DOW RESEARCH INSTITUTE OF
BIOTECHNOLOGY AND BIOMEDICAL SCIENCES

(DRIBBS)

DOW UNIVERSITY OF HEALTH SCIENCES

STRATEGIC PLAN

(2024 – 2027)

Pioneering Excellence | Inspiring Innovation

To Heal | To Educate | To Discover


بسم الله الرحمن الرحيم

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DIRECTOR'S MESSAGE

In this era of Translational Medicine, it is extremely important to focus the research on bench to bedside and facilitating patient care using advancements like Cellular therapeutics and Gene therapy. Dow Research Institute of Biotechnology and Biomedical Sciences is committed to becoming a global leader in Biotechnology & Biomedicine related translational research by integrating cutting-edge technologies such as Artificial General Intelligence (AGI) and quantum computing to revolutionize Translational Medicine and Cellular Therapeutics.

As part of strategic planning, this institute provides a centralized core research facility for the Principal Investigators and postgraduate students to do their research in the domain of DUHS signature programs involving experimental sciences. The focus of the research, based on the major proportion of projects and intramural and extramural competitive grants, is on the below-mentioned signature program of Dow University of Health Sciences.

- Regenerative Medicine, Stem cells & Transplant

Stem-cell research is rapidly advancing towards potential therapeutic applications such as tissue and organ replacement, disease modelling, and drug screening.

An extension towards advanced Cellular therapy lab within the institute can both provide a platform for translational research and clinical services to the patients, not only within DUHS but also covering the province, and can be a leading Centre for these advanced therapeutics in the country. DRIBBS aims to have National and International collaborations for the establishment of these advanced therapeutics for patient care and translational research.

Dr. Mohsin Wahid

EXECUTIVE SUMMARY

As part of DUHS' strategic plan 2024-2030, embracing advanced research and innovation through data-driven methodologies and interdisciplinary collaborations, DRIBBS will lead the transformation of biotechnology research by adopting AGI for real-time data analysis, AI-driven diagnostics, and quantum-enabled drug discovery. DRIBBS aims to have international collaborations with global leaders in Cell and Gene therapy for establishing advanced therapeutics at Dow University of Health Sciences and making it a leader in this advanced domain in the country, facilitating translational research and patient care.

Cell and Gene therapy Informatics can facilitate screening and characterization of identified suitable genes so that the individual patient has the highest level of compatibility and can avail maximum therapeutic benefits. Machine learning based models have successfully predicted stem cell differentiation, cell fate, and gene expression using algorithms trained with information already available from different individuals and pre-clinical and clinical studies. The available datasets of Genomic information and drug responses, Machine learning based models can be used for predicting the potency of cell therapy and will be utilized for personalized and individual patient-based treatments.

ABOUT DRIBBS

Since its inception, DRIBBS has pioneered the integration of AI in biomedical research, making significant advancements in stem cell research and vaccine development.

DRIBBS has provided the laboratory-based infrastructure and platform for DUHS faculty, Principal Investigators, and postgraduate students to carry out their experimental work with fully equipped labs and advance research facilities in line with DUHS signature programs. Stem Cells and Regenerative Medicine lab at DRIBBS has facilitated more than 20 MPhil and several PhD thesis and has provided the resource facilities that have led to several intramural and extramural funding/Grants in the university. Stem Cell Transplant Bio banking facility was established in order to facilitate Clinical Hematology and Bone Marrow Transplant unit of Dow University Hospital and has so far facilitated 9 Stem Cell transplants for Bio banking. More recently, Cell line cryopreservation facility based on Liquid Nitrogen freezing has been established for facilitation of Cellular based research. During COVID 19, Virology lab was utilized for COVID testing and IVIG was also produced in DRIBBS including all the experimental work. DRIBBS is a Collaborating Institute along with DIABAR and DILS in GCF-790 HEC funded project "**Development of Inactivated Human Rabies Vaccine against Wild-type Strain in Pakistan"** and the Virology and Vaccine Research Lab in DRIBBS has been upgraded for this purpose and has facilitated Vaccine research at DUHS.

DRIBBS has contributed in the university research output by facilitating faculty and Principle Investigators from all the departments and institutes within DUHS and postgraduate students from school of postgraduate studies to carry out their experimental research work at DRIBBS with the provision of general consumables and use of equipment and research labs. More than 40 PIs and more than 120 students have been facilitated in the last five years (2018-2024).

INTRODUCTION & OVERVIEW

Dow Research Institute of Biotechnology and Biomedical Sciences (DRIBBS) is a state of an art core research facility that is being utilized by Principal Investigators and Postgraduate students at Dow University of Health Sciences (DUHS) to carry out their experimental research work in advance domains of Biotechnology and Biomedical Sciences.

DRIBBS was established in 2015 as a multidisciplinary lab to promote advanced and cutting-edge research in DUHS and as part of strategic planning 2019-2030, DRIBBS now functions as Dow Smart Labs and a centralized research facility that facilitates the university mission of promoting patient centered research through generation of new knowledge, cutting edge research and innovation. The facility is provided with advanced and latest equipment for research utilization in advanced domains and includes:

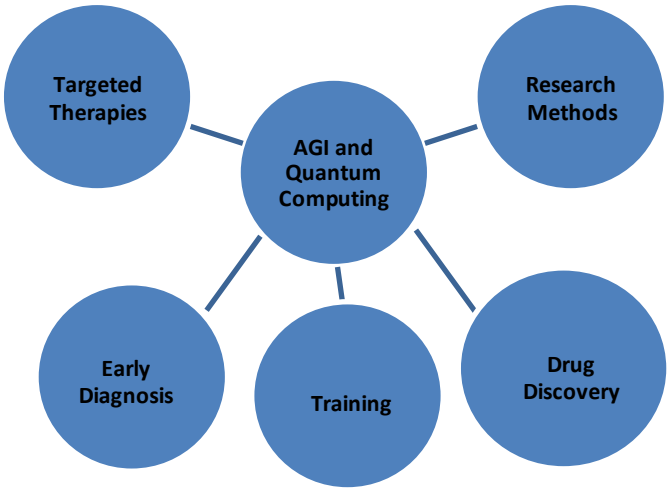
Stem Cells and Regenerative Medicine lab, Microbial BSL-3 lab and Virology and Vaccinology BSL-3 lab, Fermentation lab, Bioinformatics lab, Chromatography Facility, Protein analysis lab, Flow cytometry Facility, Cell Culture lab, PCR and Gel electrophoresis Lab, Spectroscopy and a fully equipped stem cell transplant Bio banking facility.

A complete list of equipment available at DRIBBS is attached

As part of strategic plan 2024-2030, DRIBBS will lead the transformation of Biotechnology and Biomedicine based Translational research by adopting Artificial General Intelligence for real-time data analysis, AI-driven diagnostics, and quantum-enabled drug discovery facilitating Cellular therapeutics.

AGI AND MACHINE LEARNING RESEARCH OUTPUTS.

Artificially intelligent computer systems are used extensively in biomedical and translational sciences research. AI has been instrumental in advancing stem cell technology, especially through non-invasive cell identification, genomic and proteomic data analysis, end-to-end drug discovery and the enhancement of diagnosis and targeted therapies.



Accomplishments in the last Five Years (2018-2023)

As mentioned, the facility has been utilized as per university requirements for projects requiring specific equipment or lab design and some notable achievements during that period are mentioned below:

1. Since its inception, DRIBBS has pioneered the integration of AI in biomedical research, making significant advancements in stem cell research and vaccine development.
2. DRIBBS infrastructure improvement and a new facility (DRIBBS extension) as part of KPI of Research from Master Strategic plan of DUHS (2019-2030) has been completed
3. 4 extramural Research Grants as PIs from DRIBBS, 1 extramural Grant as Academic Collaborator, 6 intramural Grants as PI from DRIBBS and 3 as Co-PI (CVs attached)
4. Impact factor publication from DRIBBS personnel and also PIs from other institutes within DUHS who utilize DRIBBS as a centralized core research facility
5. Virology and Vaccinology BSL-3 lab was utilized for COVID-19 testing for the Molecular pathology team of DDRRL (2019-2020)
6. Bioprocessing/Fermentation lab was utilized for carrying out at the experimental work for IVIG project during COVID 19
7. Fly lab and Research was facilitated for a period (2020-2022) before it was moved to Dow College of Biotechnology (DCOB) in 2023

8. Stem Cell Transplant Bio banking facility was established in DRIBBS in 2021 for facilitation of Clinical Hematology and BMT unit of Dow University Hospital and has facilitated Nine (9) Stem Cell transplants requiring Bio banking so far (List attached)
9. DRIBBS is a Collaborating Institute along with DIABAR and DILS in GCF-790 HEC funded project "**Development of Inactivated Human Rabies Vaccine against Wild-type Strain in Pakistan"** and the Virology and Vaccine Research Lab in DRIBBS has been upgraded for this purpose and part of work that has to be carried out in the facility has started.
10. Cell line Cryopreservation facility using Liquid Nitrogen for long term preservation has been started in 2023 and various cell lines from PIs within DUHS are currently cryopreserved.
11. 36 Principal Investigators (DUHS Faculty) facilitated for Research during 2018-2023 (List attached)
12. 119 Postgraduate Students (MPhil/MDS/PhD) facilitated Research during 2018-2023 (List attached)
13. General Consumables/Glassware are provided to all the faculty/Postgraduate Students as per requirement and no fees is charged for utilization of Facility/Equipment/Freezers/Liquid Nitrogen
14. A Five-year contract has been recently signed with IBBPS (Bioequivalence Centre) of DUHS for utilizing BSL-3 Microbiology lab at DRIBBS, TLA for testing as their microbiology lab is currently under planning and development phase.

