الجامعة التقنية الشمالية
NORTHERN TECHNICAL UNIVERSITY

المركز التقني للأبحاث
CENTER OF TECHNICAL RESEARCH
2022 - 1444

Center of Technical Research

Center of Technical Research

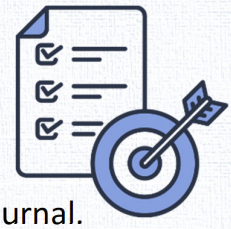
- **Vision: -**

The Center of Technical Research, established on January 6, 2022, under the Ministry of Higher Education and Scientific Research, aims to address societal needs by advancing applied research to solve health and environmental challenges. It collaborates with the Ministry of Health to develop strategies for biotherapy, early disease detection, epidemic control, and the use of natural products in alternative medicine. The center strives to elevate researchers' scientific levels, support impactful research, and enhance the university's global ranking. It focuses on pioneering cancer and genetic research, combating communicable diseases, and utilizing natural products for therapeutic and sustainable purposes.

- **Mission: -**

The center focuses on advancing scientific research by fostering an environment conducive to applied studies in collaboration with universities and institutions, addressing critical areas such as cancer, hereditary blood diseases, communicable illnesses, and alternative medicine, particularly in combating chemotherapy and antibiotic resistance. It emphasizes the importance of early genetic tumor screening to differentiate malignant from benign cases for timely intervention. Additionally, the center is committed to training staff and students in modern laboratory diagnostic techniques and early disease detection methods.

- **Objectives: -**



The center aims to create an advanced research environment comparable to global standards, organize scientific events such as conferences and workshops, and publish a dedicated scientific journal. It seeks to elevate the university's ranking by promoting research publication in recognized forums like Scopus and Web of Science. Additionally, the center plans to establish natural product warehouses and a plant herbarium for medicinal plant classification, develop cell line repositories for testing new treatments, and identify rare postgraduate specializations needed by educational and health institutions.

Center of Technical Research Departments

- **Cancer Researches and Genetic Blood Disease Department.**

- **Communicable Disease Researches Department.**

- **Natural Products Researches Department.**

About Our Center of Technical Research

Core Departments

1.Cancer Research and Genetic Diseases Department

Our department is committed to advancing the understanding and treatment of cancer and genetic disorders through cutting-edge research and innovative methodologies. Below are key areas of focus:

- **Cell Line Development and Image Analysis**
- We specialize in cultivating and monitoring cell lines using advanced imaging techniques to analyze cell growth dynamics. This facilitates precise assessment of cellular responses to various treatments and environmental conditions.
- **Cell Viability and Cytotoxicity Studies**
- Our research evaluates cell survival rates and the effects of therapeutic agents on cellular health. By assessing cytotoxicity, we aim to identify potential treatments with minimal adverse effects.
- **Cytopathic Effect (CPE) Analysis**
- Using robust analytical frameworks, we study cytopathic effects to understand cellular alterations caused by pathogens or treatments, aiding in the development of antiviral and anticancer strategies.
- **Genetic and Epigenetic Investigations**
- We conduct in-depth analyses of genetic mutations and epigenetic modifications. Our goal is to uncover molecular mechanisms driving cancer progression and genetic disorders, paving the way for targeted therapies and personalized medicine.
- **Gel Electrophoresis Applications**
- Employing gel electrophoresis, we separate and analyze DNA, RNA, and protein samples. This technique is vital for identifying genetic markers and understanding molecular interactions in disease pathogenesis.
- **Anti-Oxidative Stress and Metabolic Assessments**
- Our team evaluates oxidative stress levels and metabolic processes to investigate their roles in cancer progression and genetic diseases. These insights contribute to the development of therapeutic interventions targeting oxidative damage and metabolic dysregulation.
- For collaborations, inquiries, or further information, please contact us at (https://ntu.edu.iq/technical-research-center-home/)Together, we strive to unravel the complexities of cancer and genetic diseases to improve human health.

Oven

Centrifuge

Cooling centrifuge

Vortex Mixer

Water Bath

Inverted fluoresces microscope

Pipette gun

Laminar air flow chamber

Water Bath

Co2 Cell Incubator

2. Communicable Disease Research Department

Advancing Knowledge Through Precision and Innovation

Our Expertise

Molecular Techniques and Applications

We specialize in state-of-the-art molecular biology tools and techniques to enhance disease research and diagnostics:

- **Primer Design**: Accurate design of primers for PCR and molecular assays.
- **Nucleic Acid Extraction**:
  - From cell lines, tissues, and blood (serum and plasma).
  - Non-coding RNA (microRNA, siRNA, snRNA) and plasmid extraction.
  - DNA isolation from bacteria, fungi, viruses, tissues, and cell lines.
  - **cDNA Synthesis** for gene expression analysis.
- **Molecular Applications**:
  - Real-time PCR (qPCR) and conventional PCR.
  - Epigenetic studies: Methylation and unmethylation profiling.
  - Viral load quantification and copy number analysis.
  - High-fidelity DNA amplification.
  - Comprehensive Whole Genome Sequencing (WGS).

