

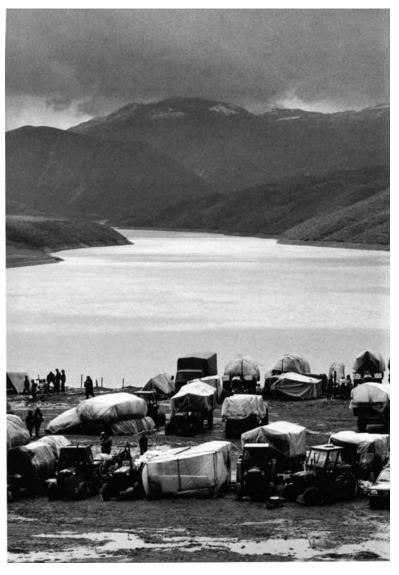
#### My Wife's Theory

All countries where I work inevitably collapse into civil chaos



#### Globalization of Health Research

#### The Global 'Village'



S Salgado: Albania - 1999

'it is not a matter of indifference if, in a city, the dwellings of the poor become infested with typhoid and cholera but it is a threat to the health of the richest people also'

1873 Reich Office Memo (Munich) From Basch PF. Textbook of International Health ) OUP 1990

#### Mobile Populations - 'Us' vs. 'Them'

**Immigrants** 

Illegal immigrants

Refugees

Asylum seekers

Internally displaced

Migrant workers

Guest workers



- cruise ships
- -'eco'-tourists
- extreme (adventure) tourists
- sex tourists
- 'professional' travellers (WTs)
- VFR travellers

Missionaries

Humanitarian aid workers

Religious Pilgrims

International students

Diplomatic corps

**Business travellers** 

**Scientists** 

Expatriates

Sailors

**Astronauts** 

Military personnel

- belligerents
- peace-keepers
- spies

### Canadian Hospital-Based Institutes Have a Responsibility to Lead in Global Health Research

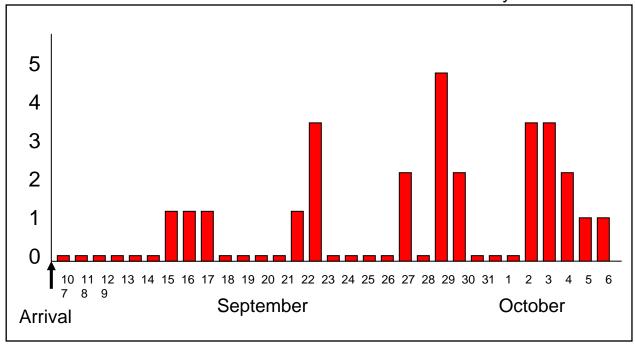
- Canada (alone) accepts ~280,000 immigrants/yr
- June 2012 >800,000 Canadians traveled overseas
- Same month 26,000 Chinese visited Canada
- 2006 census ~3.4 million foreign-born in Ontario alone
- >60% of residents in Dépt Santé Publique (Montréal Centre) foreign born



