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Chair

Mr. Bill Casey

Standing Committee on Health

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● (0845)

[*English*]

The Chair (Mr. Bill Casey (Cumberland—Colchester, Lib.)): I call the meeting to order.

Welcome, everybody, to meeting number 115 of the Standing Committee on Health.

Welcome to our guests.

Before we go to our guests, I have just a few little things we have to deal with.

The number one issue is the budget. We passed around a budget for this project, for this study. We just need somebody to move a motion to approve the budget and somebody to second it.

It is moved by Marilyn Gladu and seconded by Ron McKinnon. That problem is solved.

Second, I need unanimous consent. Dr. Yusuf's presentation this morning is only in English, and.... We don't have unanimous consent, so we can't pass that around.

Third, I just want to remind the NDP and the Conservatives that we still need unanimous consent in the House of Commons to make the minor change to the soft drink report, or the premixed drink report. Remember we did it in here, but it will have to come back. Just make sure your House leaders know that we've approved it here, and it will come up at the House leaders' meeting sooner or later.

The last issue is about the next meeting on Thursday. The Prime Minister of the Netherlands is scheduled to make an address in Parliament at 10:30 a.m. I think we'll have to end at 10 o'clock to get in our seats in time for the presentation by the Prime Minister of the Netherlands in the House. Next Thursday, we'll end at 10 a.m.

That's it for the committee business.

Today we have with us Dr. Keith Fowke, Professor, Department of Medical Microbiology and Infectious Diseases, University of Manitoba. Welcome.

As an individual by video conference from Hamilton, we have Dr. Salim Yusuf, Distinguished University Professor of Medicine, Population Health Research Institute, McMaster University and Hamilton Health Sciences. Welcome, Dr. Yusuf.

From Genome Canada, we have Marc LePage, President and Chief Executive Officer, and Cindy Bell, Executive Vice-President, Corporate Development. Welcome.

From Structural Genomics Consortium, we have Aled Edwards, Chief Executive Officer, and Maxwell Morgan, Director of Policy and Legal Counsel. Welcome.

I'm going to invite Dr. Fowke to open with a 10-minute opening statement.

Dr. Fowke, you may start. We'll let you know when we hit 10 minutes.

Dr. Keith Fowke (Professor, Department of Medical Microbiology and Infectious Diseases, University of Manitoba, As an Individual): Thank you very much, Mr. Chair, and thank you to the committee for the opportunity to present.

My name is Keith Fowke, and I'm a researcher based at the University of Manitoba. I'm the head of my department of medical microbiology and infectious diseases, and I also function as the chair for CIHR's advisory committee on HIV/AIDS research.

As a university-funded and university-based researcher, mainly funded by the Canadian Institutes for Health Research since 2001, I'd like to make the point that federally funded, investigator-initiated research has benefits for reducing health care costs, including drug costs. I'll provide just one example of this potential.

I'll try to demonstrate that our research suggests that we may prevent new HIV infections using safe, affordable and globally accessible anti-inflammatory drugs like acetylsalicylic acid, or ASA, which is also known as Aspirin. Yes, that's right: I'll try to suggest to you today that it may be possible to prevent new HIV infections using Aspirin.

What's the scale of the problem that we're talking about? In 2018, there were 1.8 million people globally who were infected with HIV each year, the majority of whom were in sub-Saharan Africa. Globally, new infections have not declined very dramatically. Over the last 10 years, they have remained relatively flat. In the Canadian Prairies, we have a growing epidemic of HIV, especially in our indigenous communities.

HIV prevention methods, such as condom use, are not possible for everyone, especially when gender-based power differentials exist. Access to HIV medications that can be used to prevent HIV infections are not always available to everyone that needs them in the community. Therefore, we need new HIV prevention approaches to be added to our HIV prevention tool box.

My research, funded by CIHR and Grand Challenges Canada, focuses on understanding the mechanisms of why some Kenyan women, who are intensely exposed to HIV, fail to become infected. We have determined that these women have, in their genital tracts, naturally low numbers of the type of cell that HIV preferentially infects. Our goal has been to determine how to induce this reduction in genital tract HIV target cells in other women who are at risk of acquiring HIV.

At its most basic level, HIV infection requires a fit virus and a susceptible cell. Once that cell has been infected, usually in the genital tract, the virus quickly spreads throughout the body in a matter of a few days. Most HIV prevention efforts focus on trying to keep the virus away from the cells, focusing on things like condoms, or crippling the virus using anti-HIV drugs. However, we've taken the approach of trying to limit that HIV target cell from migrating to the genital tract in the first place. Without a susceptible target, HIV viruses are cleared from the genital tract and the body is not infected.

How can we prevent this HIV target cell from getting into the genital tract? The process of immune cells moving from the blood into tissue is called inflammation. We rationalized that perhaps using an anti-inflammatory drug would help reduce the number of target cells moving from the blood into the genital tract. When deciding which anti-inflammatory drugs to test, we chose to test drugs that were globally available and affordable and that had a strong track record.

ASA was the leading choice because it is an anti-inflammatory drug and hundreds of thousands of people safely use it daily for the prevention of cardiovascular disease. Most importantly, it's already there, sitting in every small kiosk throughout the world and in developing countries. When we asked Kenyan women, they said that Aspirin was highly desirable because it was already known in the community, and did not carry any of the stigmatization that other anti-HIV medications do.

● (0850)

To test our theory that ASA would actually reduce the number of HIV target cells, we conducted a small CIHR- and Grand Challenges Canada-funded pilot study in Nairobi. We gave 38 women low-dose Aspirin for six weeks and we measured the number of genital tract HIV target cells before and after the therapy. Interestingly, we observed a 35% reduction in the number of HIV target cells in the genital tract following six weeks of low-dose Aspirin.

While this does not prove that ASA will actually reduce HIV infections, we feel that it is logical that if there are fewer target cells in the genital tract, then should HIV be introduced, the probability of infection would be reduced.

What are the next steps? Currently we have a CIHR-funded study to assess the optimal dose of ASA that would be required and how long the effect would last. This will pave the way for larger clinical trials that are required to assess if anti-inflammatory drugs like ASA really can have an impact on reducing HIV infections.

Studies of the use of anti-HIV drugs in HIV prevention have demonstrated that the presence of genital inflammation can reduce the effectiveness of these drugs from 75% down to 10%. In other words, we have drugs that we already know have an impact on preventing HIV infection by targeting the virus, but if there is inflammation, it reduces their effectiveness. Much like in cancer, where cocktails of drugs are used to fight off cancer, we envision that people would be provided with a cocktail of HIV prevention approaches. By combining an anti-HIV medication that targets the virus and an anti-inflammatory drug that targets the target cell, we suggest that we could create an added benefit.

Our goal is to use a safe, affordable and globally available drug like Aspirin, which may reduce the number of HIV infections around the world and be added as one of the HIV prevention approaches that are used.

There are a couple of points to consider. We never started this research looking for a link with anti-inflammatory drugs and HIV; our investigator-initiated research was focused on trying to understand the mechanism of why some people weren't infected. The data led us to this hypothesis about inflammation being important, and therefore to looking at anti-inflammatory drugs.

The choice of which drugs to be used in this study was very conscious. We wanted drugs that were extremely safe and that were globally available and affordable. This often meant generically available drugs. Using this approach, should it prove to be effective and be actually rolled out into the wider community, the timelines for rollout would be significantly shortened because the drugs are already in the community.

Finally, repurposing existing drugs to fight new diseases in different ways has the potential to save on drug spending in the long term, but it would require some short-term investments in highly innovative fundamental research.

Thank you very much for your time.

● (0855)

The Chair: Thank you very much for your presentation. It was fascinating.

Now we'll go to Dr. Yusuf, who comes to us by video conference from McMaster University.

Dr. Salim Yusuf (Distinguished University Professor of Medicine, Population Health Research Institute, McMaster University and Hamilton Health Sciences, As an Individual): Good morning, and thank you very much.

My name is Salim Yusuf. I was born in India and trained in medicine in India, and then received a Rhodes Scholarship. I went to Oxford and then worked in England, doing both clinical medicine and research for eight years. Then I moved to the U.S. NIH and worked there for eight years, involved in some national and global programs in heart failure.

In 1992 I moved to Canada, and I've been here ever since, for 26 years. The point I wish to make is that having worked in four countries, I have a global perspective on research. In addition, our current work involves 101 countries and more than 89 projects. It's very broad, very deep, and we have made a major impact in the prevention and treatment of cardiovascular disease that which has saved millions of lives.

The point I want to make here is not to give you a perspective on any single type of research or on any single discipline, but—as a researcher reflecting the voices of researchers across the country—to tell you about what we see as the needs.

The first is that we all agree that biomedical research is essential to improving the health of Canadians and developing a knowledge-based economy. Therefore, we have to invest in biomedical research and research as a whole.

Second, compared to other OECD countries, Canada's investment is substantially lower. It has remained the lowest for the last 15 years, and it's declining.

The third is that we need research that discovers better preventive and treatment strategies. Some of these originate in the laboratory and others originate by observations in humans, just as we heard, but all of them need to be tested in people if we need to translate discoveries into practice. Then, after finding that they are effective, we need to adapt them to our own health care system.

Unfortunately, our current pipeline of research is bottlenecked at stage one. All stages of research are underfunded in Canada, but even more so is the translation of findings into humans and from humans into the health care system.

We need to rethink not only our national strategy related to research and its funding but also its organization and its priority. Undoubtedly all of us will share the goal of creating a broad and world-class effort that's responsive to the health needs of Canadians and beyond, and develop the capacity in Canada to attract partners and also attract the best minds.

The first perspective I want to share with you is that discovery and invention are not the same as innovation and improving health. There is an overlap, but they're not the same. Only 5% of discoveries in the laboratory ever translate into improved human health. Investments across the entire spectrum are needed, especially in the second and third phases of research, and that's where Canada has failed miserably.

It is a long process to take discoveries from observation, from confirmation, to human health and ultimately into the system.

I'll give you three types of discoveries that have dramatically improved human health, all of which are known to you.

