

Animal Facility

The animal research facility is a specially designed state of art vivarium, which accommodates exquisitely controlled environments for the care and maintenance of experimental animals. The vivarium holds and breeds several mice and rats strains including nude mice and other specialized strains. It includes a fully-functional cage washing/ sterilization area, procedure rooms, quarantine area, and dedicated storage locations for food, bedding, and equipment. The facility has seven animal holding rooms designed primarily to support rodents in (IVC) ventilated racks. An imaging system is located within the vivarium so animals can be utilized in imaging studies without leaving the facility. A newly introduced behavioral unit supports investigators seeking to develop or implement behavioral projects. The facility received the licensing and recognition from Ministry of Environment and Climate Change. The vivarium supports research activities of UOS researchers as well as researchers from other academic institutes with UAE.

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Proteomics And Metabolomics

The Proteomics/Metabolomics Core Facility provides a full proteomics/metabolomics infrastructure for the identification and characterization of proteins and metabolites. This includes various platforms for protein, peptide, and metabolite separation, and state-of-the-art mass spectrometry for High resolution and high mass-accuracy MS, MS/MS, and LC-MS/MS for identification and quantification of proteins and metabolites in complex mixtures.

This facility provides additional services, including Project planning, sample preparation, in-solution protease digestion, data acquisition and data analysis, Protein/metabolite identification, untargeted protein/metabolite quantitative comparisons, and molecular weight determination of intact protein, peptide, and any compound using either MALDI-MS or high-resolution accurate mass ESI-MS with mass error less than 2ppm.

Proteomics/metabolomics services include analysis of proteins and metabolites extracted from cells, biological fluids, conditioned media, or tissues using the timsTOF (Bruker, Daltonik, Germany) with either Apollo II electrospray ionization (ESI) source or captiveSpray ion source connected to either Elute UHPLC or nanoElute.

This facility supports all research groups in RIMHS and other institutions inside the UAE such as AUS, MBRU, and UHS and through external research cooperation with some institutions in Jordan and Portugal, and it has been able to provide its services and run the instrument 24h/7days with more than 50 projects per year.

Among the provided services to the University Hospital, where the facility has revealed metabolic changes in patients with diabetes and kidney disease. Also, it had a major role during

the Corona pandemic, as it studied the proteins and metabolic changes of people with Covid-19 disease and metabolic changes that occur as a result of the type of vaccine taken.

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Genomics Facility

Genomics facility at Research Institute of Medical and Health Sciences harbours state of the art instruments for sequencing including Ion S5 XL (Ion torrent, Thermo Fisher Scientific), a semiconductor based next generation sequencer with high throughput used for targeted genome, exome, whole transcriptomic sequencing of RNA and DNA obtained from liquid biopsies (including saliva and blood), FFPE samples and cell lines. The facility is equipped with instruments for library preparation, quality control and gene expression studies including Access array® (Fluidigm), a microfluidic based system to prepare targeted genome libraries from as low as 5ng DNA. Agilent bioanalyzer system is microfluidic chip based automated electrophoresis used for quality control of RNA and DNA libraries. Qubit 3 Fluorometer (Thermo Fisher Scientific) is used to quantify RNA and DNA with high accuracy and precision. Quant Studio 3 real time PCR (Applied Biosystems, Thermo Fisher Scientific) can be used for gene expression analysis based on DNA, mRNA and miRNA. TaqMan based assays can be used to perform gene expression, genetic variation, and gene regulation analysis.

We collaborate extensively with hospitals and universities in UAE including Rashid hospital, Dubai; University hospital Sharjah, Sharjah; Khalifa University, Abu Dhabi; Al Jalila foundation, Hamdan foundation, and MBRU. International collaborations include Al-Farabi Kazhak national university; Medical Research Institute, Alexandria, Egypt; Skoltech, Russia; University Hospital Hradec Kralove, Czech Republic.

Approximately 500 samples are sequenced every year using the Ion S5 XL next generation sequencer for various research applications such as biomarker discovery, mutational profiling of various diseases, differential gene expression and molecular pathogenesis studies, metagenomics, single cell OMICs, genotyping assays, and population genetics. The work in the genetic facility was carried out on chronic complex diseases including cancer, diabetes and asthma as well as autoimmune and inflammatory diseases.

