



**Tuberculosis—  
Old disease,  
New Information**

PUBLIC HEALTH AGENCY of CANADA  
AGENCE DE LA SANTÉ PUBLIQUE du CANADA

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[www.publichealth.gc.ca/tuberculosis](http://www.publichealth.gc.ca/tuberculosis)  
[www.santepublique.gc.ca/tuberculose](http://www.santepublique.gc.ca/tuberculose)

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**“Tuberculosis:  
the People’s Plague”**

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**The TB situation in Canada**

- **Forgotten by most**
- **But not gone:  
A new TB case in Canada every 6 hours**



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## "Tuberculosis: the People's Plague"



*Ce qu'il faut pour vivre*

*The Necessities of Life*

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## Outline

- The Canadian TB incidence target
- TB in Canada in general
- Drug resistance
- HIV-TB
- TB among the foreign born in Canada
- TB among Aboriginal Peoples in Canada
- Role of molecular genotyping
- Role of social network analysis
- Role of interferon-gamma release assays for latent TB infection
- *Canadian Tuberculosis Standards*
- Top short-term priorities for TB prevention and control in Canada

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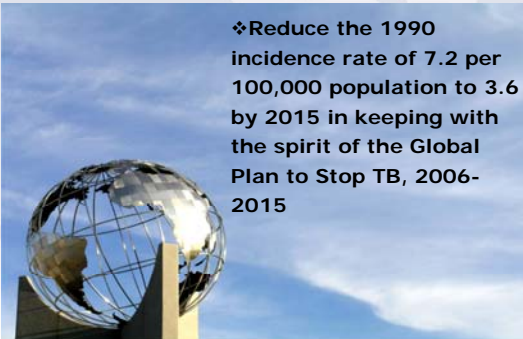
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## The Canadian Target



❖ Reduce the 1990 incidence rate of 7.2 per 100,000 population to 3.6 by 2015 in keeping with the spirit of the Global Plan to Stop TB, 2006-2015

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### Reaching the 2015 Canadian Target (Eh!)



- To reach the new Canadian target, we need to reduce the incidence rate from 4.7 (1,547) cases in 2007 to 3.6 (1,252 cases) by 2015
- Average 3.5% annual rate decrease is needed

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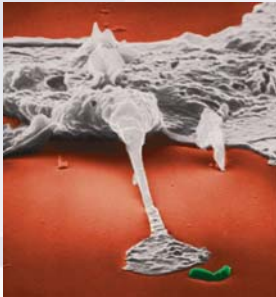
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### Conquering TB is not as simple as this picture




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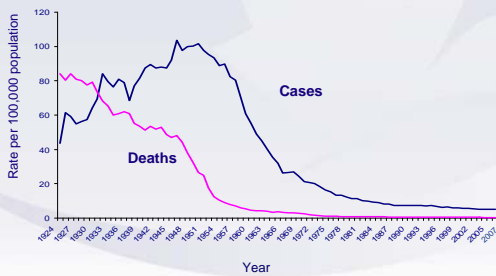
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### Tuberculosis incidence and mortality rates - Canada: 1924-2007




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### Percentage of TB cases for which HIV status is known, Canada: 1997-2006




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### HIV among immigration applicants Canada, 2002-2008

	Number of HIV infected applicants	Identified in Canada (%)	Identified outside Canada (%)
2008	603	61%	39%
Jan. 2002 to Dec. 2008	3,706	61%	39%

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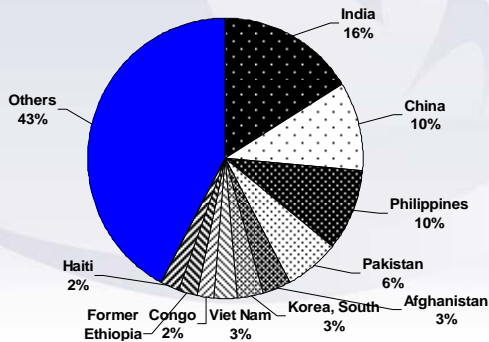
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### Diagnosis within 2 years of arrival in Canada by country of birth: 2000 - 2004




