



# Vaccine Development in Canada

Research Canada  
Health Research Caucus Luncheon

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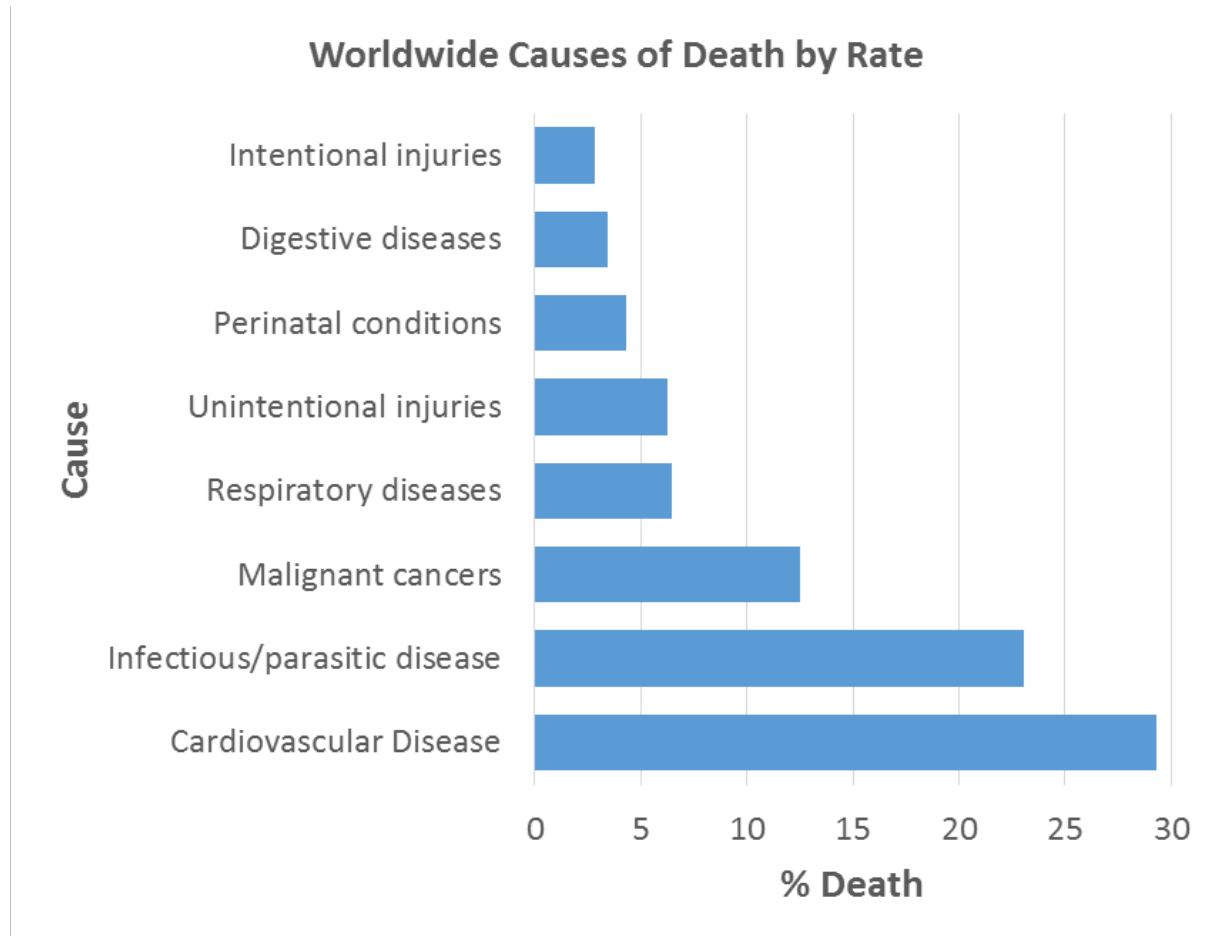
# Outline

- Overview of ID
- Some Canadian context re: vaccines
- Current infrastructure
- Some general thoughts





# Infectious Diseases are Deadly



- Children from developing nation 10-fold greater chance of dying of a vaccine-preventable disease
- HIV/AIDS, diarrhoeal diseases, malaria and tuberculosis account for ~1/3 deaths in developing nations
- over 50% of deaths in children under 5 are due to infectious disease





# Infectious Diseases Spread Easily



- Canadians remain at risk





# Infectious Diseases are Costly

- SARS: WHO travel advisory
- Hepatitis C: costs Canada about \$1 billion/yr
- HIV: NPV of ~\$250k/infected Canadian
- Influenza (US~\$10B in direct medical costs)
- Zoonotic & foodborne diseases

**DEVELOPING STORY**

**CP 24** OFFICIALS SAY GERMANWINGS CO-PILOT DELIBERATELY CRASHED JET

■ On this day in 2003, Ontario declared a provincial health emergency as number of SARS cases jumped to 62.

