In March 2020, the Scripps Hub launched an app-based research program (DETECT) that analyzes participants’ wearable health data—including heart rate, sleep, and activity levels—to more quickly detect the emergence of influenza, coronavirus, and other fast-spreading viral illnesses. Volunteers who participate in the DETECT study can donate their biometric data, as well as logged respiratory symptoms, timing of treatments they’ve taken, and diagnostic test results. Participants also have the option to share electronic health record data. This real-time, crowdsourced information is meant to complement traditional public health surveillance methods, potentially leading to earlier detection and containment of current and future outbreaks in various geographical locations.

DETECT has over 35,000 participants thus far and initial findings from the first 10 weeks demonstrated that the combination of sensor and self-reported data was able to identify infections with roughly 80% prediction accuracy. This is a significant improvement from other models that only evaluated sensor data itself. Reported symptoms. [go.nature.com/35Gw3j8]

Learn more: https://detectstudy.org

Flexible platforms are responsive to change

PowerMom (http://powermom.scripps.edu/) democratizes research in maternal and infant health: any expecting or new mother with a smartphone can use a free app and biometric trackers to capture and share health information to help build the world’s largest database of pregnancy and postpartum experiences. They can visualize their data, see how it trends over time, and eventually, compare it to others in the database. The study has already recruited a diverse cohort of participants at highest risk for complications [African Americans (13%), Rural (15%), Obese (24%), Older age (4% over 40 years)].

The COVID-19 pandemic has highlighted and amplified the health inequities that exist within our current healthcare system and the pregnant women population is no exception. Pregnant women and their fetuses represent a high-risk population during infectious disease outbreaks. Physiological and mechanical changes in pregnancy increased susceptibility to infections in general. However, pregnant women remain underrepresented in COVID-19 research. The flexible nature of the PowerMom platform enables us to introduce tracking for and surveillance of COVID-19.

Scripps Hub partner Calibr has developed the ReFRAME library, a collection of over 14,000 compounds for drug discovery studies. Soon after the initial COVID-19 outbreaks began in China, Calibr began sharing ReFRAME and conducting joint experiments with other research teams at Scripps Research and collaborating institutions worldwide. Calibr sent off the first molecules to a coronaVirus (iPSCs) model of vascular smooth muscle cells (VSMC), as a disease cell model. Using iPSCs derived VSMC, we were able to evaluate differences in mRNA expression in risk and non-risk haplotypes as well as the changes in expression as a result of knockout of the S2P1 region.

Due to the COVID-19 pandemic, and the closure of several core laboratories and facilities, we have just completed our sequencing for mRNA in our iPSCs derived VSMCs. Interestingly, we see a very distinct set of mRNA that are highly expressed in the risk wildtype samples but not in the non-risk samples. Additionally, we noted we see the expression profile of mRNA from the risk knockout samples to mirror those of the non-risk wildtype samples.

Differential Expression of microRNA and 9p21 Risk Loci for Cardiovascular Disease - Amitabh Pandey, MD (KL2 Scholar)

Atherosclerosis is a major cause of morbidity and mortality, and the primary presentation of cardiovascular disease, leading ultimately to various disease states including myocardial infarction (MI), stroke, and peripheral vascular disease. The first and strongest region of the genome that conveys genetic risk of CVD is the 9p21 locus.

We had originally planned to recruit patients who were undergoing cardiac surgery, specifically for coronary artery bypass grafting due to significant coronary artery disease.

However, due to the COVID-19 pandemic, we were unable to recruit patients. We then turned to our in vitro human vascular smooth muscle cell (iPSCs) model of vascular smooth muscle cells (VSMC), as a disease cell model. Using iPSCs derived VSMC, we were able to evaluate differences in mRNA expression in risk and non-risk haplotypes as well as the changes in expression as a result of knockout of the S2P1 region.

Blood from COVID-19 patients across age and disease severity were collected and analyzed using a novel high-throughput flow cytometry technique that encompasses all clusters of differentiation in an effort to identify cellular or molecular correlates of immunity. Tracheal aspirates were also analyzed in severe COVID-19 patients.

This project was designed and implemented in sole response to the COVID-19 pandemic. The Scripps biobank has been instrumental to this project.

Analysis is currently underway.

Adaptability as a training opportunity

Trainees have demonstrated flexibility by adapting their projects to a COVID-19 focus and minimize research disruptions caused by the pandemic.

Longitudinal High-Throughput Spectral Flow Cytometry Analysis of COVID Patients Across Disease Severity and Age - Tridu Huynh, MD (KL2 Scholar)

SEARCH is a collaborative research study between Rady Children’s Hospital, UCSD, Scripps Research and the Rady Children’s Institute for Genomic Medicine that launched in early April 2020 seeking to understand the spread and prevalence of COVID-19 in San Diego by screening individuals and sequencing SARS-CoV-2 viral genomes. The first populations of interest were nurses, physicians and other hospital staff who participated at drives, and workers at donation sites at Rady Children’s Hospital and Scripps Health. Through open collaboration between research and clinical labs across institutions the study was able to screen the local healthcare workforce early in the pandemic. As this collaboration has grown, over 3,500 individuals have been screened, over 10,000 tests performed, and over 1,000 SARS-CoV-2 genomes have been publicly shared. Learn more at: https://searchcovid.info/

Keeping our community engaged and informed

The Scripps CTSA hub has organized numerous virtual events to help keep the public informed about the COVID-19 related scientific research taking place across Scripps Research.

The Front Row lecture series, a previously bi-monthly in-person event, was transformed in March into a bi-weekly webinar focusing on COVID-19 research. Scientists at Scripps Research with expertise in vaccine development, drug discovery and genomic epidemiology have presented their research providing insights on topics ranging from the origins of SARS-CoV-2 to digital disease surveillance. These COVID-19 town halls have attracted between 1,000-1,600 live viewers per lecture. We have also developed the Science, Simplified series to help learners of all levels understand COVID-19 related scientific information. This series has attracted over 30,000 views. All videos from the Front Row lecture series, Science, Simplified, and additional COVID-19 related mechanical endeavors are being made available to the public on the Institute website and on YouTube: https://bit.ly/373Q9BK

The hub also organized a series of virtual COVID-19 town halls to engage with underserved and vulnerable communities in San Diego. Coordinated by the Scripps Hub Academic Research Core (SHARC), the three-part San Diego Community Town Hall on COVID-19 series addressed a range of topics including local health disparities, vaccine trials, research ethics and contact tracing with speakers from local hospitals, health centers and research institutes. Live translation of the lecture into Spanish and Tagalog was provided. Future sessions are being planned through the NIH Community Engagement Alliance (CEAL) Against COVID-19 Disparities.

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CALL FOR PROPOSALS

SRT and Calibr invite proposals for collaborative drug repurposing studies. This translational endeavor aims to partner clinical and translational research teams within the CTSAs network with drug discovery resources. Scan the QR code to learn more.

New research with rapid startup