DRIBBS FACULTY

Dr. Omair Anwer Mohiuddin, PhD (USA), Associate Professor, DRIBBS (Joined in 2025)

Rakhshinda Habib, MSc, PhD (Molecular Medicine), Assistant Professor, DRIBBS

Dr. Nadia Naeem, MSc, PhD (Molecular Medicine), Assistant Professor, DRIBBS

Dr. Nazia Ahmed, MSc, PhD (Molecular Medicine), Assistant Professor, DRIBBS

Dr. Asma Khursheed, PhD (Eng), Assistant Professor, DRIBBS

Principal Investigators from DRIBBS involved in Stem Cell Research with both Intramural and Extramural funding:

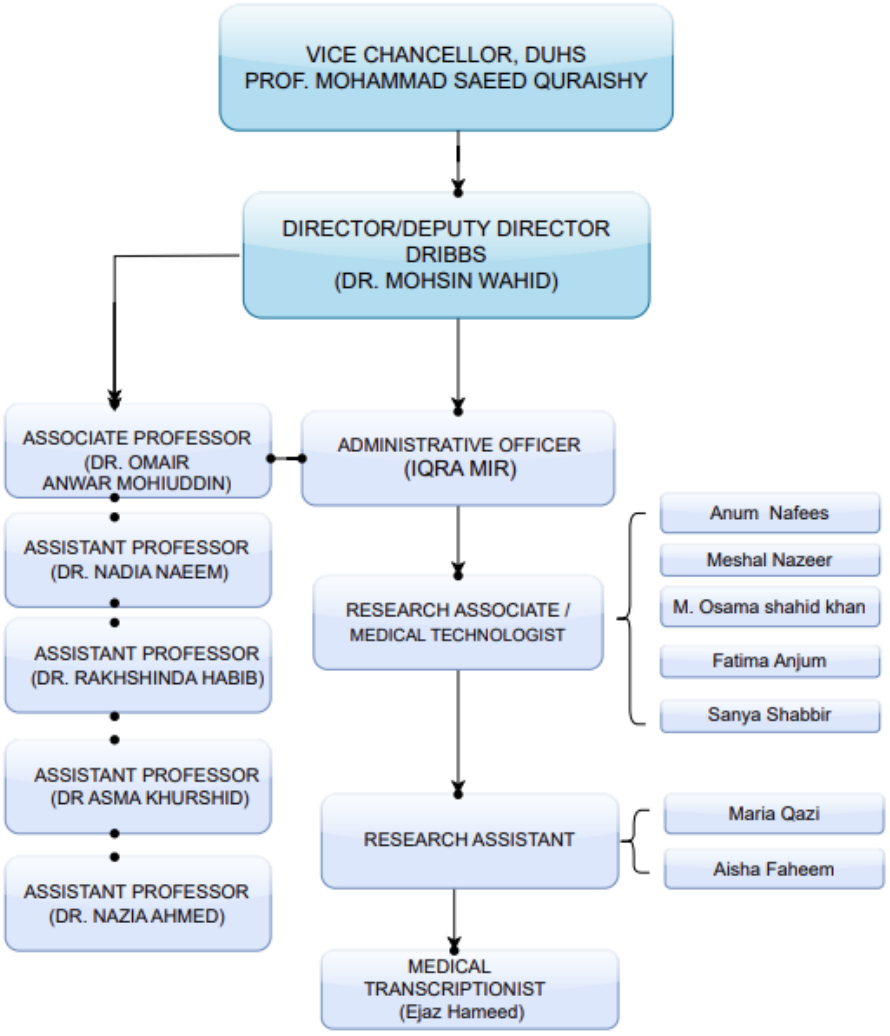
1. Dr. Mohsin Wahid, Tenure Track Associate Professor of Pathology, DIMC & Head/Deputy Director, DRIBBS
2. Dr. Rakhshinda Habib, Assistant Professor, DRIBBS
3. Dr. Nadia Naeem, Assistant Professor, DRIBBS
4. Dr. Nazia Ahmed, Assistant Professor, DRIBBS

Principal Investigators from other Institutions within DUHS involved in Stem Cell Research at DRIBBS with both Intramural and Extramural funding:

1. Dr Farina Hanif, Assistant Professor, DIMC
2. Dr Anum Gul, Assistant Professor, DCOB

INSTITUTIONAL ORGANOGRAM

ORGANOGRAM
DOW RESEARCH INSTITUTE OF BIOTECHNOLOGY AND BIOMEDICAL SCIENCES, DRIBBS.
DOW UNIVERSITY OF HEALTH SCIENCES



SECTION I: OVERVIEW OF THE STRATEGIC PLANNING PROCESS

Membership of the Executive Strategic Planning Work Group for DRIBBS was as follows.

Dr. Mohsin Wahid Head/Deputy Director, DRIBBS	Chairperson
Dr. Nadia Naeem Assistant Professor, DRIBBS	Member
Dr. Rakshinda Habib Assistant Professor, DRIBBS	Member
Dr. Nazia Ahmed Assistant Professor, DRIBB	Member

There were multiple meetings held amongst the workgroup to make the first draft of the plan. SWOT analysis and TOWS matrix were applied, and based on the findings, OKRs and strategic goals were identified.

Stakeholder feedback analysis will be integrated into the planning process, iteratively maintaining transparency in decision making. Some common methods of feedback include surveys, interviews, focus groups, workshops, observation, and feedback loops. The planning process utilized AGI to analyze global research trends, providing actionable insights for setting strategic priorities.

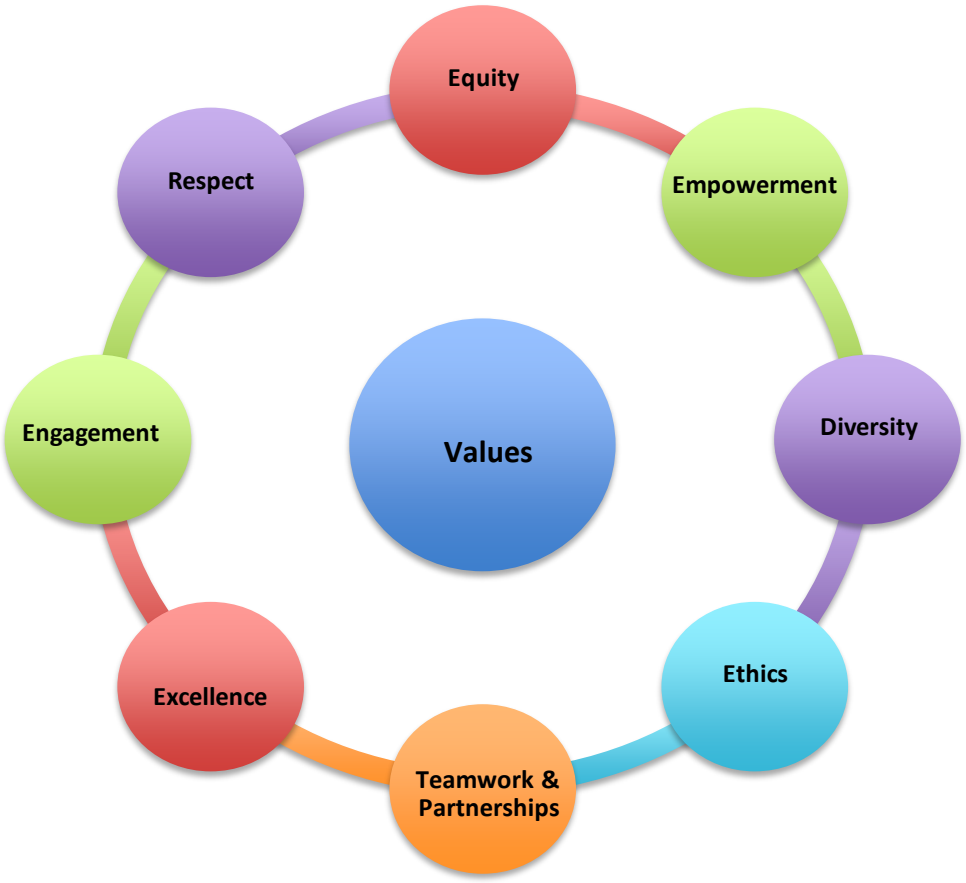
SECTION II: VISION, MISSION & VALUES

VISION

To be a pre-eminent academic institution committed to changing and saving lives.

MISSION

Providing outstanding patient-centered education, training, and clinical care informed by cutting-edge research and innovation, generating and disseminating new knowledge.



VALUES:

- Customer Service
  - Put students first
- Empathy & Compassion
  - Understand before you judge
  - Be concerned for the sufferings and misfortunes of others
- Excellence
  - Be the best and commit to exceptional quality and service
- Innovation
  - Encourage curiosity, imagine, create, and share
- Teamwork
  - Engage and collaborate
- Integrity & Leadership
  - Be a role model and influence others to achieve their best
  - Have the courage to do the right thing
  - Hold yourself and others accountable
- Respect & Collegiality
  - Be kind
  - Listen to understand
  - Value different opinions

STATEMENT OF PURPOSE

To provide a platform for Basic and Translational research and promote the DUHS signature programs in line with the university's mission of promoting patient-centered research through the generation of new knowledge, cutting-edge research, and innovation.

To advance global health by leveraging advanced technologies like AGI, quantum computing, and machine learning to lead in innovative Biotechnology and Biomedical research and education.