**TORONTO** Lake Shore at Yonge

**LONDON FTSE INDEX** 6,883.35 ▼ 107.62

**X NET LOSERS** ▶ FAIRFAX FINL HLDGS LTD 714.90 ▼ 8.10 CANADIAN PA 226.

7 MDLZ 35.14 ▼ 916,309 NXPI 95.09 ▼ 908,431 CNAT 7.50 ▲ 889,555 F





# Some ID have a 'solution'...

- Jenner's smallpox vaccine 1797
  - Intranasal smallpox vaccine in China 1022AD
- Vaccines saved more lives worldwide than any other medical intervention
- Vaccines are the most cost-effective way of controlling infectious disease to date
- Vaccines protect more than individuals; it protects entire populations
- Our population is aging

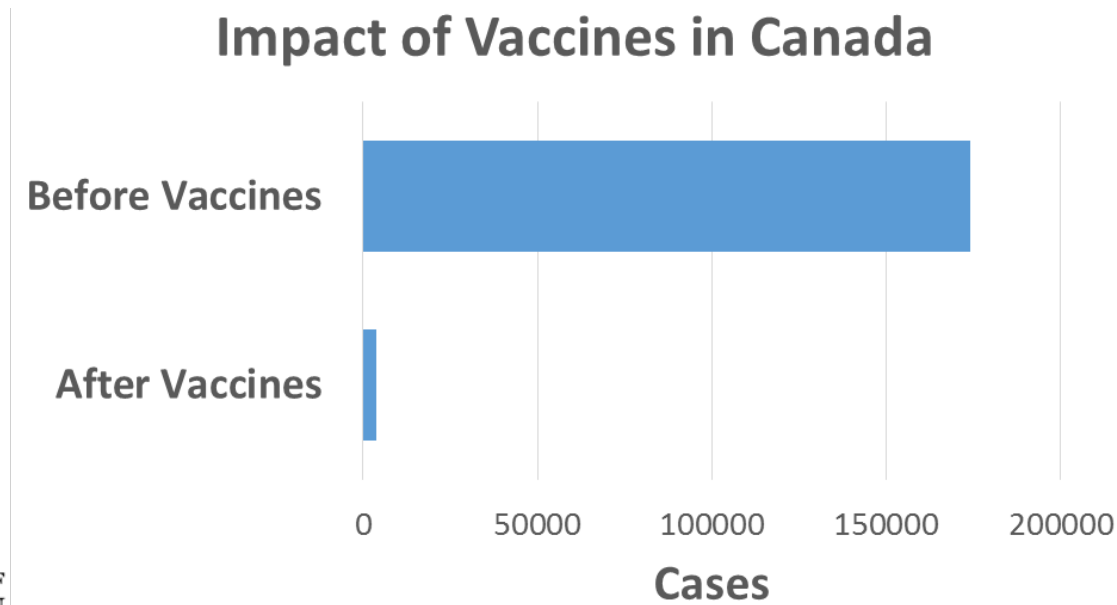




# Vaccines Protect Canadians

Preventable Disease	Pre-Vaccine Peak Cases	Peak Cases 2007-2011
Diphtheria	9,010	4
Hib	526	12
Measles	61,370	750
Mumps	43,671	1,110
Whooping cough	19,878	1,967
Poliomyelitis	1,584	0
Rubella	37,917	12
Tetanus	19	6

modified from Chief Public Health Officer's Report, 2013





# Canada has played a pivotal role in global vaccine development

- Smallpox:
  - 1<sup>st</sup> vaccination in North America in Nfld ~1800
  - leadership in smallpox eradication (recognized by WHO)
- Paralytic Polio:
  - Medium 199 & Toronto Method
  - Large scale production of polio vaccine
- 1<sup>st</sup> combined vaccine (DPT)
- 1<sup>st</sup> infant Meningitis C vaccine (NRC)
- 1<sup>st</sup> zoonotic vaccine (VIDO-InterVac)
- Ebola (NML)
- Many of these historical developments involved Connaught labs





