Driving the medical field forward through research and innovation
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Healthcare breakthroughs to improve lives

King Abdullah International Medical Research Center (KAIMRC) was established in November 2006 under the umbrella of the Ministry of National Guards – Health Affairs (MNG-HA) to develop, support and disseminate scientific research in Saudi Arabia. KAIMRC’s aim is to transform lab results into products that improve quality of life, and training skilled researchers for the healthcare sector.

Through understanding the Saudi genome and the common health issues of the society, KAIMRC aims to foster world-class medical research that contributes to knowledge internationally, but that also looks to develop treatments that fit the genetic makeup of the nation.

The thriving centre has facilities in Riyadh, Al Ahsa, Damam, Jeddah and Medina and conducts research at the community and clinical levels, utilizing cutting-edge technology and state-of-the-art facilities. It also works towards establishing an innovative research infrastructure and a network to achieve effective partnerships with the public and private sectors locally and internationally.

Saudi National Vision 2030 puts achieving a knowledge-based, sustainable economy at the forefront of its goals. To achieve Vision 2030, Saudi Arabia recognizes the need for science, research and innovation, and has allocated significant investment to research and development (R&D) in the past years. In the fiscal year 2015-2016, for instance, the government has pumped $64.8 billion in R&D investments, or 0.4 percent of the government revenues. KAIMRC is a key driver of the country’s development efforts to achieve the ambitious goals of Vision 2030. In line with that, KAIMRC has set a strategy that focuses on R&D, stressing the need for scientific research and developing new technologies. The centre leads MNG-HA’s efforts in R&D in the fields of biomedicine and clinical research.

KAIMRC’s vision is to lead innovation and development of biomedical, clinical and academic research, which would have significant impact on the economy and healthcare in Saudi Arabia. The centre also aims to facilitate cooperation between clinical and academic researchers in Saudi Arabia and the rest of the world, invest in developing researchers’ skills, and bring scientific research to life through bridging the gap between the laboratory and the economy.

To achieve this vision, KAIMRC’s strategy focuses on R&D programmes, training and capacity building, entrepreneurship and commercialization and KAIMRC’s global reputation.
Since its foundation in 2012, KAIMRC has come a long way to become the leader of the biomedical research in Saudi Arabia and the region. Behind the cutting-edge research and facilities, and the pioneering vision, lies dedication, commitment to excellence, and the hard work of its people.

Mohamed Boudjelal, chairman of the Medical Research Core Facilities and Platforms and the director of Drug Discovery Program at KAIMRC, was one of its early founders after joining the centre in December 2012.

It is in part thanks to Boudjelal that KAIMRC owns a world-class functional research core facility and platforms. He has worked on establishing many cutting-edge research units, such as cell biology, biochemistry and antibody production, molecular biology and virology, proteomics and metabolomics, nanobiotechnology, and stem cells and drug discovery.

A leader in the biomedical research field in Saudi Arabia, the Research Core Facility headed by Boudjelal is available not only for KAIMRC's researchers, but to all researchers working at Ministry of Guard-Health Affairs (MNGHA), King Saud Bin Abdulaziz University for Health Sciences (KSAU-HS), or any affiliated or associated scientists from other institutions. There are also highly skilled staff to assist with any technical requests.

These facilities, Boudjelal explains, cost more than €15 million, “I selected the latest equipment on the market, set up the labs, hired the skilled personnel and set up the operational process,” says Boudjelal.

Despite all his responsibilities in management leadership, Boudjelal always finds time to work on his own research projects and secure funds for his work. Sitting in his laboratory surrounded by his students are the moments Boudjelal enjoys the most, he says, “I carry out my own bench work and execute experiments for the projects I handle myself.”

Most of Boudjelal’s work focuses on important issues for Saudi Arabia, like breast cancer and leukemia. Boudjelal says his team is in the process of writing several papers and have also submitted three patents.