SECTION III: ASPIRATIONAL INSTITUTIONS

Global leaders in Cellular Therapy

- University of Pennsylvania, USA
- University of Washington, USA
- Advanced Cell Therapy and Research Institute, Singapore

National Centre for Regenerative Medicine and Stem Cell Research

- Aga Khan University Hospital

Global leaders for advancements in AI-driven Biomedical research

- Broad Institute of MIT & Harvard
- Stanford University
- Google DeepMind

SECTION IV: STRATEGIC GOALS

Goal 1: DOW smart labs and a centralized core facility for principal investigators and postgraduate students.

Objective 1: To provide shared research resources, expertise, and services to support innovative and cutting-edge research across various disciplines.

Objective 2: Training workshops on Flowcytometry/Stem Cell Culture/2D Electrophoresis/HPLC/FPLC/qPCR/Fermentation.

Objective 3: Teaching and supervision of PhD students in the newly offered molecular medicine program at DUHS.

Objective 4: Emphasizing green and sustainable lab practices by using environmentally friendly products and services.

Goal 2: Facilitation of translational research and cellular therapeutics at Dow University of Health Sciences.

Objective 1: Research grants and collaborations in the domain of stem regenerative medicine, stem cells & transplant.

Objective 2: Internal collaboration with DIABAR for preclinical testing of isolated and modified cells.

Objective 3: Developing revenue streams from patents and service ideas to move towards commercialization.

Objective 4: Cellular therapy lab at DRIBBS.

Goal 3: Promoting DRIBBS as a leader in AI-driven Biotechnology & Biomedical Research

Objective 1: National and international collaborations.

Objective 2: Industrial linkages and public-private partnerships.

Objective 3: Establishing partnerships with AI and tech-driven global healthcare Institutions.

Objective 4: Integrate quantum algorithms for molecular simulations and AGI for automating clinical trial data analysis.

OBJECTIVES, OKRs & KPIs

Goal 01: DOW Smart Labs and a Centralized Core Facility for Principal Investigators and Postgraduate students
Goal Statement: To continue expanding DOW smart labs and a centralized core facility that provides shared research resources, expertise, and services to support innovative and cutting-edge research, while also offering training and emphasizing sustainable lab practices.
Objectives & Key Results (OKRs)

Objective 1: To provide shared research resources, expertise, and services to support innovative and cutting-edge research across various disciplines

Objective	Key Results	KPI	Measurement Method	Target	Person Responsible	Resource Requirement	Timeline
To provide shared research resources, expertise, and services to support innovative and cutting-edge research across various disciplines	KR 1.1: One National Collaboration per faculty per year	KPI 1.1: 75% of the faculty has established a collaboration by the end of 2025	Project Collaboration or Institutional Collaboration established with a PI or Institute in Pakistan	Submitting Research Grants in Collaboration	All DRIBBS Faculty	Research Assistants and Associates	Yearly
	KR 1.2: One International Collaboration per faculty per year	KPI 1.2: 75% of the faculty has established a collaboration by the end of 2025	Project Collaboration or Institutional Collaboration established with a PI or Institute outside Pakistan	Submitting Research Grants in Collaboration	All DRIBBS Faculty	Research Assistants and Associates	Yearly

Objective 2: Training workshops on Flowcytometry/Stem Cell Culture/2D Electrophoresis/HPLC/FPLC/qPCR/Fermentation

Objective	Key Results	KPI	Measurement Method	Target	Person Responsible	Resource Requirement	Timeline
Training workshops on Flowcytometry/Stem Cell Culture/2D Electrophoresis/HPLC/FPLC/qPCR/Fermentation	KR 2.1: Training of staff and postgraduates	KPI 2.1: Number of faculty/staff/PGs registered	No of workshops are conducted in a year	4 per year	All DRIBBS Faculty	Revenue generation from the training workshops	Yearly

	KR 2.2: Training of Undergraduates DMC/DIMC/DIKOHS/DDC/DIDC for BASIC molecular techniques (DNA/RNA/PCR)	KPI 2.2: Number of Undergraduates registered	No of workshops are conducted in a year	4 per year	All DRIBBS Faculty	Revenue generation from the training workshops	Yearly

Objective 3: Teaching and Supervision of PhD students in the newly offered Molecular Medicine Program at DUHS

Objective	Key Results	KPI	Measurement Method	Target	Person Responsible	Resource Requirement	Timeline
Teaching and Supervision of PhD students in the newly offered Molecular Medicine Program at DUHS	KR 3.1: Teaching Core Courses MPhil/PhD	KPI 3.1: Teaching Genetics and Molecular Medicine Courses	No of postgraduate courses taught	3-4 COURSES	All DRIBBS Faculty	Laboratory consumables/Glassware/Equipment/Research Assistants	Yearly
	KR 3.2: Research Supervision MPhil	KPI 3.2: Supervision of MPhil Genetics and Molecular Medicine students	MPhil students supervised	2 MPhil	All DRIBBS Faculty	Laboratory consumables/Glassware/Equipment/Research Assistants	Yearly
	KR 3.3: Research Supervision PhD	KPI 3.3: Supervision of PhD Genetics and Molecular Medicine students	PhD Students supervised	1PhD	All DRIBBS Faculty	Laboratory consumables/Glassware/Equipment/Research Assistants	Yearly

Objective 4: Emphasizing green and sustainable lab practices by using environmentally friendly products and services

Objective	Key Results	KPI	Measurement Method	Target	Person Responsible	Resource Requirement	Timeline
Emphasizing green and sustainable lab practices by using environmentally friendly products and service	KR 4.1: Use of specified lab products and consumables	KPI 4.1: Use of environmentally friendly	[Describe how measurement will occur]	All consumables utilized must be tagged accordingly	All DRIBBS Faculty	Laboratory consumables/Glassware/Equipment/Research Assistants	Yearly

Goal 02: Facilitation of Translational Research and Cellular Therapeutics at Dow University of Health Sciences.							
Goal Statement: To facilitate translational research and cellular therapeutics at Dow University of Health Sciences by fostering research grants, collaborations in stem regenerative medicine, preclinical testing, and the establishment of a cell therapy lab.							
Objectives & Key Results (OKRs)							
Objective 1: Research Grants and Collaborations in the domain of Stem Regenerative Medicine, Stem Cells &Transplant							
Objective	**Key Results**	**KPI**	**Measurement Method**	**Target**	**Person Responsible**	**Resource Requirement**	**Timeline**
Research Grants, Publications and Collaborations in the domain of Stem Regenerative Medicine, Stem Cells & Transplant	KR 1.1: Research Grants in the domain	KPI 1.1: 50% of the faculty has established a collaboration by the end of 2025	Number of Grants submitted	Submitting Research Grants in Collaboration	All DRIBBS Faculty	Dedicated funds for stem cell research/ consumables/ Research Assistants and Associates	Yearly
	KR 1.2: National and International Collaborations in the domain	KPI 1.2: 50% of the faculty has established a collaboration by the end of 2025	Number of collaborations attempted	Submitting Research Grants in Collaboration	All DRIBBS Faculty	Dedicated funds for stem cell research /consumables /Research Assistants, and Associates	Yearly
	KR 1.3: Research publications in the domain	KPI 1.3: 50% of the faculty has established a collaboration by the end of 2025	Project Collaboration or Institutional Collaboration established with a PI or Institute outside Pakistan	Submitting Research Grants in Collaboration	All DRIBBS Faculty	Dedicated funds for stem cell research consumables/ Research Assistants and Associates	Yearly
Objective 2: Internal Collaboration with DIABAR for Preclinical Testing of isolated and modified Cells							
Objective	**Key Results**	**KPI**	**Measurement Method**	**Target**	**Person Responsible**	**Resource Requirement**	**Timeline**
Internal Collaboration with DIABAR for preclinical testing of Cells	KR 2.1: Dedicated area in DIABAR for stem cell research	KPI 2.1: Preclinical testing of modified cells	No. of projects with industrial linkage per faculty in a year	Industrial visits for linkages	Dr. Nadia/ Dr. Nazia/ Dr. Rakshinda	DIABAR advance lab	Yearly
	KR 2.2: Issuance of rodents/Safety cabinet for sterile organ isolation, cell propagation and ex-vivo transplantation of cells	KPI 2.2: Dedicated space and facilities provided	No. of studies for preclinical testing	Start of Clinical trials for studies involving laboratory-based work	Dr. Nadia/Dr. Nazia/Dr. Rakshinda	DIABAR advance lab	Yearly

Objective 3: Developing revenue streams from patents and service ideas to move towards commercialization							
Objective	**Key Results**	**KPI**	**Measurement Method**	**Target**	**Person Responsible**	**Resource Requirement**	**Timeline**
Developing revenue streams from patents and service ideas to move towards commercialization	KR 3.1: Patent generation from work done at DRIBBS	KPI 3.1: Number of patents submitted by faculty	Track the number of patents submitted by faculty	One per faculty	All DRIBBS Faculty	Research Grants and Funding through industry	Yearly
	KR 3.2: Revenue Generation	KPI 3.2: Total revenue generated from patent commercializ-ation	Monitor revenue from patents	[Specific target for the key result]	All DRIBBS Faculty	Research Grants and Funding through industry	Yearly
Objective 4: Cellular therapy lab at DRIBBS							
Objective	**Key Results**	**KPI**	**Measurement Method**	**Target**	**Person Responsible**	**Resource Requirement**	**Timeline**
Cellular therapy facility at DRIBBS	KR 4.1: Lab upgradation to GMP standard	KPI 4.1: Fully functional lab	GMP manufacturing can be done	Lab infrastructure 70% completed by 2025	Dr Mohsin Wahid/Dr Rakshanda	DUHS/Govt funding/Collaborations/Philanthropy	Yearly
	KR 4.2: Procurement of Equipment for Cellular therapy	KP 4.2: Clini Macs Prodigy is procured along with therapeutic apheresis machine	Equipment required are purchased	All equipment procured by 2026	Dr Mohsin Wahid/Dr Rakshanda	DUHS/Govt funding/Collaborations/Philanthropy	Yearly
	KR 4.3: Regulatory framework for Cellular therapy clinical trials	KPI 4.3: Regulatory Framework Approval for Cellular Therapy Clinical Trials	Regulatory framework is approved	Ready for clinical trials by 2026	Dr Mohsin Wahid/DRIBBS faculty	International Guidelines/FDA/European agency	Yearly

