysfunction).

• In April 2019, an HIV outbreak predominantly affecting children occurred in Larkana District, and was classified as a Grade II Emergency by the World Health Organization, Sindh.

Dr Syed Hani Abidi was an author on an original research article titled "Factors associated with HIV infection among children in Larkana District, Pakistan: a matched case-control study", published in The Lancet HIV in June 2021.

The article detailed the matched-case control study conducted with the aim of assessing factors associated with HIV infection in this outbreak.

• Dr Abdul Mannan Baig authored a News & Views article titled "Counting the neurological cost of Covid-19", which was published in Nature Reviews Neurology. The article highlighted the need to understand and respond to potentially incapacitating neurological consequences of Covid-19.

• Dr Ambrin Fatima was first author of the research paper titled "Monoallelic and bi-allelic variants in NCDN cause neurodevelopmental delay, intellectual disability, and epilepsy", published in the American Journal of Human Genetics in May 2021. The data discussed in the paper provided evidence that bi-allelic and de novo variants in NCDN cause a clinically variable form of neurodevelopmental delay and epilepsy, highlighting a critical role for NCDN in human brain development.

Enhancing laboratory capabilities

The department's Multidisciplinary, Microscopy and Anatomy and Surgical Learning Studio laboratories are crucial to a thriving research and teaching environment. Along with the labs being used for teaching sessions, journal club meetings, and general research work, processes were set in place to procure new equipment, update existing software, and implement processes to run the labs in ways that best furthered the department's research aims.

The multidisciplinary lab procured the following equipment:

- Olympus Stereo Microscope
- Pulse Oximeter
- Tissue Processor
- Proteomics system
- Biosafety Cabinets

Enabled by the generous support of a donor, BBS also acquired a semi-automated Tissue MicroArray (TMA). This equipment allows generation of immunohistochemistry data from multiple tissue samples on one slide thereby decreasing the cost and time of experiments and at the same time allows uniformity and reproducibility of experiments. Generation of TMA blocks from Pakistani cancer patients has been initiated.



Semi-Automated Tissue MicroArray

The Biological Sciences Research Symposium

On December 15 2021, the department successfully hosted its first ever Biological Sciences Research Symposium. The goal of the symposium was to bring biological sciences researchers within the country on one virtual platform to showcase basic science and mechanistic studies in different areas of human and animal biological sciences, such as genomics, cancer biology, microbiology, neurosciences, pharmacology, animal genetics and animal models, etc.

The event was well-received, featuring keynote lectures, invited talks from distinguished speakers, oral and poster presentations by BBS faculty members, and ACCME accredited post conference workshops. Professor Shahid Mahmood Baig started off the event with a special lecture on biological science research in Pakistan, followed by excellent keynotes by Professor Rashida Ferrand and Professor Simon Davis.

Four invited speakers covered genetic, epigenetic and molecular studies in neurosciences and other fields and pedagogy for enhancing learning in graduate programs. Eighteen oral presentations were delivered under the themes of genetics and human disorders, pharmacology, infection, immunity and inflammation, and stem cell and regenerative medicine. Forty posters were presented via a virtual platform and participants were given the opportunity to interact with the presenters.

Post-symposium workshops on immunohistochemistry, manuscript writing, literature search and endnote library and drug docking were offered by BBS faculty and attended by a number of participants. The event received global participation from over 20 institutions.



Achievements in Education

While each educator in the department has their own unique perspectives and teaching methods, one aim is the same for all faculty members: to engage students through innovative pedagogy and quality basic science teaching and training across programmatic levels. The BBS Academic Council, established in February 2021, serves as the principal academic body of the department. The Council provides a means of ensuring integration of various departmental academic programs and activities under the Chair of the department. One major reform undertaken by the Academic Council was to institute the role of Discipline Coordinator. In order to optimize undergraduate medical curriculum design, implementation and delivery, the role of "Discipline Coordinator" was created for each of the four PMC-recognized disciplines (Anatomy, Biochemistry, Pharmacology and Physiology). The main purpose is to enhance the motivation and engagement of all faculty and staff members of the department in teaching and related activities, and to provide them with a healthy sense of ownership of their respective academic discipline.

Learning Experiences in BBS: Growth of the MPhil Program

The department's MPhil in Biological and Biomedical Sciences program was launched in 2020 with four students. The program was designed to build local expertise and skills in biology and biomedical sciences.

