

2 **ALIGNING WITH THE SAUDI NATIONAL VISION 2030**
Facility aims to serve region's health needs.

3 **THE ERA OF PERSONALIZED AND PRECISION MEDICINE**
Honing in on diabetes and cancer

5 **SAUDI STEM CELLS DONOR REGISTRY**
Hope for every patient

7 **PROTECTING SAUDI ARABIA'S INTELLECTUAL PROPERTY**
Commercializing on innovative research



THE

RESEARCHER

KAIMRC
NEWSLETTER

ISSUE ONE
JULY 2016

Achievement in Innovation, Research and Development

Presented by His Royal Highness Prince Muteb bin Abdullah bin Abdulaziz, minister of the National Guard, at the KAIMRC annual forum, the National Guard Health Award is among the most prestigious awards on offer at KAIMRC.

"These awards recognize researchers with a track record of achievement in all aspects of research, including publications, innovation, funding and mentorship," says Ahmed Alaskar, KAIMRC's executive director and head of its awards committee.

All Ministry of National Guard affiliated staff, including KAIMRC researchers, can submit summaries of their achievements for consideration in three categories: senior researcher, active researcher and

junior researcher. "This ensures recognition across the board," says Alaskar.

The 2015 winners of the three awards were pulmonologist Hamdan Al Jahdaly, health information scientist Mowafa Househ, and computer engineer Mohammed Razak, respectively.

The 2015 innovation award was given to healthcare technologist Abdulrahman Alfifi and his partner, medical imaging consultant Hisham Alshalan. They introduced improvements on a device currently used for giving air enemas to treat infants suffering from intestinal intussusception – a condition where one part of the small intestine slips over another.



The honour of winning the prestigious awards is accompanied by a significant monetary prize. Worthy recipients are readily found among the world-class researchers at KAIMRC.



LETTER FROM THE EXECUTIVE DIRECTOR

King Abdullah International Medical Research Center (KAIMRC) has embarked on a new phase of its development with a set of focused research and development (R&D) goals based on disease-specific areas, innovative utilization of our enabling research platforms, and stronger focus on establishing selected strategic academic and industrial R&D partnerships.

A key to our success will be

improving how we reflect our R&D programs among members of our academic medical centre including the faculty, clinicians, scientists and students as well as to the larger medical research community.

Therefore, we are launching a newer and enhanced version of our newsletter, The Researcher, that will be published on a quarterly basis in partnership with Nature Publishing Group to ensure high quality standards and a high level of professional publication.

With the first issue, we are announcing the launch of the King Abdullah Medical Research Award. The award will recognize medical research excellence in the kingdom, support the

government's commitment to creating a national environment that promotes high quality research, and boost the performance of research centres working on research with a direct impact on human health and on the country's economy. This unique award will be far different from other existing awards in the kingdom.

The King Abdullah Medical Research Award may be given to qualified researchers working on translational and precision medicine, as well as on innovative research and development in medicine with an impact on health, economy and population.

Dr Ahmed Alaskar
KAIMRC Executive Director



ALIGNING WITH THE SAUDI NATIONAL VISION 2030

Research and industry work hand-in-hand to develop solutions for national and regional health needs.

As part of the Saudi National Vision 2030, and particularly the emphasis on developing a knowledge-based economy, KAIMRC is set on making a strong impact on human health through scientific innovations driven by a strong R&D agenda.

Through the development of medical biotechnology programs, KAIMRC will produce diagnostic and therapeutic tools and services that address national and regional healthcare needs. These programs will later form the nucleus for a future medical biotechnology park.

The new park will be accommodated within KAIMRC's facilities — which comprise a 35,000 square-meter space in Riyadh, with additional 15,000 square meters at KAIMRC's offshoots in the eastern and western provinces, all in the campuses of King Abdulaziz Medical City, KAIMRC's parent institution.

The new park's research focus will be disease-specific says Abdelali Haoudi, head of KAIMRC strategy and business development and one of the main architects of the new park.

Due to their complexity, the park's aim will be to develop solutions for only a small set within the major classes of high-incidence diseases in the kingdom. This focused use of resources will yield better return on investment, explains Haoudi.

It also means better matching with specific partners in academic institutions and pharmaceutical firms, who have a shared interest in a disease or a particular profile of a disease that is specific to Saudi Arabia or the Gulf region, such as diabetes, some genetic diseases and specific types of cancer.

