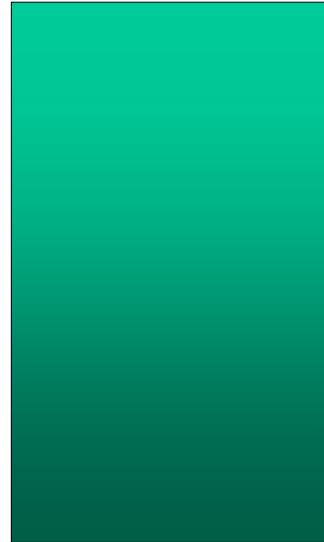


**TOOLS FOR TB CONTROL**

**BCG VACCINE (1921)**

**DRUG THERAPY (1952)**



## Bacille Calmette-Guérin (BCG) vaccine

1902:

Edmond Nocard isolates virulent *Mycobacterium bovis* from a tuberculous cow

1908-1919:

Albert Calmette and Camille Guérin attenuate the virulent isolate by serial passage in pure culture

1921:

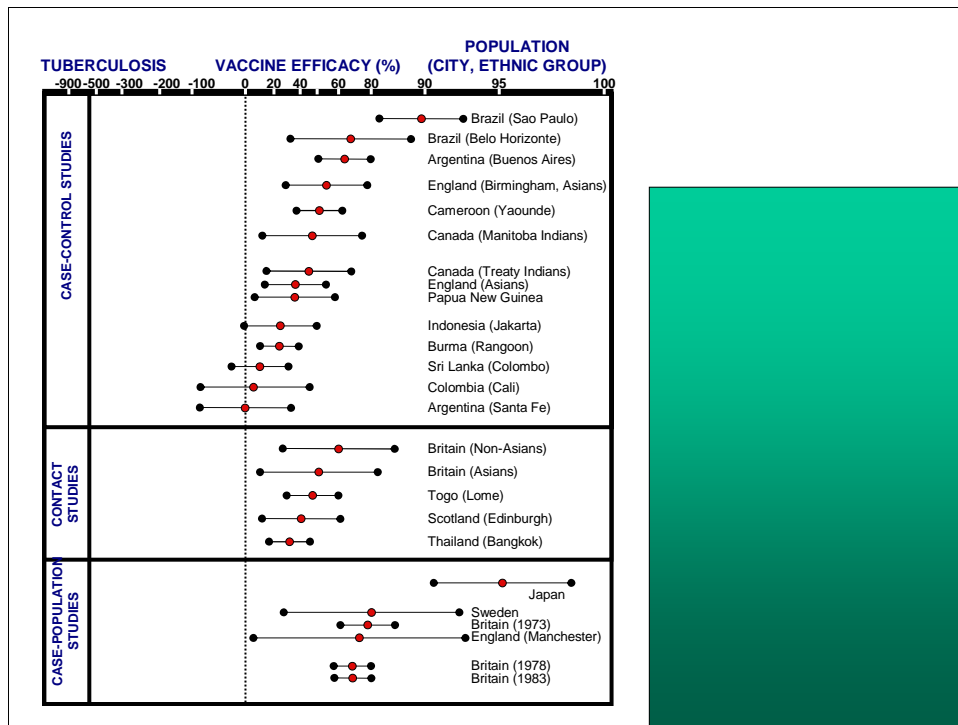
Benjamin Weill-Hallé and Raymond Turpin vaccinate a newborn child with the attenuated BCG strain

1921-2003:

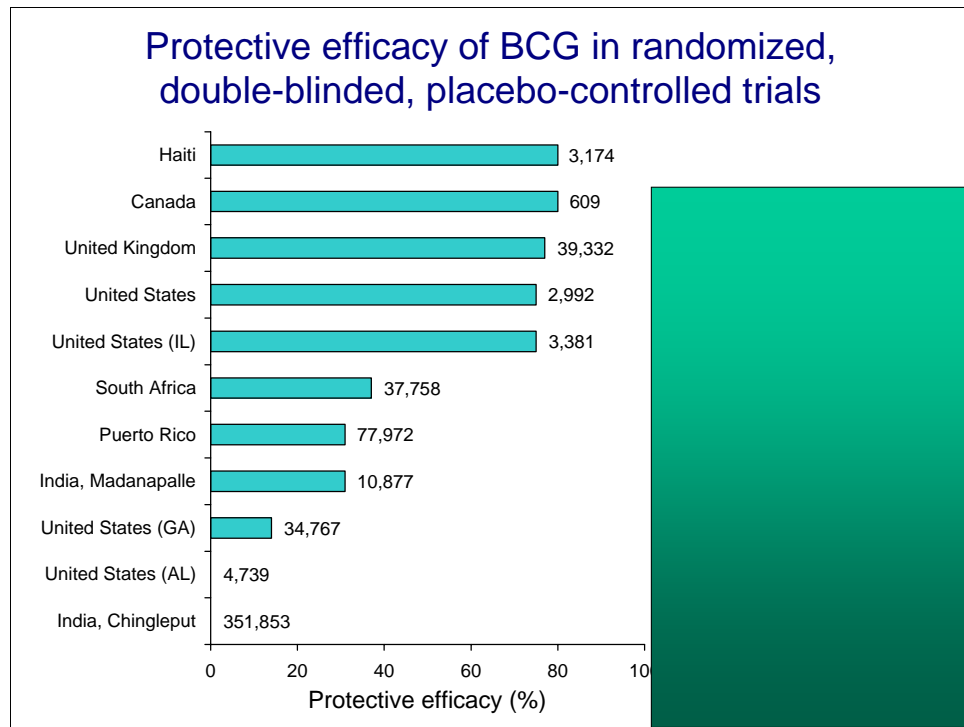
BCG administered to >3 billion individuals worldwide

## Bacille Calmette-Guérin (BCG) vaccine

- BCG can be GIVEN AT BIRTH or any time thereafter
- BCG is SAFE (adenitis in infants 370 per million; case fatality rate 0.19 per million)
- BCG is INEXPENSIVE to produce (“a dime a dose”)
- BCG is the most STABLE live vaccine in current use
- BCG can be ADMINISTERED ORALLY
- BCG elicits CELL-MEDIATED & HUMORAL responses
- BCG elicits SYSTEMIC and MUCOSAL responses
- BCG gives LONG-LIVED MEMORY without boosting

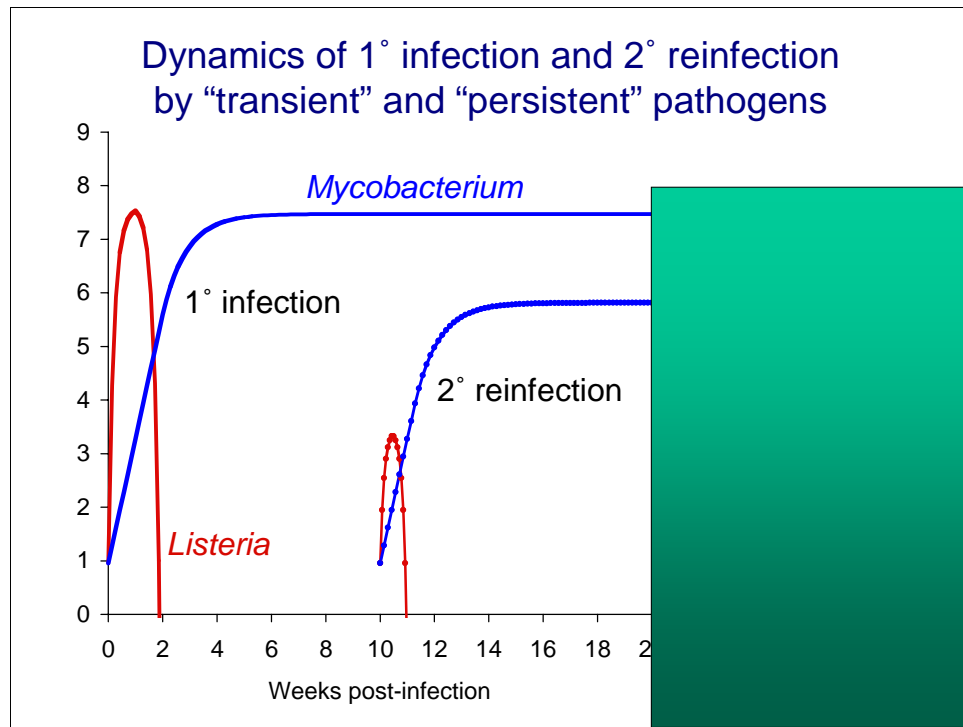


Source: Rodrigues LC, Smith PG (1990) Tuberculosis in developing countries and methods for its control. *Trans. R. Soc. Trop. Med. Hyg.* 84: 739-744.





