COMPANIES THAT APPLIED TO THE 2021 CANADA-ISRAEL CARDIOVASCULAR INNOVATION FORUM EVENT (non-exhaustive list)

Canada-Israel Cardiovascular Innovation Forum

CANADIAN APPLICANTS:

Sachin Davis, Flora Bioworks, "A non-invasive diagnostic platform for the identification of atherosclerotic cardiovascular disease via metagenomic sequencing of the gut microbiome"
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Flora Bioworks' is developing a non-invasive diagnostic platform to aid in the detection of atherosclerotic cardiovascular disease (ACVD) in individuals who may be predisposed to ACVD, using gut microbial signatures that are indicative of disease and health state. Flora Bioworks' business model comprises the delivery of a stool collection and swabbing kit to a customer's doorstep, to which they will collect and ship a stool sample to our facility where its microbial species-level composition is determined from whole metagenome sequencing. Flora Bioworks' has identified a unique gut microbial signature that can be detected from the sequencing data that yields a strong predictor of ACVD, and has developed preliminary machine learning models capable of leveraging this data to accurately predict the incidence of ACVD with comparable sensitivity (70%) and specificity (82%) to existing non-invasive tests. Flora Bioworks' is confident this figure will improve substantially with expanded clinical datasets. Ultimately, Flora Bioworks aims to leverage its innovation to introduce the world's first FDA-approved microbiome test.

Marko Jovic, Cardian Diagnostics, "Saliva-based non-invasive monitoring for heart failure patients"
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Cardian Diagnostics is developing the **first non-invasive, saliva-based device** for remote monitoring of heart failure (HF). Our device will reduce hospital readmissions and improve the quality of life of HF patients. The problem of remote monitoring is paramount at the unprecedented time of a global pandemic, when many serious cardiovascular and other conditions go untreated due to limited resources as well as reluctance of patients to reach out to seek medical advice.

Currently, HF diagnosis and monitoring requires laboratory blood testing, a major barrier in performing life-saving, frequent monitoring of HF biomarkers. In particular, the most established method measures levels of natriuretic peptide biomarkers BNP (B-type natriuretic peptide) and NT-proBNP (N-terminal pro-B-type natriuretic peptide) in serum. Saliva of HF patients contains NT-proBNP at about 77 pg/mL, making saliva suitable for non-invasive monitoring. Thus, we are developing a method for **rapid and accurate detection of NT-proBNP in saliva with a 3D printed device**, preloaded with high affinity antibodies against NT-proBNP. NT-proBNP present in saliva will be detected without the need for specialized equipment. Such an assay will be able to detect NT-proBNP with high sensitivity and specificity and can be performed at home in 20 minutes. Each device will be disposable and customized to fit a standard syringe and saliva collector. Results of the rapid test will be available for visual assessment as well as processing using a smartphone app. The device will be distributed to the HF patients already enrolled in remote monitoring programs (Telehealth). For $60/month all enrolled patients will be receiving one monitoring device each

week. The results will be automatically submitted to the telehealth database for assessment by a healthcare provider.

In the first three years of operations, we are planning to gain access to half of the 3000 HF patients enrolled into the OTN (now part of Ontario Health), expanding to reach 40% of Canada-wide remote monitoring program users by year five. The projected revenue of $1M/year is expected after three years of operations. We project to have $8.5M/year in sales after five years. Currently, non-invasive devices to trace HF-biomarkers are not available on the market. Thus, our competitive landscape is mainly represented by the companies developing blood-based, point-of-care (POC) diagnostics and monitoring for HF. We anticipate that our unique technology, cost effective operations and distinctive distribution channels will help us penetrate the market and mitigate the risk of competition.

Our major milestones include: prototype completion (November 2021); in-house manufacturing/storage and distribution (January 2022); prototype testing in pilot study (Belgrade, Serbia) (May 2022); design optimization and regulatory approval by Health Canada (October 2022); Canadian patent filing (November 2022); mass production/Canadian market penetration (December 2022); completion of clinical trial in Canada (May 2023); regulatory approval by FDA (October 2023), US market penetration (November 2023).

In this proposal, we request the funds for completion of functional testing of the prototype, a 3D-printed device detecting NT-proBNP in saliva of HF patients. The project is estimated to be completed in 7 months (May-November, 2021). Our team consists of experts in *in-vitro* diagnostics development, antibody affinity testing and optimization, cardiovascular device engineering. Thus, we are confident that the prototype development will be successful and completed on time.

Haman Mamdouhi, Health-Bridge, "Eliminating the language barrier in health care"
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Health-Bridge is focused on eliminating the language barrier in health care. Our work involves providing multilingual intake forms & on demand video interpretation when language is a barrier in a clinical setting. Our tool is provided to patients on a tablet, and is fully accessible for an elderly, tech illiterate patient population. It integrates seamlessly into the clinic flow, improves patient outcomes, cut costs, and allows specialists to better more efficiently provide care to patients and have time to consult additional patients.

The Canadian population is becoming increasingly diverse because of immigration. Understanding ethnic differences in cardiovascular risk factors is critically important in planning appropriate care delivery & prevention strategies for the country's rapidly changing population.

Our tool helps patients communicate key diagnostic information when language is a barrier and a translator can't be called, and are currently testing a guided pathway that uses ample visuals and audio cues to help patients communicate important information about their pain and medical history to doctors. Most importantly the literature has identified an urgent need for the promotion of physical activity among visible minorities and prioritizing the detection and control of diabetes

and hypertension during routine contact with patients of visible minorities (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3090103/), which we facilitate.