Thanks to the vast pool of patient data from the medical city's hospitals across the kingdom, KAIMRC and its new park are well positioned to partner with institutions aiming to conduct clinical research and clinical trials; advantages that other parks in neighbouring countries with smaller populations cannot match.

The new park's partners will include national and international academic and industrial entities and a set of these partnerships are in the process of being developed.

In addition to institutional partners, the new park will also pursue collaborations with individual researchers who are preeminent in their fields and whose expertise can speed up the pace of product development and improve the skills of KAIMRC's research staff.

FOCUSING IN ON DISEASE

Grants improve scope of investigations into bowel cancer and type 2 diabetes.

In order to support the needs of Saudi Arabians, KAIMRC has developed a new strategy for research and development (R&D) that is focused on cancer, diabetes, cardiovascular diseases, infectious diseases and neurological disorders, five of the most prevalent diseases in the Kingdom of Saudi Arabia.

“The ultimate goal is that our R&D projects will become geared towards tangible outcomes, not only fundamental research,” explains Abdelali Haoudi, head of strategy and business development at KAIMRC. Two examples of this new direction are

evident in projects currently searching for answers on possible treatment for cancer and type-2 diabetes.

KAIMRC oncologist, Mohammad Aziz, leads a team that will soon embark on a year-long investigation of one specific link between diet and bowel cancer. This is the third most common type of cancer worldwide, killing more than half a million people each year. “There have been very few studies comprehensively investigating the role of diet on this cancer,” he says.

His team will examine the involvement of certain chemicals called free fatty acids (FFAs) that are released by bacteria in the gut at the same sites where bowel cancer occurs. A grant from King Abdulaziz City for Science and Technology will be used to generate mutant cells that lack the surface receptors for specific FFAs. Aziz hopes this will provide a detailed understanding of the role FFAs play in the metabolism and growth of cancer cells. “Eventually we hope this will help to develop novel therapies against cancer,” says Aziz.

In April 2013, Abderrezak

Bouchama’s research group began a long-term study into type 2 diabetes, using a grant of more than 1,595,000 SR, also from King Abdulaziz City for Science and Technology. This form of diabetes is closely linked to obesity and therefore is often treated with bariatric surgery, involving techniques including gastric bands, gastric bypass and reduction of stomach size. Bouchama’s team enrolled 40 patients who have undergone this surgery to monitor their progress over the subsequent months and years.

The researchers are now undertaking sophisticated cellular and genetic analyses of fat and blood cell samples from participants to try to understand the molecular mechanisms behind the benefits of this type of surgery. Bouchama reports that the work is revealing “remarkable clinical and biochemical responses.” The researchers hope that eventually their insights will lead to drugs and therapies that will target the cellular processes identified by their work.



Personalized and Precision Medicine to Hone in on Diabetes and Cancer

In December 2015, KAIMRC hosted an international workshop called “Towards Personalized and Precision Medicine for Diabetes and Cancer”, which attracted leaders in the field from

across the world. The main objective was to share best practices among attendees and for researchers to discuss developing

“KAIMRC IS UNIQUELY SUITED IN THE COUNTRY AND THE REGION TO PLAY A MAJOR ROLE IN THE AREAS OF PERSONALIZED AND PRECISION MEDICINE.”

a strategic research and development (R&D) plan for the institution.

KAIMRC leaders want to leverage on-campus talent and resources in cutting-edge genomics, proteomics, metabolomics, and stem cells

research for the development of diagnostic and possible therapeutic approaches for diabetes and cancer, says Abdelali Haoudi, head of Strategy & Business Development and the organizer of the workshop.

This is the perfect time to pursue this exciting opportunity. “KAIMRC is uniquely suited in the country and the region to play a major role in the areas of personalized and precision medicine,” he says.

Over the last few years, KAIMRC scientists have conducted an average of 30 clinical trials per year and several innovations in nanoparticle drug delivery have been patented.

“The workshop was a great success, as we not only identified important projects, but it also helped us recruit key international participants to join our exciting R&D journey.”

INVESTIGATING THE SAUDI GENOME FOR TAILOR-MADE SOLUTIONS

KAIMRC researchers are sifting through the Saudi genome for mutations and variations that might explain the origins of common diseases in the kingdom.

