



SIDRA MEDICINE RESEARCH

2023
ANNUAL REPORT





**SIDRA MEDICINE RESEARCH
ANNUAL REPORT 2023**



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WELCOME NOTE



Dr. Khalid A. Fakhro Chief Research Officer

The promise of precision medicine can only reach its true potential when patients become the center of everything we do — whether it's using WGS to end a diagnostic odyssey, cellular models to dissect disease pathways, or cell and gene therapies to cure a rare disease — every patient's journey can be enriched through research.

This past year proved a significant year of firsts at Sidra Medicine, all made possible by closer integration between the research branch and the hospital. On one end, our genomics laboratory team worked tirelessly with Sidra's pathology team to deliver clinical exomes and genomes — both firsts for the State of Qatar. On another end, our advanced cell therapy team managed to license and activate Qatar's first GMP laboratory, providing for the first time in Qatar stem cell CD34 selection procedure for a patient requiring bone marrow transplantation top-up at Sidra. This combination of clinical grade diagnostic and therapeutic manufacturing will usher in an era of personalized advanced therapies to Sidra patients, preparing us to undertake early phase clinical trials for rare and orphan conditions — a key priority for the coming years.

On the scientific discovery side, our Precision Medicine program continues to influence patient workup beyond standard of care. Our scientists and clinicians discovered tens of novel genes and biomarkers of disease in 2023, publishing over 200 papers, with close to 75% percent of Research Branch publications appearing in the top 15 percent (and 22% in the top 2%) of journals worldwide. Multi-disciplinary integration between research and clinical groups continued to grow, particularly across 5 strategic clinical research programs, whose members began meeting to identify 'gold cohorts' and design research plans that significantly improve diagnostic yield and enhance treatment outcomes for our patients. To support our growing research activities, our clinicians and scientists collectively applied for and won nearly 25M QAR in grants over the past 18 months. Notably, the proportion of applications to grant agencies outside Qatar continued to grow, and we were honored to receive the first \$1M international grant awarded to Sidra Medicine.

Finally, 2023 was a stellar year in terms of demonstrating our commitment to capacity building. Altogether, nearly 70 students and interns spent time with us throughout last year, including almost 30 PhD and Masters degree candidates doing their thesis work at Sidra. Moreover, we had international visiting scientists training at Sidra labs from several countries including Mexico, France, Germany, Turkey, the US and the UK. We are proud to continue growing as a recognized brand for regional and global trainees seeking education and skill-development in biomedical and genomic research, and are thankful to our faculty and staff who take valuable time to host and train the next generation of precision medicine scientists and contribute to the vibrant knowledge-economy in Qatar.

In all, 2023 represented a year of growth, alignment, and innovation, with every step taking us closer to making precision medicine a reality for our patients. We extend our deepest gratitude to all team members across Sidra Medicine who remained focused on helping us deliver on this mission, and to all the families and patients who entrust Sidra Medicine to deliver the highest-quality, research-driven care.

LEADERSHIP STRUCTURE



Dr. Khalid Fakhro
Chief Research Officer



Dr. Souhaila Al Khodor
A/Executive Director Division of
Translational Medicine



Dr. Marla Beerens
A/Director Research Operations
Innovation & Strategy



Dr. Chiara Cugno
A/Executive Director
Research Core Facilities

RESEARCH MISSION AND STRATEGY

2023 Creating a strong culture of research innovation to support clinical care and maximizing patient access to research platforms.

Our Mission: To become the global leader in Precision Medicine for pediatric rare and complex diseases, combining genomic, computational and therapeutic technologies to transform and improve patient care.

Our Vision: Sidra Medicine is a tertiary academic medical center, established to provide cutting-edge research, education and clinical care to its patient populations. The Research Institute at Sidra Medicine serves this vision by developing and implementing cutting-edge, high-resolution platforms as close as possible to the point of care for Sidra patients, all the while building relevant technical infrastructure to support national genomic and precision health initiatives across the State of Qatar.

Our Strategy: In order to execute the mission and vision; Research is a seamless part of the journey of every patient, bringing added precision to every patient's care. At Sidra, this strategy is based on four fundamental pillars.

Screening: This pillar requires active participation of clinical, nursing and allied health researchers in a constant, iterative process of identifying and prioritizing patient cohorts that are of strategic relevance for research and ultimately the country.

Bio+Data repositories: Establishing IRB approved central repositories where Sidra patients' biospecimens and clinical data would be stored and made available to the internal and external research community in the future.

Advanced Diagnostics: Leveraging research technologies and 'omics (e.g. genome sequencing, proteomics, etc.) to make novel discoveries of genes and biomarkers that improve the understanding of disease etiology.

Personalized Therapies: Creating the infrastructure and support system to deliver advanced therapeutics (e.g. cell and gene therapy, bone marrow transplantation, etc.) to Sidra patients and support clinical trials at Sidra.



INTERNAL RESEARCH COUNCIL

As part of the IRC responsibilities, the committee reviews the scientific merit and alignment of all clinical trials to be conducted at Sidra and continually and critically reviews existing research projects and evaluates their impact.

The duty of the IRC is to provide strategic oversight over the entirety of the research portfolio and strengthen Clinical Research integration and make Sidra Medicine one of the best institutions in the world for Clinical Research.

The following clinical-research programs (working titles) were identified by IRC and approved by the Research Committee:

- Genetic and Metabolic Disorders (including Congenital malformations)
- Neurological Disorders
- Fertility and Pregnancy Complications
- Cancer
- Immune Dysregulation

The development of clinical-research programs will shift the research approach from being “opportunistic” to “structured”, to deliver transformative research with tangible and direct impact on clinical care. The programs parallel as well as complement individual Investigators’ projects, offering a additional synergies and alignments across the board.

Each program is co-led by researchers and clinicians. Program coordinators coordinate the effort of all stakeholders in the respective area to define critical questions in their specific field and to develop systems-level approaches towards answering these questions, based on alignment, clinical impact, and feasibility (timing and resources).

CHAIRPERSON

[Khalid A. Fakhro](#)

Chief Research Officer

VICE CHAIRPERSON

[Ibrahim Janahi](#)

Chair Medical Education

Division Chief - Pulmonology

MEMBER

[Mamoun Elawad](#)

Division Chief - Gastroenterology

MEMBER

[Johnny Awwad](#)

Division Chief - Reproductive Medicine

MEMBER

[Souhaila Al Khodor](#)

A/Executive Director - Translational Medicine

Director - Maternal and Child Health Division

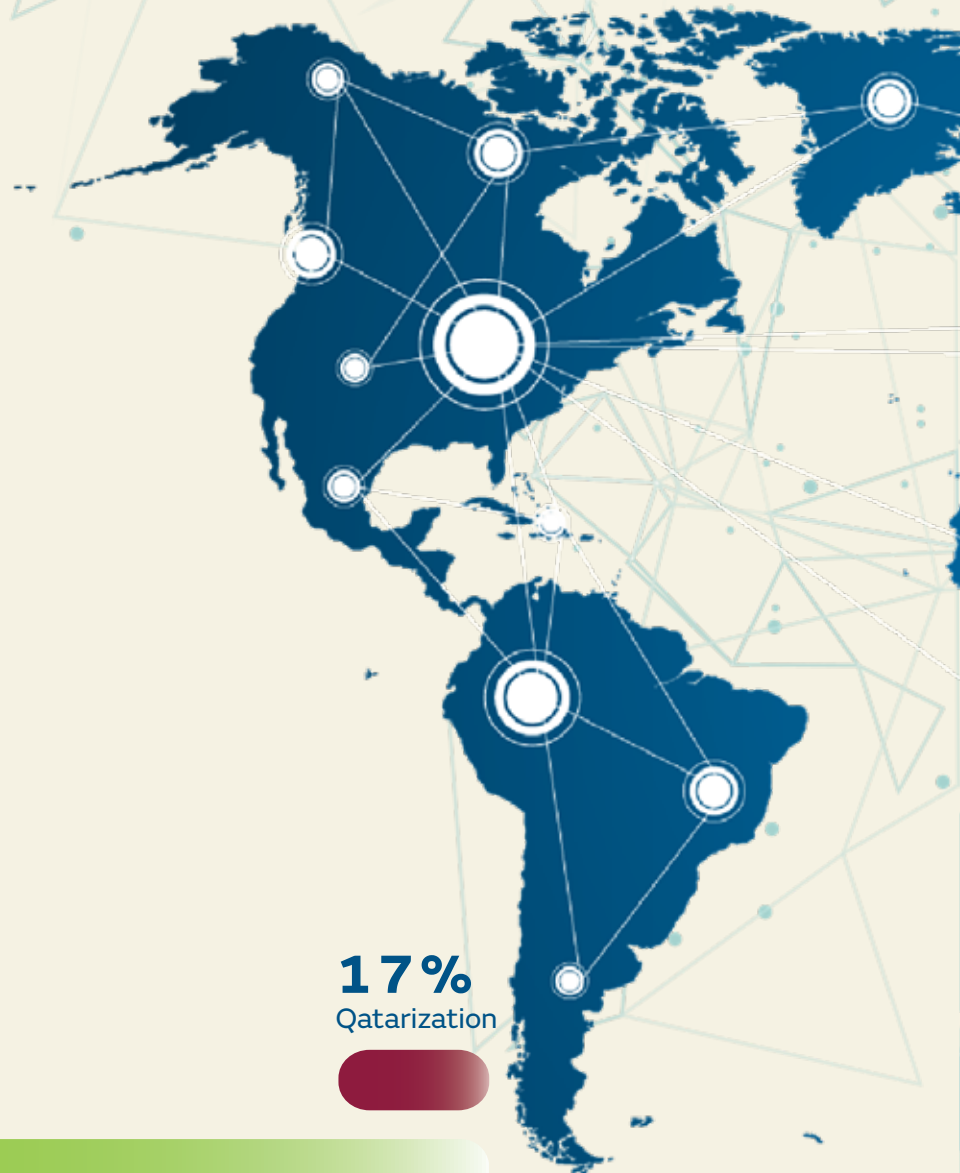
MEMBER

[Chiara Cugno](#)

A/Executive Director - Research Core Facilities

Attending Physician/ Director - Advanced Cell Therapy Core

SIDRA MEDICINE: OUR RESEARCH AT A GLANCE



17%
Qatarization

209 Total Staff



141 Female

68 Male



23

5

55

67

59



- Research Operations Team
- Office Management Team
- Researchers in Core Facilities
- Researchers in Translational Medicine
- Grant Funded researchers



35 Nationalities at Sidra Medicine Research

- | | | |
|--|---|--|
|  Algeria |  Iran |  Qatar |
|  Australia |  Iraq |  Saudi Arabia |
|  Azerbaijan |  Italy |  Somalia |
|  Bahrain |  Jordan |  Spain |
|  Belgium |  Lebanon |  Sudan |
|  Canada |  Netherlands |  Syria |
|  China |  New Zealand |  Turkey |
|  Egypt |  Oman |  Tunisia |
|  France |  Pakistan |  UK |
|  Germany |  Palestine |  Ukraine |
|  Indonesia |  Philippines |  USA |
|  India |  Portugal | |

COLLABORATIONS

129 Total collaborations

49 International Collaborations

80 Local Collaborations



Local Institutions:

Anti Doping Lab Qatar
Doha Institute for Graduate Studies
Equine Veterinary Medical Center
Hamad Bin Khalifa University
Hamad Medical Corporation
Northwestern University Qatar
Qatar Biobank
Qatar Computing Research Institute
Qatar Museum Authority
Qatar University
Texas A&M University at Qatar
University of Calgary
Weill Cornell Medicine Qatar

Countries we have international collaborations with:

| | | |
|-----------|----------|-------------|
| Australia | Italy | Singapore |
| Brazil | Japan | South Korea |
| Canada | Jordan | Spain |
| France | Lebnon | Turkey |
| Germany | Pakistan | UK |
| Hungary | Portugal | USA |

PUBLICATIONS 2023



200+
Sidra-affiliated peer-reviewed scientific papers published



78
Research Branch papers published



74%
of publications in the top 15% of internationally recognized journals



24
Research Branch Investigator average H-Index



48%
of research studies have a clinical lead/coinvestigator



11.2
Mean impact factor for Research Branch publications



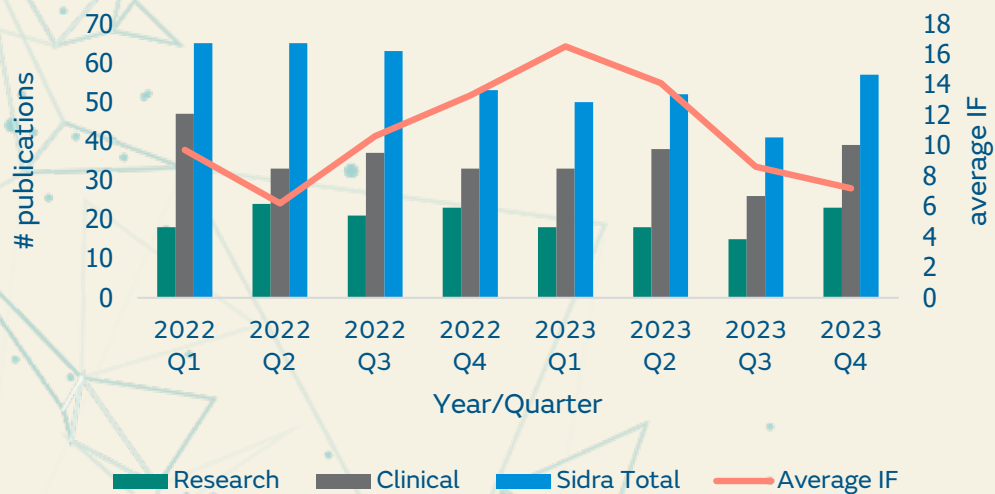
57
Research papers in top 15% of journals worldwide (IF>5.5)