Microbiology and Immunology Services

Combining advanced microbiological and immunological testing for plant, human, and environmental health:

- **Plant Microbiological Testing**: Identification and analysis of plant pathogens.
- **Sensitivity and Susceptibility Testing**: Evaluation of antimicrobial and antibiotic efficacy.
- **Enzyme-Linked Immunosorbent Assay (ELISA)**.
- Precise detection of antigens, antibodies, and disease markers.

Why Choose Us?

- Cutting-edge technologies for communicable disease research.
- Expertise in molecular diagnostics, microbial studies, and immunological testing.
- Commitment to high-quality results for academic, clinical, and industrial applications.

Complete blood picture

Centrifuge

Shaker water bath

Spectrophotometer

Microscope

Autoclave

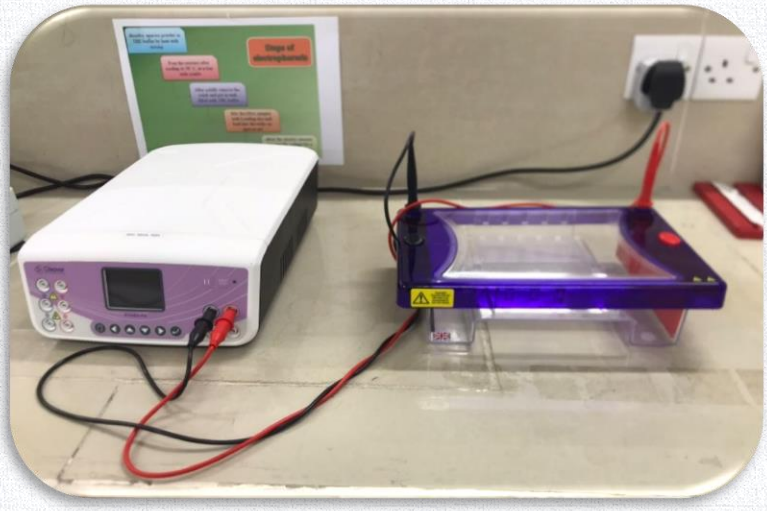
Thermocycler

Nano spectrophotometer

Real-time Thermocycler

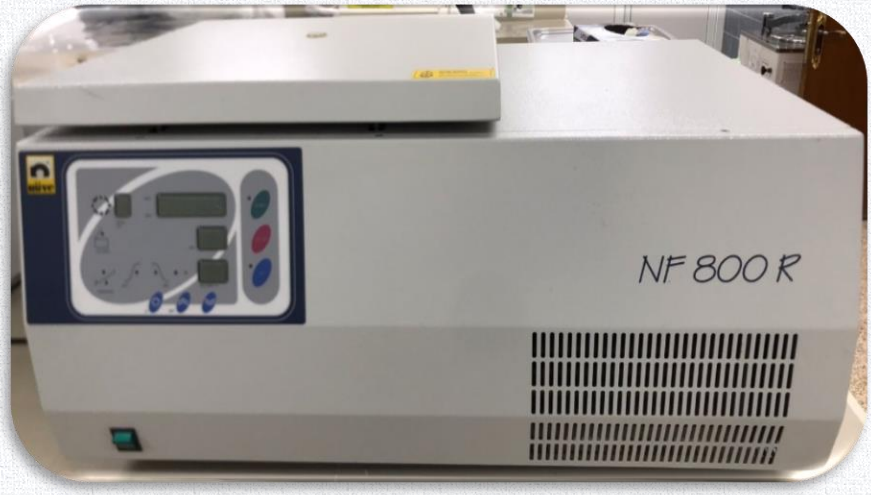
Incubator

Deep freeze



Horizontal electrophoresis

Water bath



Cooling centrifuge

Gel documentary system

3. Natural Products Research Department

Analytical Techniques

- **High-Performance Liquid Chromatography (HPLC)**
  Accurate quantification and characterization of bioactive compounds, including protein content analysis.

Sample Preparation

- **Drying, Grinding, and Storing**
  Ensuring sample integrity for reliable analysis.
- **Sample Digestion**
  Preparing samples for detailed biochemical and molecular studies.

Extraction Methods

- **Alcoholic Extraction**
  Isolation of bioactive compounds using ethanol-based solvents.
- **Aqueous Extraction**
  Water-based extraction for hydrophilic substances.
- **Oil Extraction**
  Specialized methods for extracting essential and fixed oils.

Culture Media & Tissue Culture

- **Culture Media Preparation**
  High-quality media for microbial growth and bioassay development.
- **Tissue Culture**
  Advanced plant tissue culture for the propagation and study of natural products.

- Our department is dedicated to advancing natural products research through innovative techniques and rigorous quality standards.

Freeze drying lyophilized

Fume Hood

Laboratory Shakers

FTIR-Spectrometer

HPLC

Spectrometer

OVEN

Incubator

Distillation water

Rotary Evaporator

Water Bath

Buchner Funnels

Magnetic Stirrer

Soxhlet extractor

Services and Community Contributions

- Training and skill development for researchers and students.
- Conducting workshops, seminars, and community outreach programs.
- Establishing comprehensive databases for research and innovation.
- Offering advanced personal services and scientific consultations.
- Issuing scientific reports and fostering international collaboration.