The Medical Genomics Research Department (MGRD) was established to carry out cutting-edge research that addresses medical problems in the Saudi population. By focusing on four main areas of human health — genomics, medical genetics, cancer genetics, and new therapeutics — the MGRD hopes to lay the groundwork for future personalized medical treatments for Saudi people.

The department is equipped with the most advanced technologies in DNA sequencing, gene expression analysis, cell culturing, and other molecular biology methods — all of which are available to researchers within KAIMRC or at partner institutions, including King Saud bin Abdulaziz University for Health Sciences and the hospitals of King Abdulaziz Medical City.

Using the department’s next-generation sequencing machines, for example, a team led by MGRD scientist Ibrahim Abdulkareem recently sequenced the genomes of more than 40 healthy Saudi individuals. In these cohorts the researchers identified 46 rare genetic variants that are only found in the Saudi population, helping to “create a genetic polymorphism database for our community,” says MGRD chairman Saleh AIGHamdi.

Genetic studies at MGRD have also revealed many mutations harboured by Saudis that affect the way people metabolize heparin, a common blood thinner that prevents clots forming. The department is planning to partner with clinicians at nearby hospitals in the kingdom to test how to use this

information to tailor doses of the drug for patients.

MGRD scientists have also been exploring the mutations responsible for rare diseases in Saudi children. Recent research projects have described the mutations behind Saudi cases of type 1 diabetes, inherited

“THIS WILL HELP US MAKE PRECISION MEDICINE A REALITY FOR SAUDI PATIENTS.”

bone marrow failure syndromes, juvenile polyposis syndrome, and the blood disorders Fanconi anemia and G6PD deficiency. Abdulkareem has also characterized genetic abnormalities responsible for infertility among Saudi men, while AIGHamdi’s research has probed the gene variants

underlying autism spectrum disorders in the Saudi population.

MGRD researchers are now investigating why certain mutations underlie cancer and what can be done to stop tumour progression. Adila Elobeid, for example, is studying the therapeutic properties of black cumin, a plant widely used in traditional Arab medicine. She is investigating how a substance known as herbal melanin, which is naturally found in the plant’s seeds, affects various immune pathways to limit the growth of human stomach cancer cells.

All these research efforts are designed to “help improve the quality of healthcare and pave the way for future medications,” AIGHamdi says. “This will help us make precision medicine a reality for Saudi patients.”





SAUDI STEM CELLS DONOR REGISTRY: HOPE FOR EVERY PATIENT

For thousands of Saudi Arabian patients suffering from blood diseases, a stem cell transplant may save their lives. Few, however, have family donors who can supply compatible stem cells. With data collected from more than 25,000 donors, the Saudi Stem Cells Donor Registry (SSCDR) is on a mission to secure a donor for every patient in need.

Since KAIMRC established the first national donor registry in 2011, the SSCDR has launched public awareness campaigns all over the kingdom to recruit donors. One of the most successful campaigns took place during the National Festival for Heritage and Culture "Janadriyah 30" that was held last February, with more than 6,600 new registered donors signing up to the program.

"Most of the people we met were enthusiastic and willing to help, and some of them were surprised that such a registry existed in our country," says Mohsen Al Zahrani, director of the SSCDR.

While the majority of people currently registered are Saudi Arabian, the kingdom is also home to nine million expatriates, and the SSCDR welcomes them to register as well. Three patients received donations from unrelated donors through the registry in 2015.

Funded by the Ministry of National Guard Health Affairs, the SSCDR continues its efforts to recruit new donors, cooperate with other international donor registries and work on getting accreditation that meets international standards, hoping to save thousands of lives.

A Genetic Investigator with a Passion

A Saudi molecular geneticist is determined to find the genetic underpinnings of diseases common among his country's population.



A molecular geneticist and clinical cytogeneticist by training, Mohammed Al Balwi is also an investigator. Recently he has managed to track down the reason a baby girl and two siblings were not thriving, why some leukaemia patients relapse after treatment, and he found the common genetic underpinning of multiple sclerosis in Saudi Arabian patients using a toolbox of advanced genetic next-generation sequencing technologies.

Like many detectives, Al Balwi has a passion for his work. "My work is my hobby and my vocation," he says. He was drawn to genetics because it allows him to search for clues on causes and better treatments for a wide range of genetic disorders and other conditions such as neonatal respiratory distress syndrome, male infertility and susceptibility to diabetes. The ultimate goal, he says, is not just a better understanding and treatment for these diseases but to find a way to prevent them.