17
Research papers in the top 2% of journals worldwide (IF>13.3)

2022-2023 Sidra Medicine Publications

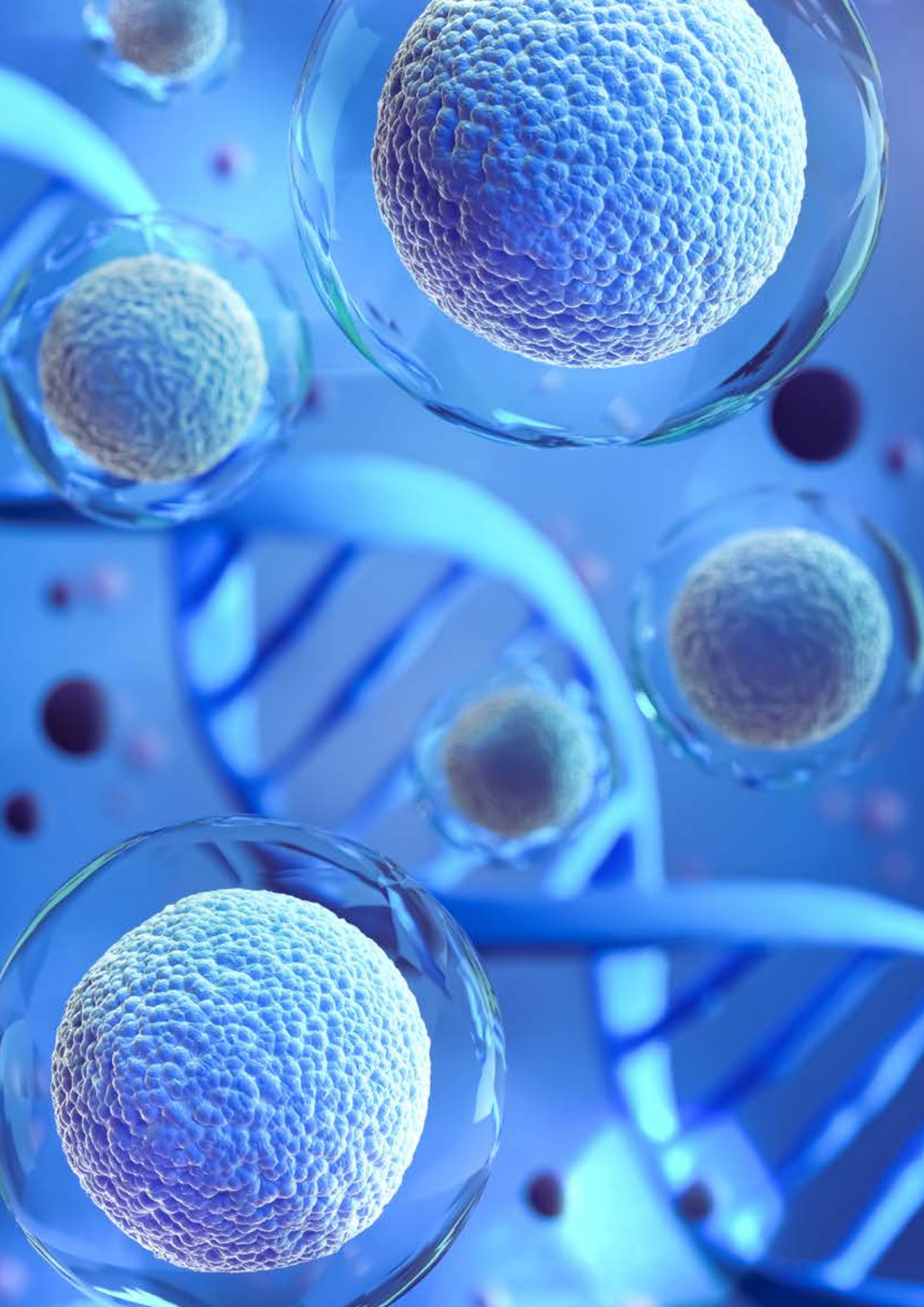
Sidra Medicine Publications







**Research
Divisions**





Dr. Souhaila Al Khodor
A/EXECUTIVE DIRECTOR
TRANSLATIONAL MEDICINE

SCIENTIFIC DIVISIONS

TRANSLATIONAL MEDICINE

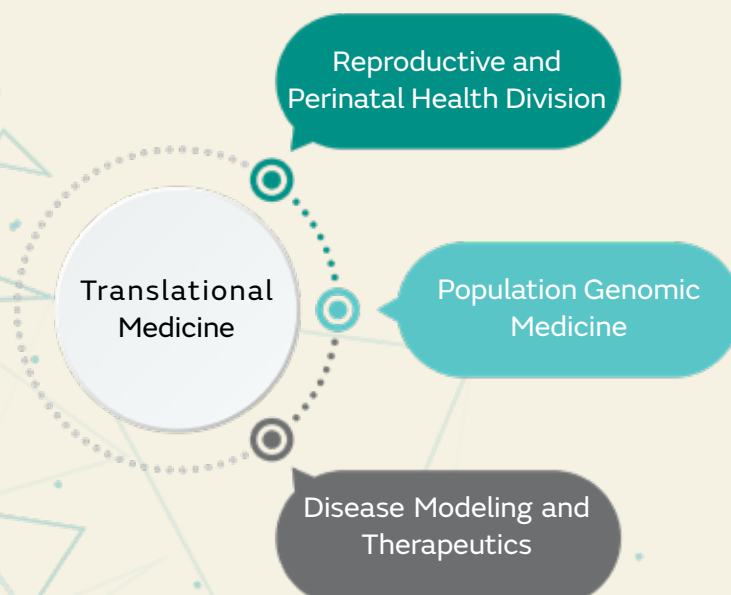
The Translational Medicine department is a key enabler for Sidra Research's strategy, which will lead to the establishment of Sidra Medicine as a world-class academic medical center and a destination for patients seeking the best available care in the region. The translational medicine department will focus on the development and implementation of precision medicine approaches.

The Department of Translation Medicine is divided into three divisions, where all research groups fall under Reproductive and Perinatal Health, Population Genomic Medicine, and Disease Modeling and Therapeutics. As a result of the commitment of Sidra Medicine to innovation in the field of precision medicine, the research groups at Sidra Medicine are engaged in research activities leveraging high throughput profiling technologies in the context of patient-based research.

DIRECTOR BIO

Dr. Al Khodor is the Director of Reproductive and Perinatal Health Division in the Research Branch at Sidra Medicine, Qatar. She acted as the Executive Director of the Translational Medicine Department from March-December 2023.

Dr. Al Khodor received her PhD in Microbiology and Immunology from the University of Louisville, Louisville, KY, USA. Dr. Al Khodor is an adjunct Faculty at the College of Health & Life Science in Hamad Bin Khalifa University. She has over 70 peer-reviewed publications. She currently serves as an Assistant Specialty Chief Editor for Frontiers in Cellular and Infection Microbiology and is the Section Editor for Metagenomics in the Journal of Translational Medicine.



DIVISION OF REPRODUCTIVE AND PERINATAL HEALTH

Sidra Medicine's Reproductive and Perinatal Health (RPH) division, directed by Dr. Souhaila Al Khodor, aims to improve women's and children's health by implementing state-of-the-art clinical and translational research. This division focuses on two of the seven priority populations described in the Qatar National Health Strategy. In collaboration with the Obstetrics and Pediatrics clinics, the RPH division aims to address major health problems facing women trying to become pregnant, pregnant women, their growing fetuses, infants, and children up to two years old. The goal of the division is to employ a systems biology approach by combining various omics tools (genomics, metagenomics, metatranscriptomics, proteomics, metabolomics, etc.) and non-omics tools such as

dietary and lifestyle assessment in order to achieve an integrative view of health and identify signatures associated with the disease.

The Division of Reproductive and Perinatal Health focuses on the following areas:

- Pre-conception health (nutrition and lifestyle).
- Genetics of infertility.
- Functional characterization of genes preserving women's reproductive health.
- Prenatal health: healthy pregnancy leading to healthy babies.
- Identify novel biomarkers to predict pregnancy complications.
- Baby's health: the first 1000 days.



PROGRAM HIGHLIGHT

THE RPH DIVISION LAUNCHED NEW STUDIES AS FOLLOW:

Omouma study: We investigate factors affecting pregnancy outcomes, the early life determinants, and their impact on the infant, child's, and adolescent's health in the population of Qatar. We monitor the pregnant women every trimester until delivery and one-year post-partum. Using the biological samples collected from the mother-baby pairs, we identify the molecular mechanisms of pregnancy complications which may pave the way for a personalized intervention. We also investigate the maternal, genetic, social, environmental, and lifestyle on the infant's health and how early childhood determinants affect health outcomes of the infant, child, and adolescent.

PN-ART study: Precision nutrition in assisted reproductive technologies. In Qatar, the fertility rate per woman dropped from 6.1 children to less than two in the last 50 years. The role of environmental factors, such as diet, lifestyle, and microbiome in the preconception period is established. However, there is still a knowledge gap in understanding the molecular mechanisms governing the interaction between diet and follicular metabolism and its effect on outcomes of assisted reproductive technology (ART). We are recruiting women attending the reproductive medicine clinics with the aim of exploring the association between women's nutritional status, their blood and follicular molecular signature, and impact on ART outcomes.

Genetics of Human Infertility study: Through extensive genomic and computational analyses, using the state-of-the-art next-generation sequencing capacities, and in collaboration with the IVF Program, and the Department of Genetics, this study aims to identify the genes and biological processes underlying fertility disorders of genetic origin. Through functional analyses in transgenic animals, the group characterizes the role of genes identified in human reproduction, with the ultimate goal of providing more precise diagnosis and targeted treatments to couples experiencing infertility in Qatar.

NutriWeMan study: Obesity and overweight in Qatar showed a very high frequency: 33.1% and 71.3%, respectively, with a higher impact in women. Obesity is a complex phenotype where, in addition to underlying genetic risk factors, preventable environmental risk factors play a significant role in accelerating risk in the population. The main aim of this project is to compare the efficacy of the diet treatment alone compared to medications on reducing body weight and improving metabolic traits, taking into account the genetics, gut microbiome and epigenetic determinants.



Dr. Younes Mokrab

A/Director Population Genomics Medicine

POPULATION GENOMICS MEDICINE

The Population Genomic Medicine department at Sidra Medicine harbours basic and translational multidisciplinary research in key areas of medical and population genomics, bioinformatics, and data science with the goal of enabling the institution's mission to deliver world class tertiary care for women and children.

The department's overall strategy is to leverage cutting-edge computational and experimental techniques to drive the precision diagnosis and treatment of disorders relevant to Qatar and the wider Middle East, focusing on key disease areas including neuroscience, diabetes, and cancer. Its ultimate goal is to help bring the best care to patients with genetic and genomic disorders, leveraging the latest research-driven tools not yet implemented in clinic to resolve complex disease cases through precise diagnostics, risk profiling, informing clinical treatment and identification of targets for downstream therapies trials.

DIRECTOR BIO

Professor Younes Mokrab is the A/Director of Population Genomics Medicine department. He is also Principal investigator and lead of Neuroscience Research Program at Sidra and adjunct Professor of Biomedical Sciences at Qatar University. Prof. Mokrab obtained a PhD in Bioinformatics from the University of Cambridge, UK (2007), followed by a postdoctoral fellowship at the University of Oxford (2010).

Upon joining Sidra in 2015, Prof. Mokrab led seminal research in population and medical genetics, co-founded the Qatar Genome Program Research Consortium. Dr Mokrab is a co-author of > 50 publications in top tier including Nature and Cell journals and is the recipient of multiple grants and awards.



PROGRAM HIGHLIGHT

UK-QATAR PRECISION HEALTHCARE COLLABORATIVE ON RARE NEUROLOGICAL DISEASES

Sidra Medicine has teamed up with local and top UK institutions to establish the UK-Qatar Precision Healthcare Collaborative on Rare Neurological Diseases, aimed at advancing the precision diagnosis and discovery of targets for therapy in Neurogenetic diseases (NGDs). NGDs encompasses a spectrum of genetic conditions affecting the brain, spinal cord, nerves, and muscles.

So far, diagnosis of these conditions involves analysis of short forms of genetic variation mainly on protein-coding regions which makes up only about 1% of the genome, leaving out critical non-coding and complex regions. To bridge the current gap, this collaboration aims to apply the latest sequencing technologies, multiomics, functional modeling and leveraging on aggregate family cohorts from both Qatar and the UK. At an initial phase, this shall focus on epilepsy, global developmental delay, and neuromuscular disorders.

This effort is co-led from Qatar by Prof. Younes Mokrab and Prof. Khalid Fakhro at Sidra Medicine and from the UK by Prof. Henry Houlden from University College London and Prof. Mark Caulfield from Queen Mary University, London. At the Sidra side, a preliminary diagnostic rate of 46% was achieved, uncovering 15 new gene-disease connections and 17 novel variants. To highlight of actionability, a disease-causing variant in a sodium-channel gene was identified in a patient seen by Dr Ruba Benini, Senior attending physician at Sidra, allowing the patient's seizures to be controlled by a sodium channel blocker, marking the importance of personalized medicine driven by genomics.

As this collaborative initiative progresses, it is expected to advance complementarity and knowledge transfer between the two countries, shortening diagnostic odysseys, and introducing personalized medical approaches for local patient groups. Beyond healthcare benefits, the project aims to ease the burden on families seeking treatments, reducing management costs and counseling expenses, thereby positively impacting the social and economic aspects of patient care.





Dr. Luis Saraiva

A/Director Disease Modeling and Therapeutics

DISEASE MODELLING AND THERAPEUTICS

The Disease Modeling and Therapeutics Division at Sidra Medicine Research Branch harnesses precision medicine technologies and informatics to reveal the intricate molecular mechanisms underlying diseases while tailoring disease treatment and prevention strategies to individuals, with the goal of enabling the institution's mission to deliver world-class tertiary care for women and children. We also empower young scientists with a wide range of experiences, enabling them to design, apply, and interpret quantitative approaches essential for advancing medical therapies. The division's global strategy is to lead the way in advancing the understanding and treatment of rare diseases through cutting-edge disease modeling, and innovative therapeutic development. Our mission is to provide hope and healing for the youngest and most vulnerable patients, empowering them to live healthier, happier lives. Our overarching goal is to achieve excellence in rare disease research, particularly within the pediatric context.

