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COUR FÉDÉRALE
20-JAN-2025
Jessica Lorch
Ottawa, ONT | 5

Action T-294-25

FEDERAL COURT

BETWEEN

UNIVERSAL OSTRICH FARMS LTD.

APPLICANT

AND:

CANADIAN FOOD INSPECTION AGENCY

RESPONDENT

AFFIDAVIT

I, Dr. Steven Pelech, of 5640 Musgrave Crescent, Richmond, British Columbia, hereby AFFIRM AND SAY AS FOLLOWS:

1. I am a professor at the University of British Columbia and as such have personal knowledge of the facts and matters herein, except where I state they are based upon information and belief, in which case I believe them to be true.

2. Attached to this Affidavit and marked as **Exhibit "A"** is a true copy of my opinion report with respect to this matter.

SWORN (OR AFFIRMED) BEFORE)
ME at Vancouver British Columbia)
on January 30, 2025)
)
.....)
A commissioner for taking)
affidavits for British Columbia)

Alyona Kokanova
Barrister & Solicitor
1321 Johnston Road
White Rock, BC V4B 3Z3
(604) 536-5002

DR. STEVEN PELECH

THE UNIVERSITY OF BRITISH COLUMBIA

This is Exhibit "A" referred to in the affidavit of Dr. Steven Pelech sworn before me at Vancouver this 30 day of January, 20 25

Dr. Steven Pelech
8755 Ash Street, Suite 1
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spelech@mail.ubc.ca

Date: 29 January 2025

Re: Expert Report – Risk of H5N1 influenza transmission from Ostriches located at Universal Ostrich Farms, Ltd.

For the case involving Universal Ostrich Farms Ltd. represented by Mr. Michael Carter of Cleveland & Doan Barristers & Solicitors

PART 1: DESCRIPTION OF SCOPE OF THE QUESTIONS TO BE ADDRESSED

1. I was asked by the firm of Cleveland & Doan to provide my expert opinion related to the flock of ostriches (Herd) located at the Universal Ostrich Farms Ltd. (UOF) near Edgewood, B.C. and the risks of transmission of the H5N1 strain of influenza, which is responsible for the current waves of avian flu. In addition, I was also requested to comment upon the value and applications of these birds with respect to the advancement of biomedical knowledge and production of diagnostics, vaccines and therapeutics.

2. In particular, in correspondence (Exhibit A) that I received in an e-mail from Mr. Carter on January 27th, 2025, I was requested to address the followings questions:

   i. What is the likelihood that the Herd presently is transmissible for H5N1 to each other and wild migratory birds such as ducks?

   ii. If the Herd has achieved herd immunity, is there anything rare and valuable about the Herd that would promote the advancement of biomedical research?

   iii. Is there any risk of transmitting the H5N1 virus from the yolk of the ostrich eggs if they were used for testing and research purposes?

iv. Would the testing for antibodies against the H5N1 virus from the egg yolks be a good measure of natural or vaccine-induced immunity?

v. Is there any evidence that vaccine-induced immunity for influenza is superior to natural immunity following recovery from an influenza infection?

3. I understand that having been named as an expert witness by Universal Ostrich Farms Ltd., and having read the Code of Conduct for Expert Witnesses set out in the schedule to the Federal Court Rules, that I am bound to these rules, including in the preparation of this report (see Exhibit B).

PART 2: COLLECTION OF FACTS IN THE PREPARATION OF THIS EXPERT REPORT

4. My opinion on these matters is informed in part on the following facts that were conveyed in Mr. Carter on January 27th, 2025 correspondence listed below:

i. Universal Ostrich Farms Ltd. ("UOF") is located at 301 Langille Road, Edgewood, British Columbia (the "Property").

ii. The Property is approximately 10 kilometres northwest of Edgewood, British Columbia.

iii. According to Statistics Canada, the 2021 Census Profile of Edgewood lists a total population of 235 people.

iv. The nearest population centres are Vernon, at over 90 kilometres by air, and Castlegar, at over 70 kilometres by air.

v. UOF raises ostriches at the Property.

vi. As of February 2020 UOF was raising about 250 ostriches on the Property.

vii. At that time some ostriches in the herd became sick. Tissue samples were taken from a deceased ostrich and were sent for analysis. A report from the BC Animal Health Centre returned positive results for "Proteus sp., *Pseudomonas aeruginosa* and *E. coli* (non-haemolytic)."

viii. Ten ostriches died around February 2020.

ix. In the following year UOF began increasing the size of the herd, including by purchasing some ostriches from other producers.

x. As of December 1, 2024 there were approximately 450 ostriches being raised at the Property (the "Herd").

xi. On about December 10, 2024 representatives from UOF began noticing some ostriches in the Herd were showing signs of illness.

xii In the following week ostriches began to die from apparent illness.

xiii. On December 29, 2024 representatives from the Canadian Food Inspection Agency ("CFIA") attended at the Property and took swab samples from two of the dead ostriches.

xiv. CFIA tested using the Avian Influenza matrix and H5H7 PCR test, and the test result was positive for the H5N1 type of Avian Influenza.

xv. On December 30, 2024 CFIA issued a written Requirement to Quarantine, which was amended on January 2, 2025, January 12, 2025 and January 24, 2025.

xvi. UOF has been complying with the requirements of the quarantine.

xvii. Between about December 12, 2024 and January 15, 2025, 69 ostriches died of the H5N1 type symptoms.

xviii. No ostriches have died of H5N1 symptoms since January 15, 2025.

xix. The only ostriches of the Herd that died of H5N1 type symptoms belonged to the group of ostriches that did not experience the pseudomonas infection in 2020.

xx. Four ostriches have died of non-H5N1 type symptoms in January 2025. Three of these ostriches slipped on the ice and injured themselves, and one ostrich was caught in a fence.

5. In addition to these facts, I have viewed several media interviews[1,2,3] with Ms. Katie Pasitney, who is the daughter of one of the owner of the UOF, and this has further informed me regarding their history and the use of these ostriches for biomedical research.

6. My own training in immunology and virology and personal experience and understanding of these fields affords me the ability to consider and weigh these issues in a knowledgeable way and offer a qualified expert opinion.

7. I have been actively involved in the study of coronaviruses for over 5 years, especially with respect to the SARS-CoV-2 virus, which is responsible for COVID-19, and the production of antibodies against this virus in people who have been infected by this virus and/or have been vaccinated against this virus. I have been involved in the development of serological tests for SARS-CoV-2 directed antibodies, and the application of these tests to evaluate natural and COVID-19 vaccine-induced immunity in a 4,500-person clinical study. My experience with SARS-CoV-2 is very applicable to influenza, which is caused by a similar respiratory virus. In Part 5 of my report, I will further elaborate on my experience in immunology and viral research to further establish my expertise in the matters under discussion.

8. Throughout this report, I have identified many of the key primary publications in the scientific literature and government websites as well as my own research that have influenced my conclusions about testing for the influenza virus, and the immune responses that the virus and influenza vaccines evoke.

9. The Canadian Food Inspection Agency has adopted a policy to test sick flocks of domesticated birds for the H5N1 influenza virus, and eradicate all the birds in the flock upon confirmation of an influenza infection. They have largely discounted the extent and effectiveness of natural immunity in the birds that have recovered to prevent future infections, and downplayed the

[1] https://www.ctvnews.ca/vancouver/article/bc-farm-fights-order-to-cull-ostrich-herd-after-2-birds-test-positive-for-avian-flu/

[2] https://www.rebelnews.com/power_hungry_feds_order_culling_of_ostrich_farm?utm_campaign=dh_ostrichupdate_012725&utm

[3] https://www.youtube.com/live/dM5xHTKSzV0

important role that serological testing for influenza virus antibodies has in tracking and controlling the avian flu pandemic to allow the Canadian livestock industry to move back towards normalcy. Wild birds, particularly migratory ducks, are commonly infected with the H5N1 strain of influenza, which produces a more virulent infection that can be lethal to birds. Therefore, it is likely that there will continue to be a high risk for future infections of domesticated birds and other livestock, especially if they have no previous immunity to the virus and there is no herd immunity established in the livestock. Various H5N1 influenza vaccine are currently in development to protect bird and other domesticated animals and people.[4] However, the influenza vaccines with attenuated, weakened forms of the virus have actually not been particularly efficacious in the past.

10. In Part 3 of my report, I will provide some background information about the influenza virus, testing for the virus and antibodies against this virus, and then in Part 4 specifically address the questions put forth by the firm of Cleveland & Doan.

PART 3 – BACKGROUND REVIEW OF INFLUENZA, NATURAL AND VACCINE INDUCED IMMUNITY

3.1. Viral Respiratory Diseases

11. Many human and animal infectious diseases are caused by airborne viruses. Notably, these include respiratory syncytial virus (RSV), influenza and coronaviruses. These viruses are highly contagious, mainly transmitted in aerosols received through the mouths and noses of victims. They produce very similar symptoms, which include runny nose, coughing, sneezing, wheezing, fever and decrease in appetite. The symptoms are largely consequences of the body's counter-reactions to a respiratory infection. These viruses infect hosts largely by inhalation of virus-laden

[4] HHS provides $590 million to accelerate pandemic influenza mRNA-based vaccine development, enhance platform capability for other emerging infectious disease. (January 17, 2025) https://www.hhs.gov/about/news/2025/01/17/hhs-provides-590-million-accelerate-pandemic-influenza-mrna-based-vaccine-development-enhance-platform-capability-other-emerging-infectious-disease.html

air. As such, their first opportunity to infect the body occurs in the larger passages of the upper respiratory tract—the nose, pharynx, larynx, trachea and bronchi.

12. Once these viruses invade cells of the upper airways, they hijack the body's intracellular machinery to replicate, and often cause cellular damage in the process by lysing the infected cells. If the body responds well, the immune system will prevent these viruses from spreading beyond the upper airways and will quickly terminate any illnesses induced by these viruses. If the immune response is insufficient, the infection might spread into the lower airways (alveoli) and develop into a much more serious systemic infection (including secondary infections such as bacterial pneumonia). The immune response to respiratory viruses in airway spaces is rather different when compared to an infection of the bloodstream from a skin wound or even an injection of a vaccine.

3.2. Influenza

13. Influenza has been recognized in humans as a seasonal illness for over a century with annual variations in prevalence and severity. Since wild birds can also migrate seasonally, the incidence of influenza is also seasonal in the wild. Adults can become infectious about a day before they manifest any symptoms, and they can remain infectious for five to seven days after the appearance of flu symptoms. These symptoms can include fever, cough, runny nose, body aches, nausea, vomiting, and diarrhea. The symptoms can be very mild to severe, with full recovery occurring in usually one to two weeks. After this time, recovered people and animals are rarely contagious. Adults tend to recover much faster than children.[5]

14. From the Orthomyxoviridae family, the influenza viruses occur in four types, A, B, C and D. The A and B types are mainly responsible for seasonal epidemics of the flu, whereas the C type produces mild illness, and the D type primarily infects cattle.[6] Their genomes consist of 8 segments of negative-sense stranded ribonucleic acid (RNA). Co-infection of the same cell with two different

[5] (2024) How flu spreads. Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/flu/spread/index.html

[6] (2022) Types of influenza viruses. Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/flu/about/viruses/types.htm

influenza viruses can allow the mixing of these segments to generate new variants, especially if one of the influenza strains is from another animal species.

15. The Influenza A viruses are divided into subtypes based on two proteins, *i.e.*, hemagglutinin (H) and neuraminidase (N), which are located on the surface of the virus. There are 18 different hemagglutinin subtypes (H1 though H18) and 11 different neuraminidase subtypes (N1 through N11). More than 130 influenza A subtype combinations have been identified in nature, mainly from wild birds, but there are likely additional influenza A subtype combinations given the propensity for virus "reassortment" of the eight RNA segments. The H1N1 and H3N2 subtypes have been responsible for the more recent influenza pandemics in humans. The H5N1 subtype in only rare occasions has caused serious illness in people, but it can efficiently infect and propagate in birds, and can infect other livestock such as cattle.

16. The most devastating human influenza pandemic on record is the 1918 "Spanish flu", which was caused by the H1N1 influenza virus A. It has been estimated to have produced disease in at least 500 million people, about a third of the world's population at the time, and resulted in up to 50 million deaths.[7] There were four waves of the Spanish flu, with the first occurring between February 15 and June 1, 1918, and the last wave persisting from December 1, 1919, to April 30, 1920.[8] Some 50,000 Canadians and 675,000 Americans appear to have succumbed to this H1N1 influenza A virus between 1919 and 1920. It had an estimated mortality rate of 2.5%, and primarily affected 25- to 40-year-olds. The deaths were primarily due to subsequent secondary bacterial pneumonia. The Spanish flu was probably one of the major factors that led to the end of World War I. The high lethality rate of the Spanish flu was likely a reflection in part of the high rates of war injuries, including damage to the airways and lungs by gas warfare, poor nutrition and inadequate sanitation, and high stress levels during the end and aftermath of World War I.

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[7] Liang, S.T., Liang, L.T., Rosen, J.M. (2021) COVID-19: A comparison to the 1918 influenza and how we can defeat it. Postgrad Med J. 97(1147):273–274. doi:10.1136/postgradmedj-2020-139070

[8] Yang, W., Petkova, E., Shaman, J. (2014) The 1918 influenza pandemic in New York City: Age-specific timing, mortality, and transmission dynamics. Influenza Other Respir Viruses. 8(2):177–188. doi:10.1111/irv.12217

On the termination of the war, the spread of the flu was exacerbated by the return of soldiers to their war-torn, home countries.

17. H1N1 influenza subtypes were prevalent in the 1950s and then largely disappeared until 1977 when they reappeared causing a pandemic that originated in the former USSR.[9] The 1977 H1N1 subtype had a fatality rate of less than 0.005% and was fairly mild; it primarily affected people 26 years of age or younger. The gene sequence of the 1977 H1N1 was almost identical to the N1H1 subtype from 1950,[10] leading scientists to believe it was likely to have "escaped" from a lab that was developing a vaccine against influenza.[11] People older than 26 in 1977 probably already had lasting immunity against the H1N1 strain due to prior exposure. However, influenza A viruses tend to mutate faster than influenza B type viruses, and so evasion of pre-existing immunity is more likely with influenza A viruses. The H1N1 subtype that emerged during the 2009–2010 flu season (called "swine flu" in the media) was caused by a combination of influenza A viruses that infected pigs, birds, and humans.

18. Vaccines against influenza are usually developed for North America based on a mix of the subtypes that appear to be prevalent during the prior flu season in the Southern Hemisphere. Often, these predictions fail, and new influenza vaccines prove to be less effective than desired for the new flu season. For example, in a meta-analysis study of vaccine effectiveness from the 2009–2010 influenza pandemic, it was estimated that in the Northern Hemisphere it was only 22% effective.[12] But when most circulating flu viruses are well-matched to those used to make

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[9] Kung, H.C., Jen, K.F., Yuan, W.C., Tien, S.F., Chu, C.M. (1978) Influenza in China in 1977: Recurrence of influenza virus A subtype H1N1. *Bull World Health Organ.* 56(6):913–918.

[10] Nakajima, K., Desselberger, U., Palese, P. (1978) Recent human influenza A (H1N1) viruses are closely related genetically to strains isolated in 1950. *Nature.* 274(5669):334–339. doi:10.1038/274334a0

[11] Rozo, M., Gronvall, G.K. (2015) The reemergent 1977 H1N1 strain and the gain-of-function debate. mBio. 6(4). doi:10.1128/mBio.01013-15

[12] Okoli, G.N., Racovitan, F., Abdulwahid, T., Righolt, C.H., Mahmud, S.M., *et al.* (2021) Variable seasonal influenza vaccine effectiveness across geographical regions, age groups and levels of vaccine antigenic similarity with circulating virus strains: A systematic review and meta-analysis of the evidence from test-negative design studies after the 2009/10 influenza pandemic. Vaccine. 39(8):1225–1240. doi:10.1016/j.vaccine.2021.01.032

flu vaccines, a reduction of flu illness between 40% to 60% can typically be observed.[13] It is clear that flu vaccines do not eliminate the potential threat of influenza infection in a population.

19. While the incidence of human influenza cases plummeted in 2020 and 2021 during the first two years of the COVID-19 pandemic, about 45% of the recorded influenza cases in Canada in the 2020–2021 season were in people who were recently vaccinated against the virus.[14] Since the influenza viruses in most vaccines tend to be attenuated, *i.e.,* weaker strains of influenza A viruses, there is a risk that some individuals who have weak immune systems that are unable to mount a sufficiently protective immune response, might contract the disease. Some inactive influenza vaccines use heat-killed virus, whereas others use only one of its proteins rather than the whole virus, but these tend to be less effective. With less efficacious vaccines, there remains a risk for a larger population of sick hosts and the increased opportunity for additional mutation of the virus to evade the weaker immune protection.

20. It should be appreciated that most people who die with influenza actually die from pneumonia. For that reason, Statistics Canada usually reports deaths from both influenza and pneumonia together. In the 2019–2020 flu season, there were 306 ICU admissions and 120 deaths with influenza in Canada, and over 70% were from influenza A. Over 90% of the human deaths were associated with at least one comorbidity, usually hypertension or another heart disorder. Typically, about 3,500 deaths with influenza occur annually in people in Canada.[15]

21. Even without prior immune protection from previous infection or vaccination, influenza can be successfully treated in most cases with antiviral drugs. Influenza A and influenza B viruses are sensitive to the recent antivirals oseltamivir (Tamiflu) from Roche and zanamivir (Relenza from GalaxoSmithKline). These are inhibitors of the neuraminidase enzyme on the surface of the

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[13] Centers for Disease Control and Prevention, N. C. f. I. a. R. D. N. (2023) Vaccine effectiveness: How well do flu vaccines work? Retrieved from https://www.cdc.gov/flu/vaccines-work/vaccineeffect.htm

[14] Nwosu, A., Lee, L., Schmidt, K., Buckrell, S., Sevenhuysen, C., Bancej, C. (2021) National Influenza Annual Report, Canada, 2020–2021, in the global context. Can Commun Dis Rep. 47(10):405–413. doi:10.14745/ccdr.v47i10a02

[15] (2023) Seasonal influenza, avian influenza and pandemic influenza. Infection Prevention and Control Canada. Retrieved from https://ipac-canada.org/influenza-resources

influenza particles, which is needed to permit budding and release of the virus from infected host cells.

3.3. The Innate and Adaptive Immune Systems

22. The composition and functioning of the immune system is complex, and involves hundreds of diverse immune-response proteins that affect over 20 different types of immune cells. What follows is a very brief introduction to this amazing multi-pronged defense system against infectious pathogens and cancer.

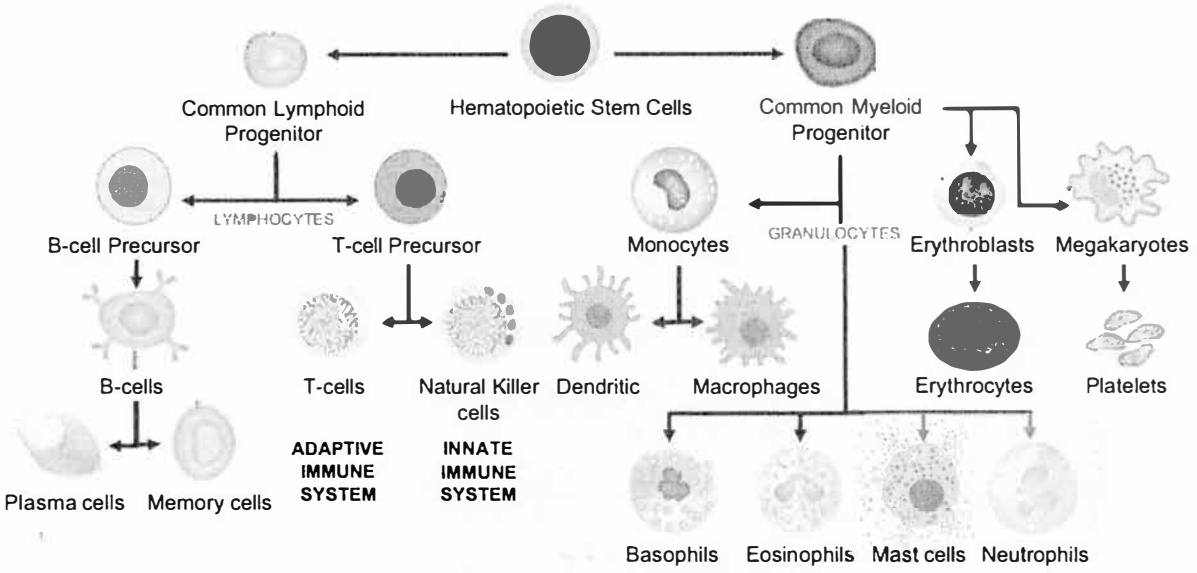
23. There are two main branches, known as the *innate* and the *adaptive* immune systems. The cells of the innate immune system are generally non-specific in their targeting, although they may be guided by antibodies that bind to pathogens. Immune cells develop very quickly, within minutes to days following exposure to a danger signal, and, therefore, are particularly useful for combating new pathogens. The innate immune system is especially strong in infants and children compared to adults. Over time, adaptive immune system cells called *lymphocytes* learn to recognize and remember foreign proteins and other structures called *antigens*. The specific portions that are targeted on an antigen are known as epitopes. The innate immune system, although still very active in adults, is less so due to the increased activity by the adaptive immune system to efficiently deal with an infection. Nonetheless, these two complementary systems work as a tightly coordinated defense force to protect the host against the diverse foreign agents that will be encountered over a lifetime.

24. Immune cells are collectively referred to as *white blood cells* or *leukocytes*. There is typically about one white blood cell for every *700 red bloods cells* or erythrocytes in the blood. There are many distinct leukocyte populations, particularly in the less specific innate immune system (Figure 1). For the purposes of this report, it is most useful to focus on the adaptive immune system. Precursor cells in the lymph nodes mature to form lymphocytes, of which *B-cells* (antibody-producing) and *T-cells* comprise the adaptive immune response. The B- and T-cells remaining after this careful selective process form a diverse pool of naïve lymphocytes that are sensitive to foreign pathogens. Selective stimulation of these naïve cells with antigens on

microbial pathogens triggers their activation and successive divisions and expansion into a clonal army of identical cells that have high specificity for an antigenic epitope (an epitope is the small part of target that is recognized by an antibody or T-cell antigen receptor). As the amount of foreign antigen in the environment declines, such as with the successful eradication of a pathogenic virus, the stimulated lymphocyte clones undergo programmed cell death or revert into an inactive resting state. During this process, memory lymphocytes also develop, which survive for various prolonged periods of times—in some cases even a lifetime—following exposure to a foreign entity. These memory cells can rapidly awaken from their slumber to engage with the pathogen once again when presented with the same or very similar antigens on the pathogen. This allows much faster and more effective immune responses than in their first encounter. This unique feature of long-term immunological memory is why recovery from a pathogenic infection often provides sustained protection against future encounters with that specific pathogen or a highly related pathogen. This is referred to as naturally acquired immunity. The durability of such natural immunity is exemplified with previous influenza infections. For example, plasma and memory B-cells in survivors of the 1918 influenza pandemic could endure for 85 years and could still produce antibodies upon reinfection with the same influenza pathogen.[16] When such immunity is established in a community, it is referred to as herd immunity. If the pathogen becomes endemic in the environment, then this becomes a source of antigen for natural boosting of the immune response as needed.

[16] Yu, X., Tsibane, T., McGraw, P., House, F.S., Keefer, C.J., *et al.* (2008) Neutralizing antibodies derived from the B-cells of 1918 influenza pandemic survivors. Nature. 455(7212):532–536. doi:10.1038/nature07231

Figure 1. Cells of the hematopoietic system.



3.4. Antibodies

25. The specific parts of the foreign antigens, such as tiny portions of viral proteins, that are recognized by B- and T-cells are called epitopes. As part of the *humoral* immune response, B-cells produce *immunoglobulin*s, which are relatively large proteins that bind to specific epitopes on antigens. These *antibodies* are among the most common classes of globulin proteins found in the plasma fraction of blood. Each B-cell initially produces a specific antibody that has affinity for a distinct epitope. Since the body has a broad repertoire of billions of different B-cells to recognize the various foreign antigens that it will encounter in a lifetime, at the start there can only be one of each unique antibody producing B-cell. However, in the process of clonal expansion, engagement of a B-cell with an antigen can induce its rapid proliferation into an army of identical B-cell clones that target exactly the same epitope on the antigen. Different B-cells may produce antibodies that bind to different epitopes on the same antigen; this is referred to as a *polyclonal antibody response*. In the long term, the body does not have the capacity to hold large numbers of each clone, so it expands and contracts the number of B-cell clones as required.

26. The pathogen itself might have many different proteins and other structures to which antibodies can bind. The binding of antibodies to a virus, bacteria or even the toxins produced by them, can block their functional interactions, such as attachment of the pathogen to host receptors to gain entry for replication. Bound antibodies also attract other immune mediators such as *complement proteins* to support the direct attack against antibody-coated infectious pathogens or cells infected with pathogens.

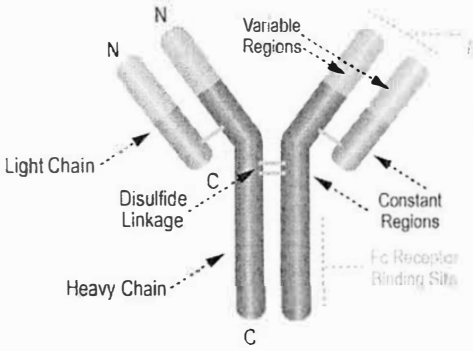
27. Antibodies are amazingly durable proteins. In humans, there are at least five different classes of antibodies that vary in their primary locations of action, ability to dock multiple antigens and stability (Figure 2). In the blood, IgG antibodies predominate, and these can survive for three weeks or more at 37°C, cruising at high speed through the 60,000 plus miles of the arteries, veins, and capillaries in the circulatory system as well as the lymphatic system. Stored at 4°C with antibiotics to prevent bacterial growth, these antibodies can retain their structure and binding properties for over a decade. In the nasopharynx, airway passages, lungs and lower digestive tract, secreted IgA and IgM antibodies can last for about five to six days. These latter antibodies are the most useful for fighting a respiratory virus infection. There are also IgD and IgE class antibodies that tend to exist primarily in the gut.

28. All human antibodies are composed of two identical large (heavy) chains and two identical small (light) chains linked together with disulfide atoms. These interwoven protein chains take on a "Y" shape where the branching portion (called the Fab portion) features two separate, identical binding regions at its tips for recognition of an epitope. This region is unique, with differences in amino acid sequences that define the specificity of an antibody. Due to the presence of two copies of epitope-binding domains in each antibody, antibodies are *bivalent* and can bridge two separate viruses simultaneously to cluster them into larger inactive complexes. The other end of the antibody, which is almost identical for antibodies of the same class, is known as the "Fc" portion and acts as a tail-piece. Many different cells of the innate immune system have specific Fc receptors, and so are directed to antibody-coated pathogens to facilitate their destruction. Antibodies of the IgD, IgE and IgG types are bivalent as they occur as only as monomers, or single units. However, IgA type antibodies can occur in units of two (dimers), four (tetramers), or five

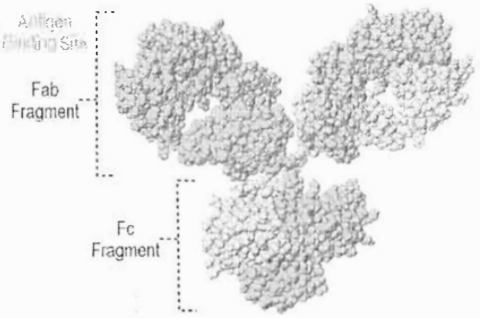
(pentamers) as well, and IgM antibodies exist in complexes as pentamers or hexamers (6 copies) (Figure 2). This and other unique features of IgA and IgM class antibodies strengthen the mucosal antibody response to pathogenic microbes. These classes are better able than IgG class antibodies to sequester viruses and bacteria for destruction by roving macrophages. However, vaccines that are injected intramuscularly predominately generate IgG class antibodies.

Figure 2. Structures of Immunoglobulins. For visualization purposes, the light and heavy chains of the immunoglobulins are shown in different colors as space-filling representations of atoms on each of these macromolecules.

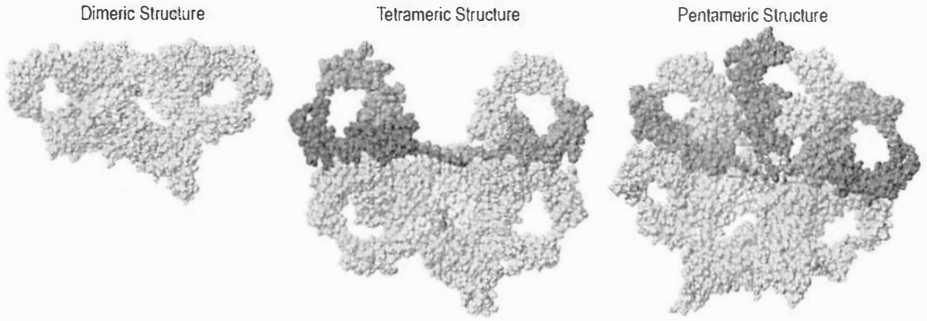
A) Diagrammatic Representation of IgG



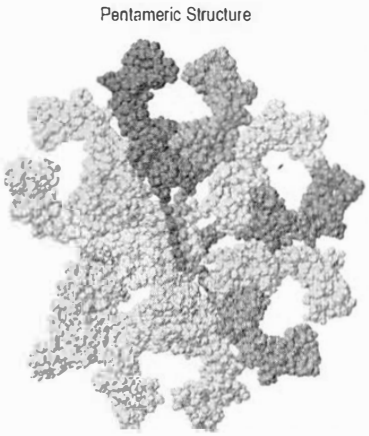
B) Crystal Structure of IgG



C) Crystal Structures of Secreted IgA



D) Crystal Structures of Secreted IgM



3.5. Detection of Viral Infections by PCR

29. Birds, amphibians and reptiles also produce a class of immunoglobulin known as IgY antibodies. These represent the major antibodies in these animals and are particularly concentrated in the yolks of bird eggs. The IgY structure is very similar to that of IgG antibodies with 2 light chains and 2 heavy chains, but they are less flexible than mammalian IgG.

30. The volume of an ostrich egg, about 1.3-1.4 liters, is typically about 25-time the volume of a chicken egg. Ostrich egg yolks contain about 4 grams of IgY, which is equivalent to the yield from the blood of about 8 rabbits.[17] Ostrich IgY are highly resistant to heat (up to 100°C) and pH changes (from 3.5 to 12).

31. There are two major types of testing used to determine whether a person or animal is actively infected with a pathogen like influenza. A nucleic acid test (NAT), most commonly the Reverse Transcription - Polymerase Chain Reaction (RT-PCR)-based test, has been used for detection of the RNA component of the virus. It relies on amplification of the viral nucleic acid material through repeated heating and cooling cycles of separation and annealing of the nucleic acid strands, with a doubling of the genetic material with each thermal cycle. The other type of test is the rapid antigen test (RAT), which typically detects the presence of a viral protein.

32. The main issue with the RT-PCR test is that it often employs a high number of thermal cycles (Ct), which can generate a large percentage of false-positive results. Individuals can still test positive with the RT-PCR test two weeks after they have fully recovered from COVID-19 and are non-contagious. It is not possible to amplify the viral protein material in a rapid antigen test, so it suffers from a lack of sensitivity and can often generate false-negatives. Depending on the specificity of the antibody detection reagent used, it may also cross-react with related proteins found in other influenza strains and produce false-positives for a target strain such as H5N1.

[17] https://ostritec.com/blog/ostrichs-strong-immune-system-leading-to-breakthrough-in-antibody-technology-research-/

33. While RT-PCR tests are based on a remarkable technology, they should not be used as a standalone "gold standard" test for defining cases of influenza or any other pathogen. It is wholly inappropriate to diagnose influenza, which is an illness with symptoms similar to those produced by infections with other respiratory viruses such as coronaviruses and RSV, based only on the presence of influenza RNA as detected by the PCR test. A positive result with a PCR test does not necessarily mean a person or animal has influenza and is able to transmit the disease. It is feasible that a person or animal may test positive for a virus from a swab from the mouth or nose simply by breathing in fragmented portions of the genome of the virus, which are replication incompetent. Cross-contamination of samples undergoing testing in a lab is also an issue with PCR-based testing.[18]

34. Firstly, every laboratory conducting RT-PCR tests for the detection of influenza should have determined an appropriate Ct cut-off through parallel testing of samples using the gold standard functional virology assay in which evidence of replication-competent, potentially infectious virus particles is obtained by looking for evidence of cytopathic effect (killing) in what are known as *permissive cells* (cells stripped of their antiviral properties so that viruses can readily infect them). For example, this was performed with the SARS-CoV-2 virus by Canada's National Microbiology Laboratory, with the Ct cut-off determined to be only 24, meaning that tests showing positive results at Ct values greater than 24 failed to demonstrate the presence of potentially infectious viral particles.

35. Ideally, following a positive-result with a PCR test, a collected sample from a swab should be tested for its ability to infect and kill permissive cells in culture. Alternatively, the sample can be

[18] Chandra, R. (2023) Preventing cross contamination in an infectious disease testing laboratory. Medical Laboratory Observer. https://www.mlo-online.com/management/lab-safety/article/53056019/preventing-cross-contamination-in-an-infectious-disease-testing-laboratory

injected into a fertilized, intact egg and tracked for the ability of the inoculate containing a pathogen to interfere with the development of the embryo in the egg.[19]

36. Secondly, the presence of replication-competent viral particles in a sample does not necessarily equate to a case of influenza, which is a disease with symptoms. The latter can only be diagnosed if an active infection is present in conjunction with signs and/or symptoms of illness, which would require assessment by a physician or veterinarian. However, it is typical for private and government laboratories to categorized swab samples with Ct cut-offs of up to 38 cycles and, in some cases, in the absence of clinical data, as representing positive cases of viral infection. However, this is associated with greater than 90% rate of false-positives with respect to replication-competent virus. Consequently, in the absence of data providing the Ct cut-off established using a functional virology assay, a PCR testing result alone is dubious.

37. Studies have shown that if more than 26 cycles of PCR amplification are required to detect the presence of SARS-CoV-2 RNA, the viral content is insufficient to propagate the virus in optimal cell culture conditions in a laboratory.[20] Unfortunately many results reported in the scientific literature are based on the use of 35 thermal cycles or greater. The extreme sensitivity of the PCR test to detect inactive virus is exemplified by its common use to detect the presence of the SARS-CoV-2 virus RNA (likely in a fragmented form) in waste water to monitor community levels of SARS-CoV-2 infection. The same issue would be true for influenza virus detection.

38. The Public Health Agency of Canada website "Avian influenza A(H5N1): For Health Professionals" states that:

> *"Influenza A and B RT-PCR with subtyping (H5) should be the primary method for detection of avian influenza A(H5N1). Any positive samples must be shared with the National Microbiology Laboratory (NML) for confirmatory testing and analysis to*

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[19] Testing protocol. Detection of pathogens by the inoculation Test in embryonated chicken eggs. US Department of Agriculture Center for Veterinary Biologicals. https://www.aphis.usda.gov/sites/default/files/VIRPRO1017.pdf

[20] Bullard, J., Dust, K., Funk, D., Strong, J.E., Alexaner, D., *et al.*, (2020) Predicting infectious SARS-CoV-2 from diagnostic samples. Clin. Infect. Dis. Ciaa638. doi:10.1093/cid/ciaa638

fulfill NML's obligations as a National Influenza Centre and Canada's obligations under the International Health Regulations and other agreements."[21]

39. Whether there is such a requirement for the Canadian Food Inspection Agency to also verify positive-PCR test results for influenza with the National Microbiology Laboratory in Winnipeg is unclear to me.

