



COVID-19  
IMMUNITY  
TASK FORCE

GRUPE DE TRAVAIL  
SUR L'IMMUNITÉ  
FACE À LA COVID-19



CanCOVID

.....

Seminar Series | Research Results & Implications

# Protecting Canada's long-term care residents from COVID-19: The evidence behind the policies

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Thursday, October 28, 2021 | 1 – 2:30 p.m. EDT

# Moderator

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## **Dr. Nathan Stall**

CanCOVID Network Science Advisor

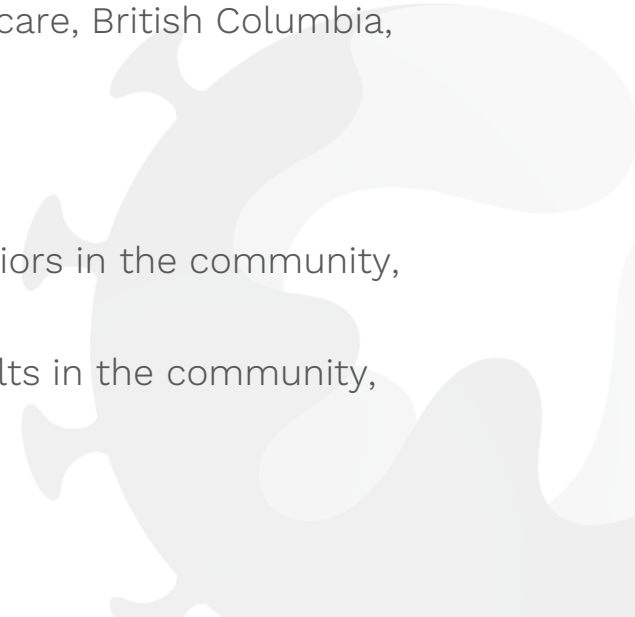
Staff Geriatrician, Sinai Health

Research Fellow, Women's College Research Institute at Women's College Hospital



# Speakers

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- **Dr. Timothy Evans**, Executive Director, COVID-19 Immunity Task Force
  - **Dr. Dawn Bowdish**, residents in long-term care, Ontario
  - **Dr. Allison McGeer**, residents & staff in long-term care, Ontario
  - **Dr. Daniel El Kodsi**, residents, staff & caregivers in long-term care, British Columbia, Ontario & Quebec
  - **Michelle Marquis**, residents of long-term care, Quebec
  - **Dr. Bonita Lee**, residents & staff in long-term care, Alberta
  - **Dr. Mark Brockman**, residents & staff in long-term care & seniors in the community, British Columbia
  - **Dr. Sharon Walmsley**, comparing younger adults to older adults in the community, Ontario
  - **Dr. Timothy Evans**, synthesis
  - **Dr. Nathan Stall**, policy implications
- 



## **Dr. Timothy Evans**


COVID-19 Immunity Task Force  
Executive Director

# COVID-19 Immunity Task Force mandate

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Established by the Government of Canada in April 2020

## **Mandate:**

- Supporting the **implementation of relevant research** projects
  - Aligning studies across Canada
  - Seeking to provide useful information to federal, provincial, and territorial decision-makers as they oversee responses to the COVID-19 pandemic to best protect Canadians
- 

# CITF: Priority areas of research

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## SEROPREVALENCE STUDIES

Assess the extent of SARS-CoV-2 infection across Canada



## IMMUNE SCIENCE

Understand the nature of immunity arising from infection



## IMMUNE TESTING

Develop improved antibody testing methods

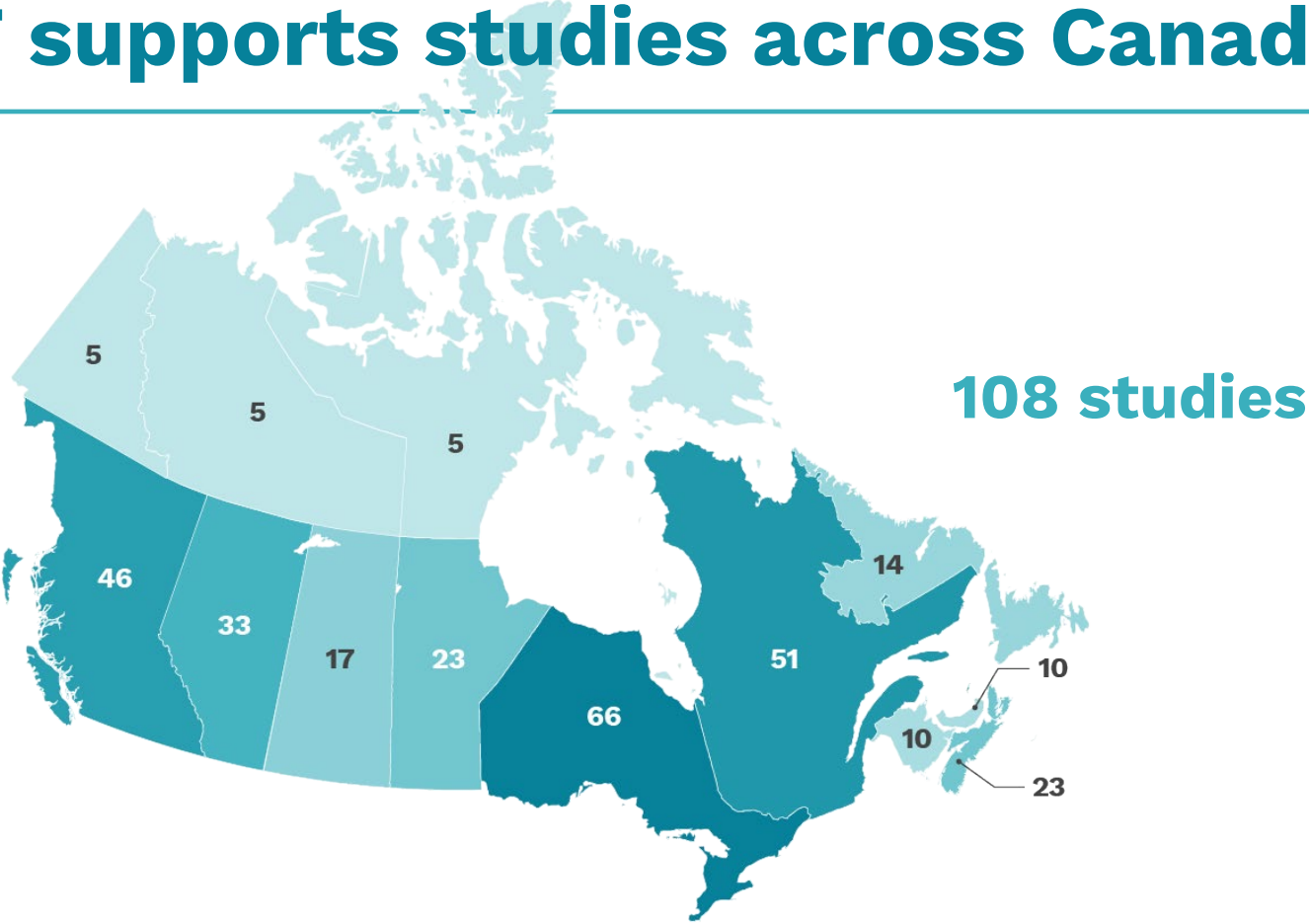


## VACCINE SURVEILLANCE

Help monitor the effectiveness and safety of vaccines

# CITF supports studies across Canada

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# Focusing research on long-term care

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- Long-term care homes (LTC) were not included in mainstream research
- After a first wave that decimated LTC in Canada, the CITF recognized the research gap and catalyzed research into LTC in our Hot Spots funding competition
- We mobilized a great set of researchers, seven of whom are presenting today, proving that increased research in LTC is possible and necessary



# CITF-funded studies on long-term care & seniors: from coast-to-coast

Residents, staff & caregivers LTC  
*British Columbia, Ontario, Quebec*  
Dr. Amy Hsu, Dr. Marc-André Langlois

Residents & staff in LTC +  
seniors in the community  
*Vancouver*  
Dr. Marc Romney, Dr. Zabrina Brumme,  
Dr. Mark Brockman

LTC residents & staff  
*Edmonton*  
Dr. Xiao Lilly Pang, Dr. Chris Sikora,  
Dr. Bonita Lee

Younger vs. older adults in the community  
*Southern Ontario*  
Dr. Sharon Walmsley

Residents & staff LTC  
*Hamilton*  
Dr. Dawn Bowdish  
Dr. Andrew Costa

Residents & staff LTC  
*Ontario*  
Dr. Sharon Straus  
Dr. Allison McGeer  
Dr. Anne-Claude Gingras

Residents LTC  
*Montreal*  
Dr. Donald Vinh  
Dr. Jean-Philippe Gouin  
Dr. Diana Cruz-Santiago



# Research informing policy

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- Today's results were presented to the National Advisory Committee on Immunization (NACI) in early September
- Helped inform NACI's guidance to government, recommending a third dose to residents in LTC

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**NACI rapid response: Booster dose in long-term care residents and seniors living in other congregate settings. 2021 September 28. Available from:** <https://www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci/statement-september-28-2021-booster-dose-long-term-care-residents-seniors-living-other-congregate-settings.html>