## **Example of the Global Village**Malaria in Quebec (2001)



Slides received at McGill Reference Laboratory



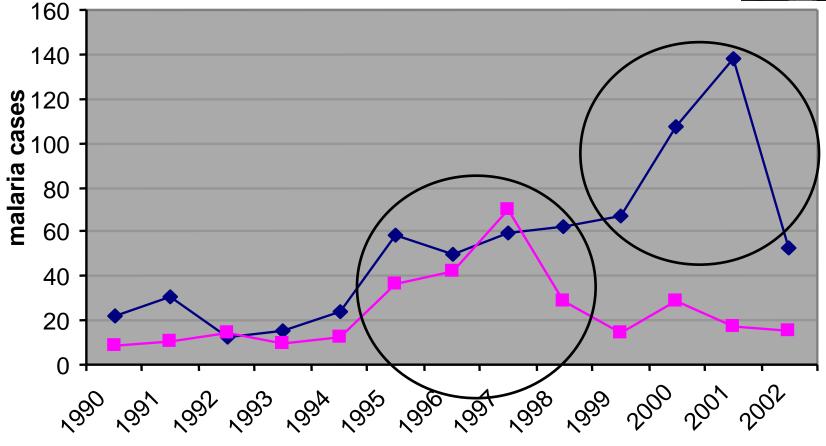
#### **What?!?!**



aaaheatingac.com

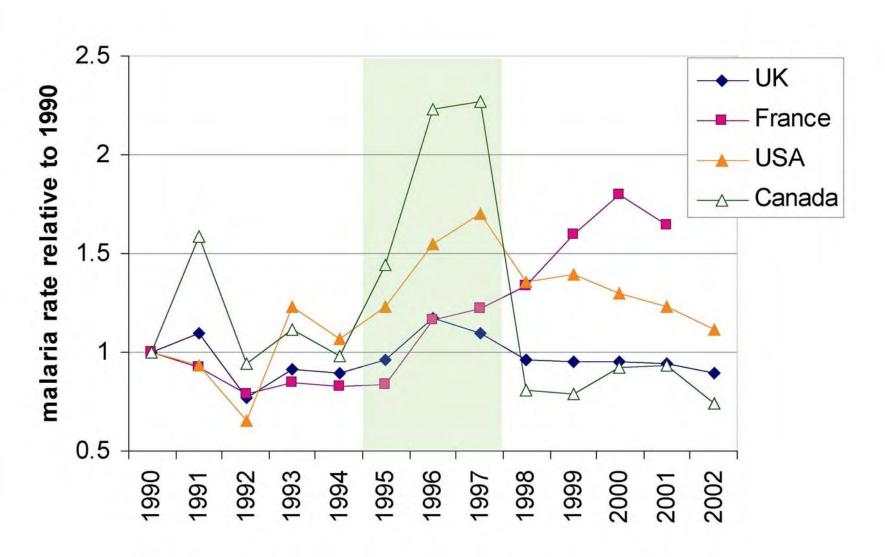
#### **QC Malaria Dynamics**



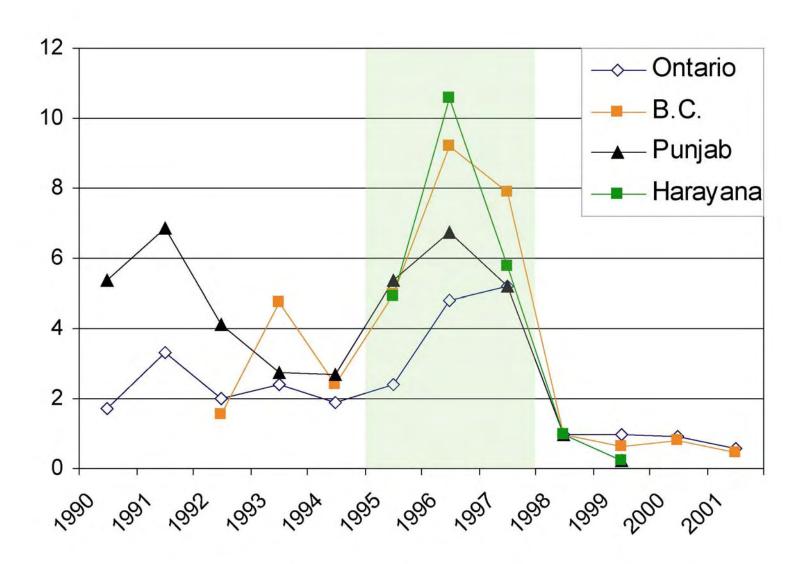




#### **Malaria Rates Relative to 1990**



#### Vivax incidence relative to 1998

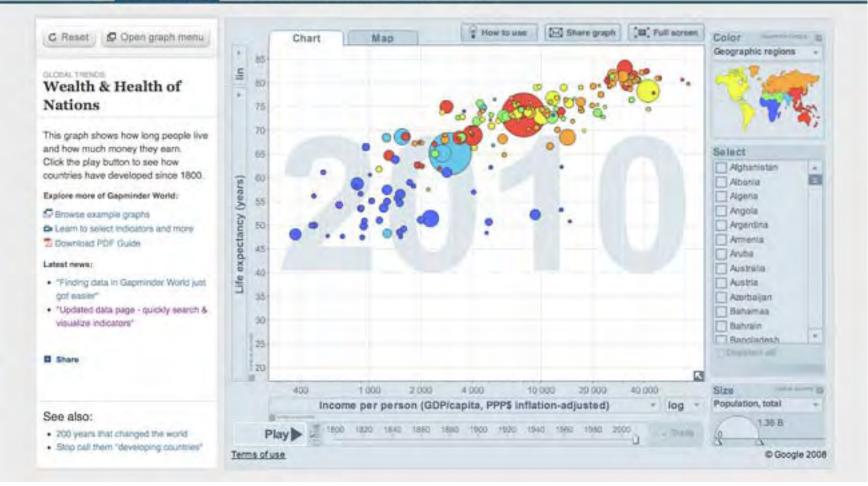


#### Hans Rosling's World

#### GAIZMINDIA: WORLD

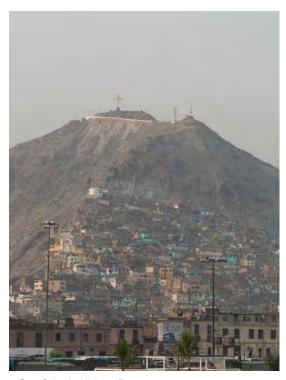
HOME GAPMINDER WORLD DATA VIDEOS DOWNLOADS FOR TEACHERS LABS





#### **Massive Inequalities Exist**

- Many countries experiencing epidemiologic transitions
- Dramatic impact on exposure to infectious diseases
- Equally dramatic impact on chronic conditions





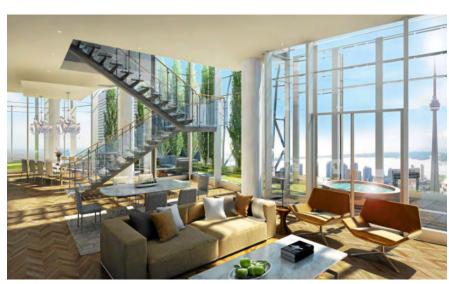