3.6. Rapid Antigen Tests for SARS-CoV-2

40. Unlike PCR tests that monitor for the presence of viral mRNA or DNA, antigen tests detect the presence of target proteins encoded by the genome of the pathogen. This relies on the availability of pre-made antibodies that bind specifically to one or more of the virus's proteins. Such antibodies may be generated in animals inoculated with target viral proteins artificially manufactured in cells, described as *recombinant* versions of the proteins. These recombinant proteins are believed to be essentially identical to the original viral proteins, although they may be subjected to minor genetic modifications. A major difference between the antigen tests and the genetic tests is that the number of viral protein molecules in a sample cannot be amplified as it is using the PCR method.

41. During the COVID-19 pandemic, many Canadian provincial health authorities recommended widespread use of rapid antigen tests, especially for those who did not receive at least two injections of a COVID-19 vaccine. However, the inability of the Abbott rapid antigen test to detect SARS-CoV-2 in asymptomatic people was confirmed in a study conducted by the Canadian Public Health Laboratory. The test kit was unable to detect SARS-CoV-2 in samples that tested positive with RT-PCR cycle thresholds greater than 22 (*i.e.*, Ct amplifications greater than 22 are required for a positive-result). People testing positive at cycle thresholds of 22 or less are very likely to be sick (*i.e.,* symptomatic).[22]

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[21] Avian influenza A(H5N1): For health professionals. Public Health Agency of Canada. (November 11, 2024) Retrieved from https://www.canada.ca/en/public-health/services/diseases/avian-influenza-h5n1/health-professionals.html

[22] (2021) Interim guidance for the detection of SARS-CoV-2 with the Abbott Panbio COVID-19 antigen rapid test. Public Health Agency of Canada. Retrieved from https://www.canada.ca/en/public-

42. Typically, swabs of mucus from inside the nose or back of the throat of a person or animal, the cloaca of birds, or a sample of blood are used in rapid antigen tests. There are several commercial rapid antigen test kits for detection of the H5N1 strain influenza viral proteins, including the CTK Biotech OnSite® Influenza A/B Ag Rapid Test,[23] the Ringbio Avian Influenza Antigen Test Kit, AIV Ag Test,[24] and GlobalDx Herdscreen® GDX84-2 AIV H5 Ag Test.[25]

3.7. Serological Tests for Antibodies Against Viruses

43. Once a virus is cleared by the immune system of recovered survivors of an infection, evidence of a previous infection and immunity is best established by the presence of antibodies in their blood and other body fluids such as saliva, or less commonly, by the presence of specific T lymphocytes in their blood.

44. Blood tests for antibody detection have the advantage that they are highly sensitive and can provide a measure of the immunity present in a previously infected individual, even years after the initial exposure to the virus. However, it is also possible to pick up cross-immunoreactivities with antibodies produced against related viral proteins found in other related viruses.

45. Serological antibody tests work by immobilizing a purified protein from a pathogen on a surface such a cellulose membrane, or glass or plastic slide. If an antibody present in a blood or saliva sample recognizes the protein or peptide as an antigen, then it may tightly bind to it. The binding of that antibody is then detected with a secondary antibody that recognizes the Fc portion of the primary antibody being tracked. For example, this could be an anti-human IgG antibody made in rabbits, sheep or even ostriches. The secondary antibody is tagged with a dye, or an enzyme that generates a dye, which will be visible on the surface of the antigen-coated membrane or slide.

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health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2021-47/issue-1-january-2021/interim-guidance-detection-sars-cov-2-abbott-panbio-antigen-rapid-test.html

[23] https://ctkbiotech.com/onsite-influenza-a-b-ag-rapid-test/

[24] https://www.ringbio.com/solutions/poultry/avian-influenza-antigen-test-kit

[25] https://globaldx.com/avian-flu/

For high throughput testing of many specimens at the same time, enzyme-linked immunosorbent assay (ELISA) plates are also commonly used.

46. According to the US CDC website on H5N1 serology testing, "*there are no commercially available H5N1 serological test since such testing does not currently have a clinical role in patient care*."[26] Part of the challenge for development of a specific serological test for H5N1 proteins is the high degree of amino acid sequence identity between both the hemagglutinin (H) and neuraminidase (H) proteins of the different influenza strains. Figures 3 and 4 shows the amino acid identities and similarities between the N and H proteins of the most common influenza strains that target chickens. Inspection of these alignments of the amino acid sequences of the 5 most common H proteins and 7 most common N proteins in strains of influenza that account for most infections of chickens reveals a high degree of what is referred to as homology within the two groups of H and N proteins. This means that antibodies against one strain of the influenza virus are likely to give a positive-test result against several other strains of the virus if recombinant full length versions of these viral proteins are used as the antigens for detection of anti-H or anti-N antibodies present in serological samples. Furthermore, it is also likely that a previous exposure to one or more of these other influenza virus strains will confer some degree of protection and immunity against the H5N1 strain.

Figure 3. CLUSTAL O(1.2.4) multiple sequence alignments of 5 chicken influenza virus hemagglutinin (H) proteins using amino acid sequences from the Uniprot (www.uniprot.org) database. Each of the 20 possible amino acid types is represented with a single letter in the sequences of five representative H types. Amino acid identity (100% match) is represented with asterisks and amino acid similarity is represented by colons (highly similar) and periods (moderately similar). This alignment comparison was generated by Dr. Pelech using the automated software available at the Uniprot website.

```
tr|Q4ZJF4|Q4ZJF4_9INFA  H9   MEAVSLITILL----VVTVSNADKICIGYQSTNSTETVDTLTENNVPVTHAKELLHTEHN   56
sp|P09345|HEMA_I59A0    H5   ME--RIVLLLA----IVSLVKSDQICIGYHANKSTKQVDTIMEKNVTVTHAQDILERTHN   54
sp|P19695|HEMA_I75A4    H4   MLSITILFLLIAEGSSQNYTGNPVICLGHHAVSNGTMVKTLTDDQVEVVTAQELVESQHL   60
sp|P12581|HEMA_I49A0    H10  MYKVVVIIALL-----GAVRGLDKICLGHHAVANGTIVKTLTNVQEEVTNATETVESTSL   55
sp|P09343|HEMA_I85A3    H7   MNTQILILTLV----AAIHTNADKICLGHHAVSNGTKVNTLTERGVEVVNATETVERRTI   56
                             *    ::  *            **:*:::  .   *.*: :    *. * : :.
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[26] CDC report on Missouri H5N1 serology testing. U.S. Centers for Disease Control and Prevention. (October 24, 2024) Retrieve from https://www.cdc.gov/bird-flu/spotlights/missouri-h5n1-serology-testing.html

```
tr|Q4ZJF4|Q4ZJF4_9INFA  H9  GMLCATNLGHPLILDTCTIEGLIYGNPSCNLLLGGREWSYIVERPSAVNGLCYPGNVENL  116
sp|P09345|HEMA_I59A0    H5  GKLCSLNGVKPLILRDCSVAGWLLGNPMCDEFLNVPEWSYIVEKDNPINSLCYPGDFNDY  114
sp|P19695|HEMA_I75A4    H4  PELCPS-PLRLVDGQTCDIVNGALGSPGCNHLNG-AEWDVFIERPTAV-DTCYPFDVPDY  117
sp|P12581|HEMA_I49A0    H10 NRLCMK-GRSYKDLGNCHPIGMLIGTPACDLHLT-GTWDTLIERKNAI-AYCYPGTTINE  112
sp|P09343|HEMA_I85A3    H7  PRICTK-GKKAIDLGQCGLLGIITGPPQCDQFLE-FTADLIIERREGN-DVCYPGKFVNE  113
                              :*           *   .   * * *:        . ::*:       ***    :

tr|Q4ZJF4|Q4ZJF4_9INFA  H9  EELRSLFSSASSYQSIQIFPDTIWNVSY--SGTSKAC----SDSFYGSMRWLAQK--NNA  168
sp|P09345|HEMA_I59A0    H5  EELKHLLSSTNHFEKIQIIPRSSWSNHDASSGVSSACPYIGRSSFFRNVVWLIKK--DNA  172
sp|P19695|HEMA_I75A4    H4  QSLRSILANNGKFEFI--VEKFQWNT-VKQNGKSGACKRANENDFFTNLNWLTKS-DGNA  173
sp|P12581|HEMA_I49A0    H10 GALRQKIMESGGISKT--STGFAYGSSINSAGTTKACMRNGGDSFYAEVKWLVSKDKGQN  170
sp|P09343|HEMA_I85A3    H7  EALRQILRESGGINKE--TTGFTYSG-IRTNGVTSACRR-LGSSFYAEMKWLLSNTDNAA  169
                              *:  : . .  .         :.     * : **     ..*: .: ** ..  .

tr|Q4ZJF4|Q4ZJF4_9INFA  H9  YPIQDAQYTNNRGKNIPFMWGINHPPTDTVQTNLYTRTDTTTSVATEDINRTFKPLIGPR  228
sp|P09345|HEMA_I59A0    H5  YPTIKRSYNNTNQEDLLILWGIHHPNDAAEQTKLYQNPTTYVSVGTSTLNQRSIPEIATR  232
sp|P19695|HEMA_I75A4    H4  YPLQNLTKVNNGDYARLYIWGVHHPSTDTEQTNLYENNPGRVTVSTKTSQTSVVPNIGSR  233
sp|P12581|HEMA_I49A0    H10 FPQTTNTYRNTDTAEHLIIWGIHHPSSTQEKNDLYGTQSLSISVGSSTYQNNFVPVVRAR  230
sp|P09343|HEMA_I85A3    H7  FPQMTKSYKNTRNEPALIVWGIHHSGSATEQTKLYGSGNKLITVGSSNYQQSFVPSPGAR  229
                            :*       *.       :**::*      :..**       :*.:.  :    *    *

tr|Q4ZJF4|Q4ZJF4_9INFA  H9  PLVNGQQGRIDYYWSVLKPGQTLRVRSNGNLTAPWYGHILSGESHGRILKTDLNSGNCVV  288
sp|P09345|HEMA_I59A0    H5  PKVNGQSGRMEFFWTILKPNDAINFESNGNFIAPEYAYKIVKKGDSAIMKSGLAYGNCDT  292
sp|P19695|HEMA_I75A4    H4  PWVRGQSGRISFYWTIVEPGDIIVFNTIGNLIAPRGHYKLNSQKKSTILNTAVPIGSCVS  293
sp|P12581|HEMA_I49A0    H10 PQVNGQSGRIDFHWTLVQPGDNITFSHNGGRIAPSRVSKLVGRGL-GIQSEASIDNGCES  289
sp|P09343|HEMA_I85A3    H7  PQVNGQSGRIDFHWLILNPNDTVTFSFNGAFVAPDRVSFFKGKSM-GIQSEVPVDTNCEG  288
                            * *.**.**:.:.* :::*.: : .   *   **     :  .    * .      .*

tr|Q4ZJF4|Q4ZJF4_9INFA  H9  QCQTERGGLNTTLPFHNVSKYAFGNCPKYVGVKSLKLAVGLRNVPAR----SSRGLFGAI  344
sp|P09345|HEMA_I59A0    H5  KCQTPVGAINSSMPFHNIHPHTIGECPKYVKSDRLVLATGLRNVPQR----KKRGLFGAI  348
sp|P19695|HEMA_I75A4    H4  KCHTDRGSITTTKPFQNISRISIGDCPKYVKQGSLKLATGMRNIPEK----ATRGLFGAI  349
sp|P12581|HEMA_I49A0    H10 KCFWRGGSINTKLPFQNLSPRTVGQCPKYVNKKSLMLATGMRNVPEIM---QGRGLFGAI  346
sp|P09343|HEMA_I85A3    H7  ECYHNGGTITSNLPFQNVNSRAVGKCPRYVKQKSLLLATGMKNVPEIPKKREKRGLFGAI  348
                            :*    * :.:. **:*:   :.*.**:**    * **.*::*:*        *******

tr|Q4ZJF4|Q4ZJF4_9INFA  H9  AGFIEGGWSGLVAGWYGFQHSNDQGVGMAADRDSTQKAIDKITSKVNNIVDKMNKQYEII  404
sp|P09345|HEMA_I59A0    H5  AGFIEGGWQGMVDGWYGYHHSNEQGSGYAADKESTQKAIDGITNKVNSIIDKMNTQFKAV  408
sp|P19695|HEMA_I75A4    H4  AGFIENGWQGLIDGWYGFRHQNAEGTGTAADLKSTQAAIDQINGKLNRLIEKTNEKYHQI  409
sp|P12581|HEMA_I49A0    H10 AGFIENGWEGMVDGWYGFRHQNAQGTGQAADYKSTQAAIDQITGKLNRLIEKTNTEFESI  406
sp|P09343|HEMA_I85A3    H7  AGFIENGWEGLVDGWYGFRHQNAQGEGTAADYKSTQSAIDQITGKLNRLIEKTNQQFELI  408
                            *****.**.*:: ****::*.* :* * *** .*** *** *..*:* :::* * ::. :

tr|Q4ZJF4|Q4ZJF4_9INFA  H9  DHEFSEVETRLNMINDKIDDQIQDIWAYNAELLVLLENQKPLDEHDANVNNLYNKVKRTL  464
sp|P09345|HEMA_I59A0    H5  GKEFNNLERRVENLNKKMEDGFLDVWTYNVELLVLMENERTLDFHDSNVKNLYDKVRLQL  468
sp|P19695|HEMA_I75A4    H4  EKEFEQVEGRIQDLEKYVEDTKIDLWSYNAELLVALENQHTIDVTDSEMDKLFERVRRQL  469
sp|P12581|HEMA_I49A0    H10 ESEFSEIEHQIGNVINWTKDSITDIWTYQAELLVAMENQHTIDMADSEMLNLYERVRKQL  466
sp|P09343|HEMA_I85A3    H7  DNEFTEVEKQIGNVINWTRDSITEVWSYNADLLVAMENQHTIDLADSEMNKLYERVRRQL  468
                              ** ::* ::  : .   *   ::*:*:.:*** :**:: :*  *::: :*:::*:  *

tr|Q4ZJF4|Q4ZJF4_9INFA  H9  GSNAVEDGKGCFELYHKCDDQCMETIRNGTYNRRKYKEESRLERQKIEGVKLESEGTYKI  524
sp|P09345|HEMA_I59A0    H5  KDNARELGNGCFEFYHKCDNECMESVRNGTYDYPQYSEEARLNREEISGVKLESMGVYQI  528
sp|P19695|HEMA_I75A4    H4  RENAEDKGNGCFEIFHQCDNNCIESIRNGTYDHDIYRDEAINNRFQIQGVKLTQ-GYKDI  528
sp|P12581|HEMA_I49A0    H10 RQNAEEDGKGCFEIYHTCDDSCMESIRNNTYDHSQYREEALLNRLNINSVKLSS-GYKDI  525
sp|P09343|HEMA_I85A3    H7  RENAEEDCTGCFEIFHKCDDDCMASIRNNTYDHSTYREEAMQNRVKIDPVKLSS-GYKDV  527
                              .** :  .****::* **:.*: ::**.**:   * :*:  :* :*. *** . *  .:

tr|Q4ZJF4|Q4ZJF4_9INFA  H9  LTIYSTVASSLVIAMGFAAFLFWAMSNGSCRCNICI   560
sp|P09345|HEMA_I59A0    H5  LSIYSTVASSLALALMIAGLSFWMCSNGSLQCRICI   564
sp|P19695|HEMA_I75A4    H4  ILWISFSISCFLLVALLLAFILWACQNGNIRCQICI   564
sp|P12581|HEMA_I49A0    H10 ILWFSFGASCFVLLAAVMGLVFFCLKNGNMQCTICI   561
sp|P09343|HEMA_I85A3    H7  ILWFSLGASCFLLLAIAMGLVFMCVKNGNMRCTICI   563
                            :   *   *.: :     .: :   .**. :* ***
```

Figure 4. CLUSTAL O(1.2.4) multiple sequence alignments of 7 chicken influenza virus neuramidase (N) proteins using amino acid sequences from the Uniprot (www.uniprot.org) database. Each of the 20 possible amino acid types is represented with a single letter in the sequences of five representative H types. Amino acid identity (100% match) is represented with asterisks and amino acid similarity is represented by colons (highly similar) and periods (moderately similar). This alignment comparison was generated by Dr. Pelech using the automated software available at the Uniprot website.

```
tr|D1LM97|D1LM97_9INFA          N8  MNPNLKIITIGSVSLGLVVLNILLHIVSIT---ITVLVLPGD-GNN---------GSCNE 47
sp|Q809V2|NRAM_I01A2            N1  MNPNQKIITIGSICMVIGIVSLMLQIGNIISIWVSHSIQTGNQHQA---------EPCNQ 51
sp|P18881|NRAM_I000F            N7  MNPNQKLFALSGVAIALSVLNLLIGISNVGLNVSLHLKGEGVKQENNLTCTTITQ--NNT 58
tr|A0A0C4K198|A0A0C4K198_9INFA  N9  MNPNQKILCTSATAIIIGAIAVLIGIANLGLNIGLHLKPGCNCSHSQPET---TN--TSQ 55
tr|A0A0K0YAR4|A0A0K0YAR4_9INFA  N6  MNPNQKITCISATGMTLSVVSLLIGIANLGLNIGLHYKVSDSTTINIPNM---NE--T-- 53
tr|A6M7W4|A6M7W4_9INFA          N3  MNPNQKIITLGVVNTTLSTIALIIGVGNLIFNTVIHEKIGDHQTVVYPTVTPPGTPNCSD 60
sp|P09573|NRAM_I83A6            N2  MNPNQKIITIGSVSLTIATVCFLMQIAILATNVTLHFRQNERSIPAYNQTTP-----CKP 55
                                    **** *:   .     :  : .:: :  :

tr|D1LM97|D1LM97_9INFA          N8  TVIREYNETVRIEKITQWHNTNIIE-YIEKPESDLFMNNTEPLCDAKGFAPFSKDNGIRI 106
sp|Q809V2|NRAM_I01A2            N1  SIITYENNTWVNQTYVNISNTNL---LTEKAVASVTLAGNSSLCPISGWAVYSKDNGIRI 108
sp|P18881|NRAM_I000F            N7  TVVENTY----------VNNTTIINKG-TNLKAPNYLLLNKSLCSVEGWVVIAKDNAIRF 107
tr|A0A0C4K198|A0A0C4K198_9INFA  N9  TII-NNY----------YNETNITNIQMEERTSRNFNNLTKGLCTINSWHIYGKDNAVRI 104
tr|A0A0K0YAR4|A0A0K0YAR4_9INFA  N6  ------N----------PTTTNITNIIVNKNEERTFLNLTKPLCEVNSWHILSKDNAIRI 97
tr|A6M7W4|A6M7W4_9INFA          N3  TIITYNN----------TVVNNITTTII--AEAEKHFKPSLPLCPFRGFFPFHKDNAIRL 108
sp|P09573|NRAM_I83A6            N2  I------------------------II--ERNIKYRNWSKPQCQITGFAPFSKDNSIRL 88
                                                                .  *   .:    ***.:*:

tr|D1LM97|D1LM97_9INFA          N8  GSRGHVFVIREPFVSCSPTECRTFFLTQGSLLNDKHSNGTVKDRSPYRTLMSVGIGQSPN 166
sp|Q809V2|NRAM_I01A2            N1  GSKGDVFVIREPFISCSHLECRTFFLTQGALLNDKHSNGTVKDRSPYRTLMSCPVGEAPS 168
sp|P18881|NRAM_I000F            N7  GESEQIIVTREPYVSCDPSGCKMYALHQGTTIRNKHSNGTIHDRTTFRGLISTPLGTPPT 167
tr|A0A0C4K198|A0A0C4K198_9INFA  N9  GESSDVLVTREPYVSCDPDECRFYALSQGTTIRGKHSNGTIHDRSQYRALISWPLSSPPT 164
tr|A0A0K0YAR4|A0A0K0YAR4_9INFA  N6  GEDAHILVTREPYLSCDPQGCRMFALSQGTTLRGRHANGTIHDRSPFRALISWEMGQAPS 157
tr|A6M7W4|A6M7W4_9INFA          N3  GENKDVIVTREPYVSCDNDGCWSFALAQGALLGTKHSNGTIKDRTPYRSLIRFPIGTAPV 168
sp|P09573|NRAM_I83A6            N2  SAGGGIWVTREPYVSCDPSKCYQFALGQGTTLDNNHSNGTIHDRTPHRTLLMNELGVPFH 148
                                    .    : * ***::**.   *  : * **: :  .*:***::**: .* *:   :.

tr|D1LM97|D1LM97_9INFA          N8  VYQARFEAVAWSATACHDGKKWMTIGVTGPDAKAVAVVHYGGIPTDVINSWAGDILRTQE 226
sp|Q809V2|NRAM_I01A2            N1  PYNSRFESVAWSASACHDGTSWLTIGISGPDNGAVAVLKYNGIITDTIKSWRNNILRTQE 228
sp|P18881|NRAM_I000F            N7  VSNSDFICVGWSSTSCHDGVGRMTICIQGNNDNATATVYYNRRLTTTIKTWAKNILRTQE 227
tr|A0A0C4K198|A0A0C4K198_9INFA  N9  VYNSRVECIGWSSTSCHDGKSRMSICISGPNNNASAVVWYNRRPVAEINTWAQNILRTQE 224
tr|A0A0K0YAR4|A0A0K0YAR4_9INFA  N6  PYNTRVECIGWSSTSCHDGISRMSICISGPNNNASAVVWYRGRPVTEIPSWVGNILRTQE 217
tr|A6M7W4|A6M7W4_9INFA          N3  LGNYKEICVAWSSSSCFDGKEWMHVCMTGNDNDASAQIIYAGKMTDSIKSWRRDILRTQE 228
sp|P09573|NRAM_I83A6            N2  LG-TRQVCIAWSSSSCHDGKAWLHVCVTGDDRNATASFIYNGMLVDSIGSWSQNILRTQE 207
                                        .:.**:::*.**   : : : * :  * * . *    .  * :*  :******

tr|D1LM97|D1LM97_9INFA          N8  SSCTCIQGECYWVMTDGPANRQAQYRAFKAKQGKIIGQTEIS-FNGGHIEECSCYPNEGK 285
sp|Q809V2|NRAM_I01A2            N1  SECACVNGSCFTVMTDGPSNGQASYKIFKIEKGKVVKSVELN-APNYHYEECSCYPDAGE 287
sp|P18881|NRAM_I000F            N7  SECVCYNGTCAVVMTDGPASSQAYTKIMYFHKGLIIKEEPLR-GSARHIEECSCYGHDQK 286
tr|A0A0C4K198|A0A0C4K198_9INFA  N9  SECVCHNGVCPVVFTDGSATGPADTRIYYFKEGKILKWESLT-GTAKHIEECSCYGERTG 283
tr|A0A0K0YAR4|A0A0K0YAR4_9INFA  N6  SECVCHKGICPVVMTDGPANNKAATKIIYFKEGKIQKIEELQ-GNAQHIEECSCYGAAGM 276
tr|A6M7W4|A6M7W4_9INFA          N3  SECQCIDGTCVVAVTDGPAANSADHRVYWIREGRVIKYENVPKTKIQHLEECSCYVDI-D 287
sp|P09573|NRAM_I83A6            N2  SECVCINGTCTVVMTDGSASGKADIRILFIREGKIVHISPLS-GSAQHIEECSCYPRYPN 266
                                    *.* * .* *  ..*** :   *  :    .:* :     :      * ******

tr|D1LM97|D1LM97_9INFA          N8  VECVCRDNWTGTNRPVLVISSD-LSYRVGYLCAGLPSDTPRGEDNQFTGSCTSPMGN--Q 342
sp|Q809V2|NRAM_I01A2            N1  ITCVCRDNWHGSNRPWVSFNQN-LEYQIGYICSGVFGDNPRPNDG--TGSCGPVSPN--G 342
sp|P18881|NRAM_I000F            N7  VSCVCRDNWQGANRPIIEIDMSTLEHTSRCVCTGVLTDTSRPGDKP-NGDCSNPITGSPG 345
tr|A0A0C4K198|A0A0C4K198_9INFA  N9  ITCTCRDNWQGSNRPVIQIDPVAMTHTSQYICSPVLTDNPRPNDPN-IGKCNDPYPGN-N 341
tr|A0A0K0YAR4|A0A0K0YAR4_9INFA  N6  IKCVCRDNWKGANRPIITIDPEMMTHTSKYLCSKILTDTSRPNDPT-NGNCDAPITGGSP 335
tr|A6M7W4|A6M7W4_9INFA          N3  VYCVCRDNWKGSNRPWMRINNE-TILETGYVCSKFHSDTPRPADPS-TVSCDSPSNVN-G 344
sp|P09573|NRAM_I83A6            N2  VRCVCRDNWKGSNRPVIDINMADYSIDSSYVCSGLVGDTPRNDDSSSSSNCRDPNNER-G 325
                                    : *.***** *:*** : :.          :*: .  *. *  *     .*
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tr|D1LM97|D1LM97_9INFA          N8  GYGVKGFGFRQGNDVWMGRTISRTSRSGFEILRVRDGWIQ-NSKEQIKRQVVVDNLNWSG 401
sp|Q809V2|NRAM_I01A2            N1  AYGIKGFSFKYGNGVWIGRTKSTNSRSGFEMIWDPNGWTG-TDSNFSVKQDIVAITDWSG 401
sp|P18881|NRAM_I000F            N7  APGVKGFGFLNGDNTWLGRTISPRSRSGFEMLKIPNAETD-PNSRIIERQEIVDNSNWSG 404
tr|A0A0C4K198|A0A0C4K198_9INFA  N9  NNGVKGFSYLDGANTWLGRTISTASRSGYEMLKVPNALTD-DRSKPIQGQTIVLNADWSG 400
tr|A0A0K0YAR4|A0A0K0YAR4_9INFA  N6  DPGVKGFAFLDGENSWLGRTISKDSRSGYEMLKVPNAETD-TQSGPTSYQLIVNNQNWSG 394
tr|A6M7W4|A6M7W4_9INFA          N3  GPGVKGFGFKTGDDVWLGRTVSISGRSGFEIIRVAEGWINSPNHAKSVTQTLVSNNDWSG 404
sp|P09573|NRAM_I83A6                NPGVKGWAFDIGDDVWMGRTISKDSRSGYETFRVIGGWATANSKSQTNRQVIVDNNNWSG 385
                                      *:**:.:  * . *:*** *  .***:* :    .           * :*   :***

tr|D1LM97|D1LM97_9INFA          N8  YSGSFTLPVELTRRNCLVPCFWVEMIRGKPEEK--TMWTSSSSIVMCGVDHEIADWSWHD 459
sp|Q809V2|NRAM_I01A2            N1  YSGSFVQHPELTGVDCIRPCFWVELIRGRPKES--TIWTSGSSISFCGVNSDTVGWSWPD 459
sp|P18881|NRAM_I000F            N7  YSGSFIDCWD-EANECYNPCFYVELIRGRPEEAKYVWWTSNSLIALCGSPVSVGSGSFPD 463
tr|A0A0C4K198|A0A0C4K198_9INFA  N9  YSGSFMDYWA-E-GDCYRACFYVELIRGRPKEDK-VWWTSNSIVSMCSSTEFLGQWNWPD 457
tr|A0A0K0YAR4|A0A0K0YAR4_9INFA  N6  YSGAFIDYWA-N-KECFNPCFYVELIRGRPKEID-VLWASNSMVALCGSRERLGSWSWHD 451
tr|A6M7W4|A6M7W4_9INFA          N3  YSGSFIV----ENNGCFQPCFYVELIRGRPNKNDDVSWTSNSIVTFCGLDNEPGSGNWPD 460
sp|P09573|NRAM_I83A6            N2  YSGIFSV----ESKSCINRCFYVELIRGRPQE-TRVWWTSNSIVVFCGTSGTYGTGSWPD 440
                                    *** *          *   **:**:***:*::   . *:*.* : :*.       .: *

tr|D1LM97|D1LM97_9INFA          N8  GAILPFDIDKM  470
sp|Q809V2|NRAM_I01A2            N1  GAELPFTIDK-  469
sp|P18881|NRAM_I000F            N7  GAQIQYFS---  471
tr|A0A0C4K198|A0A0C4K198_9INFA  N9  GAKIEYFL---  465
tr|A0A0K0YAR4|A0A0K0YAR4_9INFA  N6  GAEIIYFK---  459
tr|A6M7W4|A6M7W4_9INFA          N3  GSNIGFMPK--  469
sp|P09573|NRAM_I83A6            N2  GANINFMPL--  449
                                    *: : :
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47. A microneutralization assay is another test for the presence of antibodies in a specimen sample that is capable of blocking the ability of the avian influenza H5N1 virus to bind to host cells and cause their death. However, this is a more cumbersome and expensive test that takes longer and requires the use of cells in culture, and focuses only on a subset of antibodies in a sample that can confer immune protection.[27]

48. While commercial serological tests for anti-H5 or anti-N1-specific antibodies do not apparently exist, it is very feasible to quickly develop such tests. There are several regions in the amino acid sequences of the hemagglutinin and neuraminidase proteins that are highly unique and distinguishable from the other influenza strains as can be seen in Figures 3 and 4. Short peptides based upon these amino acid sequences can easily be produced commercially and tested for their immunogenicity to antibodies recovered in blood samples from humans or egg yolk samples from birds. This kind of testing for antibodies in human blood samples against the SARS-CoV-2 proteins

[27] Protocol for enhanced human surveillance of avian influenza A(H5N1) on farms in Canada. Public Health Agency of Canada. (November 20, 2024) Retrieved from https://www.canada.ca/en/public-health/services/diseases/avian-influenza-h5n1/health-professionals/protocol-enhanced-human-surveillance-avian-influenza-farms-canada.html

that was previously undertaken in my own laboratory.[28] This involved the use of peptide SPOT arrays in which all of the 28 predicted proteins encoded by the SARS-CoV-2 genome were synthesized directly on cellulose membranes in short peptides of 14 amino acid length. This allowed the testing of over 6,000 peptides as potential markers of a SARS-CoV-2 immune response.

49. These COVID-19-related studies in my lab demonstrated that certain regions of the SARS-CoV-2 protein elicited particularly robust antibody responses in people that recovered from COVID-19. Approximately 4,500 participants were tested for SARS-CoV-2 antibodies in their serum in this clinical study that I led at Kinexus Bioinformatics. Interestingly, many people, who never developed symptoms of COVID-19, were found to have strongly immunoreactive antibodies, which probably accounted for why they did not show any symptoms of infection during the multiple waves of COVID-19 cases during the pandemic. These studies also revealed that different people had very distinctive patterns of antibody reactivity against the various SARS-CoV-2 epitopes, and these patterns were very stable for more than a year for the same person. This may reflect, in part, genetic differences between the clinical study participants. It is also likely that the antibodies that immunoreacted against the SARS-CoV-2 peptides were generated in asymptomatic individuals from exposure to other coronaviruses previously in their history, and this conferred a degree of immunity from getting sick when exposed to SARS-CoV-2.

50. As someone who recognizes the importance of development of sensitive and specific tests to evaluate immunity against H5N1 influenza, whether by natural infection or by immunization with vaccines, it seems to me that the herd of ostriches at Universal Ostrich Farms site represent a very unique opportunity to develop such antibody tests. SPOT arrays with a set of optimal H5N1 peptides would be useful not only for evaluation of the potential immunity of wild and domesticated birds to H5N1 infection, but also easily adapted for testing humans and other livestock such as minks, pigs and cows.

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[28] Majdoubi, A., Michalski, C., O'Connell, S.E., Dada, S., Narpala, S. *et al.* (2021) A majority of uninfected adults show pre-existing antibody reactivity against SARS-CoV-2. *JCI Insight* 6(8): e14631. https://doi.org/10.1172/jci.insight.146316

PART 4 – THE RISKS OF INFLUENZA TRANSMISSION FROM THE UOF HERD AND THEIR VALUE

51. In this section of my expert report, I will comment on the specific questions that I was asked to address by Cleveland Doan LLP.

52. **What is the likelihood that the Herd presently is transmissible for H5N1 to each other and wild migratory birds such as ducks?**

53. At this time, it is highly unlikely that H5N1 is being actively transmitted within the Herd or that it would be transmissible to humans, wild birds or other animals. It would appear that the Herd has achieved a high degree of natural immunity. My conclusions are based on the following observations that are described as facts in paragraph 4, and additional information that I have learned from listening to the owners of the UOF ostriches.

54. The Herd underwent a period of illness around February 2020, which resulted in the deaths of 10 of the approximately 250 ostriches that were on-site. While this was diagnosed as a possible bacterial pseudomonas or *E. coli* infection at the time, the symptoms associated with the illness were also consistent with influenza. The first report of a pathogenic H5N1 virus in Canada was in December 2021 in Newfoundland and Labrador.[29] However, this particular virulent strain of H5N1 was already detected in wild birds in Europe in 2020, and the first H5N1 strain was first detected in geese in China in 1996.[30] Therefore, it is feasible that the ostrich herd could have been infected with H5N1 or a highly related influenza strain in 2020. In addition, secondary bacterial infections following initial influenza infection often are accompanied by a pseudomonas infection.[31]

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[29] Distribution of highly pathogenic avian influenza in North America, 2021/2022. National Wildlife Health Center. (November 27, 2022) Retrieved from https://www.usgs.gov/centers/nwhc/science/distribution-highly-pathogenic-avian-influenza-north-america-20212022

[30] Katella, K. (2024) H5N1 Bird Flu: What you need to know. Yale Medicine. Retrieved from https://www.yalemedicine.org/news/h5n1-bird-flu-what-to-know

[31] Morris, D.E., Cleary, D.W., Clarke, S.C. (2017) Secondary bacterial infections associated with influenza pandemics. Front Microbiol. 8:1041. doi: 10.3389/fmicb.2017.01041.

55. It is significant that with the recent outbreak of what appears to be H5N1 in the UOF Herd, all of the deaths were in younger ostriches that were not on the farm prior to 2021. None of the older ostriches that survived the 2020 outbreak died or were seriously ill. This is extremely strong evidence that these older birds already had natural immunity to H5N1, most likely from a previous exposure. That 69 of some 200 younger birds succumbed to the recent infection indicates that this was a particularly virulent strain, and yet it had minimal effect on the older ostriches.

56. It is somewhat problematic that only a PCR-test for H5N1 was performed on two of the ostriches that died in January of this year. As pointed out in the previous section, performed at a high thermal cycle (Ct) number, this test has a high rate of false-positives. It is unclear at what Ct number the test was performed by the CFIA. For positive-test results with human cases of H5N1, this is normally rechecked by the National Microbiology Laboratory in Winnipeg. It is not known to the owners of UOF whether this was done or even if the PCR test was repeated.

57. It is also unclear whether the presence of viable H5N1 was in the mouth and rectal samples from the two dead birds retrieved by the CFIA inspectors. Normally, the samples would be checked for their ability to infect and kill cells in culture or injected into fertilized eggs and cause developmental defects or loss of viability of the embryo. However, on the basis of probabilities, it seems likely that these birds did die with an influenza H5N1 infection.

58. The main issue is whether the remaining ostriches represent a health hazard to each other, the staff and visitors to the UOF, and wild birds and animals that come to the farm. In view of the information that there was been no deaths from infectious disease on the farm for over two weeks, and all of the ostriches appear to be healthy, it is highly likely that herd immunity has been achieved in the flock. It is extremely unlikely that they would be shedding virus to each other, their caretakers, and to other birds and animals. The longer that these birds remain healthy, the lower the risk of potential transmission of the virus.

59. To confirm that these ostriches have natural immunity, I recommend that the antibody levels against the H5 and N1 proteins be tested in a subset of the younger ostriches as well as some of

the older birds, which are likely to serve as positive controls. The owners and staff that attend these birds should also be tested to determine if they also have natural immunity.