COVID-19  
vaccinations &  
infections in  
long-term care

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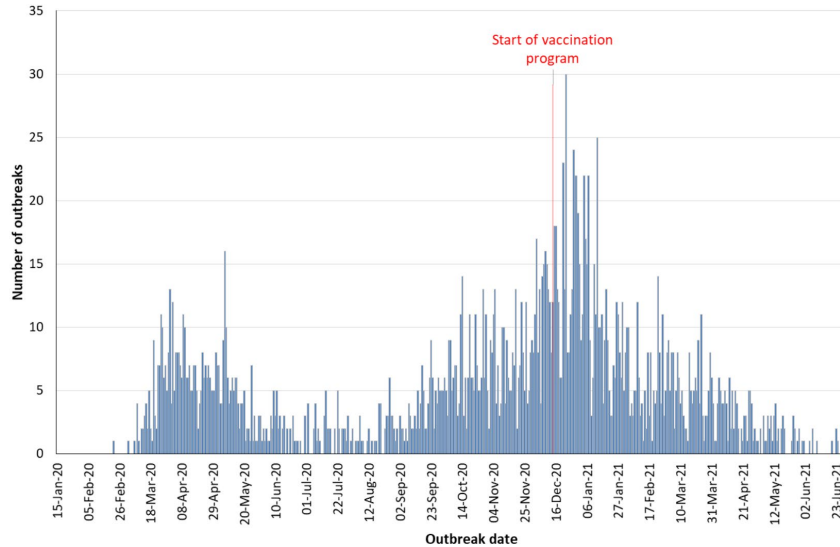
Ontario

## **Dr. Dawn Bowdish**

Professor, McMaster University,  
Canada Research Chair in Aging & Immunity, McMaster  
University



# Vaccinations have exceeded expectations in LTC

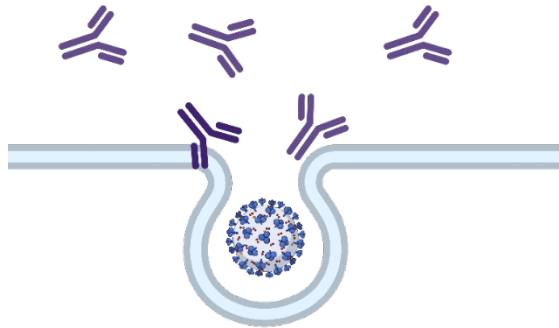


[https://www.publichealthontario.ca/-/media/documents/ncov/epi/covid-19-epi-confirmed-cases-following-vaccination-ltchrh.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/documents/ncov/epi/covid-19-epi-confirmed-cases-following-vaccination-ltchrh.pdf?sc_lang=en)

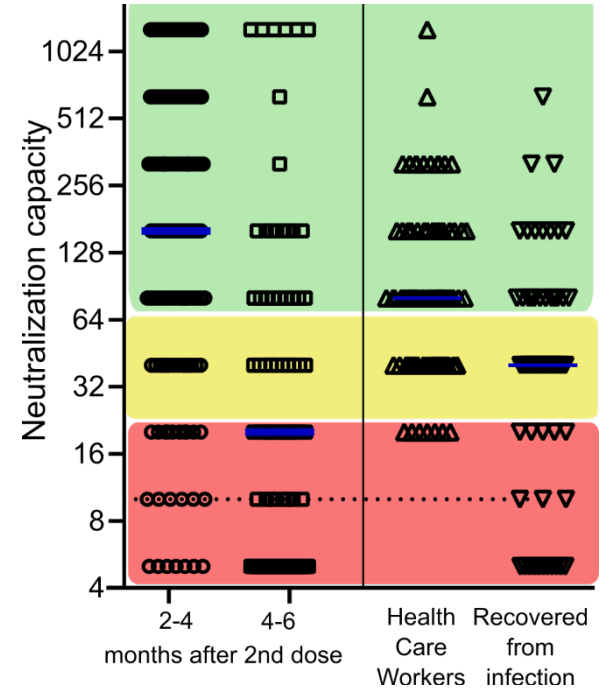
- Good news!
  - ▶ mRNA vaccines induce vaccination responses in \*most\* long-term care residents
  - ▶ Immune responses protect against infection
- Bad news!
  - ▶ Immune responses don't seem to last very long

# Quantity and quality of immune responses

Antibody quantity/stickiness/neutralization

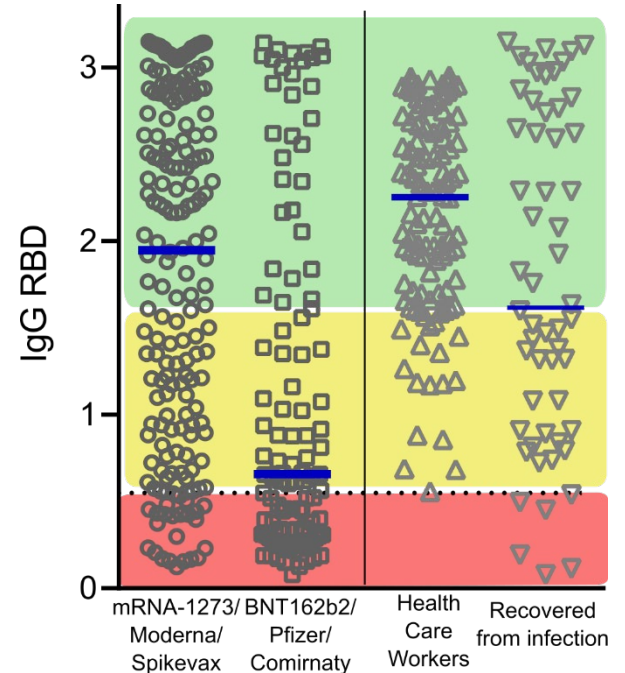


► **72% in the red zone by 6 months**

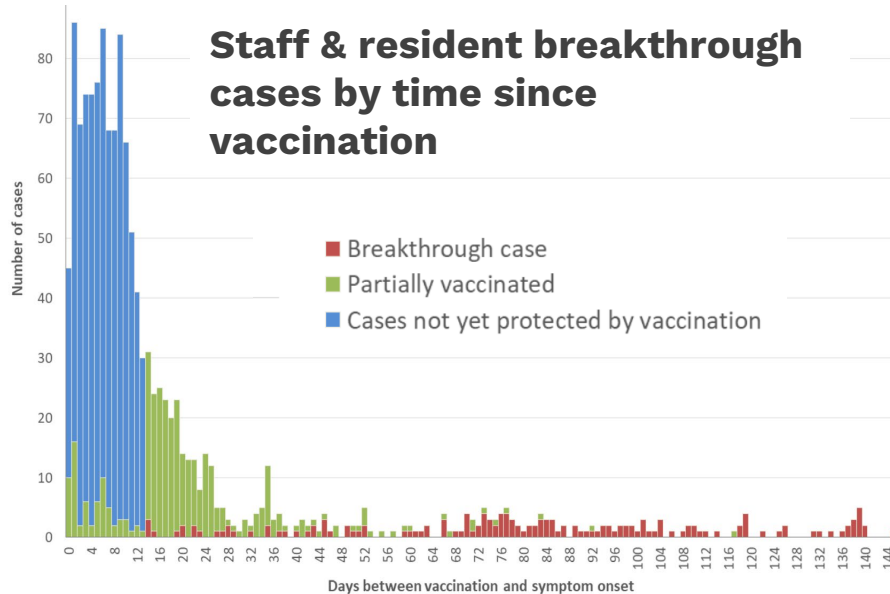


# Vaccine type matters

- By 5 months....
  - ▶ ~20% of Moderna recipients in the “red zone” vs ~60% of Pfizer recipients
  - ▶ Antibody *quality & quantity* is higher for longer in Moderna recipients
- Moderna is different because...
  - ▶ Higher dose (3x) – like the ‘high dose’ influenza shot?
  - ▶ Longer interval between doses (4 wks vs 3 wks)
- Optimizing vaccine use?



# Ongoing research



[https://www.publichealthontario.ca/-/media/documents/ncov/epi/covid-19-epi-confirmed-cases-following-vaccination-ltchrh.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/documents/ncov/epi/covid-19-epi-confirmed-cases-following-vaccination-ltchrh.pdf?sc_lang=en)

- Cellular immunity
  - ▶ Do we lose the cells that make antibodies?
- Previous exposure to COVID or related infections?
  - ▶ Previous COVID infection (59 people)
  - ▶ Previous infection with related viruses?
- Drugs, medications or health conditions?

# Our team

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## Co-PI:

**Andrew Costa (McMaster)**

## Co-Investigators:

|                        |                               |
|------------------------|-------------------------------|
| Mark Loeb              | Kevin Hines (PHO)             |
| Judah Denburg          | Michael Hillmer (Min. Health) |
| Ishac Nazy             | Jonathan Bramson              |
| Kevin Hines (Waterloo) | Parminder Raina               |
| Nathan Stall (UoT)     | Janet McElhaney               |
| Aaron Jones (IC/ES)    | Chris Verschoor               |
| Arthur Sweetman        | Kevin Stinson (SMGH)          |



# Collaborators



Convalescent data courtesy of Dr. Ishac Nazy & team and the CONCORD trial



Healthcare worker dosing schedule data courtesy of Drs. MyLinh Duong & Darryl Leong and the TIMING study

*\*unpublished & confidential*



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## Immunogenicity Sub-Study

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Ontario

# Dr. Allison McGeer

Professor, Department of Laboratory Medicine and  
Pathobiology, University of Toronto

Senior Clinician Scientist and Infectious Disease  
Physician, Sinai Health System



# Immunogenicity Sub-Study Objectives

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## Primary objective:

- ▶ To compare antibodies to COVID-19 after vaccination in residents and staff of long-term care homes (LTCHs).