Goal 03: Promoting DRIBBS as a leader in AI-driven Biotechnology & Biomedical Research							
Goal Statement: To promote DRIBBS as a leader in AI-driven biotechnology and biomedical research by building national and international collaborations, forming industrial partnerships, and integrating advanced technologies like quantum algorithms and AGI in clinical trial analysis.							
Objectives & Key results (OKRs)							
Objective 1: National and International Collaborations							
Objective	**Key Results**	**KPI**	**Measurement Method**	**Target**	**Person Responsible**	**Resource Requirement**	**Timeline**
National and International Collaborations	KR 1.1: One National Collaboration per faculty per year	KPI 1.1: 75% of the faculty has established a national collaboration by the end of 2025	Project Collaboration or Institutional Collaboration established with a PI or Institute in Pakistan	Submitting Research Grants in Collaboration	All DRIBBS Faculty	Research Assistants and Associates	Quarterly
	KR 1.2: One International Collaboration per faculty per year	KPI 1.2: 75% of the faculty has established an international collaboration by the end of 2025	Project Collaboration or Institutional Collaboration established with a PI or Institute outside Pakistan	Submitting Research Grants in Collaboration	All DRIBBS Faculty	Research Assistants and Associates	Quarterly
Objective 2: Industrial linkages and Public-Private Partnerships							
Objective	**Key Results**	**KPI**	**Measurement Method**	**Target**	**Person Responsible**	**Resource Requirement**	**Timeline**
Establishing Industrial linkages and Public-Private partnerships	KR 2.1: Establishing Industrial linkages with Pharmaceuti-cal	KPI 2.1: Industrial Projects in collaboration to be carried out at DRIBBS	No. of projects with industrial linkage per faculty in a year	Industrial visits for linkages	All DRIBBS Faculty	Research Grants and Funding through Industry	Quarterly
	KR 2.2: Establishing Public Private Partnerships with Private Research Centers and Hospitals	KPI 2.2: Research projects and clinical trials	No Enrollments in clinical trials	Clinical trials for studies involving laboratory-based work	All DRIBBS Faculty	Research Grants and Fundings for Clinical Trials	Quarterly

Objective 3: Establishing partnerships with AI and tech-driven global healthcare Institutions							
Objective	**Key Results**	**KPI**	**Measurement Method**	**Target**	**Person Responsible**	**Resource Requirement**	**Timeline**
3 Establishing partnerships with AI and tech-driven global healthcare institutions	KR 3.1: Shortlisting of Global Health Care Institutes for future partnerships	KPI 3.1: Identification of 5-7 top institutes that could potentially be partners	Number of contacts made and percentage with positive response	Three institutes	All DRIBBS Faculty	Budget for infrastructure AGI by DUHS	Yearly
	KR 3.2: Meetings online or visiting for the partnerships	KPI 3.2: Meeting for partnerships and provision of infrastructure support	Number of online meetings and visits	4 meetings/year and at least one visit for partnership	All DRIBBS Faculty	Travel and Boarding Fund	Yearly
Objective 4: Integrate quantum algorithms for molecular simulations and AGI for automating clinical trial data analysis							
Objective	**Key Results**	**KPI**	**Measurement Method**	**Target**	**Person Responsible**	**Resource Requirement**	**Timeline**
4. Integrate quantum algorithms for molecular simulations and AGI for automating clinical trial data analysis	KR 4.1: AGI provision by DUHS	KPI 4.1: AGI provision by DUHS	AGI provision by DUHS	AGI provision by DUHS	Dr Mohsin Wahid, Dr Rakshanda Habib	AGI provision by DUHS	Yearly
	KR 4.2: AGI provision by DUHS	KPI 4.2: AGI provision by DUHS	AGI provision by DUHS	AGI provision by DUHS	Dr Mohsin Wahid, Dr Rakshanda Habib	AGI provision by DUHS	Yearly

SECTION V: RESOURCE PLANNING FOR ACHIEVING STRATEGIC GOALS

- Availability of research assistants and Postgraduate students who can vigorously and dedicatedly perform experiments and research related tasks.
- Hiring of specified staff including Research Associates/Assistants/lab attendants
- Provision of isolated faculty offices with all necessities (furniture, computer and internet)
- Provision of required number of lab animals with Allocation of proper clean workspace area for stem cells related animal experiments that can be in the form of collaboration with DIABAR in DUHS
- Assistance in Grant Proposal and Budget Preparation for Stem cells related allied projects involving international collaborations.
- Dedicated intramural Funding for the Upgradation of the high-quality research design in Stem cell technology with help of advanced research designs, data collection and analysis.
- Setting up of a cellular therapy lab within DRIBBS that would facilitate Translational research in the university (Infrastructure already available, only specific equipment and consumables would be required.
- Extramural funding opportunities including philanthropy, donations for treating diseases like thalassemia and Sickle Cell Anemia using Gene therapy rather than managing them.
- Dedicated budget for quantum-ready computational facilities, AGI-based research automation systems and AI training for faculty and staff.

Plan for advanced technological Infrastructure:

Cellular therapy facility:

Procurement of specific equipment like CLIN iMacs prodigy that is routinely used in cell therapy facilities at International Centers. Equipment for therapeutic apheresis and cell expansion.

Clinical trials with Gene therapy

Gene therapy clinical trials worldwide to 2023—an update

GTCT (a873679)

In the first stage, treatment with FDA approved therapies can be established in collaboration with the clinical Hematology and BMT unit of DUHS for CAR-T cell therapy and BCMA. Later, other clinical units can be involved with FDA approved therapies and also as clinical trials for drugs that are under investigation.

An updated list of FD approved Cell and Gene therapy products is mentioned in the link.

Approved Cellular and Gene Therapy Products | FDA

A comprehensive list of approved Cell and Gene therapy products available in different markets around the world.

Available Products - Alliance for Regenerative Medicine

Cell and Gene Therapy Informatics (AI and Machine learning based)

For Cell and Gene based therapies the role of AI is still in preliminary stages but holds tremendous potential. Machine learning based algorithms, which are a subset of AI can facilitate screening and characterization of identified suitable genes so that the individual patient has the highest level of compatibility and can avail maximum therapeutic benefits. ML-based models have successfully predicted stem cell differentiation, cell fate, and gene expression using algorithms trained with information already available from different individuals and pre-clinical and clinical studies. The available datasets of Genomic information and drug responses, Machine learning based models can be used for predicting the potency of cell therapy and can be utilized for personalized and individual patient-based treatments.

SECTION VI: IMPLEMENTATION & MONITORING OF THE STRATEGIC PLAN

It is extremely important to evaluate the performance and submit an annual report to the higher authorities in a prescribed format with measurable KPI for each year. A meeting every three months amongst the committee members is suggested that it can facilitate the annual assessment report preparation and submission in a timely manner.

AGI-powered tools will monitor KPI performance and provide predictive insights, ensuring timely adjustments to the strategic plan.

● Annual report should be prepared to monitor the progress of the institute, which may include:

1. Number of Students
    a. M.Phil.
    b. Ph.D.
    c. Internees
2. Research productivity
    a. Total no. of publications
    b. Total impact factor of all publications
    c. Total citation
    d. Year Impact factor
    e. Published paper
3. Number of Projects submitted/acquired.
   Intramural project
   Extramural project
4. International conferences, seminars, and workshops organized.
5. International and National Conferences attended.
6. Honors and awards
7. Collaborative work

LIST OF APPENDICES

APPENDIX A: SWOT ANALYSIS

STRENGTHS	WEAKNESSES
1. Infrastructure and fully equipped labs utilized for Research only. 2. Provision of Facility/Equipment/General Consumables/Glassware to all the faculty and Postgraduate students with no fees/charges. 3. Current leadership is fully supportive and aware of advancements in research. 4. Already facilitated over 100 Research projects in the last five years. 5. Stem Cell transplant Bio-banking facility is fully functional, along with a recently started Cell line cryopreservation system. 6. DRIBBS personnel have both intramural and extramural funding. 7. Impact factor publications from DRIBBS personnel and other PIs from DUHS. 8. Integration of AGI and quantum computing.	1. International collaborations and funding. 2. Availability of funding and self-sustainability. 3. Revenue Generation. 4. More need for dedicated support staff for the next three-year plan. 5. Limited exposure to global technological advancements.
OPPORTUNITIES	**THREATS**
1. Industrial linkages and commercialization. 2. Cellular therapies. 3. Research opportunities and collaborations in the field of Stem Cells and Regenerative Medicine. 4. Academic and training opportunities for researchers and students. 5. One-month Molecular Medicine focused on basic lab work for Undergraduate Medical students (DMC/DIMC) who would like to learn these advancements. 6. Expanding into AI-driven drug discovery and quantum computing.	1. As cellular therapy is a highly regulated and newly advancing field, a regulatory framework is needed so that unapproved therapies are not given to the patients. 2. Treatments are expensive and require dedicated funding and philanthropy/donations. 3. Technological lag compared to global competitors.