The goals of the program are to:

1. Develop students' ability to use basic principles in biology to understand and solve problems related to health and disease in Pakistan.

2. Promote and establish a research culture in biological and biomedical sciences in the country which is creating new knowledge. In March 2021, the second batch of MPhil students were admitted to the program. In December 2021, three of the students from the inaugural batch successfully defended their thesis.



Reflections from the first graduating students of the MPhil program

Dr Faiq Amin "This was a competitive and rewarding program. It really helped me mature as a scientist and taught me how to focus on the next step and reach a genuine conclusion about what is being studied. I can't forget the moment when the examiners concluded I had passed after one hour fifteen minutes of viva and an hour of presentation preceding the viva!" Dr Alisalman Sheikh "This program required perseverance and commitment, and I'm very happy that I had the privilege to experience it! I've been able to broaden my horizons in becoming a researcher and solving the problems that are right on our doorstep. I look forward to using the science and knowledge gained here for the better." Dr Sahar Zuberi "This program was highly competitive, maturing and nourishing! On a personal level, it was important for me to embark on a more solid platform for teaching. Not only did the experience validate my decision to pursue basic sciences, but it also gave me a lot of perspective on what I want to do next. Overall, it has been an incredible journey."

Awards and Distinctions



Dr Perwaiz Iqbal received the Professor Muzaffar Ahmad Lifetime Achievement Award by the Zoological Society of Pakistan, at the 40th Pakistan Congress of Zoology (International), held on December 14, 2021 at the Sindh Agriculture University at Tando Jam.



Dr Rozmeen Akbar received the Early Career Teaching Award in recognition of her enthusiasm for teaching and efforts made towards creating a supportive and enriching environment for her students.



Dr Fareena Bilwani received the Excellence in Teaching Award in recognition of her best practices in teaching and research, which have enabled her to be an outstanding professional and role model.



Dr Sadia Fatima received the Team-Based Collaborative Award for Teaching in recognition of the group's diligent efforts to redesign Year I and II II teaching and learning activities to fit the online mode of delivery during the Covid-19 pandemic.



Dr Zuhair Yusuf received the Team-Based Collaborative Award for Teaching in honor of the group's success with teaching clinical skills including basic sciences, in an integrated manner during the Covid-19 pandemic.



Dr Satwat Hashmi and Dr Rehana Rehman received the Runner-Up Award for Collaborative Practices in the Scholarship of Teaching and Learning (ACPSoTL) for simulation-based technologies in clinical skills.



Dr Rehana Rehman and Dr Syed Hani Abidi received the prestigious Excellence in Research Award at the 2021 Health Science Research Assembly in recognition of their many outstanding scholarly accomplishments.



Dr Faiq Amin received the Best Graduate Student Oral Presentation award for his presentation "Role of chamomile, saffron and their components in the treatment of depression" at the 13th Health Sciences Research Assembly and was a Category Winner for Science and Technology at the National Entrepreneurship Challenge.



Alisalman Sheikh received the Best Graduate Student Oral Presentation award for his presentation "Analysis of host-specific miRNAs in EBV-associated prostate cancers" at the 13th Health Sciences Research Assembly.

Departmental Activity

Endowments

The following faculty members received prestigious endowments, one the highest honors that can be bestowed on a faculty member:



Dr Kulsoom Ghias The Feerasta Family Endowed Chair



Dr Rehana Rehman The Bahadur Ali Kamruddin Jessani Endowed Professor

Promotions



Dr Syed Hani Abidi The Akbar Ali Habib Bandeali Endowed Professor



Dr Bushra Chaudhry Associate Professor



Dr Abdul Mannan Baig Assistant Professor



Dr Khalid Ahmed Assistant Professor

Appointments



Gulafroze Jessa Manager



Irfanullah Baig Assistant Manager



Bilal Effendi Associate



Zahid Hussain Senior Technologist

Fellowships and recognition

Dr Salman Siddiqi, Dr Fareena Bilwani and Dr Zehra Jamil were granted Fellowship to the Higher Educational Academy. Dr Kulsoom Ghias was appointed as a member of the STEM Advisory Committee, Pakistan Science Foundation. Dr Satwat Hashmi, Dr Kulsoom Ghias, Dr Sadia Fatima and Dr Rehana Rehman were granted membership into the prestigious AKU Teacher's Academy.

