

## Protecting Workers in the Pandemic: Preventing Airborne Transmission in the Workplace

**Thesis:** A Zero Occupational Infection Rate from the Hazard of SARS-CoV-2 is a Necessary, Reasonable, Noble, & Achievable Objective.

Mode of Transmission: inhalation of infected particles that are exhaled by asymptomatic or symptomatic people. The particles are called Aerosols.

Aerosol: “A collection of solid or liquid particles suspended in a gas.”

William Hinds, 1999, *Properties, Behavior, and Measurement of Airborne Particles*

Methods of Prevention: Every Workplace and each task needs **specific** safe work procedures to prevent workers from carrying the virus into and out of the workplace.

**Selected Data Derived from W.H.O. 2021-12- 02**

**Population-based Case Relative Risk**

Country	Cumulative Cases	% Global Cumulative Cases	Cumulative Cases/100k	Relative Risk
United States	48282078	18%	14587	4.3
Brazil	22094459	8%	10394	3.1
All Europe	87717000	33%	9820	2.9
Canada	1792500	1%	4749	1.4
Global	262866050	100%	3372	1.0
India	34606541	13%	2508	0.7
Japan	1727431	0.7%	1366	0.4
Viet Nam	1252590	0.5%	1287	0.4
Korea	457612	0.2%	893	0.3
All Africa	6302922	2.4%	526	0.2
New Zealand	11525	Negligible	239	0.1
China	128022	Negligible	9	Negligible

Some countries that reduced transmission <international  $\bar{X}$

- China
- Viet Nam
- New Zealand (Aotearoa)
- Korea

Each country has different

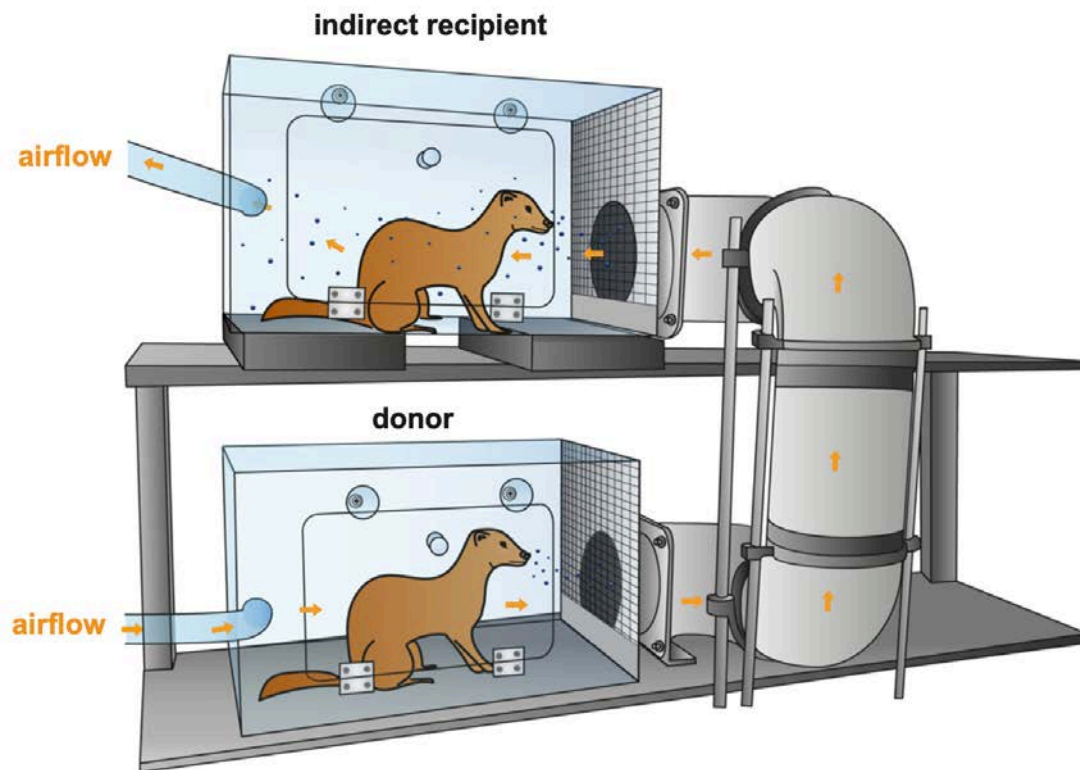
- Governance systems
- History
- Culture
- Geographic & Hemispheric location rules out seasonal differences

