SPECIALISED LABORATORIES & EQUIPMENTS

Veritas Laser Microdissection System • UPLC • Thermo Gel Doc 2000 System • Nanodrop Spectrophotometer • 2D Barcode System • Thermo Cycler PCR Machine • Proteomic Analysis System • QPod Ultra Pure Water • ABI 3130 Genetic Analyser DNA Sequencing • dHPLC • 2D Gel System • iCycler PCR Machine • Spectramax L Microplate Luminometer • Bioanalyzer • Cryostat • Bioinformatic Laboratory • Hybrid Oven • Biobank PPUKM-UMBI • Microarray System (illumina) Beadstation 500 GXDW • Microarray System (Affymetric) • HPLC • Multidetector Real-Time PCR • Inverted Fluorescence Microscop • FACS Aria II Flowcytometer • Laser Scanning Confocal Microscop • New Generation Genetic Analyzer • Transgenic Animal Cabin • UV –Vis Spectrophotometer

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UMBI
INSTITUT PERUBATAN MOLEKUL UKM
UKM MEDICAL MOLECULAR BIOLOGY INSTITUTE

Universiti Kebangsaan Malaysia
The National University of Malaysia

UMBI is a Higher Institution Centre of Excellence (HICoE) recognised by the Ministry of Higher Education

UKM Medical Molecular Biology Institute (UMBI)

UNIVERSITI KEBANGSAAN MALAYSIA

Message from the Director

UMBI was formed in July 2003 as part of the university's strategies to build up capacity in the field of molecular medicine. With a modest start-up operational funding of a mere RM25,000 UMBI has come a long way since then and has certainly made a big impact at the national level. In 2005, UMBI was given the responsibility to spearhead The Malaysian Cohort project which is the biggest ever population-based prospective health study to look at gene-environment interaction as well as to discover biomarkers for various diseases including cancers. In 2006, UMBI played a lead role in the National Space Science program. UMBI was involved in the first ever science experiments sent to space by Malaysia, via the USA shuttle programme in 2006, and later through the Soyuz programme in 2007 which also brought the first Malaysian astronaut to the International Space Station. UMBI is also part of a national consortium to study cancer epigenetics and also the Malaysian genome.

Our key areas of research include cancer research, anti-ageing, degenerative diseases, molecular toxicology, molecular epidemiology, pharmacogenetics, infectious diseases, reproductive biology and molecular basis of diseases. We have established key linkages with international institutions through research collaboration, adjunct professorships, post-graduate training as well as advisory appointments.

UMBI has indeed surprised many with its rapid growth within a short time, thanks to the support given by the university's leadership, the unwavering commitment and the tireless contribution of all the research fellows and the support staff. The smart partnership with the UKM Medical Centre has also been vital in UMBI's success. In 2009, UMBI was recognised as a Higher Institution Centre of Excellence (HICoE) by the Ministry of Higher Education after passing the audit assessment with flying colours. UMBI is only one of six research institutions in the country given the recognition. UMBI is certainly on track in its noble mission and visison. We at UMBI have promised ourselves to a lifetime commitment to research, discovery and innovation with the aim pof personalised medicine and improving health.

PROFESSOR DATO' DR. A RAHMAN A JAMAL
DIRECTOR
UKM Medical Molecular Biology Institute (UMBI)

MISSION

:: To be an excellent research institute by conducting basic, applied and translational research to improve health via personalised medicine.

VISION

:: To be the leading institute in molecular medicine and achieve global recognition and excellence.

NATIONAL KEY PROJECTS

:: The Malaysian Cohort
:: Cancer Genome Project
:: Space Science Project
:: MyGenome Project

RESEARCH AREAS

:: Cancer, Stem Cells and Gravitational Biology
:: Antioxidant & Degenerative Diseases
:: Toxicology & Cancer Pharmacology
:: Infectious Diseases & Immunology
:: Molecular Basis of Disease
:: Molecular Epidemilogy
:: Reproductive & Developmental Biology

SERVICES

UMBI also provides the following:
:: Molecular diagnostics
:: Biobanking facility
:: Contract research services

POST GRADUATE TRAINING

:: UMBI offers MSc and PhD in molecular medicine (By research).

Cancer, Stem Cells and Gravitational Biology

Our research mainly focuses on cancer biology as well as biomarker discovery on various cancers including colorectal, bladder, cervical and breast cancer. We also have a strong childhood leukaemia study group looking at gene arrangements, multi-drug resistance pathways as well as minimal residual disease. We apply the various 'omic' technologies including genomics, transcriptomics and proteomics.