DIRECTOR BIO

Dr. Luis Saraiva is A/Director of the Disease Modeling and Therapeutics Division at Sidra Medicine. Dr. Saraiva leads the Laboratory of Human Disease Modeling, which specializes in developing biological assays to explore the molecular bases of rare genetic diseases, aiming to push the boundaries of basic science and turn research into groundbreaking diagnostics and personalized therapies for brain, kidney, and heart diseases.

He is also a world-renowned expert in olfaction and on disorders affecting our sense of smell, including COVID-19-related smell loss and congenital anosmia. In addition to research and hospital duties, Dr. Saraiva served as Adjunct Faculty at the Monell Chemical Senses Center (USA) from 2016-2023 and has been a Joint Professor of Precision Medicine at Hamad bin Khalifa University since 2018.



Dr. Ammira Akil Wins \$1 Million JDRF Research Grant

Dr. Ammira Al-Shabeeb Akil, lead principal investigator and head of the Precision Medicine for Diabetes Prevention lab has been awarded a grant to the value of one million US dollars from JDRF, the leading global type 1 diabetes (T1D) research and advocacy organization. The awarded grant will support the establishment of a program in Qatar that combines autoantibody and genetic screening for children with T1D.

Titled “DIA-MENA: Type 1 Diabetes Islet Autoantibody Screening Initiative in the Middle East and North Africa”, the program will initially pilot autoantibody and genetic screenings in Qatar, aiming to predict the future risks of T1D in children. The pilot will form the basis to establish national pediatric T1D autoantibody screenings across the country, which can serve as a model for the rest of the Middle East and North Africa (MENA) region.

The awarded grant will encompass a comprehensive research-based screening program over the span of four years. Key support will be provided by our precision medicine program, pathology, genetics, and genomic medicine clinics.

According to the International Diabetes Federation’s Diabetes Atlas, Qatar is ranked fourth globally with the highest incidence of T1D. Currently, there is a lack of screening studies on T1D in Qatar and generally in the MENA region, that comprehensively covers data on computed genetic risk scores in association with islet autoantibody status in the general population.

Through the JDRF grant and in partnership with the Qatar Genome Program and the Primary Health Care Corporation, Dr. Akil’s team will embark on a combined screening pilot program on young children from the ages of 1 ½ years to 14 years old; using a small blood sample and pathology-based testing technology that has been developed in-house at Sidra Medicine by Dr. Akil’s team.





Dr. Chiara Cugno, MD

A/Executive Director
Research Core Facilities

CORE FACILITIES

CORE FACILITIES

The Advanced Research Core Facilities at Sidra Medicine’s Research Branch aims to promote a synergy between research and clinical care.

Each of our core facilities houses cutting-edge equipment and technology and is staffed by top researchers. The multidisciplinary core facilities at Sidra Medicine promote collaboration between researchers and clinicians, fostering a holistic approach to patient care.

Research Investigators and healthcare providers can work closely with experts at the core facilities to deliver the best patient care possible and lead to a better understanding of diseases affecting Qatar’s women and children.

This synergy leads to advanced diagnostics, improved treatments, access to experimental therapies, and a culture of continual improvement in medical practice. These benefits result in better patient outcomes and higher healthcare quality.

DIRECTOR BIO

Dr. Cugno covers the roles of Director of the Advanced Cell Therapy Core and Attending Physician in Pediatric Oncology and Hematology. She is a 20-year experienced medical doctor with a Board Certification in Pediatrics and Pediatric Hematology/ Oncology at the University of Pavia (Italy), and a Master in Pediatric Hematology at the University “La Sapienza,” Rome (Italy). At Sidra Medicine, Dr. Cugno has been working on the development of the Advanced Cell Therapy Core, including a Cellular Therapy Unit for the delivery of cellular products for tissue, cell and gene therapy, and a Clinical Trial Office.



ADVANCED CELL THERAPY CORE (ACTC)

The ACTC plays an important bridging function between the Research and Clinical Departments allowing the delivery of personalized, advanced and/or experimental therapies by:

- Supporting the Hematopoietic Stem Cell Transplantation (HSCT) Program which represents the cornerstone for the majority of other more advanced cell and gene therapy approaches.
- Making Regenerative Medicine, Cell Therapy and Gene Therapy available to patients in Qatar and in the region
- Providing the management and coordination of clinical trials.

A state-of-the-art GMP facility has been successfully established and will undergo MOPH licensing. All ACTC personnel who provide clinical services are QCHP licensed, trained in the field of GMP Production and certified by the Association for the Advancement of Blood & Biotherapies (AABB). Facility and staff are members of the International Society of Cell and Gene Therapy (ISCT).

The ACTC support patients' care for: production of plasma eye drops for children affected by Autosomal Recessive Plasminogen deficiency and production of autologous platelet-rich plasma.

Services portfolio is being expanded to include:

- Private cord blood banking.
- New Regenerative Medicine products/ packages in collaboration with Sidra Wellness Center.
- Serum Eye Drops as a remedy for one of the most common ocular conditions in Qatar, the "dry eye".
- Clinical grade production and biobanking of Mesenchymal Stromal Cells.
- Graft manipulation for HSCT.

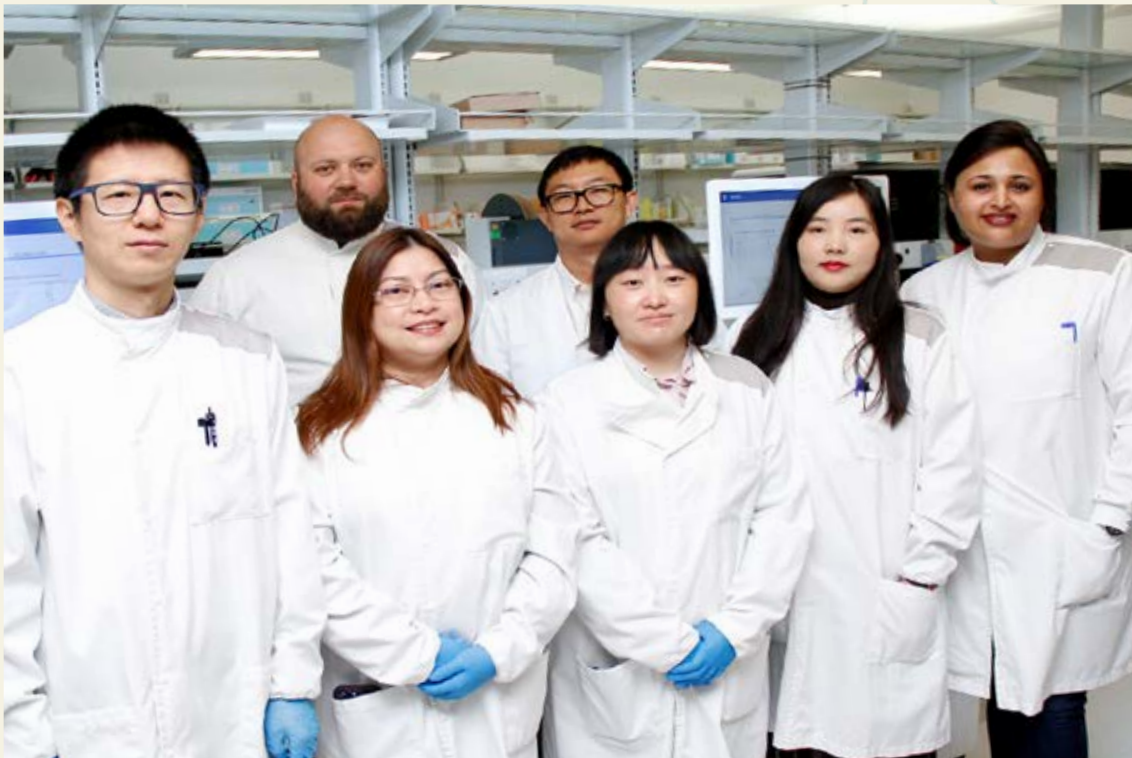
ACTC is a member of the ISCT and works on a unified QMS in the highly regulated context of the abovementioned activities. ACTC is ISO9001:2015 certified and is planning to undergo ISO 17025:2017, NetCord-FACT and JACIE-FACT accreditations.



CLINICAL GENOMICS LABORATORY

The Clinical Genomics Laboratory provides modern, medium-to high throughput library preparation and sequencing methods for Illumina sequencers. This includes Whole Exome Sequencing with standard 100x coverage as well as bespoke lower or higher coverages, e.g., 50x for normal samples and 200x for tumor samples; Whole-Genome Sequencing to 30, 60, and 120-fold coverage of the human genome

on Illumina Novaseq 6000 instruments where smaller genomes or different coverage levels are available on request; mRNA sequencing and total RNA sequencing to a variable read depth on any species with optional globin depletion. We also offer cost-efficient 3' differential gene expression profiling and small RNA sequencing using Nextseq 500, and ultra-low input RNAseq for enriched cells and rare samples.



OMICS CORE FACILITY

The Omics Core Facility at Sidra Medicine serves as a hub to support Sidra's research projects as well as international collaborations for translational and precision medicine. The Core is equipped with the SPTLabtech Arctic system for automated sample storage at -80°C along with cryogenic units, conventional freezers and refrigeration storage systems to ensure the highest quality biospecimen. We provide DNA/RNA automated extraction services performed on QIASymphony SP System. The NanoString nCounter system uses digital detection and direct molecular barcoding technology to profile up to 800 gene expression targets from samples of poor quality/quantity. Our Core offers long-read sequencing on

two Sequel IIe units from PacBio, as well as on the PromethION 24 from Oxford Nanopore Technologies to overcome short-read sequencing limitations. We also offer optical genome mapping (OGM) from Bionano Genomics, a non-sequencing-based technology which can effectively identify large structural variations, pinpoint their breakpoints, and uniquely map the location of large-scale rearrangements in the genome, the Illumina iScan and the Tecan automation system for microarray profiling, ABI3500xL system for Sanger sequencing, AriaMx for High Resolution Melting and BioMark HD for high-throughput genotyping and gene expression services.



ADVANCED IMAGING CORE

At Advanced Imaging Core (AIC), our mission is to empower researchers and innovators by providing cutting-edge imaging technologies and expertise. We are dedicated to facilitating groundbreaking discoveries and advancements in various fields, from biology and medicine to materials science and beyond. Through our state-of-the-art imaging resources and collaborative approach, we aim to catalyse progress, inspire creativity, and accelerate the pace of scientific discovery.

Imaging technology and services provided:

- Transmitted light, phase contrast, differential interference contrast (DIC) imaging.
- Widefield, oblique, and epifluorescent imaging.
- Confocal, Z stacks and 3D imaging. 2 photon microscopy.
- Super-resolution imaging and FAST super-resolution imaging.
- Advanced high-end live cell and time series imaging experiments.
- Fluorescence correlation spectroscopy, Fluorescence cross-correlation spectroscopy, and Raster Scanning Correlation Spectroscopy.
- Fluorescence Lifetime imaging microscopy.
- Second-harmonic imaging microscopy.
- 4D image analysis and visualization using Imaris.
- Spectral unmixing and deconvolution.
- Multiplexing on FFPE sections.



ANALYTICAL CHEMISTRY CORE

The Analytical Chemistry Core Facility provides Sidra Medicine staff, students, external academy, and industry with high-quality analytical services utilizing our diverse instrument platforms. The workflows include sample preparation, sample analysis, data processing and multi-variate data analysis.

Main Workflows

Discovery Metabolomics / Lipidomics:
Untargeted relative quantification of metabolites and lipids using high-resolution mass spectrometry with RP and HILIC chromatography. Identification spectra acquired with HCD and CID fragmentation in MS2 and MSn. Annotation with in-house library of >1000 compounds, mzCloud and KEGG.

Metabolic Profiling:

Targeted quantification of metabolites using triple quadrupole mass spectrometry with liquid chromatography or mass spectrometry with gas chromatography. Current methods include fatty acids, short chain fatty acids, acylcarnitines, sphingolipids, nucleotides, and amino acids.

Trace Metal Analysis:

Quantification of a range of metal and metalloid species using inductively coupled plasma triple quadrupole mass spectrometry and atomic absorption spectrophotometry.



FLOW CYTOMETRY CORE

The Flow Cytometry Core provides a multifaceted phenomics platform dedicated to establishing cellular, molecular, and functional phenotypes that complement genomics, transcriptomics, and clinical phenotypic analyses of patients. The core aims to complement in depth and breadth the panels of diagnostic and investigational assays proposed in Sidra Medicine and in Qatar as well as establishing international collaborations. The core mission is to provide the technical and intellectual frameworks for the realization of the second pillar of Sidra Research Personalized Medicine agenda: “Establishing an Advanced Diagnostics program”.

Research-Clinical Services

The core provides sperm DNA fragmentation in-house developed assay, no other lab in Qatar, currently outsourced or not offered and also provides advanced serological test for SARS-CoV-2: Home-grown assay tests for 11 antigens (SARS-CoV2 + 6 other human CoV's), filed to MOPH, approved as rapid antigenic/serology test, BAU validated, quantitative and qualitative assay.



ZEBRAFISH FUNCTIONAL GENOMICS CORE

The Zebrafish Functional Genomics Core is a leading facility in utilizing zebrafish as a model organism to make significant contributions to the field of functional genomics, focusing on advancing precision medicine in a range of pediatric diseases, including neurological disorders, cardiovascular diseases, congenital anomalies, and other conditions and furthermore supporting the objectives of the Qatar Genome Project.

The platform has achieved remarkable success in generating patient-specific genotype models, allowing us to mimic and study the genetic variations observed in patients, providing invaluable insights into the molecular mechanisms underlying diseases. These models

serve as a crucial bridge between genetic data and functional understanding. This capability has positioned our facility at the forefront of precision medicine research.

In alignment with international standards and ethical considerations, the Zebrafish Functional Genomics Core and Research Operations team have established the SIDRA-IACUC (Institutional Animal Care and Use Committee). This committee ensures the ethical treatment and use of zebrafish in research, maintaining the MOPH's highest standards of animal welfare.