60. It is likely that the ostriches at the UOF were originally infected by sick ducks that visited the farm during their migration and intermingled with ostriches as they attempted to eat their feed. It is likely that these flocks of wild birds have been developing their own natural immunity to the H5N1 virus. If the UOF ostriches have achieved natural immunity to H5N1, then this flock may actually offer some protection to wild birds from future infection with the virus. Wild birds that come to the UOF would be less likely to visit other neighbouring sites and infect birds and other animals at those locations, which would be naïve to the virus and more vulnerable to getting sick and further propagating the spread of the virus.

61. By breeding ostriches that are able to easily recover from a viral infection like H5N1, it is also feasible to produce offspring that are even more resistant to future viral epidemics. However, if a herd is completely destroyed after the first signs of H5N1 infection, it would likely be replaced by young birds that have had no previous exposure to the virus and not necessarily to right genetics to limit future infections and prevent sickness and death.

62. **If the Herd has achieved herd immunity, is there anything rare and valuable about the Herd that would promote the advancement of biomedical research?**

63. As pointed out in paragraph 30, the ostrich is an amazing model system for the production of antibodies for research and even therapeutic purposes. The IgY antibodies that are enriched in the yolk of the largest eggs that are produced by birds. These antibodies are also the most heat and pH resistant antibodies known,[17] which makes these immunoglobulins extremely attractive for industrial applications. One example of this is the use of the anti-SARS-CoV-2 antibodies to coat masks to offer increased protection from infection and reduced transmission of this virus

during a COVID-19 outbreak, which is an application developed by Dr. Yasuhiro Tsukamoto at Kyoto University in Japan.[32] Dr. Tsukamoto is an active collaborator with the UOF.

64. The high yield of IgY antibody in the yolk of ostrich eggs is extremely convenient for large scale antibody production, as it is unnecessary to have to subject the animals to any stress. In my own lab, we have been producing antibodies that target proteins that are important disease research for over 36 years, using rabbits. For the production of rabbit antibodies, we have to obtain the blood from the animal, which involves bleeding from its ear or termination of the animal and exsanguination. From one rabbit, the median yield of an affinity-purified antibody is in own hands is about 1.5 mg. In the biomedical research reagent market, this amount of antibody against an interesting target protein is worth about $6,000 if it is all sold. For comparison, from one ostrich egg, around 12 mg or more of affinity-purified antibody can be obtained, which would be worth about $48,000. if it was all sold. Literally, ostrich hens can lay golden eggs if the right proteins are targeted for development of highly desirable antibodies. Moreover, due to their long reproductive life spans, ostriches can keep producing more eggs over a period of decades.

65. Another advantage of using ostriches as opposed to using mammals like rabbits, goats, sheep, horses and mice for antibody production is that there is greater success in being able to produce a desired antibody, since the physiology of birds is more distinct and it is less likely that the antigen may resemble a naturally occurring human protein. Due to phenomena of tolerance, B-cells that recognize proteins in the body are often killed off early in development of the immune system to avoid the development of auto-immune disease.

66. In addition to antibody development, ostrich eggs are rich in oils, fats and other enzymes, including proteases and carbohydrolases such as lysozyme, which also have industrial applications.

[32] Finney, A. (2022) Kyoto University creates mask from ostrich cells that glows when coronavirus is detected. Dezeen. Retrieved from https://www.dezeen.com/2022/01/11/ostrich-coronavirus-detection-mask-glow-kyoto-university-yasuhiro-tsukamoto/

67. Due to the continued use of the UOF ostriches in biomedical research, their genetic profiling, their history of H5N1 infection, their long lifespan, and the banking of their eggs, they represent an important potential research model. For example, they can be used to evaluate how long and effective herd immunity to H5N1 can last.

68. **Is there any risk of transmitting the H5N1 virus from the yolk of the ostrich eggs if they were used for testing and research purposes?**

69. Intact ostrich eggs are normally sterile due to their thick shell wall. If an egg somehow became infected with a bacteria or virus during its development, it would not fully form and this would be plainly evident. The oviduct of the bird where the eggs develop is located very far from the organs and tissues where a respiratory virus would initially take hold. The yolk of the egg is highly enriched with IgY antibodies, which are usually present to protect the developing embryo from infection from a pathogen that may be in the environment of the egg-laying hen. While eggs can be used to propagate attenuated forms of viruses for vaccine development, they have to be injected with the virus through the egg shell. Therefore, the risk of transmission of the H5N1 virus in the yolk of ostrich eggs is extremely remote for testing purposes. Moreover, the yolk could be pasteurized by heat treatment to kill bacteria and viruses, since the IgY antibodies are very resistant to high temperatures.

70. **Would the testing for antibodies against the H5N1 virus from the egg yolks be a good measure of natural or vaccine-induced immunity?**

71. Testing egg yolks from an ostrich hen for the presence of antibodies against a virus like H5N1 would be an ideal method to evaluate natural immunity from a previous infection or immunity that may be produced using a vaccine. This method yield a large amount of antibody with no invasive treatment of the bird to obtain sufficient specimens for testing purposes.

72. **Is there any evidence that vaccine-induced immunity for influenza is superior to natural immunity following recovery from an influenza infection?**

73. Attenuated strains of influenza virus have often been used to elicit immunity in humans and animals. However, the efficacy is usually below 50%. Other methods using RNA-based genetic vaccines for influenza are being developed, but if these work in a manner similar to the COVID-19 mRNA vaccines, then their efficacy and safety are questionable. This is in part due to the fact that usually a single protein of the surface of the virus is usually targeted. With natural immunity, an immune response is generated against potentially all of the proteins of the virus. Moreover, the response is less likely to induce autoimmunity.

PART 5: QUALIFCATIONS AND ACKNOWLEGEMENTS AS AN EXPERT ON IMMUNOLOGY

74. I am a full Professor in the Department of Medicine and Division of Neurology at the University of British Columbia (UBC), where I have been on faculty since 1988. I was one of the founding senior scientists of The Biomedical Research Centre at UBC starting in 1987. I hold B.Sc. Honours (1979) and Ph.D. (1982) degrees in Biochemistry from UBC. My post-doctoral training was at the University of Dundee with Sir Philip Cohen, and at the University of Washington in Seattle with Nobel laureate Dr. Edwin Krebs.

75. I have previously completed several courses in microbiology, immunology and virology during my B.Sc. undergraduate training, and I was a founding and senior scientist for six years at The Biomedical Research Centre, which was an immunology focused institute located at UBC, where I have remained on faculty as a professor in the Department of Medicine for over 36 years. Over a dozen of my scientific research articles have appeared in specialty immunology journals, including the *Journal of Immunology, Blood, Molecular Immunology, Immunology, Infectious Immunology, Cancer Immunology and Immunotherapy*, *International Journal of Vaccine Theory, Practice and Research* and *Vaccines*. These studies document some of my work to understand the molecular mechanisms by which different immune cells, including macrophages, T and B cells become activated.

76. My lectures in formal graduate level courses include teaching in immunology and virology at UBC. I have presented my research at over 100 national and international scientific conferences. As a

faculty member at UBC, I regularly attend grand-rounds and other seminar by speakers on biomedical research on a weekly basis as part of my continuing education as a professor.

77. My UBC lab and spin-out companies have been engaged in the production and testing of over 1,600 antibodies for our internal research programs and for commercial sale for over 28 years. My research has routinely involved for over 36 years, the use of standard and novel immunological techniques developed in my lab, such as Western blotting, dot blotting, antibody microarrays, reverse lysate microarrays and epitope mapping for determination of where antibodies specifically bind their targets.

78. I have authored over 280 scientific publications in peer-reviewed journals and book chapters about cell communication systems important for cell survival and function and implicated in the pathology of cancer, diabetes, neurological and immunology-related diseases. My accolades include the 1993 Martin F. Hoffman Award for Research at UBC, and the 1993 Merck Frosst Canada Prize from the Canadian Society of Biochemistry and Molecular Biology. I was the 2001 Distinguished Lecturer for the Faculty of Medicine at UBC for the Basic Sciences. I have served on grant review panels for the US National Institutes of Health, the Canadian Institutes for Health Research, the National Research Council of Canada, the Michael Smith Health Research Foundation, Genome Alberta, Genome Prairie, the Canadian National Cancer Institute, the Canadian Heart and Stroke Foundation and the American Heart Association, and I have acted as an external reviewer for 22 other agencies including the U.S. National Science Foundation and the Israel Science Foundation. I have also been an external reviewer for over 30 different scientific journals, including those that are focused on immunology and vaccines.

79. I was the founder and president of Kinetek Pharmaceuticals Inc. from 1992 to 1998, and the founder, president and chief scientific officer of Kinexus Bioinformatics Corporation from 1999 to the present. Kinetek was engaged in the development of drugs that inhibit protein kinases, primarily for oncology application and diabetes. Kinexus has produced over 1,600 antibody products against cell regulatory proteins, and employs these antibodies in novel, immunology-based, high throughput methods such as antibody microarrays to monitor cell communication systems in biological specimens from over 2000 academic and industrial clients in over 35

countries over the last 25 years. These antibody products include those that specifically recognize proteins in the SARS-CoV-2 virus as well as host proteins that interact with viral proteins.

80. My expertise has been sought specifically with respect to understanding the immunological mechanisms by which a natural immune response is elicited by SARS-CoV-2, the causative agent of COVID-19, and the immunity afforded by the lipid nanoparticle spike RNA- and adenovirus spike DNA-based COVID-19 vaccines. This has been informed, in part, by clinical studies undertaken in the last 5 years at my company Kinexus in which we have investigated the nature and production of antibodies against the 28 different proteins that are encoded by the SARS-CoV-2 viral genome, by examination of blood samples from over 4,500 participants from across Canada. In this independent ethics review board approved clinical study, I was the lead investigator, and I have been in direct communication with all of the participants. Some of our preliminary findings have already been published in *JCI Insights*, which is the flagship journal of the American Society for Clinical Investigation in 2021.[28] Additional manuscripts that document our SARS-CoV-2 antibody testing study are currently in preparation, and we are now engaged in a second antibody testing study to determine the extent of immunity against the Omicron variants and the duration effectiveness of the COVID-19 vaccines.

81. I have also investigated the use of drugs to inhibit the replication of the SARS-CoV-2 virus in infected host cells. My expertise on enzymes known as protein kinases has permitted me to predict and then verify that compounds that inhibit a protein kinase known as GSK3-beta can block the production of the spike of the virus, and assembly of SARS-CoV-2 virus particles. A provisional patent based on this work has already been filed with the University of British Columbia (UBC) and a manuscript that describes this work has been accepted for publication.[33] I have also spearheaded the development commercial antibodies against many of the SARS-CoV-2 proteins and verified their utility in another published scientific article in the peer-reviewed

[33] Shapira, T., Rens, C., Pichler, V., Rees, W., Steiner, T., Jean, F., Winkler, D.F.H., Sarai, I., Pelech, S., Av-Gay, Y. (2022) Inhibition of glycogen synthase kinase-3-beta (GSK3β) blocks nucleocapsid phosphorylation and SARS-CoV-2 replication. *Molecular Biomedicine.* 3, 43. Retrieved from https://doi.org/10.1186/s43556-022-00111-1

journal Microbial Factories.[34] I am presently working on inhibitory therapeutic peptides that target the NSP15 protein of the SARS-CoV-2 virus.

82. In addition to the direct study of the SARS-CoV-2 and immune responses to this virus in people, I am also a co-founder and vice president of the Canadian Citizens Care Alliance (CCCA) (formerly the Canadian Covid Care Alliance) and very active within this organization. The CCCA's membership include over 600 biomedical scientists, medical doctors and other health practitioners, and the CCCA examines the scientific literature and data from public health authorities to ascertain the threat of COVID-19 and the various strategies available to mitigate its effects. In my capacity as the co-chair of the Scientific and Medical Advisory Committee (SMAC) of the CCCA, I oversee the activities of a panel of 35 scientists and medical doctors that seeks to provide a scientific evidence-based and balanced, independent, but critical assessment of health care policies related to COVID-19. This Committee has met weekly or biweekly over the last three years by Zoom, but typically has daily correspondences by e-mails. The fruits of our efforts are published on the CCCA website (www.canadiancovidcarealliance.org) and in peer-reviewed scientific journals. In particular, I was a coauthor on a CCCA report that critiqued the original 6-months clinical study performed by Pfizer/BioNTech on their BNT162b2 RNA vaccine,[35] a published review about COVID-19 vaccines and pregnancy in the peer-reviewed *Journal of Vaccine Theory, Practice and Research*.[36] In addition, I am a coauthor on several other publications that have been posted on the CCCA website that relate to the manufacturing and

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[34] McGuire, B.E., Mela, J.E., Thompson, V.C., Cucksey, L.R., Stevens, C.E., McWhinnie, R.L., Winkler, D.F.H., Pelech, S., Nano, F.E. (2022) *Escherichia coli* recombinant expression of SARS-CoV-2 protein fragments. *Microbial Cell Factories*. 21:21. https//doi.org/10.1186/s12934-022-01753-0. *bioRxiv* pre-print. Retrieved from https://doi.org/10.1101/2021.06.22.449540)

[35] Bridle, B.W., Martins, I., Mallard, B.A., Karrow, N.A., Speicher, D.J., Chaufan, C., Northey, J.G.B., Pelech, S., Shaw, C.A., Halgas, O. (2021) Concerns regarding the efficacy and safety for BNT162b2 mRNA coronavirus disease (COVID-19) vaccine through six months. www.CanadianCovidCareAlliance.org (January 10, 2022) 1-10 Retrieved from https://www.canadiancovidcarealliance.org/wp-content/uploads/2022/01/Final-CCCA-Critique-Thomas-COVID-19-Vaccines-6-months-NEJM-Jan-10-22.pdf

[36] McLeod, D., Martins, I., Pelech, S., Beck, C., Shaw. C.A. (2022) Dispelling the myth of a pandemic of the unvaccinated. *Int. J. Vaccine Theory Practice Res.* 2(1):267-286.

quality issues associated with the BNT162b2 mRNA COVID-19 vaccine,[37] the efficacy and safety of the BNT162b2 mRNA COVID-19 vaccine based on phase III trial results,[38] and the vaccination of children with COVID-19 vaccines.[39]

83. Recently, I was the leading editor and an author of several chapters in two multi-authors book on COVID-19 that have just been published.[40,41] My *curriculum vitae* is attached as **Exhibit C**, and provides a more detailed account of my professional activities.

84. I believe that my formal training, experience and published research, demonstrates my expertise in immunology, and my recent activities specifically related to SARS-CoV-2 over the last three years, places me in an excellent situation to comment upon related matters such as immunity to the influenza virus. I have been sought as an Expert Witness for several court cases with respect to natural and vaccine-induced immunity with respect to COVID-19.

85. A listing of some court cases related to COVID-19 matters that I have been asked to furnish sworn affidavits or file expert reports includes, but is not limited to:

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[37] Gutchi, M., Speicher, D. J., Natsheh, S., Oldfield, P., Britz-McKibbon, P., Palmer, M., Karrow, N., Massie, B., Mallard, B., Chan, G. Pelech, S. (2022) An independent analysis of the manufacturing and quality control issues of the BNT162b BioNTech/Pfizer vaccine identified by the European Medicine Agency. www.Canadian Covid Care Alliance.org (October 29, 2022) 1-5 https://www.canadiancovidcarealliance.org/wp-content/uploads/2022/11/22OC29_EMA-Analysis-of-BNT162b-Manufacture.pdf

[38] Bridle, B.W., Martins, I., Mallard, B.A., Karrow, N.A., Speicher, D.J., Chaufan, C., Northey, J.G.B., Pelech, S., Shaw, C.A., Halgas, O. (2021) Concerns regarding the efficacy and safety for BNT162b2 mRNA coronavirus disease (COVID-19) vaccine through six months. www.CanadianCovidCareAlliance.org (January 10, 2022) 1-10 https://www.canadiancovidcarealliance.org/wp-content/uploads/2022/01/Final-CCCA-Critique-Thomas-COVID-19-Vaccines-6-months-NEJM-Jan-10-22.pdf

[39] Payne, E., Rennebohm,R., Bridle, B., Mallard, B., Karrow, N., Massie, B., Northey, K., Shoemaker, C., Pelech, S., Chaufan C., McLeod, D., Hardie, J., Pinto, C., Britz-McKibbin, P., Shaw, C. (2022) Request to halt vaccinations of children. www.CanadianCovidCareAlliance.org (July 14, 2022) 1-28 https://www.canadiancovidcarealliance.org/wp-content/uploads/2022/07/CCCA-Halt-vaccination-of-children-Officials-Letter-Jul-14-22.pdf

[40] (2024) Down the COVID-19 rabbit hole: Independent scientists unmask the pandemic. (ed. S. Pelech & C. Shaw) Skyhorse Publishing, Inc., New York, USA.

[41] (2025) COVID-19 Pandemonium: A pandemic of ignorance, fear and greed. The capture of our institutions. Ekstasis Press, Victoria, B.C., Canada

a.	COURT FILE NUMBER	210600780
	COURT	COURT OF QUEEN'S BENCH OF ALBERTA
	JUDICIAL CENTRE	LETHBRIDGE
	APPLICANT	HAYLEY NASSICHUK-DEAN
	RESPONDENT	UNIVERSITY OF LETHBRIDGE
		Cross-examination Feb. 16, 2022
b.	COURT FILE NUMBER	T-1694-21
	COURT	FEDERAL COURT OF CANADA (Trial Division)
	APPLICANT	DAVID LAVERGNE-POITRAS
	RESPONDENTS	ATTORNEY GENERAL OF CANADA (Minister of Public Services and Procurement) – and – PMG TECHNOLOGIES INC.
		Cross-examination September 8, 2022
c.	COURT FILE NUMBER	T-168-22-ID-1
	COURT	FEDERAL COURT OF CANADA
	APPLICANTS	THE HONOURABLE A. BRIAN PECKFORD, LEESHA NIKKANEN, KEN BAIGENT, DREW BELOBABA, NATALIE GRCIC, AND AEDAN MACDONALD
	RESPONDENTS	THE MINISTER OF TRANSPORT and THE ATTORNEY GENERAL OF CANADA
		Cross-examination May 13 and 16, 2022
d.	COURT FILE NUMBER	2101-13202
	COURT	COURT OF QUEEN'S BENCH OF ALBERTA
	JUDICIAL CENTRE	CALGARY
	APPLICANTS	DR. ERIC T. PAYNE, DR. JOANNE J. MOSER, DR. DAVID W. L. LOEWEN and DR. GREGORY CHAN
	RESPONDENTS	ALBERTA HEALTH SERVICES, DR. VERNA YIU IN HER CAPACITY AS CHIEF EXECUTIVE OFFICER OF ALBERTA HEALTH SERVICES, DR. JOHN T. CHMELICEK IN HIS CAPACITY AS POST GRADUATE PROGRAM DIRECTOR, DEPARTMENT OF FAMILY MEDICINE, UNIVERSITY OF ALBERTA -and- THE UNIVERSITY OF ALBERTA
e.	COURT FILE NUMBER	CV-21-00670360-0000
	COURT	SUPERIOR COURT OF JUSTICE ONTARIO
	APPLICANTS	SARAH HARJEE, EVAN KRAAYENBRINK, HIBAH AOUN, SARAH LAMB, SAM SABOURIN, JACKIE RAMNAUTH, MARK MCDONOUGH -and- LINDA MCDONOUGH
	RESPONDENT	HER MAJESTY THE QUEEN IN RIGHT

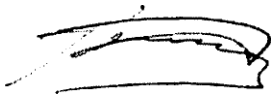
OF THE PROVINCE OF ONTARIO
Cross-examination April 28 & May 5, 2022

f.	COURT FILE NUMBER	FDF-443-19
	COURT	COURT OF QUEEN'S BENCH OF NEW BRUNSWICK
	JUDICIAL CENTRE	FAMILY DIVISION JUDICIAL DISTRICT OF FREDERICTON
	APPLICANT	VICTORIA LYNN MITHAM
	RESPONDENT	BRADLEY SCOTT FOLLETT
g.	COURT FILE NUMBER	72/2022
	COURT	HIGH COURT OF SOUTH AFRICA
	JUDICIAL CENTRE	FREE STATE DIVISION, HELD AT BLOEMFONTEIN
	APPLICANTS	SOLIDARITY obo MEMBERS, SOLIDARITY YOUTH Obo MEMBERS, JOANNA STANDER, SHANIQUE PIENAAR, ALICE FLORENCE MARINA STANDER - and - ANNELI BOTHA
	RESPONDENTS	CHAIRMAN OF THE COUNCIL OF THE UNIVERSITY OF THE FREE STATE– and – THE UNIVERSITY OF THE FREE STATE
		h.
h.	COURT FILE NUMBERS	C.A.C.V.3903of202 C.A.C.V.3904of2021 C.A.C.V.3908of2021
	COURT	COURT OF APPEAL FOR SASKATCHEWAN ON APPEAL FROM THE QUEEN'S BENCH (FAMILY LAW DIVISION)
	JUDICIAL CENTRE	JUDICIAL CENTRE OF SASKATOON DIV. No. 625 of 2012
	APPLICANT	OLENA MYKOLAYIVNA SCHEMENAUER
	RESPONDENT	EVAN JOSEPH SCHEMENAUER
i.	COURT FILE NUMBER	FD 19-01-22922
	COURT	COURT OF QUEEN'S BENCH (FAMILY DIVISION)
	JUDICIAL CENTRE	WINNIPEG CENTRE
	APPLICANT	JORDAN SARAH CURÉ
	RESPONDENT	KENNETH PETER TYSON CURÉ
j.	COURT FILE NUMBER	E59176
	COURT	SUPREME COURT OF BRITISH COLUMBIA
	JUDICIAL CENTRE	NEW WESTMINISTER
	APPLICANTS	VICTORIA LARA DRAPER AKA VICTORIA LARA DRAPER SMITH

	RESPONDENT	MATTHEW LAWRENCE NEALE SMITH
k.	COURT FILE NUMBER	E17315
	COURT	SUPREME COURT OF BRITISH COLUMBIA
	JUDICIAL CENTRE	CHILLIWACK REGISTRY
	APPLICANT	DALE JAMES HOOGENDOORN
	RESPONDENT	KATIE NADINE HOOGENDOORN
		Testimony Feb. 17, 2022.
l.	COURT FILE NUMBER	FC-13-917-02
	COURT	SUPERIOR COURT OF JUSTICE FAMILY COURT BRANCH
	JUDICIAL CENTRE	OSHAWA REGISTRY
	APPLICANT	KAREN DIAZ (BOL)
	RESPONDENT	BRENT BOL
m.	COURT FILE NUMBER	2022/1456 P
	COURT	HIGH COURT OF IRELAND
	APPLICANTS	DAVID EGAN AND SHARON BROWNE AND EMMANUEL LAVERY
	RESPONDENTS	MINISTER FOR HEALTH, AN TAOISEACH, AND HSE
n.	ARBITRATION	
	EMPLOYER	HUMBER RIVER HOSPITAL
	UNION	NATIONAL ORGANIZED WORKERS UNION
		Grievances: NOWU Policy Service #170,2021 (All Bargaining Units) Covid Directive 6, NOWU Policy Service #01,2022 (All Bargaining Units) Covid Policy, 2022-NOWU-Clerical-55-HRH; Grievance of Gail Ackie
		Cross-examination Feb. 20, 22 & 29, 2023
o.	COURT FILE NUMBER	No. S2110229
	COURT	SUPREME COURT OF BRITISH COLUMBIA
	JUDICIAL CENTRE	NEW WESTMINISTER
	APPLICANTS	CANADIAN SOCIETY FOR THE ADVANCEMENT OF SCIENCE IN PUBLIC POLICY and KIPLING WARNER
	RESPONDENT	DR. BONNIE HENRY IN HER CAPACITY AS PROVINCIAL HEALTH OFFICER FOR THE PROVINCE OF BRITISH COLUMBIA
p.	COURT	ONTARIO
	APPLICANT	VALERIE ALAGNA
	RESPONDENT	HAMILTON HEALTH SCIENCES CORPORATION

q.	DISCIPLINARY HEARING	
	CASE	2021-AF-01136
	COLLEGE	COLLEGE OF NURSES OF ONTARIO
	DEFENDENT	SARAH A. CHOUJOUNIAN-ABULU
		Cross-examination April 13 & 14, May 19, June 9 & 30, July 8, 2023
r.	DISCIPLINARY HEARING	
	COLLEGE	BC COLLEGE OF NURSES AND MIDWIVES
	DEFENDENT	SEAN TAYLOR
		Cross-examination July 19 & 20, 2023
s.	DISCIPLINARY HEARING	
	CASE	CPSID 17223; IC2021-0481; IC2021-0535
	COLLEGE	COLLEGE OF PHYSICIANS AND SURGEONS OF BC
	DEFENDENT	DR. CHARLES HOFFE
t.	COURT FILE NUMBER	CV-22-0069-1880-0000
	COURT	ONTARIO SUPERIOR COURT OF JUSTICE
	APPLICANT	DR. BYRAM BRIDLE
	RESPONDENTS	UNIVERSITY OF GUELPH, JEFFREY WICHTEL, LAURIE ARNOTT, CHARLOTTE YATES, SCOTT WEESE, GLEN PYLE, ANDREW PEREGRINE, DOROTHEE BIENZLE, AMY GREER, DAVID FISMAN, NICK DULEY, JANE OR JOHN DOE JUNIOR SCIENTIST
u.	COURT	COURT OF KING'S BENCH ALBERTA
	JUDICIAL CENTRE	GRANDE PRAIRIE
	APPLICANT	ANNETTE LEWIS
	RESPONDENTS	ALBERTA HEALTH SERVICES AND REDACTED PARTIES
v.	COURT FILE NUMBER	SCBC Action E222370
	COURT	SUPREME COURT OF BRITISH COLUMBIA
	JUDICIAL CENTRE	VANCOUVER REGISTRY
	APPLICANT	TRICIA MARIE BARR ALLARD
	RESPONDENT	PATRICK JAMES ALLARD
w.	DISCIPLINARY INVESTIGATION	
	CASE	IC 2022
	COLLEGE	COLLEGE OF PHYSICIANS AND SURGEONS OF BC
	DEFENDANT	DR. SOFIA T. BAYFIELD

Respectfully submitted by,



Steven Pelech, Ph.D.

Professor,
Department of Medicine,
University of British Columbia

President and Chief Scientific Officer,
Kinexus Bioinformatics Corporation

Vice-President, and Co-Chair,
Scientific and Medical Advisory Committee,
Canadian Citizens Care Alliance

Exhibit A

CLEVELAND DOAN
Barristers & Solicitors

Michael D. Carter*
*Practicing through a law corporation
Email michael@clevelanddoan.com
Phone 604 536 5002
File No. 26408

January 27, 2025

VIA EMAIL

Dr. Steven Pelech
University of British Columbia
Department of Medicine, Division of Neurology
2775 Laurel Street
Vancouver, BC V5Z 1M9

Dear Dr. Pelech

Re: Medical Opinion regarding Universal Ostrich Farms Ltd.

We are the lawyers for Universal Ostrich Farms Ltd. We are writing to request that you provide us with an opinion on a number of matters relating to a potential culling of ostriches.

When preparing your opinion please base it on the facts set out in the "Facts" section of this letter. If you rely on additional facts please describe those facts in your opinion.

Facts

1. Universal Ostrich Farms Ltd. ("UOF") is located at 301 Langille Road, Edgewood, British Columbia (the "Property").

2. The Property is approximately 10 kilometres northwest of Edgewood, British Columbia.

3. According to Statistics Canada, the 2021 Census Profile of Edgewood lists a total population of 235 people.

4. The nearest population centres are Vernon, at over 90 kilometres by air, and Castlegar, at over 70 kilometres by air.

5. UOF raises ostriches at the Property.

6. As of February 2020 UOF was raising about 250 ostriches on the Property.

7. At that time some ostriches in the herd became sick. Tissue samples were taken from a deceased ostrich and were sent for analysis. A report from the BC Animal Health Centre returned positive results for "Proteus sp., Pseudomonas aeruginosa and E. coli (non-haemolytic)".

8. Ten ostriches died around February 2020.

9. In the following year UOF began increasing the size of the herd, including by purchasing some ostriches from other producers.

10. As of December 1, 2024 there were approximately 450 ostriches being raised at the Property (the "Herd").

11. On about December 10, 2024 representatives from UOF began noticing some ostriches in the Herd were showing signs of illness.

12. In the coming week ostriches began to die from apparent illness.

13. On December 30, 2024 representatives from the Canadian Food Inspection Agency ("CFIA") attended at the Property and took swab samples from two of the dead ostriches.

14. CFIA tested using the Avian Influenza matrix and H5H7 PCR test, and the test result was positive for the H5N1 type of Avian Influenza.

15. On December 31, 2024 CFIA issued a written Requirement to Quarantine, which was amended on January 2, 2025, January 12, 2025 and January 24, 2025.

16. UOF has been complying with the requirements of the quarantine.

17. Between about December 12, 2024 and January 15, 2025 69 ostriches died of the H5N1 type symptoms.

18. No ostriches have died of H5N1 symptoms since January 15, 2025.

19. The only ostriches of the Herd that died of H5N1 type symptoms belonged to the group of ostriches that did not experience the pseudomonas infection in 2020.

20. Four ostriches have died of non-H5N1 type symptoms in January 2025. Three of these ostriches slipped on the ice and injured themselves, and one ostrich was caught in a fence.

Requested Opinion

Please provide your opinion on the following questions:

1. What is the likelihood that the Herd presently is transmissible for H5N1 to each other and wild migratory birds such as ducks?

2. If the Herd has achieved herd immunity, is there anything rare and valuable about the Herd that would promote the advancement of biomedical research?

3. Is there any risk of transmitting the H5N1 virus from the yolk of the ostrich eggs if they were used for testing and research purposes?

4. Would the testing for antibodies against the H5N1 virus from the egg yolks be a good measure of natural or vaccine-induced immunity?

5. Is there any evidence that vaccine-induced immunity for influenza is superior to natural immunity following recovery from an influenza infection?

Yours truly,

CLEVELAND DOAN LLP
Per:
MICHAEL D. CARTER

Exhibit B

Court File No._____

FEDERAL COURT

BETWEEN:

UNIVERSAL OSTRICH FARMS LTD.
APPLICANT

- and-

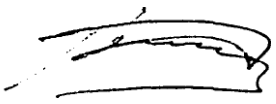
CANADIAN FOOD INSPECTION AGENCY
RESPONDENT

APPLICATION UNDER THE *FEDERAL COURTS ACT,*
R.S.C. 1985, c. F-7, s. 18.1

CERTIFICATE CONCERNING CODE OF CONDUCT
FOR EXPERT WITNESSES

I, Dr. Steven Pelech, having been named as an expert witness by the applicant, Universal Ostrich Farms Ltd., certify that I have read the Code of Conduct for Expert Witnesses set out in the schedule to the *Federal Courts Rules* (and attached hereto) and agree to be bound by it.

Date: January 29, 2025



Dr. Steven Pelech
5640 Musgrave Crescent
Richmond, B.C.
V7C 5N3

Code of Conduct for Expert Witnesses

General Duty to the Court

1 An expert witness named to provide a report for use as evidence, or to testify in a proceeding, has an overriding duty to assist the Court impartially on matters relevant to his or her area of expertise.

2 This duty overrides any duty to a party to the proceeding, including the person retaining the expert witness. An expert is to be independent and objective. An expert is not an advocate for a party.

Experts' Reports

3 An expert's report submitted as an affidavit or statement referred to in rule 52.2 of the *Federal Courts Rules* shall include

(a) a statement of the issues addressed in the report;

(b) a description of the qualifications of the expert on the issues addressed in the report;

(c) the expert's current *curriculum vitae* attached to the report as a schedule;

(d) the facts and assumptions on which the opinions in the report are based; in that regard, a letter of instructions, if any, may be attached to the report as a schedule;

(e) a summary of the opinions expressed;

(f) in the case of a report that is provided in response to another expert's report, an indication of the points of agreement and of disagreement with the other expert's opinions;

(g) the reasons for each opinion expressed;

(h) any literature or other materials specifically relied on in support of the opinions;

(i) a summary of the methodology used, including any examinations, tests or other investigations on which the expert has relied, including details of the qualifications of the person who carried them out, and whether a representative of any other party was present;

(j) any caveats or qualifications necessary to render the report complete and accurate, including those relating to any insufficiency of data or research and an indication of any matters that fall outside the expert's field of expertise; and

(k) particulars of any aspect of the expert's relationship with a party to the proceeding or the subject matter of his or her proposed evidence that might affect his or her duty to the Court.

4 An expert witness must report without delay to persons in receipt of the report any material changes affecting the expert's qualifications or the opinions expressed or the data contained in the report.

Expert Conferences

5 An expert witness who is ordered by the Court to confer with another expert witness

(a) must exercise independent, impartial and objective judgment on the issues addressed; and

(b) must endeavour to clarify with the other expert witness the points on which they agree and the points on which their views differ.

Exhibit C

University of British Columbia

Curriculum Vitae for Faculty Members

Date: January 25, 2025

Initial: —S—

1. **SURNAME:** Pelech **FIRST NAME:** Steven **MIDDLE NAME(S):**
2. **DEPARTMENT/SCHOOL:** Medicine, Div. Neurology
3. **FACULTY:** Medicine
   JOINT APPOINTMENTS:
4. **PRESENT RANK:** Professor **SINCE:** July 1, 1998

5. POST-SECONDARY EDUCATION

(a)

University or Institution	Degree	Subject Area	Dates
University of British Columbia	B.Sc.	Biochemistry	1975-1979
University of British Columbia	Ph.D.	Biochemistry	1979-1982

(b) Title of Dissertation and Name of Supervisor

Regulation of Phosphatidylcholine Biosynthesis - with Dr. Dennis E. Vance

(c) Continuing Education or Training

(d) Continuing Medical Education

(e) Professional Qualifications

1 Biomedical Research Scientist

6. EMPLOYMENT RECORD

Prior

University, Company or Organization	Rank or title	Dates
University of British Columbia	Assistant Professor	July 1, 1988 - June 30, 1993
University of British Columbia	Associate Professor	July 1, 1993 - June 30, 1997
University of British Columbia	Postdoctoral Fellow (with Dr. Dennis Vance)	1983-1983
University of Dundee, Scotland	Postdoctoral Fellow (with Dr. Philip Cohen, knighted as Sir Philip Cohen)	1983-1984
University of Washington, Seattle	Postdoctoral Fellow (with Dr. Edwin Krebs, Nobel Prize recipient)	1984-1987
Biomedical Research Centre, Vancouver (Immunology Institute)	Senior Scientist	1987-1998
Kinetek Pharmaceuticals, Inc.	Founder, President & Chief Executive Officer	1992-1997

Present

University, Company or Organization	Rank or title	Dates
University of British Columbia	Professor	July 1, 1997 - present
Kinexus Bioinformatics Corporation	Founder, President & Chief Scientific Officer, Director	1999-present

c) Date of granting tenure at UBC:
July 1, 1993

7. LEAVES OF ABSENCE

University, Company Or Organization at which Leave was taken	Type of Leave	Dates

None taken since starting as a UBC faculty member. However, from November 3, 2004 through to April 15, 2005, I was summoned for 24 full days to appear in a B.C. Human Rights Hearing Case. I also had to appear in the BC Supreme Court for a judicial review of this case over a week's period in April 2009.