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### TB control among the foreign-born

- About **500,000** immigration medical exams annually
- **250 pulmonary TB cases** (61/100,000 exams) found and treated during the Immigration Medical Exam overseas, 2008
- If they entered Canada and were then diagnosed and treated, our TB rate would go up **16%**
- **7,800** diagnosed with inactive

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### Screening the foreign-born after arrival for latent TB infection

- Usual co-morbidity risk factors for progression of LTBI to disease, or
- Lived in a high TB incidence country (smear positive TB rate of  $\geq 15/100,000$ ; see <http://www.phac-aspc.gc.ca/tbpc-latb/itir-eng.php>) and immigrated within the past 2 years:
  - Under age 15: all
  - Age 15 and older: have lived with or in known contact with a TB case in the past or at high risk for development of

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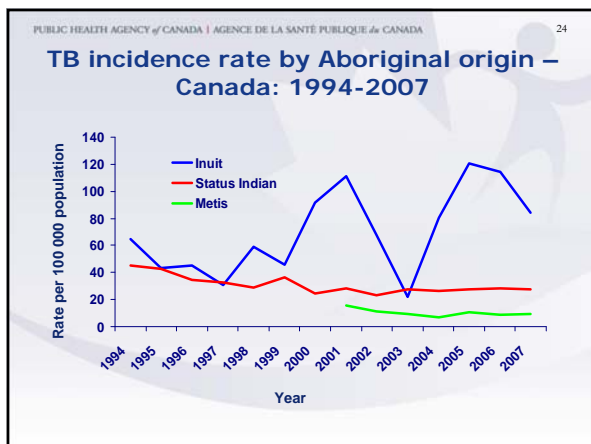
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### TB among Aboriginal Peoples in Canada: Some reasons the rate is high

- Historically high exposure to the bacteria leading to 20-30% of adults being TB skin test positive vs. ~11% for all Canadians in general
- Some may have less natural resistance to TB disease due to genetic factors (e.g., Larcombe, *Journal of Infectious Diseases*, 2008)
- Co-morbidities such as HIV infection and diabetes mellitus type 2 increase the risk of latent TB infection progressing to disease
- Decreased nutritional status
- Substance abuse and/or cigarette smoking in some cases
- Crowded, inadequately ventilated housing increases household transmission
- Delayed diagnosis of infectious cases results in prolonged exposure time for contacts
- Lack of continuity of health care providers in some remote communities

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### "Housing conditions that serve as risk factors for TB infection and disease" Canadian Tuberculosis Committee, 2007 [www.publichealth.gc.ca/tuberculosis](http://www.publichealth.gc.ca/tuberculosis)

•50% of First Nations housing on reserve are below Canada Mortgage and Housing Corporation suitable housing standards

•10% of on-reserve households have too few bedrooms compared to 1.4% for Canadian-born non-Aboriginal households, (2001)

•Inadequate ventilation mould no plumbing in some cases

•Housing needs to meet national standards




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### Genotyping (finger printing ) TB Bacteria

- TB-GRID--TB Genotyping Reference Interactive Database is in development as a national pilot project
- MIRU and spoligotyping all isolates in Canada; RFLP only when MIRU and spoligotypes match and RFLP data will guide the contact investigation etc.
- Matches will be reported to respective provinces/territories for follow-up
- MIRU pattern will be part of the national TB case reporting form

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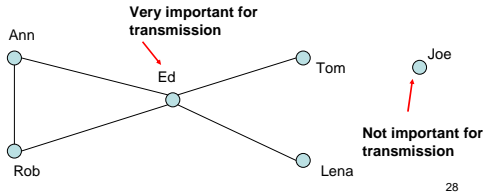
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### Social Network Analysis (Courtesy of Dr. Ann Jolly, PHAC)

- A social network is a set of relationships linking a defined set of persons, objects or events
- Network analysis added to regular contact tracing provides systematic visualization and mathematical analysis



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### Role of Interferon-Gamma Release Assays (IGRA)

- Two products registered in Canada
  - QuantiFERON-TB Gold In-Tube (Cellestis Limited, Australia)
  - T-SPOT.TB (Oxford Immunotec, U.K.)
- T-cells previously sensitized to TB antigens produce high levels of interferon-gamma when re-exposed to the same mycobacterial antigens
- Negative result with BCG and non-tuberculous *Mycobacteria*
- The Canadian Tuberculosis Committee (CTC) recommends that all provincial and territorial governments fund the use of IGRAs for use according to the current CTC recommendations.