GENOMIC DATA SCIENCE CORE

Genomic Data Science Core (GDSC) enables the researchers at Sidra and external collaborators to efficiently manage, analyze and interpret their data. The core provides analysis pipelines to QC, process and analyze wide range of datasets like WGS, WES, (sc)RNA-seq and miRNA that are being produced by IGS-core facilities and deliver the results to the end users in a short turnaround time. Moreover, it provides consultancy services and tertiary analyses like variants calling, copy number variation, structural variants, custom variant annotation, family tree, differential gene expression analysis and DNA-methylation analysis.

GDSC develops new and custom workflows to deal with the innovative technologies' outputs and according to the end user's needs. GDSC works closely with HPC team at Sidra to provide the necessary infrastructure to allow for rapid processing of datasets as well as storing and archiving the results securely and safely for internal and external collaborators. The core also offering NGS (Next Generation Sequencing) analyses training courses for researchers upon request.



CLINICAL TRIALS OFFICE

The Clinical Trials Office (CTO) serves as a centralized coordinating office for Clinical Research and Clinical Trials aiming at guiding researchers and clinicians through the local regulatory pathway (IRC, IRB, MoPH), and at conducting scientifically and ethically sound human subject research. Through the allocation of Research Coordinators' resources trained in the set-up and conduct of clinical research, the CTO's role and objective are to lead and oversee studies from protocol design to close-out.

The CTO supports investigator-initiated and sponsored studies and functions as the point of contact for external sponsors including Contract Research Organizations (CROs) and Pharma companies. The CTO strives to enable both Academic and Pharma-sponsored Clinical Trials with benefits encompassing strategic value, public health, as well as a financial value.





Dr. Marla Beerens

A/Director Research Operations
Innovation and Strategy

Research Operations Innovation and Strategy

The Research Operations and Services Core is led by Dr. Marla Beerens. Dr. Beerens studied Health law and obtained a Bachelor of Health Organization, Policy and Management and Economics at Maastricht University. She has a Master of Philosophy in Clinical Epidemiology and Health Technology Assessment obtained at Maastricht University in collaboration with London School of Economics. She was awarded over 550.000 Euros in grant funding to conduct a multicenter randomized control trial, which helped her complete her PhD in Public Health. Dr. Marla Beerens brings a wealth of experience as a scientist at Maastricht University as well as Maastricht Medical Center and has been a consultant to academic institutions as well as the European Union and worked as project lead for the Dutch Bureau of Statistics. In the last 5 years at Sidra, She has focused on managing strategic, operational, and improvement programs while working in the Business Excellence Team.

Our mission is to offer a “one-stop-shop” approach and solution-oriented admin service to researchers and clinicians. We help establish good laboratory practice, agile and fit-for-purpose processes, and high standards for managing research in a compliant manner. Our main administrative functions are as follows:

The Project Management Office serves as a central repository and enabling service for research studies. The Laboratories & Biosafety Office ensures labs are in good working condition and practices safe. The Grants Office manages external and internal competitive awards. The Business Office handles budgets, financial. Reporting and procurement matters. The Outcomes & Reporting Office looks after strategic reporting, communications and outreach. The Governance & Compliance Office governs the conduct of all research and ensures compliance to relevant regulations and standards. The Research Contracts Office manages collaborations and other research agreements.



RESEARCH SUPPORT

The Research Support Staff team has been established in 2013, directly reports to the Chief Research Officer. It is a multi-cultural team of five ladies, holding various degrees and experience in the field of chemistry, psychology, literature, nursing, and business administration.

We support the entire Research Branch and serve as a point of contact for all administrative duties and responsibilities mainly the following:

- Committee Meetings, preparing agenda, meeting minutes.
- Calendar management.
- Research HR matters like organizing interviews, hiring, recruitment, staff movements, temporary staffing contracts etc...
- Research events and conference.
- Travel and logistics.

Each staff member is assisting an average of 45 employees (Core, Translational Medicine, and Business Operations).

We also have successfully managed and organized around 12 major research conferences and symposiums during the past 9 years. “We behold all Sidra Values”. Care, Efficiency, Innovation, Teamwork, Transparency, and Trust, as well as Discipline, Punctuality, Problem Solving, and Confidentiality are the key factors of our success.



INNOVATION AND COMMERCIALIZATION

Empowering Innovation, Catalyzing Impact: Sidra Medicine's Commitment to Research Excellence and Industry Collaboration.

FOR INDUSTRY:

UNLOCK INNOVATION AND COLLABORATION AT SIDRA MEDICINE

Discover a world of possibilities at Sidra Medicine, where innovation meets excellence. Our state-of-the-art research facility, coupled with a world-class hospital, offers a unique one-stop solution for all your needs.

With a team experienced in navigating the intricacies of intellectual property, we invite you to explore licensing opportunities that align with your industry goals. At Sidra Medicine, we understand the importance of collaboration, and our institution is equipped to cater to your specific requirements under one roof.

Partner with us to access groundbreaking research, cutting-edge technology, and a collaborative environment that fosters innovation. Let's create a future where healthcare solutions are redefined through collaboration and expertise.

FOR RESEARCHERS:

UNLOCK THE POTENTIAL OF YOUR RESEARCH WITH OUR INNOVATION AND COMMERCIALIZATION SUPPORT

At Sidra Medicine, we understand the passion and dedication you bring to your research endeavors. At Research Operations & Services, we are equipped to support you in navigating the intricate landscape of intellectual property through our innovation & commercialization function.

Our dedicated team is here to assist you in every step of the way—whether it's screening your intellectual property, realizing the full impact of your current and future research, or fostering collaboration with industry leaders.

We believe that your innovative ideas have the power to transform lives, and we are committed to providing the resources and expertise to help bring your research to its full potential.

Join us on this journey of discovery and impact. Together, let's shape the future of healthcare and make a lasting difference in the world.

TECHTRANSFER@SIDRA.ORG

Opening of GMP Facility



The opening of the GMP facility at our hospital was attended by our CEO, Dr. Iyabo Tinubu-Karch; Chief Research Officer, Dr. Khalid Fakhro; Dr. Chiara Cugno, Director of the facility and her team. Also in attendance were external guests including Sheikh Dr. Mohammed Bin Hamad Al-Thani, Director of the Public Health Department at MOPH; Dr. Edison Liu, Jackson Labs, Professor, President Emeritus; Dr. Haytham Al Salama, Special Advisor from Qatar Financial Center; Dr. Boro Dropulic, CEO of Vector BioMed and Dr. Rimas Orentas, PI from the Seattle Children's Hospital Research Institute. The GMP facility will develop and manufacture individualized therapeutic products and biopharmaceuticals onsite; allowing for a much faster process of turning basic research into actual products that can be used in patients.

It will also accommodate cord blood banking and hematopoietic stem cells transplantation, which can treat more than 60 diseases including cancers like leukemia and lymphoma.

The biggest impact the GMP facility will have is that we can now offer advanced and/or experimental cell and gene therapies for patients, who don't need to travel abroad to seek such treatment. This is particularly life-changing for children requiring gene therapy approaches or hematopoietic stem cells transplantation, which can take several months.







**Research
Principal
Investigators**





Ammira Al-Shabeeb Akil, PhD

Laboratory of Precision Prevention of Diabetes,
Obesity and Cancer

Dr. Akil heads the Precision Medicine of Diabetes Prevention lab at Sidra Medicine, Qatar, serving as its Lead Principal Investigator. Dr. Akil is the named program lead of Genetics and Metabolic Diseases clinical research program at Sidra Medicine. Driven by innovation, she pioneers the use of Genetic and Polygenic Risk Scores for national disease screening, notably in Type 1 diabetes. Recognized with over \$6 million in research grants, Dr. Akil is an active member of several organizations, including the American Diabetes Association's working groups. She is also a member with the International Society for Pediatric and Adolescent Diabetes (ISPAD), the International Diabetes Society (IDS), the European Association for the Study of Diabetes (EASD), and the (INNODIA), the global partnership addressing research, prevention and a cure of Type 1 Diabetes in adults and children.

Scope of Research

Established in 2020, The Akil Lab's primary focus lies in the study of metabolic disorders, with a strong emphasis on translational research aimed at precision prevention, accurate diagnosis, and the development of therapies that can modify the course of these diseases. The research group also oversees the Cancer and Obesity research program. The Akil Lab has taken lead in pioneering the development of genomic predictive tools tailored for the MENA, contributing to the advancement of precision medicine in the region. Collaborating nationally and internationally, Dr. Akil's Lab plays a crucial role in advancing genomic sequencing for newborn screening, addressing monogenic and polygenic disorders. Contributions span clinical genomic research in complex and rare diseases, backed by expertise in population-based research, cohort design, and screening initiatives.



Reem Al-Karbi, Mohammed Kohilan, Ajaz Ahmad Bhat, Ikhlaq Ahmed, Mubarak Ziab, Summaya Khatoon, Warda Berair Mustafa Abdelgani, Alanoud Abdulla, Sara Al Marzooqi, Ammira Akil, Sura Ahmed Hussein.



Annalisa Terranegra, PhD
Laboratory of Precision Nutrition

Dr. Terranegra obtained her PhD. in Molecular Medicine in Nutritional Sciences at the University of Milan, Italy. Dr. Terranegra is currently adjunct Assistant Professor both in the College of Health and Life Sciences at Hamad bin Khalifa University, Qatar, and in the College of Health Sciences at Qatar University, Qatar. At Sidra Medicine, Dr. Terranegra leads the Laboratory of Precision Nutrition (PreNutri Lab) which is interested in characterizing the mechanisms underlying the role of food and nutrients in the development and management of pregnancy complications, infertility, and pediatric non-communicable diseases. The PreNutri lab research projects focus on understanding the effect of diet on gut microbiota and epigenetic mechanisms, as well as diet interaction with the genomic background, using the most advanced technologies.

Scope of Research

Clinical research studies include:

- PN-ART study: The “Precision Nutrition in Assisted Reproductive Technologies (ART)” study aims to unveil the molecular mechanisms governing the interaction between diet and follicular metabolism and its effect on ART outcomes.
- NutriWeMan study: The “Nutrition in Weight Management” study focuses on comparing diet treatment to medications for reducing body weight and improving metabolic traits, considering the genetics, gut microbiome, and epigenetic determinants.
- T1DM-Diet study: The triple interaction diet-microbiome-epigenome is a multi-omics study that explores the crosstalk of diet and different molecular factors (gut microbiome, epigenomics, metabolome) in pediatric type 1 diabetes mellitus (T1DM).



Arun P Lakshmanan, Salma H Ahmed, Yasmin Olabi, Fatima M Ahmad, Wided Khamlaoui, Sidra Uzair, Annalisa Terranegra, Nour Shallouf.



Bernice Lo, PhD
Laboratory of Immunogenetics
and Immunodysregulation

Dr. Bernice Lo is a Principal Investigator at Sidra Medicine and a Joint Assistant Professor at Hamad bin Khalifa University (Doha, Qatar). She has contributed to the discovery, diagnosis, and molecular understanding of inherited autoimmune disorders. Bernice performed her post-doctoral training under the leadership of Dr. Michael Lenardo in the Laboratory of Immunology at the National Institutes of Health in the US. She is trained in cell and molecular biology and genomic approaches for genetic diagnosis. During her fellowship, she helped discover and understand the etiology of two new diseases of immune dysregulation. She received her Ph.D. in Cell Biology at Duke University under the mentorship of Dr. Jo Rae Wright, where she began her appreciation for the immune system and the critical role of immune tolerance and regulation.

Scope of Research

The research focus of Dr. Lo's laboratory is on understanding the molecular mechanisms of immune regulation and tolerance. Her approach includes identifying the genetic basis of disease in patients with immune dysregulation and autoimmunity with the ultimate goal of elucidating the molecular pathways involved and, therefore, revealing new therapeutic targets for disease treatment or novel drugs for immunomodulation. Dr. Lo's lab specializes in using cellular and biochemical techniques to uncover the role of newly discovered gene mutations in causing disease and in understanding the function of these genes in immune regulation. Her lab is also interested in developing methods for disease diagnosis or evaluating treatment efficacy by assessing immune biomarkers.



Katherine Whitmore, Yasmin El Bsar, Amara Sadoun, Asha Elmi, Rafah Mackeh, Satanay Hubrack, Bernice Lo, Abdulrahman Al-Subaiey, Ahmad Al-Shaibi, Mohamed Alsabbagh, Nourhen Agrebi, Maryiam Osman, Jona Dioso



Cristina Maccalli, PhD

Laboratory of Immune Biological Therapy

Dr. Cristina Maccalli is a Principal Investigator at the Laboratory of Immune and Biological Therapy and Lead of the Cancer Program. She is also adjunct Assistant Professor at Hamad bin Khalifa University. She obtained in 1996, a Ph.D. in Applied Genetics at the University of Milan, Italy. Trained in the birth places of modern cancer immunotherapy in the United States, and Italy, Dr. Maccalli has over three decades of experience in basic and translational cancer immunology and cell therapy. She is author/co-author of 75 original peer-reviewed publications (H-index 37) and 7 monographies. She is the sections' editor of JTM and of Advances in Cancer Biology-Metastasis and member of Biomarker Working Group-Society of Immunotherapy of Cancer and of the Pathobiology group (EORTC). In 2020 she has been awarded of the SITC-“Team Science Recognition Award”.

Scope of Research

The team is dedicated to the development of personalized medicine approaches for cancer patients, based on immunology, immunotherapy and cell-based therapies. Main focus is on the manufacturing, molecular and functional characterization of “off-the-shelf” T and NK cells engineered with Chimeric Antigen Receptors (CARs) to target either hematological or solid tumors. Additional ongoing studies are aimed at isolation and immunological characterization of cancer stem cells from solid; development of novel cell-based treatments for targeting cancer stem cells, representing the components of tumor resistant to therapeutic treatments; and identification of biomarkers associated with the evolution of the inflammatory bowel disease and patients' clinical outcome.



Ola Hussein, Maha Abdulla, Alex Issam Tout, Cristina Maccalli, Evonne Chin-Smith, Salim Bougarn, Neha Gopinath.



