

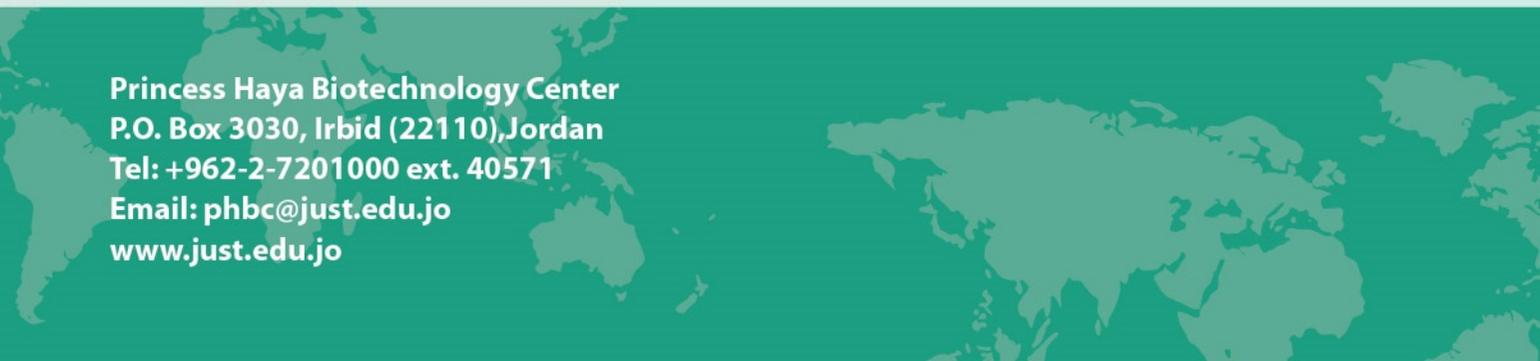
PRINCESS **HAYA** **BIOTECHNOLOGY** CENTER



Jordan University of Science & Technology



مستشفى الملك المؤسس عبدالله الجامعي
King Abdullah University Hospital



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Letter from the President

The notion of establishing a biotechnology lab in Jordan all started in 1998 when a team of faculty members from Jordan University of Science and Technology (JUST) submitted a proposal to the World Bank for the purpose of bolstering research programs in biotechnology and for the training of graduate and undergraduate students in this rather important field of specialization. The fund obtained from the World Bank was used to supply the labs with state-of-the-art biotechnology equipment.

On March 6, 2003 the biotechnology center was established at JUST and housed by King Abdullah University Hospital (KAUH).



In 2005, the center was consolidated into Princess Haya Biotechnology Center (PHBC), commensurate with ordinance number 998/2005 issued by the Council of Higher Education on March 10, 2005.

Since the establishment of the center, Her Highness Princess Haya has constantly supported the center both morally and financially.

PHBC provides faculty members, graduate and undergraduate students, and regional organizations with a robust and excellent scientific infrastructure to support important experimental research in biotechnology, particularly in the fields of genomics, metabolomics and proteomics. The center comprises a total of sixteen research laboratories and occupies approximately 1,500 square meters.

Prof. Abdallah I. Husein Malkawi
President of JUST



Letter from the Director

Welcome to Princess Haya Biotechnology Center (PHBC). The state-of-the-art center was established at Jordan University of Science and Technology (JUST) campus and is supported by HRH Princess Haya Bint Al Hussein with a primary responsibility directed towards the local and scientific communities. The Centre is hosted by the King Abdullah University Hospital building (KAUH) and is equipped with modern facilities for carrying out research, diagnostic laboratory testing and training in areas of genomics, proteomics and metabolomics.

The center was established to serve the following objectives; promote research activities in various areas of biotechnology, carry out fundamental research in the leading areas of biotechnology and enhance the human resources in biotechnology through training of undergraduate and graduate students, lab technicians, lab supervisors, and other professionals from Jordan and the region. The center is run by 40 full-time, highly trained staff with a wide range of specializations.

Whether you are a prospective patient seeking a diagnostic test or genetic counseling, a student seeking an internship, or a researcher looking for a laboratory to carry out testing and analysis of your research samples, you are invited to visit us or browse our website (www.just.edu.jo/Centers/PrincessHayaBiotechnologyCenter/) to learn more about PHBC facilities, diagnostics services, training programs and research activities.

Dr. Amjad Mahasneh
Princess Haya Biotechnology Center



Vision

The vision of Princess Haya Biotechnology Center is to become a national priority in scientific research, diagnostics and training, leading fields of genomics, proteomics and metabolomics in quality and momentum. We are set to prioritize the use of cutting-edge, global standard, interdisciplinary technologies in accordance with the national agenda.

Mission

The PHBC mission is to transfer knowledge and technology for the service of students, researchers and community in Jordan in the following fields:

- Scientific Discovery and Public Awareness
- Training the next generation of scientists
- Providing highest quality of diagnostic intervention
- Disease prevention through early diagnosis and genetic counseling

Genetic and Metabolic Disorders Clinic

GMD Clinic is run by consultant physicians in pediatric, genetic and metabolic diseases and open every Thursday (9:00 am - 4:00 pm).