img177.imageshack.us/img177/7531/54147499ea9.jp

Mathur P, Arora NK. Epidemiological transition of hepatitis A in India: issues for vaccination in developing countries. Indian J Med Res. 2008 Dec;128(6):699-704.

# Emphatically NOT a 'Developing World' Problem

- Income gaps rising rapidly in many wealthy countries
- The disadvantaged claim a disproportionate amount of health care dollars

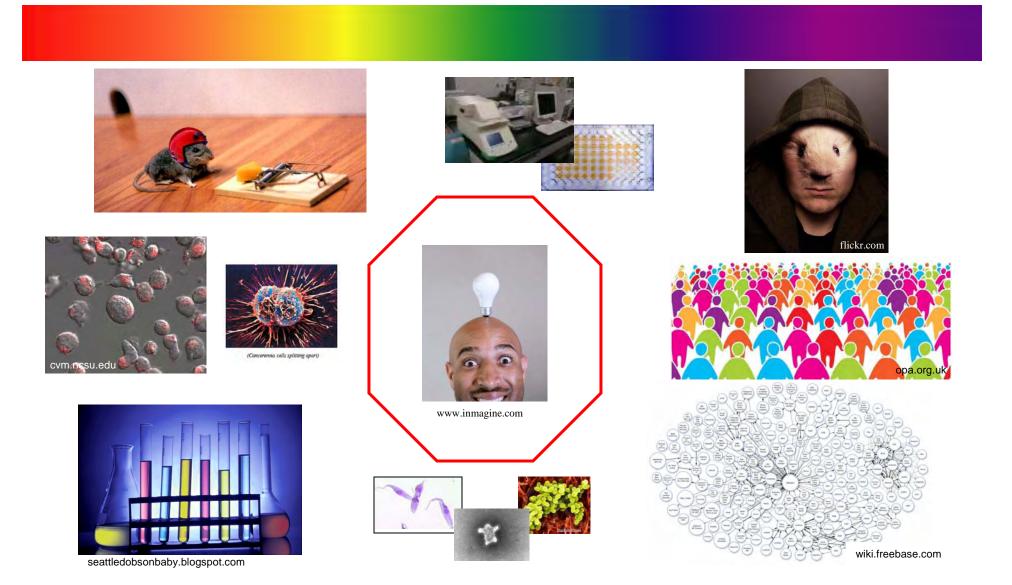




trice.ca

# 'Health Research' Cuts Across Entire Spectrum of Science

## Hospital-Based Institutes at the Centre of Global Health Research?



#### Research is a Continuum of Ideas

- Discovery is only the beginning of a long process leading to application and evaluation
- Pure : vs. Applied Science
- This is a false dichotomy since discoveries are of little value to societies if they are not applied



