Predictors of SARS-CoV-2 IgG antibody levels following TWO COVID-19 vaccine doses

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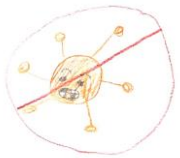


Artwork:
Kristin, 8 years old,
Richmond, BC

CHILD COVID-19 Research

Reorienting existing research platform: CHILD 2008-2020

Pre-Pandemic: Health & Environment Profile

Microbiome Profile
Other Biomarkers
Infection History*
Immune Profile*
Health Status

CHILD COHORT STUDY
12,000 Individuals
4 Provinces: BC, AB, MB, ON

Socioeconomic Factors
Outdoor Environment
Home Environment
Health Behaviours
Neighbourhood

*To be analyzed in this grant from existing samples

New project within established infrastructure: New Data & Testing 2020-21

During Pandemic: New Data & Samples

Bi Weekly Symptom Survey by text message

Quarterly CRISIS Survey: health status, behaviour/lifestyle changes due to pandemic, emotions/worries + body weight

Repeated Seroprevalence Testing ~~at home~~
…on dried blood spots collected at home

- **Vaccines**
- **Testing**
- **Coping**
- **Adherence to public health measures**

Harmonized data collection

Rapid Translation

Real-time data to inform **Predictive Modeling & Public Health Response**

- Prevalence of infection
- Transmission dynamics
- Persistence of immunity

Aim 1

- Predictors of susceptibility and severity
- Inequities

Aim 2

Direct Impacts: SARS-CoV-2 **Infection**

Symptomatic:
transmission, absenteeism, illness, death

Asymptomatic:
covert transmission

Indirect Impacts: COVID-19 **Pandemic**

Social Isolation,
Food Insecurity, Stress,
Over-Sanitation,
Physical Inactivity, Restricted Healthcare Access/Utilization,
Unemployment

Rapid Translation

Real-time data to inform **Pandemic Management & Health/Economic Policy**

- Adherence to policies
- Prevalence of mental health problems

Aim 3

- Economic impact
- Healthcare utilization
- High risk groups
- Inequities

Post-Pandemic: Long Term Impacts

Physical & Mental Health

Future Direction

While vaccination remains the best defense against COVID-19, vaccine-induced humoral immune responses vary amongst individuals

Study Aim

To evaluate persistence of SARS-CoV-2 IgG antibodies and the predictors of antibody production following COVID-19 vaccination