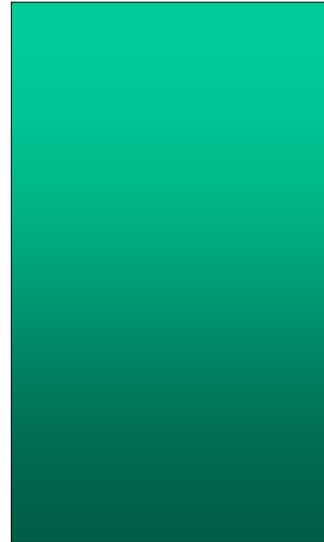




**TOOLS FOR TB CONTROL**

**BCG VACCINE (1921)**

**DRUG THERAPY (1952)**





“The ancient foe of man, known as consumption, the great white plague, tuberculosis, or by whatever other name, is on the way to being reduced to a minor ailment of man. The future appears bright indeed, and the complete eradication of the disease is in sight.”

Selman Waksman (1964) *The Conquest of Tuberculosis*

## Short-course chemotherapy for TB

*M.M.W.R. (1998) 47RR-20: 1-58*

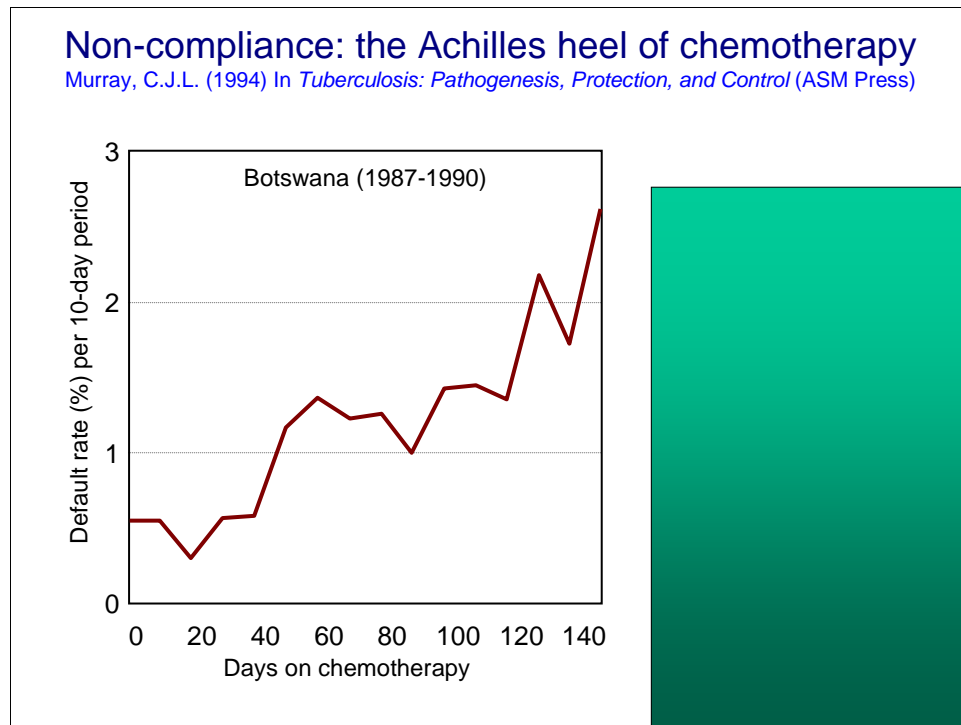
### Induction phase (2 months)

Isoniazid	→ Cell wall biogenesis
Rifampin	→ RNA synthesis
Pyrazinamide	→ Opinions vary...
Ethambutol	→ Cell wall biogenesis
Streptomycin	→ Protein synthesis