#### I HATE the Word 'Innovative'

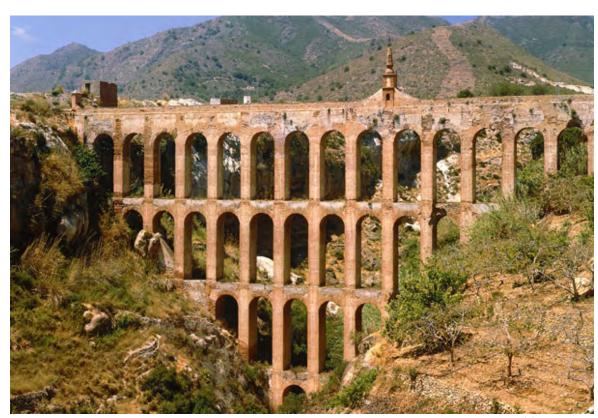


To Paraphrase One of My Heroes (Gary Larson)

#### Research Starts with an Idea

(cementum)



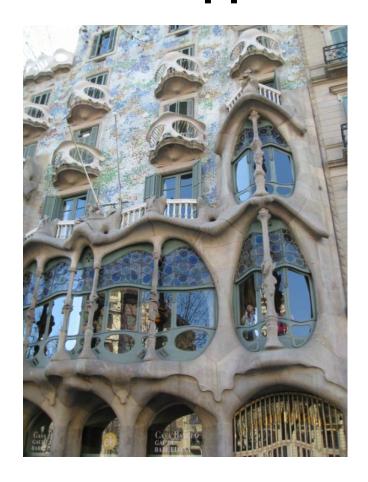


Roman aqueduct (Nerja, Spain)

history.com

#### Idea has Impact when Translated

# Same 'Discovery' Different Applications



**Enriched by Both** 



#### (and parenthetically)

# The Nobel Prize Would Have be Given To the Person Who Invented Cement



#### Research is Fundamentally about Ideas

 Societies that don't offer girls an education miss out on 50% of the best brains

- Same for societies that systematically undereducate large segments of their population (almost 30% drop-out rate in QC)
- Silly to look to 20% of the globe's population to solve the world's problems







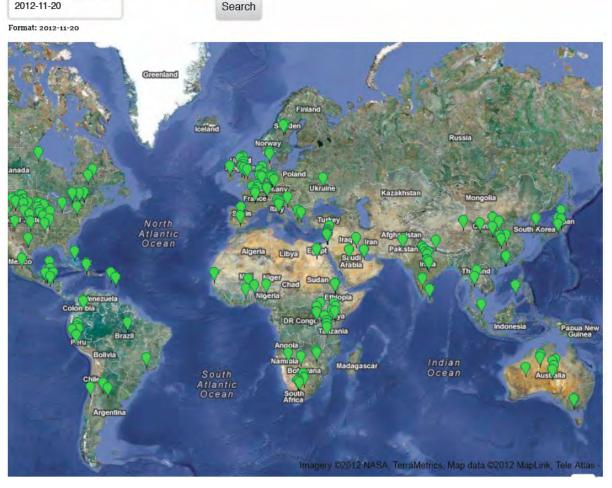




canamkitchen.com



New interactive map that let's one track all of McGill's overseas projects & collaborations



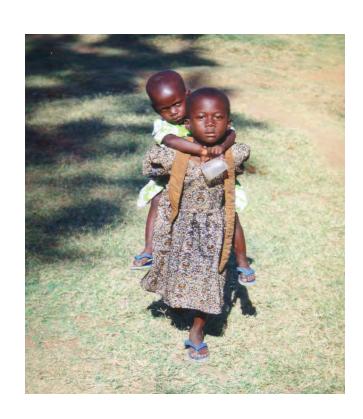
http://www.mcgill.ca/globalhealth/project/map\_view

#### The Opportunities?

#### **Opportunities in Global Health**

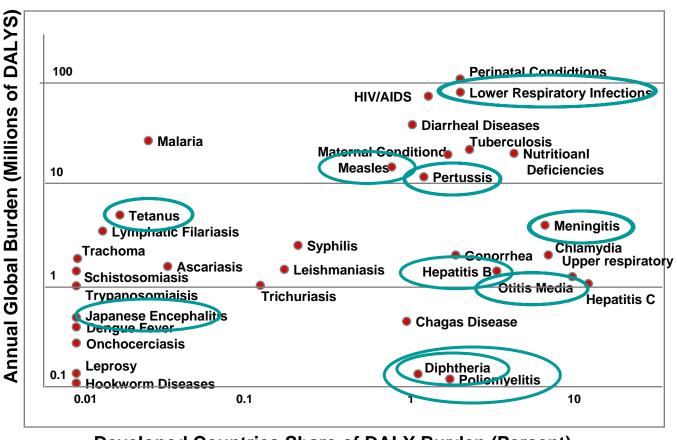
## 1) There is a Huge Backlog of 'Stuff' We Know How to Fix