As increasing global visibility and building strong global reputation is one of the main pillars in KAIMRC’s five-year strategy, Boudjelal pursued collaboration with international institutions in Europe, Asia, and the US that include Fraunhofer Institute for Molecular Biology and Applied Ecology in Germany, The Scripps Research Institute, The US National Institute of Health (NIH), The Pasteur Institute, in France, and some Japanese universities. Boudjelal explains that he does all of that “alongside organizing international courses and conferences on drug discovery and medical device clinical trials.”
KAIMRC’s Medical Biotechnology Park: Preparing a generation of science entrepreneurs

Set up to foster and encourage medical science startups and complementary businesses, KAIMRC’s Medical Biotechnology Park is designed to facilitate the transfer of technology from the lab to market, and to support the next generation of Saudi and Arab entrepreneurs. Offering facilities, expertise, knowledge, contacts and other services for startups, the park also contributes to job creation and advancing the regional economy.

The park provides R&D services and support for organizations engaged in research and commercialization, and serves as an incubator for technological start-ups. It also builds national and international collaborations, arranges industry networking, and develops the skills of Saudis to meet the needs of the labor market.

The main goal of the park is to provide a focal point for the growth of entrepreneurship and technological companies and create a common culture for similar-minded entrepreneurs in the field.

The biotech park services and programmes are designed to increase a company’s likelihood of development and growth, and spin out graduate companies to generate jobs and wealth in the region.

The services the park provides fall under five categories:

- Direct business development assistance
- Professional network and relationship support
- Capital and financing network
- Educational programmes
- Facility-based services

The incubator includes facility space, flexible leases, use of office equipment, direct business assistance and guidance, mentoring, networking to capital, and other technical resources, including access to clinical expertise and studies. A network of existing resources in the community would be developed to support companies’ needs.

It is located inside KAIMRC’s state-of-the-art R&D building in Riyadh, a walking distance from King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) in the heart of King Abdulaziz Medical City near multiple hospitals and medical centres. KAIMRC’s R&D building has an area of 35,000 square meters, split over five floors. The incubator space is an area of about 5,000 square meters, that includes laboratory and office space with access to multiple shared common services, including business development, manufacturing, commercialization, and other administrative support functions. It also provides access to facilities like an employee lounge and kitchen area, conference and meeting rooms. All the laboratories are equipped with distilled water, vacuums, air and gas, hazardous storage, and bio and chemical hoods. For a fee tenants also have access to various capital-intensive resources throughout KAIMRC, the hospitals and the university.
KAIMRC is leading four landmark projects; the Saudi Bio-Bank, the Cord Blood Bank, the Research Trauma Project and the Saudi Stem Cell Donor Registry (SSCDR). The biobank seeks to conduct studies on the environmental factors affecting the occurrence and development of chronic diseases. The Cord Blood Bank collects umbilical cord samples to extract stem cells to use in the treatment of several diseases, including leukemia. KAIMRC has implemented the first trauma system in Saudi Arabia, and established the first-of-its-kind SSCDR to establish a national registry of data and samples of stem cell donors. These projects are leading to significant advances in Saudi Arabia’s most common diseases including diabetes, cardiovascular diseases, cancer, trauma, obesity, and hypertension.
As the nation moves towards a knowledge based economy, KAIMRC strives to drive innovation within the Ministry of National Guard-Health Affairs (MNG-HA). Guided by the Saudi Vision 2030, KAIMRC launched its five-year strategic plan in 2016 to help focus the centre’s R&D and innovation efforts and make the best use of its facilities and highly skilled experts.

This translates into development plans for KAIMRC’s researchers and upgrading their facilities in order to maintain world class R&D. A key area of focus is also setting up disease-specific R&D programmes.

The disease areas for KAIMRC’s strategy focus are based on national priorities and the capabilities within the academic medical centre. Those areas include cancer, cardiovascular and metabolic disorders (diabetes and obesity), rare and genetic diseases, infectious diseases and neurological diseases.