8. TEACHING

(a) Areas of special interest and accomplishments

1 Percentage of Overall Time Devoted to:

Non-clinical instruction:	20%
Clinical instruction:	0%
Research/publication:	55% (includes R&D at private biotechnology company)
Administration (UBC):	20%
Administration (Kinexus):	5%
Clinical practice:	0%

---

2 For over 32 years, I was very active in the establishment of the Experimental Medicine Graduate Program and worked closely with its six directors (i.e. Drs. Rabkin, Quamme, Wong, Duronio, Sly and Tang). My goal was to develop courses that would provide practical, useful skills to graduate students. In particular, the students should acquire a solid knowledge base, be able to read the scientific literature and on-line websites critically, adapt to new lab environments and assimilate new techniques, deliver clear oral presentations, and write competitive grants for funding. I left this committee in the Spring of 2023.

3 To improve the knowledge-base of Experimental Medicine students, I became the course coordinator for MEDI 501, a lecture course that is required of all students in the program and focuses on the molecular basis of disease. I originally presented the opening four lectures for this course, which is taught by several faculty members. I am convinced that future improvements in the treatment of diseases will depend upon a firm understanding of the molecular mechanisms underlying the diseases. Imparting this knowledge to graduate students will better prepare them for disease-related research. In 2024, I taught one 90-minute lecture in the Fall term. I also provide an examination question for the mid-term exam and graded 35 answers.

4 To improve the laboratory skills of Experimental Medicine students, I became the course coordinator for MEDI 502, which is the second course that is required of all students in the program. Previously, the students went on mass together to a different lab each week to see a technique taught by a faculty member. I altered the course so that each student could select two host labs out of two dozen possible labs in which they would spend half a day per week for two months in each lab learning about the research area and various techniques in use in that lab. This improved research interactions among various members of the Department of Medicine. Half way through this course, the student has to give to the other students in the course a 20-minute

oral presentation that outines the nature of the research in the first host lab and a technique that is being used to approach a biological problem in that lab. At the conclusion of the rotation in the second host lab, the student has to write an MRC grant application that combines aspects of his experience in the host laboratories. The oral presentation and the grant application account for the majority of the final grade for this course. This is the only course of this kind that is offered through the U.B.C. Currently, I have one students per term in my laboratory for this course in 2025.

5 I have also provided the opportunity for many undergraduate students to obtain research experience in my laboratory through the BIOL 448A, E2P PharmD & BPSc and MEDI 548 Directed Studies courses and the cooperative education programs at the Department of Microbiology and Immunology at U.B.C. and the Simon Fraser University Science Coop. From these coop programs, over 200 undergraduate students have work full-time in my laboratory under my supervision for 4 to 12 month terms.

6 My area of research expertise is signal transduction, and defective cell signalling is at the root of cancer, Alzheimer's, diabetes, immune dysfunction and many other chronic diseases of aging. As there was no advanced, graduate level course in signal transduction that was offered each year at U.B.C., I took the initiative to create one. The majority of my teaching is in the MEDI 590 Cell Regulation course, which I coordinate and provide all of the lectures. The course is very advanced and covers a lot of ground, but most students perform very well. The final mark for MEDI 590 course is largely dependent upon an exercise to gather detailed information about various members of a family of cell signalling proteins. This exercise forces the students to read the scientific literature and collect data from relevant websites, and present their results organized in Excel tables. The collected information is made available to the scientific community after it is integrated into a database. In 2024, there were 15 registered graduate students that completed the course. All of the 52 hours of PowerPoint lectures and supporting materials are provided to all the students in pdf format in advance of each class. I devoted over 25 hours additional outside of the classroom in 2024 in MEDI 590 course preparation, including the development of new original content and marking midterms and final assignments. The results of the 2024 MEDI-590 final assignment, which was a project selected by the students to examine the expressions and interactions of extracellular mediators and their receptors, is presently being used to expand the open-access, on-line knowledgebase www.kinector.ca with the help of a team of 5 computer science BCIT students. I have made much of these educational materials available to wider audiences on the Kinexus Bioinformatics website at www.kinexus.ca. My long-term objective is to produce 10-minute teaching videos of portions of the lectures for the MEDI590 course that will be posted on-line with open-access.

7 Another course that I originally coordinated for five years is MEDI 535, which I designed to be a journal club in which the participants critically analyze recent scientific papers based on signal transduction research. In this course, the students received a scientific paper a week before the next class that they are expected to read and critically review. The following week, the student that originally selected the paper provided a brief synopsis of the paper and then led the round table discussion among myself and the other students of the paper's strengths and deficiencies. I have not tutored in this course in recent years.

8 I have also provided 2 hours of lecture per year in the Neuroscience 500 course (1999-2001), I participated as a medical student PBL tutor in the Endocrinology Block for Second Year (1999, 2000) and Hyperplasia Block for First Year), gave a 1 hour lecture to First Year Medical Students (2002) and 2 hours of lecture per year in Pathology 500 (2001, 2002) and 2 hours of lecture to Pharmaceutical Sciences graduate students in PHAR 545 (2003).

(b) Recent Courses Taught at UBC:

Year	Session	Course Number	Scheduled Hours	Class Size	Hours Taught			
					Lecture	Tutorials	Labs	Other
2019 + 2020	Fall 2019 + Winter	BIOL 448 – Directed Studies	60	1 – Kevin Wong	0	5	>250 h	1
2019 + 2020	Fall 2019 + Winter	ISCI 448 – Directed Studies	60	1 – Abiel Kwok	0	5	>250 h	1
2020	Winter 2020	MEDI 502 - Molecular and Cellular Biology	30	1 – Jackie Ho	0	4	10	1
2020	Fall 2020	MEDI 590 - Molecular Regulation of Cell Growth	>100	9	56	0	0	>100 h (see Note 1)
2020	Fall 2020	MEDI 501 - Molecular and Cellular Biology	7	19	1.5	0	0	+5.5 h (see Note 2)
2021	Fall 2021	MEDI 590 - Molecular Regulation of Cell Growth	>100	4	52	0	0	>50 h (see Note 1)
2021	Fall 2021	MEDI 501 - Molecular and Cellular Biology	10	30	1.5	0	0	+5.5 h (see Note 2)
2022	Fall 2022	MEDI 590 - Molecular Regulation of Cell Growth	>100	6-12	52	0	0	>50 h (see Note 1)
2022	Fall 2022	MEDI 501 - Molecular and Cellular Biology	10	24	1.5	0	0	+5.5 h (see Note 2)
2023	Fall 2023	MEDI 590 - Molecular Regulation of Cell Growth	>100	7	52	0	0	>50 h (see Note 1)
2023	Fall 2023	MEDI 501 - Molecular and Cellular Biology	10	28	1.5	0	0	+8.5 h (see Note 2)

2024	Fall 2024	MEDI 590 - Molecular Regulation of Cell Growth	>100	15	52	0	0	>50 h (see Note 1)
2024	Fall 2024	MEDI 501 - Molecular and Cellular Biology	10	35	1.5	0	0	+8.5 h (see Note 2)

Note 1 - +50-150 h course preparation; +2 h for midterm; +2 h midterm marking; + >50 h final assignment marking

Note 2 - +4.5-10 h lecture preparation and mid-term or final exam marking

(c) Graduate Students directly supervised at UBC:

Student Name	Program Type	Year		Principal Supervisor	Co-Supervisors
		Start	Finish		
Palaty, Chrystal	Exp. Med. Ph.D.	1990	1995	Pelech	
Samiei, Mitra	Exp. Med. Ph.D.	1990	1994	Pelech	Devine
Mordred, Guy	Biochemistry Ph.D.	1991	1993	Paucellier	Pelech
Charest, David	Exp. Med. Ph.D.	1991	1998	Pelech	
Charlton, Lorin	Exp. Med. Ph.D.	1991	1998	Pelech	
Morrison, Donna	Exp. Med. Ph.D.	1992	1998	Pelech	
Kim, Sung	Pharm. Sci. Ph.D.	1992	1998	Katz	Pelech
Tudan, Christopher	Exp. Med. Ph.D.	1993	1999	Pelech	
Tao, Jingsong	Microbiol. Ph.D.	1995	1998	Levy	Pelech
Marotta, Anthony	Exp. Med. Ph.D.	1996	1999	Sahl	Pelech
Wagey, Ravenska	Exp. Med. Ph.D.	1996	2000	Krieger	Pelech
Sayed, Mohamed	Exp. Med. Ph.D.	1998	2002	Pelech	Sahl
Vilimek, Dino	Exp. Med. M.Sc.	1999	1999	Duronio	Pelech
Je-Hong Hu	Simon Fraser	2000	2004	Krieger	Pelech
Gobind Sun	Exp. Med. Ph.D.	2006	2008	Pelech	
Amy Lai	Exp. Med. Ph.D.	2007	2008	Pelech	
Shenshen Lai	Exp. Med. Ph.D.	2009	2015	Pelech	

Javad Safaei	Math. & Comp. Sci. Ph.D	2009	2015	Gupta	Pelech
Dominik Sommerfeld	Exp. Med. Ph.D.	2010	2012	Pelech	
S.M. Shabab Hossain	Comp. Sci. M.Sc.	2011	2011	Gupta	Pelech
Lambert Yue	Exp. Med. Ph.D.	2016	2020	Pelech	
Hamidreza Galavi	Exp. Med. Ph.D.	2020	2023	Pelech	
Andréa Bleret	M.Sc. Université catholique de Louvain	2022 Feb.	2022 May	Bernard Hallet	Pelech
Ghada Maged Ali	M.Sc.(Neuro-science) Alexandria Univ., Egypt	2022 Feb.	present	Ahmad Raafat Bassiouny	Pelech

(d) MEDI 502 Graduate Student Rotation Supervision

1	Julian Vasilescu	UBC , MEDI 502	January 27-31, 2003
2	Lisa Bradley	UBC , MEDI 502	January 13-17, 2003
3	Loutfig Demirjian	UBC , MEDI 502	March 23 – April 23, 2004
4	Edgar Lam	UBC , MEDI 502	February 28 – March 4, 2005
5	Philip Ly	UBC , MEDI 502	January 10, 2006 – February 28, 2006
6	Michael Butt	UBC , MEDI 502	April 12, 2007 – April 30, 2007
7	Alastair Davies	UBC , MEDI 502	January 15 – February 15, 2008
8	Chengcheng Zhang	UBC , MEDI 502	February 15, 2009 – March 15, 2009
9	Anthony Tam	UBC , MEDI 502	January 15 – February 15, 2010
10	Helen Chen	UBC , MEDI 502	February 15 – February 28, 2011
11	Jack Lui	UBC , MEDI 502	March 1 – March 16, 2011
12	Saeideh Davoodi	UBC , MEDI 502	January 10 – January 30, 2012
13	Soojin Kim	UBC , MEDI 502	January 11 – February 1, 2013
14	Sehyun Cho	UBC , MEDI 502	February 1 – February 28, 2013
15	Paul Toren	UBC , MEDI 502	January 11 – February 1, 2014
16	Franco Cavaleri	UBC , MEDI 502	February 1 – February 28, 2015
17	Ryan Yue	UBC, MEDI 502	January 14 – February 28, 2016
18	Alexandre Kadhim	UBC, MEDI 502	January 14 – February 28, 2016
19	Jian Gao	UBC, MEDI 502	January 14 – February 28, 2017

20	Muyan Cao	UBC, MEDI 502	January 29 – February 28, 2018
21	Jackie Ho	UBC, MEDI 502	January 29 – February 28, 2020
22	Dr. Haifa Al Sudairy	UBC, MEDI 502	January 22 – February 28, 2025

In 2012, I also marked mock grant reviews prepared by Mary Rose Pambid and Saeideh Davoodi as part of the MEDI-502 course.

(e) MBA Student Supervision (at my industrial lab at Kinexus)

1	Deborah Bender	SFU, MBA Student	May 1 - July 31, 2001
2	Darius Panaligan	SFU, MBA Student	June 5 - August 31, 2001

(f) Undergraduate Coop Student Research Supervision (at my industrial lab at Kinexus)

I have taken on over 175 undergraduate students from the Simon Fraser University, University of Victoria and University of B.C. Coop programs through my companies Kinetek Pharmaceuticals Inc. (1992-1998) and Kinexus Bioinformatics Corp. (1999-present). Most of these students worked on average for 8 months full work-terms. I have only listed my trainees at Kinexus below.

No.	Name of Student	Months	Start Date	End Date
1	Korine Ung	4	1-Sep-1999	30-Dec-1999
2	David Brewster	4	1-Jan-2000	30-Apr-2000
3	Michael Hsing	8	1-Jan-2000	31-Aug-2000
4	Pinky Chua	4	1-May-2000	31-Aug-2000
5	Bonnie Jones	8	1-May-2000	31-Dec-2000
6	Claire Hou	4	1-Sep-2000	31-Dec-2000
7	Tiffany Chen	8	2-Jan-2001	31-Aug-2001
8	Christopher Huang	8	2-Jan-2001	31-Aug-2001
9	Kevin Ma	8	1-May-2001	31-Dec-2001
10	Jason Sterne	8	7-May-2001	31-Dec-2001
11	Kristy Lynn Williams	8	27-Aug-2001	31-Dec-2001
12	Jeff Druce	8	27-Aug-2001	31-Dec-2001
13	Mark White	4	27-Aug-2001	31-Dec-2001
14	Jack Min	4	4-Sep-2001	31-Dec-2001
15	Jill Youds	8	1-Jan-2002	31-Aug-2002
16	Jackie To	8	1-Jan-2002	31-Aug-2002
17	Marina Kanjer	4	1-Jan-2002	30-Apr-2002
18	Andrea Ramalho	8	1-Jan-2002	30-Aug-2002
19	Leon Poznanski	8	1-May-2002	31-Dec-2002
20	Devon Yeoman	8	1-May-2002	31-Dec-2002
21	Kyla Hingwing	8	1-Sep-2002	30-Apr-2003
22	Gavin Lee	4	10-Sep-2002	31-Dec-2002

23	Richard Li	8	1-Jan-2003	30-Aug-2003
24	Anna Moorhouse	8	1-Jan-2003	30-Aug-2003
25	Beth Clendening	8	22-Apr-2003	31-Dec-2003
26	Shauna Murray	12	25-Aug-2003	31-Aug-2004
27	Heidi Cheung	8	1-Sep-2003	30-Apr-2004
28	Sharan Swarup	16	1-Sep-2004	31-Dec-2004
29	Nadia Brinkman	8	1-Jan-2004	31-Aug-2004
30	Elbert Chang	4	1-Jan-2004	30-Apr-2004
31	Wilson Luk	8	3-May-2004	31-Dec-2004
32	Tina Chen	8	26-Aug-2004	30-Apr-2005
33	Anar Dhallar	8	26-Aug-2004	30-Apr-2005
34	Sylive Bryant	8	4-Jan-2005	31-Aug-2005
35	Melissa Hogg	4	4-Jan-2005	30-Apr-2005
36	Benjamin Jong	8	4-Jan-2005	31-Aug-2005
37	Amanda Heiler	8	2-May-2005	31-Dec-2005
38	Poonam Jassi	8	2-May-2005	31-Dec-2005
39	Theresa Connor	8	1-Sep-2005	30-Apr-2006
40	Gavin Ha	8	1-Jan-2006	31-Aug-2006
41	Megan Kofoed	16	1-Jan-2006	30-Apr-2007
42	Iris Juan	8	1-May-2006	31-Dec-2006
43	Andrew Park	5	1-May-2006	1-Oct-2006
44	Ryan Whitehead	4	1-May-2006	25-Aug-2006
45	Bryanna Grace	4	1-Sep-2006	31-Dec-2006
46	Michael Peabody	8	1-Sep-2006	30-Apr-2007
47	Joanna Kam	8	19-Dec-2006	31-Aug-2007
48	Nova Do	8	1-Jan-2007	31-Aug-2007
49	Jason Wong	8	1-Jan-2007	31-Aug-2007
50	Charrise Pagarigan	4	1-Jan-2007	30-Apr-2007
51	Sabrina Rayworth	8	1-May-2007	31-Dec-2007
52	Fredrick Bantandos (SFU)	8	1-Sep-2007	30-Apr-2008
53	Pringle Comia (SFU)	8	1-Sep-2007	30-Apr-2008
54	Raymond Leung (SFU)	8	1-Sep-2007	30-Apr-2008
55	Adam Leigh (UBC)	8	1-Jan-2008	31-Aug-2008
56	Ellen Sung (UBC)	4	1-Jan-2008	30-Apr-2008
57	Angie Chu (UBC)	4	1-May-2008	31-Aug-2008
58	Stephanie Lam (SFU)	8	1-May-2008	31-Dec-2008
59	Amy Tam (UBC)	8	1-May-2008	31-Dec-2008
60	Ken Ng (SFU)	8	1-May-2008	31-Dec-2008
61	Ryan Saranchuk (UBC)	4	1-Sep-2008	31-Dec-2008
62	Sarah Zaidi (SFU)	3.5	1-Sep-2008	15-Dec-2008
63	Anna Chau (UBC)	8	1-Jan-2009	31-Aug-2009
64	Kerrie Law (UBC)	8	1-Jan-2009	31-Aug-2009
65	Jose Canas (SFU)	8	1-Jan-2009	31-Aug-2009
66	Steven Pham (UBC)	8	1-Jan-2009	31-Aug-2009

67	Connie Drewbrook (SFU)	4	1-May-2009	31-Aug-2009
68	Justin Yu (UBC)	4	1-May-2009	31-Aug-2009
69	Ryan Foyle (UBC)	8	1-May-2009	31-Dec-2009
70	Tak Poon (UBC)	8	1-May-2009	31-Dec-2009
71	Tammy Wang (UBC)	4	1-Sept-2009	31-Dec-2009
72	Yan Zhou (SFU)	4	1-Sept-2009	31-Dec-2009
73	Tommy Lee (UBC)	4	1-Sept-2009	31-Dec-2009
74	Kerrie Tian (SFU)	8	1-Sept-2009	30-Apr-2010
75	Christine Yu (UBC)	4	1-Jan-2010	30-Apr-2010
76	Vivienne Chan (UBC)	8	1-Jan-2010	31-Aug-2010
77	Katelyn Fines (UBC)	4	1-Jan-2010	30-Apr-2010
78	Katelyn Janzen (UBC)	8	1-Jan-2010	31-Aug-2010
79	Mandy Hu (UBC)	8	1-Jan-2010	31-Aug-2010
80	Mandy Chung (SFU)	4	1-May-2010	31-Aug-2010
81	Abby Yang (UBC)	8	1-May-2010	31-Dec-2010
82	Christopher Bond (SFU)	8	1-Sep-2010	31-Dec-2010
83	Jarrod Mackay (SFU)	4	1-Sep-2010	31-Dec-2010
84	Karyll Magtibay (UBC)	8	1-Sep-2010	30-Apr-2011
85	Kathryn Marshall (SFU)	4	1-Sep-2010	30-Apr-2011
86	Christopher Meschino (SFU)	4	1-Sep-2010	30-Apr-2011
87	Bonnie Cheung (UBC)	8	1-Jan-2011	31-Aug-2011
88	Lisa Luo (UBC)	8	1-Jan-2011	31-Aug-2011
89	Abhinav Sharma (UBC)	8	1-Jan-2011	31-Aug-2011
90	Cherie Tan (UBC)	8	1-Jan-2011	31-Aug-2011
91	Puneet Litt (SFU)	4	1-May-2011	31-Aug-2011
92	Kingsley Shih (UBC)	8	1-May-2011	31-Dec-2011
93	Sophie Tsai (SFU)	8	1-May-2011	31-Dec-2011
94	Sze Wing Wong (UBC)	4	1-May-2011	31-Aug-2011
95	J.C. Cheng (UBC)	4	1-Sep-2011	31-Dec-2011
96	Dennis Chau (SFU)	4	1-Sep-2011	31-Dec-2011
97	Jarrod Mackay (SFU)	8	1-Sep-2011	30-Apr-2012
98	Lisa Ying (UBC)	8	1-Jan-2012	31-Aug-2012
99	Krista Wong (UBC)	8	1-Jan-2012	31-Aug-2012
100	Gurjot Dhaliwal (UBC)	8	1-Jan-2012	31-Aug-2012
101	Michael Ni (UBC)	4	1-May-2012	31-Aug-2012
102	Chelsea Lee (Emily Carr)	3	20-May-2012	31-Aug-2012
103	Inderpal Gill (UBC)	4	1-Sep-2012	31-Dec-2012
104	Ryan Lee (SFU)	4	1-Sep-2012	31-Dec-2012
105	Ashley Steuck (UBC)	4	1-Sep-2012	31-Dec-2012
106	Kaitlin Hong Tai (SFU)	12	1-Sep-2012	31-August-2013
107	Roanette Postma (SFU)	8	1-Jan-2013	31-Aug-2013
108	Christine Chan (UBC)	8	1-Jan-2013	31-Aug-2013
109	James Hopkins (SFU)	8	1-Jan-2013	31-Aug-2013
110	Sally Maguet (SFU)	4	1-Sep-2013	31-Dec-2013

111	Martin Radvenis (UBC)	4	1-Sep-2013	31-Dec-2013
112	Katy Tan (UBC)	4	1-Sep-2013	31-Dec-2013
113	Alisa Too (UBC)	8	1-Jan-2014	31-Aug-2014
114	Lambert Yue (UBC)	8	1-Jan-2014	31-Aug-2014
115	Enoli de Silva (UBC)	8	1-Jan-2014	31-Aug-2014
116	Sonia Hessels (SFU)	8	1-Jan-2014	31-Aug-2014
117	Jeremy Nan (UBC)	8	1-Jan-2014	31-Aug-2014
118	Alexander Mann (UBC)	8	1-May-2014	31-Dec-2014
119	Alexa Creenan (UBC)	4	1-Sep-2014	31-Dec-2014
120	Maggie Fu (UBC)	4	1-Sep-2014	31-Dec-2014
121	Lisa Lee (UBC)	4	1-Sep-2014	31-Dec-2014
122	Colm Quirke (UBC)	8	1-Sep-2014	30-April-2015
123	Kristy Dever (UBC)	8	1-Sep-2014	30-April-2015
124	Jordan Chiu (UBC)	8	1-Jan-2015	31-August-2015
125	Tam Dang (UBC)	8	1-Jan-2015	31-August-2015
126	Minnie Huang (UBC)	8	1-Jan-2015	31-August-2015
127	Marti Hua (UBC)	8	1-Jan-2015	31-August-2015
128	Nimisha Arora (India)	6	1-Jan-2015	30-June-2015
129	Jeffrey White (UBC)	8	1- May-2015	31-December-2015
130	Alex Sweeten (SFU)	4	1- May-2015	30-August-2015
131	Lambert Yue (UBC)	8	1- May-2015	31-December-2015
	Lambert Yue (UBC)	8	1-May-2016	31-December-2016
132	Ryan Hounjet (UBC)	4	1-Sept-2015	31-December-2015
133	Andy Lam (UBC)	4	1-Sept-2015	31-December-2015
134	Tianna Sun (UBC)	4	1-Sept-2015	31-December-2015
135	Johnathan Wong (SFU)	4	1-Jan-2016	30-April-2016
136	Paula Tao (UBC)	8	1-Jan-2016	31-August-2016
137	Tony Han (UBC)	8	1-Jan-2016	31-August-2016
138	Desiree Pagulayan (UBC)	4	1-Jan-2016	30-April-2016
139	Jason Liu (UBC)	8	1-Jan-2016	31-August-2016
140	Jenny Chan (UBC)	8	1-Jan-2016	31-August-2016
141	Claire Doyon (UBC)	12	1-May-2016	30-April-2017
142	Christine Sam (UBC)	4	1-Sept-2016	31-December-2016
143	Yezen Dean (SFU)	8	1-Sept-2016	30-April-2017
144	Kevin Gonzalez (UBC)	12	1-Sept-2016	31-August-2017
145	Karin Parkeh (UBC)	4	1-Sept-2016	31-December-2016
146	Ayasha Brown (UBC)	8	1-Jan-2017	31-August-2017
147	Sarina Chen (UBC)	4	1-May-2017	31-August-2017
148	Jenna Grose (SFU)	8	1-May-2017	31-December-2017
149	Dhiraj Mannar (UBC)	8	1-May-2017	31-December-2017
150	Aster Fan (SFU)	8	1-Sept-2017	30-April-2018
151	Leo Escano (SFU)	4	1-Sept-2017	31-December-2017
152	Ashley Perron (UBC)	8	1-Jan-2018	31-August-2018
153	Eva Momchilova (SFU)	8	1-Jan-2018	31-August-2018

154	Iqbal Sarai (SFU)	8	1-May-2018	31-December-2018
156	Angela Wu (UBC)	8	1-May-2018	31-December-2018
157	Joanne Chan (UBC)	4	1-Sept-2018	31-December-2018
158	Abiel Kwok (UBC)	12	1-Sept-2018	31-August-2019
159	Jazica Chan (SFU)	12	1-Sept-2018	31-August-2019
160	Zhong Yuan Zhang (UBC)	4	1-Jan-2019	30-April-2019
161	Guravneet Gill (UBC)	4	1-May-2019	31-August-2019
162	Naiomi Khan (UBC)	4	1-May-2019	31-August-2019
163	Mona Golmohammadzadeh (UBC)	8	1-Sept-2019	30-April-2020
164	Avery Mak (SFU)	8	1-Sept-2019	30-April-2020
165	Mataya Lukas (SFU)	8	1-Jan-2020	31-August-2020
166	Sarah Agnew (UBC/BCIT)	8	1-May-2020	31-December-2020
167	Gage Fairlie (UBC)	8	1-May-2020	31-December-2020
168	Akshra Atrey (UBC)	12	1-Sept-2020	15-August-2021
169	Hallie Emory (UBC)	8	1-Sept-2020	30-April-2021
170	Tammy Yu (SFU)	8	1-Jan-2021	31-August-2021
171	Britney Yuen (UBC)	8	1-May-2021	31-December-2021
172	Jason Zhao (UBC)	10	1 July-2021	30-April-2022
172	Melody Lam (UBC)	8	1-Sept-2021	30-April-2022
173	Ekaterina Galysheva (UBC)	8	1-Jan-2022	31-August-2022
174	Trang Ngyen (UBC)	4	1-May-2022	31-August-2022
175	Trinity Truong (UBC)	8	1-May-2022	31-December-2022
176	Sierra Neff (UBC)	3.5	1-May-2022	15-August-2022
177	Samuel Bakteria (UBC)	12	1-May-2023	30-April-2024

(g) Undergraduate BC Institute of Technology Student Supervision (at my industrial lab at Kinexus)

I directly worked with each of these students in the development of the open-access, on-line databases and knowledgebases hosted Kinexus Bioinformatics Corporation. These usually involved bi-weekly interactions for 1 to 2 hours over a 5 to 6 week period.

1	Anchal Jain	BCIT Computer Sci. Prgm.	21-June-2005 to 10 –Sep-2005
2	Eric Chua	BCIT Computer Sci. Prgm.	21-June-2005 to 10 –Sep-2005
3	Ho Sand (Alex) Lee	BCIT Computer Sci. Prgm.	21-June-2005 to 10 –Sep-2005
4	Jimmy Chan	BCIT Computer Sci. Prgm.	12-Oct-2005 to 25 –Nov-2005
5	Kevin Rabang	BCIT Computer Sci. Prgm.	12-Oct-2005 to 25 –Nov-2005
6	Kannon Woo	BCIT Computer Sci. Prgm.	12-Oct-2005 to 25 –Nov-2005
7	Norma Wong	BCIT Computer Sci. Prgm.	12-Oct-2005 to 25 –Nov-2005
8	Kevin Odger	BCIT Computer Sci. Prgm.	1-Nov-2006 to 30-Jan-2007
9	Travis Nicholson	BCIT Computer Sci. Prgm.	21-Apr-2008 to 21-May-2008
10	Jonathan Jose	BCIT Computer Sci. Prgm.	21-Apr-2008 to 21-May-2008
11	Ryan Pattinson	BCIT Computer Sci. Prgm.	21-Apr-2008 to 21-May-2008
12	Hannah Rosellon	BCIT Computer Sci. Prgm.	21-Apr-2008 to 21-May-2008
13	John Liau	BCIT Computer Sci. Prgm.	1-Oct-2008 to 28-Feb-2009

14	Joe Hu	BCIT Computer Sci. Prgm.	15-Apr-2010 to 21-May-2010
15	Ysabel Lago	BCIT Computer Sci. Prgm.	15-Apr-2010 to 21-May-2010
16	David Liau	BCIT Computer Sci. Prgm.	15-Apr-2010 to 21-May-2010
17	Christine Livingstone	BCIT Computer Sci. Prgm.	15-Apr-2010 to 21-May-2010
18	Melissa Manalac	BCIT Computer Sci. Prgm.	15-Apr-2010 to 21-May-2010
19	Nevin Petersen	BCIT Computer Sci. Prgm.	15-Apr-2010 to 21-May-2010
20	Janice Sargent	BCIT Computer Sci. Prgm.	15-Apr-2010 to 21-May-2010
21	Brandon Wang	BCIT Computer Sci. Prgm.	15-Apr-2010 to 21-May-2010
22	Alvin Yip	BCIT Computer Sci. Prgm.	15-Apr-2010 to 21-May-2010
23	Nicholas Tagle	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
24	Igor Kozlov	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
25	Fausto Faioli	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
26	Justin Ma	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
27	Simon Ho	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
28	Isan Chen	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
29	Keegan Kelly	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
30	Aly Jamani	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
31	Colin Nguyen	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
32	David Gannon	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
33	Lili Hao	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
34	Mila Khadarina	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
35	Andrii Skrynnyk	BCIT Computer Sci. Prgm.	26-Apr-2011 to 27-May-2011
36	Kyle Li	BCIT Computer Sci. Prgm.	21-Apr-2013 to 24-May-2013
37	Theo Mutia	BCIT Computer Sci. Prgm.	21-Apr-2013 to 24-May-2013
38	Travis Ryder	BCIT Computer Sci. Prgm.	21-Apr-2013 to 24-May-2013
39	Clarence Sng	BCIT Computer Sci. Prgm.	21-Apr-2013 to 24-May-2013
40	James Chen	BCIT Computer Sci. Prgm.	21-Apr-2013 to 24-May-2013
41	Andy Chow	BCIT Computer Sci. Prgm.	21-Apr-2013 to 24-May-2013
42	Sunju Christine Jeong	BCIT Computer Sci. Prgm.	21-Apr-2013 to 24-May-2013
43	Dan Stephenson	BCIT Computer Sci. Prgm.	21-Apr-2013 to 24-May-2013
44	Nadezhda Dobrianskaia	BCIT Computer Sci. Prgm.	20-Apr-2015 to 18-May-2015
45	Guanyi Fang	BCIT Computer Sci. Prgm.	20-Apr-2015 to 18-May-2015
46	Calvin Truong	BCIT Computer Sci. Prgm.	20-Apr-2015 to 18-May-2015
47	Kevin Thet	BCIT Computer Sci. Prgm.	20-Apr-2015 to 18-May-2015
48	Haruna Kakinoki	BCIT Computer Sci. Prgm.	20-Apr-2018 to 18-May-2018
49	Matthew Lau	BCIT Computer Sci. Prgm.	20-Apr-2018 to 18-May-2018
50	Noah McMurchy	BCIT Computer Sci. Prgm.	20-Apr-2018 to 18-May-2018
51	Roberg Koeing	BCIT Computer Sci. Prgm.	20-Apr-2018 to 18-May-2018
52	Ryan Liang	BCIT Computer Sci. Prgm.	10-Sept-2018 to 30-Nov-2018
53	Garth Nelson	BCIT Computer Sci. Prgm.	10-Sept-2019 to 30-Nov-2018
54	Andy Tang	BCIT Computer Sci. Prgm.	10-Sept-2018 to 30-Nov-2018
55	Thomas Bui	BCIT Computer Sci. Prgm.	10-Sept-2019 to 25-May-2020
56	Saeed Naguib	BCIT Computer Sci. Prgm.	10-Sept-2019 to 25-May-2020
57	Daria Dimchuk	BCIT Computer Sci. Prgm.	10-Sept-2019 to 25-May-2020

58	Dawson Verboven	BCIT Computer Sci. Prgm.	10-Sept-2019 to 25-May-2020
59	Kyle Eeles	BCIT Computer Sci. Prgm.	1-Jan-2025 to 7-April-2025
60	Christine Trites	BCIT Computer Sci. Prgm.	1-Jan-2025 to 7-April-2025
61	Byron Dray	BCIT Computer Sci. Prgm.	1-Jan-2025 to 7-April-2025
62	Max Li	BCIT Computer Sci. Prgm.	1-Jan-2025 to 7-April-2025
63	Ademi Ordobaeva	BCIT Computer Sci. Prgm.	1-Jan-2025 to 7-April-2025

I have also provided co-supervision for UBC Computer Science Ph.D. candidate Mr. Alireza Davoodi with Dr. Jan Manuch in a MITAC Project from April 1, 2013 for the KinATLAS website.

(h) Continuing Education Activities

1 February 9, 2005 – UBC TAG Workshop – Preparation of Teaching Dossier for Promotion and Tenure

2 November 9, 2005 – UBC TAG Workshop – Preparation of Teaching Dossier for Promotion and Tenure

3 November 30, 2005 – UBC TAG Workshop – Preparation of Teaching Dossier for Promotion and Tenure

4 February 15, 2006 – UBC TAG Workshop – Preparation of Teaching Dossier for Promotion and Tenure

5 March 15, 2006 – UBC TAG Workshop – Preparation of Teaching Dossier for Promotion and Tenure

6 November 8, 2006 – UBC TAG Workshop – Preparation of Teaching Dossier for Promotion and Tenure

7 April 11, 2007 – UBC TAG Workshop – Preparation of Teaching Dossier for Promotion and Tenure

8 November 14, 2007 – UBC TAG Workshop – Preparation of Teaching Dossier for Promotion and Tenure

9 November 21, 2007 - UBC TAG Workshop for Dept. of Urology – Preparation of Teaching Dossier for Promotion and Tenure

10 March 5, 2008 - UBC TAG Workshop – Preparation of Teaching Dossier for Promotion and Tenure

11 January 26, 2022 - UBC Ethics in the Arts Workshop

12 July 20, August 31, October 26, 2022 - UBC Racism Workshop - Decolonial and Anti-Racist Approaches to Wellbeing_with Future Ancestors' Larissa Crawford

13 As part of my continuing education activities, I regularly attend the Neurosciences Grand Rounds on Wednesday mornings at 8:00 am, the Department of Medicine Grand Rounds on Thursdays at 12:00 noon and the DMCBH Lectures on Fridays at 11:00 am each week.

(i) Visiting Lecturer (indicate university/organization and dates)

This is included with my invited presentation list in Section 9(d).