Commonality:

- Elimination Strategy
- Strong, Centralized Leadership
- Socially disciplined citizenry

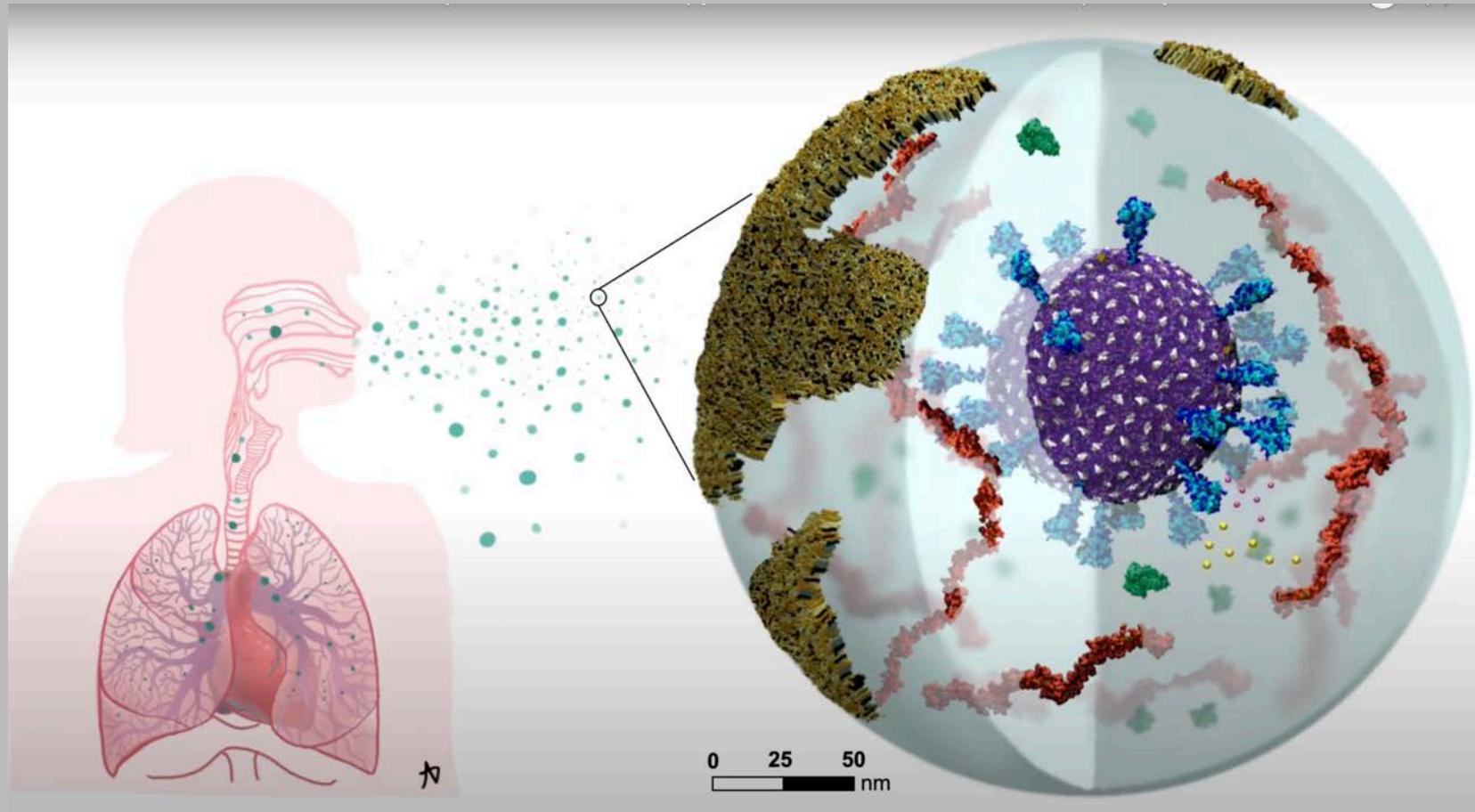
(A) Ratio of Country Rate/100K relative to the Global Rate/100K.