## Exploratory objectives:

- ▶ Compare the nature of antibodies to COVID-19 after infection to those after vaccination in residents of LTCHs
- ▶ Assess the decline in antibodies to COVID-19 over time in vaccinated and infected residents and staff of LTCHs
- ▶ Assess impact of 3<sup>rd</sup> doses of mRNA vaccines on antibody levels
- ▶ Contribute to data assessing antibody correlates of protection

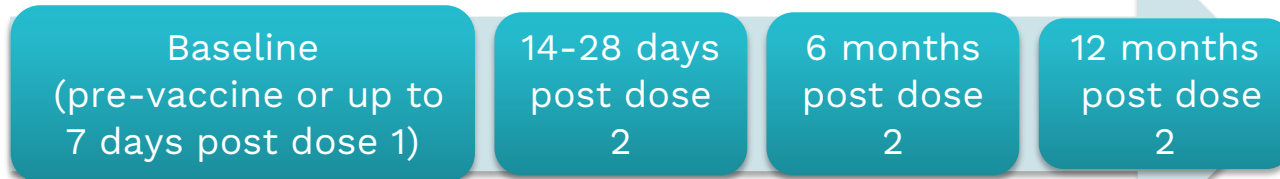
# Sampling time points

**From 200 LTC residents** (*serum, dried blood spots*)



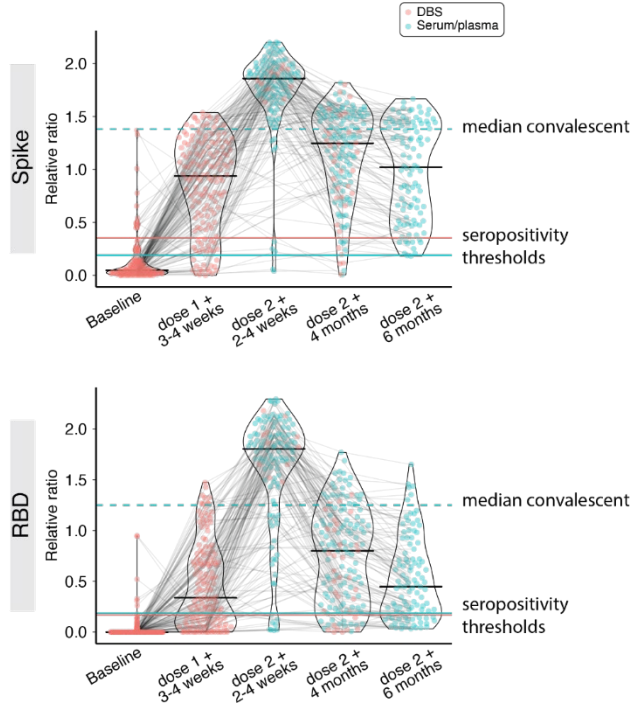
Ongoing monitoring of COVID-19 infection

**From 145 LTC staff** (*whole blood, serum, saliva*)



Ongoing monitoring of COVID-19 infection

# In residents, post-vaccine levels of anti-Spike and anti-RBD decline more quickly than expected



## • 3–4 weeks post dose 1:

- ▶ Seroconversion in **67%** of residents
- ▶ 7% had higher anti-RBD IgG than median convalescents

## • 2–4 weeks post dose 2 (apex):

- ▶ Seroconversion in **92%** of residents
- ▶ 80% had higher anti-RBD IgG than median convalescents

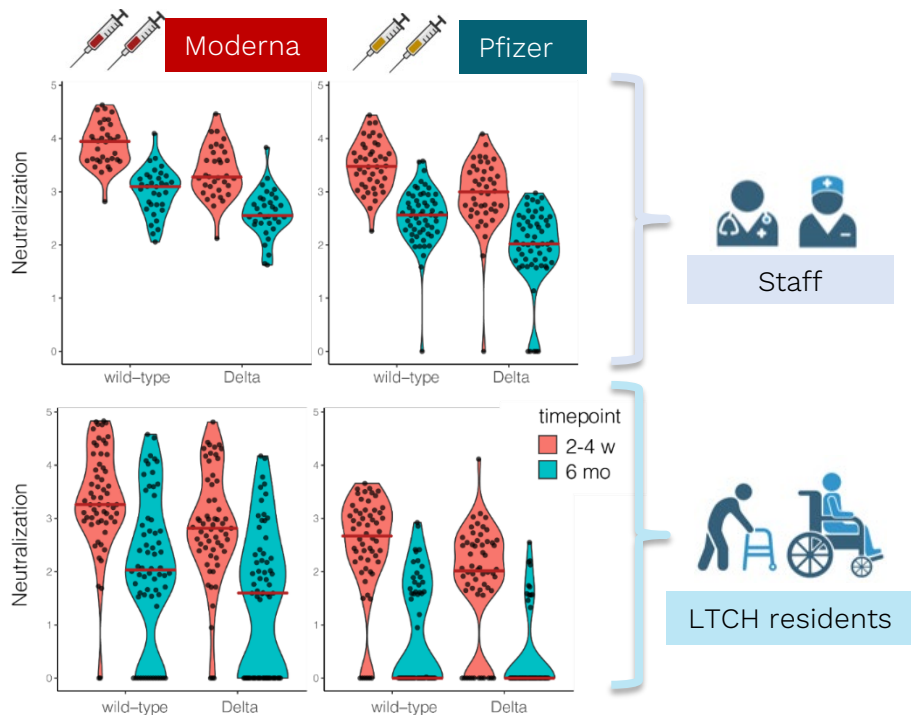
## • 4 months post dose 2:

- ▶ Seroconversion in **88%** of residents
- ▶ 23% had higher anti-RBD than median convalescents

## • 6 months post dose 2:

- ▶ Seroconversion in **72%** of residents
- ▶ 12% had higher anti-RBD than median convalescents

# Multiple factors affect neutralizing antibodies



- **Vaccine:**

- ▶ Moderna > Pfizer (~3.6 fold)

- **Population:**

- ▶ Staff > resident (~6.3 fold)

- **Virus variant:**

- ▶ Wild-type > Delta (~2.9 fold)

- **Time post dose 2:**

- ▶ 2-4 weeks > 6 months (~7.3 fold)

- **Cumulative drop in neutralization**

- ▶ **480-fold** (from top left to bottom right)

# Next Steps

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- ▶ Provide results post-dose 3 in residents to decision-makers
- ▶ Coordinate data collection time points with other studies
- ▶ Continue to assess relationships between serum and salivary antibody and breakthrough infections

# Wellness Hub Study

The aim of the Wellness Hub is to support key stakeholders in congregate living settings, **prevent and manage infectious disease outbreaks** and **optimize physical and mental wellness** both during and beyond COVID-19. The larger study includes additional aspects such as COVID-19 waste water surveillance and transmission modelling.

## Team Investigators

Drs. Sharon Straus, Allison McGeer, Anne-Claude Gingras, Jennifer Gommerman, Mario Ostrowski, Sharmistha Mishra, Christine Fahim, Stefan Baral, Adrienne Chan

## For more information:



[wellnesshub@unityhealth.to](mailto:wellnesshub@unityhealth.to)



[wellness-hub.ca](https://www.wellness-hub.ca)



[@WellnessHubKT](https://twitter.com/WellnessHubKT)

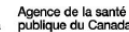


# Partners & Funders



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The underlying  
factors influencing  
the immune  
response to  
SARS-CoV-2 in  
LTC residents,  
staff, and  
caregivers

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British Columbia  
Ontario  
Quebec

## **Dr. Daniel El Kodsi**

Project Manager / Postdoctoral Fellow,  
Bruyère Research Institute

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Presenting on behalf of Principal Investigators  
Drs. Amy Hsu and Marc-André Langlois

Bruyère 



uOttawa

# The Bruyère C19 Immunity Study

The main objectives of the study are to:

1. Understand the level and duration of vaccine-mediated protection in residents, caregivers and workers in LTC homes across Ontario, British Columbia, and Quebec.
2. Investigate the factors related to a diminished immune response in residents.

Results shown today are for:



397 residents



100 caregivers



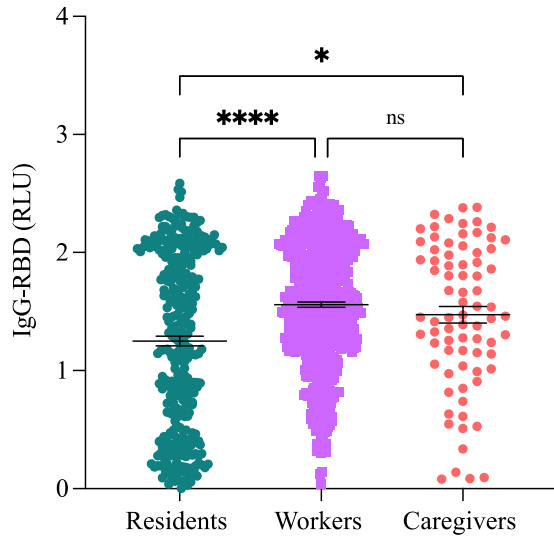
920 staff

across 17 LTC homes in Ontario

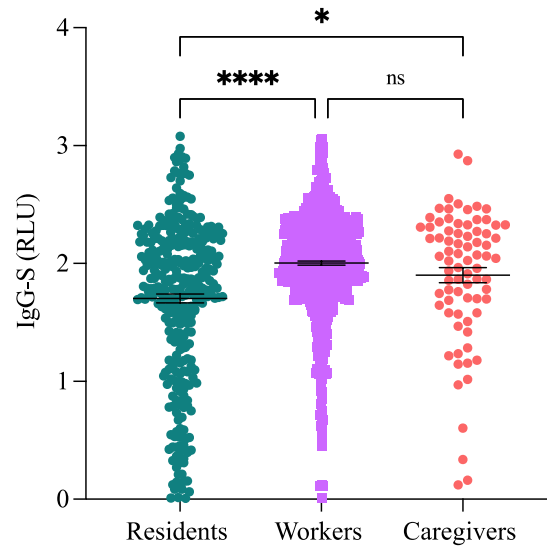


# LTC residents have a lower overall antibody response

## Antibodies to RBD after 2 doses



## Antibodies to spike after 2 doses



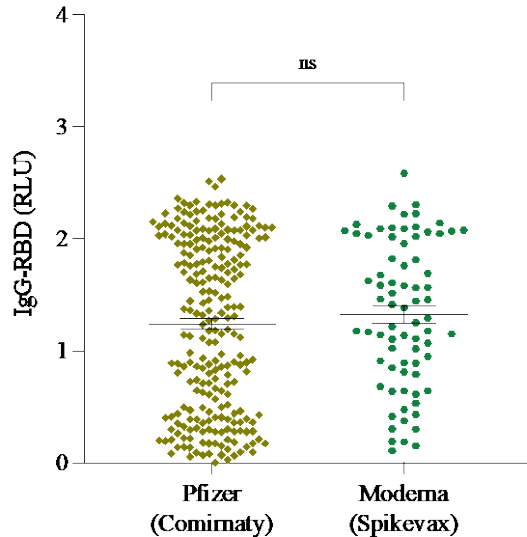
Residents, N= 340  
Workers, N= 595  
Caregivers, N= 77

A one-way ANOVA statistical analysis was conducted, assuming equal SD, with Tukey's multiple comparison test: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , and \*\*\*\* $p < 0.0001$ .

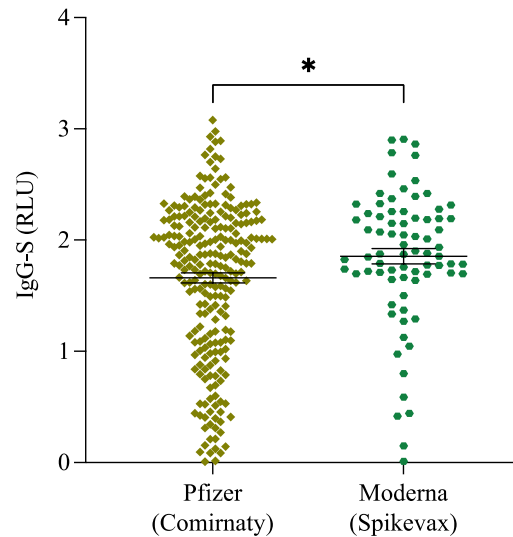


# Strong antibody response after 2<sup>nd</sup> dose more common with Moderna

Antibodies to RBD by vaccine type after 2 doses in residents



Antibodies to spike by vaccine type after 2 doses in residents



Pfizer, N= 244

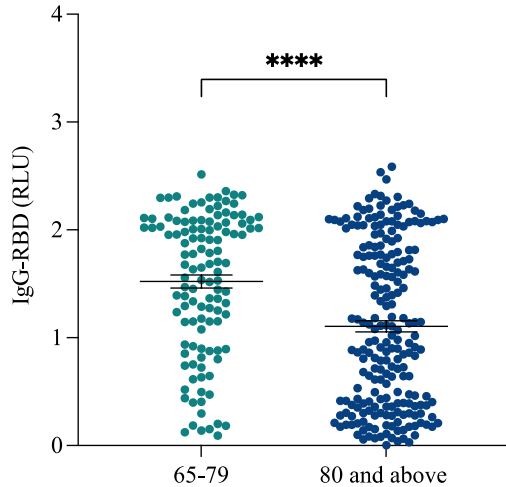
Moderna, N= 76

A Student T-test was conducted, unpaired assuming equal SD, and two-tailed: \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001, and \*\*\*\*p < 0.0001.

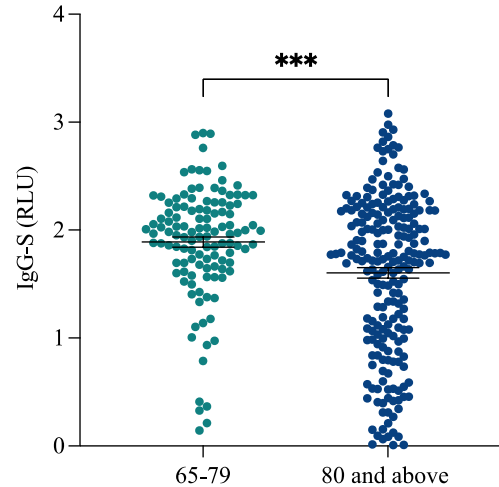


# Weaker antibody response in older residents

Antibodies to RBD after 2 doses in residents



Antibodies to spike after 2 doses in residents



Residents (65-79), N= 119  
Residents (80 and above), N= 221

A Student T-test was conducted, unpaired assuming equal SD, and two-tailed: \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001, and \*\*\*\*p < 0.0001.



# Study Team



 **C19**ImmunityStudy.ca  
Powered by Bruyère 



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**UNCoVER:**  
UNderstanding  
COVID-19  
Vaccination in  
Elderly Residents

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Montreal, QC

# Michelle Canac-Marquis

Project Manager, UNCoVER  
The Research Institute of the McGill University Health Centre

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Presenting on behalf of Principal Investigators  
Dr. Donald C. Vinh, Dr. Jean-Philippe Gouin &  
Dr. Diana Cruz-Santiago

Centre universitaire  
de santé McGill  
Institut de recherche



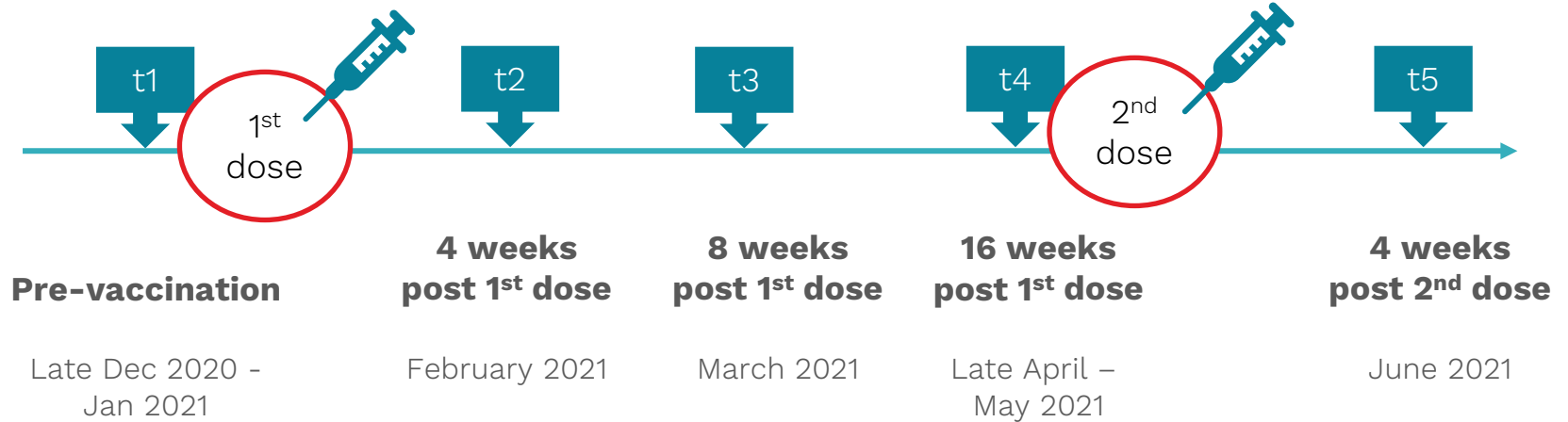
McGill University  
Health Centre  
Research Institute

Centre intégré  
universitaire de santé  
et de services sociaux  
du Centre-Sud  
de l'île-de-Montréal  
Québec



Centre de recherche  
**iugm**  
Institut universitaire  
de gériatrie de Montréal

# Blood sample collection timepoints



# Study of 185 elderly residents



Median age was **83** years



**69.2%** were female



**89.7%** self-identified as White



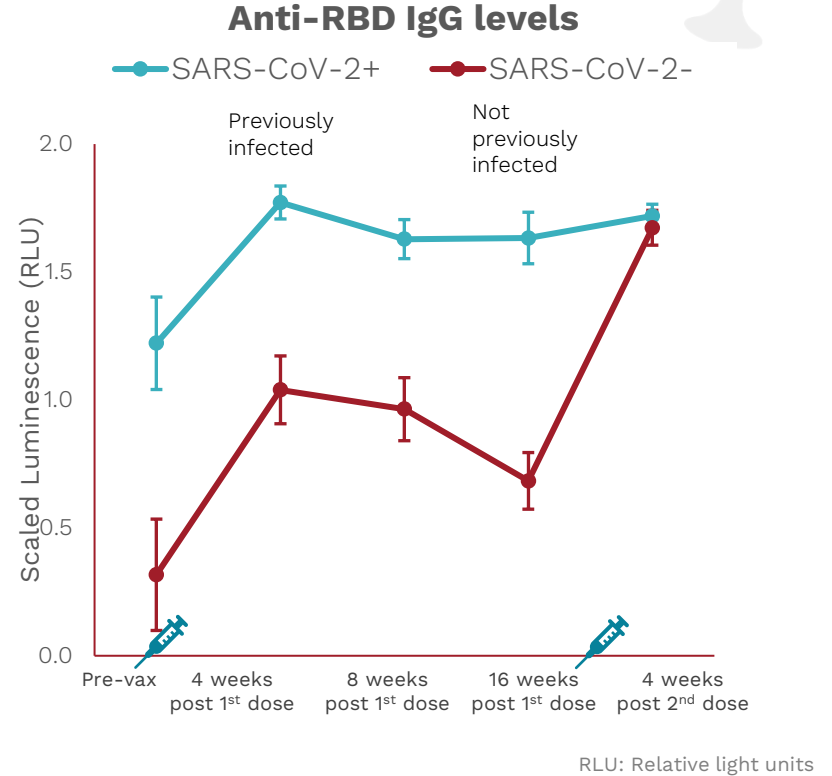
**98%** had at least one coexisting condition



**46.5%** had previously diagnosed SARS-CoV-2

# Antibody levels after vaccination with 16-week interval in residents with and without prior infection

- 16 weeks between 1<sup>st</sup> and 2<sup>nd</sup> dose is **likely the upper limit** of the time period for the dosing interval, especially in frail elderly who were not previously infected, based on waning antibody levels.