(j) Mentor for Sabbatical

1	Dr. Byung Soon Moon – Professor and Head of Surgery, WONKWANG University Iksan Oriental Medical Center, Korea, February 1, 2007 - January 31, 2008

(k) Other

1 MRC Representative for Scholarships Day at U.B.C. - October 25, 1991; Sept. 24, 1992
2 Volunteer for Careers Presentation - Science World, Vancouver - March 9, 1993
3 Scientists & Innovators in the Schools, Kitsilano Secondary School, Vancouver -Feb. 14, 1993
4 Volunteer for Careers Presentation - Science World, Vancouver - March 1, 1996
5 Scientists & Innovators in the Schools, Gladstone Secondary School, Vancouver -January 24, 1997
6 Volunteer for B.C. Regional Science Fair, University of B.C. - April 5, 2001

High School Student Mentorship (1 day to 2 weeks) at my industrial lab at Kinexus

1 Davita Fuchs - Windermere Secondary School, Vancouver, 24-29-Jul-2001
2 Ariella Zbar – Eric Hamber High School, Vancouver, 26-30-Aug-2002
3 Tom Chan - Windermere Secondary School, Vancouver, 27-31-Jan-2003
4 Nga Wailau - Windermere Secondary School, Vancouver, 23-27-Jun-2003
5 Maggie Lau - Windermere Secondary School, Vancouver, 21-25-Jul-2003
6 Winnie Chen – Prince of Wales Secondary School, Vancouver, 18-22-Aug-2003
7 Peter Quon - Windermere Secondary School, Vancouver, 26-30-Jan-2004
8 Reginald Naidu - Windermere Secondary School, Vancouver, 17-30-Jun-2004
9 Anthony Leung - Windermere Secondary School, Vancouver, 24-28-Jan-2005
10 Ricky Quan - Windermere Secondary School, Vancouver, 20-25-Jun-2005
11 Dorothy Yeung - Windermere Secondary School, Vancouver, 23-27-Jan-2006
12 Sophia Guerrero - Windermere Secondary School, Vancouver, 19 – 30-Jun-2006
13 Alex Sutter- McMath Secondary School, Richmond, 26-30-Jun-2006
14 Yin Woo - Windermere Secondary School, Vancouver, 14-31-Dec-2007
15 Gail Ng - Windermere Secondary School, Vancouver, 26-30-Jan-2009
16 Fiona Leung - Windermere Secondary School, Vancouver, 25-29-Jan-2010
17 Leanne Huang - Windermere Secondary School, Vancouver, 21-Jun - 2-Jul-2010
18 Wilkin Chou - Windermere Secondary School, Vancouver, 21-Jun - 2-Jul-2010
19 Rebecca Hu – Templeton Secondary School, Vancouver, 24-25-Jun-2010
20 Angela Pinto – Windermere Secondary School, Vancouver, 22-Jun - 30-Jun-2011
21 Katie Piper – Windermere Secondary School, Vancouver, 22-Jun - 30-Jun-2011
22 Hailey Xi - Secondary School, Vancouver, 16-Dec-2022; July 16-31-2023; August 16-31-2024.

(l) Post-doctoral Fellows

1 Dr. Hong Zhang – 2000-2002
2 Dr. Y. J. Xu – 1998-1999
3 Dr. D. F. Liao – 1998 (3 months)
4 Dr. Ian Melhado – 1998 (6 months)
5 Dr. Sanjay Bhanot – 1995-1997
6 Dr. Baljinder Sahl – 1994-1998
7 Dr. Diana Lefebvre – 1994-1996
8 Dr. Brook Koide – 1993-1995
9 Dr. Yaw Loon Siow – 1992-1997
10 Dr. Jasbinder Sanghera – 1989-1995
11 Dr. Maleki Daya-Makin – 1989-1991

9. SCHOLARLY AND PROFESSIONAL ACTIVITIES

(a) Areas of special interest and accomplishments

Role of protein phosphorylation in cellular signal transduction.

1 My research has broadly focused on the characterization of protein kinases involved in mitogen- and stress-signalling and cell cycle control. Protein kinases are major intracellular transducers of information from extracellular stimuli. Their defective signalling, as a consequence of mutations in the genes that encode these enzymes, underlies many degenerative diseases of aging such as cancer, diabetes, immune cell dysfunction, heart disease and neurological disorders.

2 The main model systems that are under investigation in my laboratory are oocytes from sea stars and frogs, human solid tumours and diverse cancer cell lines, insulin-target tissues such as skeletal muscle and heart from normal and diabetic rats, and human brain and spinal cord tissues from patients with neurological disorders. Many of the same protein kinases that are abnormally activated in cancer cells are stimulated in a controlled fashion during the meiotic maturation of oocytes or during activation of terminally differentiated immune cells of the blood, heart and brain.

3 As a postdoctoral fellow in the laboratory of Dr. Edwin Krebs, I was one of the co-discoverers of MAP kinase. Over the last 37 years, as a principal investigator, my research team and I have shown that MAP kinases such as ERK1 and ERK2 operate in the following mitogen-activated protein kinase cascade: Raf1-Mek-Erk1/2-Rsk1/2. My laboratory examined the role of this protein kinase cascade in platelets, T cells, B cells, macrophages, neutrophils, keratinocytes, cardiomyocytes, oligodendrocytes and neurons. These studies have been expanded for analysis of the related MAP kinase-dependent pathways that involve JNK and p38 MAP kinases.

4 Other protein kinases under scrutiny in my lab include cyclin-dependent kinases, p70 S6 kinase, protein kinase C, oncogene-encoded kinases (e.g., Pim1, Cot and PKB), and casein kinase 2 (CK2a), and glycogen synthase kinase 3 (GSK3). Some of these kinases are activated by second messengers such as calcium, whereas others are regulated by small GTP-binding proteins such as Ras and Rac or via direct phosphorylation by upstream kinases. Anti-peptide antibodies developed in my laboratory have been produced for the specific detection of all of these kinases. Recombinant forms of mammalian versions of kinases are expressed in *E. coli*, COS cells and baculovirus-infected Sf9 cells. Site-directed mutagenesis is used to identify important regulatory phosphorylation sites in Erk1, Mek1, Mekk and Pim1. Synthetic peptide substrates are used to identify the critical amino acid residues that are required for kinase recognition. Specific roles for these kinases are being defined by identification of their target substrates and by establishing how the kinases are integrated into signaling networks.

5 Other technologies that are applied in my research program include antibody microarrays, multi-immunoblotting, protein sequencing, cDNA cloning, sequencing and site-directed mutagenesis, cell culture and microinjection, and immunocytochemical localization. We can now track over 700 protein kinases, phosphatases, stress, cell cycle and apoptosis proteins in addition to over 1100 phosphorylation sites in many of these phosphoproteins. This kind of technology has led to the spin-out of Kinexus Bioinformatics Corporation from my UBC lab. Kinexus produces the highest density commercial antibody microarrays in the world, which feature 2026 different antibodies printed in quadruplicate per slide.

6 Over the last 25 years, in collaboration with my company Kinexus, I have built a strong bioinformatics program to create databases and knowledgebases that are available online with free access for the scientific community. KiNET (http://www.kinet.ca) has the results from the analysis of over 10,000 multi-immunoblots performed in-house at Kinexus using the Kinetworks methodology that was development in my UBC lab. It is the largest repository of quantitative proteomics data on cell signalling proteins available. In 2010, we launched the PhosphoNET knowledgebase (www.phosphoNET.ca). It presently has detailed information on over 180,000 experimentally confirmed and 780,000 predicted human phosphorylation sites. PhosphoNET also provides evolutionary analysis and kinase prediction for all 967,000 phosphosites. In 2011, we launched the TranscriptoNET knowledgebase (www.transcriptonet.ca) with detailed mRNA expression data information on 21,000 genes in over 600 different human tissues, tumour types and cancer cell lines. We also released the KiNET-AM database (www.kinet-am.ca) which contains antibody microarray data on 650-800 proteins and phosphosites levels tracked in over 2000 cell and tissues lysates from diverse experimental model systems. In 2013, we launched the DrugKiNET knowledgebase (www.drugkinet.ca) with information on the sensitivities of over 400 protein kinases to more than 850 drugs and other kinase inhibitory compounds. In 2015, we produced beta-versions of the OncoNET knowledgebase (www.onconet.ca) with detailed information on over 3000 proteins related to cancer, and the KinaseNET knowledgebase (www.kinasenet.ca) with detailed information on 536 human protein kinases. Most of these knowledgebases were further updated in 2017 and 2018. In 2018, we also developed a website for drug-protein interactions with identification of the most critical amino acid residues in proteins for the binding of over 2000 approved and experimental drugs (www.drugpronet.ca). I am also working on online knowledgebases for extra-cellula mediators and their receptors. My ultimate goal is to create an atlas of cell signalling maps and the ability to track key proteins and phosphosites within these networks with protein microarrays. Towards this end, I have also been working on producing signalling maps online with Kinections Maps that detail experimentally verified interactions with protein kinases and KinATLAS (www.kinatlas.ca), which features customizable maps of kinase-drug, protein-protein interactions, and kinase-substrate interactions and extracellular mediator-receptor interactions with KiNector (www.kinector.ca).

7 Ultimately, the research undertaken in my laboratory should help identify rational targets for the development of pharmacological agents for the treatment of cancer, neurological diseases, diabetes, autoimmune diseases, and other disorders that involve protein kinases. In addition, it is helping to identify biomarkers that may be useful for diagnosing diseases and defining the most appropriate therapeutic strategies to treat these diseases.

8 Since February of 2020, my lab has been extensively involved in the analysis of natural and COVID-19 vaccine induced immunity to the SARS-CoV-2 virus. This included leading a 4,500-person clinical study to evaluate antibody levels against 10 of the SARS-CoV-2 proteins in blood, serum and saliva samples. This involved an extensive examination of hundreds of epitopes in SARS-CoV-2 proteins. My research also involved the development of rabbit polyclonal antibodies against at least 8 of the SARS-CoV-2 proteins, including several against the Spike protein. We also examined the role of the kinase GSK3-beta in the replication of the SARS-CoV-2 virus, and identified inhibitors of this kinase that blocked the reproduction of the virus in cultured cells. In 2024, we have been optimizing a pentapeptide that binds to the SARS-CoV-2 NSP15 protein, which also has the potential to block the replication of the SARS-CoV-2 virus. Presently, we are also working on a serological test for antibodies against the H5N1 influenza strain.

(b)+(c) Research or equivalent grants/contracts (indicate under COMP whether grants were obtained competitively (C) or non-competitively (NC))

Grants

Granting Agency	Subject	COMP	$ Per Year	Year	Principal Investigator	Co-Investigator(s)
Med. Res. Council of Canada	Role of Protein phosphorylation in viral action	C	54,000 -2 yr	1987-1989	Pelech	
B.C. Health Care Res. Foundation	Phosphatidylcholine turnover and protein phosphorylation in lymphokine action	C	12,000 -2 yr	1988-1990	Pelech	
B.C. Health Care Res. Foundation	TL-100 ultracentrifuge - Role of protein phosphorylation in cell cycle progression	C	17,000	1989	Pelech	
Med. Res. Council of Canada	Purification and characterization of cell cycle-regulated protein kinases	C	57,640 -2 yr	1989-1991	Pelech	
B.C. Health Care Res. Foundation	Role of protein phosphorylation in signal transduction by platelet agonists	C	22,000 -1 yr	1990		
B.C. Health Care Res. Foundation	Oocyte microinjection system & microscope	C	19,600	1990	Pelech	
B.C. Health Care Res. Foundation	Role of protein kinase C in signal transduction by platelet agonists	C	23,320 -1 yr	1991	Pelech	
Medical Research Council of Canada	Sorvall RC28S supraspeed centrifuge & F28/36 rotor	C	32,736	1991	Pelech	
B.C. Heart & Stroke Foundation	Protein kinase cascades in signal transduction by platelet agonists	C	60,000 -2 yr	1991-1993	Pelech	
Nat'l Cancer Inst. of Canada	Tyrosine-phosphorylated MBP/MAP-2 kinases in haemopoietic signal transduction	C	59,438 -3 yr	1991-1994	Pelech	
Nat'l Cancer Inst. of Canada	Characterization of oncogene-encoded protein-serine kinases	C	64,050 -3 yr	1991-1994	Pelech	

Med. Res. Council of Canada	Protein kinase cascades in cell cycle control	C	81,488 -3 yr	1991-1994	Pelech	
B.C. Health Care Res. Foundation	Elutriator Centrifuge	C	48,000	1992	Pelech	Berger, Weeks, Sadowski, Astell
B.C. Health Care Res. Foundation	HPLC system	C	29,000	1993	Pelech	
National Cancer Institute of Canada	HPLC system	C	29,000 (declined)	1993	Pelech	
B.C. Heart & Stroke Foundation	Role of protein kinase cascades in platelets	C	84,500 -2 yr	1993-1995	Pelech	
NRC of Canada IRAP	Protein kinase assay kit development	C	50,000	1994-1995	Pelech(Kinetek)	
Med. Res. Council of Canada	Protein kinase cascades in cell cycle control	C	84,748 -3 yr	1994-1997	Pelech	
Nat'l Cancer Inst. of Canada	MAP kinase pathways in haemopoietic signal transduction	C	77,825 -4 yr	1994-1998	Pelech	
Nat'l Cancer Inst. of Canada	Characterization of oncogene-encoded protein-serine kinases	C	99,063 -4 yr	1994-1998	Pelech	
B.C. Heart & Stroke Foundation	Role of protein kinase cascades in platelets	C	10,000 -1 yr	1995-1996	Pelech	
B.C. Science Council	Assay for activated Ras-related G proteins	C	50,000	1995-1996	Pelech (Kinetek)	Kalmar (Simon Fraser Univ.)
B.C. Heart & Stroke Foundation	Activation of protein kinases in heart	C	82,000 -3 yr	1996-1999	Katz	Pelech
Kinetek Pharmaceuticals, Inc.	Histidine kinase and tumour-activated protein kinases	NC	65,000 - 3 yr	1996 - 1999	Pelech	

Med. Res. Council of Canada	Characterization of insulin-inhibited serine kinases	C	82,000 -1 yr	1997-1998	Pelech	McNeill
Nat'l Cancer Inst. of Canada	MAP kinase pathways in seastar oocyte cell cycle control	C	10,000	1998-1999	Pelech	
Nat'l Cancer Inst. of Canada	Structure-function analysis of protein-serine kinase complexes	C	37,500	1998-1999	Pelech	
BC Heart & Stroke Foundation	Regulation of cardiomyocyte differentiation by protein kinases	C	58,450 - 2 yr	1999 - 2001	Pelech	
JDF/MRC NCE	Cell signalling in NOD mice	C	5,000 - 3 yr	1999 - 2001	Delovich Ochi et al.	Pelech
Nat'l Cancer Inst. of Canada	Identification of putative breast cancer-linked protein kinases	C	49,000 - 1 yr	1999 - 2001	Pelech	
BC Heart & Stroke Foundation	MAP kinase pathways in normal and disease heart	C	92,970 - 3 yr	1999 - 2002	Pelech	Katz
Can. Inst. Health Res.	MAP kinase pathways in seastar oocycte cell cycle control	C	82,000 - 3 year	2000-2003	Pelech	
National Research Council of Canada IRAP	Development of Relational Functional Proteomics Databases	C	48,000 - 9 months	2004-2005	Pelech	Kinexus Bioinformatics Corporation
National Research Council of Canada IRAP	Development of Protein Kinase-Based Arrays for Diagnostics and Drug Discovery	C	80,000 - 2 year	2004-2006	Pelech	Kinexus Bioinformatics Corporation
Can. Inst. Health Res.	Protein kinase pathways in seastar oocyte cell cycle control	C	107,000 - 5 year	2005-2007	Pelech	
Can. Foundation for Innovation	Brain Research Centre: A Platform for Basic and Translational Neuroscience.	C	$6.8 million	2007	Cynader	Pelech + 10 other co-investigators. I wrote approximately 30% of this successful

National Research Council of Canada IRAP	Building the On-line SigNET KnowledgeBank	C	50,000 – 1 year	2009-2010	Pelech	Kinexus Bioinformatics Corporation
Nati. Sci. & Eng. Res. Council of Canada	Mapping the human kineome and phosphoproteome	C	80,000 – 2 years	2009-2011	Stacho + Pelech	Simon Fraser Univ. + Kinexus Bioinformatics Corporation. I wrote 95% of this successful grant
National Research Council of Canada IRAP	Production of Epitope-mapped Phosphosite Antibodies	C	38,000 – 1 year	2011-2011	Pelech	Kinexus Bioinformatics Corporation
National Research Council of Canada IRAP	Development of Protein Kinase/Phosphatase Substrate Microarrays	C	178,000 – 2 years	2012-2014	Pelech	Kinexus Bioinformatics Corporation
National Research Council of Canada IRAP	Development of Protein Kinase/Phosphatase Assays (Salary support for Iqbal Sarai)	C	20,000 – 9 months	2020	Pelech	Kinexus Bioinformatics Corporation
Neurodegenerative Disease Research (NDR), Inc.	Development of Phosphosite Antibodies for ALS Target Proteins	C	US$140,000	2021	Pelech	Kinexus Bioinformatics Corporation
COVID-19 Immunity Task Force	Immmunogenicity of current SARS-CoV-2 vaccine schedules in BC and Ontario	C	$729,149	2021	Pascal Lavoie	Pelech
Neurodegenerative Disease Research (NDR), Inc.	Development of Phosphosite Antibodies for ALS Target Proteins (Salary support for Ghada Maged)	C	US$15,000	2022	Pelech	Kinexus Bioinformatics Corporation

(d) Invited Presentations

103 Local in B.C.; 37 in Canada outside B.C.; 66 in U.S.A.; 32 Internationally, outside of Canada and USA

1. July 1987 - Biochemistry Department, Univ. of B.C.
2. December 1988 - Biochemistry & Molecular Biology, Univ. of Manitoba, Winnipeg, Manitoba.
3. 14 December 1989 - Dept. of Obstetrics & Gynaecology, Univ. of B.C., Grace Hospital Site. Regulation of meiotic maturation and egg mitosis by protein phosphorylation.
4. 6 February 1989 - Vancouver Council of Woman, Unitarian Church, Vancouver. Present and future of human embryo and fetal research.
5. 12 March 1990 - Dept. of Paediatrics, Univ. of B.C., Shaughnessy Hospital Site.
   Protein phosphorylation in cell cycle control.
6. 21 March 1990 - Pharmacology Department, Univ. of B.C. Cell cycle-regulated protein kinase cascades.
7. July 1990 - Ludwig Cancer Institute, London, U.K.
8. July 1990 - Imperial Cancer Research Fund, London, U.K. Regulation of protein kinase C in haemopoietic cells.
9. July 1990 - Wellcome Biotech., Beckenham, U.K.
10. February 1991 - Biotechnology Building, Cornell University, Itheca, NY, USA. p44mpk - a paradigm for a family of mitogen-regulated, tyrosine-phosphorylated protein-serine kinases implicated in cell cycle control.
11. 4 October 1991 - Inst. Molecular Biol. & Biochem., Simon Fraser Univ., Burnaby. MAP kinases, a family of tyrosyl-phosphorylated and activated protein-seryl kinases.
12. 8 October 1991 - Dept. of Ophthalmology, Univ. of B.C., Eye Care Centre, V.G.H. MAP kinases, a family of tyrosine-phosphorylated & activated protein-serine kinases.
13. 7 November 1991 - Manitoba Inst. of Cell Biology, Univ. of Manitoba, Winnipeg, Manitoba.
14. 6 December 1991 - Dept. of Biochemistry, Queens University, Kingston, Ontario. MAP kinases, a family of tyrosyl-phosphorylated and activated protein-seryl kinases.
15. 15 January 1992 - Department of Physiology, Univ. of B.C. MAP kinases, God's gift to the Pelech lab.
16. 28 February 1992 - Dept. of Microbiology, University of Virginia, Charlottesville, VA, USA. Charting regulatory pathways with MAP kinase.
17. 11 March 1992 - Department of Microbiology, Univ. of B.C.
18. 9 April 1992 - Department of Anatomy & Cell Biology, University of Kansas, Kansas, USA.
19. 8 May 1992 - Department of Biochemistry, University of Calgary, Calgary, AB. Charting regulatory pathways with MAP kinase.
20. 17 September 1992 - Div. Endocrinology, Dept. Medicine, Univ. of B.C. Charting regulatory pathways with MAP kinase.
21. 11 July 1992 - D. Vance Honourary Symposium, Univ. of B.C.
22. 25 October 1992 – Keystone A.S.B.M.B. Symposium, Keystone, CO, USA Chairperson
23. 14 November 1992 - Frontiers in Science, Shrum Science Centre, Simon Fraser Univ., Burnaby. The power and promise of biomedical research.

24. 3 March 1993 - Dept. of Biochemistry, University of Alberta, Edmonton, AB
25. 26 October 1993 - Department of Medicine, Univ. of B.C. Abnormal insulin regulation of protein kinases during diabetes.
26. 28 October 1993 - Pharmaceutical Sciences, Univ. of B.C. Insulin-activated protein kinase cascades - A paradigm for mitogenic signalling.
27. 4 November 1993 - Department of Obstetrics & Gynaecology, Univ. of B.C. Networking with MAP kinases.
28. 8 December 1993 - Department of Biochemistry, McGill Univ., Montreal, QC. Charting regulatory pathways with MAP kinases.
29. 18 June 1993 - C.F.B.S. Meeting, Windsor, ON. Merck Frosst Canada Prize Award Lecture for C.S.B.M.B.
30. 21 June 1993 - Hotel Dieu Hospital, Montreal, QC. Regulation of insulin-activated protein kinases in diabetic rats.
31. 22 June 1993 - N.R.C. Biotechnology Research Institute, Montreal, QC. Networking with protein kinases.
32. 22 September 1993 - European Cell Cycle Conference, La Rochelle, France.
33. 1 October 1993 - Biological Regulatory Mechanisms, Rossiter Conference, Barrie, ON. Cell cycle-regulation of serine/threonine kinases
34. 18 April 1994 - Dept. Anatomy & Cell Biology, University of Toronto, Toronto, ON. At the cross-roads of diverse signal transduction pathways.
35. April 1994 - Department of Biochemistry, University of Minnosota, St. Paul, MN, USA. Networking with protein kinases.
36. November 1994 - N.R.C. Workshop-Biotechnology Research Institute, Montreal, QC. Signal transduction: Advances and applications.
37. 21 May 1994 - Schmitt Symposium: The Cytoskeleton in Alzheimer's Disease, Univ. of Rochester, Rochester, NY. Phosphorylation cascades.
38. 14 June 1994 - Dupont Symposium on Biological Signals, C.F.B.S. Meeting, Montreal, QC. Mitogen-activated protein kinases: at the cross-roads of diverse signal transduction pathways.
39. 21 June 1994 - XIIth Annual Workshop on Membrane Transport, University of Montreal, Montreal, QC. Protein kinase and phosphatase networks in cell signaling.
40. 21 July 1994 - XVI Annual Meeting Internatl. Society Heart Research Symposium, London, ON. Regulation of protein kinase circuitry by growth factors.
41. November 1994 - Onyx Pharmaceuticals, Richmond, CA. U.S.A. MEK'ing connections in MAP kinase-dependent signalling pathways.
42. 28 March 1995 - Dept. of Pathology, Univ. of B.C., St. Paul's Hospital. MAP kinase networks in cell proliferation and stress.
43. 16 May 1995 - Dept. of Pharmacology, Vanderbilt University, Nashville, TN, USA. Mitogenic and stress-activated protein kinase modules in cellular signalling.
44. 29 June 1995 - Internatl. Soc. Neurochemistry Workshop, Nagoya Japan.
45. 18 July 1995 - Cornell University, Ithaca, NY, USA.
46. 28 August 1995 - Virological and Immunological Mechanisms, Functional Outcomes and Possibilities for Therapy in Enteroviral Heart Disease: An International Workshop, St. Paul's

Hospital, Vancouver, Moderator, Ventricular function, myocyte biology, therapeutics.

47. 26 January 1995 - Pacific NorthWest Biotechnology Exposition, Westin Hotel, Vancouver.
48. 27 January 1995 - Aquatech'95 Conference, Westin Hotel, Vancouver.
49. 9 May 1995- John P. Robarts Research Institute, London, ON. MAP kinase pathways in hemopoietic cell activation.
50. 15 February 1995 - Merck Frosst - Growth Factor Meeting, Hyatt Regency, Vancouver.
51. 11 May 1995 - Weis Centre for Research, Geisinger Clinic, Dansville, PE, USA. Regulation of mitogenic and stress-activated protein kinases.
52. 19 May 1995 - ICOS Inc., Bothell, WA, USA.
53. 20 July 1995 - W. Alton Jones Science Centre, Lake Placid, NY, USA. Protein kinase circuitry in mitogenic and stress signalling.
54. 6 December 1995 - Upstate Biotechnology Inc., Lake Placid, NY, USA.
55. 3 May 1996 - Dept. of Surgery, Univ. of B.C., Jack Bell Research Centre. Malfunctions in cell signaling systems - the molecular basis of chronic diseases.
56. 9 May 1996 - Dept. of Pathology, Univ. of B.C., Eye Care Centre. Protein kinases and disease.
57. 22 January 1996 - Pierce Chemicals, Rockford, IL, USA.
58. 21 February 1996 - Hospital for Sick Children, Toronto, ON.
59. 4 March 1996 - Biochemistry, Pharmacology & Physiol. Club of Univ. of B.C.- Keynote Speaker. Your future in the basic medical sciences-bridging academia, government & industry.
60. 23 March 1996 - Fisher Winternational Conference, Banff, AB.
61. 26 March 1996 - Vancouver Enterprise Forum, Science World, Vancouver. Coaching the captain: the mentoring process.
62. October 1996 - Signal Transduction Conference, Lake Tahoe, Nevada, USA. Insulin signaling through protein kinase cascades.
63. October 1996 - Insulin Signaling & Diabetes, Washington, D.C. , USA Vanadium compounds for treatment of diabetes in rats.
64. November 1996 - Biochem. Pharma, Laval, QC. Insulin signal transduction through protein kinases.
65. November 1996 - Life Sciences Venture Forum, Toronto, ON. Kinetek Pharmaceuticals Inc.
66. 20 December 1996 - Biochemistry, Pharmacology & Physiol. Club of U.B.C.- Vancouver Keynote Speaker - Careers in Biotechnology.
67. 7 November 1997 - Dept. of Medicine, Univ. of B.C., St. Paul's Diabetes Centre. Insulin signalling and organovanandium compounds.
68. 23 July 1997 -1997 International Society for Heart Research International Conference, Vancouver. Protein kinase workshop.
69. 22 September 1997 - IBC Signal Transduction Therapy, San Diego, CA, USA. Insulin signalling and vanadium compounds for treatment of diabetes in rats.
70. 23 June 1997 - University of Calgary, Dept. of Pharmacology, Calgary, AB. Insulin signalling through kinase cascades.
71. 18 December 1997 - Dept. of Medicine, University of B.C., St. Paul's Diabetes Centre. Insulin signalling and organovandandium compounds.

72. 29 November 1997 - Brain and Spinal Cord Research Centre Symposium. UBC, Vancouver. Signal transduction research.
73. 6 June 1998 - Bridging the Straight of Georgia Cancer Conference, Cowichan Bay, BC. Protein kinases for cancer diagnosis and therapeutic targets for chemotherapy.
74. 11 June 1998 - Dept. of Pharmacology, University of Virginia, Charlottesville, Virginia, USA. MAP kinases in sea star oocyte cell cycle control.
75. 5 March 1998 - Biochemistry, Pharmacology & Physiol. Club of University of BC, Vancouver. Keynote speaker - Career opportunities in the biotechnology industry.
76. 7 May 1998 - Association of University Anaethesists Annual General Meeting, San Francisco, CA, USA. Pursuit of scientific excellence in industry.
77. 11 March 1999 - Dept. of Physiology, Univ. of B.C. Introduction to protein kinases.
78. 8 April 1999 - Dept. of Pharmacology, Univ. of B.C. Introduction to protein kinases.
79. 25 June 1999 - American Society for Microbiology Conference, Vancouver. Analysis of protein kinase networks.
80. 24 August 1999 - Pacific Institute for the Mathematical Sciences Symposium, Univ. of B.C. Mathematical analysis of protein kinase networks.
81. 14 October 1999 - Simon Fraser University - Harbour Centre, Vancouver. Canadian Brain drain to United States.
82. 3 February 2000 - Dept. of Pharmacology, University of South Alabama, Mobile, Alabama, USA. MAP kinases in cardiovascular disease.
83. 21 February 2000 - UBC Signal Transduction Network, Univ. of B.C. Mapping kineomes - protein kinase network analysis.
84. 28 April 2000 - Dept. of Biochemistry, University of Alberta, Edmonton, AB. p38 MAP kinase pathways.
85. 6 October 2000 - Montreal Heart Institute, Montreal, QC. Analysis of protein kinase networks in muscle models.
86. 14 March 2000 - BC Biotechnology Alliance, Hyatt Regency, Vancouver. Genomics, proteomics and bioinformatics.
87. 8 June 2000 - Canadian Society Pharmaceutical Sciences, Crowne Plaza Hotel, Vancouver. Spinning out companies from university research.
88. 21 August 2000 - Univ. of B.C. Dept. of Medicine Jubilee CME, Galaxy Cruise, Alaska. What you need to know about molecular biology.
89. 30 September 2000 - Foresight Capital Corporation, Delta Resort, Whistler, BC. Human genome project benefits for disease diagnosis and treatment.
90. 13 November 2000 - Pacific Rim biotechnology Conference, Hotel Vancouver, Vancouver. The Midas Touch.
91. 30 November 2000 - Eldercollege/Capilano College, North Vancouver. How to invest in biotechnology with dollars and sense.
92. 30 November 2000 - Biofuture Fund conference, Vancouver. Human genome and personalized medicine.
93. 25 January 2001 - PENCE Group, University of Toronto, Toronto, ON. Proteomic analysis of signal transduction pathways.

94. 24 April 2001 - Vancouver Enterprise Forum - Proteomics, bioinformatics and personalized medicine.
95. 26 April 2001 - Aventis Biotechnology Fair - BCIT, Burnaby - Genomics, proteomics and bioinformatics.
96. 27 April 2001 - UBC Department of Pharmacology and Therapeutics - Proteomics analyses of protein kinase networks.
97. 28 May 2001 - UBC Department of Biochemistry and Molecular Biology. MAP kinase networks in cell signaling.
98. 11 June 2001 - University of Calgary, Calgary, AB. Kinetworks mapping of cell signaling pathways.
99. 28 June 2001 - BC Canacer Agency - Advanced Therapeutics Group. Analysis of protein kinase networks.
100. 4 October 2001 - UBC Faulty of Medicine Distinguished Lecture. MAP kinase signalling pathways in human cancer.
101. 3 July 2001 Institute of Molecular and Cell Biology, National University of Singapore - Proteomic analyses of cell signalling networks: Mapping protein kinase networks.
102. 27 February 2002 - Children's Hospital Eastern Ontario, Univ. of Ottawa, Ottawa, ON. Kinetworks proteomics analyses: Mapping protein kinase networks in neural disorders.
103. 5 March 2002 - Scripps Institute, San Diego, CA, USA. Kineome analysis: Mapping cell signalling networks.
104. 6 March 2002 - International Business Communications - Protein Kinase Drug Discovery Conference, San Diego, CA, USA. Kineome analysis: Mapping protein kinase networks.
105. 21 March 2002 - Cambridge Health Institute- Protein to Profits Conference, Munich, Germany. Kinetworks analysis: Mapping cell signalling networks.
106. 4 April 2002 - First Forward Network/BC Biotech, Vancouver Terminal City Club. Bioinformatics for Biotech Executives - Keynote talk - A history of Bioinformatics: The past and beyond.
107. 12 April 2002 - The Prostate Centre at Vancouver General Hospital Seminar. Mapping cell signalling systems by Kinetworks analysis.
108. 26 April 2002 -BC Institute of Technology, Aventis Student Biotech Challenge Talk. Biotechnology in your future.
109. 3 June 2002 - 85th Meeting of the Canadian Chemical Society, Vancouver. Drug profiling by Kinetworks analysis.
110. 9 September 2002 - IBC 2nd Annual Protein Kinase Conference, Boston, MA, USA Mapping protein kinase pathways by Kinetworks.
111. 19 September 2002 - The First Pacific North-West Cell Signalling Conference, Vancouver. Charting protein kinase pathways involved in mitotic checkpoint control.
112. 20 September 2002 - The 4th Annual Pacific Northwest Venture Forum- Monte Jade, Vancouver. Kinexus Bioinformatics.
113. 9 October 2002 - Laval University, Quebec City, QC. Mapping protein kinase networks.
114. 21 November 2002 - BioFuture 2002 Conference and Exhibition, Vancouver. Stress Molecules - Listening to cells to silence disease.
115. 29 November 2002 - University of Calgary, Calgary, AB. Promise of proteomics in the post-genomic era.

116. 29 November 2002 - University of Calgary, Calgary, AB. Challenge to the entrepreneur scientist in the pursuit of academic excellence and success in the biotechnology industry.
117. 3 March 2003 - Strategic Health Institute's Protein Kinase Meeting, San Diego, CA, USA. Kinetworks analysis: Elucidating the cell specific architecture of protein kinase networks.
118. 6 March 2003 - Bioinformatics Training Initiative - BC Institute of Technology. Drug discovery in the post-genomics era: The Bioinformatics challenge and opportunity.
119. 10 March 2003 - Invest NorthWest Conference, Seattle, WA, USA. Drug target discovery by Kinetworks analysis.
120. 19 March 2003 - Cambridge Health Institutes, Molecular Market Place Meeting, Santa Clara, CA, USA. Tracking protein kinase pathways for identification and validation of drug targets.
121. 21 March 2003 - Cambridge Health Institute's TriGenome Conference - Santa Clara, CA, USA. Kinetworks analysis: Elucidating the cell-specific architecture of protein kinase networks.
122. 29 March 2003 - BC Pharmacy Assoc. Continuing Education Association - Richmond, BC. The promise of proteomics in the post-genomics era of personalized medicine.
123. 4 April 2003 - Eric Hamber Secondary School, Vancouver, BC. Careers in biotechnology.
124. 25 April 2003 - British Columbia Institute of Technology - Burnaby, BC. Genomics and proteomics and the future of medicine.
125. 29 April 2003 - Pt. Grey Secondary School, Vancouver BC. Careers in biotechnology.
126. 29 May 2003 - International Council of Electrophoresis Society on Proteomics: Present perspectives and future challenges. Glasgow, Scotland. Mapping protein kinase pathways in mitotic checkpoint control by Kinetworks.
127. 16 June 2003 - University of California San Francisco Cancer Centre, San Francisco, CA, USA. Proteomics analysis of cancer.
128. 15 September 2003 - Parkinson's Disease Conference. Painter's Lodge, BC. Proteomics analysis of neurodegenerstive diseases.
129. 8 October 2003 - Human Proteome Organization Meeting. Montreal, QC. Tracking protein kinase signalling on macroarrays with antibodies and peptide antibody mimetics (PAM's).
130. 20 October 2003 - Strategic Health Institute - Protein Kinase Meeting – Philadelphia, PA, USA. Mapping protein kinase signalling oathways by Kinetworks analysis.
131. 23 October 2003 - IIR Life Science Conference - 2nd Annual Protein Kinase Meeting - Amsterdam, Holland. Monitoring protein kinase networks with arrays of antibodies and peptide antibody mimetics (PAM's).
132. 10-17 Jan 2004 - Cambridge Health Institute - PEPTalk Meeting, San Diego, CA, USA. Tracking protein kinases and protein phosphorylation on macroarrays with antibodies and paptide antibody mimetics (PAM's).
133. 2+3 March 2004 - GenomeCanada presentation in Toronto, ON.
134. 8 March 2004 - Univ. of British Columbia, Robson Square, Public Address for Research Awareness Week. Dr. Professor/Mr. President - The curse of the entrepreneur scientist.
135. 9 June 2004 - Cambridge Health Institute - Protein Kinase targets - Strategies for Drug Development. Boston, MA, USA. Tracking the kinome by multiblotting with antibodies and peptide antibody mimetics (PAM's).
136. 19-23 September 2004 - International Business Communications - CHIPS to Hits, Boston MA,

USA. Kineome analysis: Mapping protein kinase networks.

137. 22-23 Jan. 2005 - Ramandhai Foundation 2nd International Symposium "Current Trends in Pharmaceutical Sciences: Role of Genomics and Proteomics. Ahmedabad, India. (Had to cancel 2 days before departure due to illness)

138. 28 Feb. 2005 - Strategic Research Institute – 3rd Annual Protein Phosphorylation Drug Discovery World Summit, San Diego, CA, USA. Tracking the kineome and phosphoproteome in arrays with antibodies and peptide antibody mimetics (PAM's).

139. 14 May 2005 - B.C. Pharmacy Association Annual Meeting, Vancouver. The promise of pharmacoproteomics for disease diagnosis and drug discovery.