APPENDIX B: TOWS MATRIX

	OPPORTUNITIES	THREATS
	1. Industrial linkages and commercialization. 2. Cellular therapies. 3. Research opportunities and collaborations in the field of Stem Cells and Regenerative Medicine. 4. Academic and training opportunities for researchers and students. 5. One-month Molecular Medicine focused on basic lab work for Undergraduate Medical students (DMC/DIMC) who would like to learn these advancements. 6. Expanding into AI-driven drug discovery and quantum computing.	1. As cellular therapy is a highly regulated and a newly advancing field, a regulatory framework is needed so that unapproved therapies are not given to the patients. 2. Treatments are expensive and require dedicated funding and philanthropy/donations. 3. Technological lag compared to global competitors.
STRENGTHS	SO	ST
1. Infrastructure and fully equipped labs utilized for Research only. 2. Provision of Facility/Equipment/General Consumables/Glassware to all the faculty and Postgraduate students with no fees/charges. 3. Current leadership is fully supportive and aware of advancements in research. 4. Already facilitated over 100 Research	1. Leverage well-equipped labs and research infrastructure to lead in Stem Cell and Regenerative Medicine research, forming collaborations in this space. 2. Strengthening Industrial linkages and commercialization by providing access to resources for collaboration with industry partners. 3. Capitalize on the leadership's vision and awareness to expand into AI-driven drug discovery and	1. Strengthen the regulatory framework for cellular therapy to ensure that all therapies meet global standards and comply with regulations. 2. Use strong leadership to form policy advocacy groups or engage with stakeholders to push for regulations that safeguard against unapproved therapies. 3. Utilize research funding and expertise to counteract the threat of technological lag by facilitating cutting-edge research and

projects in the last five years. 5. Stem Cell transplant Bio banking facility is fully functional along with a recently started Cell line cryopreservation system. 6. DRIBBS personnel have both intramural and extramural funding. 7. Impact factor publications from DRIBBS personnel and other PIs from DUHS. 8. Integration of AGI and quantum computing.	quantum computing initiatives. 4. Expand the current stem cell bio-banking facility into a global research hub for cellular therapies and regenerative medicine.	technological advancement.
WEAKNESSES	**WO**	**WT**
1. International collaborations and funding. 2. Availability of funding and self-sustainability. 3. Revenue Generation. 4. More need of dedicated support staff for the next three years plan. 5. Limited exposure to global technological advancements.	1. Focus on global collaborations in Stem Cells, Regenerative Medicine, and AI-driven drug discovery to overcome funding and collaboration challenges. 2. Tap into philanthropy, donations, and commercialization of cellular therapies and research products to address funding gaps. 3. Provide academic and training opportunities (e.g., training for undergraduate students in molecular medicine) to build a skilled workforce to support future growth.	1. Seek out strategic partnerships or joint ventures to increase self-sustainability and avoid financial strain that limits progress on cellular therapies. 2. Expand staffing plans and train more personnel in critical areas such as cellular therapies to prepare for increased demand and global competition. 3. Revenue Generation Develop a sustainable revenue generation model through the commercialization of research products, especially in cell-based therapies and AI drug discovery.

APPENDIX C: LIST OF PROJECTS FOR POSTGRADUATE STUDENTS

S.NO	NAME	COURSE	TITLE	STATUS
01	Dr. Misbah	MDS	Comparison of fluoridated bioactive gases and zinc carbonate hydroxyapatite-based toothpaste with fluorides for remineralization of permanent irradiated teeth specimens	In process
02	Dr. Urooba Khan	M.Phil	Effect of selenium nanoparticles on Oste inductive potential in human umbilical cord derived mesenchymal stem	In process
03	Fizza Zaidi	M.Phil	Invitro Antibacterial screening of N,N Dimethyl BiguanideAnlogues against E.coli Resistant strains and their Molecular docking studies.	In process
04	Sumbul Rafique	M.Phil	Molecular Characterization of Acute leukemia based on gene expression of miRNAs	Complete
05	Erum Munir	M.Phil	Antioxidant effect of Patulin on oxidative stress damage in human mesenchymal stem cell	In process
06	Dr. Mahrukh sheikh	MDS	Presence and quantification of ILC3 and its association with lymph node metastasis in oral squamous cell carcinoma	Complete
07	Dr. Ruqaiya Shahid	PhD	Identification of histopathological and molecular subtypes of preeclampsia	In Process
08	Sumaira Naz	M.Phil	Neuroprotective potential of papain in Parkinson's disease rodent model	Completed
09	Amna Rumaisa Zahidi	M.Phil	CRISPR-Cas 9 mediated editing of a specific (619 bp Del) mutation in human HBB Gene in In-vitro derived cells from Thalassemia Major Patients	In process
10	Komal	M.Phil	Preclinical screening of the therapeutic potential of	COMPLETED

			vanillin derivatives as anti-epileptics and promoters of neuroplasticity	
11	Dr. Mahrukh Kamran	PhD	Effect of modified human umbilical cord derived mesenchymal stem cells in animal model of Alzheimer's disease A preclinical study	In process
12	Dr. Sehrish Rehman	MDS	Influence of silk fibers on the setting time, hydrolytic stability, strength and hardness of glass ionomer tooth filling material	In process
13	Dr. Javeria	M.Phil	MicroRNAs 223 and 21 in non-alcoholic fatty liver disease and NAFLD related hepatocellular carcinoma and their association with visceral obesity	In process
14	Zubia Tahir	M.Phil	Role of selenium nanoparticles in osteogenic differentiation of human umbilical cord derived mesenchymal stem cell	In process
15	Dr. Saima Naseem	PhD	Investigating potential biomarkers and molecular methods to improve diagnosis of viral meningitis	In process
16	Afshan Mehmood	M.Phil	Identification of single nucleotide polymorphism in exon 6 of lactase gene (LCT) from umbilical cord blood	In process
17	Quratulain Pirzada	M.Phil	Synthesis chemical and biological evolution of charge transfer complexes of selected Antihistamines	In process
18	Zohra Barkat Ali	M.Phil	Invitro and In vivo studies of newly synthesized diclofenac sodium metal complexes.	completed
19	Danya Fyaz	M.Phil	Investigation of matrix metalloprotein 9 gene polymorphism and protein expression in oral squamous cell carcinoma	completed
20	Dr. Shazia Jabbar	PhD	Liquid Biopsy: molecular characterization of circulating tumor cells in Epithelial ovarian cancer	In process
	Dr. Dania		Investigation of expression of C-terminal cross-linking	completed

21		MDS	telopeptide of type I collagen (Ctxi) levels in saliva with early and delayed loading of dental implants.	
22	Dr. Sobia Akhtar	M.Phil	Estimation of salivary S100A8 along with Zinc and Calcium levels among patients presenting with Oral sub-mucous fibrosis and oral squamous cell carcinoma.	COMPLETE
22	Rubina Gulzar	PhD	Investigating the role of Innate lymphoid cells in pathogenesis of triple negative breast cancer	In process
23	Samreen Khan	M.Phil	Comparison of serum SKA 1 levels and its tissue expression in oral potential malignant and squamous cell carcinoma	COMPLETED
24	Dr. Hina jabeen	M.Phil	Isolation and characterization of amniotic fluid stem cells and their differentiation towards nephron progenitor's cells.	COMPLETE
25	Dr. Abdul Qadir	M.Phil	Investigating the synergistic effects of bevacizumab and celecoxib on angiogenesis using in vitro derived human umbilical vein endothelial cells	COMPLETE
26	Dr. Mehwish Zehravi	M.Phil	Determination of mutational profile of muscular dystrophy patients and derivation of induced pluripotent stem cells from peripheral blood of DMD patients	COMPLETE
27	Muhammad Osama Shahid Khan	M.Phil	Cellular reprogramming of cord blood derived endothelial colony forming cells towards induced pluripotent stem cells (iPSCs)	COMPLETE
28	Dr. Ayesha Kashmala	M.Phil	Isolation and Characterization of human Mesenchymal stem cells	COMPLETE

			(MSCs) from cord blood and their differentiation towards keratinocytes	
29	Dr. Fareeha Shahab	M.Phil	In vitro generation of human DMD-cardiomyocytes from DMD patient-specific induced pluripotent stem cells derived from urine cells	COMPLETE
30	Dr. Parma	M.Sc.	Investigating the expression of salivary miRNA -31 in oral squamous cells of carcinoma patients.	COMPLETE
31	Dr. KhushbuL ohana	M.Sc.	The impact of salivary proteins, MUC1 and MUC5b in vegetarians with or without dental caries	COMPLETE
32	Lubna Khan	M.Phil	Generation of neural progenitor cells from mesenchymal stem cells using small molecules and fibroblast growth factors	COMPLETE
33	Sidra Zaheer	M.Phil Co-student of szabist	Identification of rare SNV in GLP1R in association of type 2 Diabetes susceptibility in a subgroup of Pakistan population	COMPLETE
34	Dr. Tauqeer bibi	M.Sc	Evaluation of MMP8 & IL-1b in chronic periodontitis using gingival crevicular fluid –as a fluid biopsy for diagnostics, maintenance and intervention	COMPLETE
35	Sehrish Urooj	M.Phil	Partial purification and antimicrobial potential evaluation of protein/peptide from Pakistani yellow scorpion (buthussindicus)	COMPLETE
36	Dr. Zohra	MDS trainee	Estimation of salivary MMP-12 levels among patients presenting with oral sub mucous fibrosis and oral squamous cell carcinoma	COMPLETE

