

Interview with Dr. Charu Kaushic

Grace Lee and Ryan Daniel



Dr. Charu Kaushic

Charu Kaushic, PhD, is the Scientific Director of the Canadian Institutes of Health Research (CIHR)-Institute of Infection and Immunity, serving in this role since July 1, 2018. Dr. Kaushic is also a tenured Full Professor in the Department of Medicine in McMaster University, Hamilton, Canada. In her role as the Scientific Director for CIHR-III, Dr. Kaushic is responsible for making decisions for CIHR strategic investments in the area of infection and immunity,

nationally and internationally. She also represents CIHR and the Government of Canada at various national and international forums related to infectious diseases. In this capacity, she serves as a Chair of GloPID-R, a global consortium of funders in pandemic preparedness and emergency response research. She also represents Canada on the JPIAMR Management Board. During the COVID-19 pandemic, she has been closely involved in shaping CIHR's research response to the pandemic and is serving on Canada's COVID-19 National Immunity Task Force.

Dr. Kaushic has a PhD in Immunology and did her post-doctoral training in mucosal immunology. Since her faculty appointment at McMaster in 2002, she has done extensive teaching and training in immunology and built an interdisciplinary research program in women's reproductive health, specifically basic, clinical and translational research examining susceptibility and immune responses to sexually transmitted viruses, HIV-1 and HSV-2. Prior to joining CIHR, Dr. Kaushic's research program was funded by CIHR, CFI, CANFAR and OHTN. She has received numerous national and international awards including a Rockefeller post-doctoral fellowship, CIHR New Investigator Award, OHTN Research Scholar Award, OHTN Research Chair Award and the 2017 American Journal of Reproductive Immunology Research Excellence Award.

UTMJ: Can you describe the role(s) you have played in Canada's COVID-19 response?

CK: As the Scientific Director of the CIHR-Institute of Infection and Immunity, I have been quite involved in shaping the COVID research response across Canada. What [the Canadian Institute of Health Research] and my institute does is to design research funding opportunities best aligned to meet research needs. Since March 2020, CIHR has delivered more than \$250 million in funding for COVID-19 research and my institute has participated in designing many of these opportunities focused on addressing gaps in COVID research. Because my institute staff and I are work closely with the infection and immunity community, we are

very aware of what the progress in research is, where are the gaps and research needs are, that need better support. This helps us to target strategic investments where they are most needed.

My other roles during the pandemic have been to participate in national leadership groups such as the Immunity Task Force. As a member of this Task Force, we have been able to initiate and fund several studies across the country to get a clear sense of how much and in which populations within Canada did SARS-CoV-2 spread, by conducting sero-surveillance studies. Currently, I am also working on a Canadian Variants Leadership group that is coordinating surveillance and research into the emerging SARS-CoV-2 variants, which are very much in the news.

Internationally, I work with multiple organizations like the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R), which I am currently chairing. GloPID-R is a consortium of 29 research funders across the globe who fund research in the space of pandemic research and preparedness. We keep a close eye on the emergence of pathogens that have the capability of becoming epidemics and pandemics. This allows us to work closely and coordinate with each other and with WHO to determine what the immediate research priorities are. We did this last February when SARS-CoV-2 was identified as a major global threat by organizing a Global Research and Innovation Forum to decide how best to respond to the virus and from that meeting, a global R&D Blueprint identifying research needs was produced.

UTMJ: In June 2020, you published a review called "Understanding Immune Responses to SARS CoV-2", where you discussed measuring "correlates of immunity" to determine who could re-enter the workplace and when herd immunity could be reached. With new vaccines and variants coming into existence since then, how has the understanding of SARS-CoV-2 immunity changed? Do you foresee standardized tests being used at all to monitor for population immunity?

CK: Last year when I wrote that article, very little was known about the immune responses to SARS CoV-2. For instance, only initial reports of humoral or antibody-mediated responses were coming out and not much was known about other aspects of immunity, including T-cell immunity or innate immunity, which also play an important role in protection against SARS CoV-2. Almost a year later, there are hundreds of published reports on every aspect of immunity and we know much more about the humoral and cellular immunity [to SARS CoV-2], how long the antibodies last and what kinds of T-cell responses are

there. We also know much more about the correlation of disease severity with immune responses. We know that inflammation early in the infection is correlated with worse outcomes and that severe forms of COVID-19 are primarily due to an over-exuberant inflammatory response, also known as a “cytokine storm”. However, we still do not know what the correlates of protection are and how to predict who will have severe disease.