The first is penicillin. It was a serendipitous finding by Fleming, who thought certain fungi were killing bacteria in a petri dish in his lab. It would have remained there had it not been for the work of Florey and Chain, who synthesized it, isolated the active molecule, and did human studies that led to medium-sized production. Then it was taken by industry, and that was the era in which antibiotics were born. Hundreds of millions of lives have been saved since then. It would have remained in the petri dish had it not been for the translational work of Chain and Florey.

Blood pressure causes strokes. Reducing blood pressure reduces strokes and heart attacks. How was this discovered? It was discovered by taking 5,000 people in a little town in Massachusetts called Framingham, where they measured blood pressure and observed people and found those with higher blood pressure had more strokes. This was then taken by various companies who produced blood pressure-lowering drugs.

● (0900)

This was then tested in humans in large clinical trials that showed that lowering blood pressure was feasible, that it could be safe and that it saved lives, and now this is one of the biggest health impacts that has happened. It's the combination of basic science and population science and discoveries by industry that have led to improved human health.

We all know that tobacco is the number one killer in the world. It killed a hundred million people in the last century. It's projected to kill a billion people in this coming century. We do not understand the basic cellular mechanisms as to why tobacco causes cancers, heart disease, and 21 other diseases, but we know if people stop smoking, or if they avoid tobacco entirely, we will save tens of millions of lives, if not hundreds of millions. This is entirely population research, yet there is a schism in the level of funding for population and clinical research compared to biomedical research. I want to stress that everything is underfunded, but the first two are substantially more underfunded.

We just heard from Dr. Fowke. For him to make his discoveries come to reality, he has to do large clinical trials, and they cost money. They're in people, but they're essential.

The next slide, which is handout 4, shows you the overall funding in various countries and Canada. It is low. In the U.S. about $120 billion was spent in 2012. In western Europe it was about $82 billion; Japan, $37 billion; Australia, $6 billion; South Korea, $6 billion; Canada $5 billion.

The next handout tells you that as a proportion of the per capita funding or the GDP, Canada is about one-fourth of the U.S. and one-half of the U.K., so relative to the size of our economy, relative to the population, we are underfunded from public sources.

The next handout, which is number 6, shows you the decline in funding in Canada compared to other countries. You will see that between 2007 and 2012 in Canada, there was a 2.6% decline in inflated, adjusted growth rate. Compare that with China at the bottom, at 33%. Of course, China started low, but take Australia, which is a country similar to ours, smaller than ours. They went up 7%. Singapore went up 10%, South Korea 11%, Japan 6%. Even tiny Taiwan went up more.

During this period there was a decline in the U.S., but far less than in Canada, and they started at a much higher level. In Europe it was essentially flat. Canadian funding was low up to 2012.

What has happened since 2012? The situation has gotten worse. This is handout number 7. You will see that in the U.S. in 2012, 2.7% of the GDP was spent on research in the country. In 2016-17, it was the same. You will see that's more or less the case in the OECD countries. In Japan and in Australia there was an increase, and in South Korea there was an increase. Contrast that with the bottom line. In Canada there was a substantial decline over this period, with 1.8% going down to 1.5%.

Over the last decade and a half, we started low, we remained low, and we are declining. No wonder our global competitiveness has gone down and no wonder we're having difficulty attracting money from industry.

Handout 8 tells you the distribution of federal funds by various themes. This tells you that—

● (0905)

The Chair: Sorry; I just have to mention that we were not able to pass out the handouts, so when you refer to handout number 8, we don't have it. Because they weren't in both official languages, we were not able to pass them out.

You can still describe the information on the handout, but the members don't have the handout.

Dr. Salim Yusuf: Well, that's a shame. I was invited to participate last Thursday, so as you can imagine—

The Chair: We appreciate your participation. It's very, very helpful.

Dr. Salim Yusuf: Okay. Well, I hope they'll at least share it with you after translation, but I will try to explain things slowly, now that I know you don't have them.

Was what I said understood by the committee?

The Chair: Yes, the committee has indicated it is, and it's very plain. Your message is very clear, I think. I think most of the members seem to be agreeing with that, so you're good.

Dr. Salim Yusuf: Okay. Thank you very much.

I want to compare the amount spent on basic research in various countries and other forms of research. In the U.S., the U.S. National Institutes of Health spends 55% of its budget on basic biomedical research, and all other forms, which are clinical, population, translation, health systems, are about 45%, so it's approximately half and half. In the U.K., 50% is basic biomedical and 50% goes to the others.

In Canada, there's a marked divergence from that. In Canada, we've spent two-thirds of our money on basic biomedical research, and only one-third goes into translating it into clinical impact or into the population or into our health systems. Overall, Canadian funding is low, but its distribution is skewed.

The type of research that is critical to bridging any discovery into practice is a clinical trial. This is where you formally test the impact of treatments on human health—the kind of thing that Dr. Fowke would like to do next.

In the U.S., 11% of the NIH budget is spent on clinical trials. In the U.K., they have two bodies: one body called the U.K. MRC, and the other called the U.K. National Institute for Health Research. The latter is for clinical population research. Of that, each one was about a billion pounds when it was started five years back.

In the NIHR in the U.K., 20% to 25% of its budget, or 10% of the national budget, is spent on clinical trials.

The Chair: Dr. Yusuf, I have to ask you to wind up your 10 minutes. You're a little over that, and we want to get to questions and the other guests.

I hate to do this because your information is very helpful and very clear, but we need you to wind up.

Dr. Salim Yusuf: Okay.

Well, the point I want to make is that in Canada, we only spend 3.3% as opposed to 10% or 11%.

I'll wind up with one point: What is needed in Canada?

We need to increase funding for all forms of health research right across the board. Importantly, we need to redress the imbalance so that clinical population research is funded, and eventually basic biomedical and clinical and population research are equally funded. Ultimately, this may only be possible by creating a new structure, one that includes the current CIHR, and then an expanded vision, as has been done in the U.K. with the NIHR, where a similar amount was provided for translational clinic population and health systems research.

I'll stop there.

Thank you very much.

● (0910)

The Chair: Thank you very much.

Now we'll move to Genome Canada and Mr. LePage

Mr. Marc LePage (President and Chief Executive Officer, Genome Canada): Thank you, Mr. Chairman.

Good morning. Thank you for the opportunity to speak to you today.

I'm joined by my colleague Dr. Cindy Bell, who is our senior VP of Corporate Development and one of the founders of Genome Canada.

I'll make a few comments in French and English, so if you need your earpieces, this is fair warning.

[*Translation*]

Good morning, Mr. Chair.

We are going to talk to you about our industry, genomics, and the importance of health research in Canada.

Identifying which technologies to promote and nurture means understanding rapidly evolving science, assessing their potential and deciding which show the most promise. For governments, it means providing the environment and funding to enable researchers to keep at the leading edge. It also means shouldering part of the risk of helping discovery develop into transformative products.

Artificial intelligence, quantum computing and synthetic biology are some of the fields attracting attention.

[*English*]

Genomics is one of those transformative technologies, and it is driving innovation in health care today. However, as the Barton panel on economic growth confirmed, it is just as critical to other important areas for Canada: agriculture, fisheries, forestry, the environment, and even the mining and the oil and gas sectors. It has become the enabling technology for the bioeconomy.

The bioeconomy is at the core of Canada's economic past, present and, more importantly, future. Because of our enormous natural endowment, Canada has built world-leading industries in the agricultural food sector, in fisheries, in aquaculture and in forestry. If we add the public and private investments in health care, Canada is probably the most biologically centred economy of all of the OECD.

Genomics unlocks the genetic code, the operating software for the living world. To maintain and grow our natural advantage and to continue to expand our exports, Canada must continue to be a leader in the fundamental technology that drives biological systems. We can't be first rate on production and third rate on technology.

That's why we're here. Genome Canada was created by the scientific community with the support of the granting councils as an independent organization dedicated to harnessing its transformative power and accelerating the uptake into industry and public service.

Health is our single largest sector. About 50% of our funding goes to the health sector, but—usually people are fairly surprised by this—the other 50% goes to agriculture, the environmental sector and natural resources.

We're a specialist agency. We provide strategic funding, direction, management and oversight. We focus on large-scale research projects. We also convene coalitions of interested parties around shared challenges and opportunities.

We should note that the Canadian effort is best described as a national initiative rather than a federal one. While the federal government clearly led the parade on funding as first investor and 45% of our research funding is from the federal government now, 55% is from other partners: the provinces, industry, and Canadian and international foundations.

We are also deeply rooted in the regions, working in a collaborative network with six regional genome centres: Genome British Columbia, Genome Alberta, Genome Prairie, Ontario Genomics, Génome Québec and Genome Atlantic. It is very decentralized, just like Canada. It reflects our federal-provincial arrangement.

[*Translation*]

Genome Canada's mandate has evolved from the early days of genomics, when sequencing the complete gene set of a single organism was a monumental achievement, to today when scientists read hundreds or thousands of genomes during a project.

Nowhere is this more true than in health care and medicine, where genomics is driving a revolution called precision health or personalized medicine. The central idea is simple: each and every one of us has a very precise and differentiated genetic signature and our susceptibility to disease or how we respond to drugs varies from individual to individual based on this genetic signature.

● (0915)

[*English*]

Countries around the world are rushing to embrace the potential of these new tools. Just this month the U.K. minister of health announced an ambitious plan to sequence five million patients as part of a national precision health initiative. The United States has launched a $1.5-billion program to sequence one million Americans and combine that data with electronic health records. France, Australia and China all have ambitious national programs.

In Canada, we have launched a national initiative to implement precision health. Phase one of this initiative is actually focusing on rare diseases—a subject of interest to this committee, I think—and genetic disorders that impact roughly one million Canadians, mostly children. These diseases are notoriously difficult to diagnose and to treat. Building on Canada's strength in rare disease research and a wonderful regional children's hospital network, this pilot initiative will establish shared and effective policies, processes and technologies to establish a national system for Canadians.

The program will consist of three parts.

The first part is the establishment of a national rare disease cohort with 30,000 genomic samples from patients and their families. This will be matched with clinical data.

