CGEn-TCAG (Toronto) Response to COVID-19

CGEn is Canada’s national genome sequencing facility, funded under the Canada Foundation for Innovation’s Major Science Initiatives, with support from Genome Canada and other partners. With locations in Toronto (The Centre for Applied Genomics, TCAG, at SickKids hospital), Montreal (McGill Genome Centre) and Vancouver (Canada’s Michael Smith Genome Sciences Centre), CGEn’s facilities, personnel, and know-how provide an essential set of resources to enhance and support Canada’s response to COVID-19. This document outlines efforts both already underway, and planned for the immediate future, at CGEn’s Toronto node (TCAG).

Immediate Response

- Remaining “open for business” and in a state of readiness to support Canadian science. Consistent with SickKids hospital and Research Institute directives, TCAG is providing essential research services to maintain momentum of ongoing projects, continue to generate valuable data for scientists unable to access their own research laboratories, and rapidly respond to emerging COVID-19 related projects. Some of these are outlined below (“Ongoing Response”). Since March 16th, TCAG has supported 139 Principal Investigator laboratories to finish ongoing projects, or to start new essential COVID-19 research service work.
- Developing new genome sequencing initiatives. With many colleagues both locally, across the country, and spanning the breadth of CGEn, TCAG immediately embarked on developing a national host (human) genome sequencing initiative. This program is designed to partner with, and complement, international efforts, and to work hand-in-hand with many clinical research and virus-genome sequencing projects also underway. TCAG will be directly funding some of these whole genome sequencing studies and is working with many other partners to further leverage these investments. In-kind staff support from the CGEn CFI-MSI is also being used.
- Responding to clinical and public health needs. TCAG responded to inquiries from Public Health Ontario and provincial hospital diagnostic laboratories, including the Genome Diagnostics laboratory at SickKids. We are working to support the needs of these labs, including identifying reagents, supplies, and equipment that can be shared, and clinically-trained staff (lab technologists, genetic counselors, medical geneticists) who can be seconded into diagnostic labs if necessary. Several of TCAG’s staff have also volunteered to work as entry screeners either in the research tower or the hospital itself.
- Developing strategic partnerships to catalyze COVID-19 research. CGEn-TCAG’s close partner, the University of Toronto McLaughlin Centre, also directed by Dr. Steve Scherer, was the first to provide rapid-response grant support (on February 3rd, 2020) to the Toronto COVID-19 working group led by Drs. Allison McGeer (Mount Sinai Hospital), Samira Mubareka and Rob Kozak (Sunnybrook Hospital), Vanessa Allen (Public Health Ontario), and colleagues.
- Enabling rapid viral genome sequencing. CGEn-TCAG is working with the group mentioned above, which is also linked to McMaster University, to develop rapid viral genome sequencing technology for implementation in appropriate clinical or biohazard-certified laboratories.
- Safeguarding our staff. TCAG has shifted as many personnel as possible to work-from-home status, including its bioinformatics and statistical analysis teams, and administrative support staff. Working with Research IT and the SickKids hospital information services, remote access to
all needed resources has been put in place. Key management personnel and necessary laboratory staff are on-site, while carefully maintaining appropriate social distancing.

Ongoing Response

• *Protecting and banking valuable samples and bioresources.* Cell cultures already underway, biological samples that need processing, and those arising from new COVID-19 related projects, all need time-sensitive and ongoing attention. TCAG’s Biobanking and Genome Resources facilities are operating with reduced staff on an as-needs basis, to ensure that no irreplaceable bioresources are lost.

• *Working across CGEn nodes.* Regular executive management, operations management, and technical experts’ calls are focusing on skills and expertise at each CGEn site and working to best understand how each can respond in the face of differing institutional, municipal, and provincial guidelines.

• *Continuing support for important genomics research.* TCAG is continuing large-scale (and very expensive) genome sequencing studies in autism, cancer, cerebral palsy, heart disease, paediatric developmental disorders, and the Personal Genome Project Canada. These efforts complement new COVID-19 projects, ensure that instruments and pipelines remain in a state of readiness, and will provide valuable data so that Canada’s genomics research does not stall during this pandemic. Other facilities are completing key projects (microarray facility), providing ongoing support for other essential research (genetic analysis, genome resources, Sanger sequencing, biobanking facilities), working on both client and internal data analysis (bioinformatics and statistical analysis facilities), or working on an as-needs basis for critical experiments (cytogenomics facility).

• *Supporting new federal, regional, and hospital-based projects.* With new funding from the federal government, and many other funders pivoting to provide grants for COVID-19 related research, CGEn’s facilities need to support these new initiatives. Among these at TCAG are many projects developing new diagnostic testing capabilities, including one with TCAG’s Dr. Lisa Strug and the Chief of the Division of Infectious Diseases at SickKids, Dr. Upton Allen.

• *Implementing new research funding.* CGEn-TCAG will invest some of its strategic funding, coupled to investments from the University of Toronto McLaughlin Centre, to continue to invest upwards of $1 million in 2020, to keep Toronto in the lead of genomics research in COVID-19. CGEn-TCAG is also actively interacting with other funding partners to expand available resources and impact.

Summary

TCAG, the Toronto node of CGEn, is responding to COVID-19 by doing what we do best: providing ongoing and robust support to researchers, and access to the expertise of highly skilled analytical and experimental personnel, while remaining nimble to respond to rapidly-shifting priorities. TCAG also remains “on-call” for whatever, and for whenever, provincial or hospital clinical testing labs might need us. Following our model of enabling Canadian science, CGEn will continue to support important regional, national, and international efforts to characterize both virus and host genomes, in order to better inform a wide variety of clinical research into biomarkers, diagnostics, and therapies.