“We are establishing a new R&D mega-projects program for strategic, multidisciplinary, joint projects,” says Abdelali Haoudi, the head of strategy and business development at KAIMRC. “This multidisciplinary research approach is the way forward in the R&D and innovation sector.” These projects bring together expertise from different departments and units across KAIMRC, King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) and MNG-HA clinical centres. As Abdelali explains, this approach will contribute to the development of precision medicine in the clinical setting, and to ensure better opportunities for product development and commercialization.

The aim is to use R&D and innovation to truly make an impact on the kingdom’s health and economy. Ahmed Alaskar, executive director of KAIMRC, says the best way to do that is by “continuously bridging basic research with translational and clinical research through strong support for clinical trials, and supporting commercialization via supporting biotech and biopharma projects.” To achieve this goal, KAIMRC allocates 60 percent of its budget for it.

Other aspects of KAIMRC five-year strategy include focusing on research that meets international standards, training and capacity building for people, and entrepreneurship and commercialization by developing intellectual property and local start-up businesses.

“We focus more on patents that could have a potential for further development and commercialization,” says Haoudi. KAIMRC have set up a dedicated structure to achieve this; the Medical Biotechnology Park, which is designed to incubate biotechnology and biopharma-based projects, and foster its transfer to the marketplace. The biotechnology business incubator was accredited by Monshaat, the national agency responsible for accrediting
“KAIMRC reviews its R&D strategy annually to ensure its impact on health and economy and its alignment with the national vision 2030.”
Advancing the kingdom’s clinical trials

In line with an aim to increase the kingdom’s participation in clinical trials held in the Middle East from the current 3 percent, KAIMRC has been leading an initiative to form the Saudi Network for CT (SNCT), launched in April 2019.

As a cornerstone of medical R&D, clinical trials also generate jobs, revenues and free cutting-edge treatments to patients in desperate need. By increasing clinical trials around the country, researchers can also develop medicine for the specific genome of the Saudi population.

The SNCT aims to increase the quality and quantity of clinical trials conducted within Saudi Arabia through several approaches aiming at the development of the kingdom’s legal and regulatory framework to streamline approval processes, the training and retention of talents, and attracting the pharmaceutical industry for partnerships within the kingdom.

The SNCT prioritizes attracting and maintaining clinical trials expertise within the country through a training programme and by bringing international experts to educate current and future Saudi clinical research personnel, says the project’s lead, Shuruq Al Yousef.

The centre also wishes to coordinate with the regulatory agencies within Saudi Arabia to make the country an attractive destination for national and international partners in the field. Abdelali Haoudi, KAIMRC’s head of strategy and business development, explains that the national legal and regulatory framework is evolving to adapt to the speed of the clinical trial process and the new requirements as it is rather time-sensitive.

It’s envisaged that by laying the two foundations of skill development and regulatory amenability, Saudi Arabia can start to transform its clinical trials ecosystem. The team behind the initiative also hopes the SNCT can become a regional hub for drugs and therapies, and a coordinating centre for clinical trials.

KAIMRC is working to further clinical research by giving scientists more time, enabling clinicians to designate protected time to research. “Clinicians are extremely busy, and allo-
cating time for their patients is their number one priority,” says Ahmad Alaskar, KAIMRC’s executive director.

To achieve this, KAIMRC is pushing more funding support towards clinicians, to reduce the time sink of applying for grants.

The KAIMRC team is drawing inspiration and guidance from the clinical research success story of South Korea. In less than 10 years South Korea has transformed its unex-

tire Saudi population.” In addition, KAIMRC’s own clinical trials set up operates similarly to a clinical research organization (CRO), which brings with it key insights and experience to the business side of clinical research operations. The research centre’s deep ties with governmental agencies and academia offer the support for many leading institutions across the country, including the Saudi Food and Drug Authority, the Saudi Health Council, King Faisal Specialist Hospital and Research Center, King Abdulaziz University, Princess Nourah bint Abdulrahman University and many others. KAIMRC is also the only intu-

Taking success to a national level

KAIMRC has been devising a plan to form the SNCT for almost two years in close collaboration with a number of national stakeholders, including the Industrial Clus-
ters (IC) and the National Industrial Development and Logistics Program (NIDLP), in hopes to take KAIMRC’s own success in maintaining its own clinical trials initiative to a national level, benefitting healthcare and the economy of the country.