# Faster decline in antibody responses to Pfizer as 1<sup>st</sup> dose, mix-and-match effective

- There is a **difference in the kinetics** of the antibody responses at 16 weeks between the Moderna and Pfizer as 1<sup>st</sup> dose, but it is resolved at 4 weeks post 2<sup>nd</sup> dose.
- Specifically, anti-S and anti-RBD IgG levels decrease significantly faster in LTC residents with **Pfizer** as 1<sup>st</sup> dose, whether they were previously infected or not.

## Legend

M: Moderna

P: Pfizer

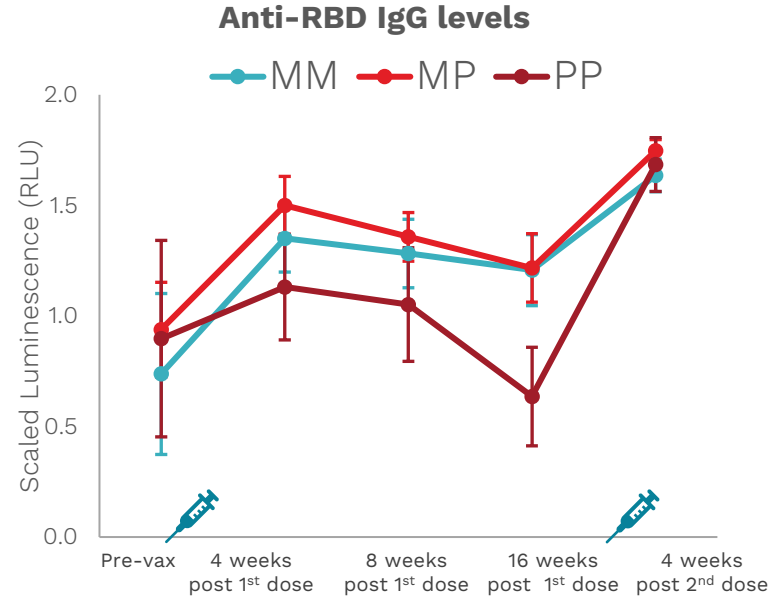
RLU: Relative light units

## Vaccine breakdown

MM: 65 (35%)

MP: 84 (45%)

PP: 36 (20%)



# Inter-changeability of mRNA vaccine combinations

- We demonstrate, for the first time to our knowledge, the **inter-changeability** of the mRNA vaccines as the 2<sup>nd</sup> dose when comparing the serologic **responses at 1 month post-2<sup>nd</sup> dose**

## Legend

M: Moderna

P: Pfizer

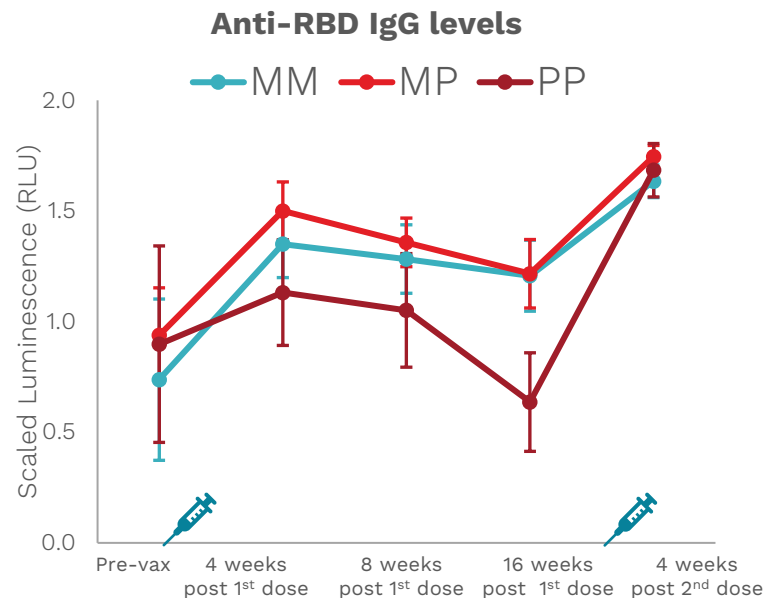
RLU: Relative light units

## Vaccine breakdown

MM: 65 (35%)

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PP: 36 (20%)



# Study Team

Donald C. Vinh, MD\*<sup>1,2</sup>

Jean-Philippe Gouin, PhD\*<sup>3, 4</sup>

Diana Cruz-Santiago, MD<sup>3,5</sup>

Michelle Canac-Marquis, MPH<sup>1</sup>

Stéphane Bernier, MSc<sup>1</sup>

Florian Bobeuf, PhD<sup>3</sup>

Avik Sengupta, MD<sup>1</sup>

Jean-Philippe Brassard, BSc<sup>1</sup>

Alyssa Guerra, B.Sc.<sup>1</sup>

Robert Dziarmaga, M.Sc.<sup>1</sup>

Anna Perez, BSc<sup>1</sup>

Yichun Sun, B.Sc.<sup>1</sup>

Yongbiao Li, MD<sup>1</sup>

Lucie Roussel, PhD<sup>1</sup>

Mélanie J. Langelier, MSc(N)<sup>1</sup>

Danbing Ke, MD, PhD<sup>8</sup>

Corey Arnold, PhD<sup>6</sup>

Martin Pelchat, PhD<sup>6,7</sup>

Marc-André Langlois, PhD<sup>6,7</sup>

Xun Zhang, PhD<sup>9</sup>

And Bruce D. Mazer, MD<sup>8,10</sup>

on behalf of the COVID-19  
Immunity Task Force and  
UNCOVER Investigators

<sup>1</sup> Infectious Diseases and Immunity in Global Health program, Research Institute of the McGill University Health Centre, Montreal, Canada

<sup>2</sup> Division of Infectious Diseases, Department of Medicine, McGill University Health Centre, Montreal, Canada

<sup>3</sup> Centre de recherche de l'Institut de gériatrie de Montréal, Montréal, Canada

<sup>4</sup> Department of Psychology, Faculty of Arts and Sciences, Concordia University, Montreal, Canada

<sup>5</sup> Département de médecine de famille et médecine urgence, Université de Montréal, Montréal, Canada

<sup>6</sup> Department of Biochemistry, Microbiology and Immunology, Faculty of Medicine, University of Ottawa, Ottawa, ON, Canada

<sup>7</sup> uOttawa Center for Infection, Immunity and Inflammation (CI3), Ottawa, ON, Canada

<sup>8</sup> Meakins-Christie Laboratories, Research Institute of the McGill University Health Centre, Montreal, Canada

<sup>9</sup> Centre for Outcomes Research and Evaluation, Research Institute of McGill University Health Centre, Montreal, QC, Canada.

<sup>10</sup> Division of Allergy, Immunology, and Dermatology, Department of Pediatrics, Montreal Children's Hospital, Montreal, Quebec, Canada.