Al Balwi's research has been made possible due to support and financial grants from KAIMRC, the Ministry of National Guard Health Affairs (MNGHA), and King Abdulaziz City for Science and Technology in Riyadh, as well as collaboration from international researchers in the US, UK, Japan and France.

Al Balwi heads the section of molecular pathology and genetics and the department of pathology and laboratory at King Abdulaziz Medical City in Riyadh. He also directs two cytogenetics laboratories and teaches genetics at King Saud bin Abdulaziz University for Health Sciences.

An important area of Al Balwi's research is genetic disease risk in the Saudi population. "It's estimated that over two-thirds of the Saudi population has type 2 diabetes," he explains. He devotes serious effort to understand why this is and what can be done about it, with the hope that it will be possible to change this statistic by finding genetic markers for the disease.

Also, inter-marriage within extended families brings a risk of genetic diseases such as the fatal Omenn's syndrome, which severely impairs an infant's ability to fight infection. "If we can identify conditions like this, we can offer patients genetic counselling and prenatal diagnosis, which will reduce the incidence of this tragic syndrome," Al Balwi says.

Due to his hard work and dedication, Al Balwi received the "Research Award" and "Senior Research Award" in 2012 and 2015 respectively in the annual recognition commissioned by the MNGHA through KAIMRC. Some of his recent studies in genetics were published in the *American Journal of Human Genetics*, the *European Journal of Human Genetics* and the *Multiple Sclerosis Journal*.



FORGING PARTNERSHIPS: A BOOST TO HEALTHCARE AND MEDICAL RESEARCH

Collaborative initiatives are cementing the foundations of world-class medical research capabilities and facilities in Saudi Arabia.

Leading research demands networks of skilled scientists and technicians along with state-of-the-art facilities and the ability to generate viable datasets. Collaborations forged by KAIMRC at local, regional and international levels will help secure the future of the Kingdom of Saudi Arabia as a world-class research base.

At the local level, KAIMRC is working with King Abdulaziz City for Science and Technology to fund the Saudi Biobank — a national resource centre that, over time, will collect and analyze health data and biological samples from a targeted 200,000 donors.

“Although many countries have established large-scale projects investigating genetics and disease progression, no equivalent project has been created for the Arabian population,” says Saleh AlGhamdi, director of the Saudi Biobank. “The datasets will enable genetic and biomedical research into many diseases, including cancer, neurological diseases and diabetes.”

The biobank will be an invaluable resource for the kingdom’s healthcare

system, notes AlGhamdi, and may lead to collaborations with research institutes across the globe.

“ALTHOUGH MANY COUNTRIES HAVE ESTABLISHED LARGE-SCALE PROJECTS INVESTIGATING GENETICS AND DISEASE PROGRESSION, NO EQUIVALENT PROJECT HAS BEEN CREATED FOR THE ARABIAN POPULATION.”

To ensure the kingdom has the expertise to benefit from ambitious research projects like the biobank, KAIMRC has also created professional development opportunities for their healthcare and veterinary professionals at regional and international universities. For example, since 2010, junior medical and clinical researchers at KAIMRC have received training on research protocols by faculty from the American University of Beirut.

“This has resulted in a community of researchers at KAIMRC with a shared understanding of the challenges of research design,” says Ibraheem Bushnak, head of Research Promotion

and Education at KAIMRC. “The researchers can also help us improve national healthcare provision and set protocols for clinical practice.”

Providing KAIMRC’s scientists with state-of-the-art facilities to carry out their work is another key goal. Now, three Saudi-based animal laboratories are being built as a direct result of a management consultancy agreement with Monash University in Australia.

“The support that John Phelps and his team at Monash University are providing enables us to build facilities that should meet strict international standards for animal welfare and give international credibility to the research conducted here,” explains Abderrezak Bouchama, KAIMRC’s chairman of experimental medicine. “Monash University is also training the Saudi veterinarians and technicians who will operate the animal laboratories.”

The partnerships secured by KAIMRC will help ensure a bright future for the kingdom’s healthcare system and its place as a centre for world-class research and development in medical sciences.



Protecting Saudi Arabia's Intellectual Property

An office at KAIMRC is helping researchers commercialize on their innovative ideas and teaching them all they need to know about technology transfer.