37	Qurrat-ul-Ain	M.Phil	To study DRD2 gene polymorphism in schizophrenia patients visiting a tertiary care hospital in Karachi	COMPLETE
38	Dr. Tooba Noor	M.Phil	Detection of Serum Copeptin levels in Diabetic patients to evaluate progressive nephropathy	COMPLETE
39	Dr. Alveena Shabbir	M.Sc trainee	Comparison of Salivary Cathepsin B in different Histological Grades of Oral Squamous Cell Carcinoma	COMPLETE
40	Dr. Zurqa	M.Phil	Early growth response protein as putative biomarker for the diagnosis of gestational diabetes mellitus	COMPLETE
41	Naila Sheeraz	MPhil	Evolutionary Genetics of Microsatellites in Human Genome	COMPLETE
42	Saadia Shakir	MPhil	Structure-Function Relationship of Cancer Associated Ubiquitin Specific Proteases	COMPLETE
43	Shabana Arzoo	M.Phil	Screening and Characterization of Silver Nanoparticles Synthesized from Indigenously Isolated Pseudomonas species	COMPLETE
44	Amna Mughal	M.Phil	Expression of USP7 and p53 in the Development of Lungs in Mouse Model	COMPLETE
45	Javeria Masnoon	M.Phil	Structure-Function Relationship of Ubiquitin Specific Proteases Involved in Viral Pathogenesis	COMPLETE
46	Dr. Ambreen Ashfaq	M.Phil	In-vitro Modulation of Glioblastoma Cells Using natural compounds	COMPLETE
47	Ambreen Rafique	M.Phil	Microbiological and Genetic Characterization of	COMPLETE

			Enterococcal Virulence Factors	
48	Fozia Raza	M.Phil	Structural Phylogenomics of Human Cylindromatosis CYLD gene	COMPLETE
49	Sadaf Gul	M.Phil	Genotypic and Pathological Variations in HBV Associated Hepatocellular Carcinoma (HCC)	COMPLETE
50	Zoha Naqvi	M.Phil	Screening and Characterization of Silver Nanoparticles Synthesized by Indigenously Isolated Escherichia Coli	COMPLETE
51	Sumera iffat	M.Phil	Aggressive Behavior: Potential Role of Serotonin or its Receptors	COMPLETE
52	Dr Nighat Manan	PhD	Molecular Physiology of Epilepsy: Sequence Polymorphism and Structure Function Relationship of SCN1A	COMPLETE
53	Shazia Qayum	M.Phil	Molecular detection of Class 1 Integron and Antibiotic Resistance Profile of Clinically Isolated Pseudomonas Species	COMPLETE
54	Darakshan Saleem	M.Phil	Structural and functional divergence of HBV Oncogene HBx	COMPLETE
55	Fatima Israr	MDS	Investigating Expression of NGF and its partner protein in irreversible pulpitis	COMPLETE
56	Masood Khan	MDS	Investigating the Expression of Tropomyosin Receptor Kinase B and its Ligand in Irreversible Pulpitis in Human	COMPLETE
57	Aemon Razzaque	M.Phil	Developing Primary and Secondary Information Database of USPs	COMPLETE

58	Abdul Rehman	M.Phil	Structural Phylogenomics of Grb-2 Binding Proteins	COMPLETE
59	Dr. Rabiya Junaid	M.Sc	Comparing the growth kinetics and intracellular reactive oxygen species (ros) production of dental mesenchymal stem cells under oxidative stress.	COMPLETE
60	Dr. Hasham Aleem	MDS trainee	Influence of light curing moods on cytotoxicity of composite resins	COMPLETE
61	Dr. Tehmina	M.Phil	Investigating the expression of salivary miRNA-31 in oral squamous cell carcinoma patients.	COMPLETE
62	Nayab Somroo	M.Phil	Identification of DNA polymorphisms at specific site loci in β thalassemia and compound heterozygote of sickle/β thalassemia patients	COMPLETE
63	Dr Sarah Rafique	M.Phil	Low density array for inflammatory genes in CORD blood derived chondrocytes exposed to inflammatory stress	COMPLETE
64	Iqra Ahmed	M.Phil	Effects of ultrasonic waves treatment on recovery of Mycobacterium tuberculosis from sputum samples and on subsequent drug sensitivity testing using a liquid culture system	COMPLETE
65	Mujtuba Khan	M.Phil	Isolation, identification and probiotic potential evaluation of indigenously isolated Saccharomyces boulardii by using invitro and in vivo methods.	COMPLETE
66	Urooj Ishrat	M.Phil	Comparison of the interferon gamma release assays (X.DOT-TB and QuantiFERON-TB gold) with tuberculin skin test for diagnosis of latent TB	COMPLETE

			infection in Pakistani and Chinese populations	
67	Fatima Anjum	M.Phil	1) Design of experiment approach for high cell density production for probiotic yeast saccharomyces boulardii using sugar cane molasses. (M.Phil) 2 (NRPU) 3. IVIG	Complete
68	Dr. Noor Tariq	M.Sc	Effect of probiotic strains of Saccharomyces boulardii on biofilm formation of Candida albicans on acrylic denture	COMPLETE
69	Neha Baqai	M.Phil	Mismatch Repair (MMR) in Androgen Receptor; Expression of EMT Transcriptional Regulators (ZEBs') in Relation to the Trinucleotide Repeats in OSCC Patients	COMPLETE
70	HareemNisar	M.Phil	Study on selenium and selenoprotein levels inidiopathic generalized epileptic patients.	COMPLETE
71	Dr Munazzah Ambreen	M.Phil	Evaluation of Antifungal Activity of terpene Compounds against MalasseziaGlobosa targeting lipase genes	COMPLETE
72	Sarah Khan	MDS	Antibacterial activity and surface hardness of Cetylpyridinium chloride modified resin–based dental composites	COMPLETE
73	Dr. Nadia Wajdan	MSc	Comparison between commercial cleaners and Miswak extracts against Candida Albicans on heat cured acrylic denture base resin.	COMPLETE

74	Dr. Hina Shahid	MDS trainee	Comparative study of chitosan and EDTA as a final root canal irrigant on micro leakage and sealer penetration using different sealers. An invitro study	COMPLETE
75	Irshad Bibi	M.Phil	Impact of Brain-Derived Neurotrophic Factor Gene Polymorphism on its peripheral levels in Schizophrenic Patients	COMPLETE
76	Dr. Shafea Saad	MDS trainee	Modulation of epotopic and AKT/PI3K/Mtor SIGNALING PATHWAYS IN glioblastoma cells using semi-synthetic compound	COMPLETE
77	Dr. Muhammad Atif Siddiqui	MDS	Osteogenic differentiation of Wnt Activated hPDLSCs in three-dimensional (3D) hydrogen	COMPLETE
78	Dr. Saba Hashmi	M.Phil	Identification of MRP1 and its role in complete remission (CR) after induction therapy in acute myeloid leukemia patients.	Complete
79	Saleha	M.Phil	The impact of Vitamin D receptor (VDR) gene polymorphisms, VDR expression and Vitamin D status on modifiable atherosclerotic metabolic risk factors in young healthy Pakistani adults	COMPLETE
80	Noor-ul-Hira Aftab	M.Sc trainee	Effect of bone morphogenic protein 2 (BMP2) and Notch signaling Activation on osteogenic differentiation of human periodontal Ligament stem cells	COMPLETE
81	Dr. Araib Tahir	MDS	Ethanolic extract of sapindusmukrorossi as final endodontic irrigant (A randomized control trial vitro)	completed
82	Dr. Muhammad Ali Akbani	M.Sc trainee	Evaluation of role of metallothionein levels on oral oxidative stress status in saliva subjects with and without dental carries.	COMPLETE

83	Nousheen Faizullah	M.Phil	Investigating the expression patterns of androgen receptor in different grades of Oral Squamous Cell carcinoma	COMPLETE
84	Dr. Surraiya Hirani	M.Sc	Interlukin 10 and interlukin17 : salivary biomarkers for hepatitis c associated oral lichen planus.	COMPLETE
85	Dr. Sameera Tariq	M.Phil	Exploring the potential association between Bisphenol A (BPA) and advanced glycation end products (AGES) in the pathogenesis of PCOS related subfertility	COMPLETE
86	Dr. Asma Bilquis	M.Phil	Evaluation of iron &hepcidin homeostasis in relation to body mass index in young healthy women of different age groups.	COMPLETE
87	Dr. Asma Iqbal	MDS trainee	Association between Streptococcus mutants Serotypes, Collagen Binding Proteins cnm/cbm and Dental Caries risk	COMPLETE
88	Dr. Tehniyat	M.Phil	Investigating the plasma concentration of AB42, P-Tau and NFL as potential biomarkers for Alzheimer's disease.	COMPLETE
89	Dr. Syed Muhammad Umer Hasan	MDS	Estimation of protein and gene expression level of cytokeratin-10 in oral submucous fibrosis and oral squamous cell carcinoma	COMPLETE
90	Dr. Arshad Hassan	Ph.D	Role of dectin-1:A B Glucan Receptor in inflammation of endodontic origin	COMPLETE
91	Dr. Amir Ahmad Ansari	M.Phil	Protective effect of Vitamins against radiation induced inflammatory changes in Parotid glands of Guines pigs	COMPLETE