- Clean water & enough food
- Sanitation
- Mother-Child Health
- Maternal Education
- Vaccines
- Bednets & simple antibiotics
- Vitamin A
- Need research to find ways to meet needs with resources (Application & Evaluation)



# Distribution of Global Infectious Disease Burden

(2004)



>50% of lowincome country
DALYs lost
are lost due to
infectious
diseases
(vs <4% in the
wealthy countries)

**Developed Countries Share of DALY Burden (Percent)** 

Ridley DB et al. Health Affairs 2006:25: 313



# No Trivialization ... Some of These Are Big Problems

http://neatorama.cachefly.net/images/2007-08/sumo-kid.jpg

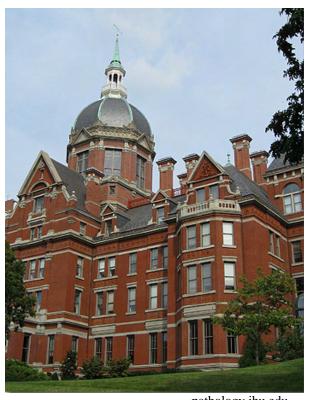
#### Johns Hopkins (1980s)

- Pre Anti-Retroviral Drugs
- 10-15% of hospitalized HIV<sup>+</sup>
- 30-40% of trauma HIV+
- Infection across mucosa
- Immune deviation/destruction

#### My fellowship

- immunosuppressive viruses
  - measles
  - HIV





pathology.jhu.edu

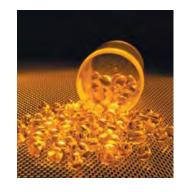
#### **ZVITAMBO**

Zimbabwe Vitamin A for Mothers & Babies Project

14,110 women & their babies Recruited at birth Randomized to receive

Mother	Baby		
400,000 iu	50,000 iu		
400,000 iu	placebo		
placebo	50,000 iu		
placebo	placebo		





Followed for up to 24 months (q 3 months)

#### Findings for Initial ZVITAMBO

• 31% HIV-positive at enrollment

additional 9% seroconverted during 2 yr follow-up

ANY supplemental feeding major risk for MTCT

Infant mortality (12 months of life)

M+B+ 400/1000

M<sup>+</sup> B<sup>-</sup> 40/1000

M-B- 4/1000

Infant vitamin
 A had no
 impact on
 survival



#### Sixteen Years Later



#### **Zimbabwe**

- 18+ digit deflation
- massive social disruption
- malnutrition/stunting
- basic needs not met



#### **ZVITAMBO**

- >\$43 million in grants
- Employ/train 100s
- Access to safe water
- RCT of sanitation
- HIV testing/counseling
- microbiome studies
- breastmilk proteomics





#### **Opportunities in Global Health**

#### 2) Tsunami of 'Stuff' We Know is Wrong

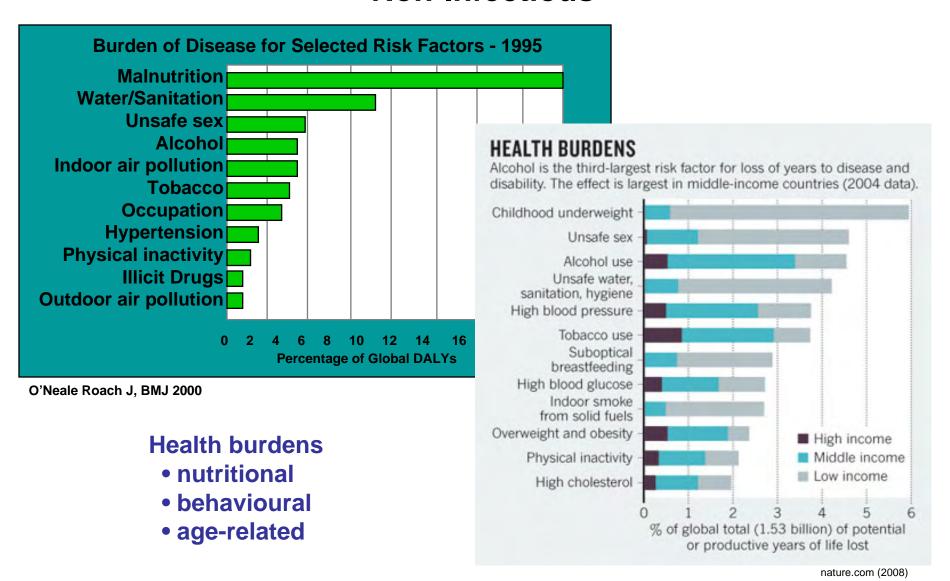
- Smoking
- Pollution (indoor & outside)
- Cheap calories
- Obesity
- Diabetes
- Hypertension
- Aging