We currently provide the leadership for the Malaysian Cohort project which aims to look at risk factors for various diseases as well as biomarker discovery for early detection of diseases including cancer.

We are also conducting research in gravitational biology and space science. We were involved in sending experiments to the International Space Station in 2006 and 2007 and are now planning for experiments for future missions with our international collaborators.

Antioxidant & Degenerative Diseases

Research on antioxidants has been focused on the association between antioxidants and degenerative diseases involving free radicals such as cancer and ageing. The antioxidants used were mainly vitamin E from palm oil in particular gamma-tocotrienol and other natural antioxidants such as Piper betel (sirih), and algae such as Chlorella vulgaris in modulating neuronal, skin and body ageing. The cancer studied is hepatic cancer. The research covers from the molecular level to human studies. Currently, the molecular mechanisms involved in the modulator effect of antioxidant gamma-tocotrienol using several models of ageing are being studied. The study was expanded into ageing due to the close association between antioxidants and ageing. The ageing population in Malaysia is growing as women's lifespan increased to 76 and men to 70. The desired successful ageing is healthy ageing that is free from chronic and degenerative diseases which can be achieved by healthy living with balance diet as well as supplementation if necessary by taking into consideration differences in individuals' requirement for optimum health.

Toxicology & Cancer Pharmacology

Research in our laboratory focuses on the understanding of the molecular mechanisms of toxicity induced by toxic chemicals and natural products.

- Molecular regulation of benzene metabolites induced apoptosis
  Benzene is an industrial and environmental myelotoxicant and it has been demonstrated to cause hematological disorder including leukemia. Our laboratory investigates the molecular regulators of benzene induced apoptosis and DNA damage. The genes of interest in our laboratory includes Fau and NQO1.
- Design, synthesis and drug development of styryllactones and stilbenes
  Stryryllacytones and stilbenes can be found in several plant species although iin the past few years, there have been initiatives to synthesise various analogs of these chemical. Our laboratory is interested in understanding the molecular mechanisms of apoptosis and chemoprevention induced by these analogs. Determination of mutagenic effects of chemicals using the OECD guidelines for mutagenicity.

Infectious Diseases & Immunology

The laboratory focuses on two main research areas namely dengue and methicillin-resistant Staphylococcus aureus (MRSA). Our research interests in dengue include the pathogenesis and pathophysiology of dengue, with the aim of developing biomarkers for early prediction of dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). We are also investigating the extent of dengue exposure in the Malaysian adult population via a country-wide sampling and detection of dengue antibodies in serum samples. In addition, our dengue research group, which includes researchers from the Department of Obstetrics and Gynaecology, is also looking at the impact of dengue antibodies in pregnant women and transplacental antibody transfer. For MRSA and other staphylococci, our research focuses on vancomycin resistance in MRSA and VISA (vancomycin-intermediate S. aureus). Pilot studies on the contribution of staphylococcal virulence towards patient clinical outcome are also being carried out. Our research groups has close collaboration with the Department of Microbiology and the Infection Control Unit on the molecular epidemiology of Staphylococci sp. isolated in UKMMC, with the objective of controlling staphylococcal transmission and antibiotic resistance within the medical centre.

Molecular Basis of Disease

This research area is focused on understanding the molecular basis of common respiratory diseases including asthma, COPD, sleep apnoea and lung cancer. Our current research is centred in defining molecular pathways in various types of inflammatory cells in asthma. We also aim to identify gene signatures that are associated with asthma severity, control status and steroid response. In the lung cancer project, we identify the gene expression profiles that are associated with tumour type, stage and survival. We further define the functions of these genes using RNA interference (RNAi). Understanding of the disease pathways will allow future identification of novel biomarkers and therapeutic targets.

Molecular Epidemiology

- Epidemiology of biomarkers including drug metabolizing enzymes, MTHFR genes and DNA repair genes. Mutation of the RET gene in Hirschsprung's disease
- Genetic markers in cancer including bladder, lung and leukaemias

Reproductive & Developmental Biology

Reproductive and developmental biology group focuses on the molecular basis of early development, stem-cell biology, male and female reproduction and women-related cancers. The research emphasis on normal physiological and pathological conditions on both male and female reproductive tract. The aim of the research is to apply the knowledge of the basic problems in development, function and disease across a broad spectrum of human as well as animal models. Currently, the group has included a collaboration between multidisciplinary scientists and clinicians within this institution and the neighbouring local universities. The funding for the researches are presently secured through the national and the internal research university funds. The on-going researches include the gene expression profiling of endometrial cancer, ovarian cancer and recurrent miscarriages patients using the platform of microarray.