The clinic is an independent facility, where patients can visit directly or through King Abdullah University Hospital (KAUH) and Royal Medical Services (RMS). GMD Clinic services include:

- Diagnosis, counseling and follow up
- Follow up of lab reports from PHBC
- Prenatal diagnosis through CVS samples

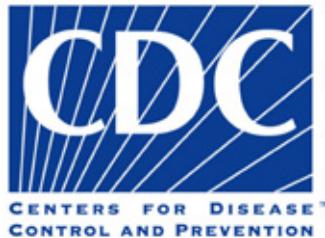


Quality Control and Quality Assurance

PHBC is dedicated to increasing the performance and quality of our services in diagnosis and research through the implementation of the highest international quality standards.

Since the accreditation of ISO 9001/2008 in April 2011, PHBC has moved several steps in quality control and continues through the application of College of American Pathologists (CAP) standards. PHBC is looking forward and working hard towards CAP accreditation very soon.

Our staff is highly trained in the fields of biosafety and biosecurity. In addition, we are actively involved in proficiency testing with Centers for Disease Control and Prevention (CDC), USA.



Genomics Lab

Genomic Sequencing Lab

The PHBC is equipped with DNA sequencers, which have been utilized by the lab's team of analysts to decode hundreds of thousands of gene code in the past decade representing the haplotypes of most genetic diseases in Jordan. The equipment include:

- Two 16-Capillary 3130 XL Genetic Analyzers
- Two 310 Genetic Analyzers
- PCR, Gel Electrophoresis and Gel Documentation

Genetic Tests: The following tests are performed at the lab:

- β -Thalassemia
- Familial Mediterranean Fever (FMF)
- Cystic Fibrosis (CF)
- Hearing Loss (Connexin 26)
- Gaucher Disease
- Methylene Tetrahydropholate Reductase (MTHFR)
- Factor V Leiden
- Factor II Deficiniceies (prothrombin)
- Oxalosis
- JAK2 (Myeloproliferative Disorders MPD)



Genomic Expression Lab

Complementing the high-throughput gene expression testing (Microarray) with highly specific and quantitative Real-time PCR is also a key standard at PHBC:

- Affymetrix Genechip Array
- Several Platforms of Real-Time PCR
- Nanodrop and Capillary Electrophoresis for DNA/RNA Quality

Testing Projects: The following projects are carried out at the PHBC:

- Identification of microRNA biomarkers for Breast Cancer
- DNA methylation of BRCA1 in Breast Cancer
- Using DMET for genotyping of drug metabolizing genes in Jordan



Virology Lab

The combination of instrumentation between Quantitative Realtime PCR and DNA sequencing have allowed us to provide the following tests:

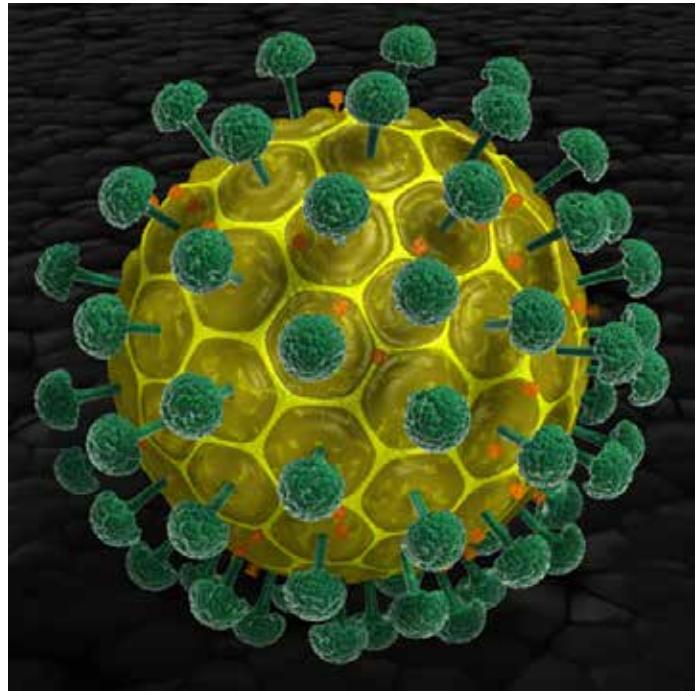
- Hepatitis B Virus quantitation
- Hepatitis C Virus quantitation
- Swine Flu (H1N1)

Microbiology Lab

Our microbiology lab is multidisciplinary harmony of biochemical, genetic and genomic sciences ranging from assay identification to Pulse field electrophoresis to DNA sequencing.

The lab has been a training resort and a resource for graduate students from all faculties at JUST.

Ongoing research is focused on genetic profiling of multidrug resistance pathogens.



Oligonucleotide synthesis Lab

Equipped with ASM-800 DNA synthesizer and reverse phase OPS-201 purification system, this lab is dedicated to synthesis of HPLC grade high quality oligonucleotide primers for research and diagnosis, in addition to on-demand services in case of emergency (outbreaks of infections).