The second part is a national platform for data standards, consent forms and governance, working with the provinces so that we can aggregate provincial data.

The third part will be the establishment of regional sites that are linked together nationally to provide diagnostics across the country.

This project builds on the world-leading research led by investigators here in Ottawa at CHEO by collaborating with 21 other sites across the country through a program called Care for Rare. This team has so far identified 82 novel rare diseases—very high productivity—and has provided definitive diagnoses to over 1,000 patients who have been spared the long diagnostic odyssey. They continue to work with colleagues around the world to understand other rare diseases and to develop therapies to help these patients.

Dr. Aled Edwards and his colleagues will speak to the issue of developing affordable therapies for rare disease patients, which is one of our very innovative funded projects. We'll come back to that in a second.

I'll finish with a few words about the future for Genome Canada. We are scheduled for review and renewal of our funding in March 2019, so it's just around the corner. We have presented a strategic plan in our pre-budget submission that sets out a vision for Canada to be a world leader in biotechnology and the bioeconomy. We have requested continued federal support through a five-year contribution of $630 million from the federal government. This would be matched with partner funding of $680 million from the provinces, industry and our usual funding partners around the world.

This will drive discovery, translation and personalized health care for rare diseases. Over time it will roll into cancer, cardiovascular disease, pharmacogenomics and a number of areas that will be phased in as we move through this whole process.

It will also drive growth in agriculture, adaptation, fisheries and important resource industries from coast to coast to coast. We have a number of projects in the Arctic and around the boreal forest.

We respectfully request that the federal government consider our pre-budget submission to help ensure that Canada remains a world leader in the field of genomics research.

In closing, prior to being asked to come to the committee, we had organized Genomics on the Hill for next week, a public event right next to the House of Commons, where a number of these researchers I spoke of will be presenting their projects across the whole portfolio of health, agriculture and natural resources. I think you've all received invitations, but if you've lost yours, I have some spares, so I hope to see you again next week.

Thank you very much.

● (0920)

The Chair: Thank you very much.

Now we go to Structural Genomics Consortium. I believe Dr. Edwards will open for 10 minutes.

Dr. Aled Edwards (Chief Executive Officer, Structural Genomics Consortium): Thanks for having us. I guess it's your day of listening to geeks.

I'm a professor at the U of T, Oxford and McGill, and an entrepreneur who has founded several companies, among which is Affinium Pharmaceuticals, whose new antibiotic is in late phase II clinical trials. When we sold it, it provided excellent returns for investors when it was bought by a Swiss company.

Today I'm speaking in my capacity as a chief executive of the Structural Genomics Consortium. It's a hard word, so let's call it SGC. It's a global charitable research company headquartered in Toronto, with labs in six different countries. I'm also the chair of the board of M4K Pharma, a Toronto drug discovery company I'll tell you about.

My colleague here, Max Morgan, is a patent lawyer by training who practised in the private sector in America and Canada and joined us recently as the lead in legal matters and policy.

I doubt you know about the SGC, but we're the largest, longest-running and arguably most successful global public-private partnership with the pharmaceutical sector. We carry out fundamental research at our labs, and over the years we have attracted about $400 million in funding for our science. About $200 million comes from 10 different pharmaceutical companies.

What's most interesting from the policy point of view is that despite our intense collaboration with global pharma, we never, ever file for patents. All of our funders, including the industry, believe that the fundamental science we do will have the most scientific and economic impact if made openly available to all, as so-called open science.

Indeed, the success of our organization has led us to be considered global pioneers in biomedical open science. Max and I advise governments and foundations all around the world on how open science can not only promote discoveries but can stimulate economic growth.

I'd like to mention that Genome Canada has funded us continuously since 2003—one of our many funders—and has played a central role in developing and honing this open-science business model.

I'm not here to preen about what we've accomplished but rather to humbly admit we need to do much, much better. As members of the global biomedical research community, our aim is to develop innovative treatments of the diseases that afflict society, and we're not delivering. Globally, despite literally trillions of dollars of public funding over the past decades and an equal amount of private sector funding, we are inventing too few new medicines. What's worse, those medicines we invent are priced at levels that will cripple our health care system and are unaffordable to most people on the planet. Something is not right, obviously.

I know that the Canadian government is desperately looking for ways to help, but I also appreciate the inherent conflict you're in. On the one hand, Industry Canada's or ISED's role is to help develop policies that promote economic growth, and if we create biotech companies that create new medicines, it's viewed as a success. As much as ISED is happy about this, Canadians are less so, because in our sector, business success is predicated on high drug prices. Simply put, the big policy problem is that if public funding supports and buys into the current business and investment models used to incentivize drug discovery, we may get new medicines, but they'll be priced unaffordably. It's nobody's fault; it's just the business model on which the world currently operates, and currently there's no option.

Will advances in science help? Sure, but not as much as we hope. As Marc told you about personalized or precision medicine, it's fantastic science. In the long run, it will be awesome, but in the short term, it's going to make things worse. Let's explain.

The brilliant genetic work by CIHR- and Genome Canada-funded researchers all over the country is disassembling all complex diseases into a range of precise genetic smaller diseases. Diabetes, for example, was one or two diseases. Now it's going to be dozens of rare diseases that should be able, in theory, to be treated more precisely, more individually.

However, think about it. From a business perspective, this means that the immense, uniform diabetes market is being fragmented into smaller markets, and each is a group that needs its own new medicines. Unfortunately, as the patient groups and markets get smaller, the cost of inventing a medicine has stayed the same. If you have costs that are the same and the market is smaller, the only way to get your required return on investment is to set the drug prices higher. It's simple math. Now with new medicines being priced at literally hundreds of thousands of dollars a year, that simple math is going to bankrupt us.

What do we do? In our organization over the last 15 years, we've shown that open science provides the most cost-effective way to carry out fundamental research of relevance to drug discovery, and it delivers the science goods, and we'll talk about that. Moreover, it has the buy-in from industry. Why can't the model be extended all the way from the science we do to the registration of new drugs?

● (0925)

Max and I decided to try to figure out how. We looked at how to create a made-in-Canada business model to invent new but affordable medicines, a business model that creates companies to make a profit but not an exorbitant profit, and a business model that balances the tension between economic growth and societal benefit. In short, we wanted a drug discovery model that I hope you think is Canadian, and I think we've done it.

At its core, our model is based on two principles. First, it extends and leverages the expertise we have in open science and applies these learnings to drug discovery. We believe that open science uniquely provides a way to ensure that any public investment in research and drug discovery is used not only to develop new affordable medicines but also to increase science knowledge in the public domain.

Second, the open science model more efficiently uses existing biomedical research funding. As Salim was saying, Canada alone spends $5 billion each year supporting biomedical research, mostly at our universities and hospitals, and the world invests about $300 billion in biomedical research in companies and in the public sector.

I put it to you that there's a lot of money around, and I'm not here to ask you for more. The open science model provides a mechanism to tap into, focus, and align existing sources of capital, including public funds, towards a public-good business objective.

You might be thinking that I'm a hippie, that I'm smoking something...or at least tomorrow, maybe. If a company makes its science and research available, how can it protect itself against competition? When Max was doing his graduate work at Harvard, studying intellectual property law and drug discovery, he thought deeply about this and how one could cleverly use protections that are already provided by regulators like Health Canada—not patents: you don't need patents to stave off competition—and about the advantages of this approach.

When we started working together, we realized that this alternative form of market protection is consistent with open science. If you follow a patent strategy, you can't share it. If you follow this strategy, you can share it and get all the benefits of it.

We thought, wow, this new drug-discovery model just uses existing laws in new ways. We can get the scientific, social, and economic advantages of open science and yet still be able to fend off competitors in the marketplace.

We formed M4K Pharma to test the ideas. M4K stands for Meds for Kids, and it was formed to invent medicines for rare pediatric diseases. The first project is diffuse intrinsic pontine glioma, which is a brain cancer in the brain stem. You can't operate, and all of the children die—all of them. There are no drugs for the disease. The market is too small for the traditional business model.

As background, this science story is also cool. It starts with the work of genius clinician scientists in Montreal and Toronto, who, with public funding, in part from Genome Canada, discovered the genetic makeup of that cancer and uncovered a gene that's the cancer's Achilles heel. In an fortunate twist of fate, Alex Bullock, who is a prof at our lab in Oxford, happened to be the world expert in that gene. It's a really cool test case for the business model. We have sick children with no treatment, a disease that's not attracting interest, and a team of world experts who are our friends and are committed to the public good.

We started it, and it's going better than we hoped. Based on the science and a competition—we shouldn't get money for free—we got public funding from the Ontario Institute for Cancer Research. We matched their $2-million grant with donations and corporate in-kind contributions, giving us another $2 million. Consistent with open science, we share our most recent science every month on WebEx for anyone who wants to listen.

As a result, the scientific community is responding in kind. Last month a doctor from Washington, D.C., offered to do some experiments for the company for free. Scientists in Barcelona and Philadelphia offered advice and also resources. In May, there was a stunning presentation from Boehringer Ingelheim, which is a large pharma in Vienna, where their cancer group is. They called in and told us what they'd discovered internally about the gene and highlighted things we should watch out for.

Think of that. It's a large pharma phoning a competitor drug-discovery organization and letting them know their trade secrets. It's all because we're doing it openly and sharing our science. I think we're only just learning the competitive advantages of this open model. There are undoubtedly surprises to come. Indeed, we're so encouraged that we're starting the process of forming M4ND, Medicines for Neurodegeneration, such as Parkinson's, and M4ID, Medicines for Infectious Disease, such as antibiotic-resistant bacteria.

How can the government help? We're not here for new funding, but I think it would go faster and the model would attract more interest with a few policy changes to incentivize like-minded entrepreneurs.

● (0930)

The first thing we suggest is to tweak existing government funding programs to allow applications from folks with alternative business models. There's a monolithic position in Canada, and frankly all over the world, that patents are key to making new medicines. This is patently untrue, as it were.

Policy suggestion number one is that government and public funding programs should embrace business models with innovative strategies to bring products to patients.