140. 20 March 2005 - World Congress on Microarray Technology, Vancouver. Tracking the kineome and phosphoproteome in arrays with antibodies and peptide antibody mimetics (PAM's).

141. 13 September 2005 - International Consortium on Anti-Virals Symposium and Workshop, Trent University, Peterborough, ON. Mapping cell signaling pathways.

142. 28 September 2005 - National Research Council of Canada Genomics and Health Initiative Annual General Meeting. Ottawa, ON. Commercialization of technology.

143. 9 January 2006 - Cambridge Healthtech Institute PepTalk Conference. Coronado, CA. Mapping the phosphoproteome by Kinex™ antibody arrays.

144. 24 March 2006 - World Congress on Microarray Technology, Vancouver. Tracking cell signalling protein expression and phosphorylation by antibody microarrays.

145. 8 May 2006 - GTCbio Protein Kinases in Drug Discovery Conference. Boston, MA, USA. Tracking the regulation of protein kinases and phosphorylation by quantitative antibody microarrays and multi-immunoblotting.

146. 3 July 2006 - IIR's 5th Annual Protein Kinases Congress. Zurich, Switzerland. Kinase pathway analysis for target identification. Chair.

147. 26 September 2006 - NRC-Biotechnology Research Institute, Montreal, QC. Meta-analyses of the human kineome and phosphoproteome.

148. 2 December 2006 - GTCBio Drug Discovery Meeting. Philadelphia, PA. Antibody multi-immunoblotting and microarray analysis for CNS biomarker discovery in Alzheimer, Parkinson and ALS disease.

149. 22 February 2007 - UBC Department of Medicine, Division of Neurology Grand Rounds. Vancouver. Phosphoproteomics and neurodegenerative diseases of the CNS.

150. 8 March 2007 - SSP,.PSC.CSCO.WPS Joint meeting. Banff, AB. Mapping cell signalling networks with multi-immunoblotting and antibody microarrays.

151. 22+24 May 2007 - Workshop Course - Informa 6th Annual Protein Kinases Congress – Biomarker profiling for kinase target evaluation– Principal Instructor and Coordinator. Lisbon, Portugal

152. 18 June 2007 – Frontiers in Bioinformatics Workshop – University of British Columbia, Vancouver. Mapping the human phosphoproteome.

153. 30 June 2007 - Workshop Course - World Congress on Microarray Technology, Vancouver. Tracking cell signalling protein expression and phosphorylation by antibody microarrays.

154. 29 August 2007 – Seminar Presentation - University of Bath, Bath, UK. Tracking the human phosphoproteome.

155. 30 August 2007 – Seminar Presentation - University of Liverpoole, Liverpoole, UK. Tracking the human phosphoproteome.

156. 3 September 2007 - Workshop Course - Discovery – Select European Biomarkers Summit and Proteomics Europe Conference. Principal Instructor and Coordinator. Amsterdam, Holland. Mining the kineome and phosphoproteome with protein microarrays for biomarker and drug target.

157. 28 October 2007 - Seminar Presentation - Joint meeting of 3rd Czech Proteomic conference and 1st Central and Eastern European Proteomic Conference. Olomouc, Czech Republic. Protein microarrays and phosphoproteomics.

158. 6 December 2007 – Seminar Presentation – Lousiana State University Health Sciences Center – Shreveport, LO, USA – Proteomics methodologies.

159. 6 December 2007 – Seminar Presentation – Lousiana State University Health Sciences Center – Shreveport, LO, USA – The human kineome and phosphoproteome.

160. 9 February 2008 – Visiongain Protein Kinase Conference – London, UK (This meeting was cancelled 4 weeks before, but I was invited as a speaker and chairperson)

161. March 11, 2008 – Max Planck Institute– Berlin, Germany. The human kineome and phosphoproteome.

162. March 12, 2008 - Informa 7th Protein Kinase Congress – Berlin, Germany. Antibody-based phosphoproteomics for biomarker and drug target identification. (Speaker and panelist)

163. March 27, 2008 - Canadian-Dutch Dementia Colloquium, University of British Columbia, Vancouver. Proteomic approaches for the diagnosis of Alzheimer's disease: What is the rationale and what are the prospects?

164. April 17, 2008 – Department of Biochemistry, Vanderbilt University, Nashville, TN, USA. The human kineome and phosphoproteome.

165. July 4-17, 2008 – In collaboration with the Japanese company Cosmo-Bio, I gave 90 to 120 minute scientific presentations to the following 13 companies. The number of scientists at these presentations ranged from about 6 to 40. The talk was entitled: Tracking the human kineome and phosphoproteome.

    Daiichi-Sankyo Pharma (Tokyo)

    Ono Pharma (Tsukuba)

    Ono Pharma (Osaka)

    Astella Pharma (Tsukuba)

    Banyu Pharma (Merck) (Tsukuba)

    Takeda Pharma (Tsukuba)

    Takeda Pharma (Osaka)

    Tanabe-Mitsubishi (Saitama)

    Japan Tobacco (Osaka)

    Dainippon-Sumitomo Pharma (Osaka)

    Santen Pharma (Nara)

    Shionogi Pharma (Osaka)

    Nippon Shinyaku (Kyoto)

167. September 8-10 - Informa Drug Discovery Summer School in Cambridge, UK with Dr. Pelech as an invited speaker and chairperson. (This workshop was cancelled 6 weeks before it was to have transpired).

168. September 24, 2008 - IBC ACT 2008: Protein Kinase Target Conference, San Diego, CA. Mapping the human phosphoproteome. (Speaker, panelist and chair)
169. October 23, 2008 – Omeros Pharmaceuticals, Inc., Seattle, WA, USA. Kinase Inhibitors in the Clinic. Tracking the human kinome and phosphoproteome.
170. February 3, 2009 – University of Washington, Seattle, WA, USA. Breakfast Club Seminar. Tracking the kineome and phosphoproteome.
171. March 3, 2009 – Informa 8th Annual Protein Kinase Congress. Barcelona, Spain. Validation of protein kinase drug targets and drug leads with microarray approaches. (Speaker, panelist and chair)
172. May 8, 2009 – Prostate Centre Grand Round at VGH. Vancouver, BC. Mapping the human kineome and phosphoproteome by protein microarray and bioinformatics analyses.
173. August 6, 2009 – Select Biosciences Microarray World Congress. South San Francisco, CA, USA. Antibody microarrays for biomarker discovery and kinase microarrays for drug screening.
174. December 10, 2009 – Bristol Meyer Squibb. Princeton, NJ, USA. Kinase Inhibitors in the Clinic. Phosphoprotein biomarker and kinase drug target discovery with protein microarrays.
175. February 1, 2010 – University of British Columbia, Coop Program Networking Workshop. Vancouver, B.C.
176. June 21-23, 2010 - Cambridge Healthtech "Next–gen kinase inhibitors: Oncology and Beyond" Meeting. Cambridge, MA, USA. Mapping protein kinase networks and drug interactions with protein microarrays and predictive bioinformatics. (Speaker, panelist and chair)
177. March 24, 2010 – University of British Columbia, Department of Biochemistry Career Workshop. Vancouver, B.C.
178. September 10, 2010 – Global Biomarker Conference & Workshop. Vancouver, B.C. Mapping the human kineome and phosphoproteome with predictive bioinformatics and protein microarrays.
179. September 26 to 30, 2010 - International Society of Hypertension 23rd Scientific Meeting (ISH 2010). Vancouver, B.C. Mapping protein kinase networks for diagnostics and therapeutics development.
180. October 29, 2010 – Select Biosciences – Microarray World Congress, La Jolla, CA, USA. Protein and peptide microarrays for tracking human protein kineome regulation.
181. February 27, 2011 – Student Biotechnology Network. University of Victoria, Victoria, BC. Mapping and tracking the human kineome and proteome.
182. June 9, 2011 – Experimental Medicine Research Day Keynote Talk. University of British Columbia. Vancouver, BC. Confronting the uncertain future of biomedical research and the biotechnology industry in this decade.
183. September 30, 2011 – Select Biosciences – Microarray World Congress. South San Francisco, CA, USA. Protein kinase and phosphosite biomarker discovery and validation with protein microarrays with antibodies, lysates, protein kinases and substrate peptides.
184. February 10, 2012 – Bristol-Meyer-Squibb, Wallingford, CT, USA. Signalling network analyses and biomarker discovery and validation with protein and peptide microarrays.
185. March 7, 2012 – Department of Biochemistry Career Workshop. University of British Columbia. Vancouver, B.C.
186. July 10, 2012 - Merck Molecular Biomarkers: Translational Research Deep Dive Conference. Long Branch, NJ, USA. Tracking the human Kineome, Phosphatome and Phosphoproteome for

biomarkers with antibody-based array technologies.

187. July 11, 2012 – Johnson & Johnson Pharmaceuticals. Springfield, PA, USA. Tracking the human Kineome, Phosphatome and Phosphoproteome for biomarkers with antibody-based array technologies.

188. July 12, 2012 - Bristol Myer-Squibb. Princeton, NJ, USA. Tracking the human Kineome, Phosphatome and Phosphoproteome for biomarkers with antibody-based array technologies.

189. July 13, 2012 – Novartis Institute for Biomedical Research Inc., Cambridge, MA, USA. Tracking the human Kineome, Phosphatome and Phosphoproteome for biomarkers with antibody-based array technologies.

190. October 2, 2012 – Purdue University, Department of Biochemistry. West Lafayette, IN, USA. Mapping the human Kineome, Phosphatome and Proteome with cell lysate, antibody and peptide microarrays.

191. March 8, 2013 – University of Missouri, Biochemistry Department. Columbia, MO, USA. Hierarchical molecular, cellular and social intelligence systems in the evolution of life.

192. July 17, 2013 – OMICS Group 3rd International Conference on Proteomics and Bioinformatics. Philadelphia, PA, USA. SigNET KnowledgeBank Workshop.

193. May 29, 2014 – BioConference Live Clinical Diagnostics & Research. On-line, CA, USA. Navigating the complexities of the human oncoproteome with the SigNET KnowledgeBank.

194. August 5, 2014 – OMICS Group 4th International Conference on Proteomics and Bioinformatics. Northbrook (Chicago), IL, USA. Phosphoproteomics and the origin and operations of the kineome. (also session chair)

195. August 6, 2014 – OMICS Group 4th International Conference on Proteomics and Bioinformatics. Northbrook (Chicago), IL, USA. Oncoproteomics for uncovering cancer biomarkers and therapeutics targets. (1 hour workshop)

196. September 10, 2014 – Biochemistry, Biology and Pathology of MAP Kinase II Conference. Vilnius, Lithuania. Navigating human phosphorylation networks with SigNET suite of on-line knowledge bases.

197. September 11, 2014 – Biochemistry, Biology and Pathology of MAP Kinase II Conference. Vilnius, Lithuania. Regulatory roles of conserved phosphorylation sites in the activation T-loop of the MAP kinase ERK1.

198. May 6, 2015 – Division of Neurology, University of British Columbia. Vancouver, BC. The protein kineome: Tracking and manipulating the predominant molecular intelligence system of cells with proteomics and bioinformatics.

199. September 29, 2015 – Human Proteome Organization (HUPO) Conference. Vancouver, BC. Profiling protein expression, modifications and interactions with antibody microarrays.

200. March 14, 2016 – Cure Huntington's Disease Initiative (CHDI) Foundation. Los Angeles, CA, USA. Overview of the Kinexus integrated proteomics and bioinformatics services platform.

201. March 29, 2016 – OMICS Group World Proteomics 6th Meeting. Atlanta, GE, USA. Two oral presentations: The SigNET KnowledgeBank - A series of on-line, open-access proteomics websites for biomarker identification and drug development; Tracking protein expression, modifications and interactions with antibody microarrays. (I also chaired two oral sessions)

202. July 18, 2016 – International Union of Molecular Biology and Biochemistry Meeting. Vancouver, BC. Positive and negative control of protein-serine/threonine kinases by phosphorylation in the catalytic domain T-loop. (I also chaired two oral sessions)

203. February 6, 2017 – Samsung Medical Center. Seoul, Korea. Tracking protein biomarkers in human lung tumour biopsies.

204. February 9, 2017 – 13th Korea Genome Organization (KOGO) Winter Symposium. Vivaldi Park, Korea. Tracking protein expression, modifications and interactions with antibody microarrays.

205. July 24th, 2017 – COSMO Bio. Toyko, Japan. Tracking protein expression, post-translational modifications and interactions with antibody microarrays.

206. July 26th, 2017 – Ono Pharmaceutical. Kyoto, Japan. Tracking protein expression, post-translationa modifications and interactions with antibody microarrays.

207. July 27th and 28th, 2017 – JPrOS 15th JHUPO Conference. Osaka, Japan. Two oral presentations: Tracking protein expression, post-translational modifications and interactions with antibody microarrays; Structure-function analyses of the catalytic domains of eukaryotic protein kinases.

208. August 30, 2017 – Bridging Discovery Research with Therapeutics Conference. Banff, Alberta. Investigations of the multi-site phosphorylation of CTP:phosphocholine cytidylyltransferase in huma cancer cell lines.

209. May 1, 2018 – Vancouver, BC. Tracking cell signalling protein expression, post-translation modifications, interactions and activation with antibody microarrays.

210. July, 2018 – EuroScicon Proteomics Meeting. London, England. Monitoring protein expression, phosphorylation and interactions with high content antibody microarrays. Structure-function studies of the catalytic domains of eukaryotic protein kinases. Meta-analyses of small molecule inhibitors of protein kinases. (Invited chair) (Meeting was cancelled by conference organizers 6 weeks in advance of the meeting)

211. November 19th and 20th, 2018 – 2nd Global Summit & Expo on Proteomics – 2018. Dallas, Texas. Structure-function studies of the catalytic domains of eukaryotic protein kinases. Monitoring protein expression, post-translational modifications and interactions with high content antibody microarrays Workshop – The open-access suite of bioinformatics websites in the SigNET KnowledgeBank. (Invited chair).

212. February 12, 2019 - 15th Korea Genome Organization (KOGO) Winter Symposium. Vivaldi Park, Korea. Tracking protein expression, post-translational modifications and interactions with high content antibody microarrays.

213. February 13, 2019 - Daegu Gyeongbuk Institute of Science and Technology. Daegu, Korea. Trackir protein expression, post-translational modifications and interactions with high content antibody microarrays.

214. January 15, 2021 – Overview of Kinexus Bioinformatics Corporation and the NDR ALS Biomarker Project. Neurodegenerative Disease Research (NDR), Inc. Group via ZOOM in USA

215. October 28, 2021 - Dr Steven Pelech - Science or fear vaccine mandates UBC. UBC Students for Freedom of Expression. Vancouver, B.C.

216. February 2, 2022 – Pandemic of the unvaccinated. Canadian Covid Care Alliance. Live Zoom presentation.

217. April 9, 2022 – Third Annual Med Ed Conference. Lions Gate Hospital Foundation Youth Advisory Committee. My past and your future in medical research and practice. Vancouver, B.C.

218. May 7, 2022 – Unity Conference. COVID-19, natural immunity and vaccines. Kelowna, B.C.

219. May 28 and 29, 2022 - Restore Canada Conference. We Unify Canada. Victoria, B.C.

220. June 22, 2022 – Citizen's Hearing on COVID-19. Canadian COVID Care Alliance, Toronto, Ontario

221. June 23, 2022 – COVID-19 and natural immunity: Do I need to get vaccinated. Langley, B.C.

222. June 30, 2022 – Progress report for the Kinexus Bioinformatics Corporation and the NDR ALS Biomarker Project. Neurodegenerative Disease Research (NDR), Inc. Group via ZOOM in USA

223. September 10, 2022 – Natural versus COVID-19 vaccine-induced immunity. Victory Canada Candlelight Vigil. Vancouver Art Gallery Plaza. Vancouver, B.C.

224. September 26, 2022 – Conference on Idaho Victims of Pandemic Policy and Law. Prevalence of natural and COVID-19 vaccine induced immunity: What does SARS-CoV-2 antibody testing show Via Zoom in USA.

225. October 1, 2022 – White Rock SDA Church. Natural immunity ... Science or science fiction? Part 1 and Part 2. White Rock, B.C.

226. December 10, 2022 – Vancouver Art Gallery Plaza. Natural Immunity versus COVID-19 vaccine-induced immunity. The risks are so great. Vancouver, B.C. https://www.canadiancovidcarealliance.org/all/20628/

227. January 18, 2023 – David Eby Constituent Office. Why Bill 36 is dangerous to our healthcare system. Vancouver, B.C.

228. January 21, 2023 – UBC Cancer Association. The discovery of the molecular basis of cancer. UBC SUB Nest, Vancouver, B.C.

229. January 23, 2023 – Fraserview Community Hall. Natural versus COVID-19 vaccine-induced immunity ... The Dwindling case for vaccination. Maple Ridge, B.C.

230. January 29, 2023 – Heritage Hall. Natural versus COVID-19 vaccine-induced immunity ... The Dwindling case for vaccination. Canadian Film Workers for Human Rights & Ethics Association Town Hall. Vancouver, B.C.

231. February 4, 2023 - White Rock SDA Church. The crumbling case for COVID-19 vaccination. White Rock, B.C.

232. February 18, 2023 - World Wide Rally for Freedom at 999 Robson Street. Vancouver, B.C.

233. March 13, 2023 – Neurodegenerative diseases – From their molecular basis to societal impacts. KINE 495-Neuro-motor movement control and rehabilitation. Capilano University. North Vancouver, B.C.

234. May 3, 2023 – The COVID-19 Pandemic...What Really Happened. Testimony at the National Citizen's Inquiry in Canada's COVID-19 Response. Langley, B.C. https://www.canadiancovidcarealliance.org/all/dr-pelechs-nci-presentation/

235. May 20, 2023 – World Freedom Rally at 999 Robson Street. Vancouver, B.C.

236. May 26-28, 2023 – Natural and COVID-19 vaccine-based immunity. WeUnify Reclaiming Canada Conference. Victoria, B.C. https://www.youtube.com/watch?v=iCB-h9Cd550 Starting at 1:09:00

237. September 16, 2023 – White Rock SDA Church. Natural Immunity – Update #3. Q&A with Dr. Steven Pelech. White Rock, B.C. https://livestream.com/accounts/23819274/events/9259494/videos/237604548

238. November 26, 2023 – Christine Anderson Canadian Tour – Freedom Rising. Maple Ridge, B.C. https://rumble.com/v3z5r6j-dr.-steven-pelech-documenting-the-science-around-covid-19.html Starting at 3:14

239. March 18, 2024 – Neurodegenerative diseases – From their molecular basis to societal impacts. KINE 495-Neuro-motor movement control and rehabilitation. Capilano University. North Vancouver, B.C.

240. September 21, 2024 – Bills, bills, bills – The taking of your rights and the ability to tell you so. Town Hall, Thompson Community Centre, Richmond, B.C.

241. October 3, 2024 – Bill 36 – The Health Professions and Occupations Act. White Rock Seventh-Day Adventis Church. White Rock, B.C.

242. December 7, 2024 – Bills 36, C63 and C293 – Dealing with the next pandemic. Town Hall Meeting, 5383 Granville Street, Vancouver, B.C.

243. January 22, 2025 – Masks – More harm than good? B.C. Rising Meeting by Zoom. B.C.

(e) Other Presentations

(f) Other - Poster (only Poster Presentations from 2016 are listed)

1. April 16, 2016 – American Association for Cancer Research Annual Meeting. New Orleans, LA, USA. Steven Pelech, Lambert Yue, Jeff White, Ryan Hounjet, and Dirk Winkler. Profiling signalling protein expression,
modifications and interactions with multi-dimensional antibody microarrays.
2. April, 2016 – Federation of American Societies for Experimental Biology Annual Meeting. San Diego, CA, USA. Two posters: Steven Pelech, Lambert Yue, Jeff White, and Dirk Winkler. Modifications and interactions with multi-dimensional antibody microarrays; Steven Pelech, Lambert Yue, Shenshen Lai, Dirk Winkler, Jane Shi and Hong Zhang. Production and Characterization of polyclonal generic phosphotyrosine-specific antibodies.
3. July 18, 2016 – International Union of Molecular Biology and Biochemistry Meeting. Vancouver, BC. Two posters: Lambert Yue and Steven Pelech - Multi-dimensional analyses of protein expression, modifications and interactions with high content antibody microarrays (PP01.108); Steven Pelech,

Shenshen Lai, Javad Safaei and Lambert Yue - Positive and negative regulation of protein-serine/threonine kinases by their phosphorylation upstream of subdomain VIII in the T-loop (CS02.04).

4. **April 2017 – American Association for Cancer Research Annual Meeting. Washington, DC. Poster: Lambert Yue and Steven Pelech - Tracking expression, post-translational modifications and interactions of EGF signalling proteins in A431 cells with antibody microarrays.**

5. April 2018 – Canadian National Proteomics Network Annual Meeting. Vancouver, BC. Two posters: Kevin Gonzales, Lambert Yue and Steven Pelech - Phosphorylation of CTP:phosphocholine cytidylyltransferase (PCYT1A); Dirk Winkler, Lambert Yue, Javad Safaei, Zhoung Hua and Steven Pelech - Identification of optimal substrate peptides for protein kinases.

6. October 2019 - Canadian Association of Neuropathologists. Kingston, ON. Poster: Koeppen, A., Travis, A.M., Sutter, C., Pelech, S., and Mazurkiewicz, J.E. - Friedreich cardiomyopathy is a secondary desminopathy.

7. November 13-16, 2019 - International Ataxia Research Conference. Washington, DC. Poster: Koeppen, A.H., Travis, A.M., Qian, J., Mazurkiewicz, J.E., Gelman, B.B., Pelech, S., Sutter, C. The tissue proteome of dorsal root ganglia in Friedreich ataxia.

8. December 11-14, 2021 - American Society for Hematology. Atlanta, GA. Oral presentation: Yen, R, Yue, L. Pelech, S., Jiang, X. Identification of a highly deregulated eIF4F translation initiation complex in drug-resistant BCR-ABL^{+} cells by a phospho-proteomic antibody microarray.

9. June 3, 2022 – American Peptide Society 2022 Symposium. Whistler, B.C. Poster: Winkler, D.F.H., Atrey, A., Kraft, J.C., Wang, J., Zhao, J.Z., Pelech, S. Investigation into the antibody responses of COVID-19 positive individuals.

10. June 24-29, 2023 - American Peptide Society 2022 Symposium. Scottsdale, Arizona. Poster P248: Winkler, DF.H., Pelech, S. SPOT synthesis – Advantages, Challenges, Limitations.

11. 2024 – Monterey, California. Poster: Koeppen, A.H., Mazurkiewicz, J.E., Feustel, P.J., Pelech, S., Sutter, C., Ahmad, S., Khan, H. Cellular proliferation in dorsal root ganglia of Friedreich ataxia.

12. March 5-9, 2024 – Alzheimer's and Parkinson's Diseases Conference. Lisbon, Portugal. Poster: Tânia Soares Martins, T.S., Pelech, S., Ferreira, M., Breitling, B., Hansen, N., Esselmann, H., Wiltfang, J., da Cruz e Silva, O.A.B. Ana Gabriela Henriques, A.G. Blood-derived extracellular vesicles proteome and phosphoproteome profiling in Alzheimer's disease through microarray analysis.

(g) Conference Participation (Organizer, Keynote Speaker, etc.)

1 1991 - Vancouver organizing committee for 1991 Society for the Study of Reproduction International Conference

2 25 October 1992 - Keystone, Colorado A.S.B.M.B. Symposium, Chairperson

3 1996 - 1997 Vancouver organizing committee for 1997 International Society for Heart Research International Conference

10.1 SERVICE TO THE UNIVERSITY

(a) Memberships on committees, including offices held and dates

Departmental

1 1988 - 2023 - Univ. of B.C. Dept. Medicine - Experimental Medicine Graduate Program Committee

In 2022, I attended two formal meetings of the Committee, reviewed over 80 scholarship applications, as well as faculty and student admissions to the graduate program

2 1993 - 1997 - Univ. of B.C. Department of Medicine Grant Review Committee - Active Member

3 1998 - 2002 - Univ. of B.C. Dept. Medicine - Academic Appointments, Reappointments, Promotions and Tenure Committee, Co-chair

4 July 24, 2000 - VHHSC Grant Panel

5 Brain Research Centre – Space Planning Committee – Meetings: April 8, 2009; May 1, 2009;

Divisional

6 1998 - 2004 - Brain Research Centre - Space Planning Committee - Active Member

7 1987 - 1996 - Univ. of B.C. Biomedical Research Centre - Safety Committee - Active Member

Faculty

8 1998 - 2001 - Faculty of Medicine MD/PhD Graduate Program Committee

9 2000 - 2003 - Faculty of Medicine Research Advisory Committee - Member

10 2003 - 2007 - Faculty of Medicine Senior Academic Appointments, Reappointments, Promotions and Tenure Committee - Member

11 2006-2008 – Faculty of Medicine Internal Reviewer (HeRRO) of grants prior to submission to C.I.H.R. (1 grant per year). In 2008, I reviewed a grant application prepared by Dr. Brian Kwon. He was successful in funding.

12 2004-2008 – TAG Workshop Instructor for Preparation of Teaching Dossiers (2-3 workshops per year). In 2008, one was given on March 5 at VGH and another was given on September 22 at Richmond General Hospital.

13 November, 2014 – Reviewer for VCHRI Top Graduate Doctoral Student Award – Preparation of reports for 7 applicants.

14 April 18, 2017 and May 10, 2017 – Facilitator for UBC Responsible Conduct Course

15 January 23, 2018 and February 6, 2018 – Facilitator for UBC Responsible Conduct Course

University

16 1998 - 2007 - Brain Research Centre - Space Planning Committee - Active Member

17 March 14, 1992 Judge - Second Annual Research Workshop, Reproductive & Developmental Sciences Program, Dept. Obstetrics & Gynaecology, U.B.C.

18 June 22, 2000 - Chairman of the Degree Validation Panel convened to review the Proposal for a joint British Columbia Institute of Technology/University of British Columbia Program for a Bachelor

of Science degree in Biotechnology

19 2001 - 2004 - Faculty of Medicine Research Planning Committee - Member

20 2001 - 2003 - University of British Columbia Research Awareness Committee Member

21 May 2, 2001 - Canada Research Chairs Selection Committee Member

22 March 12, 2002 - Vancouver Hospital Health Sciences Centre Salary Awards Panel

23 January 24, 2008 – Judge – UBC Faculty of Dentistry Graduate Research Poster Competition

24 February 27, 2008 – Panelist - UBC Department of Biochemistry and Molecular Biology Careers
25 Evening

March 13, 2014 – Panel member for 2014 Science Career Information Fair (SCIFair) at the Life Sciences Centre, UBC.
26
March 19, 2014 – Panel member for 2014 Biochemistry Careers Night for the Department of Biochemistry and Molecular Biology at the Abdul Ladha Science Student Centre, UBC.

27 January 11, 2017 – Poster judge for the Faculty of Dentistry Graduate Student Program

28 November 7, 2018 – Poster judge for the UBC Faculty of Medicine and VGH Research Expo

29 January 17, 2019 – Panelist – UBC Computer Science/Life Sciences Panel – Careers Evening

30 March 9, 2019 – Panelist and speaker at 2 workshops - Operation Med School Vancouver (OMS) – Career event for high school students at the Robert H. Lee Alumni Centre

31 October 1, 2020 – present – UBC Senate. Faculty of Graduate and Postdoctoral Studies Representation. Also served on the Senate Admissions Committee, and the Senate Admissions Appeals Committee (2020-2023); the Senate Academic Policy Committee, and the Senate Nominating Committee (2023-present)

(b) Other service, including dates

1 October 25, 1991 Medical Research Council representative for Scholarships Day at UBC

2 September 24, 1992 Medical Research Council Representative for Scholarships Day at UBC

3 October 29, 2008 - Representative for Brain Research Centre for strategic discussion meeting in Waterfront Hotel in downtown Vancouver with Deputy Minister David Molony from Industry Canada to review government support for translational research

4 December 11, 2008 – Representative for UBC for strategic discussion meeting with N.S.E.R.C. at Pinnacle Marriott Hotel in downtown Vancouver to review government support for translational research

5 September 29, 2014 – Panel member for biotechnology curriculum development at the Langara College – Teaching and Curriculum Development Centre

6 October 15, 2020 to December 31, 2022– Panel member for Langara College B.Sc. in Bioinformatics Advisory Committee

Dissertation Committee and Examinations

Ph.D. & M.Sc. Supervisory Committee Membership

1 Dr. Paul Sunga - Dept. of Medicine (1989-1992 until Ph.D.)

Dr. Yong Hei - Pharmaceutical Sciences (1990-1993 until Ph.D.)
Ms. Elham Ettehadieh - Dept. of Biochemistry (1990-1993)
Mr. Brett Gabelman - Dept. of Anatomy (1990-1992 until M.Sc.)
Mr. Liren Tang - Dept. of Zoology (1991-1995 until Ph.D. & Ph.D. Examiner)
Ms. Rachel Zhande - Dept. of Biochemistry (1991-1998 until Ph.D.)
Mr. Aswin Patel - Pharmaceutical Sciences (1992-1996 until Ph.D.)
Ms. Patricia Herrera-Velt - Dept. of Microbio. Immunol. (1992-1997 until Ph.D.)
Mr. Sep Farahbakhian - Pharmaceutical Sciences (1992-1994 until M.Sc.)
Ms. Marie-Terese Little - Dept. Obsteterics & Geynecology (until 1993)
Mr. Patrick Tang - Dept. Microbio. Immunol. (1993-1997 until Ph.D.)
Mr. Mohammed Hasham - Dept. of Medicine (1994-1995 until M.S.)
Ms. Krista McCutcheon - Dept. of Anatomy (1994-1996 until M.Sc.)
Mr. Allen Young - Dept. of Oral Biology (1995-1997)
Mr. Brent Hehn - Dept. of Oral Biology (1995-1997 until Ph.D.)
Mr. Steven Drew - Dept. of Medicine (1995-1998 until M.Sc.)
Mr. Alaa El-Husseini - Dept. of Psychiatry (1995-1997 until Ph.D.)
Ms. Julia Mills - Dept. of Psychiatry (1995-1998 until Ph.D.)
Ms. Claire Sutherland - Dept. Microbiology Immunology (1995-1999 until Ph.D.)
Ms. Rochelle Starhe - Dept. of Medicine (1996-2001 until Ph.D.)
Mr. Mark Ware - Dept. of Medicine (1996-2000)
Mr. Vijay Viswanathan - Dept. Psychiatry (1998-2004 until Ph.D.)
Mr. Olaf Heisel - Dept. of Medicine (1999-2001 until Ph.D.)
Mr. Godfrey Miles - Dept. of Plant Sciences (1999-present)
Mr. Jan Ehses - Dept. of Physiology (1999-2003 Ph.D.)
Ms. Shu Hong Li - Pharmaceutical Sciences (2000 until 2001 Ph.D.)
Ms. Doris Chiu - Dept. of Medicine (2000-until 2001 M.Sc.)
Ms. Lucy Marzban - Pharmaceutical Sciences (2000 until 2001 Ph.D.)
Ms. Somrudee Sritubtim - Dept. Plant Sciences (2000 until 2005 Ph.D.)
Mr. Steven Drews - Dept. of Medicine (2000-2003 until Ph.D.)
Mr. Farrell MacKenzie - Dept. of Pathology (2001-2003 until M.Sc)
Ms. Jiehong Ju - Dept. of Kinesiology, Simon Fraser University (2001-2004 until Ph.D.)
Ms. Mannie Fan - Neuroscience Program (2002-2008 until Ph.D.)
Ms. Gina Rossi - Dept of Medicine (2002-2010)
Ms. Michelle Woo - Dept. Medicine (2003-2007 until Ph.D.)
Ms. Catherine Tucker - Dept. Medicine (2004-2007 until Ph.D.)
Mr. Tyson Brust – Neuroscience Program (2005-2008 until Ph.D.)
Mr. Philip Ly – Dept. Medicine (2005-2007 until M.Sc.)

39 Mr. Ebrima Gibbs – Dept. Medicine (2005-2008 until Ph.D.)
40 Ms. Shirley Chen – Dept. Medicine (2005-2009)
41 Mr. Scott Widenmaier – Dept. Cellular Physiological Sciences (2006-2010 until PhD)
42 Mr. Gobind Sun – Dept. Medicine (2006-2007 until transfer to new supervisor)
43 Ms. Amy Lai - Dept. Medicine (2007-2008 until transfer to new supervisor)
44 Ms. Arezoo Ostenehe – Dept. Medicine (2009-2013)
45 Ms. Shenshen Lai - Dept. Medicine (2009-2015 until Ph.D.)
46 Mr. Dominik Sommerfeld - Dept. Medicine (2010-2012 until transfer to new supervisor)
47 Mr. Javad Safaei – Dept. Mathematics & Computer Science (2008-2015 until Ph.D.)
48 Ms. Trisha Kostesky – Dept. Medicine (2010-2011 until M.Sc.)
49 Mr. Mazyar Ghaffari – Dept. Medicine (2011-2015)
50 Ms. Valerie Poirier - Dept. Medicine (2011-2015 until Ph.D.)
51 Mr. Dennis Wong - Dept. Medicine (2011-2013)
52 Ms. Melissa Richard-Greenblat - Dept. Medicine (2012-2016 until Ph.D.)
53 Ms. Anna Cecilia Sjoestroem – Dept. Medicine (2013-2014 until M.Sc.)
54 Mr. Franco Cavaleri - Dept. Medicine (2014-2017)
55 Mr. Bisher Hassan Abuyassin – Dept. Pharmacology (2015-2018)
56 Mr. Lambert Yue - Dept. Medicine (2016-2020)
57 Ms. Anam Nan Nan Liu – Dept. Pathology and Laboratory Medicine (2017-2019)
58 Mr. Ryan Yen – Dept. Medicine (2017-2022)

Directed Research Studies or Practicum Supervision

1 Mr. Gordon Cheung – 4th year Zoology (2003-2004) 8 months
2 Ms. Nastaran Mohammadi – 5th year unclassified (2006) 7 months
3 Ms. Sharon Zhao – Department of Mathematics & Computer Sciences, Simon Fraser University. Ph.D. graduate student. Joint MITACS project supervision. (2005-2006) 8 months
4 Mr. Mazyar Ghaffari – 1st year graduate student (2008) 6 months starting March 1
5 Mr. Javad Safaei – Department of Mathematics & Computer Sciences, Simon Fraser University. Ph.D. graduate student. Joint MITACS project supervision. (2008-2015)
6 Ms. Parisa Shoosht – Department of Mathematics & Computer Sciences, Simon Fraser University. Ph.D. graduate student. Joint MITACS project supervision. (2008)
7 Mr. M. Shabab Hossain – Department of Computer Science, University of B.C., M.Sc. graduate student. Joint MITACS project supervision. (2011)
8 Mr. Alireza Davoodi - Department of Computer Science, University of B.C., M.Sc. graduate student. Joint MITACS project supervision. (2013-2014)
9 Ms. Nishima Arora – Biotech Biotechnology, Vellore Institute of Technology, India., undergraduate student. Six months full-time directed research studies (January 1 – June 30, 2015).

10 Mr. Lambert Yue – Department of Biology, University of B.C. 5th undergraduate student. Four months full-time directed research studies (January 1 – April 30, 2016).

11 Mr. Kevin Gonzales – Department of Biology, University of B.C. 5th year undergraduate. Eight months, part-time directed research studies (September 1, 2017-April 30, 2018).

12 Mr. Abiel Kwok – Integrated Sciences Program, University of B.C. 4th year undergraduate. Eight months, part-time directed research studies (September 1, 2019-April 30, 2020).

13 Mr. Kevin Wong – Department of Biology, University of B.C. 3th year undergraduate. Eight months, part-time directed research studies (September 1, 2019-April 30, 2020).