Their efforts paid off when the initiative was funded with SAR 55 million (more than $14.6 million) and was earmarked as one of the country’s strategic initiatives by Khalid Al-Falih, the minister of Energy, Industry and Mineral Resources. Then in January 2019, the Crown Prince of Saudi Arabia, Mohammed bin Salman bin Abdulaziz Al Saud, chaired the announcement of a number of a national strategic initiatives, including the formation of the SNCT. A memorandum of understanding with the Korean KoNECT was signed in support of the project.

Haoudi believes that several significant factors make KAIMRC the right institution to spearhead the country’s new clinical trials programme. “We conduct the largest number of clinical trials in the country as an institu-
tion, averaging 70 per year,” he says, adding that KAIMRC’s sites spread around the coun-
try extends the institution’s reach to “the ex-

ceptional clinical trials profile into that of a world leader,” explains Haoudi. KoNECT (the Korea National Enterprise for Clinical Trials) is now a close partner to the KAIMRC initia-
tive, with the SNCT’s creators aiming at rep-
licating South Korea’s exceptional growth in their own country. The architects of the Sau-
di-Korea partnership (Saudi-Korea National Vision 2030) intend for their work to also deepen ties between the two countries.

Clearly the biggest benefactors of the SNCT, however, will be Saudi patients. With the current limited track record of high-quality clinical trials in the country, there remains a largely-underexploited opportunity to tailor treatments to conditions arising from Sau-
di-specific genetics. An investment in Saudi clinical trials will inevitably lead to new treat-
ments and interventions able to transform the lives of Saudi citizens. There’s a long road ahead before this goal is realized, but KAIMRC is making daily progress. “Hopefully, this will set up the ecosystem that leads to facilitating local industrial drug development, manufactur-
ing, and commercialization,” says Haoudi. “One step at a time.”
Looking back at the eight years he spent at KAIMEC, Professor Majid Alfadhel, deputy executive director and chairman of the Medical Genomics Research Department (MGRD), feels proud to be part of an entity that strives to achieve equal opportunity for people to live a longer and healthier life through science and research.

Throughout those years, he has been a witness to how KAIMEC encourages young researchers, faculty and students to work in a highly-motivating scientific environment. It also provides them with funding opportunities that enable them to work harder, excel and collaborate in different disciplines. This unique atmosphere helps them interact and collaborate with national and international researchers to share ideas and innovate to serve the people of Saudi Arabia.

After finishing his neurometabolic fellowship at BC Children’s Hospital Foundation in Canada, Alfadhel came back to his homeland with one aim: to serve the people of Saudi Arabia. As the nation shifts its strategy to build a knowledge-based economy, Alfadhel emphasizes how the scientific community and the administration at KAIMEC are fully on board with the Saudi National Vision 2030.

“I am hopeful that under such outstanding leadership and with such talented researchers, KAIMEC will make a strong impact on human health through scientific innovations in various fields,” says Alfadhel. He was part of the core team involved in the development of KAIMEC’s infrastructure, and is now working with KAIMEC’s leadership towards establishing a strong economy and generating funding through research and developmental projects in collaboration with different institutions and organizations.

Genetic disorders are some of the major health issues impacting the lives of Saudi Arabians. KAIMEC’s Medical Genomics Research Department (MGRD), chaired by Alfadhel, carries out cutting-edge research in search for answers and new cures. “We have established state-of-the-art, next-generation sequencing technology and we are planning to sequence the DNA of the Saudi population through various collaborative research projects in the near future,” says Alfadhel. The ultimate aim is to build on this research and translate it into personalized treatment.

Cutting-edge facilities and talented expertise come together at MGRD using the latest technologies in the field of human genetics, medical genomics, cancer genomics and hepatology, and cellular and gene therapy. “We are the first genomic lab to establish whole genome sequencing from lab preparation to molecular interpretation,” explains Alfadhel.