# CONNAUGHT ANTITOXIN LABORATORIES

## UNIVERSITY OF TORONTO

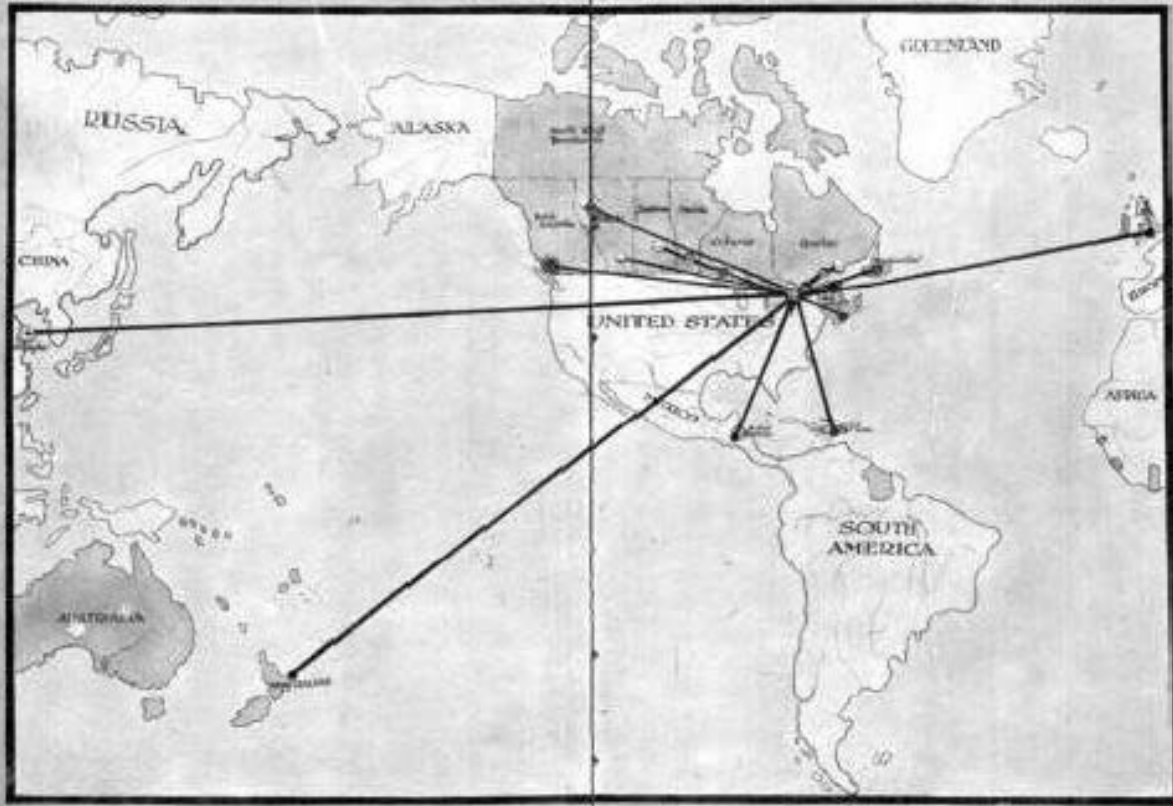
*Established for research investigation in Preventive Medicine and for the production and distribution of all Public Health Biological Products at Minimum Prices..*

### SERVICE TO THE EMPIRE

**VACCINES**

For Prevention  
*of*

**SMALLPOX**  
**TYPHOID FEVER**  
**WHOOPING COUGH**  
**HYDROPHOBIA**



**SERUMS**

For Prevention  
or Cure of

**DIPHTHERIA**  
**LOCKJAW**  
(TETANUS)  
**PNEUMONIA**  
(CERTAIN CASES)  
**EPIDEMIC  
MENINGITIS**

*This map shows the success of the effort to prepare and distribute these life-saving products at minimum prices.*

