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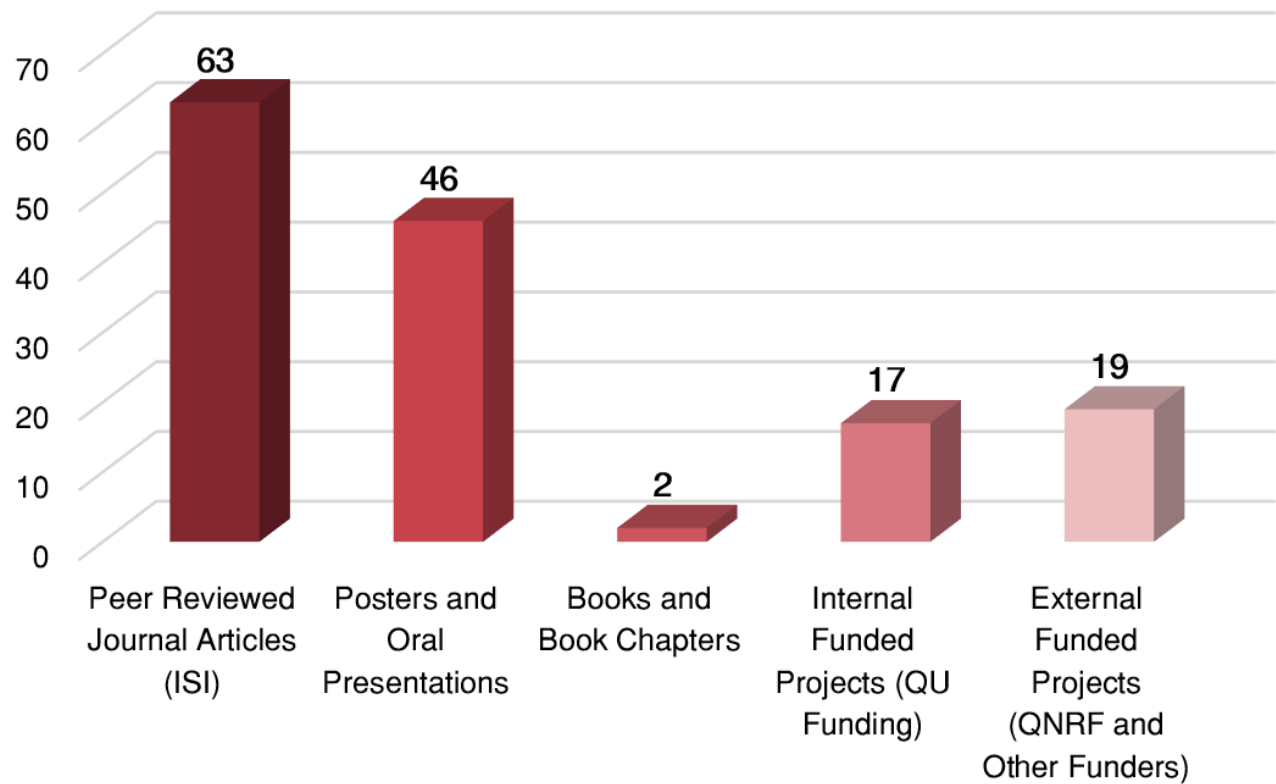


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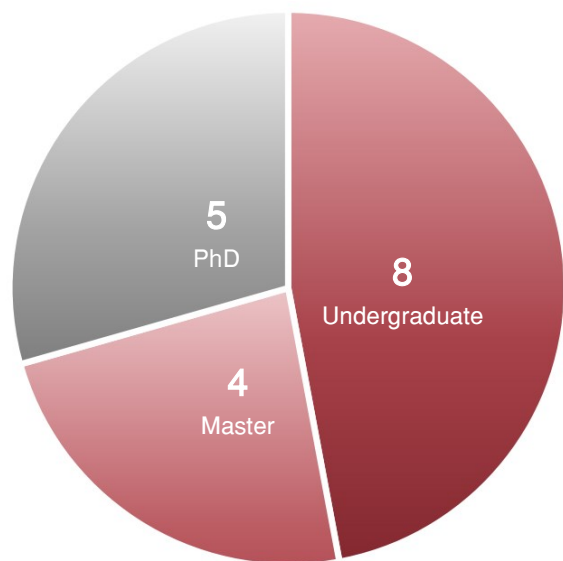
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Fact Sheet: 2018-2019