Therapeutic genomics, big data analysis and using artificial intelligence (AI) for analysis, in addition to determining new genes and studying its different pathways, are among the focus areas for MGRD. “Until now, we have discovered or contributed to the revealing of more than 50 novel genes,” says Alfadhel.
THE CROWN JEWELS OF KAIMRC

From its cord blood bank to its stem cell research, KAIMRC plays a vital role in creating medicine that is specific to the Saudi population’s needs and genomic composition.
KAIMRC is a leader in healthcare research in the Kingdom of Saudi Arabia, and although still a young organization, it prides itself on landmark projects and initiatives undertaken since its inauguration. Governing all our activities and research products is our bioethics section, which ensures dissemination of ethical principles in biomedical research and clinical investigations, following international guidelines.

We’re especially proud of our biobanking projects; the Saudi Biobank and Cord Blood Bank. Established in 2007, the Saudi Biobank is a state-of-the-art facility and the first functional biobank in the Gulf. It collects, stores and processes samples for various research projects in KAIMRC and the Ministry of National Guard — Health Affairs to study common diseases and how they are associated with genes, the environment and lifestyle. The biobank aims to enroll 200,000 participants, to increase the quality of patient care, and accelerate the impact of research in that field. It also aims to educate the public about the benefits of studying biological materials and encourage participation. It also follows the highest standards of biological banking to provide outstanding clinical, medical, demographical and analytical data. The Cord Blood Bank, which is FACT-accredited, collects cord blood donations from around the kingdom to later on infuse patients in need of cord blood stem cell transplants. It has specialized units that are responsible for recruiting, processing, testing, cryopreserving, storing, thawing and infusing the samples, all activities carried out with a strict quality control system, compliant with international standards.

One of KAIMRC’s key aims is to develop treatment specific to the composition and needs of the Saudi population’s genome, common diseases, lifestyles and needs. The Medical Genomics Research Department carries out cutting-edge research to address medical problems with a focus on the Saudi population, using the latest technologies in next-generation sequencing, microarray, cell culture, DNA sequencing and other molecular-biology-based research. Along the same lines, the Population Health Department aims to contribute to public health at the national and regional levels through world-class research that uses the latest methods and technologies. The results of the various research projects are then presented to policymakers to help guide their decisions. The Developmental Medicine Department also aims to understand the complex biology of the genetic diseases that have devastating effects on many Saudi families, to ultimately find solutions and develop interventions and therapies specific to these widespread diseases. The department has three major laboratories; brain genome, birth defects, and therapy developmental labs.

To further understand diseases and develop treatments, KAIMRC’s Stem Cells and Regenerative Medicine Department works to understand and restore normal functions by repairing or replacing damaged or malfunctioning cells and tissues in patients with cancer, diabetes or neurological, immunological and cardiovascular diseases.

A key area for delivering the best practice and latest in treating a range of diseases from cancer to diabetes, nanotechnology has been an area of focus for KAIMRC. Nanomedicine focuses on improving point of care diagnostics to allow early intervention and better outcomes, developing novel drug delivery systems for chemotherapy, vaccine, gene delivery and infectious diseases.

The Department of Biostatistics and Bioinformatics focuses on developing computational and analytical methods essential for biomedical research, amassing collections of genetic and non-genetic diseases information and establishing multiple registries to provide the research community with the data and tools they need for their research. The department collaborates with researchers from various fields, covering a range of diseases that include obesity and diabetes.
A key area for delivering the best practice and latest in treating a range of diseases, nanotechnology has been an area of focus for KAIMRC.
KAIMRC drives the future of health and biomedical research in Saudi Arabia

Since its founding in 2006, KAIMRC has made significant contributions to Saudi Arabia’s biomedical research and healthcare services. Through an ambitious five-year strategy launched in 2017, KAIMRC aims to become the leading scientific institution regionally and globally, while creating a viable biomedical and life science economy.