## Transmission of SARS-CoV-2: Ferret Experiment



From Kutter, et al., March 2021. *SARS-CoV and SARS-CoV-2 are transmitted through the air between ferrets over more than one meter distance.* <https://www.nature.com/articles/s41467-021-21918-6>

## Computational Microscopy Model of an Aerosolized Viral Particle, 16 November 2021



From: <https://www.youtube.com/watch?v=ZfmmJnG7le8&t=51s>

## Assessing the Occupational Environment Risk for SARS-CoV-2

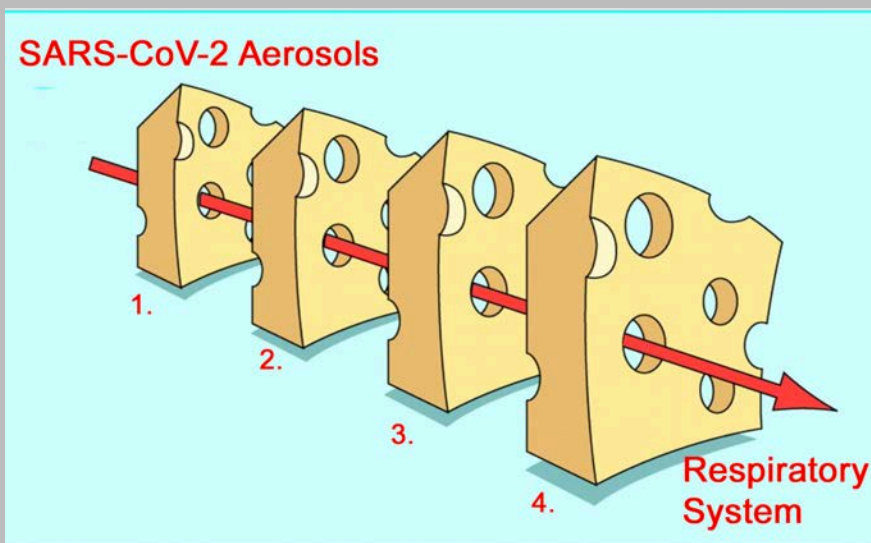
The normal method for risk assessment is to measure airborne concentration over time for different hazardous materials is to measure them.

However, “Occupational exposure limits for biological agents do not currently exist. To date, there are a limited number of validated methods to measure airborne or surface contamination of infectious agents ([\*The Role Of The Industrial Hygienist In A Pandemic, AIHA 2021\*](#)).

### Characteristics of SARS-CoV-2 for Risk Assessment:

- A **novel**, highly infectious airborne respiratory disease
- The sources of infection are mobile human beings (symptomatic or asymptomatic)
- Turbulent gas clouds from multiple workers generated;
- Particle Sizes are inhalable and respirable;
- Infectious Dose is unknown;
- There was no pharmaceutical intervention (vaccine);

## The Swiss Cheese Barrier Model



adapted from James Reason, <https://www.bmj.com/content/320/7237/768>

Each workplace control is conceived as a barrier or layer: each has strengths (Layer) & weakness (Hole). A weak would be large,

If the holes line up, the bio-aerosol can enter the respiratory system and infect the person.

If the holes do not line up, the bio-aerosol probably cannot enter the respiratory system and infect the person.

Examples:

1. QR code, self-administered health check (weak barrier with large holes because of self-perception bias)
2. Surgical Mask (moderate barrier with large holes, does not seal with the face)
3. Regular Testing (smaller holes, a strong barrier)
4. Vaccination & Ventilation (very small holes, strong barriers)

## **International Film Production in Canada**

### **Workforce Characteristics & Control Zones**

- Production Duration: 5 months September 2020 - January 2021.
- Multiple & Dynamic Settings, Different from a Fixed Workplace
  - Indoor: Studio, Office Buildings, Residential Homes, Schools, Town Hall.
  - Outdoor: River Banks, Forests, Farms, Residential Streets, Speed Boats
- Unionized, 5 months,  $\approx$  500 workers/week excluding extras, 12-16 hours/shift.
- A-Zone the “Hot Set”, PCR tested 2x/week:
  - Performers (actors), Directors, Sound, Lighting, Camera, Hair & Make-up coming into close contact for <15 minutes/time during performance or preparation.
  - Senior Management, Doctor & Nurse Staff, COVID Compliance Officer;