Policy suggestion number two is that we should tweak Health Canada's regulatory protection scheme to provide additional incentive for companies that commit to open science and affordable pricing, the two of them. If a company shares its science and agrees to make the product affordable, Canada should find ways to encourage that.

My last policy suggestion is we should—and I absolutely agree with the previous speakers—continue to support research in the public domain, such as the research supported by CIHR and Genome Canada. Fundamental research provides the foundation on which all medicines will eventually be discovered.

Thank you.

The Chair: What a great panel. Often we don't know where these studies are going to go, but every one of you is so impressive. You bring so much to the table.

We're going to start our seven-minute round of questioning with Dr. Eyolfson.

Mr. Doug Eyolfson (Charleswood—St. James—Assiniboia—Headingley, Lib.): Thank you, Mr. Chair.

Thank you all for coming.

My only regret about this morning's panel is we don't have more time to talk to all of you. This is fascinating.

I'm one of the fellow geeks. I'm a physician myself. I've done some medical research before that. Much of this is familiar to me and is part of the reason that I'm now in this strange line of work.

Dr. Edwards, I want to clarify something first. You said that your organization doesn't apply for patents but that there is protection of the property. What is to prevent something that you develop from then being patented by somebody else and then being restricted by those who patent it?

Dr. Aled Edwards: The rules of patenting are that you may not patent something that has been prior art or in the public domain. Our organization rapidly puts things out there, and that prevents people from patenting and lets everybody use it all around the world.

Mr. Doug Eyolfson: Thank you. That's very good to know, and a very worthwhile effort and philosophy. Thank you for promoting this approach.

This question is for Dr. Fowke. I'm a graduate of the University of Manitoba, so thank you for coming. We talked about the different steps of research. When you find a new drug, you have the biomedical discovery. You find this molecule. It does this, and it could be useful, but developing it into a drug requires the very expensive process of a randomized clinical trial, which is to somewhat allude to what Dr. Yusuf had said about population-based research.

I know you were talking about something different, Dr. Yusuf, when you said population-based research, but it involves very large populations. We understand that pharmaceutical companies are doing this research, and they want patents because they want a protection for all this money they spent.

If these randomized clinical trials were, in fact, performed or funded through public agencies, would this then take the burden off these companies that produced them to recoup the losses of development and lead to lower drug prices? Is there that potential if the public is funding the randomized clinical trials?

Dr. Keith Fowke: Yes. Thanks for the question.

I think that's very much the case. There are several barriers for moving new ideas to translation into patients. The clinical trial just costs so much money, so I do think there would be significant advantages if there were some mechanism to fund those clinical trials other than the individual companies funding them themselves, or in our case an individual investigator trying to fund them. Individual investigators might have good ideas, but to do a 10,000-person clinical trial is unrealistic. Some support mechanisms to perform those trials would reduce barriers for sure.

● (0935)

Mr. Doug Eyolfson: All right. Thank you.

This is a very difficult question, and I'll throw it out to everybody. By what percentage would we have to increase our medical research funding to allow the public sphere to be doing this research, based on Canadian or even worldwide national funding levels?

I'll start with you, Dr. Fowke. Do you have any idea what this would be?

I'm sorry, Dr. Fowke, did you hear my question?

Dr. Keith Fowke: No, sorry. Could you repeat that?

Mr. Doug Eyolfson: By about what percentage would you say countries would have to increase their medical research funding levels to do the kind of research that's currently being done by industry?

Dr. Keith Fowke: To be honest, I don't know that answer. Again, having more focus in the modelling would be appropriate, but I don't have a number.

Mr. Doug Eyolfson: Mr. LePage or Dr. Edwards, would you comment?

Mr. Marc LePage: I was thinking about this and expecting a variation of this question. When we started, we were thinking about brain drain, with 2,000 human genome programs going gangbusters. It wasn't pretty. If you look at it today, using the example of a hockey scene, we have a team, and we get into the quarter finals every year. We're really at quite a good level now. If we want to get to the next level up, in the finals every year, we're not quite there, but we're close.

I would say with the kind of budget proposal we put forward, maybe it should be 30% above where we are right now. Where we are is a good place, but the best place is another step up. It's not a massive.... It might be a little different in the broader system.

Aled, do you have any thoughts on this?

Mr. Doug Eyolfson: Thank you.

Dr. Yusuf, you were indicating you wanted to add in.

Dr. Salim Yusuf: Yes. There are two numbers I'll give you. One is that to be as competitive as the U.K., the U.S., Japan or Australia, we'd have to increase our national health research funding by 50%. Second, we'd have to redistribute the money so that more money goes into clinical trials and population research. The ratio has to change.

I don't think we can ever replace industry funding, but I also want to point out that a large number of clinical trials are needed to fund things that industry is not interested in—for example, appropriate diet, or the best way to improve our health care system. These are not drug-related questions; they're systems-related.

There will always be a need for government funding, and at the very least we need to increase our funding by 50%.

Mr. Doug Eyolfson: Thank you very much.

The Chair: We're going to go now to Ms. Gladu.

Ms. Marilyn Gladu (Sarnia—Lambton, CPC): Thank you, Chair, and thank you to our witnesses.

I'm going to start with Dr. Yusuf. I'm very interested in trying to see how we can support having more clinical trials in Canada. I have heard some people say that one of the things that may impact clinical trials is the changes to the PMPRB drug approval process that will make the process longer and take away price certainty, possibly for about three years.

You mentioned that Canada's at 3.3% in its spend on clinical trials, compared to the U.K. and the U.S. at 11%, so of course one obvious action is to put more money in, and that's the amount, but are there other barriers that we should address in order to encourage more clinical trials in Canada?

Dr. Salim Yusuf: That's a very good question. We have to triple the amount we put into clinical trials to be comparable with other countries.

Second, right now to get a clinical trial started after you get funding, you have about 100 separate steps. For a large clinical trial, those steps cumulatively add up to about a million dollars. For an academic investigator to do that is difficult. Industry has the resources and the manpower to do it.

Third, we need to leverage money from industry. By having more money in the pot from public sources, we can come up with a mechanism of 2:1 funding: For every $1 the government puts in, we could leverage $2, and most of that $2 would come from outside the country. We have raised about $1.5 billion over the last 25 years from a variety of sources, with 80% of the funding coming from industry, yet we've answered questions that are related to public health. That's leveraging.

The last point is what you mentioned—that we'll have to wait and see whether prolonging patent life will lead industry into putting more money into research in Canada. I think it's more likely that there's more public health money that could be leveraged.

● (0940)

Ms. Marilyn Gladu: Very good.

Dr. Edwards, I was interested to hear that you had a company that was coming to the second stage of a clinical trial, and then it was sold to a Swiss company. It's not the first time I've heard of people doing clinical trials in Canada and then selling the company elsewhere. What is it that Canada could have done to encourage you to keep that as a Canadian company, creating Canadian jobs?

Dr. Aled Edwards: I prefer not to answer it that way. It's a business. I have investors.

In my job, I don't agree with any of this. I run a charity, but when I was doing that, I had to make money for the investors, or the guys who ran the company had to make money, and that was the best deal on the table. This company was going to fund the subsequent clinical work, which gets expensive. The investor pool we happened to have at the time wanted.... When you take venture capital, they have to pay back their investors, and if you're at the end of the cycle, they are interested more in cash than in building. That's how business works.

Ms. Marilyn Gladu: I'm a Conservative, so I'm all about profitable business, but I'm trying to figure out where the shortcomings are in Canada. It sounds as if one factor might be venture capital available from Canadian sources to invest in your company when they see that you're coming to something good and that's where they need to get involved. Is that one factor?

Dr. Aled Edwards: It could be, but remember what I said first. That is the model, and if we follow that model—which I no longer do—it will lead to unaffordable pricing, so again, we have that tension, right? If we increase the VC funding in Canada and build lots of little biotechs, all the professors would be driving Ferraris. Somebody is paying for it, and it's us. This is going to achieve a breaking point maybe in about five years; I don't know.

Then why not invent a different way of inventing new medicines? There's still going to be as much economic payoff; it will just be in a different way, and we'll have savings in the health system.

Ms. Marilyn Gladu: Good. If we take these ideas and expand them into the rare disease area, where you're talking about a very small population, what kind of a model are you recommending then to actually produce the drugs? Is it like a *Breaking Bad* lab that does rare diseases, or what are we talking about?

Dr. Aled Edwards: No, I think you could license the regulatory protection that Max came up with, which is that it guarantees 10 years of right to sell, and you can license that right to a factory. There is no reason on the planet that industry has to invent medicines. Industry has to manufacture and distribute and market, but we've evolved the system to the point where they invent because it's more convenient for us, and the price we pay is at the back end. We think it's expensive and that industry should do it, but there's no law of physics that says that industry has to do all of this research stuff. They don't do it efficiently. The ROIs on research are going to be negative soon.

I just think we need to rethink this part, and why not Canada to do it? I mean, we don't have a strong pharma sector here, so it's not as if we're killing our goose that lays the golden egg to do this.

Ms. Marilyn Gladu: Mr. LePage, I know that genomics is expanding, that you're a leader in the world. What do you think the federal government should be doing in this area to create an environment to be even more successful?

Mr. Marc LePage: Well, as all the speakers have said, I think that part of the role of public policy is to create a research ecosystem. That is one of the fundamentals of a thriving community. I would say that ecosystem includes funding for public health research and public-good activity. If the government doesn't do it, certainly industry is not going to do it. I think we have generally done quite a good job. I think the next challenge for us is to be a bit more ambitious. We're actually quite good at this. I think we need to push it further, frankly, and dream bigger dreams.

● (0945)

Ms. Marilyn Gladu: Very good. Thank you.

The Chair: You have 30 seconds.

Ms. Marilyn Gladu: Oh, well, all right; I'm going to go to Dr. Fowke.

What would you recommend the Canadian government do to better achieve health research and come to commercialization?

Dr. Keith Fowke: I think a couple of things could be done. Continued support and growth of basic biomedical discovery research, I think, is important. As was pointed out, you never know where it's going to end up, but it's improving knowledge, and that has resulted in development of antibiotics and a number of other approaches that have saved health care dollars.