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### Canadian TB Committee Updated Statement on IGRAs, October, 2008 [www.publichealth.gc.ca/tuberculosis](http://www.publichealth.gc.ca/tuberculosis)

- **Diagnosis of active TB disease:** Supplementary diagnostic test in children under 18 with suspected TB disease
- **Contacts of a case of active infectious TB:** May use as confirmatory test for a positive TST if there is a low pretest probability of recent infection and there are no risk factors for progression to active disease if infected
- **Immunocompetent person with a positive TST, low risk of being infected and low risk of progressing to disease if infected:** Use

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### Canadian TB Committee Updated Statement on IGRAs (2)

- **Immunocompromised:** Use if TST result is suspected to be false negative
- **Immigrant screening:** Not recommended for the Immigration Medical Exam but may be used after immigration if the person has been in a high TB incidence country and immigrated within the past 2 years:
  - Under age 15: all
  - Age 15 and older: have lived with or in known contact with a TB case in the past or at high risk for development of active TB
- **Serial testing and prevalence surveys:** Use TST

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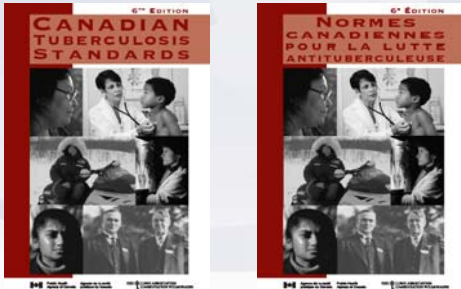
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### Canadian Tuberculosis Standards 6<sup>th</sup> edition, 2007

<[www.publichealth.gc.ca/tuberculosis](http://www.publichealth.gc.ca/tuberculosis)>




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### Canadian Tuberculosis Standards Tuberculosis Control Within Institutions

- Risk classification of health care facilities by volume of admissions and workers by activities
- Early identification of patients with suspected TB
- Airborne isolation
- Ventilation recommendations
- UV light and HEPA filtration
- Use of respirators and masks
- Tuberculin skin test screening

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### Top short-term priorities for TB prevention and control in Canada (Ellis' view)

- Training and funding to implement the *Canadian Tuberculosis Standards*
- Increase our efforts to control TB among First Nations and Inuit populations—especially in remote communities
- Completion of medical surveillance for all immigrants with inactive pulmonary TB
- More LTBI screening and treatment among immigrants in Canada for less than 2 years; delivered in primary care settings
- HIV testing of all TB cases in order to monitor co-infection trends more precisely
- Fund TB control in high incidence countries

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### Don't Forget Some of the Basics

•Sir William Osler (1849-1919) Canadian born and trained physician



•"Tuberculosis is a **social disease** with a **medical aspect**."

•Unfortunately, this remains largely true today

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### Never, never give up!



•Eleanor Wilson, wife of President Roosevelt, died in New York City, 1962 with TB resistant to INH and streptomycin

•"You must do the thing you think you cannot do."

•So, what are we doing to stop TB?

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### Acknowledgements

- Melissa Phypers, Derek Scholten, Andrea Saunders, Victor Gallant, Ann Jolly--Public Health Agency of Canada
- Canadian Tuberculosis Committee and Subcommittees
- Authors of the *Canadian Tuberculosis Standards*
- Dr. Sylvie Martin--Citizenship and Immigration Canada
- Lena Shah—British Columbia Centre for Disease Control
- Irwin Sherman, *Twelve Diseases That Changed Our World*, ASM Press, Washington D.C., 2007
- Photography: U.S. National Institute of Allergy and Infectious Diseases, STOP-TB, Merriam-Webster Online, Rimrock Opera

**I AM Stopping TB**

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