 Need research at all levels to figure out how to deal with these problems for everyone (eg: nicotine vaccine, prevention & treatment of Alzheimers, how to effectively address obesity)

#### **Global Health Burden**

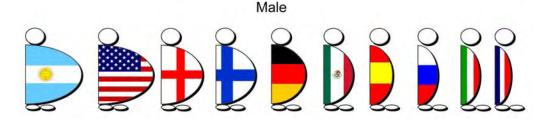
#### **Non-Infectious**



# Obesity Not Just North America

Comparison of percentages of population classified as obese

# Female



Percentage of people classified as obese			
	female	male	
USA (1999-2000)	34	27.7	
Argentina (1997)	25.4	28.4	
Mexico -	25.1	14.9	
Russia -	25	10	
England (2001)	23.5	21.0	
Germany (1991)	19.3	17.2	
Finland -	19	20	
Spain (1997) 15.2	11.5		
Italy (1999)	9.9	9.5	
France (1995-1996)	7.0	8.0	

#### **How Should We Set Priorities?**



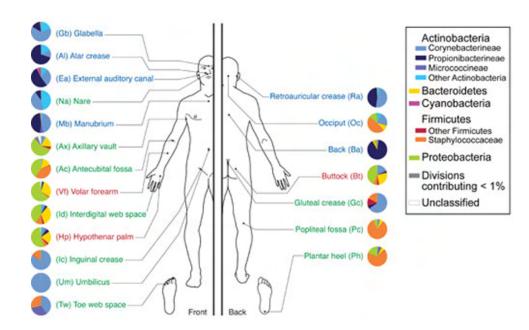
bextruthfinder.blogs.com/.../2005/09/



www.smh.com.au/.../2005/06/30/1119724757442.html

# It is Ironic (and Should be Instructive) That BASIC Microbiome Research May Provide Novels Approaches for Both

- gut flora
   participates
   actively in
   extracting
   calories from
   available food
- Can increase calories by as much as 30%

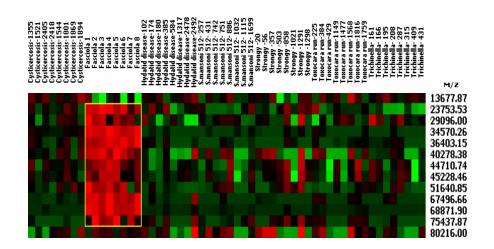


- gut flora alone can cause and/or prevent weight loss on fixed caloric intake
- First human trials of stool 'transplant' for weight loss underway

#### **Opportunities in Global Health**

## 3) Plenty of New 'Stuff' to Think About

- Pesky Remnants
   (TB, influenza, malaria, HIV)
- Genomics & Proteomics
- Metabolomics
- Microbiome
- Personalized Medicine
- Nanomedicine
- Stem cells



 Need research at all levels and global partnerships to fully understand these new ideas and exploit them optimally

## **Both Good and Bad Examples**

#### **Good**

Preliminary AIDS Vaccine Evaluation (PAVE) Sites
Pasteur Institutes
Wellcome Trust facilities
Walter Reed Institute

#### The Bad

Hepatitis B vaccine trials in Haiti (early 1980s) yet HBV vaccine program in Haiti only in (±) 2010 Indonesia's refusal to permit the use 'Indonesian' H5N1 virus strains to make candidate vaccines Zimbabwean policy (and others) of refusal to permit human materials to leave country

