

DEBBIE MCKENZIE: My name's Debbie McKenzie. I'm an associate professor at the University of Alberta. My primary research interest is chronic wasting disease, and we're interested in many aspects, including strain differentiation, transmission, and the social economic impacts of CWD.

GENOME ALBERTA: Dr. McKenzie, we've been talking for a few years now about CWD and the progress of your research. And you mentioned that the progress of this research is often small steps. Can we talk a bit about those small steps since I last spoke with you?

DEBBIE MCKENZIE: One of the things that's always an issue in a sense with prion disease is that when you use animal models of disease, the incubation periods take a long time. They are anywhere from 150 to 600 days, so that immediately makes any progress slow. But the other that comes in is developing a new method. Validating it. And once you've demonstrated that it works the way you think it should is then to start moving on to your experimental isolates. And that's where we're at with a lot of our experiments right now.

GENOME ALBERTA: Let's talk about the last six months. Anything that popped up that was interesting that we should talk about?

DEBBIE MCKENZIE: Overall, within the Genome Canada project, both our lab and [Hermann Schaezel's](#) lab in Calgary had been working on developing cell lines that you can infect with CWD. This is very important because currently the best ways of generating the infectious agent is in the animal models. And as I said, those are really slow. So the preliminary data, and we're still in the process of validating, suggests that within a month we can infect and analyze. So we can actually have an answer in a month. Right now we're still using known prion isolates and so we'll move into the experimental ones probably in the next three to six months.

GENOME ALBERTA: I'd like to talk a bit about the coronavirus -- at the time we're recording this right now -- it seems to be spreading -- very rapidly. And the vector for this -- if I can use your fancy language -- is an animal market where there's selling the meat products. It all sounds a bit like chronic wasting disease.

DEBBIE MCKENZIE: It would have some similarities. Coronaviruses have a probably greater likelihood -- if I could say it that way -- to jump into other species. And because they're RNA viruses, they can undergo rearrangements and change their host range so you can move. I think right now the coronavirus is thought to come from a bat into a snake and then eventually into a human, but it has to change at all of those steps. That's somewhat analogous to what happens with CWD and prions is as we move, and we've shown this definitely within deer, is that as you move from one deer to a deer with a different prion protein sequence, that we can generate

new confirmations. In the old literature, these are actually referred to as mutations. And this then allows that when you put it into a new host, that it can adapt so we can select the confirmation that it likes best. So in that sense, it's kind of like an RNA virus that mutates and maybe the original coronavirus from bats couldn't infect human cells, but as it moved through the snake and continued to undergo mutations and adaptations, it can now, infect a human. And I think there's always the possibility that the same kind of thing is happening with CWD, whether it's a change that allows it to go from deer into a different species that shares the environment. Or perhaps something that would allow it to jump into humans. We haven't seen it. We don't know if it's going to happen, but the possibility is there

GENOME ALBERTA: When we consider the history of science, serendipity is one of those vectors... Is there anything to be learned then from the coronavirus in relation to your research and CWD?

Would you be monitoring it or do you have some contacts or context with people in China at this moment?

DEBBIE MCKENZIE: Not directly. We sort of definitely are following the coronavirus story, but I don't think that there's direct parallels between the coronavirus and anything that we're doing here.

GENOME ALBERTA: That's the beauty about serendipity... How would we know if there was anything to be learned from what looks to be something similar, but obviously very different?

DEBBIE MCKENZIE: I think that that probably the thing that we could learn from this is that, you know, zoonotic diseases do pop up. Something like 75% of all emerging infectious diseases are zoonotic, which means that they're coming from wildlife of some sort.

It definitely demonstrates that there is zoonotic potential to different pathogens.

I think that the fact that the coronavirus. Is currently, you know, zoonotic is not surprising cause coronavirus have a history of that, whereas prion diseases have less of a history, with the exception of bovine spongiform encephalopathy. But the rest of the time we don't see those jumps. The other major difference is that the coronavirus is spreading very rapidly...

GENOME ALBERTA:] Human to human.

DEBBIE MCKENZIE:...human to human. The problem that we have always with prion diseases is that the incubation periods can be very long, so we could take anywhere from 10 to 20 years from the time, you know, if a person ate an infectious prion and it could cross the barrier into humans, it would take a very long time.

We don't know what we're looking for, so it's not like pneumonia is going to pop up. It could be a neurological disease, but there's lots of different neurological diseases, so we have to have a lot of discussions in the lab about, you know, how would one prove that this particular person was infected by eating CWD? Even if they were known to be a hunter we would still have no direct correlation. And that's not something we've solved yet, you know, in terms of just hypothetically, how would we demonstrate this.

GENOME ALBERTA: Tricky is probably the word right?

And let's just talk a bit about that next six months -- probably we'll see you again before the spring or the summer kicks in -- what does that look like ahead? You've got some papers in the loop...

DEBBIE MCKENZIE: We have a paper right now on strain differentiation. That's in progress. Various members of the team have a number of different papers moving through. I think really the big thing that we're looking for in the next six months is we're expecting a call for a new Genome Canada LSARP [large scale research project] on the environment.

And so: coming up with a plan to submit again and build on what we've done in the last three and a half years. And how to move that forward without sort of it being iterative. So we have to come up with new ideas and new plans, and that's what we're working on right now.

GENOME ALBERTA: Debbie McKenzie is an associate professor in the department of Biological Sciences at the University of Alberta.