Khalid A. Fakhro, PhD

Laboratory of Human Genetics and Genomics

Dr. Khalid Fakhro is the Chief of Research and Chair of the Precision Medicine Program. Dr. Fakhro leads the Laboratory of Human Genetics and Genomics, which focuses on bringing emerging genomic technologies from the lab close to the patient's bedside. To date, his lab has been awarded competitive grants exceeding \$8m to study genome structure and the genetic etiology of rare diseases and Autism. In addition to research and hospital duties, Dr. Fakhro serves multiple leadership roles in Qatar's growing biomedical ecosystem, including as a Board Member of the Qatar Precision Medicine Institute and Adjunct Professor at both Weill-Cornell Medical College and Hamad Bin Khalifa University, where he teaches and supervises Masters and Ph.D. students in genomics and precision medicine.

Scope of Research

The Fakhro Lab interprets the human genome. We approach this question from three fronts. We study the genetic basis of rare disorders and Autism in patients at Sidra Medicine. The Qatari population is very well suited for such gene mapping studies, given the high rates of consanguinity and uniform environment. We are interested in the genetic structure of Arab populations, which are severely under-represented in global databases. Using short- and long-read sequencing technologies, we identify single mutations as well as large variants (structural variants, e.g. deletions, duplications, inversions, translocations, etc.) in the genomes of both healthy and sick individuals. We augment the above endeavors with other high-throughput data, such as gene expression (RNA-sequencing), metabolomics and zebrafish screening to link genetic variation with downstream functional consequences.



Alya Al Kurbi, Waleed Aamer, Khalid Fakhro, Elbay Aliyev, Rulan Shaath, Aljazi Al-Maraghi, Najeeb Syed, Geethanjali Gandhi, Shoab Nawaz.



Matteo A Avella, PhD

Laboratory of Reproductive Biology

Dr. Matteo Avella is a Principal Investigator in the Division of Maternal and Child Health at Sidra Medicine and is head of the Lab of Reproductive Biology. Prior to joining Sidra Medicine, Dr. Avella was an Assistant Professor in the Department of Biological Science at the University of Tulsa, USA, and the School of Health Professions at Eastern Virginia Medical School, USA. Dr. Avella received his Ph.D. at the Polytechnic University of Marche (Ancona, Italy), studying the intestinal microbiota's effects on fish's early development and reproduction. At the National Institutes of Health (Bethesda, USA), he switched studies to the mammalian system and focused his research efforts on understanding the molecular mechanisms regulating fertilization in mice and humans. Dr. Avella received training as a human embryologist at Shady Grove Fertility (Chesterbrook, PA, USA).

Scope of Research

The development of healthy gametes (sperm and eggs) is paramount for successful fertilization and conception. Research on the functional genome has played a vital role in uncovering shared molecular mechanisms governing mammalian gametogenesis and fertilization, as well as in revealing the causes behind certain monogenic fertility disorders. Our lab uses state-of-the-art genome sequencing to screen infertile families and singletons. Our final goal is to identify novel variants within genes regulating human gametogenesis and fertilization and discovering new genes with unknown functions in these reproductive processes. Our discoveries shed light on the genetics of human infertility and empower fertility specialists to develop new tools and targeted fertility treatments for patients struggling to conceive.



Maria Esteves, Matteo Avella, Manar Ata, Fatima Al Ali, Nadhir Djekidel, Suma Garibova.



Nicholas van Panhuys, PhD
Laboratory of Immunoregulation

Dr. van Panhuys completed the Honors program in Molecular Biosciences at Victoria University. Before being awarded Rex and Betty Coker Post Graduate Scholarship to conduct his PhD studies at the Malaghan Institute for Medical Research (New Zealand) where he investigated the role of IL4 and STAT6 in protective immunity and T helper 2 immune responses. He was then awarded the NZ Foundation for Research Science and Technology post-doctoral fellowship award, to work as a visiting fellow at the National Institutes of Health (Bethesda, USA) in the Laboratory of Immunology with Dr. Ronald Germain. Consequently he was appointed as a research fellow in the Laboratory of Systems Biology at the NIAD, NIH. Since 2015, he has led the Laboratory of Immunoregulation at Sidra Medicine.

Scope of Research

Major research projects include:

- A study of the immune responses that occur in fat during the onset of type 2 diabetes. Determining the precise nature of the inflammation that drives metabolic disease is necessary to design innovative therapies for treatment of disease.
- A QNRF NPRP grant funded study into assessing the genetic, epigenetic, and developmental features that make a family history of asthma the number one risk factor for the inheritance of asthma and allergic diseases.
- Increasingly the microbiome is recognized as a prime driver of immune dysregulation. In this study we are assessing the impact of microbial dysbiosis on the development of pediatric food allergies.



Randa Al Yafie, Asmma Doudin, Tracy Augustine, Sanaa Sharari, Nicholas van Panhuys, Eman Abdelsalam, Mohammad Ameen Al Aghbar, Meritxell Espino Guarch, Ghalia Missous.



Wouter R.L. Hendrickx, PhD

Laboratory of Tumor Biology and Immunology

Dr. Wouter Hendrickx leads the Tumor Biology and Immunology Laboratory and has experience in stem cell and cancer research at the universities of Brussels (VUB), Leuven (KUL) and Norwich (UEA). He gained a PhD in Medical Science and has worked on several different projects relating to the tumor micro environment including extensive work on the role of MMP's and the degradome. He has experience with classic molecular biology techniques as well as advanced 3D cell culture and proteomics technology. At Sidra Medicine he has focused since 2014 on the tumor immune micro environment deploying bioinformatic tools to analyze tumors for immune related signatures and other determinants of the immune phenotype and translating the findings to the wet lab environment. He was a participant of the EU FP6 and PF7 grant framework and is a QNRF/QRDI awardee (JSREP7 PPM5 and ARG1).

Scope of Research

My lab focuses on multi-omics and spatial omics studies of Pediatric solid tumors like CNS, Willms Neuroblastoma and Sarcomas. We manage the Pediatric Precision Oncology Initiative that aims to biobank and sequence all solid tumours in Qatar. We also study the microbiome and its interaction with the immune system and the effect this interaction has on tumor progression or rejection. We have several international and local collaborations on molecular tumour profiling and classification. My lab always has a presence of MSc and PhD students who join our research in either the wet lab (in-vitro and in-vivo) or computational biology team.



Tariq Masoodi, Wouter Hendrickx, Tekincan Cagri Aktas, Christophe Raynaud, Sathyavathi Sundararaju, Shima Sherif, Ayesha Jabeen, Apryl Sanchez, Eiman Ahmed, Dina Nehad Awartani.

Qatar Biobank-Based Catalogue of Causal Effects of Middle Eastern Genetic Variation Provides Clinical Insights

A large-scale study from the lab of Prof. Younes Mokrab, led by Dr. Haroon Naeem and Dr. Ilhame Diboun, performed a comprehensive examination of the regulatory landscape of gene regulation within the Qatari population by leveraging whole genome RNA and DNA data from ~2,000 individuals from Qatar Biobank. In collaboration with Stanford University USA, the team established the largest resource to date of regulatory genetic signals in human blood, known as Quantitative Trait Loci (QTL), comprising novel findings specific to Qatari and Middle Eastern populations. The research, supported by the Qatar National Research Fund, provides a valuable dataset from an under-represented population with regional and global impact on our understanding of biology and disease.

The study identified approximately 12 million QTLs influencing the regulation of gene expression, splicing, allelic imbalance and isoform expression.

Fine mapping further delineated the causal relationship and intricate architecture of these effects. Comparative analyses with public resources including GTEx, eQTLGen, and eQTL Catalogue, revealed both universal and population-specific genetic signatures of regulatory mechanisms with direct influence on biological traits and diseases. Causal effects were co-localized with several clinically relevant, previously unreported biobank phenotypes including Platelet count, gamma-glutamyl transferase activity, and Triglycerides levels.

Importantly, the study also examined the differential allele frequency of QTLs among world populations, identifying founder mutations that confer both risk and protective effects. Initial results from this study were presented during the Precision Medicine and Functional Genomics Meeting in 2023. The findings have wide implications for precision medicine research in Middle Eastern populations and worldwide.



Sidra Medicine Study Key for New Versions of COVID-19 mRNA Vaccines



The findings of a ground-breaking study by a consortium of researchers, led by Sidra Medicine will be instrumental in the development of new versions of Covid-19 mRNA vaccines as well as aid in the treatment of patients with severe symptoms of Sars-CoV-2.

The study, which illustrated the actions of the vaccines and identified the molecular mechanisms to predict the severity of the disease, employed cutting-edge technology and approaches to better understand the response to the vaccines. It also highlights significant differences between the first and second doses of vaccines, which have been administered to billions worldwide.

The study was done in collaboration with Hamad Medical Corporation (HMC), Qatar University and international partners, Predict-19 and the University of Genoa in Italy and has been published in the journal Science Advances, and

highlights a novel technique that can assess hundreds of various immunological pathways and antibodies with just a small amount of blood. The process can be done at home with a finger stick, similar to how diabetic patients test blood sugar levels. The team found several differences in the strength and type of immune response elicited after the first or second dose of vaccine. By gaining a more comprehensive understanding of the mechanisms of Covid-19 vaccines, researchers hope to develop more effective and safer vaccines and to identify strategies for treating and possibly preventing severe Covid-19 infections. Dr Ali Ait Hssain, senior consultant intensivist, and lead investigator at HMC said: “The findings of the study are extremely important as they offer the opportunity to identify patients that might require tailored or personalised treatments, particularly those with severe symptoms of the disease.”



Sidra Medicine Study Reveals Immunesystem, Microbiota Impact on Colon Cancer Survival



A study led by Sidra Medicine has revealed the impact of our immune system and microbiota on our ability to survive colon cancer. The study was based on a grant from the Qatar National Research Fund and Sidra Medicine intramural funding, titled Immune–microbiota interactions affect the prognosis of patients with colon cancer and published in Nature Medicine, was conducted in collaboration with main partner, Leiden University Medical Center (LUMC) in the Netherlands.

The team found that a specific composition of bacteria in the tumour and intratumoral immune response were associated with a more favourable prognosis for colon cancer patients. Core researchers included Dr. Wouter Hendrickx from the Functional Cancer Omics lab and Dr. Davide Bedognetti, former director of the Human Immunology Division, while LUMC researchers included Dr. Jessica Roelands, who was

previously a joint PhD student at Sidra Medicine, and Dr Peter J.K. Kuppen, Associate Professor. By combining the bacterial composition and the score for intratumoral immune response, the team identified a subgroup of patients with colon cancer, with an almost 100 percent survival rate. This score, along with ICR score, could be used as predictive biomarkers in cancer immunotherapy to successfully treat colon cancer patients.

The study showcases the potential of multi-omics profiling and offers promising avenues for microbiota-targeting approaches, such as dietary interventions. The study will be extended by adding other layers of data, including spatial transcriptomics, immune phenotyping and methylome analyses. These findings could lead to more targeted treatments for colon cancer patients based on their immune response and microbiota composition.



Sidra Medicine and Its Digital Transformation Journey with The Cloud



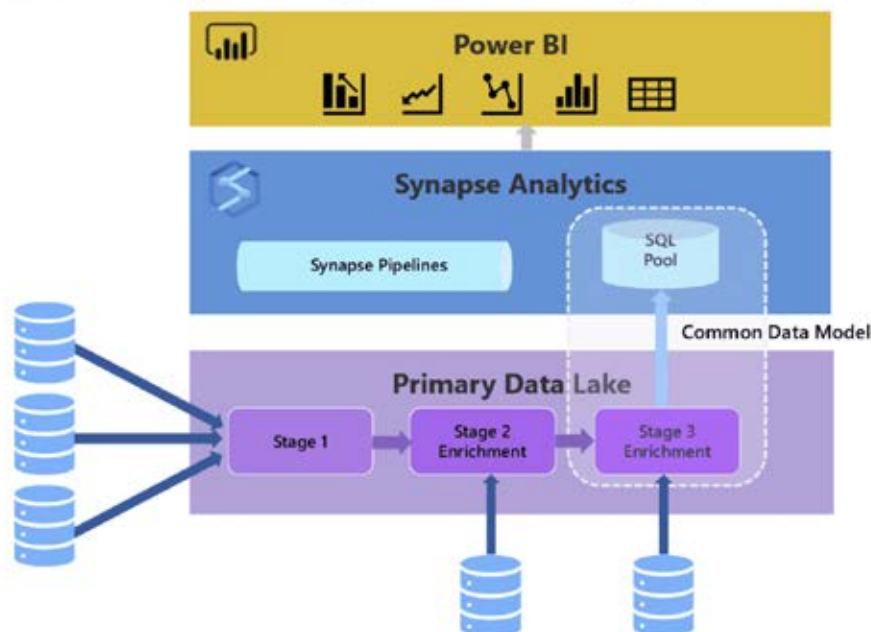
Sidra Medicine provides specialist healthcare services for women and children. Its research team built an Azure-powered centralized data warehouse to enable easier cross-border research collaboration and achieve its digital transformation goals. With world-class data privacy and security standards, the healthcare facility empowered medical and research professionals to freely and securely exchange data, analyze results, and compare findings.

“We are one of the few hospitals in the world, with an established research facility where clinical, biomedical and scientific research collaborations are embedded in the patient care journey. We wanted a trusted technology partner, that would enable our multi-disciplinary clinical research teams to use genome analysis and gain a 360-degree view of the patient, leading to a more informed diagnosis.

We also want to scale up our genomics research capabilities to meet growing local and global demands and achieve our digital transformation goals,” explains Dr. Khalid Fakhro, Chief Research Officer and Chair of the Precision Medicine Program at Sidra Medicine.

To facilitate data analysis and collaboration with international researchers, Sidra Medicine deployed specific solutions in partnership with Microsoft. The first was a centralized data warehouse for Power BI, enabling the institution to generate analytical reports from any data stored in the warehouse. Being on the cloud, has opened up more collaborative pathways for our researchers and physicians and will also strengthen our positioning strategy to become a benchmark for precision medicine and personalized healthcare, not only in the Middle East but beyond.