SARS-CoV-2 serology testing

Dried blood spots collection kit for parents and their children

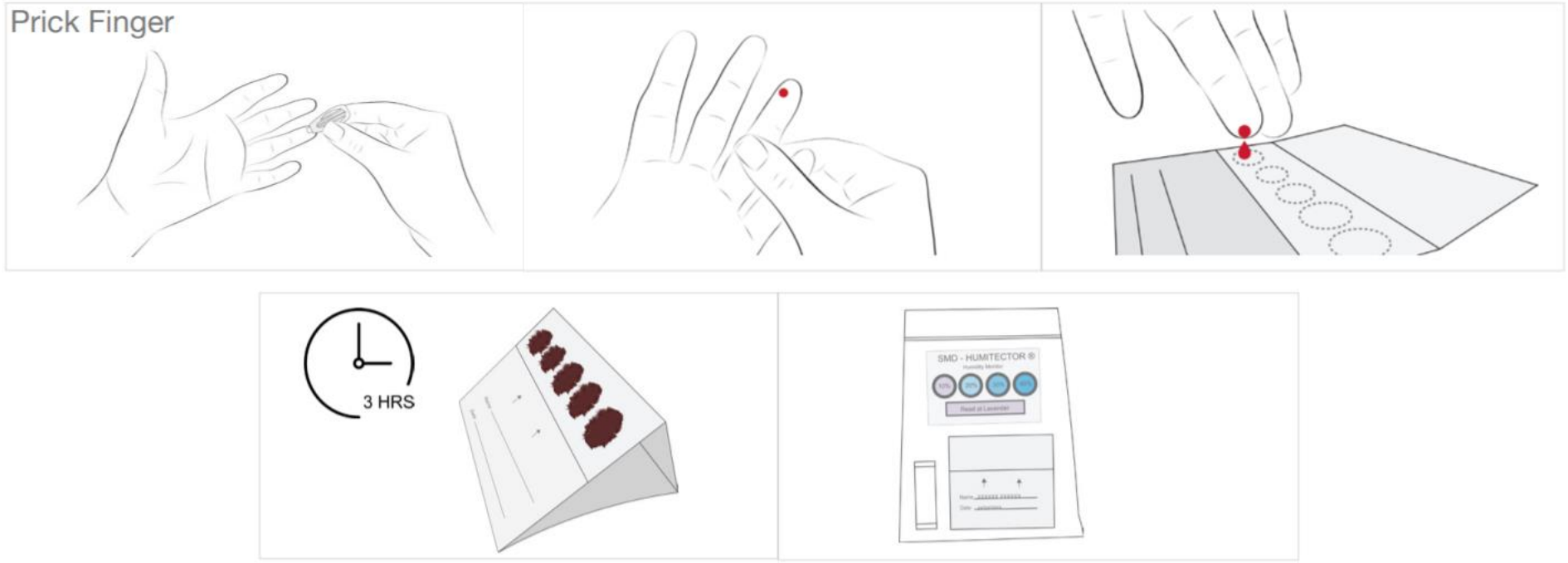
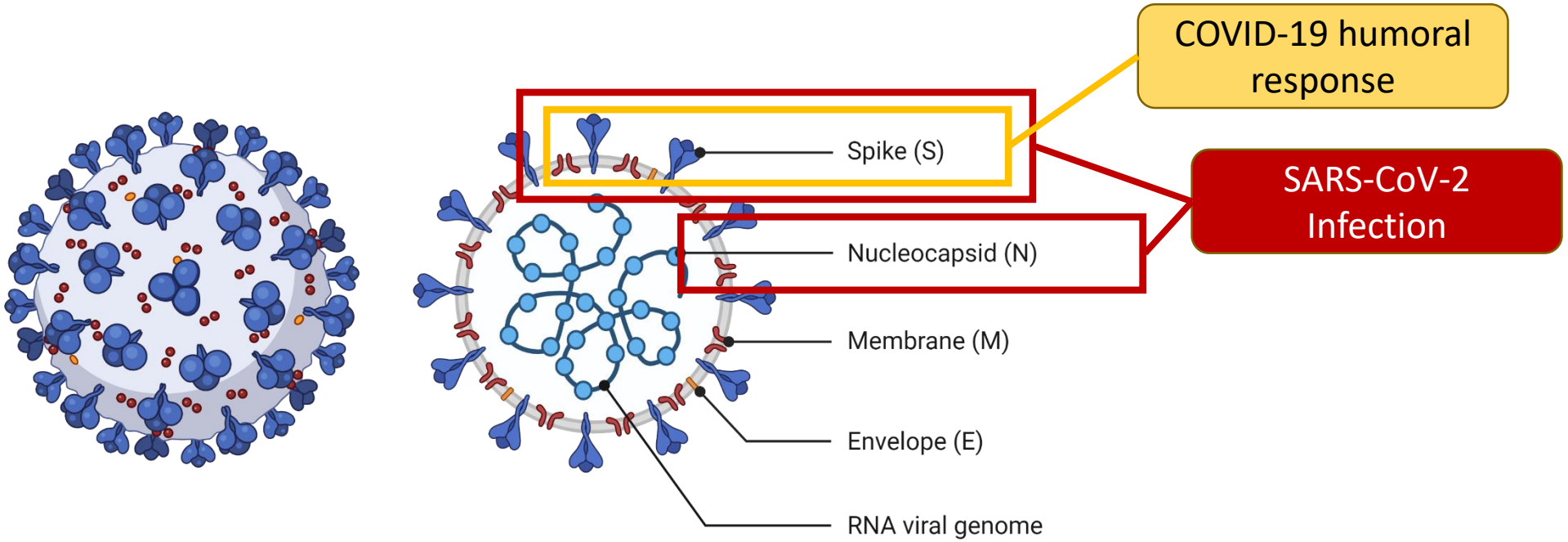