The other is that there could be a focus on repurposing existing drugs. I think that the development of brand new drugs takes a long time and has to go through a number of hurdles. If we used drugs that are already very well characterized, but used them in new ways and new approaches that are scientifically validated, I think that's a way of shortening that pipeline.

The Chair: Okay. Thanks very much.

Now we go to Ms. Moore for seven minutes.

[*Translation*]

Ms. Christine Moore (Abitibi—Témiscamingue, NDP): Thank you very much, Mr. Chair.

Our study is looking at ways for the public to benefit more from health research. How are research results transposed? Is it done effectively?

Mr. Fowke, I was particularly interested in your study. I assume you were talking about Aspirin 80 mg.

In an ideal world, based on your findings, should the guidelines be quickly changed so that people at risk of contracting HIV are prescribed Aspirin 80 mg? After a few years, we could see if this will have had a significant impact on the population at risk.

[*English*]

Dr. Keith Fowke: We are talking about a baby dose of Aspirin, 81 milligrams. It wouldn't be our recommendation that everyone who is at low risk of acquiring HIV take aspirin. This would be a focused intervention for people who are at extremely high risk—for example, sex workers or others who face extreme risk. We would advise them to take a number of approaches, including using condoms, reducing the number of partners and using antiretroviral drugs, as well as taking aspirin.

Some people don't have antiretroviral drugs available, and others aren't in a position to negotiate the use of a condom, so maybe an aspirin would be something they could use that would be available and not stigmatizing. Each person would have to decide which was the best approach for them. I would not recommend that anyone use aspirin as their sole HIV prevention. It would reduce risk, but it wouldn't eliminate it.

[*Translation*]

Ms. Christine Moore: That's not really what I meant. I was talking about people at risk. The translation may not have reflected my thoughts well.

When we talk about people at high risk, we're talking about people for whom this drug could be prescribed, in addition to all the other measures. Often, these people aren't covered by any drug insurance. It is very difficult to get people to take medication preventively, especially when they don't have insurance coverage, since taking these medications makes no difference in their daily lives.

Could having universal drug coverage help to conduct research and then apply the results? Wouldn't that make it more likely that people will take the prescribed medications, especially if they are at high risk and don't have any insurance coverage?

[*English*]

Dr. Keith Fowke: That's an excellent point. Most people around the world who are at risk of HIV, for example, are extremely poor. They don't have private insurance coverage. Governments could make the decision to invest in very inexpensive generic drugs that would help prevent some of these diseases. Individuals also, if they're counselled properly, may decide that an aspirin is a couple of cents a day, so people could invest that in their own health care. It's something within reach. Both government funding of these approaches, as well as individual funding if the bar is low enough, are accessible.

● (0950)

[*Translation*]

Ms. Christine Moore: Thank you very much.

Mr. Edwards, parents who have children with a rare genetic disease are often left to their own devices. They are told that there is currently no treatment coverage in Canada, and they then do their own research online. They realize that the costs associated with these drugs are high, that they are not covered and that, sometimes, they are only available in other countries. They have to buy them on the Internet, and they are at risk of receiving fake drugs.

What can we do to ensure that Canadians are more quickly connected to people doing research on different rare diseases?

[*English*]

Dr. Aled Edwards: If I understood correctly, one of the problems is that for most rare diseases there are no medicines at all. When you're talking about unaffordable medicines that parents are trying to get, that's what we're trying to fix.

There's the problem of today, which as you say is how parents get their medicines, and there are the problems of tomorrow, which we as researchers are interested in: How do we make affordable medicines for all these children, so they never have to do as you're saying?

To your specific question, I can't tell you the answer, but we're trying to argue that Canada should try to make it happen, such that these children—and the parents, obviously—have affordable medicine and are not forced to make difficult decisions and do things to get access to medicines they can't afford and that aren't available.

[*Translation*]

Ms. Christine Moore: Parents sometimes tell me that they have found a drug, but that it's only available in the U.S., that it isn't approved in Canada and that they can't get it here. They end up in somewhat difficult situations. No one puts them in contact with a specialist in the field in Canada or tells them who they could contact.

What could the government do to improve so that Canadian patients and researchers with expertise in Canada can be connected so that these patients receive information on clinical trials or on what has been done outside the country?

[*English*]

Dr. Aled Edwards: I don't know how the treatment of these patients...but presumably, when we have friends like Kym Boycott at CHEO, they know all the network of folks. It's a very close community and it's close to these rare disease researchers. When it's not available in Canada, our regulators are slower than in many aspects of Canadian regulatory life; it's not just medicine. Our regulators tend to be more cautious than the American ones, so inevitably it's available in America first. The solution is, as you say, to go to the clinics and talk to the physicians that Genome Canada supports. They will have good advice as to what is and what is not a good medicine and where to get it.

The problem of accessibility is due to our regulators.

[*Translation*]

Ms. Christine Moore: Mr. LePage, do you want to add anything?

Mr. Marc LePage: Yes. It's a dynamic we're quite familiar with.

As Mr. Edwards mentioned, people who have connections in the research community are able to find partners in the network of researchers working in another province as well as other families in the same situation. Solidarity between families whose members suffer from a rare disease is very important.

What is still missing is a clinical network. For people who are not in contact with research communities, it is difficult. They go to the hospital and they are alone, which is why the project we have proposed is important. It would make this link with a pan-Canadian and even international network, with other communities. In many cases, this solidarity extends beyond the country's borders.

Intervening with the diagnosis and knowing exactly what the disease is is already a step forward. In some cases, drugs exist, but in others they don't. Sometimes, the intervention may concern the nutritional aspect. There may also be situations where surgery is required. Drugs aren't necessarily prescribed in all cases.

Nevertheless, there is still no network between the so-called normal hospitals. People living near Sainte-Justine Hospital, CHEO or SickKids in Toronto may have an advantage, but it is still a problem in remote areas. That's why we are proposing that the clinical world do what has been successfully done in the research world.

● (0955)

[*English*]

The Chair: Time's up. Sorry.

We'll now go to Mr. Saini, who is the mover of this motion. It's turned out to be quite interesting and informative.

Mr. Raj Saini (Kitchener Centre, Lib.): Thank you all very much for coming here today.

I'm going to start off my comments with a highlight. For disclosure, I am a practising pharmacist, so I have some knowledge in this area. I'm going to start off by highlighting a particular problem. You raised many issues, but let's focus on something that's going to confront all of us. Let's talk about Alzheimer's.

Right now we have 45 million people worldwide who live with this disease. I don't have the Canadian figures, but we can extrapolate. The current cost in the United States to treat this disease is $225 billion every year. By 2050 the cost will go up to $1.2 trillion.

Between 2010 and 2012 we had 413 clinical trials. We had 244 potential drug candidates. We had a 99.6% failure rate between phase I and phase II. Currently we have no cure.

You mentioned also, Dr. Edwards, that when it comes to diabetes, you have the subgroups when it comes to personalized medicine. You're going to face the same situation when you come to Alzheimer's. You also said there's no law of physics that says that a company must produce, distribute, and come up with the potential drug candidate. Open science, to me, is the one aspect going forward that can fold in all the issues that we're having, whether with current diseases—diabetes, heart disease, Alzheimer's—or neglected diseases, especially the 12 or 13 tropical diseases that nobody talks about anymore. We have to change the ecosystem among government, industry, researchers and financiers.

This is such a broad topic, but I want the committee to get an understanding of what can be done practically right now. We are a small science power. We represent less than 2% of the global pharmaceutical market. What can we do? Given our lack of finances compared to those of the bigger countries or the richer countries, what can we do to lead the process forward, to change fundamentally research not only in Canada but around the world? The diseases we're talking about are going to affect not only Canadians. They're going to affect people worldwide, so it's incumbent upon us, being an educated country, not only to worry about our own citizens but also to provide a step forward for those citizens who live in different parts of the world and who don't have the same access we do.

What fundamentally, practically, can we do to change the ecosystem so Canada can be a leader as opposed to a follower? I can ask everybody for their comment on this.

You can start.

Dr. Aled Edwards: Okay.

The Alzheimer's example is a great one. The beta amyloid hypothesis has been tested by about 10 companies. Probably about $20 billion has gone into that hypothesis. All the companies did it in secret. We're still no wiser as to whether that hypothesis is true or not for Alzheimer's. It was a tragic waste of money. If one had imagined a different universe where we tested that hypothesis once or twice in the open, then 10 people wouldn't have had to spend $2 billion each and we would have come up with the answer transparently.

We are a small country, and what can a small country like Canada do? I would argue that we can change the behaviour and the incentives in the ecosystem. We are leaders in open science. Our organization, the Montreal Neurological Institute, has just gone open. They're not filing for patents. If we can get more and more people to follow, we'll use the existing global spend more efficiently.

There is not going to be a bag of money that everyone can get, so we're currently using the existing bag in a highly duplicative way. Everyone's doing the same experiment, nobody's sharing, and we're not learning. If we change the model, we'll get far more impact per dollar. That's my suggestion. They're looking for a leader to do that, and I think we can do it here in Canada.

● (1000)

Mr. Raj Saini: Mr. LePage, would you comment?

Mr. Marc LePage: I would agree with Aled's comments. In fact, I remember that when we funded the original SGC, the whole idea was to have open science discovery of drug targets and then maybe to have 10 companies go after those targets, increasing the likelihood of something coming out, instead of patenting too early and having a very narrow approach. It's open science, and that has evolved. That continues to be one of our responses to it.

I'd have to say in terms of our genomics activity in the neurosciences more broadly, it's the most difficult area. We have to keep plugging away at it. It's probably the area in which we've made the least amount of progress. We should continue to go at it, not just in Canada but around the world.

Mr. Raj Saini: Dr. Yusuf, would you comment?

Dr. Salim Yusuf: Mr. Saini, you asked two big and broad questions. I'll deal with both because we've been working in both areas for about 20 years.