Standardize reporting data with Synapse Analytics







**Education
and
Capacity Building**

CAPACITY BUILDING AT SIDRA MEDICINE

Outreach and education at Sidra Research is paramount, the department hosts several trainees, volunteers and visiting researchers/scientists coming from various universities and institutions, both locally and from around the world.

Sidra Research prides itself as a teaching entity in alignment with the education pillar, one of the three pillars that form the foundation of Sidra Medicine's mission to provide patient care and biomedical research. Training at Sidra encourages young adults to hone their career path in science, medicine and public health. By training under varied professionals and experts, the trainee is provided with invaluable work experience, develops and refines skills and has access to a platform to network with other professionals in the field.

12 VISITING SCIENTISTS:

Mahmoud Mohamed, HMC

Faook Al-Ajli, Al Ghannas Qatari Society

Naziha Alem, University College London

Ayesha Yasmin, HMC

Tawa Olukade, HMC

Arash Rafii, WCMQ

Sawssan Ahmed, California State University

Abeer Fadda, Heidelberg University

Maryam Al-Nisf, ADLQ

Nora Magdalena Torres, University of Guadalajara

Ayse Nur Ugur, TUBITAK

Tekincan Aktas, Izmir Dokuz Eylul University



66 Externs and volunteers enrolled in 2023



12 PhD students in 2023



29 Local and international universities from Malaysia, Mexico, Belgium, Pakistan & others

FRESH PHD AND MASTER'S GRADUATES



Dr. Abdul Rahman Al-Subaiey

PhD in Biological and Biomedical Science
Hamad Bin Khalifa University
Supervised by Dr. Bernice Lo



Dr. Mona Mahmoud Abdi

PhD in Biological and Biomedical Science
Hamad Bin Khalifa University
Supervised by Dr. Khalid Fakhro



Mohammed Abuhaliqa

Master in Computing
Supervised by Dr. Abdul Rahman Salhab



Dr. Patricia Hachem

Master of Business Administration
University of Fredericton Canada



Wadha Al Marri

Master of Business Administration
Graduated with Honors
University of Aberdeen

ACHIEVEMENT AWARDS

Education Excellence Award by HH the Amir

In recognition of her outstanding academic achievement, Sheema Hashem has been honored with the Education Excellence Award by HH the Amir for her exceptional performance in her Master's program. The award, which is given annually to individuals who have demonstrated exceptional performance in their academic pursuits, was presented to Sheema Hashem at a special ceremony held as part of the 16th Education Excellence Day. Sheema, research specialist at Sidra Medicine, was recognized for her outstanding overall performance in her Master's program, as well as her numerous peer-reviewed research publications.



Cultural and Social Forum in the United Arab Emirates

Ameera Saadoun, Research Specialist at Sidra Medicine, was chosen by the Ministry of Youth and Sport to represent Qatari females in the Cultural and Social Forum in the United Arab Emirates. The Gulf Cooperation Council Secretariat General arranged the event, which included delegations from GCC countries as well as the Jordanian Kingdom, aiming to empower females by improving their capacities, encouraging them to believe in themselves, and exchanging expertise among attending delegations. Inspiring models of successful and influential personalities were also highlighted by the participating countries in various fields, and Ameera chose Dr. Kholoud Al-Shafai as her inspiration, prominent Sidra Medicine researcher in genetic research related to congenital and inherited cardiovascular diseases.



Sidra Medicine Doctorate Student at HBKU's CHLS Gets Research Specialist Author Award

In recognition of outstanding scholarship by early-career researchers studying at Hamad Bin Khalifa University (HBKU), Anjud Khamis N. Al Mohannadi, a PhD student in the Biological and Biomedical Sciences programme at the College of Health and Life Sciences (CHLS) and research specialist at Sidra Medicine, has been named by Sidra Medicine as the 'Top Research Specialist Author of 2022'. Acknowledging Mohannadi's accomplishment, Dr Georges Nemer, interim dean of CHLS, said: "It is a great honour for CHLS, HBKU to continue attracting exceptional research talent to our multidisciplinary graduate programmes and to nurture future leaders."



UDST International Conference on Drug Discovery and Development

University of Doha for Science and Technology (UDST) hosted the International Conference on in silico Trends and Approaches in Drug Discovery and Development as a forum for knowledge exchange among researchers, academics, students, and industry professionals. The conference witnessed more than 300 individual registrations and featured more than 50 accepted abstracts internationally. The Best Researcher Presentation Award was presented to Dr. Shima Mohamed Sherif Khedr, Post Doc Fellow at Sidra Medicine.

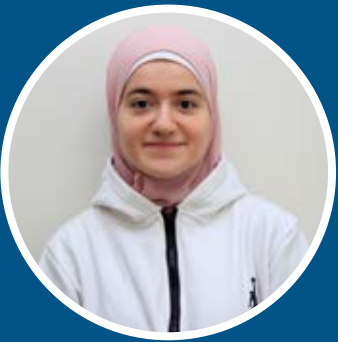


STUDENT TESTIMONIALS



Wided Khamlaoui
PhD with Dr. Annalisa

My six months externship in Research with Dr. Annalisa Terranegra has equipped me positively with problem-solving skills. I gained vast experience and knowledge in dietary effects on gut microbiota composition during pregnancy and post-partum period. It was a wonderful experience meeting great people and learning from them and acquiring skills from experts. I had the opportunity to present research findings at international conferences, and I won second prize in poster presentation in Women's Health Conference 2023. Now I feel extraordinary energy to deal with some issues I am going through from the value I gained from this training.



Yasmin El Bsateh
MSc with Dr. Bernice Lo

I obtained a Master's at American University of Beirut in Clinical Immunology Research. During my externship with Dr. Bernice Lo, I fine-tuned my research skills and enriched my background in the field of Immunodysregulations. Throughout this journey, I strengthened my technical skills in performing sterile cell culture techniques, proliferation assay, RT-PCR, and Western blot. Furthermore, I acquired additional skills by cross-training on advanced experimental procedures including Sanger Sequencing, ELISA, and others.



Yasmin Olabi
MSc with Dr. Annalisa

Sidra's vision immediately attracted me to apply for a training opportunity. Luckily, I was offered an opportunity to start as a volunteer in the precision nutrition team under the supervision of Dr. Annalisa Terranegra which six months later developed into offer to join Dr. Terranegra's team as research specialist. Looking back at the whole experience, I can proudly say that I have developed a lot of scientific and analytical skills that enlightened me and are key motivators to move forward and to learn more in the research field. My passion for research has grown and my expectations are now higher.



Maria Esteves
MSc with Dr. Matteo

Over the past few months, I have had the privilege to work as an extern in Dr. Avella's Reproductive Biology lab as part of my MSc in Human Embryology and Developmental Biology at the University of Aberdeen. This experience has given me insight into the research industry and helped me grow in a professional work environment, surrounded by incredible like-minded individuals. The skills I have learned will be incredibly beneficial in my career as a scientist. I truly relish this opportunity and can't wait to see what else I learn and achieve throughout the rest of my year here.



Khadija Niyaz
BSc with Dr. Oleksandr

I had an enriching experience in the genomics and research externship program, which has had a significant impact on my academic and professional journey. Actively participating in hands-on experience, exposure to cutting-edge technologies, and collaborative research environment has deepened my understanding and appreciation for genomic intricacies and the dynamic field of research. Under the guidance of dedicated mentors, I had the privilege of expanding my skill set and fostering valuable connections within the scientific community.



Nour shallouf
BSc with Dr. Annalisa

During my 6-month externship in the research department at Sidra Medicine I had a positive and rewarding experience collaborating with Dr. Annalisa, who was supportive and a kind supervisor. I also built good connections with the entire team. I gained proficiency in utilizing various software tools. I was given the opportunity to present a poster at the Young Scientist and PMFG. I eagerly anticipate the publication of our paper and am looking forward to participating in another conference at (2nd Pediatric in Qatar University) with the same poster.



Sarah Subeh
BSc with Dr. Oleksandr

As a research extern at Clinical Genomics Laboratory at Sidra Medicine- Research Branch, I acquired different professional skills through performing a diverse set of laboratory protocols in professional settings. It was a great opportunity to work closely with a team of researchers to learn the value of good lab practices. Such skills include a thorough knowledge of different laboratory equipment and instruments, familiarity in preparing, collecting and documenting of different samples. The externship program expanded my horizons in the clinical genomics field and motivated me to pursue my studies in genomics and precision medicine.

GRADUATE ASSOCIATE

Stepping into the Sidra Medicine research realm, each day presented a new opportunity for me to fuel my intellectual curiosity and unlock my capabilities across diverse research fields, thereby broadening my knowledge and enriching my skill set. Engaging with a variety of different research laboratories, such as the Laboratory of Reproductive Biology, the Laboratory of Immune Biological Therapy, and the Zebrafish Core Facility, granted me a profound understanding of their ongoing projects and their dedicated objectives. Thus, exploring different research labs before making a final decision proved immensely beneficial for a recent graduate like me. This hands-on experience significantly improved my understanding, aiding me in pinpointing the one that resonates with my interests the most.

Amidst the Graduate Associate role, I had the opportunity to immerse myself in the excitement of generating innovative ideas, pitching concepts, and contributing to the initiation of a ground-breaking project in Qatar– the initiation of the first Science Café in the region. Adding to my experience as a Graduate Associate, presenting a poster at the Young Scientist Symposium– where I showcased my research findings, improved my communication skills, and connected with fellow researchers– significantly contributed to my professional growth.

As I reflect on my time as a Graduate Associate, this experience not only equipped me with the academic toolkit but has also instilled in me a lifelong commitment of the pursuit of knowledge and the continual exploration of the unknown. This was not just a job; it evolved into a crucial milestone, propelling me towards a meaningful future.

- Maha Abdulla



Visiting Scientist and Student from University of Guadalajara, Mexico

Graciela Llanos Becerra, PhD student in Translational Nutrition Sciences and her supervisor Dr. Nora Torres a Researcher professor at the University Center of Health Sciences, both from the University of Guadalajara in Mexico reached out to Sidra Medicine to express their interest in a research stay at the Research Branch. For one month, they were in the Laboratory of Microbiome and Biomarkers Discovery of the Maternal and Child Health Department, directed by Dr. Souhaila Al-Khodor, and received training in the analysis of the intestinal microbiota using Next-Generation Sequencing. Graciella shares, “Dr. Souhaila and her research team are a great example of teamwork; they kindly provided me with their

support at all times, mainly Dr. Selvasankar Murugesan, who was most directly supporting me in this training; he was very patient in guiding me throughout the entire process, from DNA extraction, library preparation, sequencing and bioinformatic analysis of the sequences.” Dr. Nora further adds, “This one-month journey was exceptionally fascinating and beneficial to my career as a researcher. I am truly grateful to Dr. Souhaila by accepting me into her research Group, made possible through a collaboration with Dr. Selvasankar Murugesan” This international experience was made possible through Sidra Medicine’s priority to engage the global community and Exchange knowledge.



Visiting Scientist from Dokuz Eylul University, Turkey

Dr. Tekincan Aktas joined Sidra Medicine as a Visiting Scientist from Dokuz Eylul University, Turkiye. He is collaborating with our Pediatric Cancer Omics laboratory, focusing on neuroblastoma pediatric tumors. The goal is to use this neuroblastoma archive to advance knowledge and treatment options on neuroblastoma world-wide. Sidra Medicine's research labs have noteworthy work done on pediatric tumors and TBI labs with a focus on cancer immunity, rendering them a great force to collaborate with in a joint study. Dr. Aktas was very impressed by Sidra Medicine's remarkable infrastructure and lab capabilities and noted that the facilities are amazingly well-equipped and spacious, like no other lab he has worked in before. Organizing and managing such a large lab with this many workflows takes great skills, and everything works seamlessly. He also attests to the people working in the labs as being astounding and says "Sidra did a great job attracting talent from many countries. I was able to work and observe several methods of high throughput sequencing, able to observe and learn about spatial transcriptomics, learn more about R programming and use it to analyze data into meaningful information about patients."



SIDRA RESEARCH AT CAREER FAIRS



Sidra Medicine Research participated in and actively promoted training programs throughout 2023. This included CMU-Q's Careers Platform - STEM Edition, CMU-Q Future's Fair, Education City's Job Fair, Qatar University Health Colleges New Student Orientation, Amna Bint Waheb

Career Fair, and the Career Counselor's Hub hosted by the Ministry of Education, among others. This active participation resulted in an influx of training requests by quality and talented students to not only the Research Branch, but also to other branches in the institution.

LAUNCH OF INGEN PROGRAM

Lead by Iman Al Azwani from the Omics Core, the InGen program starts with a captivating lecture attended by over 150 high school students, out of which 12 outstanding individuals are selected for a two-day hands-on experience at the genomic facility. Measures have been placed for the safety of these students; and a specialized biosafety level 1 room was dedicated for the purposes of the program. Looking ahead,

InGen is committed to reaching more students from both private and governmental high schools. The program plans to collaborate with a different school each month, thus contributing to the expansion of the horizons to science education. The success of the inaugural batch of the InGen Program demonstrates the power of experiential learning in igniting students' passion for science.



“I was honored to participate in the InGen program at Sidra Medicine. It was a truly enriching experience for me. Being able to make experiments using the fascinating lab facilities at Sidra’s Genetics lab showed how the life of a biologist is very amusing. This program not only deepened my interest in genetics but also improved my laboratory skills, leaving me with and a solid foundation in the field.”

“InGen introduced me to genomics and the world of genes. I had the chance to engage in hands-on laboratory work, extracting DNA from a lab sample and studying its nucleotide sequence. I saw work done by the genetics team in Qatar and witnessed efforts to study the Arabic and Qatari genome. InGen was an amazing, eye-opening experience.”



ZEBRAFISH WORKSHOP



The Zebrafish team successfully hosted a hands-on workshop on zebrafish assays in precision medicine. Participants from Sidra Medicine and the wider research community in Qatar enjoyed the intensive 5-days workshop. They focused on the zebrafish model applications in deciphering the underlying mechanisms of rare genetic diseases. Ruaa, a QU affiliate, shared: The personal experience of handling zebrafish is exceptional and adds a huge impact on precision medicine. I enjoyed and was interested in every detail of the workshop.