Image used is from Neoteryx DBS illustration

1. Blood samples were collected by participants using in-home dried blood spot sampling kids and returned by mail
2. SARS-CoV-2 IgG antibody serology testing was performed by the Marc-André Langlois Lab, University of Ottawa

SARS-CoV-2 serology testing



Human Coronavirus Structure

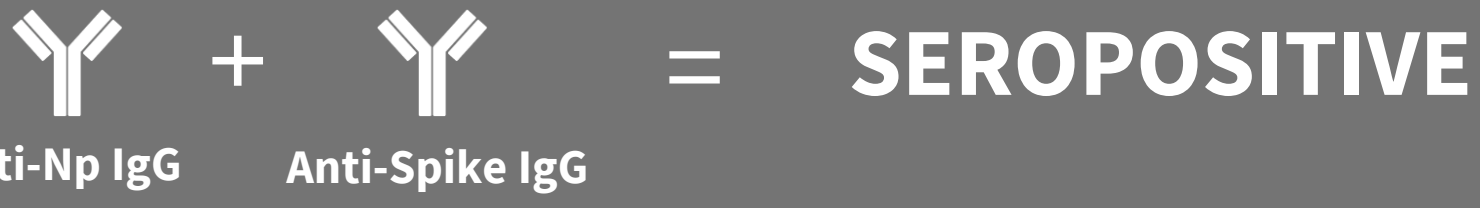
The IgG antibody assay targeting the Receptor Binding Domain of the SARS-CoV-2 spike **(S) protein** and **Nucleocapsid protein (N)**

Image made using BioRender

SARS-CoV-2 infection *case definition*

Positive SARS-CoV-2 test from self-report
(obtained from the biweekly and quarterly surveys)

Positive SARS-CoV-2 test from DBS testing



Positive SARS-CoV-2 test result from either self-report OR positive DBS serology → **Positive SARS-CoV-2 infection**

SARS-CoV-2 infection among participants

25%

of **CHILDREN (n= 385/1501)** with SARS-CoV-2 infection

30%

of **ADULTS (n= 465/1558)** with SARS-CoV-2 infection

*Prior SARS-CoV-2 infection: positive report of SARS-CoV-2 infection from DBS serology, biweekly or quarterly questionnaires
DBS samples obtained from March 2021 – January 2022

Research question

What is the anti-spike IgG **antibody response** following **TWO-DOSES** of COVID-19 vaccination?

Anti-Spike SARS-CoV-2 IgG Antibodies

Hybrid immunity slows the decay rate of anti-spike IgG

Antibody levels after TWO COVID-19 vaccine doses

Hybrid immunity
helps **maintain antibody levels**
and slows the ‘decay’ rate

Children demonstrate higher anti-spike SARS-CoV-2 IgG production compared to adults

Antibody levels after TWO COVID-19 vaccine doses

For both
CHILDREN and **ADULTS**,
the **highest antibody levels**
were observed around
3 months post-vaccination

mRNA COVID-19 vaccines are associated with the greatest anti-spike SARS-CoV-2 antibody production

Antibody levels after TWO COVID-19 vaccine doses

HIGHER antibody
levels were observed
in ADULTS who received
mRNA vaccines for both doses
compared to
AstraZeneca Oxford