BRC Projects and Funds



BRC Students



BRC Academic Events



BRC Projects Under Focus

Influenza Complications and Underlying Mechanisms in Disease Pathogenesis in Diabetic Patients in Qatar

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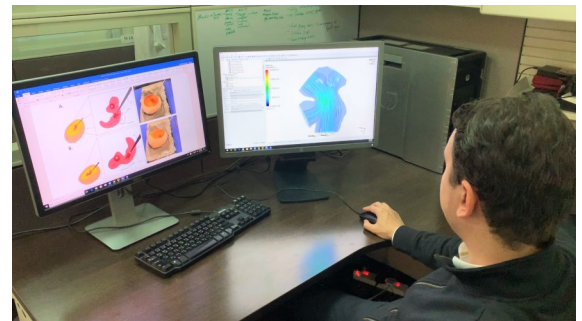
Influenza is one of the most common respiratory illnesses associated with diabetes. Diabetic patients are six times more likely to get hospitalized during influenza epidemics than non-diabetic patients. In addition, influenza A viruses have been shown to infect human pancreatic cells in vitro, and cause pancreatitis and diabetes in an animal model.

Although the prevalence of diabetes in Qatar is high, burden of influenza in diabetic patients has never been studied. In this study, we are focusing on characterizing influenza infection in diabetic patients in Qatar and identifying potential markers reflecting disease prognosis. This study is the first of its kind in Qatar and the region, and shall substantially help in reducing influenza burden in diabetic patients. Results from this project could translate in generating or adopting new treatments for diabetic patients suffering from influenza infection.



Mechano-Biological Development of Congenital Heart Defects

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Congenital heart defects (CHDs) are the defects in the heart at birth. While global incidence is about 1 in every hundred live births, this number is close to 2 in Qatar. Etiology of most CHDs are not well understood. Hemodynamic forces are the forces applied by the blood flow on cardiac tissues. Disturbed hemodynamics is believed to be a major factor that leads to congenital heart defect (CHDs). One of these CHDs is hypoplastic left heart syndrome (HLHS), where patients are featured to have a significantly small left ventricle that cannot support systemic circulation. HLHS is responsible for 25% of all neonatal deaths. In this project, we characterize how disturbed hemodynamics contribute to embryonic development of HLHS. The study involves the use of chicken embryos as animal models, mathematical modelling and clinical studies combined to have a clear, full picture of the defect. The animal model is used to induce disturbed hemodynamics introducing HLHS, which will then be studied at different levels. Heart function is assessed by Doppler echocardiography; gene expression is assessed by Real time-PCR and RnaSeq; micro-CT and histology is used to assess morphology, and computational modelling is used to reveal shear stresses in the defected hearts. Merging computational modellings with molecular and genetic signaling analysis promises great potential in understanding the relationships between mechanical and biological signaling in proper and improper heart development. We will also evaluate restoring disturbed flow as a potential rescue strategy. This information will provide a critical basis for future therapies aiming to rescue these defects. A chick embryo facility was established at BRC as part of the project.

Events

BRC organized a number of seminars, workshops and training courses for a wide range of audience, including professionals, college students and school students.

Seminars

- "The Role of Cancer Stem Cells in the Immunomodulation of Anti-Cancer Immune Responses" by Dr. Cristina Maccalli (Sidra)
- "Nanopore Sensing Technology and Applications for Nucleotide Sequencing" by speakers from Oxford Nanopore Technologies
- "Qatar Severe Respiratory Failure ECMO Program" by Dr. Ibrahim Fawzy (HMC)
- "Microbial-Medicated Minerals (Biomaterials): Dolomite as Example" by Prof. Fadhil Sadooni (QU-ESC)
- "Opportunities for Genomic Medicine in Qatar" presented by Dr. Khalid Fakhro (Sidra)
- "Cartilage disease: Connecting clinical to fundamental research" by Dr. Tatiana Vinardell (QF-EVMC)
- "Female Infertility and Big Data: Insights on the First Genome-Wide Association Study (GWAS) on Twinning" presented by Dr. Hamdi Mbarek (QGP)
- "New diagnostics and therapeutic technologies for precision medicine in obesity, diabetes, osteoarthritis and autism" presented by Dr. Naila Rabbani (Warwick Medical School)
- "The Role of Fat Stem Cells in Obesity-Associated Insulin Resistance and Type 2 Diabetes" presented by Dr. Mohamed Elrayess (QU-BRC)