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Study of the  
immune response  
and site-specific  
wastewater  
surveillance of  
SARS-CoV-2 in  
LTC as early  
warning system

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Edmonton, AB

## **Dr. Bonita Lee**

Associate Professor, Pediatric Infectious Diseases  
Faculty of Medicine & Dentistry,  
Department of Pediatrics, University of Alberta





# Study has two components

# 1

## Immunity study

Study of immune protection in LTC residences



### Venous blood / DBS

- LTC residents & staff
- Multiple time points
- COVID-19 history



Analysis at University of Alberta & National Microbiology Laboratory



13 LTCs  
in  
Alberta

10 LTCs  
in  
Alberta

# 2

## Site-specific wastewater-based surveillance for SARS-CoV-2

Early warning system by finding virus RNA in sewage & rapidly alerting public health



Pang  
Research  
Lab





COVID-19  
Outbreak measures in place



Alberta Health  
Services

# Cross-sectional immunity study: Participant characteristics

|   |  <b>Residents</b><br>(n=125) |  <b>Staff</b><br>(n=253) |
|---|--|---|
| <b>Median age (Interquartile range)</b> | 86.2 (81.5-90.5)   | 44.9 (36.0-52.7)  |
| <b>Female : Male ratio</b>              | 2.7 : 1  | 6.7 : 1   |
| <b>% Pfizer</b>                         | 99% (1 not vaccinated)   | 66% (1 mixed)   |
| <b>% Moderna</b>                        | 0%   | 33%   |
| <b>Median days between doses</b>        | 21 (21-22)   | 38 (33-39)  |
| <b>Interval min.</b>                    | 21   | 20  |
| <b>Interval max.</b>                    | 83   | 134   |
| <b>Third dose received</b>              | 106 (85%)  | NONE  |

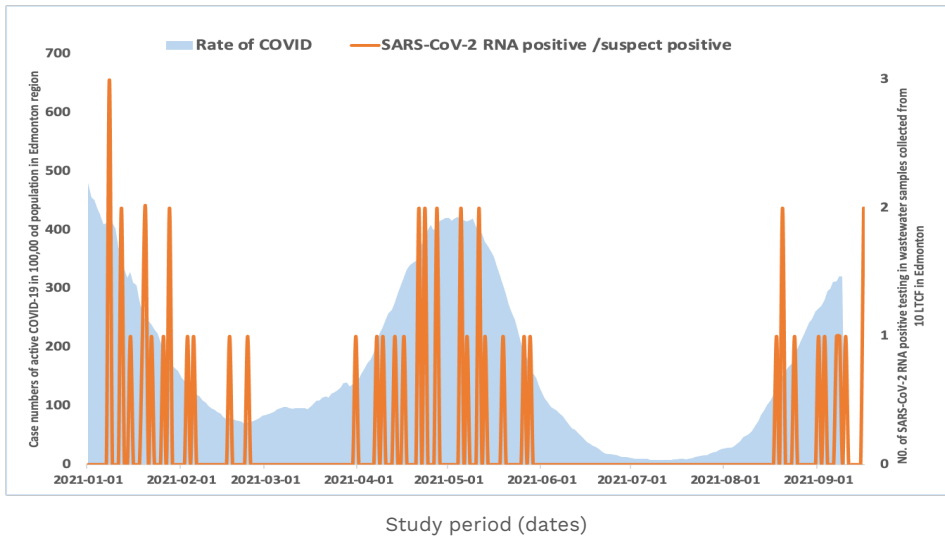
# Cross-sectional immunity study: Preliminary results of neutralizing antibodies

In most cases, a higher % of staff had detectable neutralizing antibodies than residents after two doses of vaccines regardless of prior COVID-19 infection.

| Post 2 <sup>nd</sup> dose | Percent (%) of study participants with neutralizing antibodies |              |  |             |
|---------------------------|--|--------------|--|-------------|
|                           | Documented COVID-19 before vaccination                         |              | No known COVID-19 before/after vaccination |             |
|                           | Staff  | Residents    | Staff                                      | Residents   |
| 3 months                  | 100% (8/8)   | 100% (3/3)   | 93% (55/59)                                | 43% (16/37) |
| 4 months                  | 100% (9/9)   | N/A          | 85% (34/40)                                | 21% (4/19)  |
| 5-6 months                | 63% (5/8)  | 100% (11/11) | 76% (31/41)                                | 35% (13/37) |

# LTC-specific wastewater-based surveillance can be used as an early warning system

Incidence of SARS-CoV-2-positive sewage samples with respect to COVID-19 case numbers in Edmonton

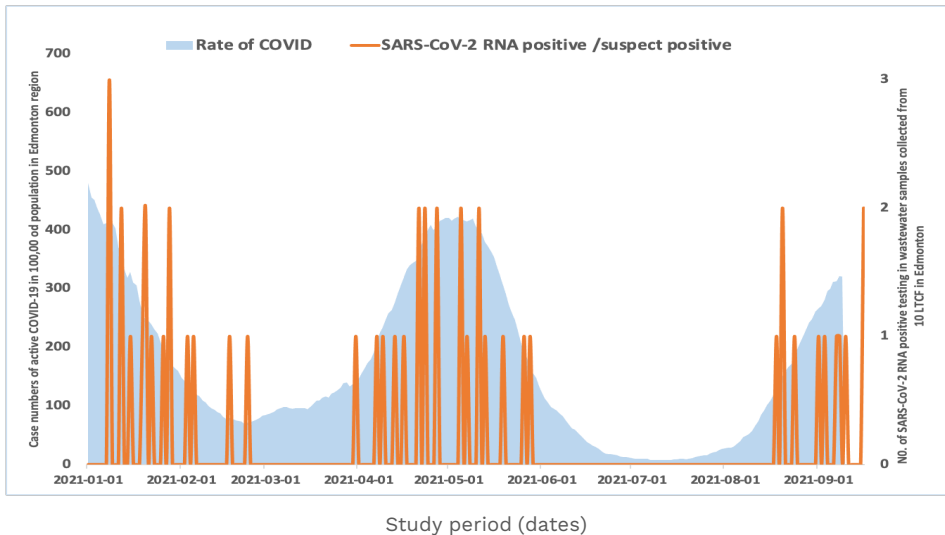


## Advantages:

- Highly sensitive – can detect new asymptomatic or symptomatic COVID-19 cases but, so far, outbreak investigations were already underway at the sites
- Only one wastewater sample is needed for the whole facility
- No risk or interruption to the facility
- Non-invasive for residents/staff

# LTC-specific wastewater-based surveillance can be used as an early warning system

Incidence of SARS-CoV-2-positive sewage samples with respect to COVID-19 case numbers in Edmonton



## Limitations:

- Without daily testing, some cases are not detected due to sampling schedules, diaper use, routine staff rotation, visitors
- Positive sewage samples not linked to the clinical case at the source
- Some manholes found to be draining more than 1 facility

## **LTCF Site-specific Wastewater-based surveillance for SARS-CoV-2 – Early Warning team**

**Xiao Li (Lilly) Pang (PI)**

**Chris Sikora (co-PI)**

**Bonita Lee (co-PI)**

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APL-PHL staff (testing for COVID-19)

Edmonton Medical Officers on call

Edmonton Outbreak management team

Carol Estabrooks

### **Pang Lab**

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Jiaao Yu

Melissa Wilson

Melissa Misutka

Cassandra Ganje

Rebecca Jin

Eloisa Hasing

Sudha Bhavanam

Parker Vanderzwan

## **Immunity Study team**

All the providers, staff and residents of the 13 LTCFs

**Bonita Lee (co-PI)**

**Xiao Li (Lilly) Pang (PI)**

**Chris Sikora (co-PI)**

John Kim, National Microbiology Laboratory

Heidi Wood, National Microbiology Laboratory

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Sheila O'Brien, Canadian Blood Services

Nancy Ruholl

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ACESO

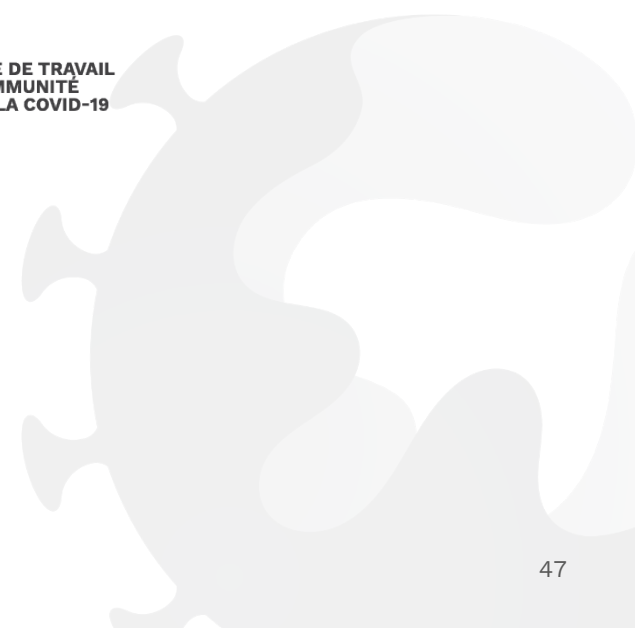
APL-PHL staff (testing for COVID-19)

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FACE À LA COVID-19**



Impact of older  
age on the  
immune response  
to COVID-19  
mRNA vaccines

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Vancouver, BC

## Dr. Mark Brockman

Professor, Faculty of Health Sciences and  
Co-Director of the SFU Interdisciplinary Research Centre for HIV  
(SIRCH),  
Simon Fraser University



BRITISH COLUMBIA  
CENTRE for EXCELLENCE  
in HIV/AIDS



# Study of 151 adults living in Vancouver, BC

We examined the immune response elicited by COVID-19 mRNA vaccines in:



**89** staff  
(median 41 years of age)



**23** residents  
(median 86 years of age)

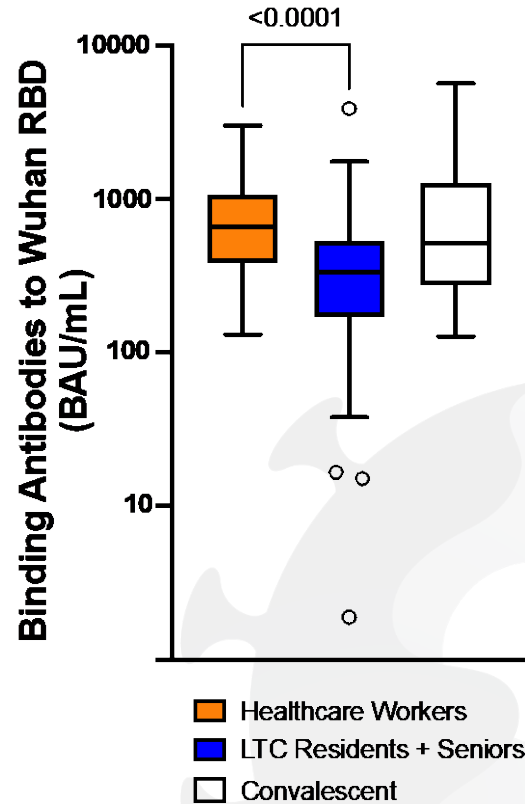


**39** seniors in the community  
(median 77 years of age)

- ▶ >90% of participants received two doses of Pfizer
- ▶ Antibody responses were measured after the 1<sup>st</sup> and 2<sup>nd</sup> dose
  - Responses at 1-month post 2<sup>nd</sup> dose presented here
  - Residents and seniors have been combined into one group (n=62)