92	Dr Tazeen Mustansar	Ph.D	Investigating Mutational Profile and Structure Function relationship of RAS gene family in Oral Squamous Cell Carcinoma	COMPLETE
93	Dr. Fareha Kashan	M.Phil	Identification of biomakers for the diagnosis of polycystic Ovarian Syndrome patients.	Completed
94	Dr Naheed Khan	Ph.D	Structural and Molecular Evolution of Cerebellar Cortex in Vertebrates	Completed
95	Dr Khalida Perveen	Ph.D	Structural and Molecular Evolution of Pituitary Gland in Vertebrates	Complete
96	Dr Sahar Mubeen	Ph.D	Invitro modulation of Wnt signaling pathway and its associated molecules in Glioblastoma Stem Cells to investigate their proliferation, invasion and migration.	Complete
97	Dr Fatima Fasih	Ph.D	Investigating Intermolecular Complexes of HBV Oncogene (HBx) and Ubiquitin Specific Proteases	In process
98	Dr Dure Sameen Kamran	Ph.D	Investigating Expression and Molecular Interactions of c-MYC and Ubiquitin Specific Proteases Involved in Diffuse Large B-Cell Lymphoma	Complete
99	Nasir uddin	M.Phil	Construction of Composite Molecular Systems Network of Aggression and Finding Novel Driver Genes	Completed
100	Farooq Zaidi	M.Phil	Construction of Composite Genome Mining Program for Microsatellite Detection	In process
101	Samad Khan	M.Phil	Investigating Reversible and Heritable Effects of Bisphenol-A on Aggressive and Reproductive	In process

			Behaviors in *D. Melanogaster* Model	
102	Anusha Amanulah	M.Phil	Exploring Direct and Heritable Effects of Bisphenol-A on Dfd Gene Expression and Development of *D. melanogaster*	COMPLETE
103	Anita Zahid	MDS	Investigating C-MYC Sequential and Expressional Polymorphism in Oral Squamous Cell Carcinoma	completed
104	Saba Masood Khan	MDS	Investigating Expression of c-MYC and Its Ubiquitin Specific Proteases in Oral Squamous Cell Carcinoma	Completed
105	Mehak Anis	MDS	Investigating Myc/MAX/MAD Expression in Oral Squamous Cell Carcinoma	Complete
106	Ayesha Abdullah	MDS	Evolutionary Transition of Anatomical, Elemental and Physical Traits of Vertebrate Teeth and Their Alignment with Resin-Based Dental Composite	Complete
107	Sahar Zahid	M.Phil	Validation of Role of USP36 in cMYC Stabilization in Diffuse Large B Cell Lymphoma by Computationally Designed DIP-36 Peptide	In process
108	Ambreen Iqbal	M.Phil	Identification of Class I, II, and III Integrons in Indigenous Clinical Isolates of Extreme Drug Resistant (XDR) *Salmonella typhi*	In process
109	Syed Muhammad Omer	M.Phil	Developing Models of Anatomical Anomalies in *melanogaster*	COMPLETE

110	Iffat Raza	Ph.D	Investigating Expression of Notch Signaling Pathway Associated USPs in the Development of Mice	In process
111	Zaheer Amjad	M.Phil	Effects of Ginkgo biloba Extract (EGB761) on Lead-induced Nephrotoxicity in Albino Rats	Complete
112	Noor Jahan	M.Phil	Pharmacogenomics of Taxane	In process
113	Zia Ikram	M.Phil	Investigating Reversible and Heritable Effects of Lead on Neural Anatomy in the *D. melanogaster* Model	In process
114	Rabia Farhat	M.Phil	Ex vivo expansion of Human umbilical cord-derived stem cells and analysis of the influence of small molecules on their differentiation potential into adipocytes and renal epithelial cells (NRPU)	COMPLETE
115	Dr Amynah Charania	Ph.D	Interplay of immunological pathways of HCV-induced OLP in a subgroup of the Pakistani population.	COMPLETED
116	Dr Sofia	Ph.D	Characterization & modulation of innate lymphoid cells in oral squamous cell carcinoma	COMPLETE
117	Maria Ahmed	M.Phil	Comparison of different fermentation media for citric acid production using indigenous Aspergillus sp.	COMPLETE
118	Aniqa Batool	M.Phil	Investigating gene expression-based drug screening on Alzheimer's disease patients-specific neuronal Cells derived from iPSCs.	Completed
119	Dr. Sana Masood	MDS	Antibacterial efficacy of triphala tooth wipes in the reduction of Streptococcus mutans colonies in differently abled children	COMPLETED

120	Zainab najam	M.Phil	Attenuation of NLRP3 Inflammasome pathway in human synovial cells using ticagrelor nano-formulation	COMPLETED
121	Hiba Jaffar	M.Phil	Investigation of anti-inflammatory potential of isolated phenolic compounds from Melia azedarach flower via NF-K8 and MAPK/P38 signaling pathway	Completed
122	Samra Anwar	MDS	Exploring MMP20 and KLK4 SNP in patients of molar incisor Hypo hypo-hypomineralization in Karachi	Completed
123	Tooba Farhan	MDS	Mechanical and physical characterization of novel cetylpyridinium chloride incorporated resin-based dental composites.	Completed
124	Mubashir khan	M.Phil	Expression analysis of akt/mtor signaling pathway: an evaluation of cardiorenal syndrome risk factor in B thalassemia major patients.	Completed
125	Tehrim Fatima	M.Phil	Evaluation of anti-inflammatory, antinociceptive, and antioxidant activities of malonic acid capped silver nanoparticles	Completed
126	Huma zaidi	MDS	An in vitro evaluation of different concentrations of cellulose and chitosan nanoparticles on the physical, mechanical, and antibacterial properties of epoxy resin base sealer	COMPLETED
127	Dr Salik Rasool	Ph.D	Down-regulation of miRNA-165 gene related to human papilloma virus and Epstein-Barr virus among oral precancer and oral squamous cell carcinoma patients of Karachi	In process
128	Tuba Alim	M.Phil	Evaluation of antibiotic combinations against multidrug-resistant Escherichia coli harboring blandm-1 and blaoxa 48	In process

129	Iqra Rizwan	M.Phil	Development and Immunological assessment of an indigenously developed Newcastle disease vaccine.	In process
130	Iqra Parveen	M.Phil	The whole genome sequencing annotation and propagation of walbachia isolated from Drosophila melanogaster ANU-1	In process
131	Maha Ali	M.Phil	Association of matrix metalloproteinase 11 and angiopoiten 1 and 2 levels with epilsepsy	In process
132	Anum Mehmood	MDS	Effect of acidic beverages on the flexural strength, flexural modulus and surface hardness of chitosan modified resin dental composites	In process
133	Dr Uzma Anum Iqbal	MDS	An in vitro evaluation of mechanical and anti-fungal properties of cetylpyridinium chloride modified heat cure acrylic resin	In process

APPENDIX D: PRINCIPAL INVESTIGATORS THAT HAVE UTILIZED DRIBBS FACILITY (2018-2024)

S.No	Name of Principle Investigator	Institute
01	Dr Mohsin Wahid	DIMC/Pathology H.O.D DRIBBS
02	Dr Rakhshinda Habib	DRIBBS
03	Dr Nadia Naeem	DRIBBS
04	Dr Nazia Ahmed	DRIBBS
05	Dr Asma Khursheed	DRIBBS
06	Dr Mushtaq Hussain	DCOB
07	Dr Tehseen Fatima	DCOB
08	Dr Rafat Amin	DCOB
09	Dr Humera Waheed	DCOB
10	Dr Sadaf Khan	DCOB
11	Dr Salman Ahmed	DMM/DCOB
12	Dr Mahera Moin	DCOB
13	Dr Anum Gul	DCOB
14	Dr Nida Dastagir	DCOB
15	Dr Faiza Nadeem	DCOB
16	Dr Sheba Naz	DCOB
17	Dr Shaukat Ali	Dow College of Biotechnology
18	Dr Sonia Siddiqui	Department of Biochemistry DIMC
19	Dr Arisha Sohail	Department of Biochemistry DIMC
20	Dr Talat Roomi	DIMC/DIABAR
21	Dr Meha Fatima	Institute of Medical Technology
22	Dr Saima Malhi	Dow College of Pharmacy

23	Dr Farina Hanif	DIMC/Pathology
24	Dr Asif Qureshi	DIMC/Pathology
25	Dr Furqan Bari	Dr Ishratul Ebad Khan Institute of Blood Disease
26	Dr Asif Qureshi	DIMC/Pathology
27	Dr Arshad Hassan	Dow Dental College
28	Dr Shehbaz	Dr Ishratul Ebad Khan Institute of oral health sciences
29	Dr Naresh Kumar	Dr Ishratul Ebad Khan Institute of Oral Health Sciences
30	Dr Saba Arshad	Dr Ishratul Ebad Khan Institute of Oral Health Sciences
31	Dr Sanam Faheem	Department of Oral Biology, DIKIOHS
32	Dr Asma Saher Ansari	Department of Oral Biology, DIKIOHS
33	Dr Ambreen Qamar	Department of Physiology
34	Dr Mohiuddin Alamgir	Department of Pathology, DIMC
35	Dr Anwar Ali	Dr Ishratul Ebad Khan Institute of Oral Health Sciences
36	Dr Uzma Zaman	Department of Biochemistry DIMC
37	Dr Mehwish Rizvi	Dow College of Pharmacy