Workshops



- Next Generation Sequencing Data Analysis Workshop (19-20 November 2018)
- Bioinformatics and Laboratory Investigations of Emerging Pathogens and Epidemics Workshop (14-17 January 2019)
- Qatar International Zebrafish Workshop (23-24 April 2019)
- Food Inspection and Public Health Workshop (3 November 2019 - 5 December 2019)

Training



- Principles of Mammalian Cell Culture Training Course (2-5 September 2018)
- Summer Training Program for Health Cluster Sr. Students (10-23 June 2019)
- Oxford Nanopore Sequencing Training (16-17 July 2019)

Achievements



- Ms. Maria Smatti, Research Assistant at the Infectious Disease Division, attended a conference at USA organized by The Infectious Diseases Society of America (IDSA). She won International investigator award– Out of all international submitted abstracts. The abstract was recognized as one of the top four outstanding abstracts.

Issue Story: Biosafety Level-3

Facility run and managed by: Dr. Hashim Alhussain, Lab-Technologist, Biosafety Specialist

The first of its kind in Qatar: Biosafety level-3 (BSL-3) research mobile laboratory for the study of highly infectious and epidemic disease in Qatar. A biosafety level is a set of biocontainment measures needed to isolate dangerous biological agents (e.g. bacteria, virus, & toxin) in an enclosed laboratory facility. The levels of containment in laboratories range from the lowest biosafety level 1 (BSL-1) to the highest at level 4 (BSL-4).



Biosafety level 3 (BSL-3) is appropriate for work involving microbes that can cause serious and potentially lethal disease via the inhalation route. This type of work can be done in clinical, diagnostic, teaching, research and production facilities. A BSL-3, which is also named high containment facility, must incorporate extra safety and containment measures due to the nature of the highly dangerous agents handled in it. Measures of precautions in the BRC BSL-3 mobile facility exceeds all the standard precautions incorporating even some of the BSL-4 safety requirements.

The new BSL-3 mobile facility opens new horizons for research in Qatar. In addition to that, being the only mobile high containment facility in the country, the lab can serve as a crisis intervention unit in the unfortunate cases of disease break-outs or biological and terrorist attacks, this is especially important during the football world cup 2022, as millions of visitors are expected to visit the country.

Examples of pathogens that are handled in BSL-3 lab include *Francisella tularensis*, *Mycobacterium tuberculosis*, SARS/MERS, coronavirus, *Coxiella burnetii*, Rift Valley fever virus, chikungunya, yellow fever virus, West Nile virus, and Highly Pathogenic Influenza Viruses (e.g. H5N1).

Interview with BRC's PhD Candidates

Mrs. Balsam Rizeq and Mrs. Zain Zaki are PhD candidates at the Department of Biological Sciences at Qatar University. We had an interview with them about their experience at BRC.

What is the nature of your work at BRC? And how would you describe your experience?

Balsam: Working at a unique research environment, such as BRC labs, allowed me to explore and use the most advanced medical and biological technologies and instrumentations in the biomedical field. This contributes to enhancing the research quality in order to compete for the international research outcomes in present days.

Zain: I perform scientific experiments at BRC's

multidisciplinary labs, using state-of-the-art instruments. This interface of research and community activities will materialize the mission of Qatar University and Qatar 2030 Vision.



What did you learn during your research period?

Balsam: During my work at BRC, I worked on several research projects in the area of genetic behavior and material assessment and their importance in age-based studies besides their environmental and health effects.

Zain: My work at the center enriched my knowledge background and my well-understanding to educational and research experience.

What are the most prominent achievements you had during your studies at BRC?

Balsam: I won the first place, for two years: 2018 and 2019, of Poster presentation-Postgraduate level, at the 3rd and 4th QU Health Research Symposium at Qatar University. In addition, my work and experience at BRC were coroneted with winning the Postdoctoral Research Award (PDRA) QNRF with Dr. Ala-Eddin Mustafa as the lead PI, who is a professor at CMED-QU and a joint-appointed researcher at BRC.

Zain: I won the best poster award in posters competition (AIMECS 2019-Istanbul), (1st international zebrafish conference 2019-Qatar) as well as second place in poster competition (Health Cluster Symposium 2018).

New Collaborators Joining Forces with BRC