**BY THE UNIVERSITY OF TORONTO.**



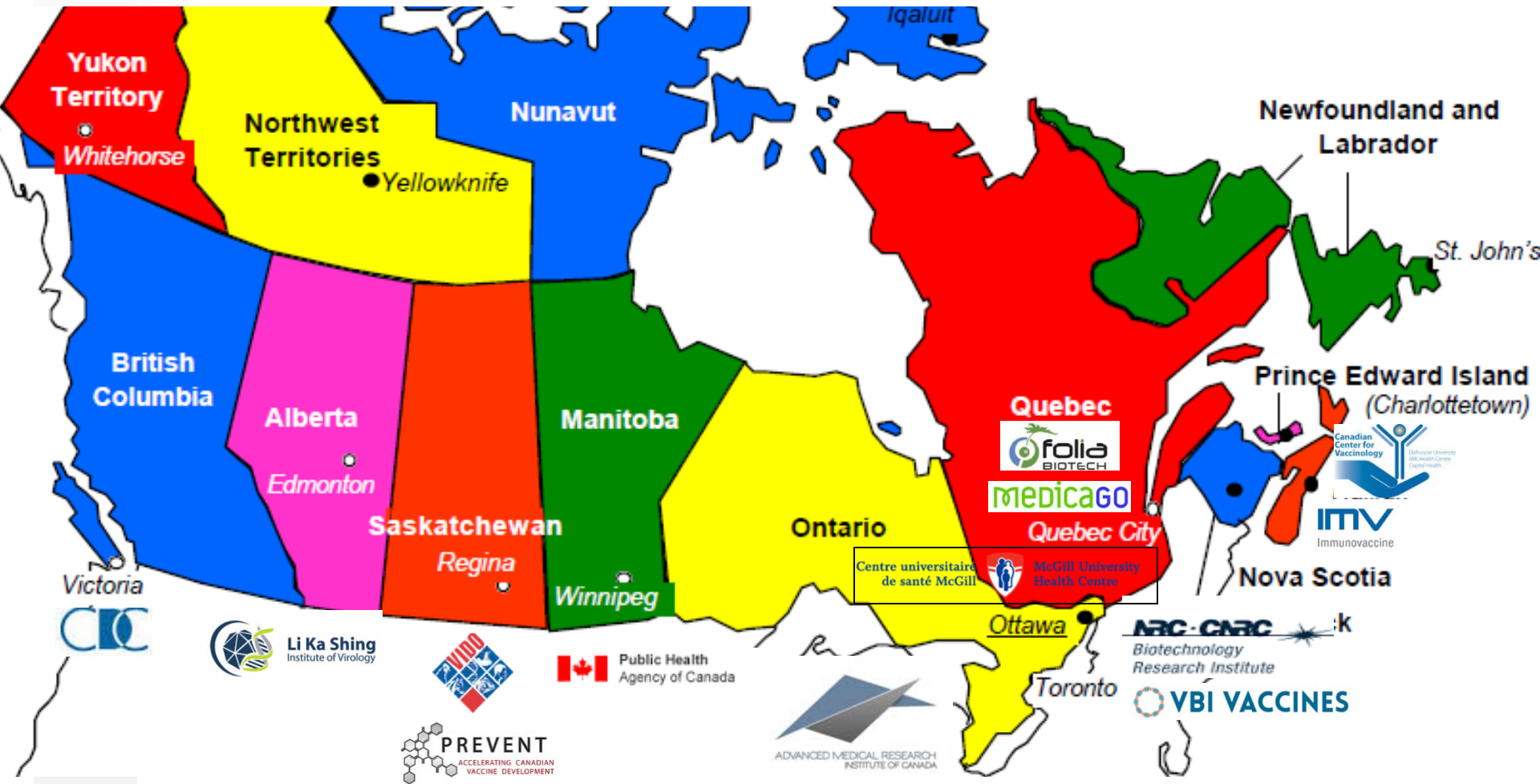
## ...others do not

- The 'easy diseases' are done
- Emerging diseases and several known diseases are proving challenging
- Most of the emerging diseases require special infrastructure – CL3
- Challenge: money less important when you are sick, current vaccines are preventative
- Need to improve on the translational aspects of vaccine development





# Canadian Landscape Examples





# PREVENT

ACCELERATING CANADIAN  
VACCINE DEVELOPMENT



- A not-for-profit corporation - funding from NCE CECR
- Goal to help with translation/accelerate vaccines to the marketplace
- 3 nodes: BC, SK, NS
- Currently 5 vaccine candidates in the pipeline





# The Vaccine and Infectious Disease Organization – International Vaccine Centre





# VIDO-InterVac

- 165 personnel
- ISO9001 Certified
- Expertise in large animal models of disease
- 8 commercialized vaccines; 6 world firsts
- >\$200 million in state-of-the-art infrastructure
- CL2 (VIDO)
  - ~100,000 ft<sup>2</sup> of labs + 20,000 ft<sup>2</sup> animal isolation
  - 160 acre research station
- CL3 (InterVac)
  - 150,000 ft<sup>2</sup> (~13 hockey rinks)
  - 18 animal holding rooms; 6 laboratories
  - Select agent lab
  - Aerobiology challenge capability (e.g., Flu, TB)





# Officially 'hot'





# Summary

- Canadians should be proud of our role in international vaccine development
- Our scientific personnel for vaccine research and discovery are world class; but...
- Infrastructure including manufacturing capacity is fundamental
- Continued research and development remains essential to tackling new diseases
- Consider vaccines as a cost saver to public health and convince modern society to invest in prevention

***IF YOU THINK RESEARCH IS EXPENSIVE  
YOU SHOULD TRY DISEASE***





# Saskatchewan:

*Land of the living skies*