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Nuclear Magnetic Resonance Facility

RIMHS Nuclear Magnetic Resonance core facility is equipped with state-of-the-art scientific instrumentation from Bruker Biospin and expertise to support researchers, students, faculties, and their various research projects. We have Ascend Aeon 500 MHz magnet with room temperature BBO probe. The major application of NMR is structural determination and molecular identity of small molecules. The facility is capable of one-dimensional (Proton-¹H, Carbon-¹³C, Fluorine-¹⁹F, Nitrogen-¹⁵N, Phosphorus-³¹P etc.) and two-dimensional (NOESY, COSY, HSQC, HMBC etc.) spectral evaluations and relaxation (T₁ & T₂) measurement experiments, services and support. We run about 1200-1300 samples annually. Our facility is open for external collaborations with Universities, Research Institutes, Contract Research Organisations, and any other entity across and outside UAE, which can effectively utilise the applications of this unique instrumentation. We provide preliminary and introductory training on theory and instrumentation to students and researchers etc. as part of their projects and curriculum. For your projects viz. drug design and discovery, custom synthesis, pharmaceutical research etc, our NMR facility can provide the service, support and expertise needed for you to succeed in advancing scientific research, discovery, and health sciences.

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Molecular Imaging Facility

Our Molecular Imaging Core Facility at RIMHS offers a wide range of advanced imaging technology and expertise to support researchers, faculties, and students from various fields. We house a range of advanced fluorescent microscopes, including a NIKON Eclipse Ti confocal microscope, a Leica-LMD6 laser capture microdissection microscope, two Olympus-IX53, two BX43, and other state-of-the-art equipment. Our Imaging Core Facility is equipped to support a variety of molecular imaging applications, such as single-cell analysis, live-cell imaging, and high-resolution imaging at the bright field, phase contrast, and fluorescence level. Our facility is also capable of colocalization, translocation, timelapse imaging, Z-stacking/optical sectioning, FRET, FRAP, FLIP, and laser microdissection at the single-cell level from tissue sections.

Our team of experts provides comprehensive training and support, from sample preparation to image analysis, helping researchers and students to conduct innovative research and make groundbreaking discoveries. Our facility has been already supporting actively researchers and students from other universities and institutes across UAE, providing access to the latest technology and techniques to advance scientific research and discovery. Whether you are studying cellular mechanisms, tissue architecture, or other molecular imaging applications, our Molecular Imaging Core Facility can provide the technology and support you need to achieve

your research goals. We invite you to explore our facility and learn more about how we can support your research endeavors.

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Emerging Infectious Disease Lab

Our research center's COVID laboratory is outfitted with crucial biosafety equipment for tissue culture, including a biosafety cabinet and an incubator. To process blood tissues and samples, we have a centrifuge available. Additionally, we maintain -80°C and -150°C freezers to ensure proper storage of specimens. These resources offer a secure and controlled environment for conducting SARS-COV-19 research and studying its impacts. We have received thousands of biological samples from patients, including saliva, blood, and nasal swabs, which have been processed and analyzed using our state-of-the-art equipment. Our work has contributed to numerous local and international collaborations, including partnerships with institutions such as Dubai Health Authority, Khalifa University, and MBRU in the UAE. At the international level, we have collaborated with the COVID Human Genetic Effort, an international consortium focused on understanding the genetic factors that contribute to COVID-19 susceptibility and severity.

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Integrated Analytical Center

Integrated analytical lab comprises two central sections: Research Institute for Medical and health sciences and Research Institute of Sciences & Engineering.

This lab provides services and support with the latest in technological innovations and expertise to assist Sharjah University research community, and other institutions in UAE to facilitate research and education in pharmaceutical, medical, and environmental sciences.

The integrated analytical lab offers various workflows and provides the analysis of drugs, vitamins, amino acids, steroids, metabolites, plants, food and beverage, natural products, and petroleomics. Also, the lab provides a wide range of specialized tests including new-born

screening test, comprehensive drug testing, drinking and sea water, drug stability, and environmental testing.

The integrated analytical lab provides support on a wide range of advanced analytical instruments including:

- Liquid chromatography mass spectrometry (LC-MS/MS, Xevo TQ-S, Waters)
- High-performance liquid chromatography (HPLC and UPLC, Shimadzu)
- Gas chromatography mass spectrometry (GC-MS and GC-MS/MS, Shimadzu)
- Ion chromatography, (Thermo)
- Inductively coupled plasma optical emission spectroscopy, (Thermo)

Besides pure analytical capabilities, the integrated analytical lab also offers additional services, including sample preparation, analytical method development and validation, analytical identification and quantification of substances, metabolomics analysis, and Data analysis.