# The Challenges?

#### **Challenges in Global Health**

## From the Simple to the Philosophical

**Sending a Documnt to Sudan** 



#### **Challenges in Global Health**

## From the Simple to the Philosophical

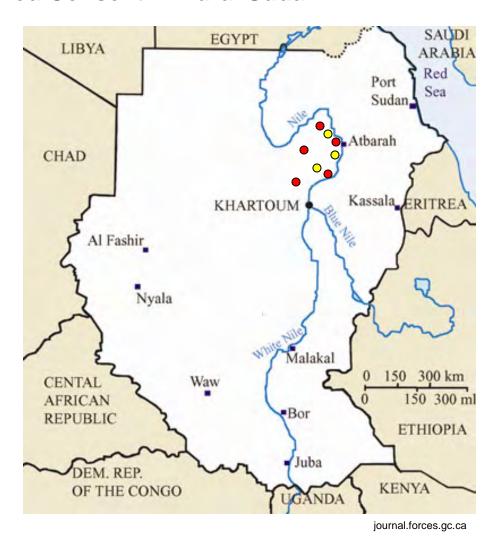
#### **How To Assess Informed Consent in Rural Sudan**

#### 1994-2000

Study of High-Titre Measles Vaccines Vaccines protected against measles but associated with increased deaths in infant girls

Protocol: approach religious leader then local health worker then families

- Local religious leader agreed
   All health workers agreed
   100% enrollment
- Local religious leader disagreed
   All health workers said 'no'
   Enrollment <5%</li>



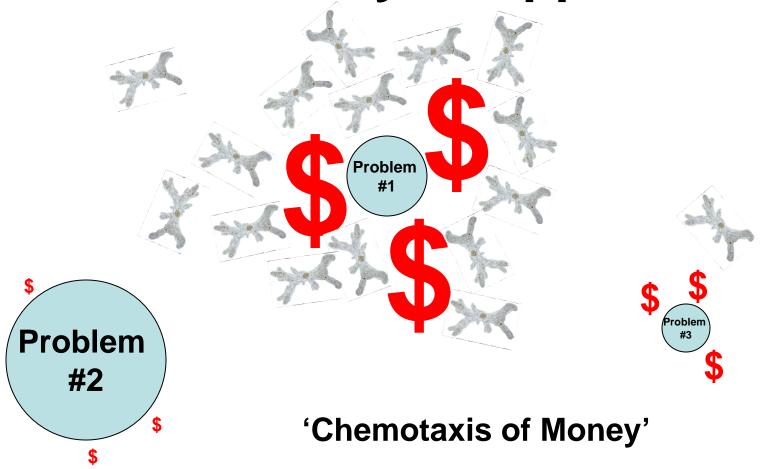
#### **Self-Serving Slide #1.1**

Resources Drive Research from Discovery to Application



#### **Self-Serving Slide #1.1**

# Resources Drive Research from Discovery to Application



## **Gates Foundation**



Total Assets (2012)
Total Grants to date
2010 grants
2011 grants

\$36 billion \$25 billion \$2.6 billion \$3.4 billion

# Realistically ... What Can We Do?

## **Global McGill**

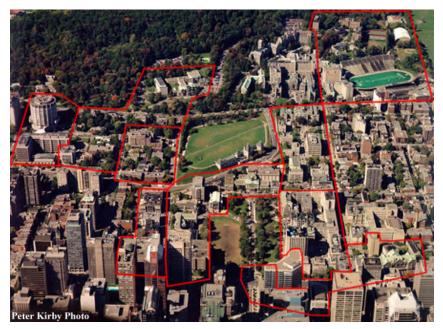
Graduate students from 150+ countries

Non-Canadian Citizen Trainees

38% of graduate students

49% of doctoral students

>45% of post-docs (clinical fellows)



cac.mcgill.ca

# RI MUHC Today

- 3<sup>rd</sup> Research Hospital in Canada & 1<sup>st</sup> in Quebec for 2011
- \$175M annual budget in 2012 (\$17M operating)
- 620 researchers (370 FTEs)
- 300 labs devoted to fundamental and clinical research
- 1,150 students (MSc, PhD, Post-Doc, Clinical Fellows)
- ~1,700 peer-reviewed publications per year
- 306 principal investigators



### Personal Networks Through Trainees And Collaborations



# **Not Enough**

- Canadian universities need to attract foreign students & trainees at all levels
  - NOT for their fees (the current strategy)
  - for their brains
  - for their energy
  - for their passion
- Need to offer scholarship assistance or (at the very least) level the tuition for international students. Consider taking some funds from our development assistance 'pot'.

## Canada?



fourfourtwo.com

QuickTime\*\* and a decompressor are needed to use this picture.