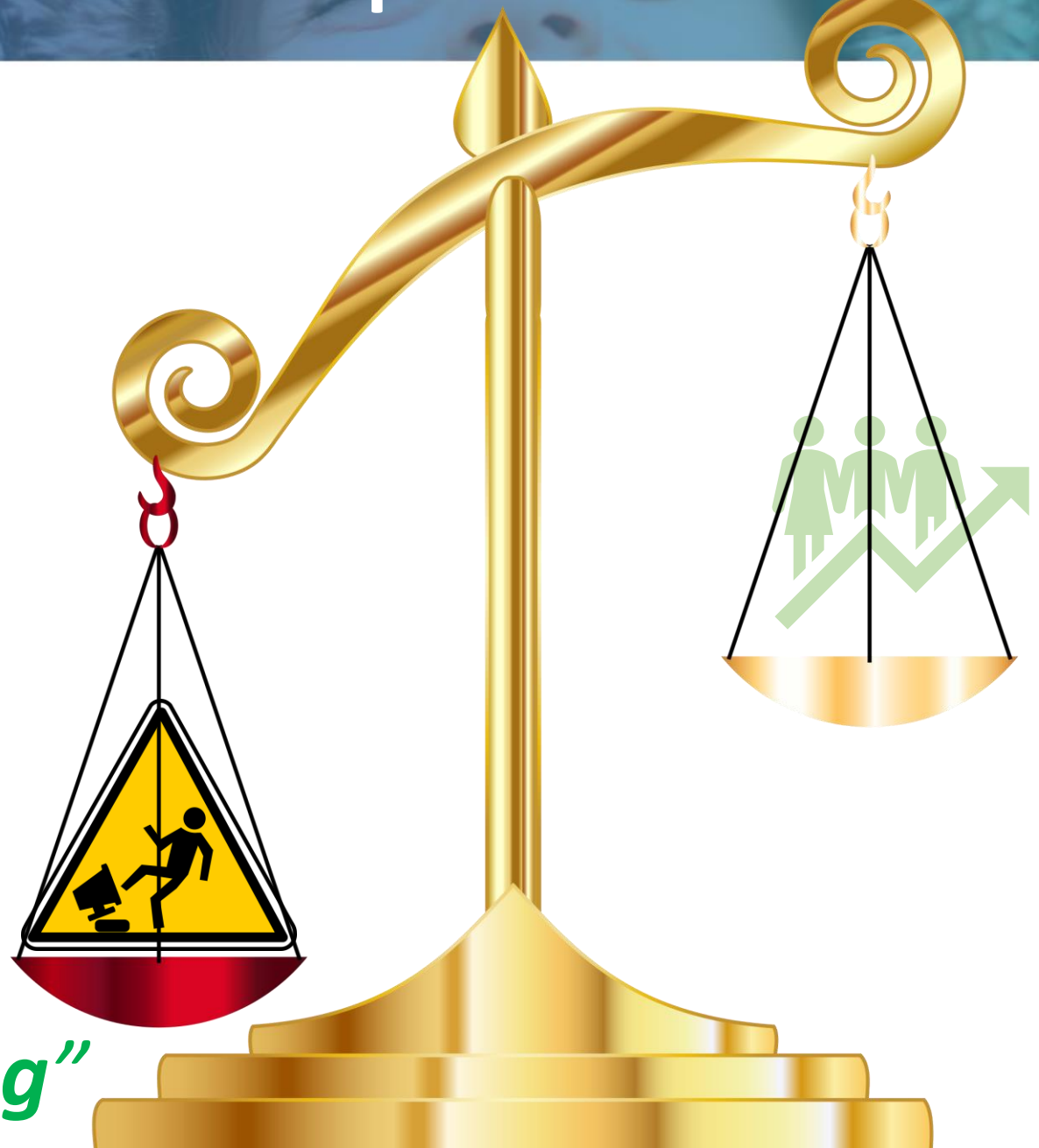
Lessons Learned – In Home Biological Sampling

Health Canada

- **In-home blood collection device choice** was not approved by Health Canada for diagnostic purposes and resulted in study delays

- **Serology Blood Sampling**
  High- vs Low-Flow Lancets:
  - **High-flow** blood draw (blue) finger-prick lancets resulted in adequate samples but were considerably ***too painful*** for most participants.
  - **Low-flow** pink lancets were less painful but likely increased the number of insufficient samples collected for serology

Lessons Learned – Participant Burnout



"This is too long"

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

Research Manitoba

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