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Tissue Biobank

The Sharjah Tissue Bank is core facility that currently has around 60,000 tissue biopsies in Formalin Fixed Paraffin Embedded (FFPE) from various diseases including cancer, inflammatory and autoimmune diseases. Around 20,000 of those tissues contain clinical records.

The techniques and software in the Tissue Bank allow the researchers to work with single cell characterization from any disease, this has been used to identify early diagnostic biomarkers linked various diseases. This detection of early onset of disease can help in disease prevention for the community

The techniques developed in the Tissue Bank are used to diagnose various diseases from liquid biopsies including saliva and blood. This provides convenient way to carry out screening programs for various diseases without the need for individuals to come to hospital and the person will only be asked to attend for further checkups if the test show early signs of the diseases.

The techniques and software developed in the Tissue Bank allow for the identification of biomarkers that can predict the resistance to therapy. This is very common in cancers as well as autoimmune diseases where the treatment is only effective for short period of time before the patient relapse due to the disease cells developing resistance to therapy. Identifying biomarkers

that can predict such resistance can help to personalize the treatment to individual patients providing them with more effective treatment.

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Tissue Culture Facility

The Tissue Culture Facility 1 is a facility within RIMHS for cell culture in sterile conditions. It has two tissue culture labs equipped with a class II cabinet, CO2 incubator, microscope, a Hypoxia station, Gel documentation instrument, and Sonicator. The facility also has centrifuges, water baths, refrigerators, and other equipment necessary for cell culture studies. The tissue culture labs are used to grow cancer, normal human and mice cells, fibroblasts, chondrocytes cell lines, and in vitro studies. The Gel Documentation instrument detects proteins and nucleic acids, while the Hypoxia Station mimics physiological oxygen conditions. The Class II cabinet and CO2 incubator provide aseptic conditions and optimal conditions for biological cell growth. The tissue culture facility provides tissue culture support for researchers and students at RIMHS as well as visiting internal and external researchers.

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X-Ray Crystallography Facility

Single crystal X-ray diffraction lab (SC-XRD) offers non-destructive analytical instrument that provides compound structural details like bond lengths and bond angles. It is equipped with Bruker D8 Venture diffractometer and is coupled to an extraordinarily sensitive-large Bruker AXS PHOTON II 14 CPAD detector that gives rise to high-resolution data even on tiny crystals. After data being generated and collected, the single crystal refinement process is performed to afford the crystal structure.

The SC-XRD lab committed to advanced research and discovery, the facility is useful to researchers and students from academia or industry across UAE. The facility provides you the support, whether you have small compounds from synthetic or natural source. The facility receives more than 300 samples from all over the UAE and the region.

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Quality Assurance Lab

The quality assurance lab comprises two central sections: Research Institute for Medical and health sciences and Research Institute of Sciences & Engineering.

This lab provides services and support with the latest in technological innovations and expertise to assist Sharjah University research community, and other institutions in UAE to facilitate research and education in pharmaceutical, medical, and environmental sciences.

The quality assurance lab offers various workflows for qualitative and quantitative analyses of elements, anions and cations, small molecules drugs, Metabolites, and other chemical and biological compounds, and provides support on a wide range of advanced analytical instruments including:

- Liquid chromatography mass spectrometry (LC-MS/MS, Xevo TQ-S, Waters)
- High-performance liquid chromatography (HPLC and UPLC, Shimadzu)
- Gas chromatography mass spectrometry (GC-MS and GC-MS/MS, Shimadzu)
- Ion chromatography, (Thermo)
- Inductively coupled plasma optical emission spectroscopy, (Thermo)
- Total Organic carbon, (Teledyne Tekmar)
- Particle Analyzer, (Anton Paar)
- Automatic Polarimeter / Saccharimeter SAC-I, (ATAGO)
- Dissolution, (Distek)
- UV spectrophotometer, (Shimadzu)

Besides pure analytical capabilities, the quality assurance lab also offers additional services, including sample preparation, analytical method development, analytical identification and quantification of substances, metabolomics analysis, and Data analysis.

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