The development of multiple vaccines, four of which are now approved in Canada, has been astonishing. That all of them have excellent efficacy and protect against severe disease, is the silver lining to the cloud of the pandemic. A lot of hard work, years of planning and the expeditious way clinical trials have been completed, without compromising any safety testing, is a testament to the collective and collaborative effort of researchers, clinicians, governments, and regulatory agencies, among many other partners who have come together. The development of variants since the end of 2020 has thrown a new curveball on how quickly we can get the pandemic under control. Right now, all data indicate that the vaccines currently being deployed continue to be quite effective against the current variants. But it does mean that we need to be prepared and start working on the next generation of vaccines, as SARS CoV-2 is evolving and not going away anytime soon.

Regarding testing, I think you are referring to the “immunity passports” that have been discussed. First, when people get vaccinated, all you can ask them to show is their vaccine certification. That is not a confirmation that they have developed a good immunity to this virus. Vaccine certification is not a new concept for international travel. For example, if you are travelling to or from countries with yellow fever, you must carry proof of vaccination. However, for COVID-19, no one yet knows how long the protection from vaccine will last and what exactly should be measured to show “good immunity”. The concept of “vaccine” or “immunity passports” also creates further inequity and divisions among different populations within our country and even more so globally. People can be barred from travelling or participating in events if they cannot show their vaccine certification. Unfortunately, this may very well be our reality for the next few years, as countries and organizations may see this as a necessary step towards opening economies and businesses.

UTMJ: Given that mRNA based COVID-19 vaccines by Pfizer and Moderna have had the most efficacy in preventing the disease to this point, do you feel that mRNA-based vaccines will be the standard in vaccine development moving forward?

CK: The mRNA-based vaccine technology has really taken off with the success of the SARS CoV-2 vaccine. But in fact, the mRNA-based vaccines have been under development for more than 20 years, with decades of research effort to improve their stability and delivery. So, when the COVID-19 pandemic broke, this technology and its platform was ready. The real progress is that with the remarkable success

of these mRNA-based vaccines for COVID-19, there is a lot of enthusiasm that this will expedite [vaccine] development for many other infectious agents that currently do not have vaccines. For example, scientists are exploring how to use this technology to develop a vaccine for HIV, so it's very exciting.

UTMJ: As both a researcher and member of Canada's COVID-19 immunity task force, what has this experience taught you about how scientists and government can best collaborate to improve population health - not only in the present instance but for issues such as antimicrobial resistance and future pandemics?

CK: For most researchers and scientists, evidence-informed decision making is the gold standard. Most governments will say this is what they rely on as well. However, while scientists provide advice based on evidence, eventually it is the government officials who make the final decision. This can be complex, since recommendations from the scientific community have changed as evidence has evolved, rightfully so. We are seeing this play out in real life, every day, with the various task forces and science tables designed to provide evidence-based information to governments. On the positive side, I don't think governments have ever relied as much on scientists as they are right now for answers to important questions like: “Is this really being transmitted through the air?”; “Can I get infected from surface contact?”; “How much distance should there be between people?”; “What are the public health measures that will work?”; “What vaccine and therapeutics should we use?”. Science, research, and evidence can really provide a strong basis for good decisions. However, the decisions that are made by governments and politicians are not based on science alone – they must balance many more things and take other factors into consideration.

The importance of scientists and governments working hand-in-hand has been extremely important during this pandemic. Some countries like Brazil and the USA where public health advice was not widely followed have had massive numbers of infection and unfortunately high death rates. But places like Canada, New Zealand, Japan and many other countries, where public health advice and guidance has been followed, have managed to keep the infections under control and stop their health systems from becoming overwhelmed. I hope the experience of the last year will help governments continue to collaborate closely with scientists and researchers to make evidence-based decisions.

UTMJ: Now that we thankfully have several vaccines that are being offered very soon to the broader population, how big of an issue do you think vaccine hesitancy will be? How can the scientific and medical community combat misinformation in the coming months as these vaccines roll out?

CK: Right now, there are multiple vaccines available, but we are very early in the rollout and the demand is outpacing the

supply. But I am pretty sure that this summer, we will be having a completely different discussion: whether we can get to 80% [vaccination rate], which is the target for herd immunity. In places like Israel, where they have managed to vaccinate over 60% of their population, they have seen a dramatic drop in rates and hardly any new infections. But that is a high bar to reach for most countries. In Canada, fortunately, we have higher vaccine confidence than some other countries, but I am not sure we can get up to the recommended 80% target given that means almost all adults will have to be vaccinated. Hopefully, as we increase vaccine eligibility and include those under 16 years of age in the vaccination campaign by fall, we may be able to get to that target more realistically.