Launched in 2012, the Innovation and Technology Transfer Management Office (ITTMO) is making a significant difference in advancing KAIMRC's mission. Under the watchful direction of Ali AlMuntashri, a biomedical engineer and a recognized leader in technology commercialisation, the ITTMO aims to build the technology transfer capacity of researchers working at KAIMRC and the Ministry of National Guard Health Affairs (MNGHA) and to protect and manage their intellectual property (IP).

"Nowadays, universities face increasing challenges in terms of funding and translating research outcomes into useful products," explains AlMuntashri. "KAIMRC's objective is to tackle this dilemma upfront to avoid losing time, money and economic opportunities. This can be done by positioning the technology transfer office to strategically plan, guide and partially fund ongoing research."

In December 2015, the office organized a workshop called "Patents, Innovations and Intellectual Property Registration at MNGHA". In the session, AlMuntashri shared the many successes he has spearheaded, including the hiring of local and international IP attorneys to support the process of acquisition and protection of patents.

To achieve its long-term objective, the ITTMO has created a system for technology transfer associates to review KAIMRC research for innovative ideas that could potentially be patented. It is also negotiating with technology commercialization firms and technology transfer consultants to establish partnerships for IP commercialization and technology licensing. In addition, AlMuntashri established institutional agreements with various national and international universities and institutions to enable more efficient evaluation of the commercial potential of shared technological innovations.

SCIENCE CLUB: DISCUSSING AND CRITIQUING RESEARCH

KAIMRC's Research Scientific Club was established in March 2014 to provide a forum for the institution's scientific community to discuss cutting-edge research and develop new ideas.

"The club is meant to provide an opportunity for the scientific community at KAIMRC and the Ministry of National Guard Health Affairs to present their research work, exchange ideas and critique breakthrough research articles published in high-profile journals by researchers around the globe," says Sameer Mohammad, a research scientist at KAIMRC's department of experimental medicine and the club's director.

In May 2016, Ali Rizwan, a post-doctoral researcher at KAIMRC's medical research core facility and platforms, gave a talk titled "Correlative Light and Electron Microscopy and its Applications in Cell Biology." Discussions revolved around the benefits of using these microscopic systems in KAIMRC's laboratories.

Earlier in April, KAIMRC molecular biologist Shuja Malik gave a talk on bio-molecular interactions in bacteria, yeast and humans.

Lectures are held on the second Tuesday of every month. Upcoming talks will cover cancer, diabetes, infectious diseases and confocal microscopy.

RESIDENTS ONE STEP CLOSER TO A RESEARCH CAREER

Clinical postgraduate training is a critical component for the development of a country's healthcare talent pool. To become competent in their fields, resident clinicians need to develop the ability to build, critique and apply relevant knowledge. The Resident Clinical Research Program offers a basic clinical training module for all Ministry of National Guard Health Affairs (MNGHA) residents. It is organized by King Abdullah International Medical Research Center in collaboration with NGHAs deanship of post-graduate education.

"We train residents to become lifelong learners and to incorporate new evidence into their daily practice," says Manal Bawazeer, the program's director. The program aims to instil a sense of productive curiosity that leads to asking the right questions and developing innovative solutions, she says.

Residents are trained to become competent in evaluating and critiquing research studies, independently developing research proposals, conducting basic statistical analyses, and writing basic research abstracts, posters and manuscripts.

The program takes place twice a year, with the last round hosting 46 residents over the period from 1 to 26 May 2016.



TRAINING THE YOUNG RESEARCHERS OF TOMORROW

KAIMRC's 8th Research Summer School will be held from 24 July to 1 September 2016 and aims to provide medical students from universities in the kingdom and beyond with theoretical and practical information on research basics.

The four-week course includes training on writing research proposals, using an evidence-based approach to analyze data based on bioethical values and principles, and how to present research study output for peer review.

"The research summer school was initiated to augment the backbone of medical research in Saudi Arabia and to teach medical students the importance of research early in their professional careers, with the ultimate aim of improving patient care," says Ibraheem Bushnak, the school's director.

Students who take part in the course will choose a research topic and will work closely with their mentors on it. At the end, each student will present their work to an audience of peers and mentors.

Registration for future summer schools is announced online and is open to students of medicine, dentistry, pharmacy, nursing and applied medical sciences.

<http://kaimrc.med.sa/rss/register/>