Workshops conducted

- "Leadership Skills for Junior Faculty" by Dr Sadia Fatima, Dr Qamar Riaz, Department for Educational Development and Dr Nadeem Abbasi, Department of Oncology, April 5-9, 2021
- "Digital Portfolio: Showcase your Accomplishments" by Dr Rehana Rehman and Dr Azam Afzal and Dr Shazia Babar, Department of Educational Development, May 8, 2021
- "Overview of NIH and other Grant Mechanisms" by Dr Najeeha Iqbal and Dr Sana Syed, Department of Paediatrics and Child Health, November 23, 2021
- "How to Craft 'Specific Aims' Section" by Dr Najeeha Iqbal and Dr Sana Syed, Department of Paediatrics and Child Health, Biological Sciences Research Symposium, December 16, 2021
- "Manuscript Writing" by Dr Arfa Azhar, Biological Sciences Research Symposium, December 16, 2021
- "Drug Docking Prediction on Receptor-binding Domain of S protein in SARS-COV-2" by Dr Abdul Mannan Baig, Biological Sciences Research Symposium, December 16, 2021
- "Literature Search and Endnote Library" by Dr Saara Muddasir, Biological Sciences Research Symposium, December 16, 2021
- "Drug Development: From the Benchtop to Market" by Dr Shakil Ahmed Saghir, Biological Sciences Research Symposium, December 16, 2021
- "Brew Your Stains: a Hands on Experience with Immunohistochemistry and its Implementation in Biomedical Research" by Dr Zuhair Yusuf, Biological Sciences Research Symposium, December 16, 2021

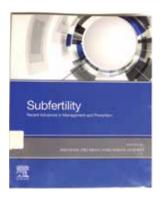
BBS Authors

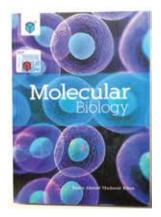
Subfertility by Dr Rehana Rehman "My inspiration for writing this book came from the struggles I have seen infertile couples go through in my career as a reproductive endocrinologist. I personally witnessed the threats that females normally faced from their family members. My book emphasizes the importance of support needed from different sources such as family, friends, healthcare providers and lastly infertility specialists in minimizing stress, strengthening partnerships and helping couples in acquiring conception"

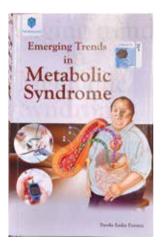
Molecular Biology by Dr Saara Muddasir "I was in the midst of my PhD when my supervisor gave me the suggestion to write a book on molecular biology. My aim was to write a diverse book that could be referenced by both undergraduate and postgraduate students. The process was very challenging, as I wrote the book alongside completing my PhD research and thesis. This book is about basic biochemistry, biology, molecular biology and bioinformatics, giving the reader flavors of many different topics"

Emerging Trends in Metabolic Syndrome by Dr Sadia Fatima

"My research work is focused on identifying genetic and epigenetic links related to diabetes mellitus, obesity and metabolic syndrome (MetS). My motivation for writing this book were the research findings that my group had identified. I noticed that there were some unique aspects of Mets and trends related to the Pakistani population which were not common knowledge. There were people who were at higher risk of cardiovascular injury even though they were lean and thin due to the presence of unique biomarkers or genetic modification. On the other hand, there were obese/overweight individuals who never developed the disease. Therefore, I decided to write about these factors, causes and preventative measures to clarify the misconceptions regarding MetS, childhood obesity and feto-maternal health. I, along with field experts, wrote on selected topics that could benefit the non-technical reader"



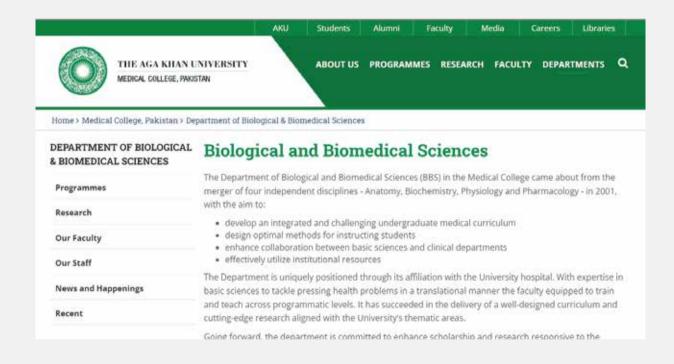




Department website

In order to provide an outward-facing platform to people within and outside of the university as an introduction to the department, the Department Communications Committee undertook the major task of updating the BBS section of the AKU webpage

(https://www.aku.edu/mcpk/bbs/Pages/home.aspx). This task was spearheaded by Dr Sadia Fatima and executed by Dr Rozmeen Akbar and Bilal Effendi. The website is now a regularly updated feature that provides an overview of the department, as well as highlights in research and education.