We are further taking advantage of telemedicine to provide video interpretation at the click of a button, any time during the patient's pathway of care. We are using as interpreters trained and standardized skilled immigrant professionals expert in medical and cultural nuances who otherwise face precarious workforce situations were it not for our training and organization.

Furthermore, there is an alarming under-representation of minority ethnic groups in cardiovascular research (doi:10.1093/fampra/cms054) which we have been able to address both through multilingual informed consent forms and on demand medically expert interpreters available via video.

Our long-term goal is to ensure growing number of patients with diminishing English proficiency receive equitable service and outcomes through their pathway of care, here, and (with support of partnerships we've developed) across the globe. We've received international recognition as a UN Sustainable Development Goal driven company on behalf of Canada. This problem comes from personal the experience of the founders, and is urgent and growing, which is why we're supported by many partners including the Institute of Canadian Citizenship which picked our project as one of 13 around the world to support, Institute of Global Health Innovation & Equity, as well as NEXT Canada.

ISRAELI APPLICANTS

Doron Adler, Sanolla, "AI Powered Primary Care Diagnostics Solutions"
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Sanolla is developing an AI driven medical and consumer diagnostic devices that use deep learning technology to detect, amplify, record, and diagnose all Lung and Heart sounds including the sound projected by the body in the "infra-sounds" range - which cannot be detectable by the human ears. The devices also measure vital signs (Heart Rate, Respiration, Body Temperature), and provide medical grade one lead ECG.

Our embedded AI algorithms applied to infrasound [as well as to the auditable sound] generated by the human body, improve detection accuracy of pulmonary conditions such as: Asthma, Pneumonia, COPD, COVID-19, and cardiac disorders such as: Aortic Stenosis [AS], Mitral Regurgitation [MR], Atrial Fibrillation [A Fib] and Myocardial Infraction [MI].

Sanolla's diagnostic solutions will revolutionize patient management and enable Tele-Health for cardio-pulmonary chronic diseases. Sanolla's products providing an immediate and accurate assessment for everyone, everywhere, thus, reducing in-clinic visits, saving time and money, and lowering the associated risk of exposure to infections ideal for chronic patients, geriatric, elderly monitoring, and young families.

Arie Huber, PRC Cardio Optic Ltd., "An innovative Imaging System For Directing Guidewire Crossing in Arterial Chronic Total Occlusion ("CTO") and Reducing Contrast Reagent Use in Coronary Angiography"
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PRC Cardio-Opitc Ltd, an SME located in Israel, is currently developing a forward visualization imaging system guide wire's probe whose main aim is to allow **navigation and** forward looking in coronary or other artery Chronic Total Occlusion ("CTO") and enabling safe moving, steering and cleaning of such total occlusion. The core proved technology is based on a unique development of a special Laser Ultra Sound System and image processing based integrated tool with other imaging and cleaning methods. The system will be capable to present forward imaging in occluded arteries, wall detection and blockage safe removal purposes.

A preliminary computer-based imaging technology has been assembled to test the capability of 'forward visualization' into the occluded segment of several centimeters. Imaging processing will enable 3-D (dimensional) visualization on an external display, as well as characterized composition of the occluding material and provide measurement distances sideways in the wall and forward looking into the open lumen ahead.

The system will enable the interventional cardiologist to safely control guide wire movement and mainly to visualize forward into the Total Occlusion, while opening and clearing it as well as on other arteries. The forward looking visualization within the occluded segment will increase safety of the CTO procedure by avoiding perforation and other known risks.

Future developments will include the capability to open the total occlusion by non-heating laser US (Ultra Sound) application or by alternative micro mechanic method. **The major project milestone will be addressed in trials on porcine coronary arteries.**

At the later future the company will address the market of open and cleaning blockages at **peripheral arteries as well.**

A second area of investigation that has been submitted for Intellectual Property is to utilize this visualization system during coronary angioplasty in patients that have kidney dysfunction. The system will enable operators to advance guidewires across coronary narrowing and avoid or reduce use of contrast reagent, which is highly injurious to the kidneys.

Jonathan Maron, VenoVision, "VenoVision Hemodynamic Remote Monitoring Platform"
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VenoVision will enable medical staff to better monitor cardiorenal and cardiopulmonary patients at risk of deterioration related to fluid imbalance, perioperative deterioration, or shock.

It uniquely combines non-invasive, contactless deep thermal imaging technology, EMR data, and ethical-AI to bring ICU-grade remote patient monitoring to the entire patient care continuum. By providing greater insight into patient hemodynamic status and right heart function, VenoVision will support medical staff to turn around the patient's condition when needed most, avoiding more intensive and expensive treatments. With VenoVision, we can raise the overall quality of

perioperative care and reduce the burden of undetected patient deterioration and its ever-rising costs and harm to patients' lives.

VenoVision was conceptualized as part of the 2015 BioDesign Israel program of The Hebrew University. The Proof of Principle clinical study was carried out on 15 patients at the Shaare Zedek Medical Center under Prof. Tal Hasin, MD, Head of the Heart Failure Unit. The engineering development for the study was completed at the Grass Center of Bioengineering at the Hebrew University under Prof. Yaakov Nahmias, Chair of Bioengineering. The study was sponsored by Terumo (Japan) and the data was then presented at the ICI 2018 Meeting, in Tel Aviv, December 2018. The first functional prototype is being completed in early 2021, to be followed by detailed research on human factors and usability with Charité-Universitätsmedizin Berlin.

VenoVision is currently a Finalist in MassChallenge Israel 2021.

For more information, visit https://www.cicvinnovation.com/

For any questions regarding the Canada-Israel Cardiovascular Innovation Forum or regarding any of the innovators, please contact Liz Thuo at hsrl.centre@utoronto.ca.