With Alzheimer's, it is a long-term process, and the current business model is that you need to get your results within a few years in order to make money from your patented drugs. Alzheimer's develops over 20 or 30 years, and there is recent data that suggests that the beta amyloid hypothesis is not wrong; it is factors in middle age that affect disease in old age. Therefore, we need mechanisms whereby we can study people for 20 to 25 years to affect the course of the disease. We have studies in which we intervened in the year 2000, and we're still counting whether that had an impact. This can only be done through the public purse at the moment, so I think a long-term national initiative on Alzheimer's, a 25-year strategy, would make sense.

If I may, I'll now switch to your second question on neglected diseases.

I'm a person from India, originally. I've worked in 100 countries, of which 80% are low- and middle-income countries in Africa, South America, and Asia. We've worked on three areas—TB pericarditis, which is neglected completely; Chagas disease, which affects 10 million people in South America; and rheumatic heart disease, which kills about 400,000 people every year in Africa, Asia, and South America. What we've been able to do is squeeze the juice from our western countries, take the drops, and invest them in those areas.

We have the largest research programs there. We've used that to write CIHR grants—this is where public funding becomes important—leverage that money, and institute some of the biggest studies in the world. We've been bringing people in and training them in Canada. We also send teams out to many of these countries to train people.

You're right; there is a big need for trying to address neglected diseases, but it can only be done by a model that includes not only open science but also open capacity-building in these countries. That's what we've been doing, and I think federal funding and corporate social responsibility become key to it.

Mr. Raj Saini: I have one quick question with just a yes-or-no answer.

In the U.K., the research councils there have now put regulations in place to the effect that if there is any government funding, the research that emanates has to be in the public domain.

Yes or no, is that a good idea?

Dr. Salim Yusuf: I give a qualified yes.

Dr. Aled Edwards: But it's also not true. They're allowed to patent the results and keep things secret; it's the publication that has to be in the public domain. The background intellectual property can be....

We have a story on one of the universities in England. For 18 months, we have not been able to sign the deal. They're going to give us information, we're going to do the experiments, and they want to own all of our intellectual property. We say no; we want to share it.

Universities are structured in our ecosystem to look after their intellectual property. The rules are that once you publish the paper, the paper must be public, but that still could be patented and unuseful to the world.

The Chair: Thanks very much.

That concludes our seven-minute round.

We'll go to our five-minute round, starting with Mr. Lobb.

Mr. Ben Lobb (Huron—Bruce, CPC): Thank you very much, Mr. Chair.

That kind of led off the first part of the question that I had for the group today.

I was on the industry committee, and we studied some of these very topics. I was on the health committee years ago, and we studied this very topic, and here we are again, studying this very topic.

The question is—and I'm sure among scholars this is quite a debate—if the government is providing federally funded money to universities and researchers, etc., who should own the intellectual property? Should there be any intellectual property? When there are public dollars that are going forward for research in the public good, how is it that a researcher in a university lab has the ability to own that intellectual property?

Does anybody have any thoughts on that?

● (1005)

Mr. Marc LePage: I think that in most of the universities in Canada, in fact it's the university that owns the intellectual property. There are a few universities where it's the individual, but in most cases—and I've worked in San Francisco and places like....

As an economic model, that model has been very successful in the U.S. in terms of deriving benefit from health research. That is the model.

Dr. Salim Yusuf: It's a question that we face many times.

I think the first thing is to say that public funding, even for studies that are “funded publicly”, does not even cover a half of the cost, so the investigator in the university has to bring added money. Second, unlike many countries, Canada does not fund the time of investigators. I fund my time by doing clinical work on the weekends, and then I use that money to support me to do pro bono work for research, and I'm not the only one. Most clinical scientists in Canada do that.

I think there's a myth that public funding means that's the only money that has led to a discovery. No. That is a key part of it, but it's leveraged multiple times. When we reframe the question in that context, then we make it a different answer.

Dr. Aled Edwards: There are obviously lots of studies about this. When universities started to own their intellectual property, it was driven by the American government when they passed the Bayh-Dole Act in the early eighties. That created that idea that it's too complicated for governments to manage intellectual property, so let's give it to the universities, and that created what we have today, which is universities acting like little companies.

They don't manage their intellectual property well. Canada loses money. If you just do a financial check on how much we gain and lose at our universities, you see we lose money on our intellectual property portfolio. The intellectual property we invent is so early it's not a product yet. Actually, there's strong evidence that it gets in the way of creating products that are useful for society.

It wouldn't be such a bad deal if we got out of the business of trying to pretend we're little companies at universities.

Mr. Ben Lobb: I've talked to many software companies—not pharmaceutical companies, but I'll use the software example—where there's been federal money, the universities maybe found some granters, and the companies chipped in money. The universities come up with a great idea, and now they have to negotiate with the university to actually use this great technology. To me it's bizarre.

The other thing I want to talk to—and I know I'll probably run out of time here—is I'm sure all of us around the table meet with many pharmaceutical companies and pharmaceutical executives. They praise the tier 1 status that Canada has, but I heard in somebody's comments this morning that the pharmaceutical investment in this country is declining. Still we hear from all the executives of these pharmaceutical companies about the great benefit of being a tier 1 country. Does anybody want to throw that out there?

Dr. Aled Edwards: On the pharmaceutical sector, if you think of the corporate structure, the CEO has sales and marketing divisions that have CEOs in every country, and they have global research and development that invents the new medicines. There used to be some global research and development sites in Canada, but there are very few anymore. The research guys, the guys who every day, passionately, want to invent medicines and help people, are on the research side. The Canadian CEOs report up to sales and marketing, which is quite distinct from the organization that actually does research on new medicines, so the messages the Canadian government is going to get are filtered through.... Their compensation is selling more, expanding their market and stuff, and they're doing completely appropriately what their job is, which is try to increase their sales.

I think you need some sophistication about what pharma is. It's two different organizations under one big umbrella. If you call it one thing, then I think you're going to get messages that are almost incomprehensible. That's the way I like to think about it.

The Chair: Thank you.

Go ahead, Dr. Yusuf.

Dr. Salim Yusuf: I think we have to think of why global pharmaceutical companies would invest in Canada.

First, we need something special to offer. We're a tiny part, population-wise, of the world. We need special expertise that is better than the U.K., the U.S., Japan or Korea. There are some areas where we are special, and when that happens, they invest in us.

The second part is tax advantages. Tax breaks have made a difference to companies investing through Canada.

The third is that our marketplace is going to remain tiny. We're a small country relative to the world. That is a factor we cannot beat, but we can try to build Canadian expertise by investing heavily in research in the university. That in turn will bring in global pharma. The second factor here is that there is practically no investment from the local Canadian pharmaceutical industry or device industry into research. Our generic industry charges the highest generic prices in the world and does not invest very much in research.

I think this committee needs to look at the behaviour of the generic industry as well, on one hand, and on the other hand at the factors that will attract money from global industry so they divert it from Europe, the U.K., Australia, and the U.S. to us.

● (1010)

The Chair: Thanks very much.

We're going to Mr. Grewal.

Mr. Raj Grewal (Brampton East, Lib.): Thank you, Chair, and thank you to the witnesses for being here.

My background is that of a corporate mergers and acquisitions lawyer, Dr. Edwards. You gave your example of open science and how you started a company and your investors got a good return. You spoke about the importance of how these companies will be profitable but will not have extreme profits. How do you coordinate that with fiduciary duties to maximize the value of shareholder wealth? How is that a sustainable model?

It sounds really good, and I'm not disagreeing with you that it probably should be the model, but from a practical standpoint, how can that be implemented?

Dr. Aled Edwards: You're too young to remember the days before this shareholder optimization stuff that Harvard Business School put out in the eighties, right? A company used to be described as the community, the employees, the company and the shareholders, all of equal value. With the shareholder value stuff, a lot of the other stuff has gone by the wayside.

Paul Newman's company, the one that makes the salad dressing—do you know it?—employs people, makes a profit and makes a good product. There are no shareholders. It all goes to the Paul Newman foundation. He's given away $560 million to the world. In that, you have the community impact of the company, and it makes a profit. It's just that the excess goes to the public good, akin to the new pharmaceutical businesses, where the excess would go to the affordability of the pricing.

It's completely achievable. It changes the way in which you value the company, and I think that's not a bad thing.

Mr. Raj Grewal: Yes. I mean, that's up for debate, but I think the reason it will be very difficult to get buy-in is the fact that the majority of people out there.... I hate to stereotype individuals, but my background not just on Bay Street, but even in Brampton East, which I represent, tells me that people are out there to make money. That's their number one goal.

At the same time, obviously, we want to live in a healthy and vibrant society. That's where I believe government's role is; from a public policy perspective, it's to come up with that balance. That balance is really difficult to achieve when it's a for-profit company. Are we now looking at not-for-profit corporations that are going to be able to do public good? What's the cost-benefit analysis of investing in them?

At the same time, what are your views on tax policy reform? Are there certain jurisdictions that get this right when it comes to giving tax incentives to large companies or pharmaceuticals or not-for-profit research organizations to benefit the public good when it comes to open science?

Dr. Aled Edwards: I'll let my attorney take care of this one.

Voices: Oh, oh!

Mr. Maxwell Morgan (Director, Policy and Legal Counsel, Structural Genomics Consortium): I'll give you a little background on M4K Pharma. Our company, as in the Newman foundation scenario, is wholly owned by a charity. You could conceive of scenarios in which you attract impact investors who are willing to balance returns with other socially minded objectives when they place an investment. This would all be dealt with in a shareholders agreement in which it's very clear that maximization of value is not the sole criterion by which performance is evaluated.

We're envisioning a division of labour between the development and clinical trials of the drug and the sales and marketing, which Dr. Edwards was talking about before. This new business model would, for lack of a better term, de-risk an asset to the point where it's commercially attractive at a lower price for an actual industry participant who is looking to maximize profits to take on. There would be a negotiation between the business development entity and the manufacturing-distribution entity around pricing. We would be handing over a fully de-risked asset to that company at that point, where we could say that there's a business case to be made for selling at that price because they haven't borne any of the research and development risk.