Celebrating BBS

It's not really work if you're having fun!



"All of our employees are fully vaccinated and masks were only temporarily removed for the pictures"

BBS Personnel

Faculty

Dr Kulsoom Ghias, Associate Professor and Chair, The Feerasta Family Endowed Chair Dr Perwaiz Igbal, Professor Emeritus Dr Satwat Hashmi, Associate Professor and Vice Chair, Education Dr Syed Hani Abidi, Associate Professor and Vice Chair, Research, Akbar Ali Habib Bandeali Endowed Professor Dr Shahid Mahmood Baig, Professor Dr HR Ahmad, Professor Dr Rehana Rehman, Associate Professor, Bahadur Ali Kamruddin Jessani Endowed Professor Dr Najeeha Igbal, Associate Professor (Joint appointee) Dr Tanveer Jilani, Assistant Professor Dr Shaqufta Khan, Assistant Professor Dr Fazal Manzoor Arain, Assistant Professor Dr Hasan Salman Siddiqi, Assistant Professor Dr Fareena Bilwani, Assistant Professor Dr Syeda Sadia Fatima, Assistant Professor Dr Junaid Igbal, Assistant Professor (Joint appointee) Dr Saara Muddasir, Assistant Professor Dr Mati Ur Rehman, Assistant Professor Dr Muhammad Zuhair Yusuf, Assistant Professor Dr Zehra Jamil, Assistant Professor Dr Muhammad Nouman Mughal Assistant Professor (Joint appointee) Dr Bushra Amin. Assistant Professor Dr Ambrin Fatima, Assistant Professor Dr Abdul Mannan Baig, Assistant Professor Dr Amber Palla, Assistant Professor Dr Khalid Ahmed Hameed, Assistant Professor Dr Sayed Ali Raza Shah Bukhari Assistant Professor (Joint appointee) Dr Arfa Azhar, Senior Instructor Dr Kanza Muzaffar, Senior Instructor Dr Faig Amin. Instructor Dr Rozmeen Akbar, Instructor Dr Sadia Cassim, Instructor Dr Shakil Ahmed Saghir, Visiting Faculty

Postdoctoral Fellows

Dr Sobia Naz Shaukat Dr Haq Nawaz Khan

Teaching Associates

Dr Zul Qarnain Dr Muhammad Qaiser Dr Kamlesh Mahesh Bhojwani Dr Amna Afzal Saeed Dr Aman Qureshi Dr Muhammad Bilal Ibrahim Dr Alishah Akbar Ali Dr Sanober Jamil

Laboratory Staff

Dr Azhar Hussain, Director, BBS Laboratories Dr Farzana Abubakar, Research Specialist Zeeshan Haider, Specialist, ASLS Ghulam Haider, Research Coordinator Asra Khan, Research Coordinator Shazveen Saleem, Research Coordinator Mussarat Ashraf, Research Associate Syed Masnoon Akhtar, Research Associate Sabah Farhat, Research Associate Mahwish Fatima, Research Associate Hira Rafi, Research Associate Tahira Ghulam, Senior Research Assistant Sher Khan, Senior Research Assistant Fizza Nazim, Senior Research Assistant Adil Jamal, Senior Research Assistant Ghazala Zafar, Senior Research Assistant Zahid Hussain, Senior Technologist Pirbux Memon, Technologist Ghulam Abbas, Laboratory Aide

Laboratory Staff on Grants

Hamna Rafique, Research Associate Alisalman Sheikh, Research Associate Dur-e-Shahwar Khan, Research Associate Hina Shakil, Senior Research Assistant Fatima Iqbal, Senior Research Assistant Nida Farooqui, Senior Research Assistant Prashant Tikmani, Senior Research Assistant

Administrative Staff

Gulafroze Jessa, Manager Irfanullah Baig, Assistant Manager Noorulain Salim, Associate Bilal Effendi, Associate Ali Moosa, Coordinator Imran Hajani, Coordinator Ramzan Samnani, Senior Assistant