APPENDIX E: CELL LINE CRYOPRESERVATION

S.no	Principle Investigator	Colour Code	Cell Line	No of Vials	Cryopreservation
1	Dr Mohsin Wahid	White	Umbilical cord MSCs	2	Starts from 22-01-2024
			Gingival MSCs	2	
			Dental Pulp MSCs	2	
2	Dr Farina Hanif	Blue	Glioblastoma Cell Line	1	Starts from 19-12-2023
			Glioblastoma Cell Line	2	Starts from 12-12-2023
			Fibroblast BJ Cell line	4	Starts from 21-12-2023
			Fibroblast BJ Cell line	2	Starts from 07-10-2023
			Glioblastoma multiforme Cell line	3	(27-6-2023 to 31-10-2023)
3	Dr Salman Ahmed	Red	Triple Negative Cancer Cells wild type	1	Starts from 21-06-2023
			Triple Negative Cancer Cells Knockout	5	
4	Dr Talat Roomi	Yellow	Embryonic Kidney; Human (Homo sapiens)	1	Starts from 03-02-2024

			Neuro-2a; Neuroblastoma; Mouse (Mus musculus)	1	
			BHK-21 (C-13); Kidney; Syrian golden hamster (Mesorectums auratus)	1	
			Neuroblastoma	4	Starts from 27-03-2023
			Embryonic Fibroblast	2	
			Primary Epidermal Keratinocytes normal, human, neonatal	1	Starts from 3-03-2023
			Dermal Fibroblasts, normal, human, neonatal	1	
			Primary Epidermal melanocytes normal, human, adult	1	
			Ker-CT Keratinocyte human	1	
			BJ-5ta Foreskin fibroblast human	1	
			NIH/3T3 Embryonic fibroblast mouse	1	
			Hep G2 Hepatocellular carcinoma human	1	
			N1E-115 Neuroblastoma mouse	1	
5		Brown	Human Foreskin fibroblast	1	Starts from 21-6-2023

	Dr Anum Gul and Dr Nida Dastagir		Human synoviocytes; Synovial sarcoma	1	
			BJ01 cell line	4	Starts from 19-04-2023
			Sw982 cell line	6	
			Sw982 cell line	4	Starts from 28-03-2023
			Sw982 cell line	1	Starts from 24-03-2023
			Caco-2 cell line	8	Starts from 08-02-2023
			RAW, mouse monocytes	12	Starts from 26-011-2022
			RAW, mouse monocytes	8	Starts from 21-11-2022
6	Dr Nazia Ahmed	Green	S1O, Breast cancer (primary culture): Human	2	Not transferred Yet

APPENDIX F: STEM CELL TRANSPLANT BIOBANKING PATIENT RECORD

S.no	Patient name	MR NO	Sample Collection	Cryopreservation
1	Maha Gayas	114004974	2-01-2023 to 5-01-2023	3 weeks
2	Samina Nasir	112484341	17-06-2022 to 19-06-2022	20 weeks
3	Moin khan	111569386	13-06-2022 to 15-06-2022	20 weeks
4	M. Yousuf	111864172	31-01-2022 to 02-02-2022	2 weeks
5	Iqra Nasir	111681863	08-11-2021 to 11-11-2021	12 Weeks
6	Karim Bux	112285665	11-10-2021 to 14-10-2021	04 Weeks
7	Talha Saleem	112122598	19-05-2021 to 21-05-2021	03 Weeks
8	Rubab	15921006	29-03-2021 to 30-03-2021	03 Weeks
9	Umair	111077931	13-07-2020 to 16-07-2020	04 Weeks

APPENDIX G: LIST OF PUBLICATIONS BY DRIBBS PERSONNEL (2018-2024)

1. Serwer, T., Mohsin Wahid, Imtiaz, F., & Memon, A. S. (2024). Identification of specific codon 201 mutation of the DCC Gene in the colonoscopic specimen of colorectal cancer. *Journal of the Pakistan Medical Association*, *74*(2), 287–293. https://doi.org/10.47391/JPMA.9158.

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5. Junaid R, Wahid M, Waseem FS, Habib R, Hasan A. Effect of glucose mediated oxidative stress on apoptotic gene expression in gingival mesenchymal stem cells. BMC oral health. 2021;21(1):1-13.

6. Kumari P, Syed SA, Wahid M, Qureshi MA, Kumar R. Expression of miR-31 in saliva-liquid biopsy in patients with oral squamous cell carcinoma. Journal of Taibah University Medical Sciences. 2021;16(5):733.

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8. Shahid O, Shamim S, ara Ainuddin J, Wahid M. Genetic reprogramming of cord blood derived endothelial colony forming cells towards human induced pluripotent stem cells using episomal plasmids. Journal of the Pakistan Medical Association. 2021;71(4):1081-8.

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14. Jabeen H, Wahid M, Uddin JAA, Mustafa F. Differentiation of CD117+ Amniotic Fluid Stem Cells towards Nephron Progenitors. Pakistan Journal of Medical Sciences. 2022;38(6):1656.

15 Hasan A, Roome T, Wahid M, Ansari SA, Akhtar H, Jilani SNA, Kiyani A. Gene expression analysis of toll like receptor 2 and 4, Dectin-1, Osteopontin and inflammatory cytokines in human dental pulp ex-vivo. BMC Oral Health. 2022 Dec 3;22(1):563. doi: 10.1186/s12903-022-02621-4. PMID: 36463168; PMCID: PMC9719632.

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3. Tarique S, **Naeem N**, Salim A, Ainuddin JA, Haneef K. The role of epigenetic modifiers in the hepatic differentiation of human umbilical cord derived mesenchymal stem cells. Biol Futur. 2022 Dec;73(4):495-502. doi: 10.1007/s42977-022-00145-0. Epub 2022 Dec 13.
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4. Ahmed S, Aftab MF, **Ahmed N**, Yusuf IM, Qureshi MS. Restoration of C-type natriuretic peptide and glial fibrillary acidic protein expression in fear centers and intrinsic cardiac ganglia by theta frequency sound during chronic stress in mice. Journal of Neurorestoratology. 2024 September; 12, Issue3: 100133. https://doi.org/10.1016/j.jnrt.2024.100133.
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6. Lawrence S, Lin J, **Khurshid A**, Utami W, Singhania R, Ashraf S, Thorn GJ, Mangangcha IR, Spriggs K, Kim DH, Barrett D. Cordycepin generally inhibits growth factor signal transduction in a systems pharmacology study. FEBS letters.
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APPENDIX H: LIST OF EQUIPMENT, UPDATED 2025

Dow Research Institute of Biotechnology and Biomedical Sciences

Name of the Equipment	Model/Make/Specs
Flow cytometer	BD FACS Celesta 3 Lasers, 12 Color Flowcytometry
Real Time PCR	Quant Studio 7 FLEX (4485698), Applied Biosystems 1. 96 well FAST Format 2. TLDA Block Format
Bioanalyzer	Agilent, Automated Electrophoresis for quality of Biomolecules
HPLC	1260 Infinity II, Agilent
FPLC	Akta Pure, Protein Purification System, GE Healthcare HVD Biotech
Inverted Phase Contrast Microscope	Leica, DMi1
Inverted Fluorescent Microscope	Leica DMi8
Upright Fluorescent Microscope	Leica DM2500
Bench-Scale Fermenters	BioFlo, New Brunswick (1.3-7.5Liters)
CLC Genomics Workbench	Qiagen
Micropulser Electroporator	Bio-Rad
Neon Transfection System	Lifetech, Invitrogen
Gel doc System	ChemiDoc MP Imaging System, Bio-Rad
Spectrophotometer	Multiskan Sky (51119700), Thermo Fisher Scientific
Micro plate Reader with Washer	Varioskan LUX Multimode Micro plate Reader, Thermo Fisher Scientific
Thermal Cyclers	Applied Biosystems, C-1000 Bio-Rad
Horizontal and Vertical Electrophoresis Systems	Mini Protein Tetra Cell, Protein II xi Cell, Bio-Rad
IEF system and Accessories	Protean i12 IEF System 1646000 + 1646020 +1646113, Bio-Rad
Centrifuge (Small Table Top)	Megafuge 8R, Thermo Fisher Scientific
Centrifuge (Swing Bucket)	Megafuge 16R, Thermo Fisher Scientific

Class II A 2 Biosafety Cabinets	Nuaire, Thermo fisher Scientific
Class III Biosafety Cabinets	ESCO
Fume Hood	CHC (CLE-101)
Western Blotting (Wet Transfer Equipment)	Mini Trans Blot Electrophoresis, Bio-Rad
CO_2 incubator	Eppendorff, Binder
Variable Oxygen Control CO_2 incubator	Hera cell Vios 160i, Thermo fisher Scientific
CO_2 incubator with Shaker	New Brunswick, s41i
Cell Viability Analyzer	Vi Cell XR , Beckman and Coulter
Nanodrop UV Spectrophotometer	Nanodrop lite, Thermo Fisher Scientific
Thermo mixer	Eppendorff
Fridge, Freezers (-20and -80˚C)	Thermo Fisher Scientific, Haier
Liquid Nitrogen Storage System	Thermo Fisher Scientific
Cell Homogenizer	Precellys 24, Bertin Technologies
Sonicator (3 Liter)	Faithful
UV Transilluminator	Invitrogen
Flowjo Software for Flowcytometry Analysis	Beckton & Dickinson (BD)
Digital Binocular Microscope	Optika, Italy
Electrophoresis assembly, Horizontal	Thermo Fisher Scientific