● (1015)

Mr. Raj Grewal: That's very interesting. Has that ever been implemented?

Mr. Maxwell Morgan: We're piloting the model right now. We have a lot of interest for doing it again in other places.

Mr. Raj Grewal: That makes a lot of sense, because the whole existing business model is that it's because of the research investment and costs to develop that the cost of the drugs on the flip side.... It means you have some financial analysts sitting there on Excel just figuring out the break-even price.

Mr. Maxwell Morgan: Exactly. We're decoupling the research and development costs from the marketing and distribution costs.

Mr. Raj Grewal: Just playing in hypothetical scenarios here, would there be a licensing agreement, or would there just be a handing over of the intellectual property, essentially?

Mr. Maxwell Morgan: There would be a licensing agreement. We would be licensing the regulatory data and the regulatory approval, if it went that late in the development process.

Mr. Raj Grewal: Okay.

Mr. Maxwell Morgan: That's a real, tangible asset. It gives you an entitlement to protection from generic competition. In Canada, for example, we have innovative drug status for new chemical entities that come to market. That gives you eight years when you have sole market protection. That's a real, tangible asset that you can license. There would be a license agreement that would spell out things like access and affordability provisions. We'd be negotiating that on behalf of the contributors to this open science development process.

Mr. Raj Grewal: My last question is—

The Chair: No, your time's up. Sorry.

Mr. Raj Grewal: It's a really good question. It's worth it.

The Chair: I'm sure it was a really good question, but we're going to go to Mr. Webber now.

Mr. Len Webber (Calgary Confederation, CPC): Thank you, Mr. Chair.

I'd like to thank the panel for your information.

I'm certainly not an emergency room doctor, or a pharmacist, or a corporate lawyer, or a self-described nerd. Actually, I'm very much not a nerd. I'm very much a layman here, so some of my questions might be pretty basic.

I'm just going back to 2015, when I was campaigning for the first time as a federal MP. I represent Calgary Confederation, where there are a lot of research scientists at the research park at the University of Calgary. I go to their doors and ask for their support, but they say, “No, I'm sorry. You muzzled the scientists. I can't support you guys.” I leave graciously and I'm thinking, “Okay, we obviously must muzzle these scientists, so something should be done about it, I guess.”

Has anything changed? I'm going to be door-knocking again in that particular area in about a week or so. Are there still muzzles on these scientists as we speak? Are they happier now than they were in 2015?

Dr. Aled Edwards: I'll take this one.

You need to remember that other scientists, like the ones around the table here, work at universities, and we're "unmuzzleable", as it were. However, regarding the scientists that work in the government labs, my understanding was that they were told to keep on message. You could see that there was a slight reason that it might have been a good thing, because you don't want randomness out there, but arguably it went too far and it became more about controlling the message.

In my view, transparency is always better. Even if there is a disclosure of something that you might not want to be disclosed, it's probably, in the fullness of time, in the public good to have complete transparency about what scientists do.

It is better now. It wasn't evil before, although you could see what was going on, but in our collective opinion, it went too far, because science advances through transparency and through critique. We think that should be the mainstay of how we support our scientists in the country.

Mr. Len Webber: You say it is better now. What changes have been made? Has the government put policies in place to say that now you're allowed to take the muzzle off?

● (1020)

Dr. Aled Edwards: We don't represent the sector that was muzzled, but my understanding is.... Does anyone on the line know more than I do about the policies internal to the ministry of the environment, etc.? No? We would have to ask the ministries.

The folks that I know in there are happier, so I presume they have been let off the leash.

Do you guys know?

Mr. Marc LePage: Just as a broad sweep, I think you're right.

The academic side is "unmuzzleable", so it goes all over the place. Of course, government science works for organizations, as do people who work in big corporations. I think there was a time when there was a fair bit of pressure to line up with whatever the messaging of an organization was. There is a sense now that there are policies that allow people—at least for their scientific work—to speak more freely, or at least it's perceived that they can speak more freely.

Mr. Len Webber: Okay.

When they speak more freely, then you get these private corporations that take advantage. By listening and then going out and developing research from that information, they are making excellent returns from it and selling it to foreign countries. They make good profits. What does the public purse get in return, from all the investment they put into it initially?

Mr. Marc LePage: As a general statement, whether it would be government science or academic science, I think we all collectively benefit from open access to general information. The idea of publishing, sharing and engaging more broadly is very potent.

Occasionally people can use that information to develop products, but there's a lot of work. I think it's rare for something to be developed, then there is a product and then it's all done. There's the beginning of an idea, maybe, but there's a lot of work to be done.

Dr. Aled Edwards: There's a lot of evidence that sharing locally creates ecosystems that can more quickly uptake the research. There is a lot of local economic benefit from projects that share locally, because the best intellectual property walks on two feet, so the scientists can walk back and forth and discuss.

Also, other governments are sharing their results. The American government is very good. I don't think we should be wimps. We should be as competitive, and if we want to start companies, start them. Instead of complaining that other people are taking our stuff, we should take their stuff.

The Chair: Okay. Your time is up. Now we go to Ms. Sidhu.

Ms. Sonia Sidhu (Brampton South, Lib.): Thank you, Mr. Chair, and thank you to all the panellists for being here, especially Dr. Edwards. Thank you for your great efforts, which are definitely helping to lower drug prices.

The positive impact of your recommendation seems clear when it comes to approving and making drugs for new diseases less expensive. How will it be beneficial for developing treatment for well-known and common diseases, like diabetes? That's a big burden on the health care system, to the tune of $27 billion. How can we develop it more efficiently?

Also, I know you said we need a change in the federal policy. Do you think we need more than what is in Motion No. 132, presented by Mr. Saini? Do you think we need to include more policies in it?

Dr. Aled Edwards: I suspect the bigger experts are sitting here in Hamilton. If I might reiterate, the model we're proposing as researchers is to make a better world in the future, where the medicines we invent now will be affordable. You're saying that the medicines now are very expensive and asking how we make the existing ones affordable.

It's harder, because we tacitly endorsed high pricing by all the things we put in place to do research. We allow the universities to patent. We think venture capital companies are the best thing ever. The consequence of that is high pricing. Other countries—Brazil, for example—nationalize the production of essential medicines and make them affordable to their people. I don't know if that's a model that would work here.

There are other ways, through public health, to tackle existing prices. We could also negotiate harder. Honestly, though, the pricing of medicines is decoupled from this research stuff we do, so I don't think I should speak too much about what I don't know.

Ms. Sonia Sidhu: Mr. LePage, you said the six centres are working together. Do they share any information? Is it open information or closed?

● (1025)

Mr. Marc LePage: Yes, in general in genomics there's always been a history of putting your data out almost as you generate it and making it available in the evolution of the science.

There was an earlier question in this area, but the challenge for us —and maybe our contribution to the drug pricing pressure—is to establish an independent diagnostic facility so that you can assess your patients and determine which patients should get which drug on objective criteria, as opposed to maybe a marketing push or manipulation. Our sense of where we can intervene might be on the characterization of the patients really objectively, so that health care systems can more easily deal with those cost pressures.

The Chair: I believe Dr. Yusuf wanted to make a comment.

Dr. Salim Yusuf: We need to realize that health is not all about drugs. A large part of health is how we live, how we eat, how we exercise and who we interact with. Diabetes is a disease of societal change, so investing in research that leads to improved health behaviours is actually the fundamental aspect, and that's something companies won't do. We need to do it ourselves out of the public purse. That investment simply is not happening in Canada.

The second part of it is about drugs. In the short term, or even in the foreseeable future, we are not going to change the system of patents and the idea that industry is for commerce—and commerce means generating money. They will do what is needed within the limits of the law.

There is a short-term issue and a long-term issue. We can't do anything about the short-term issue in terms of what drug prices are going to be during the patent period. However, remember that if a drug is of benefit, it will be used for 50 or 100 years after the patent has expired. This is where, in Canada, we've failed. Our generic drugs are among the highest-priced in the world. They're five to 10 times more costly than those in the U.S. and several times more those in the U.K.

This is something this committee can legitimately address, and one of the things may be what is done in Brazil, where you have a national pharma-producing plant that produces essential drugs at low cost.

It is possible to tackle the long-term issues, but much tougher to deal with the short-term issues.

Ms. Sonia Sidhu: Thank you.

The Chair: Time is up. Now we will go to Ms. Moore again.

You have three minutes.

[*Translation*]

Ms. Christine Moore: Thank you very much, Mr. Chair.

I'm very interested in an issue that the Genome Canada representatives didn't have time to explain in detail, namely the issue of rare diseases and the coordination of their treatment, pharmaceutical or otherwise. I'd like to give this organization a chance to tell us more.

[*English*]

Dr. Cindy Bell (Executive Vice-President, Corporate Development, Genome Canada): Thank you very much.

I think that one of the key things that is required in Canada at the moment is to provide opportunities for Canadians to get equal access to emerging new technologies such as genomics, as Marc LePage described is going on in the United States and the U.K. In order to do that, there are many steps. One of the things that Aled has been promoting, open access, is really about sharing data as well, so that we can have access to different kinds of clinical treatment, and it doesn't matter where it is.

Globally, we need to be able to have access to a broad range of data and to share that. For patients to benefit in Canada, we need to have access to data of patients around the world. We have been part of a large initiative called the Global Alliance for Genomics and Health. It's also based on open access and sharing of data,

You need to do it at the research level as well as at the level of access to the actual clinicians.

[*Translation*]

Ms. Christine Moore: So that would mean, for example, that a doctor in a rural area could have access to data related to a disease and the patients who suffer from it, as well as the results of the treatments that have been tried, which would give the doctor a better idea of this disease that he or she is probably hearing about for the first time ever?

Mr. Marc LePage: Exactly.

The objective here is to be able to connect to a network of collaborators who have treated patients with the same disease, to find families who are victims of the same circumstances and to promote solidarity not only between these families, but also between health professionals and perhaps specialists. That way, this network would allow the regional doctor to know what is happening across Canada and even, as Ms. Bell just said, on the international scene, where we also want to establish solidarity in this regard. We are actively involved in this project.