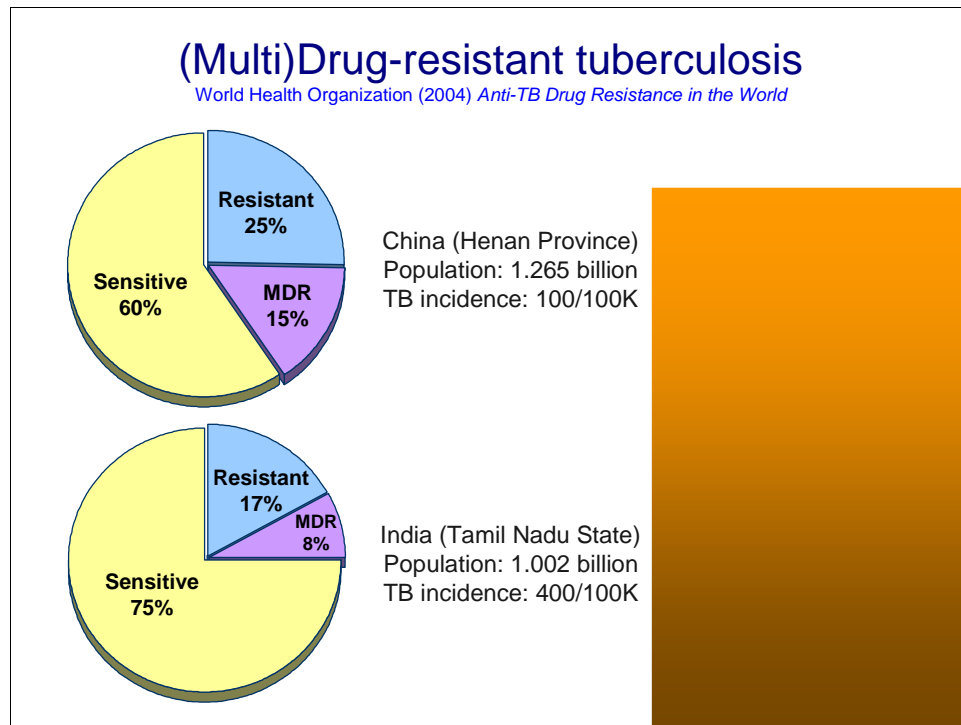
### Continuation phase (4-7 months)

Isoniazid	→ Cell wall biogenesis
Rifampin	→ RNA synthesis

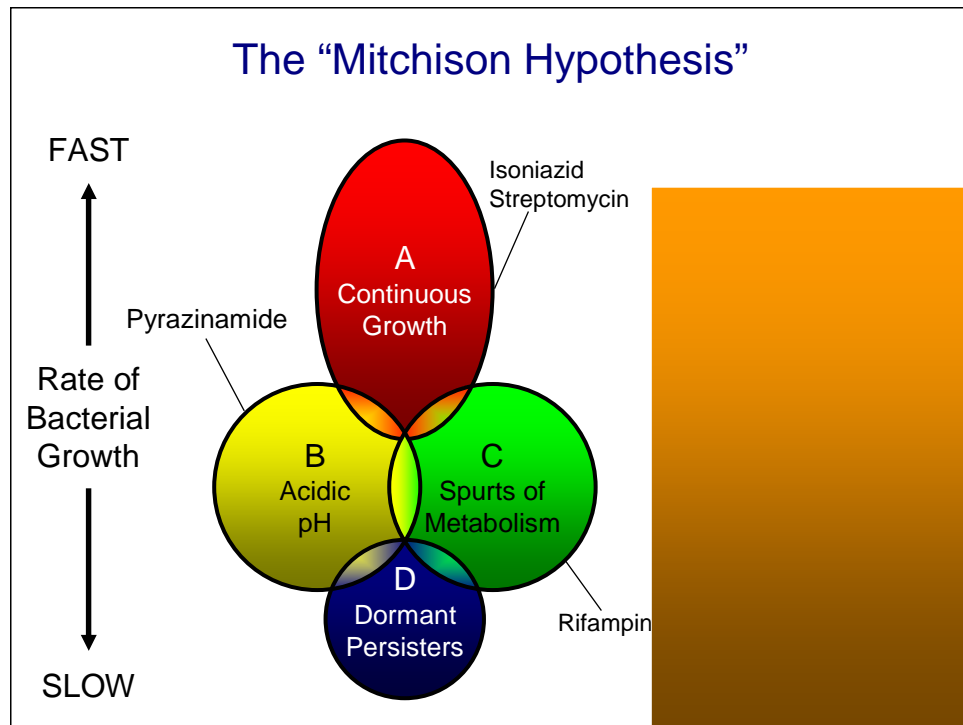
Source: MMWR Morb. Mortal. Wkly. Rep. (1998) 47RR-20: 1-58.



Source: Murray, C.J.L. (1994) Issues in operational, social, and economic research on tuberculosis. In *Tuberculosis: Pathogenesis, Protection, and Control* (ed. Bloom, B.R.), ASM Press, p. 607.