GENOME EDITING WORKSHOP



Sidra Medicine's Precision Medicine and Functional Genomics conference held a genome editing workshop in partnership with Pfizer-University of Granada-Junta de Andalucía Centre for Genomics and Oncological Research (GENYO) and the European COST action 'GeneHumdi'; an EU-funded network that connects researchers and innovators across Europe and beyond. This aimed to tackle knowledge fragmentation and accelerate the translation of genome editing technologies for the treatment of human diseases.





**Grants
and
Collaborations**

GRANT AND COLLABORATIONS

13 total Grants from Qatar National Research Fund (QNRF) and other external funds were awarded in the last 18 months.

Totaling QAR 24.39 M

Breakdown of Grant Application In The Last 18 Months

| Grant Application | Submitted | Awarded |
|--|-----------|---------|
| Path Towards Precision Medicine (PPM 06) | 13 | 2 |
| Academic Research Grant (ARG 01) | 19 | 5 |
| Highschool Research Experience Program (HSREP04) | 1 | 0 |
| Highschool Research Experience Program (HSREP05) | 1 | TBC |
| Conference and Workshop Sponsorship Program (CWSP22) | 1 | 0 |
| Gulf Strategy Fund 2022 - Precision Medicine* | 1 | 1 |
| Genome Assembly Grants* | 1 | 1 |
| Junta de Andalucia* | 1 | 1 |
| 2023NIG-JOINT - Travel Award* | 1 | 1 |
| JDRF 4-SRA-2023-1375-M-B (SRA) 2023 | 1 | 1 |
| leading House For The (ME&MA) "Research Partnership Grants" | 1 | 1 |
| Cystic Fibrosis Foundation Grant | 1 | 0 |
| Pfizer ASPIRE Grants | 1 | 0 |
| Pfizer Global Medical Grants | 1 | 0 |
| Pfizer Grants | 1 | 0 |
| Waterloo Foundation | 1 | 0 |
| March of Dimes | 1 | 0 |
| Biocodex Microbiota Foundation | 1 | 0 |
| Repro Grant | 1 | 0 |
| 2023 UMDP Principal Investigator | 1 | 0 |
| Crohn's & Colitis Foundation-Takeda, "Fibrosis in IBD Research Initiative" | 1 | 0 |
| CDKL5 Pilot Grant | 1 | 0 |
| Organization for Autism Research (OAR) 2023 Competitive Grants Round | 1 | 0 |
| Pfizer Independent Education Grants | 1 | 0 |
| Orphan Disease Center, Million Dollar Bike Ride Pilot Grant Program* | 1 | TBC |
| Orphan Disease Center, IQSEC2 RAFR Grant Program 2023* | 1 | TBC |

*International grants and awards

INTERNAL RESEARCH FUND

Sidra Medicine (Sidra) invited research proposals for the Internal Research Fund 2024 (IRF 24) to be awarded in Q1 2024. Projects should be planned for a duration of 2 years, with a start in Q1 2024. Sidra is engaged in personalized and applied medical research that strongly supports translation and implementation of novel scientific discoveries into medical practice and meaningful health outcomes. Sidra's mission is to deliver Precision Medicine by fostering efficient therapies and preventative strategies for human diseases, enhancing human health and well-being, and ultimately supporting the development of a personalized health care system.

The purpose of this intramural grants' program is to support competitive and innovative research initiatives that improve the patient's outcome by leading to early detection, better prevention, improving diagnostics, and treatments. Fertility/pregnancy complications (e.g., pre-term birth, infertility, newborn sequencing).

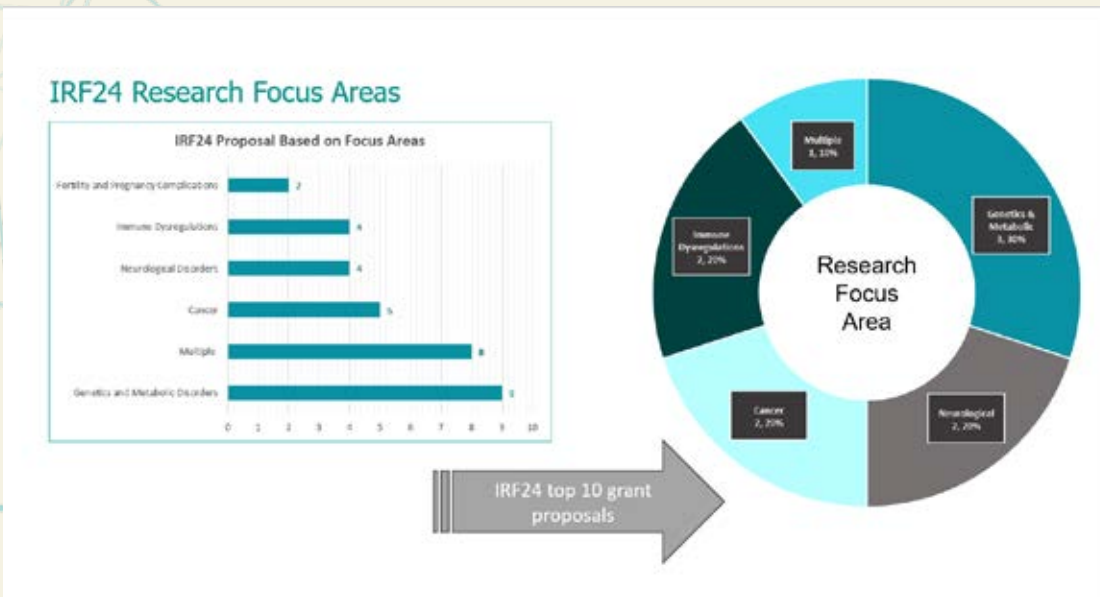
Special attention was given to disorders that are prevalent in Qatar and that affect Sidra's patients,

and that fall within the following programs:

- Neurological disorders (e.g., autism, epilepsy)
- Cancer (e.g., pediatric solid tumors, leukemia)
- Genetic/metabolic disorders (e.g., rare genetic diseases, childhood diabetes)
- Immune dysregulations (e.g., IBD, primary immune deficiencies)

Applications need to be translational and outcome-driven; where clinical outcome improvements would be possible to measure and enabled by Precisions Medicine approaches.

The primary purpose of IRF 2024 is to provide funds for activities that will lead to the development and submission of a competitive research proposal to an external agency (e.g. QRDI or others). The application should demonstrate how the proposed activities will enhance the probability of reaching definitive outcomes in a targeted, externally funded grant. It is mandatory for each project to have one LPI from the Research and the Clinical Department.



TOP ORIGINAL PUBLICATIONS

01

An integrated tumor, immune and microbiome atlas of colon cancer

Authors: Jessica Roelands, Eiman I Ahmed, ..., Wouter Hendrickx, Davide Bedognetti.

Journal: Nature Medicine

02

Human IRF1 governs macrophagic IFN- γ immunity to mycobacteria

Authors: Taushif Khan, Fatima Al Ali, ..., Mahbuba Rahman, Nico Marr.

Journal: Cell

03

Human MCTS1-dependent translation of JAK2 is essential for IFN- γ immunity to mycobacteriar

Authors: Taushif Khan, Nico Marr.

Journal: Nature Medicine

04

Human IL-23 is essential for IFN- γ -dependent immunity to mycobacteria

Authors: Taushif Khan, Manar Mahmoud Ahmad Ata, Fatima Al Ali, Nico Marr.

Journal: Science Immunology

05

Encephalitis and poor neuronal death-mediated control of herpes simplex virus in human inherited RIPK3 deficiency

Authors: Nico Marr

Journal: Science Immunology

06

Inherited human ITK deficiency impairs IFN- γ immunity and underlies tuberculosis

Authors: Taushif Khan, Manar Ata, Fatima Al Ali, Nico Marr

Journal: Journal of Experimental Medicine

07

Human CARMIL2 deficiency underlies a broader immunological and clinical phenotype than CD28 deficiency

Authors: Taushif Khan, Nico Marr

Journal: Journal of Experimental Medicine

08

Stressed target cancer cells drive nongenetic reprogramming of CAR T cells and solid tumor microenvironment

Authors: Cristina Maccalli

Journal: Nature Communications

09

Guadecitabine plus ipilimumab in unresectable melanoma: five-year follow-up and integrated multi-omic analysis in the phase 1b NIBIT-M4 trial

Authors: Davide Bedognetti

Journal: Nature Communications

10

Positive regulation of oxidative phosphorylation by nuclear myosin 1 protects cells from metabolic reprogramming and tumorigenesis in mice

Authors: Shimaa Sherif, Davide Bedognetti

Journal: Nature Communications

11

Juvenile dermatomyositis disease activity is associated with the expansion of blood B and T-cell memory subsets lacking follicular markers

Authors: Damien Chaussabel

Journal: Arthritis and Rheumatology

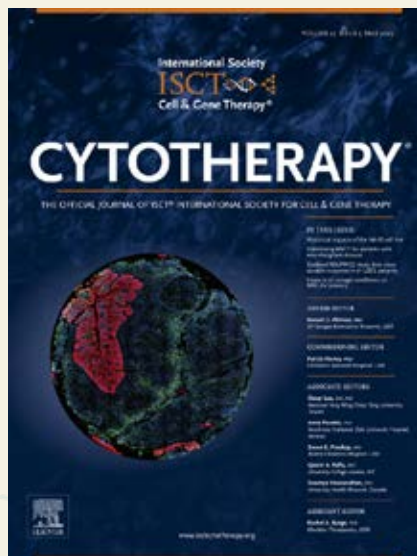
12

Associations between HLA class II alleles and IgE sensitization to allergens in the Qatar Biobank cohort

Authors: Taushif Khan, Fatima Al Ali, Evonne Chin-Smith, ... , Nico Marr

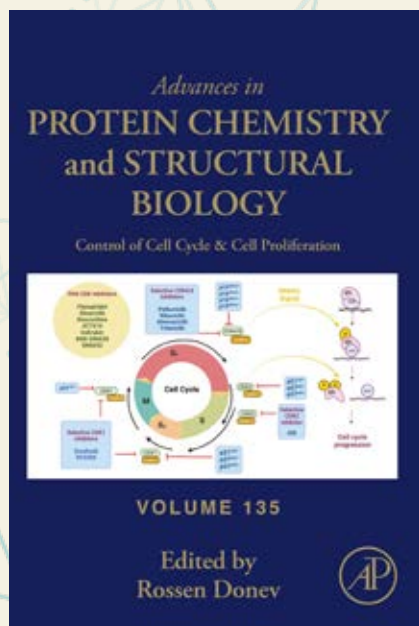
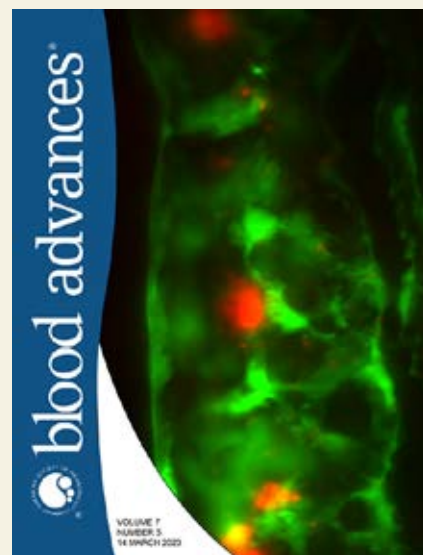
Journal: Journal Of Allergy and Clinical Immunology

SIDRA MEDICINE PUBLICATIONS ON JOURNAL COVERS



ISCT announced the winners to the third edition of its Annual Insta-Your-Cells Photo Challenge. The contest invited image submissions from labs all over the world. The best image taken by Abbirami Sathappan, Research Specialist, wins a ISCT 2022 Annual Meeting Registrations and a chance to be featured on the front cover of *Cytotherapy*. The image submitted was of an inflamed tonsils biopsy section extracted from a patient, and won the first prize.

The paper titled ***CD14+/CD31+ monocytes expanded by UM171 correct hemophilia A in zebrafish upon lentiviral gene transfer of factor VIII***, authored by Muhammad Elnaggar, Anjud Al-Mohannadi, ..., and Sara Deola made the journal cover for *Blood Advances* Journal. The image portrays the dynamic interplay of human blood CD34+ cells labeled in red and the zebrafish green blood vessels. This visual synergy between the treated cells and zebrafish vessels sheds light on human cells' remarkable ability to contribute to clot formation in Hemophilia A model.



The book chapter titled ***"Cyclin-dependent kinases in cancer: Role, regulation, and therapeutic targeting"*** authored by Dr. Ajaz Bhat and Dr. Ammira Akil (senior authors), and Sara Al. Marzooqi, Sheema Hashem, and Hana Q. Sadida (junior authors), has made the cover page image in "Advances in Protein Chemistry and Structural Biology," a publication by Elsevier. The cover page image depicts the regulation of cell division in the eukaryotic cell cycle by Cyclin/CDK complexes and inhibitors such as p16INK4A.

Sidra Medicine Launches Benevolent Healthcare Grant in Precision Medicine

Sidra Medicine has announced the launch of a benevolent healthcare grant 'Precision Medicine for All,' coinciding with the Rare Disease Day. The grant will allow young patients of all backgrounds, particularly those with genetic, rare or hard-to-diagnose conditions, to access cutting-edge precision diagnostics at Sidra Medicine.

CEO of Sidra Medicine Dr. Iyabo Tinubu-Karch said: "through this grant, we are generating a change that will positively impact the lives of hundreds of patients living with rare or complex diseases in Qatar." She pointed out that Sidra Medicine plays an important role in implementing a program that is in support of Qatar's pledge to the UN Sustainable Development Goals, one of which is to achieve universal health coverage and enhancing good health and well-being for all (UNSDG Goal 3).

"As one of the few hospitals in the region with the capacity to deliver advanced diagnostics

and precision therapies under one roof, Sidra Medicine is committed to widening the access to its Precision Medicine services," she added.