14 Mr. Samuel Bakteria – Pharmaceutical Sciences, University of B.C., 4th year undergraduate. Two months, full-time directed research studies (May 1-June 30, 2023), Four months, Honours Thesis, January 1-April 27, 2024).

15 Ms. Elizabeth Grountseva – Pharmaceutical Sciences, University of B.C., 4th year undergraduate practicum. Three months, full-time directed research studies (September 1-December 7, 2024). Four

16 months, Honours Thesis, January 1-April 27, 2025).

Ms. Delia Tjokroardi – Pharmaceutical Sciences, University of B.C., 4th year undergraduate practicum. Three months, full-time directed research studies (September 1-December 7, 2024).

B.Sc. Honours Thesis Examiner

1 Ms. Maryam Baghannazary - Dept. of Biology, University of B.C. (1992)

2 Mr. Danny Leung - Dept. of Biochemistry, Simon Fraser University (1994)

3 Ms. Monika Aluweilla - Dept. of Biochemistry, Simon Fraser University (1995)

4 Mr. Samuel Bakteria – Pharmaceutical Sciences, University of B.C. (2024)

M.Sc. Thesis Examiner

1 Mr. Jonathan Kao - Dept. of Medicine (1990)

2 Ms. Rachel Zhande - Dept. of Biochemistry (1991)

3 Mr. Peter Dreyden - Dept. of Medicine (1992)

4 Mr. John Stingl - Dept. of Anatomy (1992)

5 Mr. Brett Gabelman - Dept. of Anatomy (1992)

6 Mr. Sep Farahbakhian - Pharmaceutical Sciences, U.B.C (1994)

7 Mr. Mohammed Hasham - Dept. of Medicine, UBC (1996)

8 Ms. Krista McCutcheon - Dept. of Anatomy, UBC (1996)

9 Mr. Steven Drew - Dept. of Medicine (May 19, 1998)

10 Ms. Shu Hong Li - Pharmaceutical Sciences, UBC (May 23, 2000)

11 Mr. Tom Yokogawa - Dept. of Medicine (October 10, 2000)

12 Ms. Doris Chiu - Dept. of Medicine (October 4, 2001)

13 Mr. Farrell Mackenzie - Dept. Pathology (April 23, 2003)

14 Mr. Geoff Karjala – Dept. of Biochemistry & Molecular Biology (November 30, 2004)

15 Mr. Philip Ly – Dept. of Medicine (October 9, 2007)
16 Ms. Trisha Kostesky – Dept. Medicine (June 21, 2011)
17 Ms. Anna Cecilia Sjoestroem – Dept. of Medicine (October 7, 2013)
18 Ms. Anam Lui - Dept. of Medicine (September 30, 2019)

Ph.D. Oral Comprehensive Examiner

1 Ms. Marie Terese Little - Dept. Obstetrics & Gynaecology (June 10, 1991)
2 Dr. Amanda Jones - Dept. Medicine (December 11, 1991)
3 Ms. Patricia Herrarez - Dept. Microbiol. Immunol. (December 14, 1992)
4 Ms. Julia Mills - Dept. Psychiatry (June 21, 1995)
5 Mr. Alaa El-Husseini - Dept. Psychiatry (January 24, 1996)
6 Ms. Rochelle Starhe - Dept. of Medicine (May 27, 1997)
7 Mr. Olaf Heisel - Dept. of Medicine (2000)
8 Mr. Vijay Viswanathan - Dept. Psychiatry (June 15, 2000)
9 Mr. Godfrey Miles - Dept. Plant Sciences (September 15, 2000)
10 Mr. Jan Ehses - Dept. of Physiology (November 21, 2000)
11 Mr. Mohamed Sayed - Dept. of Medicine (December 19, 2000)
12 Mr. Steven Drews - Dept. of Medicine (February 7, 2001)
13 Mr. Kelvin Chang - Dept. of Obstetrics and Gynaecology (April 17, 2002)
14 Ms. Gina Rossi - Dept. Medicine (Sept 17 and Nov 10, 2004)
15 Mr. Gobind Sun – Dept. Medicine (May 28, 2007)
16 Mr. Scott Weidermaier – Dept. of Physiology (September 30, 2008)
17 Ms. Arezoo Astenehe – Dept. of Medicine (April 17, 2009)
18 Mr. Dennis Wong – Dept. of Medicine (September 30, 2009)
19 Mr. Darryl Bannon - Dept. of Medicine (November 10, 2011)
20 Ms. Valerie Poirer - Dept. of Medicine (November 25, 2011)
21 Ms. Shenshen Lai - Dept. of Medicine (December 14, 2011)
22 Mr. Darryl Bannon - Dept. of Medicine (May 17, 2012)
23 Ms. Joanna Triscott - Dept. of Medicine (June 4, 2012)
24 Ms. Melissa Richard – Dept. of Medicine (February 7, 2013)
25 Mr. Franco Cavaleri – Dept. of Medicine (April 17, 2015)
26 Mr. Bisher Hassan Abuyassin – Dept. of Medicine (December 12, 2016)
27 Mr. Ryan Yen – Dept. of Medicine (January 17, 2019)

Ph.D. Thesis Examiner

1 Mr. Grant Hatch - Dept. of Biochemistry, University of Manitoba (1989)

Dr. Poul Sorenson - Dept. of Pathology, UBC (1990)
Ms. Alice Mui - Dept. of Pathology, UBC (1992)
Mr. Paul Sunga - Dept. of Medicine, UBC (1992)
Dr. Jong Hei - Pharmaceutical Sciences, UBC (1993)
Mr. Guy Mordret - Dept. of Biochemistry, University of Brest, France (1993)
Ms. Corinne Reimer - Dept. of Anatomy, UBC (1994)
Mr. John Hill - Dept. of Pathology, UBC (1994)
Ms. Ruth Lanius - Dept. of Opthomology, UBC (1994)
Mr. Ashwin Patel - Pharmaceutical Sciences, UBC (1996)
Mr. Patrick Rebstein - Dept. of Microbiol. Immunol., UBC (1996)
Ms. Patricia Herrera-Velt - Dept. Microbio. Immunol, UBC (1997)
Mr. Xi-Long Zheng - Dept. of Medical Biochemistry, University of Calgary (June 23, 1997)
Mr. Vuk Stambolic - Dept. of Biochemistry, University of Toronto (August 7, 1997)
Mr. Alaa El-Husseini - Dept. of Psychiatry, UBC (October 17, 1997)
Ms. Rachel Zhande - Dept. of Biochemistry, UBC (December 1, 1997)
Mr. David Ng - Dept. of Microbio. Immunol., UBC (April 24, 1998)
Mr. Jeffrey Posaconi - Dept. of Chemistry, UBC (June 19, 1998)
Ms. Adrienne Boone - Dept. Biochemistry, UBC (April 5, 2000)
Ms. Zahara Jaffer - Dept. Microbiol. & Immunology, UBC (August 14, 2000)
Mr. Abdulaziz Al-Fahim - Dept. of Medicine, UBC (August 11, 2000)
Ms. Ravenska Wagey - Dept. of Medicine (December 14, 2000)
Ms. Amy Dambrowitz - Dept. of Biochemistry (June 6, 2001)
Ms. Rochelle Heisel - Dept. of Medicine (July 30, 2001)
Ms. Lucy Marzban - Faculty of Pharmaceutical Sciences (September 6, 2001)
Mr. Mohamed Sayed - Dept. of Medicine (October 26, 2001)
Ms. Xiaoli Cheng - Dept. of Biochemistry (December 10, 2002)
Mr. Steven Drews - Dept. Medicine (June 24, 2003)
Mr. Jan Ehsus - Dept. Physiology (July 18, 2003)
Mr. Kelvin Cheng - Dept. Gynaecology and Obstretics (Feb 4, 2004)
Ms. Sherri Christian - Dept. Microbiology and Immunology (May 5, 2004)
Ms. Elizabeth Slow - Dept. Medicine (November 26, 2004)
Ms. Rita Maghsoodi – (January 17, 2005) - Chair
Ms. Tanya Griffith – Department of Biochemistry and Molecular Biology (January 27, 2006) - Chair
Ms. Zhou Hongyan – University of Hong Kong (November 12, 2006) – External Examiner
Ms. Justine Karst – Department of Botany (July 9, 2007) - Chair
Mr. Robert Ferdman – Department of Astronomy (December 13, 2007) - Chair
Ms. Catherine Tucker – Department of Medicine (December 21, 2007)

39 Ms. Jin Suk Lee – Department of Botany (January 18, 2008) – University Examiner
40 Mr. Ebrima Gibbs – Dept. of Medicine (August 22, 2008)
41 Mr. Mark Romanish – Faculty of Science (July 22, 2009) – Chair
42 Mr. Douglas Sweeney – Faculty of Engineering (Nov. 12, 2009) - Chair
43 Mr. Scott Widenmaier – Dept. Cellular Physiological Sciences (June 30, 2010)
44 Mr. David Morin – Dept. of Medicine (December 22, 2011) - Chair
45 Ms. Grace Lee Kam – Dept. of Medicine (December 23, 2011)
46 Ms. Valerie Poirier – Dept. of Medicine (January 23, 2015)
47 Mr. Too Jin Park – Dept. of Medicine (February 10, 2015)
48 Ms. Shenshen Lai – Dept. of Medicine (March 25, 2015)
49 Mr. Javad Safaei – Dept. of Computer Science and Mathematics (April 9, 2015)
50 Ms. Melissa Richard – Dept. of Medicine (June 28, 2016)
51 Ms. Sylvia Cheung – Dept. of Surgery (September 15, 2016)
52 Mr. Saleem Iqbal – Crystallography and Biophysics, University of Madras, Chennai, India (November 9, 2018) – External Examiner
53 Mr. Bisher Hassan Abuyassin – Dept. of Medicine (December 21, 2018)
54 Mr. Ryan Yen – Dept. of Medicine (August 25, 2022)
55 Mr. Andrew Santos – Dept. Microbiology and Immunology (December 15, 2022)

10.2 SERVICE TO THE HOSPITAL

(a) Memberships on committees, including offices held and dates
(b) Other service, including dates

11. SERVICE TO THE COMMUNITY

(a) Memberships on scholarly societies, including offices held and dates

1 1990-present Canadian Society for Biochemistry and Molecular Biology - Active Member
2 1990-1992 Society for the Study of Reproduction (on local organizing committee for 1991 S.S.R. International Conference)
3 1996-1997 International Society for Heart Research (on local organizing committee for 1997 I.S.H.R. Conference)
4 1996-1999 American Society for Microbiology - Active Member
5 2016-2018 American Society for Biochemistry and Molecular Biology – Active Member

(b) Memberships on other societies, including offices held and dates

1 1980-1987, Canadian for Health Research - Active Member

2 1996-2002, 2008 Vancouver Public Aquarium - Active Member

2021-present, Vice-President, Co-chair of the Scientific and Medical Advisory Committee, Canadian Citizens Care Alliance (formerly Canadian Covid Care Alliance)

(c) Memberships on scholarly committees, including offices held and dates

1 1992-present Lunar Society - Active Member

(d) Memberships on other committees, including offices held and dates

1 1980-1983 - Executive Committee of B.C. Chapter of Canadian for Health Research

2 1991-1993 - M.R.C. of Canada Studentship Committee

3 1991-1994 – Canadian Heart & Stroke Foundation Operating Grant Panel

4 1994-1995 - Committee for West Vancouver High Schools Cooperative Education Program

5 1994- M.R.C. of Canada Program Grant Committee

6 1994- American Heart Association Grant Panel

7 1995-1996 -M.R.C. of Canada Operating Grant Committee - Biochem. Mol. Biol. Panel B

8 May 29-31, 2000 - Invited Member Strategic Planning Committee for the National Research Council of Canada Industrial Research Assistance Program

9 November 6-9, 2000 - Canadian Institute for Health Research - Operating Grant Committee - Cardiovascular Panel

10 July 31, 2001 - Michael Smith Foundation for Medical Research Senior Scholars and Scientist Award Committee

11 2001 - 2006 - Member Advisory Committee for the National Research Council of Canada Industrial Research Assistance Program

12 2001-2006 - Genome Prairie Scientific Advisory Board

13 2002 - 2007 - Simon Fraser University Biotechnology Advisory Council - Member

14 2003-2005 - Canadian Bioinformatics Resource Initiative - Chairman

15 2004-2010 - National Research Council of Canada Genome Health Initiative Expert Panel. In 2009, I attended the Annual Meeting of the GHI in Montreal in June 1st and 2nd, and provided mid-term reviews of 5 GHI projects for the NRC at an Expert Panel Meeting in Ottawa on December 6. In 2010, I judged new GHI projects on September 27 & 28 in Ottawa.

16 2005-2007 - Simon Fraser University Master of Technology Advisory Board

17 2005 - U.S. National Institutes of Health Director's Roadmap Initiatives, Technology Centers for Networks and Pathways (TCNP) Grant Panel (I was invited to join this panel again in 2008, but declined due to a timing conflict.)

18 2006 – Alberta Cancer Board Grant Review Panel for Programs of Distinction

19 2009 – Canadian Institutes for Health Research - Catalyst Grant: Invention and High-Risk, High-Benefit Research Panel. June 3-5 in Ottawa.

20 2010 – Canadian Institutes for Health Research - Catalyst Grant: Invention and High-Risk, High-Benefit Research Panel. June 3-5 in Ottawa.

21 2021 – 2022 Langara University Bioinformatics Advisory Committee

(e) Reviewer (journal, agency, etc. including dates) wec - Peer-reviewer of grant-in-aid applications

1 Medical Research Foundation of Canada: 1988 - 4; 1989 - 9; 1990 - 4; 1991 - 2; 1993 - 5; 1994 - 20; 1995 - 21; 1996 - 19; 1997 - 11; 1998 -6; 1999 -10; 2000 -5

2 Alberta Heritage Foundation: 1988 - 1; 1990 - 1; 1991 - 3; 1992- 2; 1993 - 4; 1994 -1; 1995 -2; 2000 - 4; 2001-1; 2005-1

3 Canadian Diabetes Association: 1988 - 1; 1990 - 1; 1993 -1; 1994 -2; 1995 - 2; 1996 -1; 2002-2; 2003-3

4 Canadian Arthritis Society: 1988 - 1; 1989 - 1

5 National Cancer Institute of Canada: 1988 - 1; 1995 -1; 2001 -8

6 Heart & Stroke Foundation of Canada: 1988 - 1; 1990 - 1; 1991 - 16; 1992 - 16; 1993 - 16, 1994 - 12; 1998 -1; 1999 -3; 2000-4; 2002-1

7 Kidney Foundation of Canada: 1989 - 1; 1990 - 1

8 Natural Sciences & Research Council of Canada: 1990 - 1; 1995 -1; 1996 -1; 2002-1; 2004-2; 2006-1; 2015-1; 2016-1

9 Manitoba Health Research Council: 1992 - 1; 1993 -1; 1994 -1; 1997-2

10 National Science Foundation (USA): 1992 - 1; 1993 - 4; 1994 -2; 1996 -1; 1997 -2; 1998 -2; 2004-1

11 American Diabetes Association: 1994-1

12 Israel Science Foundation: 1994-1; 1996 - 4

13 American Heart Association (USA): 1994 - 5

14 Alberta Cancer Board: 1996 - 2; 2000 –1; 2007-2

15 U.S.-Israel Binational Science Foundation: 1996 -1

16 British Columbia Health Research Foundation: 1999 -7

17 Canadian Institute for Health Research: 2000 -11; 2001-5; 2002-2; 2003-2; 2004-1; 2005-1; 2009-12; 2010-13

18 Hong Kong Research Granting Council: 2000 -1; 2003-2

19 Vancouver Hospital Health Sciences Centre: 2000 -2; 2002-5; 2005-1; 2006-1

20 Michael Smith Foundation Health Research: 2001-4; 2003-1

21 GenomePrairie: 2001-21; 2003-3; 2004-5; 2006-2

22 B.C. Lung Assoc.: 2002-1

23 Canadian Blood Services: 2002-1

24 Carcinogenesis: 2002-2

25 Biotechniques: 2002-1

26 Scottish Rite Charitable Foundation: 2003-1

27 International Cancer Research Agency: 2004-1

28 Biotechnology and Biological Sciences Research Council (United Kingdom): 2004-1
29 National Research Council of Canada: 2004-5; 2006-5; 2007-16; 2009-5; 2010-3
30 U.S. National Institutes of Health: 2005-13
31 Singapore Biomedical Research Council: 2010-1
32 Genome Alberta: 2012-4
33 Cancer Research UK: 2012-1

(f) Reviewer (journal, agency, etc. including dates) - Peer-reviewer of scientific manuscripts

1 Analytical Chemistry: 2005 - 2
2 Biochem. Cell Biology: 1989 - 1; 1990 - 1; 1992 - 1; 1993 -2
3 Biochim. Biophys. Acta: 1989 - 9; 1990 - 5; 1991 - 4; 1992 - 3; 1993 -1; 1994 - 3; 1995 - 3; 1998 -1; 2000 –1; 2005 - 2
4 Brain Research: 2005 - 1
5 Molecular Cellular Biology: 1989 - 2; 1992 - 1; 1993 - 5; 1994 - 3; 1995 -2; 1996-1; 2003-1
6 Science: 1989 - 1; 1991 - 1, 1992 - 1; 1993 -1; 1994 - 2
7 Digestive Diseases & Sciences: 1990 -1; 1991 -1
8 Endocrinology: 1990 -1
9 Experimental Eye Research: 1990 - 1
10 FEBS Reviews: 2005 - 1
11 Journal Biol. Chem.: 1989 - 1, 1997 -1
12 Journal of Interferon Research: 1990 - 1
13 Journal Clinical Invest.: 1992 - 1
14 Journal of Immunology: 1992 - 2, 1995 -1
15 Nature: 1992 - 2, 1993 - 4
16 Proc. Natl. Acad. Sci. USA: 1992 -1, 1994 - 3; 1995 -1
17 American Journal of Physiology: 1993 - 1
18 Developmental Biology: 1993 -2
19 Diabetes: 1993 -1
20 European J. Biochemistry: 1994-2, 1995-1
21 Blood: 1993 -1; 1995 -1; 1998 -1;1999 -1
22 Analytical Biochemistry: 1996 - 2
23 Trends in Cardiovascular Medicine: 1996 -1
24 Cancer Res.: 1997 -1
25 Journal of Neurochemistry: 1997- 2; 2001-1
26 Neurobiology of Aging: 1998 -1
27 Biochemistry: 2000 -1

28 Journal of Endotoxin Research: 2000 -2
29 Life Sciences: 2000 -1
30 Carcinogenesis: 2007-1
31 Public Library of Science (PloS): 2008-1
32 Journal of Neurological Sciences: 2010-1
33 Science – Cell Signaling: 2010-1
34 Systems Biology of Free Radicals and Anti-oxidants – 2012-1
35 Proteomics – 2016-1
36 Molecular and Cellular Proteomics – 2016-1
37 Journal of Proteome Research – 2017 -1
38 Cell Signalling – 2019-1
39 J. Alzheimer's Disease – 2021 - 1
40 Vaccines – 2022 – 2; 2023 - 1; 2024 – 1; 2025 - 1
41 Journal of Radiology and Oncology – 2023 - 1
42 Exploration of Drug Science – 2023-1
43 International Journal of Molecular Science – 2023-1
44 Medicina – 2024-1
45 Life Sciences – 2024-1
46 Viruses – 2024-1
47 Pathogens – 2024-1
48 Children – 2024-1
49 Microorganisms – 2024-1

(g) External examiner (indicate universities and dates)

1 1989 Ph.D. Defence of Grant Hatch - Dept. of Biochemistry, Univ. of Manitoba
2 1993 Ph.D. Defence of Guy Mordret - Dept. of Biochemistry, Univ. of Brest, France
3 1997 Ph.D. Defence of Xi-Long Zheng - Dept. of Medical Biochemistry, Univ. of Calgary
4 1997 Ph.D. Defence of Vuk Stambolic - Dept. of Biochemistry, Univ. of Toronto
5 2006 Ph.D. Defence of Zhou Hongyan - Department of Biochemistry, Univ. of Hong Kong
6 2018 Ph.D. Defence of Saleem Iqbal – Crystallography and Biophysics, Univ. of Madras, Chennai, India

(h) Consultant (indicate organization and dates)

1 1991-1999 Upstate Biotechnology Inc., Lake Placid, N.Y.
2 1995-present Kinections Consulting Ltd, Richmond, B.C.
3 1995-1999 Biozyme, Vancouver, B.C. (member of scientific advisory board)
4 1996-2000 Viratest, Burnaby, B.C. (member of scientific advisory board)

5 1997-2000 StressGen, Victoria, B.C.

6 1999 - present Kinexus Bioinformatics Corporation, Vancouver, B.C. (member Board of Directors)

7 2001 - 2006 GenomePraire Scientific Advisory Board

8 2001 - ARC Pharmaceuticals, Vancouver BC (member of Scientific Advisory Board)

9 2018 - present – GLG, Austin, Texas and London, UK (member of advisory council for industry)

10 2020 – present – Neurodegenerative Disease Research, Inc. (member of research consortium)

(i) Other service to the community

1 1990-present - Cooperative Education Program - Simon Fraser University

2 1991-2007 - Scientist in The School Program - coordinated by Science World

3 1992 – 2010 - Cooperative Education Program - University of Victoria

4 March 9, 1993 - Volunteer for Careers Presentation - Science World, Vancouver.

5 February 14, 1993 - Scientists and Innovators in the Schools, Kitsilano Secondary School, Vancouver

6 1994-present - Cooperative Education Program - West Vancouver Secondary Schools

7 1994-present - Mentor for B.C. Institute of Technology Biotechnology Program

8 1996-present Cooperative Education Program - University of B.C.

9 March 1, 1996 - Volunteer for Careers Presentation - Science World, Vancouver.

10 January 24, 1997 - Scientists & Innovators in the Schools, Gladstone Secondary School, Vancouver.

11 April 2, 1998 - Judge for 1998 Greater Vancouver Regional Science Fair at the University of BC

12 February 4, 1999 - Judge for 1999 BC Biotechnology Alliance Awards

13 April 8, 1999 - Judge for 1999 Greater Vancouver Regional Science Fair at the University of BC

14 April 19, 1999 - Judge for 1999 Connaught Biotechnology Science Fair, Vancouver

15 February 8, 2000 - Judge for 2000 BC Biotechnology Alliance Awards

16 April 6, 2000 - Judge for 2000 Greater Vancouver Regional Science Fair at the University of BC

17 2001 - Judge for 2001 Aventis Biotechnology Science Fair

18 February 1, 2001 - Judge for 2001 BC Biotechnology Alliance Awards

19 April 26, 2001 - Judge for 2001 Aventis Biotechnology Science Fair

20 March 2002 - Scientists & Innovators in the Schools, University Hill Secondary School, Vancouver.

21 2002 - Judge for 2002 Aventis Biotechnology Science Fair

22 January 17, 2019 - Invited Panelist – UBC Computer Science/Life Sciences Panel –
23 Careers Evening

March 9, 2019 - Invited Speaker at Operation Med School Vancouver (OMS) Workshop for high school students. Career mentoring workshop (2 x 30 minute sessions) held at the
24 Robert H. Lee Alumni Centre at UBC

September 1, 2020 – 2022 – Langara College Bioinformatics Advisory Board member

12. AWARDS AND DISTINCTIONS

(a) Awards for Teaching (indicate name of award, awarding organizations, date)

1 2001 Faculty of Medicine Distinguished lecturer - Basic Sciences

(b) Awards for Scholarship (indicate name of award, awarding organizations, date)

2 1975 Killarney Secondary School Scholarship, Killarney Sec. School, Vancouver

3 1975 B.C. Government Scholarship, Killarney Sec. School, Vancouver

4 1977 Canadian Found. for Diseases of the Liver Summer Studentship, Univ. of B.C.

5 1978 Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship, Univ. of B.C.

6 1979-1982 Medical Research Council of Canada Studentship, Univ. of B.C.

7 1982 Univ. of B.C. Graduate Student Speaker Competition (1st Place)

8 1982 Izaak Walton Killam Postdoctoral Fellowship

9 1982-1984 M.R.C. of Canada Postdoctoral Fellowship

10 1985 M.R.C. of Canada 1967 Centennial Fellowship

11 1988-1993 M.R.C. of Canada Scholarship Award

12 1993-1996 M.R.C. of Canada Scientist Award

13 1996-1998 M.R.C. of Canada Industrial Scientist Award

(d) Other Awards

14 1993 Canadian Soc. for Biochem. & Molec. Biol. Merck-Frosst Award - for outstanding research in the area of biochemistry and molecular biology in Canada

15 1993 Martin M. Hoffman Award - Univ. of B.C. Hospital Site for Research in Dept. of Medicine

16 1996 Business in Vancouver Top Forty Under Forty Award for Business Achievement

17 1998 International Who's Who

18 2001 Faculty of Medicine 2001 Distinguished Lecturer, University of BC

Fellowship Awards (won by Post-Doctoral Fellows under supervision)

19 Lefebrve, D. - MRC Fellowship 1995-1996

20 Sahl, B. -MRC Fellowship 1995-1997
21 Bhanot, S. - BC Heart & Stroke Fellowship 1995-1997
22 Bhanot, S. - MRC Fellowship (declined) 1995-1997
23 Koide, B. - MRC Fellowship 1995
24 Xu, Yan-Jun - MRC Fellowship 1998-1999
25 Zhang, Hong - NSERC Industrial Fellowship 2003-2004

Studentship Awards (won by Graduate Students under supervision)
26 Palaty, C. - NSERC Studentship 1991-1994
27 Samiei, M. - MRC Studentship 1992-1994
28 Charest, D. L. - Walter Babicki Studentship 1992
29 Charlton, L. - NSERC Studentship 1992-1995
30 Charest, D. L. - MRC Studentship 1993-1997
31 Morrison, D. L. - MRC Studentship 1993-1997
32 Tudan, C. - MRC Studentship 1993-1996
33 Kim, S. - MRC Studentship 1993-1997
34 Palaty, C. - Walter Babicki Studentship 1995
35 Charlton, L. - Killam Studentship 1996-1997
36 Wagey, V. - University Graduate Fellowship 1997-1998
37 Marotta, A. - Evelyn Martin Fellowship 1998-1999
38 Sayed, M. - MRC Studentship 2000-2002
39 Shenshen Lai – University of B.C. Graduate Fellowship 2010-2014
40 Lambert Yue – UBC Experimental Medicine Graduate Program Entrance Award (2016); NSERC Graduate Fellowship 2017-2018; UBC 4YF Scholarship 2018-2020
41 Hamidreza Galavi - UBC Experimental Medicine Graduate Program Entrance Award (2020); UBC 4YF Scholarship 2020-2023; Vanier Award 2022-2024

13. OTHER RELEVANT INFORMATION (Maximum One Page)

1992-1998 - President, CEO and major stock owner of Kinetek Pharmaceuticals, Inc.

Kinetek was a private, early stage biotechnology company that employed 15 Ph.D./M.D. level scientists and 25 other technical and other supporting personnel at the time that I left the company. It was engaged in the discovery and development of drugs for the treatment of cancer, diabetes and other chronic diseases of aging. The Kinetek activities occupied over 18,000 square feet at two locations in south Vancouver. It was acquired by QLT, Inc. in 2004.

1995 - present - President and major stock owner of Kinections Consulting Ltd.

Kinections is a private company that provides consulting advise related to cellular signal transduction and the biotechnology industry. Its services also include the preparation of scientific reports and

illustrations.

1999 - present - Founder, President, Chief Scientific Officer and major stock owner of Kinexus Bioinformatics Corporation

Kinexus Bioinformatics is a private company that provides analytical services related to the tracking of protein kinases and bioinformatics related to protein kinases. It has provided proteomics services to over 2000 laboratories in 40 countries. Over 200 of the company's clients are in companies. Twenty-nine of the top 30 pharmaceutical companies in the world have been clients of Kinexus.

2021 – present – Founder, Vice-President, Co-Chair of the Scientific and Medical Advisory Committee (SMAC) of the Canadian Citizens Care Alliance (CCCA) (originally called the Canadian Covid Care Alliance). The CCCA was founded to provide balanced, evidence-based and scientifically sound analyses of recommendations related to COVID-19 with respect to it diagnosis, prevention and treatment. It has over 1700 members across Canada, which includes over 600 research scientists, professors, medical doctors and other health practitioners, and lawyers amongst other professionals. I participated in weekly meetings throughout 2021, 2022, 2023 and 2024, Tuesdays 4:00 pm - 5:00 pm – SMAC meetings, Tuesdays 5:00 pm - 8:00 pm – Steering Committee meetings, Wednesdays 5:00 pm - 8:00 pm – General Membership meetings. These meetings are now biweekly.

14. SCIENTIFIC PUBLICATIONS

Total Peer Reviewed in Published in Journals: 201 + 1 submitted
Total Reviews, Book Chapters, Pre-prints Published: 76 + 2 books as an editor with authored chapters
Patents Applied and Issued: 3
Websites: 9

i. REFEREED PUBLICATIONS IN PEER-REVIEWED JOURNALS

1. PELECH, S.L., Pritchard, P.H., and Vance, D.E. cAMP analogues inhibit phosphatidylcholine biosynthesis in cultured rat hepatocytes. J. Biol. Chem. 256: 8283-8286 (1981).

2. Pritchard, P.H., PELECH, S.L., and Vance, D.E. Analogues of cAMP inhibit phosphatidylethanolamine N-methylation by cultured rat hepatocytes. Biochim. Biophys. Acta 666: 301-306 (1981).

3. PELECH, S.L. and Vance, D.E. Regulation of rat liver cytosolic CTP:phosphocholine cytidylyltransferase by phosphorylation and dephosphorylation. J. Biol. Chem. 257: 14198-14202 (1982).

4. PELECH, S.L., Pritchard, P.H., and Vance, D.E. Prolonged effects of cyclic AMP analogues on phosphatidylcholine biosynthesis in cultured rat hepatocytes. Biochim. Biophys. Acta 713:260-269 (1982).

5. PELECH, S.L., Pritchard, P.H., Brindley, D.N. & Vance, D.E. Fatty acids promote translocation of CTP:phosphocholine cytidylyltransferase to the endoplasmic reticulum and stimulate rat hepatic phosphatidylcholine synthesis. J. Biol. Chem. 258: 6782-6788 (1983).

6. PELECH, S.L., Jetha, F. & Vance, D.E. Trifluoperazine and other anaesthetics inhibit rat liver CTP: phosphocholine cytidylyltransferase. FEBS Lett. 158: 89-92 (1983).

7. PELECH, S.L., Pritchard, P.H., Brindley, D.N. & Vance, D.E. Fatty acids reverse the cyclic AMP inhibition of triacylglycerol and phosphatidylcholine synthesis in rat hepatocytes. Biochem. J. 216: 129-136 (1983).

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ii. MANUSCRIPTS SUBMITTED

201. Koeppen, A.H., Mazurkiewicz, J.E., Feustel, P.J., PELECH, S., Sutter, C. Kit and its ligand, mast/stem cell factor, contribute to the pathogenesis of the lesion in dorsal root ganglia in Friedreich ataxia. J. Neurochem. (submitted).

iii. MANUSCRIPTS IN PREPARATION

Lai, S., Sommerfeld, D., Safaei, J., Winkler, D., Shi, J., Zhang, H., Sanghera, J., Yan, J., and PELECH, S. Determination of the specificities of 200 protein kinases with peptide microarrays.

PELECH, S. and Safaei, J. Quantification of amino acid interactions in protein complexes.

Safaei, J., Manuch, J., Gupta, A., Stacho, L. and PELECH, S. Prediction of 970,000 human protein phosphorylation sites.

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v. PATENTS

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vi. WEBSITES

In the last few years, I have begun to develop on-line, open-access databases and knowledgebases with comprehensive information on proteins, their mRNA and protein expression as well as their phosphorylation. While many people have been involved in the coding of the interfaces for these websites, I have personally devoted much of my time into their conception, design, data annotation, data inspection and coordinating their production. The following is a listing of these websites.

1. KiNET-IB – Kinetworks™ Immunoblotting DataBase (www.kinet.ca)
First in 2006, KiNET-IB features over 200,000 measurements of the expression and phosphorylation states of hundreds of signal transduction proteins from over 6000 Kinetworks™ multi-immunoblots performed with control and treated tissue/cell samples. Immunoblotting remains the gold standard for protein quantification and the Kinetworks™ methodology was originally developed in my UBC lab. KiNET-IB is a useful tool for evaluating proteins that may participate in the control of diverse cellular processes and their connection with other proteins in signaling pathways. Over 95% of this data has been previously unpublished.

2. KiNET-AM – Kinex™ Antibody Microarray DataBase (www.kinet-am.ca)
First launched in 2011, KiNET-AM features the quantitative results from nearly 2000 Kinex™ Antibody Microarray analyses with over 1.5 million measurements of 650 to 800 hundred different signalling proteins and phosphosites tracked per microarray. The data can be queried based on biological samples, treatments, specific proteins and phosphosites. Over 98% of this data has not been previously unpublished and was produced from analyses performed at Kinexus.

3. PhosphoNET – Human Phosphorylation Site KnowledgeBase (www.phosphonet.ca)
First launched in 2010, PhosphoNET is the world's largest repository of known and predicted information on human phosphorylation sites, their evolutionary conservation and the identities of protein kinases that may target these sites. PhosphoNET presently holds data on over 970,000 known and putative phosphorylation sites (P-sites) in over 20,000 human proteins that have been collected from the scientific literature and other reputable websites. Over 177,000 of these phosphosites have been experimentally validated. The rest have been predicted with a novel Phosphosite Predictor algorithm developed at Kinexus. With the PhosphoNET Evolution module, this website also provides information about cognate proteins in over 20 other species that may share these human phospho-sites. This helps to define the most functionally important phosphosites as these are expected to be highly conserved in nature. With the Kinase Predictor module, listings are provided for the top 50 human protein kinases that are likely to phosphorylate

each of these phospho-sites using another proprietary kinase substrate prediction algorithm that I helped to develop at Kinexus. With the Phosphosite Match module added in 2017, it is possible to identify phosphosites that are highly related in amino acid sequence. This helps to identity phosphosites that may be detected in cross-reactive off target proteins with phosphosite-specific antibodies. Over 8 million kinase-substrate phospho-site pairs are quantified in PhosphoNET, and over 200 signalling pathway maps are available.

4. TranscriptoNET – Human mRNA Expression KnowledgeBase (http://207.150.202.175)
First launched in 2011, TranscriptoNET features comprehensive information on the mRNA expression levels of about 21,000 genes in about 600 types of human organs, tissues and cells as measured with gene microarrays. The original data used in TranscriptoNET was retrieved from the National Center for Biotechnology Information Gene Expression Omnibus (NCBI GEO), which serves as a repository of experimental gene microarray results submitted by diverse academic and industrial laboratories around the world. We normalized the data from over 900 different studies with over 6000 biological specimens to permit investigations of gene expression and potential interactions that can only be undertaken with such a large dataset of over 125 million gene expression measurements. This normalization process was based on the identification of 60 genes that were commonly and highly expressed in all of the biological samples. This site was first posted in 2013.

5. DrugKiNET – Human Kinase Drug Interaction KnowledgeBase (www.drugkinet.ca)
First launched in 2013, DrugKiNET is an open-access, online resource to foster the identification and characterization of inhibitors of protein kinases for academic and industrial research. It features comprehensive information on over 850 compounds that have been experimentally determined to inhibit human protein kinases. This includes the retrieval of the lowest reported compound IC50, Ki and Kd values from several sources, including the National Center for Biotechnology Information (NCBI) PubChem Compound database, the Kinase SARfari database from the European Molecular Biology Laboratory (EMBL) European Bioinformatics Institute, The International Centre for Kinase Profiling at the University of Dundee, Ambit Biosciences and hundreds of original research publications. In some cases, estimates for IC50 values were derived from limited measurements of kinase inhibition at only one to three different concentrations of the compounds. Using over 105,000 experimentally tested, non-redundant kinase-compound pairs for training, we have developed two kinase inhibitor prediction algorithms to further predict another 200,000 kinase-compound interactions. In 2017, we added a new module to DrugKiNET that provides information on the bond distances between the atoms of over 1500 drugs and the atoms in protein kinases as determined from their x-ray crystallographic structures.

