

**Proceedings of the University of Toronto Leaders' Breakfast and Roundtable
on
"The Future of Infectious Diseases Research and Innovation in Canada"**

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A Leaders' Breakfast and Roundtable in honour of Dr. Lorne Tyrrell, the 2021 winner of the Henry G. Friesen International Prize in Health Research, was held at Massey College at the University of Toronto on Wednesday, November 16th 2022.

Dr. Tyrrell served as Dean of Medicine and Dentistry at the University of Alberta and was the Founding Director of the Li Ka Shing Institute for Virology. His research led to the development of the first oral anti-viral drug for chronic HBV. Dr. Tyrrell served on the COVID-19 Vaccine Task Force that provided timely expert advice to the federal government on "vaccine development, related bio-manufacturing and international partnerships" to facilitate the procurement of safe and effective vaccines.

The topic of the Roundtable was "The Future of Infectious Diseases Research and Innovation in Canada" with an emphasis on the role of Emerging and Pandemic Infections Consortium (EPIC), a collaborative partnership between the University of Toronto and The Hospital for Sick Children (SickKids), the Lunenfeld-Tanenbaum Research Institute, Sunnybrook Research Institute, University Health Network and Unity Health Toronto.

Welcome and Recognition of Dr. Tyrrell

The proceeding commenced with a welcome to Massey College, a Land Acknowledgement, and introduction of Dr. Tyrrell by Dr. David Malkin, the President of Friends of CIHR, a national organization whose mission is to promote health research in Canada. Dr. Malkin thanked the nominators, the Advisory Committee who reviewed the applications, and the sponsors of the Friesen Prize.

Dr. Timothy Chan, Associate V-P and Vice-Provost Strategic Initiatives, welcomed Dr. Tyrrell to U of T and spoke on the role of the 20 Institutional Strategic Initiatives like EPIC to increase U of T's capacity to support large scale, high impact interdisciplinary research and to train the next generation of leaders and scholars: "EPIC will position our research community to effectively combat infectious diseases; prevent the rise of future pandemics; continue to advocate for science-based policies; educate the public; and train the next generation of leaders." He thanked Scott Gray-Owen and the EPIC team and looked forward to supporting the growth and sustainability of EPIC.

EPIC Roundtable Presentations

- Natasha Christie-Holmes (Director, Strategy and Partnerships) highlighted the vision of EPIC (<https://epic.utoronto.ca/>) as a critical research hub in the Canadian effort to

combat future pandemics. She highlighted the four pillars: Transformative Research, Training and Talent, Toronto High Containment Facility, and Knowledge Translation. Dr. Christie-Holmes emphasized the role of EPIC in championing cross-connectivity across disciplines and sectors and training the next generation of researchers. At the heart of EPIC is the Level 3 Toronto High Containment Facility that has now received a \$35M CFI grant to revitalize the THCF into a state-of-the-art facility, and will play a significant role in addressing future pandemic and health threats in Ontario and Canada. The current facility was well poised to deal with viral threats such as SARS-CoV2, but the new facility will allow EPIC to support a rapid pipeline to respond to any infectious threat, a recent example being mpox.

- Jen Gommerman (Immunology) noted that interdisciplinary collaborations happened readily and rapidly because of the richness of the U of T research network. Many established fundamental research labs could transform to take on more translational research. COVID-19 gave students the opportunities at multiple levels to pitch in to the pandemic response. Dr. Gommerman also emphasized the responsibility of scientists to be able to speak to the media, especially to battle misinformation. This is perhaps the dawn of a new era with the hope that Canada will continue to invest in vaccine research and that scientists continue to advocate that these investments continue to be made.
- Warren Chan (Director, Institute of Biomedical Engineering) highlighted that engineering has evolved to be a translational hub for medical discoveries, bringing products to market. Rapid tests that were rapidly developed in the 60s and 70s are having a real impact now in point-of-care testing. COVID-19 inspired a lot of engineers to work on infectious diseases, such as the development of tracking apps, because they saw a real need. Dr. Chan is keen to build Biomedical Engineering by recruiting talent and inspiring engineers to go into this growing field.
- Rupert Kaul (Director, Division of Infectious Diseases, University Health Network) noted that we have had endemics/pandemics every two years: SARS, West Nile, flu, Zika, Ebola, and now COVID-19. He highlighted the need to learn how to sustain that interest and not just focus on a specific infection and how to sustain funding in longer term so we can respond rapidly to emerging infections as they come. EPIC can provide funding and bring together researchers across the hospital system. It's key however to also work effectively with communities that are most impacted by these diseases when they emerge. Those connections have to be maintained because the trust cannot be built overnight. People from those communities need to be part of the research team long term in a meaningful way.
- Tania Watts (Immunology) noted that during the COVID-19 pandemic, rapid funding was critical to get money to start research quickly. But, she said "You can't recruit students on one-year grants so we had to use students that were already there." She also pointed out that "you can't train an immunologist overnight." Being ready for future pandemic requires a big base of scientists in all the fields. During the lockdown, students were able to pivot to essential COVID research supported quickly by small grants, resulting in the rapid publication of results. There is, however, a need for core, sustained funding

and building ties to industry from big biopharmaceutical companies like Sanofi to small biotech start-ups.