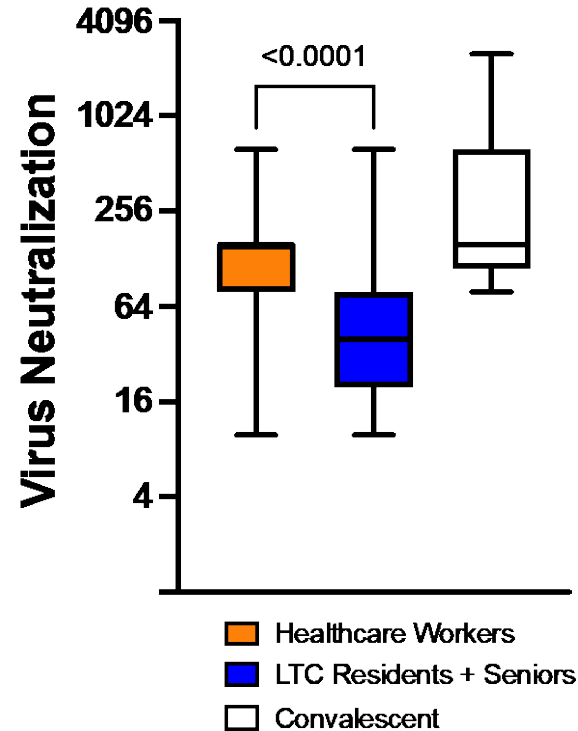
# Reduced binding antibodies in older adults after 2<sup>nd</sup> dose compared to staff

- After the 2<sup>nd</sup> dose, median binding antibody responses among LTC residents and seniors was **half (51%)** that seen among staff (healthcare workers)



# Reduced virus neutralizing activity in older adults after 2<sup>nd</sup> dose compared to staff

- After the 2<sup>nd</sup> dose, median virus neutralizing activities among LTC residents and seniors was **one-quarter (25%)** that seen among healthcare workers



# Age, sex and chronic health conditions independently associated with weaker vaccine immune responses

Our analysis considers the independent roles of age, sex, & number of chronic health conditions, among other variables:

|                           | Binding antibodies   | Neutralizing activity   |
|---------------------------|----------------------|-------------------------|
| Age                       | 20% lower per decade | 15% lower per decade    |
| Sex                       | -                    | 30% lower in men        |
| Chronic health conditions | -                    | 15% lower per condition |

# Summary and Conclusion

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- Older adults displayed significantly weaker immune responses to COVID-19 mRNA vaccines
  - ▶ ~50% lower binding antibodies
  - ▶ ~75% lower virus neutralizing activity
- Older age remained a significant predictor of weaker immune responses after correcting for demographic and vaccine-related differences
  - ▶ Male sex and number of chronic health conditions also contributed to lower virus neutralizing activity

# Study Team

## PI's:

**Marc Romney**  
(PHC and UBC; NPI)

**Zabrina Brumme**  
(SFU and BC CfE HIV/AIDS)

**Mark Brockman**  
(SFU)

## Co-I's:

John Harding (PHC; Knowledge User)  
Chanson Brumme (BC CfE)  
Jonathan Choy (SFU)  
Mari DeMarco (PHC, UBC)  
Daniel Holmes (PHC)  
Jeffrey Joy (BC CfE, UBC)  
Christopher Lowe (PHC)  
Victor Leung (PHC, UBC)  
Nancy Matic (PHC)  
Julio Montaner (BC CfE)  
Masahiro Niikura (SFU)  
Ralph Pantophlet (SFU)  
Gordon Ritchie (PHC)  
Janet Simons (PHC)

## Key Personnel:

Hope LaPointe (BC CfE)  
Olga Agafitei (SFU)  
Laura Burns (PHC)  
Peter Cheung (BC CfE)  
Siobhan Ennis (SFU)  
Rebecca Kalikawe (SFU)  
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Landon Young (PHC)



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Genome  
British Columbia



CIHR IRSC  
Canadian Institutes of  
Health Research    Instituts de recherche  
en santé du Canada



CoVaRR+Net



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Southern Ontario

## **Dr. Sharon Walmsley**

Infectious Diseases Specialist, University Health Network

Director, Immunodeficiency Clinic & Research,

Toronto General Hospital

Senior Clinician Scientist,

Toronto General Hospital Research Institute

Professor of Medicine, University of Toronto





# Evaluation of the antibody response to COVID-19 vaccines in older adults in the community

- Do older adults ( > 70 years) respond as well as younger people (aged 30-50 years)?
- What are the impacts of sex, comorbidity, vaccine brand, mixing-and-matching, and vaccine dose interval changes on antibody peaks and duration?



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# Studying older adults in the community



377 adults  
30-50 years old





911 adults  
> 70 years old

## Study participants are required to complete:

- ▶ Electronic consent form
- ▶ Baseline questionnaire
- ▶ 7-day symptom diaries for each vaccine dose
- ▶ Self-collected dried blood spots (DBS) for one year
- ▶ Monthly check-in

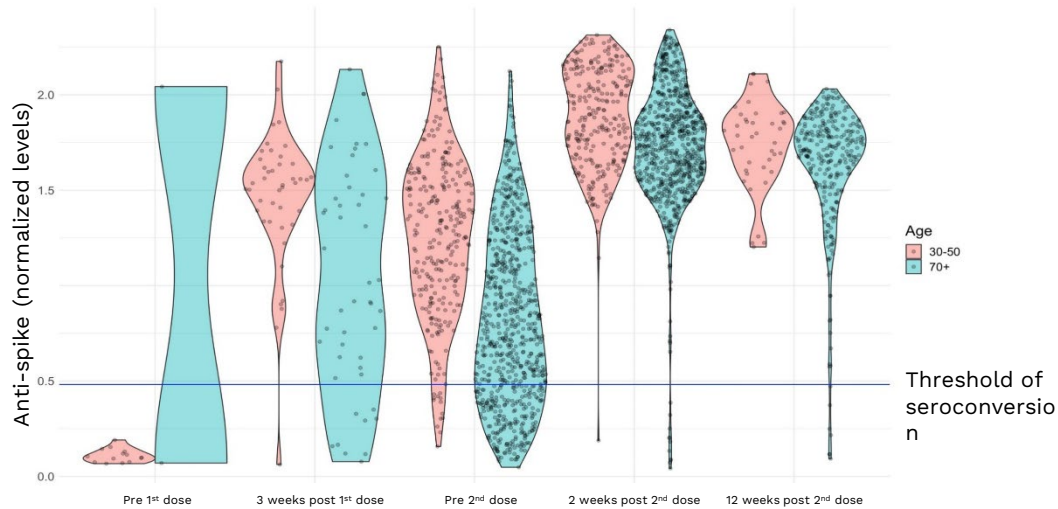
# Participant Characteristics

|                        |  30-50 years old |  70+ years old |
|------------------------|---|---|
| Total (n)              | 341   | 855   |
| Female                 | 75%   | 60%   |
| Caucasian              | 75%   | 93%   |
| Diabetes               | 1.5%  | 14%   |
| Cardiovascular disease | 5%  | 49%   |
| Cancer                 | 3%  | 20%   |
| Vaccine Type           |   |   |
| Pfizer                 | 47%   | 68%   |
| Moderna                | 18.5%   | 8%  |
| Mixed                  | <b>16.4%</b>  | 15%   |

# Seroconversion for spike increases after the 2<sup>nd</sup> dose



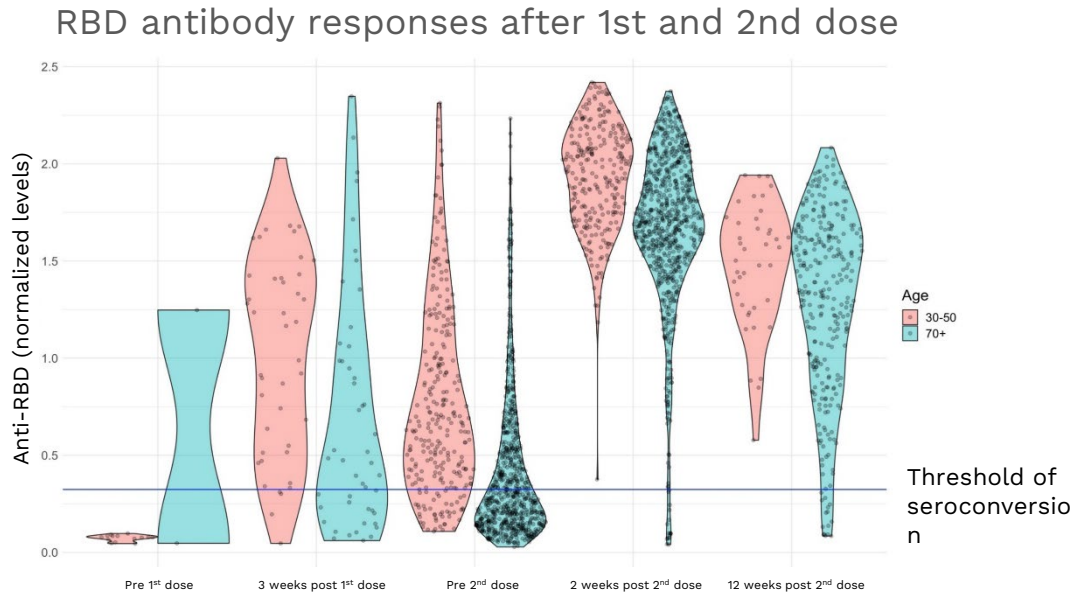
Spike antibody responses after 1<sup>st</sup> and 2<sup>nd</sup> dose\*