## Workforce Characteristics & Control Zones

- B-Zone Workers, PCR tested weekly:
  - Change sets and equipment positions in-between “takes.”
  - Allowed into Hot Set A Zone with masks on;
  - COVID Team: B-Zone deploys hand-sanitizing stations, signage,
- C-Zone Workers, not tested:
  - Drivers, Food-Service, Carpenters, Painters, Set Designers



## Zero COVID-19 Infections On a TV-Series Production

Note: The COVID-19 Programme exceeded the minimum requirements of WorkSafeBC

- Step One: the international prime contractor (Studio) with agreement of unions sets out the COVID-19 Prevention program & expectations of each Production.
- Step Two: Organizational & Infrastructure Issues at each Production included:
  - Constant modification of the script to meet the COVID-19 Compliance requirements,
  - Contract with a certified PCR Testing Laboratory;
  - Medical Doctor & Nursing Staff + COVID Compliance Officer
  - Installation of MERV13 filters in studio ventilation system.
  - Orientation of sub-contractors for COVID-19 protocols
  - Formation of COVID Compliance Team (signage, daily QR code check-in procedures)
  - Standard Masking & Social Distancing

## Success Factors for Results

### Management:

- Coherent Planning & Co-ordination between Management, Creative, COVID Medical, & CIH/Compliance Teams;
- Constant surveillance, education, & sympathetic listening by Nursing & COVID Compliance Officer.

### Workers, Management, Creative Teams:

- A common vision that SARS-CoV-2 could not enter the Production: no worker allowed to be infected.
- Social Discipline: no worker wanted SARS-CoV-2 to enter the production or take it home to their family (Christmas).
- Workers who did not wish to follow COVID Compliance regulations 'magically' disappeared either through social pressure or contract provisions. (Role of Compliance Officer?)

**Results: SARS-CoV-2 did not enter the workplace. Zero infections for ≈ 500 workers/week over the course of 5 months. Production finished on time, on budget.**

## Lessons I

Every Workplace and each task needs **specific** safe work procedures to prevent workers from carrying the virus into and out of the workplace. Occupational COVID-19 need to be set differently/higher than Public Health measures.

Union & Worker participation & acceptance of the COVID-19 Prevention Programme is essential for rigorous compliance.

A Zero Occupational Infection Rate from the Hazard of SARS-CoV-2 is a Necessary, Reasonable, Noble, & Achievable Objective.

A Zero Occupational Infection Rate helps lower the family & public rate of SARS-CoV-2 transmission.

## **Lessons 2: Enhancing the Prevention Programme**

**Vigorous use of PCR Testing exceeded the minimum requirements of WorkSafeBC.**

**A Vaccination programme is an essential component of a successful COVID-19 Prevention Programme.**

**Use of easily accessible N95 or equivalent respirators provide superior respiratory protection to surgical masks.**

**Union & Worker participation & **acceptance** of the COVID-19 Prevention Programme is essential to prevent SARS-CoV-2 from entering the workplace. Eliminate confusion through education by truly knowledgeable worker representative & trusted professionals.**

## Some Resources

### **AIHA:**

[Back to Work Safely](#)

[The Differences between Respirators, Masks, Face Coverings](#)

[Personal Protective Equipment for SARS-CoV-2](#)

[Reducing the Risk of COVID-19 Using Engineering Controls](#)

[Joint Consensus Statement on Addressing the Aerosol Transmission of SARS CoV-2 and Recommendations for Preventing Occupational Exposures](#)

### **ACGIH**

[COVID-19 Infogram: The Virus is in the Air](#)

[Control Banding Resources Sheet](#)

[COVID-19: Health and Safety Programs Protect Workers](#)

**Morawska & Milton**, June 2020

[It Is Time to Address Airborne Transmission of Coronavirus Disease 2019 \(COVID-19\)](#)

### **New York Times:**

<https://www.nytimes.com/interactive/2020/04/14/science/coronavirus-transmission-cough-6-feet-ar-ul.html>

<https://www.nytimes.com/interactive/2021/12/01/science/coronavirus-aerosol-simulation.html>