Chief Research Officer at Sidra Medicine Dr. Khalid Fakhro said that Sidra Medicine embedded research with philosophy for patient care, adding that it has successfully showcased this for children with rare diseases such as neurological disorders, immune deficiencies, congenital malformations and cancer.

"Precision Medicine for All will support funding key patient-related clinical research and personalized interventions, thus reducing the emotional and financial burden for patients in need," he noted, adding that "with the support of benevolent partners, Sidra Medicine hopes this grant will significantly grow over the years to make precision medicine a reality for all rare disease patients and their families in Qatar."



Your Health is Your Wealth: How Qatar Invests in Well-Being



Sidra Medicine's Omics Core laboratory was featured in a Euro news article and television segment highlighting Qatar's investment into well-being. The study of human DNA is so important to understanding and ultimately diagnosing human diseases. In Qatar, scientists and researchers work with the latest technology to better understand our genetic framework.

The Omics Core lab is based in the women's and children's hospital in Doha. The research centre has systems in place that can aid with the extraction of DNA/RNA from a range of sample types including saliva and blood samples. It has software for DNA genotyping, molecular karyotyping, gene expression, single cell sequencing as well as the associated capabilities for data analysis.

In 2003, the first draft of the Human Genome Project was released. Starting its research in 1990, the objective of the project was to map all DNA sequences of the human genome. The initial draft however only possessed 92% of the total human genome. With the expansion of technology, however, that 8% gap has been bridged.

The work done at the Omics Core labs has contributed to that gap in knowledge, and now helps us understand how newly discovered variants influence health and diseases, explains Dr Tomei. From creating a thriving startup ecosystem to being at the forefront of genetics research, Qatar is always looking to pump fresh ideas into a rapidly changing healthcare industry.







Events

Leading Healthcare Experts to Explore Future of Precision Medicine in Region at PMES 2023

The 2023 edition of the PrecisionMed Exhibition & Summit (PMES), the Middle East's leading event dedicated to the advancement of precision medicine in the region, took place on 23-24 May at the Dubai World Trade Centre. Our CRO was invited to give the opening plenary keynote address at PMES, where he spoke about advancing the precision medicine agenda across the GCC and lessons learned from the Qatari experience over the last 10 years. Bringing together key figures in the field of precision medicine, PMES 2023 offered a unique platform for knowledge sharing and collaboration by reviewing the practical application of precision medicine and encouraging clinical adoption. Attendees enjoyed engaging discussions, insightful presentations, and interactive

exhibits showcasing the latest breakthroughs and technologies in precision medicine. PMES 2023 was generously hosted by the UAE's Ministry of Industry and Advanced Technology (MoIAT), Ministry of Health and Prevention (MoHAP), Department of Health (DoH) Abu Dhabi, and the Dubai Health Authority (DHA). The opening ceremony of PMES 23 featured appearances by Sarah Al Amiri, Minister of State for Public Education and Advanced Technology; Dr. Asma Al Mannaei, Executive Director Research and Innovation Centre at DoH Abu Dhabi; Dr. Yendry Ventura, CEO of Abu Dhabi Stem Cells Centre; Saba Samir Flaihan Hamasha, part of the patient support group for the UAE Rare Disease Society; and Dr. Khalid Fakhro, Chief Research Officer at Sidra Medicine, Qatar.



Sidra Medicine on the World Stage at Precision Medicine World Conference

A team of researchers and physicians from Sidra Medicine were at Precision Medicine World Conference (PMWC 2023) in California in January 2023. The QF entity was the only Hospital from Middle East to showcase precision medicine success stories based on Arab Genome datasets, proving how it has made precision medicine a reality for children with rare diseases in Qatar.

Held in the United States of America, PMWC is the largest and original annual conference dedicated to precision medicine. Its mission is to showcase practical content that helps close the knowledge gap between different sectors and to accelerate the development and spread of precision medicine.

The delegation of Sidra Medicine experts attending PMWC 2023 included Prof. Ziyad M. Hijazi,

Chief Medical Officer; Dr. Khalid A. Fakhro, Chief Research Officer; Prof. Khalid Hussain, Div. Chief of Endocrinology; Dr. Ruba Benini, attending pediatric neurologist and epileptologist and Dr. Chiara Cugno, Director of Advanced Cell Therapy Core and attending Physician in Pediatric Hematology and Oncology as well as Dr. Max Renault, the Director of Research Operations and Strategy.

In a panel session titled 'Building Future Precision Care in Qatar', Prof. Ziyad M. Hijazi and Dr. Khalid Fakhro, along with Dr. Edison Liu, the former President and CEO of the Jackson Laboratory and member of the Research board at Sidra Medicine, explored the bench to bedside pathways of care for patients at the hospital.



Precision Medicine and Functional Genomics Conference

Our Precision Medicine and Functional Genomics Conference was a major success with over 870 attendees, partners and exhibitors and 50 local and international speakers.

This year, we also made several announcements highlighting new programs, publications and ground-breaking studies to showcase our achievements and advancements in precision medicine.

On Day 1, it was shared that nearly 10,000 families enrolled in research at Sidra Medicine, and there was a call for a stronger Arab genome representation to advance precision health. Sessions on Day 1 of PMFG 2023 focused on large scale population genomic programs from Oman, Qatar, Saudi Arabia, United Arab Emirates and the United Kingdom. Session keynote speaker, Sir Mark Caulfield, Professor of Clinical Pharmacology from Queen Mary University of London, was introduced by the British Ambassador to Qatar, H.E Jonathan Wilks CMG. PMFG 2023 also featured an address by Dr. Salih Ali Al Marri, the Assistant Minister of Health Affairs from Qatar's Ministry of Public Health.

Medicine and Genomics in Pediatric Healthcare was the main theme on the second day of PMFG2023, and it was announced that we were recently awarded two Path Towards Precision Medicine grants. In another precision medicine achievement, we announced the publication of its BARAKA-Qatar study on the genomic architecture of autism spectrum disorder in Qatar in the prestigious journal, Genome Medicine.

Functional Genomics and its application to advancing women's health was a key session on Day 3 PMFG 2023. Conference Co-chair Dr. Matteo Avella highlighted the holistic approach to women's health, wellness services which are being underpinned by research at Sidra Medicine.

On Day 4 of PMFG we announced the launch of our Good Manufacturing Practice (GMP) facility. Other highlights from the final day of PMFG included a key focus on pediatric cancers.

PMFG 2023 was closed by CRO Dr. Khalid Fakhro and conference co-chairs Dr. Bernice Lo and Dr. Matteo Avella, who thanked everyone for making PMFG 2023 a major success and were looking forward to seeing everyone back for PMFG 2024.



Qatar's First Young Scientists Symposium

Themed as “The Impact of Biomedical Research on Patient Care”, and chaired and hosted by young scientists, Ahmad Al Shaibi and Fatima Al Ali for other young scientists, the Young Scientists Symposium brought together senior and junior scientists and editors of high impact journals, to put the spotlight on how research can be applied to patient care.

Ahmad Al Shaibi, Research Specialist in Human Genetics said: “There are many young scientists who don't yet have the skills or access to mentorship about getting their work recognized or reviewed in journals. Our symposium was seeking to change that, as we want them to be more forthcoming and to get an understanding of what the end result of their hard work could look like.”

The symposium featured keynote talks by: Dr. Paul Bastard from the Imagine Institute, University of Paris in France and Dr. Markus R. Wenk, the Dean of the College of Health and Life Sciences at HBKU Doha.

There was also a mentorship session by Dr. Safia Danovi, the Senior Editor of Nature Genetics, Dr. Elizabeth Phimister, the Deputy Editor of The New England Journal of Medicine.

A series of presentations were featured from local young scientists from Sidra Medicine; Weill Cornell Medicine-Qatar; Qatar University and Hamad Bin Khalifa University. Several international speakers from Canada, Saudi Arabia and the United Kingdom also presented at the symposium.

Fatima Al Ali, who is a Research Specialist at the Laboratory of Reproductive Biology said: “We wanted this symposium to serve as an opportunity for junior scientists and clinicians to share their experimental approaches - whether basic, translational, or clinical research – that has the potential to improve patient care.”

Both Ahmad and Fatima were recognized and appreciated by the Co-Chairs of PMFG, Dr. Bernice Lo and Dr. Matteo Avella on Day 1 of the conference.



Women in Qatar Strive in Science



Women in Qatar have made significant progress and advance in science and their future in the field is promising. There are a number of women working in prominent positions in the health and research sector, who have lauded the country's commitment to promoting women and girls in science.

Qatar is providing women with equal opportunities in education and employment in all sectors, enabling them to pursue their dreams. Science and gender equality are both vital for the achievement of the internationally agreed development goals, including the 2030 Agenda for Sustainable Development.

Sara Al Marzooqi, a Research Specialist in Precision Medicine (Diabetes), said Qatar has implemented a number of initiatives to support

women in science, such as the Qatar National Research Fund, which provides grants to support research projects led by women. Additionally, Qatar Foundation has been a strong avenue for women to access world-class education in science through scholarships and fellowships.

Fatima Al Ali, a Research Specialist in Reproductive Biology, is of the belief that more women in science will have a positive and lasting impact on the field. According to her, women bring a unique perspective to the table, and their presence can help to create a more diverse and inclusive environment. "This can lead to more innovative ideas and solutions, as well as a greater understanding of the complexities of the scientific field," she said.



Qatar's First Artificial Intelligence and Medicine Symposium

International keynote speakers at the event include Daniyal Stoyanov, Professor of Robot Vision in UCL Computer Science (UK); Roozbeh Jafari, Professor of Biomedical, Electrical and Computer Engineering and Computer Science, Texas A&M University (USA); Moncef Gabbouj, Professor of Information Technology, Tampere University (Finland); Alejandro Frangi, Diamond Jubilee Chair of Computational Medicine and RAEng Chair in Emerging Technologies, University of Leeds (UK); and Bart de Witte, Founder and CEO of the Hippo AI Foundation (Germany).

A pre-symposium workshop on the 'Basics of AI for Healthcare Workers' was part of the agenda as well as sessions covering a broad range of topics such as the use of AI in computer-assisted surgical systems and data management across large health systems within a healthcare context. Other hot topics included precision medicine applications for patients with certain diseases as well as new developments in health-related AI in wearable devices.

There was also a panel discussion on ethics, moderated by Ms. Maleen Saeed, from Al Jazeera Media Network.

Dr. Mitch Stotland, Symposium Chair and Vice Chair of the Department of Surgery at Sidra Medicine said: "Sidra Medicine is committed to improving health outcomes and adapting to new technologies that positively impact clinical decision making, analysis and research. The AI in Medicine symposium was a fantastic platform for those in the clinical, research and computer sciences community, whose work intersects healthcare and AI, to jointly share in their experiences and challenges. We were honoured to welcome some of the world's top thought leaders as well as local-based research experts. There is much to learn from each other, and much to consider in how we prepare for future digital breakthroughs in machine learning. We hope that this was the first of many research collaborations that will change the face of AI in medicine."





The image features a magnifying glass with a white handle and a blue outline, positioned over an open book. The book's pages are visible, with some showing faint text. The background is a dark blue gradient with a bokeh effect of light blue and white particles. The text 'Publication Registry' is centered within the magnifying glass's lens in a bold, dark blue font.

**Publication
Registry**

ARTIFICIAL INTELLIGENCE

Hamed E, Sharif A, Eid A, Alfehaidi A, Alberry M. **Advancing Artificial Intelligence for Clinical Knowledge Retrieval: A Case Study Using ChatGPT-4 and Link Retrieval Plug-In to Analyze Diabetic Ketoacidosis Guidelines.** Cureus. 2023 Jul 15;15(7):e41916. doi: 10.7759/cureus.41916. PMID: 37457604; PMCID: PMC10349539.

Al-Shaban FA, Ghazal I, Thompson IR, Klingemier EW, Aldosari M, Al-Shammari H, Al-Faraj F, El-Hag S, Tolefat M, Ali M, Nasir B, Frazier TW. **Development and validation of an Arabic language eye-tracking paradigm for the early screening and diagnosis of autism spectrum disorders in Qatar.** Autism Res. 2023 Dec;16(12):2291-2301. doi: 10.1002/aur.3046. Epub 2023 Nov 27. PMID: 38013243.

Kabir S, Pippi Salle JL, Chowdhury MEH, Abbas TO. **Quantification of vesicoureteral reflux using machine**

learning. J Pediatr Urol. 2023 Nov 2:S1477-5131(23)00486-2. doi: 10.1016/j.jpuro.2023.10.030. Epub ahead of print. PMID: 37980211.

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Hamed E, Eid A, Alberry M. **Exploring ChatGPT's Potential in Facilitating Adaptation of Clinical Guidelines: A Case Study of Diabetic Ketoacidosis Guidelines.** Cureus. 2023 May 9;15(5):e38784. doi: 10.7759/cureus.38784. PMID: 37303347; PMCID: PMC10249915.

CANCER

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Farzaneh M, Nasrolahi A, Ghaedrahmati F, Masoodi T, Najafi S, Sheykhi-Sabzehpoush M, Dari MAG, Radoszkiewicz K, Uddin S, Azizidoost S, Khoshnam SE. **Potential roles of lncRNA-XIST/miRNAs/mRNAs in human cancer cells.** Clin Transl Oncol. 2023 Jul;25(7):2015-2042. doi: 10.1007/s12094-023-03110-y. Epub 2023 Feb 28. PMID: 36853400.

Kassab A, Gupta I, Moustafa AA. Role of E2F transcription factor in oral cancer: Recent insight and advancements. Semin Cancer Biol. 2023 Jul;92:28-41. doi: 10.1016/j.semcancer.2023.03.004. Epub 2023 Mar 15. PMID: 36924812.

Taib N, Merhi M, Inchakalody V, ..., Maccalli C, Al Homsy MU, Dermime S. Treatment with decitabine induces the expression of stemness markers, PD-L1 and NY-ESO-1 in colorectal cancer: potential for combined chemoimmunotherapy. J Transl Med. 2023 Mar 31;21(1):235. doi: 10.1186/s12967-023-04073-y. PMID: 37004094; PMCID: PMC10067322.

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Compiled and edited by Noor Faisal and designed by Zubair Pote
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