Proteomics Lab

As the sole proteomics lab in Jordan, our aim is to identify the priorities of the research community. Our focus is set on the identification of novel proteins for biotechnology and clinical applications through research projects:

- Purification and identification of enzymes
- Disease biomarker discovery for Cancer, Schizophrenia, Familial Mediterranean Fever.... etc.

The Lab's most recognized facilities include:

- Low Pressure Liquid Chromatography (LPLC)
- Electrophoretic techniques (SDS-PAGE, Gradient-PAGE, Preparative -Tube Electrophoresis, 2D-PAGE and Western Blotting)
- Ultracentrifugation and Spectrophotometry



Metabolomics Lab

The PHBC metabolomics lab is equipped with several platforms of chromatography and mass spectrometers, in addition to an amino acid analyzer. Among the most sensitive instruments is the Triple Q-Trap MS/MS detector which has enough specificity and sensitivity to identify most small compounds and metabolites.

Projects:

- Identification of metabolic biomarkers of Behcet Disease
- Identification of amino acid hydrolysate samples for food, plant and animal samples
- Development of diagnostic tests for peroxisomal disorders through the detection of very long chains fatty acids Inborn-error metabolism is among the most common genetic/metabolic disorders that can be managed if detected early. The facility is specialized in diagnosis of:
 - Organic acid metabolic disorders (using GC-MS)
 - Amino acid metabolic disorders (using amino acid analyzer, and LC- MS/MS)
- Newborn Screening Program (using LC-MS/MS)
- Lysosomal storage disorders LSDs (using enzyme assay by HPLC- FLD and LC-MS/MS)
- Sensitive vitamin D2/D3 test (using LC-MS/MS)



Organic Acid Metabolic Disorders Tests:

- Methyl Malonic Acidemia (Methyl Malonic Acid)
- Isovaleric Acidemia (Isovalyl Glycine)
- Propanoic Acidemia (Propanoic Acid)
- Glutaric Acidemia (Glutaric Acid)
- Methyl Cartonyl Glycineurea (Methyl Cartonyl Glycine)
- Tyrosinemia Type I (succinyl Acetone)

Amino Acid Metabolic Tests:

- Maple Syrup Urine Diseas (MSUD)
- Phenyl Keton Urea (PKU)
- Cystinurea
- Homo Cystinurea
- Ketotic & non Ketotic Hyperglycemia
- Tyrosinemia Type I, II

Lysosomal Storage Disorders (LSDs) Tests:

- Mucopolysaccharidosis:
 - Hunter (MPSII)
 - MPSIII B
 - MPSIV
 - MPSVI
 - MPSVII
- Gaucher Disease (GBA enzyme & CHIT enzyme)
- GM1 Gangliosidosis
- Multiplex screening test:
 - Gaucher Disease
 - Fabry Disease
 - Pompe Disease
 - Krabbe Disease
 - Niemann Pick A/B
 - Hurler (MPS1)



Trace Element Monitoring Lab (TEM Lab)

The TEM lab was initially established for Pb, Cu, and Zn poisoning detection; now the lab is also dedicated for serving graduate students, faculty members and the private sector, for analyzing biological, environmental and agricultural samples for Pb, Cd, Mn, Fe, Cu, Zn, Cr, Na K, Mg, Co, As and Hg.

The TEM Lab includes:

- Two Atomic Absorption Spectrometers fully equipped for flame and graphite furnace.
- Direct Mercury Analyzer
- Microwave Digestion System



Forensic and Toxicology Lab

Our interdisciplinary facilities work also in cases of:

- Terrorists Attacks
- Drug / pesticide screening (using Q-Trap MS/MS library)
- Microbial / biological threats
- Missing individual identification
- Paternity Testing (by order of court)

The genomics lab also provides forensic genetic testing for:

- STR analysis of autosomes and Y chromosome
- mit-DNA sequencing (Mitochondrial Control Region variants)



Psychological Disorders Research

The field of psychological disorders has gained momentum in the past few years. With the availability of advanced testing equipment at PHBC, we aim to investigate the genetic, metabolic, and proteomic aspects of psychological disorders in Jordan.

Projects:

- Genetic determinants and disease biomarkers in Schizophrenia patients
- Genetic, metabolic and proteomic investigation of Autism



Training Courses and Workshops

PCR and DNA sequencing

PHBC offers three training courses in the basic, intermediate and advanced levels of molecular biology. The courses cover DNA extraction, PCR and DNA sequencing.

Laboratory Instrument Maintenance

This workshop is designed for troubleshooting and maintenance of laboratory instruments (analytical balance, centrifuge, pH meter, and spectrophotometer) and offered by laboratory professionals and engineers. The workshop covers all theoretical, technical, mechanical and electrical aspects of instrumentation; thus increasing the caliber of technicians.

Biosafety and Biosecurity

PHBC staff has received training for Biorisk management and has been involved in workshop training of laboratory professionals, students and engineers from the Middle East.

Since biosafety and biosecurity are considered a mutual interest, our mission is to help unify their knowledge and practice with the international standards.







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