Source: World Health Organization (2000) *Anti-TB Drug Resistance in the World*. The complete report can be downloaded from:  
<http://www.who.int/docstore/gtb/publications/drugresistance/index.htm>





## Short-course chemotherapy for TB

*M.M.W.R. (1998) 47RR-20: 1-58*

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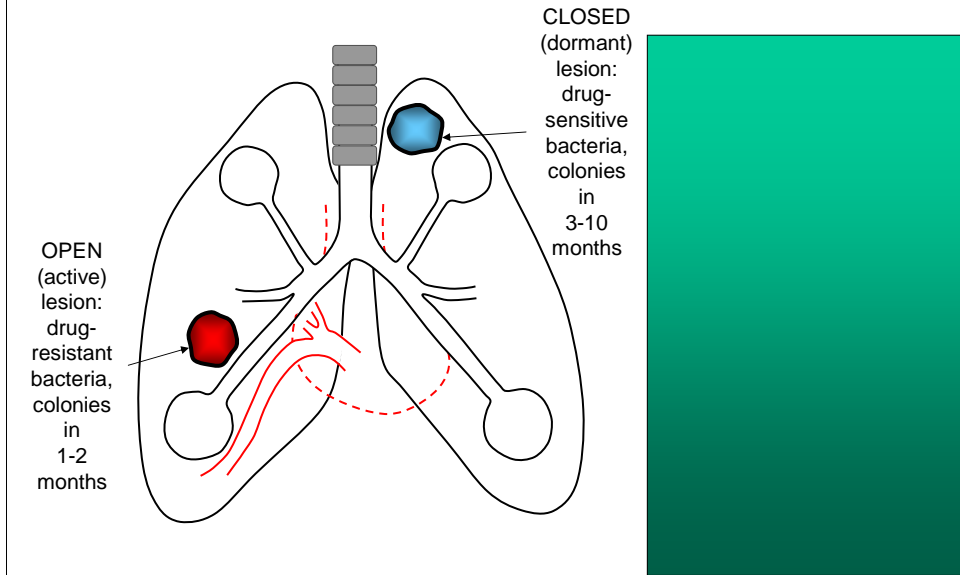
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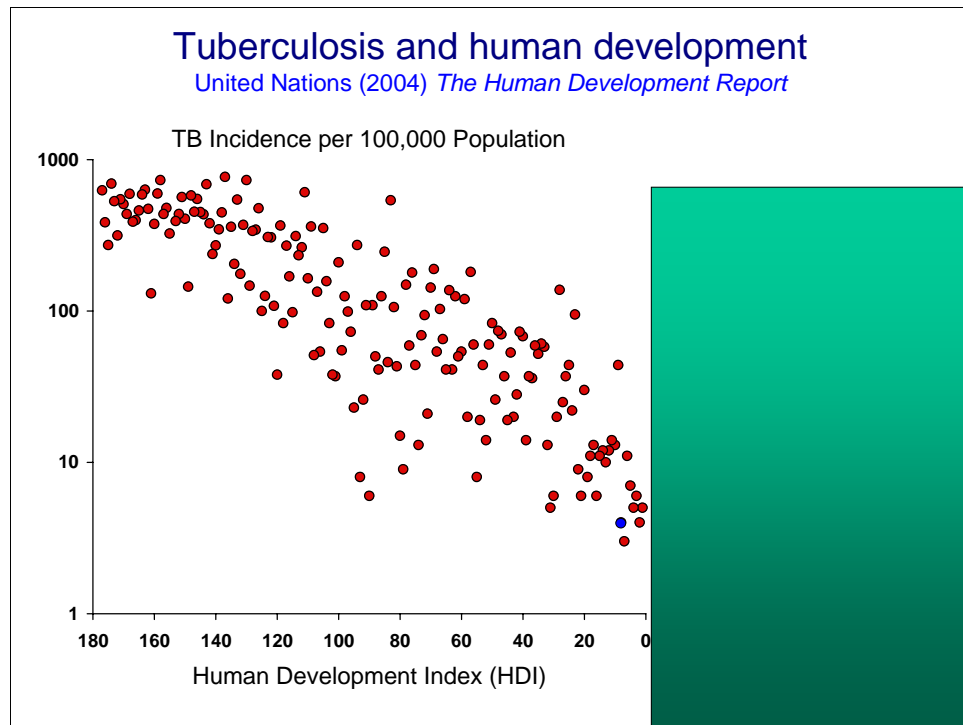
Isoniazid	→ Cell wall biogenesis
Rifampin	→ RNA synthesis

Source: MMWR Morb. Mortal. Wkly. Rep.  
(1998) 47RR-20: 1-58.

### Persistence of *M. tuberculosis* in patients undergoing drug therapy

Vandiviere et al. (1956) *Am. J. Med. Sci.* 232: 30-37





Source: United Nations (2004) *Human Development Report*. The complete report can be downloaded from:

<http://hdr.undp.org/reports/global/2004/>

95% of TB cases are in  
developing countries

99% of TB deaths are in  
developing countries