“Our R&D strategy is set up to achieve that economic impact, which is the cornerstone of Saudi Vision 2030,” says Ahmed Alaskar, the executive director of KAIMRC. “Our strategy aims to support innovation, technology development and commercialization as the basis for a knowledge-based economy.”

Seeing KAIMRC as a key driver of R&D, the Ministry of National Guard-Health Affairs (MNG-HA) has invested more than SAR 1.2 billion ($320 million) in infrastructure and in furnishing its facilities at KAIMRC with cutting-edge equipment.

Through state-of-the-art medical research core facilities and platforms in three regions across the kingdom, KAIMRC ensures coverage of their services, and helps more than 80 active PhD-level investigators, and more than 200 supporting scientific research staff and administrative and operational personnel to achieve their goals. The KAIMRC leadership has a much bolder target, however, of scaling up its R&D staffing to approximately 800 by 2020 and 1,500 by 2025.

By 2018, KAIMRC had published 1,005 scientific papers with more than 23,000 citations, and is now looking at conducting more impactful projects, with a focus on patents that have development and commercialization potential. To achieve that, KAIMRC developed the Medical Biotechnology Park within its campus as a home for biotechnology and biopharma projects, and to support innovation and commercialization. “Those projects are either spin outs of KAIMRC and the Medical City or partnerships and joint ventures with other national and international partners,” Alaskar explains. The Park includes projects that research using stem-cell-based cell therapeutics for treating diabetes and cancer, precision genomics-diagnostics, and cellular therapy. It also provides biotechnology services, like the Good Manufacturing Practice Facility (GMP).

One of the biggest success stories within KAIMRC is the Saudi Biobank, which is the first functional biobank, not only in Saudi Arabia, but in the Gulf Cooperation Council region (GCC) “It has equipment ranging from sequencing platforms through cell- and tissue-culture labs to sophisticated imaging capabilities,” says Alaskar. The Saudi Biobank main aim is to enroll 200,000 participants from both healthy and disease-specific populations.

“We believe that KAIMRC is well positioned nationally and regionally to play a key role in setting up the right standards and the right model for the safe, effective and innovative conduct of R&D and innovation,” explains Alaskar.

Over the past two years, KAIMRC has boosted collaboration and partnerships through launching a number of mega projects. “We have already launched a set of collaborations with other academic and industrial entities in KSA, ranging from research training projects, to focused R&D projects carried out by senior investigators, as well as R&D and commercialization projects,” says Alaskar. “This multifaceted approach to R&D collaboration enhances the innovation outcomes of these projects and usually leads to more tangible outcomes and better impact on health and economy.”

KAIMRC is also committed to building a knowledge-based economy using Saudi skills by investing in young people in the kingdom. The center regularly provides scholarships for young Saudi nationals to go to high-profile universities worldwide for further training, as well as the creation of various jobs and career opportunities related to R&D throughout the kingdom.

“We believe that these small steps will allow KAIMRC to solve critical national problems and build a sustainable R&D infrastructure,” says Alaskar.

“I am honoured to have been working at KAIMRC for eight years now. Here, we are always examining the impact of up-to-date technologies, and exploring new dynamics of research that will shape lives.”

The centre draws its strength from state-of-the-art research equipment, machines, high-standard labs, along with outstanding faculty members and research students affiliated with different universities. These make up a remarkable intellectual community of scholars, researchers and teachers of diverse fields including medical genetics, bioinformatics, developmental studies, statistics, cell culture, stem cells, cancer genetics, and nanotechnology.

At the Medical Genetic Research Department that I chair, we strive to improve the quality of medical research. We are working on timely and cost-effective genetic diagnosis to study and find the cure and therapy for different diseases like cancer, diabetes, and different genetic disorders that burden Saudi Arabia.

MGRD is also generating a database for the Saudi population that might help identify the key issues facing the population.”

-- Majid Alfadhel, Deputy Executive Director and Chairman of the Medical Genomics Research Department (MGRD)