● (1030)

Ms. Christine Moore: Okay.

Mr. Marc LePage: In practice, a pan-Canadian system has yet to be developed. The current system is still based on 10 health networks. Clinically, we are not yet able to exchange patient data, which we are already doing for research purposes. This is the structural challenge we are currently trying to overcome.

Ms. Christine Moore: I imagine that this is particularly crucial if the number of cases of certain diseases is low. It is therefore important that the data doesn't remain in a vacuum in a provincial database. In this regard, the federal government could play a leadership role in advancing the issue of clinical information sharing.

Mr. Marc LePage: It could indeed play a role at the organizational level. For their part, the provinces are autonomous; they participate when they want. However, they are increasingly realizing the benefits of increased collaboration. If we fail to share and consolidate this data, everyone will suffer because we will not achieve as good a result as we had hoped.

[*English*]

The Chair: Thanks very much. Your time is up.

We have a few minutes left, and I believe that committee would like to use those to ask questions, so we're going to have a four-minute round here and a four-minute round there, and a two-minute round for the NDP. If everybody stays on schedule, we will be all right.

Mr. Ayoub, you have four minutes.

[*Translation*]

Mr. Ramez Ayoub (Thérèse-De Blainville, Lib.): Thank you, Mr. Chair.

Thank you to all the witnesses.

I'll be quick because I only have four minutes for my comments.

What our witnesses are saying is very interesting. Based on what I'm hearing from them, I wonder if we shouldn't approach the issue from a completely different angle when it comes to administration and research—but perhaps I'm naive to think so.

Large countries, such as the United States, India and China, are doing research just like us. Do they actually communicate all the information they collect? It seems that they do, in some cases. So what is the added value for Canada?

Canada is often told that it is a small country with a small market and has no power or influence. What is the benefit to Canada of spending millions of dollars to maintain its administrative structures for drug management and research approval and to continue to want to become a leader in the research community?

Following on from what Dr. Yusuf was saying, it may be better to take advantage of what is already being done elsewhere in research and production, what is already approved by such industrialized countries as ours, which has a comparable geography and standard of living to these countries. We could then invest more in education and behaviour change, and prevent companies from giving Canadians bad habits.

I'll stop there. I took one minute and fifteen seconds of my time, which gives you three minutes to respond, Mr. Edwards or Dr. Yusuf.

[*English*]

Dr. Salim Yusuf: This is a question that we have all been grappling with, and that every country other than the United States grapples with.

I think the answer is very simple. Health is a global problem, and we're a rich country, so we need to do our share to help solve a global problem. That will help us. Similarly, research done in Korea or the U.K. or the U.S. will help us. We can't be so selfish and say we won't do anything.

The second thing is that any findings or any discovery, whether it's from Tokyo or Toronto, has to be adapted to the Canadian health system. That research can only be done in Canada. This is why the translational part definitely must be invested in.

Finally, countries that invest in research benefit from the advances of research first. They have the expertise to attract dollars from outside. Eighty per cent of my research funding comes from outside the country, because our group has the expertise. Improving our own health requires us to invest in ourselves. As a global citizen, we need to invest.

[*Translation*]

Mr. Ramez Ayoub: I'll take you at your word, Dr. Yusuf.

Without taking anything away from scientists or research, because I strongly believe in that, I nevertheless have the impression, when I see all this, that we are trying to treat the disease rather than attack the habits that create it. That's the balance I'm trying to find. I agree that there is a need for research and leadership in this area, but at the same time I have the impression that there is a strong focus on the solution and not on the source of the problem.

● (1035)

Mr. Marc LePage: The focus is indeed on the disease rather than on healthy lifestyles. The latter is an underdeveloped area, and Dr. Yusuf mentioned this. This is precisely part of the contribution we can make in the long term, and it is an aspect that is becoming increasingly important as our population ages.

[*English*]

The Chair: Thanks very much.

We have to move on now to Mr. Webber.

Mr. Len Webber: I'm just going to follow along with Mr. Ayoub's questioning of Dr. Yusuf regarding what's going on internationally. You commented earlier on how we've failed miserably here in Canada with respect to our research dollars. Your main point was that we certainly need to increase our funding in health research.

Do any of these other countries that are doing so much more investment than we are here have that open science concept whereby they share their intellectual property with anyone, or any other country? Is there any example, or is it still muzzled throughout the world?

Dr. Yusuf, would you comment?

Dr. Salim Yusuf: I think the policies of at least the western countries—the U.K., the U.S., western Europe, Japan and Australia—are similar to what we do here. The intellectual property is owned either by the person who discovered it or the universities. By and large it's the same.

China is very regressive. They have not only tried to take ideas and patents from other people; they are now even preventing their own data from coming out. There's been a recent edict, in April, that will prevent any collaboration between Chinese and international investigators. The papers have to be reviewed and approved by the Chinese government. I don't know how this is going to play out.

I do want to add to one point you raised. One of my points was that we need to increase our investment research. A second equally important point is that we need to ensure a redistribution of that money so that the translational part, into clinical systems and patients and into populations, is well supported. That is even more miserably underfunded than the basic biomedical research.

Dr. Aled Edwards: I'm the CEO of an organization with labs in Stockholm, Germany, England, America, Brazil and Canada. The system of science is the same around the world. Frankly, it is rather open. We publish. That's how we get our credibility, by publishing. When we're speaking about product development, we believe that the secrecy in that small aspect of the research endeavour causes more harm than good. We think open science is the solution to that.

To the point about whether Canada should invest, let's all remember the U.K. government study that showed that a dollar invested in health research leads to six dollars of economic benefit—not only health impacts, but actual economic benefit. If you're thinking of your ROI, it's a good investment in terms of public dollars.

Mr. Len Webber: I have one very quick question, not quite related, to Dr. Fowke with your expertise on Aspirin. I carry two Aspirin around all the time because I'm told that if I feel like I'm going to have a stroke, I should be popping these Aspirins and rushing to the closest emergency room. Do you suggest this? Do you recommend everybody should be carrying Aspirin around for this particular reason?

Dr. Keith Fowke: The reason you carry two Aspirin around is not for a risk of acquiring HIV. It's for heart disease. I think Aspirin is a good example. These drugs are very complex and have many different mechanisms. The mechanism Aspirin uses to prevent stroke or a heart attack is different from the mechanism that prevents the cell that HIV infects from getting to the genital tract.

There are different approaches, and we need to understand how these drugs are working. It's two different mechanisms in one drug.

Mr. Len Webber: Thank you.

The Chair: Thank you very much.

Now we go to Ms. Moore.

● (1040)

[*Translation*]

Ms. Christine Moore: Mr. Fowke, you said that more research should be done on molecules that are known and have been used for a long time in our health care system to see if we can also use them for other therapeutic indications than those generally known. With this objective in mind, are there any molecules or classes of drugs that should be studied in particular?

[*English*]

Dr. Keith Fowke: All of us have a very focused field of investigation, so I won't speak in general terms.

One commonality in many diseases is inflammation. Arthritis is an inflammatory disease. Some neurological conditions are inflammatory diseases. We're discovering that even infectious diseases involve inflammation. If we can understand how the immune system works, how the inflammation process works, and exactly how particular drugs interfere with that inflammatory process, it would be just one example of how understanding basic processes of inflammation may have impacts on many different diseases.

The Chair: Okay. Is there anything further?

[*Translation*]

Ms. Christine Moore: Is there anyone else who would like to answer this question?

[*English*]

Dr. Aled Edwards: Repurposing, which is what it's called, is pretty exciting. Again, when you think about diseases that have shared mechanisms, it's good. We must be cautious, though. The well is not that rich in medicines. We have medicines to very few pathways. Those that happen to work will be cost-effective for the health care system, but the track record for repurposing medicines is poor, and not because it's not a great idea; it's just that biology is complicated and we don't really understand it.

We have to balance between inventing new things and trying to extract the value of what already exists. Both are good ideas. You just have to be cautious. It's not going to be the panacea.

The Chair: Okay. Thanks very much.

I want to say that you've been an excellent panel. You've created an appetite for us to dig into this a little further.

I want to thank the member for raising this issue as well, because it certainly has been interesting.

You've been a wonderful panel and very helpful, great communicators. I want to thank you all for your contribution.

With that, I have one question. Why is it 81 milligrams and not 80 or 85 milligrams of Aspirin? How did they come up with 81 milligrams?

Dr. Keith Fowke: That's historical. I can't answer that question.

The Chair: That's a tough question.

Thanks very much.

I'm going to adjourn the meeting, but the parliamentary secretary wants to comment very quickly.

Mr. John Oliver (Oakville, Lib.): Tomorrow Bill C-45, an act to legalize and regulate the production of cannabis, comes into effect. I wanted to take this moment in time to acknowledge and thank the HESA committee for the work that they did in furthering that legislation.

You will recall it was a year ago September that we met for a solid week before anybody else was back here on the Hill. We heard over a hundred witnesses and made some very substantive changes to the legislation. On October 5, 2017, we tabled our document in the House and it proceeded to go to the Senate after that.

Again, thank you for that time and the contribution by the committee.

The Chair: I understand you have free samples for us all, do you?

Thank you very much.

Mr. Len Webber: I have a question with regard to translation.

First of all, do our witnesses on teleconference hear that translation as well? They do. Okay.

Second, with regard to documents that are brought in—like Dr. Yusuf's, with no French translation—is it up to witnesses to provide that translation, or do we do that here?

The Clerk of the Committee (Ms. Marie-Hélène Sauvé): We do provide the translation. There is a turnaround time, and given that we received Dr. Yusuf's presentation yesterday, there was not enough time to have that translated for the meeting today.

Mr. Len Webber: How much time do you require to get documents translated?

The Clerk: Typically, we require three business days.

Mr. Len Webber: We just got Dr. Yusuf's yesterday? Okay.

The Chair: Witnesses are always given the parameters of what their opening statement time is and the language requirements as well.

● (1045)

[*Translation*]

Ms. Christine Moore: So we can get them on Thursday.

[*English*]

The Chair: Thank you very much, everybody.

With that, I adjourn the meeting.