The roundtable presentations were followed by comments and questions from the invited members of the audience.

Will Navarre

- How flexible has the academic system been for students who have had to pivot from their original projects to COVID-19 projects?
- One Health: infectious diseases that affect agricultural crops and biodiversity and that will, directly and indirectly, impact humans. Would like to see EPIC expand to include that.

Natasha Christie-Holmes

- We will address One Health through the HI3 hub proposed in our CBRF application.
- We have members who are very interested in this, not just zoonotic diseases but also ones that affect ecosystems.
- We are also interested in the impacts of climate change on infectious diseases.

Jen Gommerman

- One Health is a cross cutting enabling capacity in our CBRF.
- If you do any of this work in isolation, they're not informed by these other areas. For example, how do you manufacture new devices and therapeutics? How do you deliver them to at-risk communities?

Brad Wouters

- Effectiveness of interventions guided by policies, behaviours, etc... How will EPIC address this?

Jen Gommerman

- EPIC will work with the Centre for Vaccine Preventable Diseases at the Dalla Lana School of Public Health. A key aspect of this will be addressing vaccine hesitancy.
- We all have to be ready to communicate effectively. Meet Canadians where they are.
- Doing lots of media interviews without proper media training was very stressful.

Natasha Christie-Holmes

- EPIC hoping to provide media training, formalized approach to help people hone their skills.

Tania Watts

- How do you maintain the link through the COVID-19 tables that policy makers can come directly to scientists for advice?
- Tables were a great source of public trust and information.
- Having an ability to form an advisory table that's academic and independent is very important. But it needs core administrative and research support.

David Malkin

- A lot of the regulatory parameters around doing research changed rapidly during the pandemic (REB, rapid funding, etc...). Now that we know we can do that, how do we keep it alive? How do we maintain nimble research funding?
- How do we collect and maintain large data sets? And maintain linkage between public health and research?

Warren Chan

- Building data collection infrastructure, etc... can't be funded through NSERC, CIHR, etc... because it's not seen as innovative. So, it falls through the cracks.
- But there is a tremendous need!

Stephen Scherer

- We've learned nothing from the 1918 flu pandemic! He worries that in a few years as the pandemic fades, we won't have learned very much.
- In 2020, the Ontario provincial government deemed research as essential. Was it the right decision to shut down labs?
- Maintaining the sense of urgency that we felt during COVID-19 requires a change of mindset that usually comes from patient advocates.

Baweleta Isho (graduate student)

- Many students are engaged in outreach. If we want to change how the public sees infectious disease research, we need to do it early by engaging students when they are young

Reflections by Drs. Alan Bernstein and Lorne Tyrrell.

Alan Bernstein (Former President of CIFAR and CIHR)

- Every recommendation the national vaccine task force made to buy or not buy was listened to by the federal cabinet.
- There is a strong argument to build up scientific capacity so that we can give sound scientific advice to government.
- Governments are very good at changing the channel. How do we get governments to stick to the right channel? There's a lot they can listen to.
- The scientific community pivoted during this pandemic. He was impressed by how many scientists, including social scientists, etc. contributed to the research effort.
- Roughly one-third of CIFAR fellows pivoted during the pandemic.
- We need to foster a scientific culture that instills in government long-term thinking to prepare society for the next existential threat to humanity, climate change.
- The public does not understand the scientific process. So, when scientists disagree, the public thinks that we don't know what we're talking about. But that's part of the scientific discourse. How do we educate kids and the public about the importance of that?

- Young people are key to the future of science. There needs to be exciting opportunities for young people to go into science because they are the changemakers.

Lorne Tyrrell (University of Alberta)

- He was very impressed with EPIC and hopes we can bring together groups like EPIC to address these public health challenges at a national level.
- There is an average of one new disease/year.
- We need continuing medical education in infectious diseases. What are the new infectious diseases, how do they spread and how do we approach them?
- The Vaccine Task Force had direct access to cabinet and advice was enacted on within days. Everyone was very motivated and had a shared sense of urgency.
- How do you go from a substance (in a lab) to a product (in the market)?
- There was a time at universities when you didn't want to be involved with industry. Now everyone wants to be involved.
- How can we work together with industry, government and academia?
- Pandemic preparedness is not just how hospitals respond.
- We have to keep the urgency of pandemic preparedness in the country and in the government with the same level of importance as climate change.
- We cannot afford another pandemic, especially one with higher mortality than COVID-19!

Summary

There were a number of themes that emerged from the Roundtable:

- The COVID-19 Pandemic will not be the last infectious disease threat to global health.
- Sustained funding across disciplines will position us to respond quickly.
- Organizations like EPIC will play a key role in facilitating rapid responses in training the next generation of researchers and facilitating productive collaborations.
- The high containment laboratory was vital in our response to new and emerging pathogens and investment in a new facility will help ensure a rapid response to future treats.
- Governments have many priorities and short memories so it is necessary to engage decision makers about the importance of sustained and broad investments in science.
- There is a need to continue to build trust in science with the public and particularly with vulnerable communities affected most by infectious diseases.