6. OncoNET – Human Cancer Protein KnowledgeBase (www.onconet.ca)
This website features comprehensive information on the mutations and mRNA expression levels for about 3,000 genes in diverse types of human cancers. The mRNA expression data used in OncoNET was originally retrieved from the National Center for Biotechnology Information Gene Expression Omnibus (NCBI GEO), which serves as a repository of experimental gene microarray results submitted by diverse academic and industrial laboratories around the world. We normalized the data from hundreds of different gene microarray studies using a normalization protocol based on the identification of 60 genes that were commonly and highly expressed in all of the biological samples. To explore the mutation of human cancer-related genes, we relied primarily on the collection of data from the Wellcome Trust Sanger Institute's Catalogue of Somatic Mutations in Cancer (COSMIC) database. Further information on these genes and their encoded proteins was annotated from several other sources, including UniProt and the Atlas of

Genetics and Cytogenetics in Oncology and Haematology websites. I have used this database to identify new potential oncogenes, tumour suppressor genes and tumour requiring protein genes. This site was first posted in 2013.

7. KinaseNET – Human Protein Kinase KnowledgeBase (www.kinasenet.ca)
KinaseNET features comprehensive information on 536 human protein kinases, including their primary and tertiary structure, regulation, distribution, evolutionary conservation, protein substrate targets, pathway maps, sensitivities to compounds and linkages to human diseases. Each protein kinase is represented with a separate webpage. KinaseNET also serves as a portal to many other useful websites with additional data about protein kinases. This site was first posted in 2015 and updated in 2017.

8. Kinetica Online – E-journal for Intelligence Systems Research (www.kinexus.ca/kinetica)
This website has not yet been officially launched, but a beta-version is available for viewing since 2013. This unique resource features commentaries, original research publications, databases and knowledgebases, and it also serve as portal to hundreds of other websites that should be useful to researchers engaged in the investigation of cell signalling. All of the articles in Kinetica Online have been published elsewhere.

9. KinATLAS – Human Protein Interaction Altas
(http://kinatlas.ca:8080/KinAtlas/KinaseDrugQuery.html)
This website is in development and a beta version with the first (Kinase-drug interactions) and second modules (Protein-protein interactions) are available for viewing since 2016. The underlying database is complete, and the web interface is still in the process of being coded for the third module (Kinase-substrate interactions). It will show tissue/cell-specific maps of protein-protein and kinase-drug interactions. The kinase-substrate interactions are prioritized using our updated kinase prediction algorithms, and the viewer will contain filters to permit generation of more customized maps.

10. DrugProNET – Human Protein – Drug Interaction KnowledgeBase (www.drugpronet.ca)
This website provides for the identification of the most critical atomic interactions between drugs and their protein targets based on 3D x-ray crystallographic analyses. Defining the key amino acid residues for drug binding in proteins permits the prediction of specific mutations in human genomes that will affect the sensitivities of individuals to these compounds. The bond distances in Angstroms between the closest protein and drug atoms in each crystal complex are provided in downloadable tables, along with definition of the closest amino acid residue side-chains. The single nucleotide variants (SNV's) that would affect these critical amino acid residues involved in drug interactions are also identified in DrugProNET. This website features comprehensive information on over 2000 compounds that have been co-crystallized with over 480 different human proteins in over 4400 protein-compound structures retrieved from the Research Collaboratory for Structural Bioinformatics (RCSB) Protein Databank (PDB).

11. KiNector – Human Protein Kinase-Protein Substrate+Phosphosite Interaction KnowledgeBase (www.kinector.ca)
Over 21,450 human kinase-substrate relationships (KSRs) were retrieved from several sources, including the PhosphoNET, PhosphoSitePlus and PhosphoNetworks websites and the scientific literature. The data are presented in a graphic format as maps, and full functional information was provided for at least 6000 of these KSRs. KiNector shows both direct and indirect linkages between a starting protein kinase and a phosphoprotein target that acts downstream in signalling

pathways. KiNector also serves as a portal to other reputable websites that contain detailed information on these kinases and substrates, and provides direct links to the Kinexus Products website, which features over 3500 images of full Western blots performed with lysates from diverse rodent tissue panels and human cancer cell lines. In January 2025, development began on the third phase of the KiNector website to permit the identification of connections between extracellular mediators, such as hormones and cytokines, with cellular receptors. This is slated to be completed by the end of March, 2025.

vii. ARTISTIC WORKS

1. Smith, J., Xu, Y., and PELECH, S.L. Human protein kineome. (2006) [This is a large wall chart that contains the identification of all of the known domains and phosphorylation sites in 515 human protein kinases. It was printed and distributed by Kinexus Bioinformatics Corporation.]

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5. PELECH, S. L. Human Cancer Protein Interaction Network. (2017). This is a wall chart that shows how over 100 of the most frequently mutated oncoproteins and tumour suppressor proteins interact with each other. It was presented and distributed at the 2017 American Association for Cancer Research Meeting and is downloadable from the Kinexus website (http://www.kinexus.ca/pdf/OncoNET_Poster.pdf).

viii. BLOG COMMENTARIES

Over the last decade, I have written commentaries on over 300 blogs as part of an outreach effort to inform the broader scientific community on a wide range of issues ranging from career development to genomics to biotechnology. I have only listed those commentaries that appeared primarily at the GenomeWeb website. Unfortunately, these, like all previous commentaries, are no longer accessible at the GenomeWeb site, but mine can be viewed at www.kineticaonline.ca in the Blog Comments section.

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ix. MEDIA INTERVIEWS (including podcasts)

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2. The Evolution of Life and Kinases. (7/3/2016). Interview on Round House Radio in Vancouver with Kirk LaPointe. bit.ly/1LM0HYR
3. Overview of Kinexus Bioinformatics Corporation and the NDR ALS Biomarker Project for Neurodegenerative Disease Research (NDR), Inc. Posted on You-tube on January 15, 2021.https://youtu.be/zGyReyoWJmk

4. COVID-19 and vaccinations (6/2021). Doctor Talks with host Wayne Peters and "What's Up Canada." https://www.facebook.com/WhatsUpCanadians/videos/1392691891123832/

5. Canadian doctors who speak out are being attacked but will still speak & stand up for our children (16/7/2021). Take Action Canada. Panel discussion with host Didi Vergados and Drs. Steven Pelech, Charles Hoffe, Francis Christian, Mark Trozzi, Paul Alexander and Stephen Malthouse. https://www.bitchute.com/video/f0do2DOXG4x9/

6. Dr. Steven Pelech – ProVax Scientist and UBC Professor Speaks Out (27/7/21). Children's Health Defense Canada. Interview with Sherry Strong, Alberta Provincial Director of Children's Health Defense Canada. https://rumble.com/vkepmv-dr.-steven-pellech-provax-scientist-and-ubc-professor-speaks-out.html

7. Medical and Scientific Expert Panel (29/7/2021) Canadian Peoples Union. NFP. Interviews with host Nicole Lebrasseur and Drs. Steven Pelech, Ira Bernstein, Harvey Risch, Howard Tenenbaum, Bonnie Mallard and Paul Alexander. https://www.facebook.com/CPUFREEDOM2017/videos/1475008056199105

8. Doctors Talking Variants (9/8/2021) Doctor Talks with host Wayne Peters and "What's Up Canada." Panel discussions with Drs. Steven Pelech, Paul Alexander and Harvey Risch. https://www.facebook.com/642959389451042/videos/199723008704299

9. Professor Steven Pelech (30/8/2021) Shawn Newman Podcast Ep. 197 (Lloydminister Alberta/Saskatchewan) https://anchor.fm/shaun-newman/episodes/Ep--197---Professor-Steven-Pelech-e16kiua/a-a6edme0

10. 75th Anniversary of the Nuremberg Trials. Vancouver Art Gallery Plaza (1/8/2021). Organized by Common Ground.

11. Universities in the Time of Covid and Vaccine Mandates (13/10/2021). Civitas Canada with True North podcast with host Lindsay Shepard and Drs. Steven Pelech, Julie Ponesse, Allison Pejovic and Benjamin Gabbay. https://www.facebook.com/watch/?v=222043673325034

12. Dr. Steven Pelech Science or Fear Vaccine Mandates UBC (28/10/2021). UBC Students for Freedom of Expression. https://peoplesworldwar.com/dr-steven-pelech-science-or-fear-vaccine-mandates-ubc/

13. Natural Immunity Part 1. The Hill with MP Dean Alliston (21/10/2021). Embed.vhx.tv show with host MP Dean Alliston and Dr. Steven Pelech and Niel Karrow. https://embed.vhx.tv/videos/1827963?autoplay=1&api=1&authorization=VRxgQxQ3wjPpzGtx2531WkyZ3dgtQwR9&color=9E8959&title=0&sharing=1#

14. Natural Immunity Part 2. The Hill with MP Dean Alliston (21/10/2021). Embed.vhx.tv show with host MP Dean Alliston and Dr. Steven Pelech and Niel Karrow. https://embed.vhx.tv/videos/1838887?autoplay=1&api=1&authorization=VRxgQxQ3wjPpzGtx2531WkyZ3dgtQwR9&color=9E8959&title=0&sharing=1#

15. A Deep Dive into the Real Facts about Natural Immunity: Immunologist Dr. Steven Pelech (4/11/2021). Strong and Free Canada podcast with host Will Dove. https://strongandfreecanada.org/vlog/7646/

16. Dr. Steven Pelech, Ph.D. – The Missing Science that You Need to Know About Antibody Immunity, with Dr. Michael Thiessen Liberty Coalition (25/11/2021) Canada Podcast. https://tv.gab.com/channel/libertycoalitioncanada/view/dr-steven-pelech-phd-the-missing-61de3eb7bedad6c2ac1bb847

17. The Griffin Talks with Dr. Steven Pelech (23/12/2021). With Dr. Bruce Girdler of Novometrix Podcast. https://www.youtube.com/watch?v=QPCKE5JeKMA

18. The Pfizer Inoculation for COVID-19 – More Harm than Good – Co-created with Deanna McLeod, Amy McConnell, Steven Pelech and Byram Bridle (14/12/2021) Canadian Covid Care Alliance. https://www.canadiancovidcarealliance.org/media-resources/the-pfizer-inoculations-for-covid-19-more-harm-than-good-2/ This video had over 1.3 million views on Rumble.

19. Dr. Steven Pelech – UBC professor on COVID shots. Students Against Mandates interview in December 2021 (12/2021) https://rumble.com/vwsinp-dr.-steven-pelech-full-interview-dec-2021.html?mref=7ju1&mrefc=5

20. Dr. Steven Pelech explains why thousands want Canada to stop COVID-19 shots for pregnant women and children. Interview with Drea Humphrey of Rebel News (5/1/2022). https://www.rebelnews.com/dr_steven_pelech_petition_canada_stop_covid-19_shots_for_pregnant_women_and_children

21. Should you vaccinate your children? An interview with BC radio personality Kid Carson with Dr. Steven Pelech (5/3/2022). https://podcasts.apple.com/si/podcast/16-should-you-vaccinate-your-children/id1506974121?i=1000552984530

22. Masking: Following the Science. Episode 2. Interview with Teen Talks Freedom with Dr. Sarah Musavi (11/5/2022). https://www.youtube.com/watch?v=OBhrL9EK8Os

23. Citizens' Hearing June 2022. Examining Canada's COVID-19 response – Natural immunity. An independent inquiry into Canada's response to COVID-19 held in Toronto, June 22-24, 2022. (22/6/2022) Day 1. 2 hours 7 minutes to 2 hours 31 minutes in second video for Pelech testimony. https://vantagevenues.zoom.us/rec/play/YqWrScCmTrGnGHvqjHaqIlhH1a_IpjNVDdWQ_dyBktDaCusRVbUeyd9DVOxpOknv9FoZO_A0r4dJ2g8p.6tpCs8bth4qEi2Ct?_x_zm_rhtaid=999&_x_zm_rtaid=stLONZc-RP68tjckDufsnA.1655939403378.4a1d6ad726688f0f363c07c24a2f1eae&autoplay=true&continueMode=true&startTime=1655919870000

24. Vaccine Mandates: Science or Fear? Dr. Steven Pelech. Walnut Grove Freedom Rising - Quo Vadis TV – Langley, B.C. Lecture (23/6/2022) https://rumble.com/v1i9bpv-vaccine-mandates-science-or-fear-.html https://www.canadiancovidcarealliance.org/media-resources/dr-pelech-vaccine-mandates-science-or-fear/

25. Comparing Natural Immunity to Vaccine-Induced Immunity. Interview with Dr. Julie Ponesse (27/6/2022) (https://rumble.com/v1a5oej-comparing-natural-immunity-to-vaccine-induced-immunity-dr.-steven-pelech-an.html)

26. Insights on the COVID-19 pandemic and vaccine with Dr. Steven Pelech of UBC. A Biblical Frame: Current Events in Perspective. Panel discussion with Dr. Ed Gerber, Dr. Jens Zimmermann, Dr. Douglas Farrow, and Ivan DeSilva (7/11/2022). https://abiblicalframe.substack.com/

27. It's time to stop the shots. Co-created with Deanna McLeod, Amy McConnell, Steven Pelech and Byram Bridle (14/7/2022) Canadian Covid Care Alliance https://rumble.com/v1cc9ud-stop-the-shots.html?mref=7ju1&mrefc=3 This video had over 40,000 views on Rumble.

28. UBC prof of Medicine Stephen Pelech speaks out on COVID immunity in vaccinated vs unvaccinated. Interview with Maryann Pousette Gebauer as part of the MaryAnn and the Professor series (7/22/2022). https://www.bitchute.com/video/4UNQCMFOHA12/ and https://www.bitchute.com/video/C9Kuk1CWCGQk/

29. Interview with Dr. Steven Pelech on natural immunity, COVID-19 vaccines, masking and other public health measures. Interview with CANSEL and Rachel Becher (7/26/2022). https://cansef.ca/interviews/interview-with-dr-steven-pelech/

30. Immunity to SARS-CoV-2 – Round Table w/ Drs. Steven Pelech and James Lyons-Weiler. Interview with Liam Sturgess, Mathew Crawford and Jame Lyons-Weiler as part of the Rounding the Earth series (8/1/2022). https://rumble.com/v1efue7-immunity-to-sars-cov-2-round-table-w-drs.-steven-pelech-and-james-lyons-wei.html

31. Dr. Steven Pelech – What you should know about the vaccine. An interview with BC radio personality Kid Carson (2/9/2022). https://www.kidcarson.com/71-dr-steven-pelech-what-you-should-know-about-the-vaccine/

32. What's better, natural or COVID-19 vaccine induced immunity? What does SARS-CoV-2 antibody testing show? Youth and Families with Dr. Sara Masavi (19/9/2022) (https://www.youtube.com/watch?v=QF68pO9vfpE).

33. Prevalence of natural and COVID-19 vaccine induced immunity: What does SARS-CoV-2 antibody testing show? Conference on Idaho Victims of Pandemic Policy and Law. (26/9/2022). This was covered Epoch times, Stew Peters, gateway pundit, Dr. Paul Alexander substack. https://www.theepochtimes.com/victims-of-pandemic-policy-law_4753445.html https://rumble.com/v1llpah-live-hearing-vaccine-injured-speak-out-stew-peters-and-vaxx-injured-testify.html

34. Natural immunity ... Science or science fiction? Part 1 and Part 2. White Rock, B.C. White Rock SDA Church (1/10/2022). https://livestream.com/whiterocksdachurch/events/9259494/videos/233136255

35. Jessica Rose, Ph.D. and Steven Pelech, Ph.D. – Antibody deception. Jessica's Universe - CHD-TV (28/10/2022). http://www.rumble.com/v1qbrwd-good-morning-chd-episode-165-antibody-deception-with-steven-pelech-ph.d.html?mref=6zof&mrefc=2

36. Jessica Rose, Steven Pelech and Bernadette Pajer – It's all about the spike - CHD-TV (1/11/2022). https://live.childrenshealthdefense.org/chd-tv/shows/an-informed-life-radio-with-bernadette-pajer/its-all-about-that-spike-with-jessica-rose-phd--steven-pelech-phd/

37. Steven Pelech and Nathan Barrett – Accountability...Class action certification hearings. (28/11/2022). https://www.instagram.com/reel/ClnZRN9LZn2/?igshid=OTRmMjhlYjM%3D

38. Live with Steven Pelech and Laura-Lynn Tyler-Thompson (13/1/2023). https://www.lauralynn.tv/2023/01/live-with-dr-steven-pelech.html

39. The crumbling case for COVID-19 vaccination. White Rock, B.C. White Rock SDA Church (4/2/2023). https://livestream.com/whiterocksdachurch/events/9259494/videos/234894719

40. Rebel News interview of Dr. Pelech by Tamara Ugolini. (8/3/2023). https://www.canadiancovidcarealliance.org/all/rebel-news-interview-of-dr-pelech/

41. Dr. Steven Pelech and Controversial Topics. Interview with Maryann Pousette Gebauer as part of the MaryAnn and the Professor series (4/8/2023). https://www.bitchute.com/video/gIPJGDln1Pfe/.

42. The COVID-19 Pandemic...What Really Happened. Testimony at the National Citizen's Inquiry in Canada's COVID-19 Response (5/3/2023). https://rumble.com/v2m3z3s-ubc-professor-dr-steven-pelech-gives-presentation-on-the-virus-and-vaccine-.html

42. Canadian doctors testify. Good Morning CHD. Episode 121. Live interview with Drs. Christopher Shaw, Charles Hoffe and Stephen Malthouse. (5/12/2023). https://live.childrenshealthdefense.org/chd-tv/shows/good-morning-chd/canadian-doctors-testify/

43. The power of natural immunity, Bill 36 & Dr. Bonnie Henry's April 6 Public Health Order with mandatory COVID-19 vaccination of all BC health care workers. Live with Steven Pelech and Laura-Lynn Tyler-Thompson (12/6/2023). https://rumble.com/v2tsvtw-live-with-dr.-steven-pelech.html

44. The Real Science: Dr. Steven Pelech. Will Dove Interview. Iron Will Report. (15/6/2023) https://ironwillreport.com/interviews/paged-2/7/

45. Natural and COVID-19 vaccine induced immunity. Canadian Covid Care Alliance Roundtable presentation. (9/8/2023)

46. Organ transplant denied, Dr. Pelech on the death of Sheila Lewis. Interview with Anita Krishna (30/8/2023). https://rumble.com/v3e00ye-organ-transplant-denied-dr.-pelech-on-the-death-of-sheila-lewis..html

47. Elo Wants to Know Podcast with Dr. Steven Pelech. Interview with Éloise Boïes. (30/1/2024). https://youtu.be/MSfjvrx8tK4

48. UBC Canada Chief Scientific Officer Warns of Danger Re: MPOX, Covid and Vaccines! Interview with Odessa Orlewicz of Liberty Talk Canada. (6/9/2024) https://rumble.com/v5dfmys-ubc-canada-chief-scientific-officer-warns-of-danger-re-mpox-covid-and-hpv-v.html?e9s=src_v1_upp

49. COVID-19 Unmasked. Interview with Dr. Christopher Shaw and Bernadette Pajer on Informed Life Radio Health Hour. (1/11/2024). https://live.childrenshealthdefense.org/chd-tv/shows/an-informed-life-radio-with-bernadette-pajer/holistic-oral-health--covid19-unmasked/

50. What Are Coronavirus Antibodies Telling Us? Interview with Dr. Christopher Shaw and Dr. Peter McCullough on Courageous Discourse. (6/11/2024). https://petermccuIloughmd.substack.com/p/what-are-coronavirus-antibodies-telling?utm

51. Down the COVID-19 Rabbit Hole. Interview with Christopher Shaw and the B.C. Rising Group. (20/11/2024). https://rumble.com/v5tq45g-bc-rising-wed-nov-20-2024-drs.-steven-pelech-and-chris-shaw.html

52. Drs. Steven Pelech and Chris Shaw: 24 Experts Weigh In on the False Covid Narrative. Interview with Will Dove. (13/12/2024). https://www.dropbox.com/scl/fi/vrpnxpvmgsx05j3kw6t9o/568-Steven-Pelech-and-Chris-Shaw-safc.mp4?rlkey=8ogcufenyv8hkehc3v8n6pjsy&st=r3fxlf3j&dl=0

53. Celebrating an Important Book Launch with Dr. Pelech and Dr. Christopher Shaw. Interview with Dr. Sara Musavi on the Followingthecovidscience's Newsletter and podcast. (18/11/2024) https://followingthecovidscience.substack.com/p/celebrating-an-important-book-launch

54. Down the COVID-19 Rabbit Hole. Interview with Christopher Shaw and Dr. Brian Hooker on Good Morning CHD. (22/11/2024). https://live.childrenshealthdefense.org/chd-tv/shows/good-morning-chd/down-the-covid19-rabbit-hole--the-geoengineering-report/

55. Down the COVID-19 Rabbit Hole: Scientists and Doctors Unmask the Pandemic. With Zoey O'Toole, Maria Gutschi, York Hsiang, Christopher Shaw, John Hardie, Children's Health Defense. X-space (21/11/2024) https://x.com/i/spaces/1rmGPoqgQNjKN

56. Down the COVID-19 Rabbit Hole: Scientists and Doctors Unmask the Pandemic. With Christopher Shaw and Trish Conlin on TishTalk Podcast. (28/11/2024).

57. COVID-19 Pandemonium. Ekstasis Press Toronto Reading Event with publisher Richard Olafson with Christopher Shaw. (1/12/2024)

58. CCCA + CHD. Interview with Drs. Maria Gutschi, Christopher Shaw, York Hsiang and Sheldon Yakiwchuk of Townhall. (10/12/2024). https://sheldonyakiwchuk.substack.com/p/townhall-full-recording?r=qjp6c&utm_campaign=post&utm_medium=web&triedRedirect=true

59. Catalytic Conversation with Guests Dr. Pelech and Dr. Shaw. Interview with Dr. Rima Laibow on Catalytic Conversation Podcast. (31/12/2024). https://rumble.com/v65xt3p-catalytic-conversations-with-guests.-4th-10-pm-uk-2-pm-pacific-4-pm-central.html?e9s=src_v1_upp

60. Interview with Charles Kovess on the Charles Kovess Show in Australia. (14/1/2025).

61. Live: Save the Ostriches – Fighting Back Against a Heartbreaking Order. Interview with Adrienne Richards of Citizens Oversight and Westward Independent. (18/1/2025). https://www.youtube.com/live/dM5xHTKSzV0

x. TRAINING VIDEOS

1. Kinex KAM-850 Antibody Microarray Kit Components – Directed, scripted and designed by Steven Pelech. Starring Catherine Sutter. Narrated by Catherine Sutter. Filmed and edited by Keefer Pelech. Title and credit animations by Cameron Bowyer. Music by William Campbell. Produced by Kinexus Bioinformatics. Posted on You-tube on Jan 25, 2014. https://www.youtube.com/watch?v=JtMn-Gk0q_4&list=PL15H9uvi7IpGvnpoYaSr62CeBHFgzO28k&index=1
2. Stage 1: Preparation of Lysates from Cultured Cells for Proteomics Analyses – Directed, scripted and designed by Steven Pelech. Starring Dominik Sommerfeld. Narrated by Catherine Sutter. Filmed and edited by Keefer Pelech. Title and credit animations by Cameron Bowyer. Music by William Campbell. Produced by Kinexus Bioinformatics. Posted on You-tube on Jan 25, 2014. https://www.youtube.com/watch?v=0_YdxuOdGhU&list=PL15H9uvi7IpGvnpoYaSr62CeBHFgzO28k&index=2
3. Stage 2: Measurement of Protein Concentrations with the Bradford Protein Assay. Directed, scripted and designed by Steven Pelech. Starring Shenshen Lai. Narrated by Catherine Sutter. Filmed and edited by Keefer Pelech. Title and credit animations by Cameron Bowyer. Music by William Campbell. Produced by Kinexus Bioinformatics. Posted on You-tube on Jan 25, 2014. https://www.youtube.com/watch?v=TAMrj0Z9FOk&list=PL15H9uvi7IpGvnpoYaSr62CeBHFgzO28k&index=3
4. Stage 3: Dye Labelling Cell and Tissue Lysates for the Kinex™ KAM Antibody Microarray. Directed, scripted and designed by Steven Pelech. Starring Jane Shi. Narrated by Catherine Sutter. Filmed and edited by Keefer Pelech. Title and credit animations by Cameron Bowyer. Music by William Campbell. Produced by Kinexus Bioinformatics. Posted on You-tube on Jan 25, 2014. https://www.youtube.com/watch?v=3sMaRnAC7-4&index=4&list=PL15H9uvi7IpGvnpoYaSr62CeBHFgzO28k
5. Stage 4: Incubation of the Kinex™ KAM Antibody Microarray with Dye-Labelled Lysate Protein. Directed and designed by Steven Pelech, and scripted and designed by Hong Zhang and Steven Pelech. Starring Jane Shi. Narrated by Catherine Sutter. Filmed and edited by Keefer Pelech. Title and

credit animations by Cameron Bowyer. Music by William Campbell. Produced by Kinexus Bioinformatics. Posted on You-tube on Jan 25, 2014. https://www.youtube.com/watch?v=LcuQ-1CYJrw&list=PL15H9uvi7IpGvnpoYaSr62CeBHFgzO28k&index=5

6. Stage 5: Kinex™ KAM Antibody Microarray Scanning and Quantitation. Directed, scripted and designed by Steven Pelech. Starring Jane Shi and Winnie So. Narrated by Catherine Sutter. Filmed and edited by Keefer Pelech. Title and credit animations by Cameron Bowyer. Music by William Campbell. Produced by Kinexus Bioinformatics. Posted on You-tube on Jan 25, 2014. https://www.youtube.com/watch?v=wBf0t4xhV5g

xi. EXPERT REPORTS FOR COURT CASES

Over the three years, I have been asked to prepare, expert reports with respect to natural immunity and COVID-19 vaccines for several court and arbitration cases in Canada, South Africa and Ireland. These are usually sworn and notarized documents, and in several cases I have undergone cross-examination in Canadian courts. This is a listing of many of the court cases that I have served in.

1.	COURT FILE NUMBER	210600780
	COURT	COURT OF QUEEN'S BENCH OF ALBERTA
	JUDICIAL CENTRE	LETHBRIDGE
	APPLICANT	HAYLEY NASSICHUK-DEAN
	RESPONDENT	UNIVERSITY OF LETHBRIDGE Cross-examination Feb. 16, 2022
2.	COURT FILE NUMBER	T-1694-21
	COURT	FEDERAL COURT OF CANADA (Trial Division)
	APPLICANT	DAVID LAVERGNE-POITRAS
	RESPONDENTS	ATTORNEY GENERAL OF CANADA (Minister of Public Services and Procurement) – and – PMG TECHNOLOGIES INC. Cross-examination September 8, 2022
3.	COURT FILE NUMBER	T-168-22-ID-1
	COURT	FEDERAL COURT OF CANADA
	APPLICANT	THE HONOURABLE A. BRIAN PECKFORD, LEESHA NIKKANEN, KEN BAIGENT, DREW BELOBABA, NATALIE GRCIC, AND AEDAN MACDONALD
	RESPONDENTS	THE MINISTER OF TRANSPORT and THE ATTORNEY GENERAL OF CANADA Cross-examination May 13 and 16, 2022
4.	COURT FILE NUMBER	2101-13202
	COURT	COURT OF QUEEN'S BENCH OF ALBERTA
	JUDICIAL CENTRE	CALGARY
	APPLICANTS	DR. ERIC T. PAYNE, DR. JOANNE J. MOSER, DR. DAVID W. L. LOEWEN

		and DR. GREGORY CHAN
	RESPONDENTS	ALBERTA HEALTH SERVICES, DR. VERNA YIU IN HER CAPACITY AS CHIEF EXECUTIVE OFFICER OF ALBERTA HEALTH SERVICES, DR. JOHN T. CHMELICEK IN HIS CAPACITY AS POST GRADUATE PROGRAM DIRECTOR, DEPARTMENT OF FAMILY MEDICINE, UNIVERSITY OF ALBERTA -and- THE UNIVERSITY OF ALBERTA
5.	COURT FILE NUMBER	CV-21-00670360-0000
	COURT	SUPERIOR COURT OF JUSTICE ONTARIO
	APPLICANTS	SARAH HARJEE, EVAN KRAAYENBRINK, HIBAH AOUN, SARAH LAMB, SAM SABOURIN, JACKIE RAMNAUTH, MARK MCDONOUGH -and- LINDA MCDONOUGH
	RESPONDENT	HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF ONTARIO Cross-examination April 28 & May 5, 2022
6.	COURT FILE NUMBER	FDF-443-19
	COURT	COURT OF QUEEN'S BENCH OF NEW BRUNSWICK
	JUDICIAL CENTRE	FAMILY DIVISION JUDICIAL DISTRICT OF FREDERICTON
	APPLICANT	VICTORIA LYNN MITHAM
	RESPONDENT	BRADLEY SCOTT FOLLETT
7.	COURT FILE NUMBER	72/2022
	COURT	HIGH COURT OF SOUTH AFRICA
	JUDICIAL CENTRE	FREE STATE DIVISION, HELD AT BLOEMFONTEIN
	APPLICANT	SOLIDARITY obo MEMBERS, SOLIDARITY YOUTH Obo MEMBERS, JOANNA STANDER, SHANIQUE PIENAAR, ALICE FLORENCE MARINA STANDER - and - ANNELI BOTHA
	RESPONDENTS	CHAIRMAN OF THE COUNCIL OF THE UNIVERSITY OF THE FREE STATE– and – THE UNIVERSITY OF THE FREE STATE
8.	COURT FILE NUMBER	C.A.C.V.3903of202 C.A.C.V.3904of2021 C.A.C.V.3908of2021
	COURT	COURT OF APPEAL FOR SASKATCHEWAN ON APPEAL FROM THE QUEEN'S BENCH (FAMILY LAW DIVISION)
	JUDICIAL CENTRE	JUDICIAL CENTRE OF SASKATOON DIV. No. 625 of 2012

	APPLICANT	OLENA MYKOLAYIVNA SCHEMENAUER
	RESPONDENT	EVAN JOSEPH SCHEMENAUER
9.	COURT FILE NUMBER	FD 19-01-22922
	COURT	COURT OF QUEEN'S BENCH (Family Division)
	JUDICIAL CENTRE	WINNIPEG CENTRE
	APPLICANT	JORDAN SARAH CURÉ
	RESPONDENT	KENNETH PETER TYSON CURÉ
10.	COURT FILE NUMBER	E59176
	COURT	SUPREME COURT OF BRITISH COLUMBIA
	JUDICIAL CENTRE	NEW WESTMINISTER
	APPLICANT	VICTORIA LARA DRAPER AKA VICTORIA LARA DRAPER-SMITH
	RESPONDENT	MATTHEW LAWRENCE NEALE SMITH
11.	COURT FILE NUMBER	E17315
	COURT	SUPREME COURT OF BRITISH COLUMBIA
	JUDICIAL CENTRE	CHILLIWACK REGISTRY
	APPLICANT	DALE JAMES HOOGENDOORN
	RESPONDENT	KATIE NADINE HOOGENDOORN Testimony Feb. 17, 2022.
12.	COURT FILE NUMBER	FC-13-917-02
	COURT	SUPERIOR COURT OF JUSTICE FAMILY COURT BRANCH
	JUDICIAL CENTRE	OSHAWA REGISTRY
	APPLICANT	KAREN DIAZ (BOL)
	RESPONDENT	BRENT BOL
13.	COURT FILE NUMBER	2022/1456 P
	COURT	HIGH COURT OF IRELAND
	APPLICANTS	DAVID EGAN AND SHARON BROWNE AND EMMANUEL LAVERY
	RESPONDENTS	MINISTER FOR HEALTH, AN TAOISEACH, AND HSE
14.	ARBITRATION	
	EMPLOYER	HUMBER RIVER HOSPITAL
	UNION	NATIONAL ORGANIZED WORKERS UNION Grievances: NOWU Policy Service #170,2021 (All Bargaining Units) Covid Directive 6, NOWU Policy Service #01,2022 (All Bargaining Units) Covid Policy, 2022-NOWU-Clerical-55-HRH; Grievance of Gail Ackie Cross-examination Feb. 20, 22 & 29, 2023
15.	COURT FILE NUMBER	No. S2110229
	COURT	SUPREME COURT OF BRITISH COLUMBIA
	JUDICIAL CENTRE	NEW WESTMINISTER

	APPLICANTS	CANADIAN SOCIETY FOR THE ADVANCEMENT OF SCIENCE IN PUBLIC POLICY and KIPLING WARNER
	RESPONDENT	DR. BONNIE HENRY IN HER CAPACITY AS PROVINCIAL HEALTH OFFICER FOR THE PROVINCE OF BRITISH COLUMBIA
16.	COURT	ONTARIO
	APPLICANT	VALERIE ALAGNA
	RESPONDENT	HAMILTON HEALTH SCIENCES CORPORATION
17.	DISCIPLINARY HEARING	
	CASE	2021-AF-01136
	COLLEGE	COLLEGE OF NURSES OF ONTARIO
	DEFENDENT	SARAH A. CHOUJOUNIAN-ABULU
		Cross-examination April 13 & 14, May 19, June 9 & 30, July 8, 2023
18.	DISCIPLINARY HEARING	
	COLLEGE	BC COLLEGE OF NURSES AND MIDWIVES
	DEFENDENT	SEAN TAYLOR
		Cross-examination July 19 & 20, 2023
19.	DISCIPLINARY HEARING	
	CASE	CPSID 17223; IC2021-0481; IC2021-0535
	COLLEGE	COLLEGE OF PHYSICIANS AND SURGEONS OF BC
	DEFENDENT	DR. CHARLES HOFFE
20.	COURT FILE NUMBER	CV-22-0069-1880-0000
	COURT	ONTARIO SUPERIOR COURT OF JUSTICE
	APPLICANT	DR. BYRAM BRIDLE
	RESPONDENTS	UNIVERSITY OF GUELPH, JEFFREY WICHTEL, LAURIE ARNOTT, CHARLOTTE YATES, SCOTT WEESE, GLEN PYLE, ANDREW PEREGRINE, DOROTHEE BIENZLE, AMY GREER, DAVID FISMAN, NICK DULEY, JANE OR JOHN DOE JUNIOR SCIENTIST
21.	COURT	COURT OF KING'S BENCH ALBERTA
	JUDICIAL CENTRE	GRANDE PRAIRIE
	APPLICANT	ANNETTE LEWIS
	RESPONDENTS	ALBERTA HEALTH SERVICES AND REDACTED PARTIES
22.	DISCIPLINARY HEARING	
	CASE	24-20220001146; 30-21-3125
	PLANTIFF	GILLES MARION, syndic ad hoc COLLÈGE DES MÉDECINS DU QUÉBEC
	DEFENDENT	DR. MARC LACROIX
23.	COURT FILE NUMBER	SCBC Action E222370

COURT	SUPREME COURT OF BRITISH COLUMBIA
JUDICIAL CENTRE	VANCOUVER REGISTRY
APPLICANT	TRICIA MARIE BARR ALLARD
RESPONDENT	PATRICK JAMES ALLARD

24. DISCIPLINARY INVESTIGATION

CASE	IC 2022-0489
COLLEGE	COLLEGE OF PHYSICIANS AND SURGEONS OF BC
DEFENDENT	DR. SOFIA T. BAYFIELD