- The majority of adults in both age groups are above the seroconversion limit after the 2<sup>nd</sup> dose
- Mean antibody titer 1.90 (younger) vs 1.71 (older)  $p < .001$

\*DBS antibody analysis at Gingras lab, University of Toronto

# Seroconversion for RBD increases after the 2<sup>nd</sup> dose



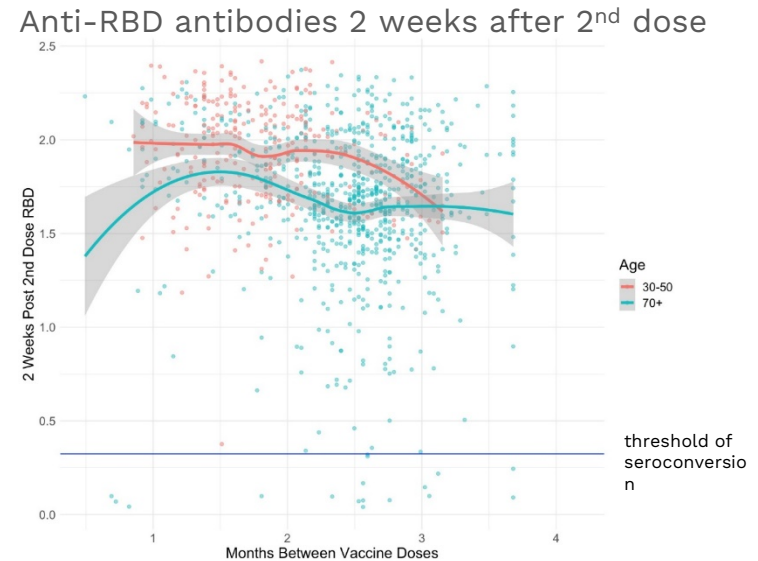
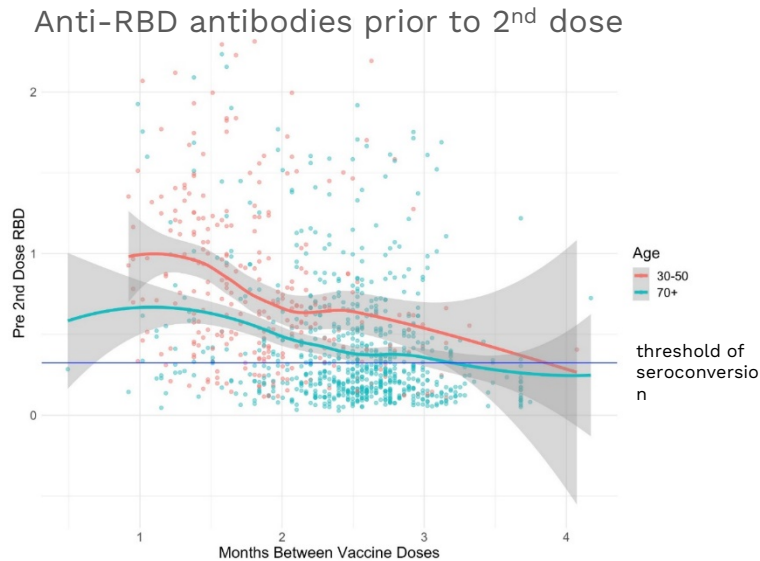
- After the 1<sup>st</sup> dose, adults over 70 have weaker anti-RBD responses compared to those aged 30-50
- Levels rebound after the 2<sup>nd</sup> vaccine dose, but remain lower in those > 70 years old
- Mean antibody titer 1.98 (young), 1.71 (older),  $p < .001$

# DBS Results by Vaccine Type

| 2 weeks Post 2 <sup>nd</sup> Dose | Pfizer-Pfizer mean normalized ratio [SD]<br>n=717 | Moderna-Moderna mean normalized ratio [SD]<br>n=129 | Pfizer-Moderna mean normalized ratio [SD]<br>n=178 | Mixed/Other/Unknown mean normalized ratio [SD]<br>n=133 |
|-----------------------------------|---|---|--|---|
| Spike                             | 1.74 [1.58, 1.92]                                 | 1.87 [1.67, 2.05]                                   | 1.85 [1.67, 2.03]                                  | 1.75 [1.57, 2.01]                                       |
| RBD                               | 1.71 [1.53, 1.94]                                 | 1.96 [1.73, 2.13]                                   | 1.93 [1.72, 2.09]                                  | 1.79 [1.48, 2.03]                                       |

# Impact of the dosing intervals on antibody levels

Prior to 2<sup>nd</sup> dose, participants who had a longer interval between doses had lower anti-RBD antibody levels. However, longer intervals did not seem to impact antibody levels 2 weeks after the 2<sup>nd</sup> dose.





# STOP-CoV Study Team

**Investigators:**

Sharon Walmsley, Anne-Claude Gingras, Paula Rochon, Brad Wouters, Allison McGeer, Chris Graham, Michael Brudno, Amit Oza

**Research Manager:** Rosemarie Clarke

**Project Manager:** Rizani Ravindran

**Statistics:** Janet Raboud, Leah Szadkowski

**Digital team:** Dorin Manase, Amanda Silva, Kelly Bell, Jessica Simpson, Laura Parente

**DBS Lab:** Karen Collwill, Monica Dayam

**Summer students:** Halima Abubakar, Crystal Valdez

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## **Dr. Timothy Evans**

COVID-19 Immunity Task Force  
Executive Director

# Key findings: immunity

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- Residents of LTC experience waning immunity much faster than younger, healthier adults
- Fewer LTC residents have a neutralizing antibody response vs. younger adults
- Their neutralizing antibody levels after 3-6 months post dose 2 are low
- The Moderna vaccine seems to elicit a better immune response than Pfizer in residents of LTC
- Understanding immune protection = understanding the individuals and the environments they live in



# Limitation to interpretation of results

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- No clinical correlates
  - Waning antibody levels do NOT necessarily mean one is vulnerable to disease
  - However, such significant antibody wane, as seen in this research, does suggest we should be safe rather than sorry





## **Dr. Nathan Stall**

CanCOVID Network Science Advisor  
Staff Geriatrician, Sinai Health

Research Fellow, Departments of Medicine and Institute of  
Health Policy, Management and Evaluation, University of  
Toronto

# Implications - immunity

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- LTC residents are a **vulnerable population** whose immune response to vaccination should continue to be monitored
- Third dose may help increase antibody levels, but some residents may **still not mount an adequate long-term antibody response** and/or experience faster waning



# Implications – vaccination of others

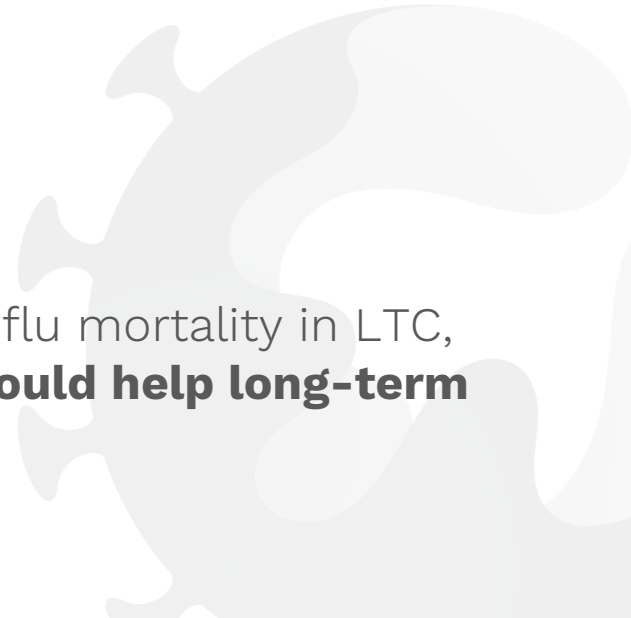
- We must do even more to encourage, support and assist as many individuals as possible to **get vaccinated** to protect this vulnerable population, and others
- **Vaccination of all staff** in LTC is of utmost importance



# Long-term considerations

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- We need to think about the **underlying structural factors** that have allowed COVID-19 to be devastating in LTC
  - ▶ Crowding and multi-occupancy rooms
  - ▶ Older design standards and poor ventilation
  - ▶ Staffing issues
  - ▶ Poor infection prevention and control
- These risk factors likely contributed to past high flu mortality in LTC, so fixing these structural factors for COVID-19 **would help long-term** for many other conditions







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summary of this  
seminar at

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**Questions?**



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[cancovid.ca](https://cancovid.ca)

A large, faint graphic in the bottom right corner featuring a stylized maple leaf with numerous thin lines radiating from its base, resembling a network or data visualization.

# Publications

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