



Speaking notes for Dr. Robert Annan

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Appearance before the Standing Committee on Health (HESA)

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Virtual (Zoom/teleconference)

Introduction

- Thank you for giving me the opportunity to speak to the Committee today.
- On behalf of Genome Canada, I'm joined by Dr. Cindy Bell, who has been with Genome Canada since we were founded 20 years ago, and who played an important science leadership role during the SARS outbreak in 2003.
- We are very pleased today to join colleagues from the University of Toronto, the Canadian Society for Molecular Biosciences and the Vaccine and Infectious Disease Organization based at the University of Saskatchewan, to share insights from Canada's bioscience community and to engage in dialogue with Committee members.
- I would like to pay tribute to the front-line workers at our hospitals, grocery stores, pharmacies, truck stops, and take-outs.

- I also think of the millions of Canadians who make sacrifices every day to help fight COVID-19. We all live in a time of extreme uncertainty, but we do so with great strength and resilience.
- The challenges facing our world – in human health and disease, climate change, and food security – do not involve inanimate objects, but the living world, living systems, the world of biosciences.
- And at the heart of these living systems lies DNA – the blueprint of life. That DNA is the basis of the science of genomics.
- At Genome Canada, we believe genomics, responsibly applied, can change the world for the better.
- And that is especially true now, as Canadians are in the grips of a terrible biological pandemic.
- Today, I will begin with a brief description of genomics and underscore how it is driving immense advances in biosciences.
- Then, I will provide an overview of how genomics is helping us understand and address the current outbreak,

- Finally I will introduce you to CanCOGeN, a new national genomics network launched to coordinate and amplify Canada's efforts.

Genomics, the story

- Today, Canada is a world leader in genomic research and the knowledge coming out of genomics research is transforming our world for the better.
- But how did we get here?
- Genomics is, at its core, the study of DNA – of genes – and how those genes interact with each other and the environment. It's about reading the blueprint of life, and using that knowledge to understand how things work – or in the case of infectious disease – don't work.
- Genomics is about data – the generation of molecular data about our health, our diseases, our food, our environment – every living thing. And then using that data to improve health, support the environment, and improve our standard of living.
- Genomics really came to prominence with the completion of the Human Genome Project in 2003. That international effort took 13 years and about \$1 billion dollars to complete, the equivalent of a biological moon landing.

- Since then, we've gained powerful knowledge, technologies and tools, including the ability to read—and interpret—an organism's DNA – its genome. We can now sequence a human genome practically overnight and for a few thousand dollars.
- Which we are increasingly doing, as genomics begins to find its way into our clinics, our public health labs, our companies and our research institutes. Genomics is producing massive data sets which, through the application of AI and other tools, are opening our eyes to new understandings, innovative products, and groundbreaking therapies.
- Canada has some of the world's best researchers working across many sectors – from health to agriculture, forestry to energy.
- They are world leaders in data production and analysis, genome sequencing, gene editing, synthetic biology, novel diagnostics, and more.
- And why are we able to do this?
- Because since 2000, the Government of Canada has made forward-looking investments to build Canadian genomics excellence through Genome Canada.



- A few words about who we are: Genome Canada is a unique collaborative national model that has leveraged over \$1.5 billion in strategic federal support into \$3.6 billion worth of research through partnerships with provincial governments, industry, and other partners.
- Our federated network of six regional Genome Centres – from Genome BC to Genome Atlantic - ensures that Canada’s genomics enterprise has national breadth and regional depth.
- Moreover, our partnerships with industry – especially small and medium size enterprises - and other end-users in the public and not-for-profit sectors ensure that genomics research results have real-world applications.
- For example, we’ve helped create 82 start-ups and promoted the growth of 230 other companies. And Canadian genomics patents are 2nd worldwide after the US.

Genomics, health research and COVID-19

- Let me move to our role in healthcare and the mandate of this Committee.
- With an aging population and increasing chronic disease rates, the imperative to bring genomic innovations to Canada’s healthcare systems is clear.

- Through Genome Canada investments in human health, genomics research has already led to saving lives and improving health outcomes and disease management for patients touched by cancer, heart disease, autism, epilepsy, and rare diseases.
- These investments at the intersection of genomics and healthcare are leading the shift from a disease-oriented healthcare system to one that is more precise, personalized, predictive and preventative.
- Genome Canada has been laying the foundation for its implementation in clinics across Canada through *All for One*, Canada's precision health partnership.
- This strong health genomics foundation has been the engine driving our rapid response to COVID-19 now.

Canadian COVID Genomics Network

- In mid-December, Chinese scientists identified and sequenced the genome of SARS-CoV-2 – the virus that causes COVID-19 – **in just 10 days.**

- Scientists around the world – including Canadians – have since been working around the clock to understand what that genome tells us, how it interacts with people and who may be most at risk.
- And they’ve started to use the viral genome and the mutations it accumulates like a series of fingerprints, so we’re able to track the virus’ spread and transmission patterns within communities and around the world.
- Genomics can also help us understand why some people get so sick and others do not and identify risks of disease severity and potential health outcomes.
- This is where CanCOGeN comes in.
- Announced by the Prime Minister on April 23, CanCOGeN is part of a new national medical and research strategy to combat COVID-19.
- It is a grassroots effort led by Genome Canada but driven by Canadian scientists, public health labs, and genomics institutions to use genomics to unlock understanding and help shape effective policy.
- With the \$40 million in federal support announced last week, the network will scale up the sequencing of up to 10,000 patient and

up to 150,000 viral genomes from individuals who have tested positive for the virus in order to generate large scale data sets.

- CanCOGeN's members include the National Microbiology Lab and provincial public health labs, major genome sequencing centres through CGeN, hospitals, universities, the private sector and the six regional Genome Centers.
- The network will be a coordinated and decentralized model working with standard protocols for sample collection, data sharing and data analysis across provinces. Results will be pooled by the National Microbiology Lab for analysis and deposited into global databases.
- CanCOGeN will connect to national genomics initiatives around the world in the UK, US and elsewhere.
- It will also align with Canada's national medical and research strategy on COVID-19, including the new Canada Immunity Task Force and national serology study.
- The data we collect today will help shape and inform public health policies, including test and trace plans, and will be available to researchers for years to come, enabling studies of future novel viruses to quickly determine how they spread and how to stop them.

- We are building a sustainable national genomics infrastructure to combat both the current pandemic and the next one.

Canada's future

- Beyond the immediate health crisis, we need to think about Canada's future recovery.
- We know that Canada is not in this fight alone.
- Countries everywhere have implemented unprecedented health control measures and how and when we will fully recover – economically, socially and mentally – is still unknown.
- Genomics can make crucial contributions to Canada's economic and social recovery across all regions of the country and key sectors like agriculture, national resource management, advanced manufacturing and public health.
- It's clear there will be an imperative to develop industrial strategy with an eye to ensuring greater national self-sufficiency and having made-in-Canada solutions through the lens of genomics and biosciences will be essential.
- This experience has shown us that while we can't predict precisely where science will be needed, it is certain that scientific capacity

is essential in a crisis like this. An important lesson that we must remember as we emerge from this crisis.

- I'd be happy to discuss these further in the question and answer period.

Conclusion

- In closing, I would like to reiterate that the Canadian genomics research community was able to step up its efforts during this pandemic because Canada has been funding this science for decades.
- Thank you again for inviting us to speak to you about CanCOGeN and the role genomics plays in Canada's national effort.
- I would be happy to answer questions from the Committee.
- Thank you.