About 76% of Canadians above 12 years of age have indicated that they will be open to taking the COVID-19 vaccine. Among the remaining 24%, many are vaccine hesitant and only a few are anti-vaccination. Vaccine hesitancy is seen often among people who want more information for various reasons, and there is nothing wrong with wanting more information. As scientists our job is to provide accurate information, answer questions and provide good sources of information for them to consult. I keep on hand a list of places to suggest for information like the CDC, the Public Health Agency of Canada, Health Canada, and WHO or recommend people to ask doctors, nurses, and scientists. It is critical to caution people against turning to social media as their primary source for information given how much misinformation is shared on these platforms.

UTMJ: How can Canada ensure that vaccines are being distributed in an equitable manner to high-risk populations that need it the most? Beyond this, do you foresee an issue where middle- to low-income countries are also disadvantaged in the process of vaccine distribution?

CK: Inequities in vaccine distribution has been an important consideration in the global space. For instance, there is the COVAX Facility, which is co-led by the Coalition for Epidemic Preparedness Innovations (CEPI), WHO and GAVI with a focus on equitable distribution of vaccines across the world. Many others like the Bill and Melinda Gates Foundation and other international players are also working hard to encourage countries to move away from vaccine nationalism. For instance, countries like the USA are being criticized for vaccine stockpiling, and to some extent, Canada is guilty of this as well. Although it might be difficult to believe, considering we are currently experiencing a vaccine shortage, we have signed contracts for around 300 million vaccines for 37 million people. However, given the difficulties in controlling infections everywhere, it is very difficult to come up with a model for equitable distribution in a time of crisis. Countries like Canada have promised to donate the excess vaccines to other countries and that will help.

Within Canada, we have seen the recent changes in strategies to prioritize the worse hit populations in the third wave, primarily those working in essential workplaces, of

which there are so many: teachers, grocery store workers, those working in warehouses, meat-packing plants, truck drivers. So, it will take a while to cover all these people who are risking infections because they do the essential work that allows the rest of us to work from home. The unfortunate part is that many of the neighborhoods where people work on the frontlines are also the same communities where there is high vaccine hesitancy. The hesitancy can be due to language barriers, cultural barriers, and others, and if we do not start addressing this, we will run into the problem of not enough vaccinations in these neighbourhoods. That's why working with community leaders to run vaccine campaigns out of these neighborhoods is much better than having our public health teams work in isolation. Overall, we are adapting, but we always seem to be in a reactive mode, not a proactive mode. Hopefully, by the end of summer we will figure this out and be in a good place.

UTMJ: What has the COVID-19 pandemic taught you about yourself and our society at large?

CK: What has it taught me about myself? Well, I took on this job [as Scientific Director] two and a half years ago thinking that I could make a difference. It is not your typical 9AM-5PM job. I routinely work seven days a week, and during the pandemic, I have worked around 16 hours a day. I knew that I wanted to make a difference, but this is a punishing pace for anyone. And it's not just me, but it's all my staff and all of the other people who are working on the COVID response. Ultimately though, I think we are here for a reason. I have had to rely on 27 years of research training, academic and leadership experiences, as well as other soft skills to be resourceful and flexible in this crisis. Even though my staff and I are a small piece of the puzzle, all the pieces have to come together for everything to work well. This has been a big motivation for us. We are making real contributions to ensure that science and research-based evidence is produced and used for decision making. I think that has been very inspiring.

What has it taught me about society? Canada has been my adopted country for the last 22 years and I am very proud of being a Canadian. I would not want to live anywhere else in the world. The resilience that Canadians have shown and how well informed our public is, has blown me away. In fact, I really believe that as scientists and public health experts, we can be more nuanced with our public health messaging. We don't have to give very broad blunt messages, like "wear masks" or "don't wear masks" because most people are actually listening and truly understand the messaging. In that sense, I'm very impressed by the Canadian public at large.

I guess the one big part where we did not do well is that we failed our seniors, which is not something that I thought would happen in one of the richest and most developed countries in the world. The ageism in our society has really come through and it has been very disappointing and disheartening to witness. I really think that how a society treats their vulnerable speaks volumes about our values

and I think we are better than this. Hopefully, we will learn valuable lessons from this experience to see how we can do better in the future.

UTMJ: What advice do you have for healthcare professionals and scientists as they progress through the COVID-19 pandemic and beyond?

CK: This pandemic has opened people's minds to science and research. As an immunologist, I have never heard so many people talk about immune responses and antibodies! To me, this is mind blowing. As a society, and as medical professionals and scientists, we need to make sure that we

continue to push science forward. The public is listening at this point and we have a platform that we need to make use of. The responsibility to move forward not only falls on people in my generation, but also on the younger folks. As scientists and health professionals, we tend to focus on our work and keep our heads down. Scientists publish papers and go to conferences, and medical professionals go to work and save lives, but we don't talk enough about our findings and our experiences. We have a platform and the public and government are listening, so we need to advocate for more STEM-based training and funding because that is the future. Change isn't going to happen unless we all advocate for it.