Assets \$36 billion 2010 awards \$2.6 billion 2011 grants \$3.4 billion

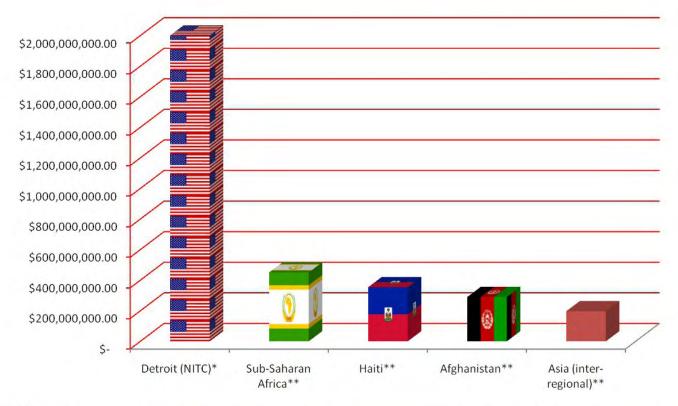
> Norway GNI 485 billion Norway, Sweden & Denmark >1%

GNI
CIHR
CIDA
IDRC
Total aid

\$1.74 trillion ~\$1 billion \$4.8 billion \$180 million 0.29% GNI

> http://www.gatesfoundation.org http://www.globalissues.org

### Canadian Foreign Aid: Detroit NITC vs CIDA Top 4



#### Sources:

<sup>\* &</sup>quot;over \$2 billion for green space development, replacement costs and other related impacts" - State Representative Rashida Tlaib (D-Detroit), June 15/2012 <a href="http://012.housedems.com/news/article/statement-from-state-representative-rashida-tlaib-d-detroit-on-the-announcement-of-an-agreement-between-michigan-and-canada-to-build-the-new-international-trade-crossing">http://012.housedems.com/news/article/statement-from-state-representative-rashida-tlaib-d-detroit-on-the-announcement-of-an-agreement-between-michigan-and-canada-to-build-the-new-international-trade-crossing</a>

<sup>\*\*</sup> Canadian International Develop Agency - Statistical Report on International Assistance — Country Spending ,2010-2011

# Make Research A Basic Principle Of Canadian Development Assistance

- Currently an after-thought (at best)
- Personal Opinion
  - this is dumb as rocks
  - why would we NOT want to know how to do things better
- One of our new immigration policies focuses on highly trained students ('brain drain')
- Needs to be paired with program to support international trainees who want to return to their countries of origin
- Each returning trainee is a potential 'small business'

# ATIU AIRPORT Voluntary Security Check

Would passengers please hand their AK47s Bazookas, grenades, explosives and nukes to the pilot on boarding the aircraft.

Airport Management thanks you for your cooperation.

## **Canadians Are Not Risk Takers**

- 'No guts no glory' foreign to Canadian psyche
- Our approach to life relatively conservative
- Increasingly focused on predictable 'outcomes'
- Not the best environment for research
- Extends to translation of ideas (eg: VC community)



If we knew the answers, we wouldn't have to do research

If we knew what it was we were doing, it would not be called research, would it?

(A Einstein)

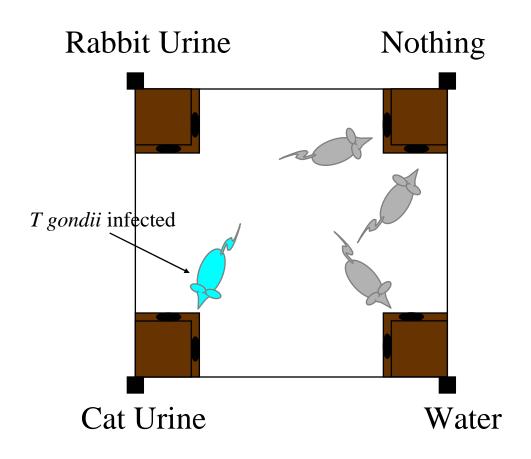


drmills.wiki-site.com

vickicaruana.blogspot.com

## A Modest Proposal

### Infect all Canadians with T. gondii



If you were a parasite and wanted to make your victims Hyperactive andtake risks ... what part of the brain would you target?

Right ... the sexual arousal centres



zoo-logic.tumblr.com

## 'Globalize' the Next Generation

Develop **Promote Fund** and STUDY overseas experiences & work





Much of what is done now amounts to poverty 'tourism'

## Thanks for your attention

