Tuberculosis and BCG

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Child Lung Health
International Union Against Tuberculosis and Lung Disease
Paris
UNION INTERNATIONALE CONTRE LA TUBERCULOSE
Siège: AVENUE VELASQUEZ 2 — PARIS VIII

NOUVEAU COMITE EXECUTIF
1930—1932

(ELECTIONS FAITES PAR LE CONSEIL DE DIRECTION,
EN SA SÉANCE DU 12 AOÛT 1930)

Président
Professeur Dr. FRÖLICH (Osel)

Membres
Professeur CALMETTE (Paris)
Dr. HAMEL (Berlin) — Professeur NOLEN (La Haye)
Dr. OPIE (Philadelphie) — Professeur FAOLUCI (Rome)
Sir Robert PHILIP (Edinburgh)

Secrétaire général
Professeur Léon BERNARD (Paris)
Risk of TB disease following infection by age

<table>
<thead>
<tr>
<th>Available approaches to prevent TB in children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Improved case-finding and management</strong></td>
</tr>
<tr>
<td><strong>BCG</strong></td>
</tr>
<tr>
<td><strong>Contact screening and management</strong></td>
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<tr>
<td><strong>Infection control</strong></td>
</tr>
</tbody>
</table>
BCG protects against disseminated TB in children

### Summary Efficacy

#### Miliary Tuberculosis
- **Buenos Aires, Argentina**: 1988
  - Efficacy: 78% (28 to 93)
- **Yangon, Burma**: 1987
  - Efficacy: 80% (45 to 92)
- **Papua New Guinea**: 1980
  - Efficacy: 70% (0 to 91)
- **Djakarta, Indonesia**: 1983
  - Efficacy: 75% (5 to 94)
- **Summary efficacy**: 77% (58 to 87)

#### Tuberculous Meningitis
- **Buenos Aires, Argentina**: 1988
  - Efficacy: 98% (70 to 100)
- **Bahia, Brazil**: 1991
  - Efficacy: 91% (78 to 97)
- **São Paulo, Brazil**: 1990/93
  - Efficacy: 87% (72 to 94)
- **São Paulo, Brazil**: 1990/93
  - Efficacy: 92% (65 to 98)
- **Belo Horizonte, Brazil**: 1988
  - Efficacy: 81% (47 to 93)
- **Belo Horizonte, Brazil**: 1988
  - Efficacy: 65% (17 to 86)
- **Yangon, Burma**: 1987
  - Efficacy: 52% (13 to 73)
- **Nagpur, India**: 1996
  - Efficacy: 87% (70 to 94)
- **Chennai, India**: 1996
  - Efficacy: 77% (63 to 86)
- **Delhi, India**: 1996
  - Efficacy: 64% (30 to 81)
- **Delhi, India**: 1989
  - Efficacy: 84% (69 to 97)
- **Lucknow, India**: 1999
  - Efficacy: 47% (-6 to 74)
- **Papua New Guinea**: 1980
  - Efficacy: 58% (-36 to 87)
- **Delhi, India**: 1993
  - Efficacy: 56% (-49 to 87)
- **Summary efficacy**: 73% (67 to 79)

*Trunz, et al. Lancet 2006*
Child TB caseload in Malawi in 1998
Harries AD et al. Int J Tuberc Lung Dis 2002

<table>
<thead>
<tr>
<th>Malawi NTP, 1998</th>
<th>numbers (proportion of childhood caseload)</th>
<th>proportion of total caseload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total caseload</td>
<td>22,982</td>
<td>11.9%</td>
</tr>
<tr>
<td>Total childhood caseload</td>
<td>2,739</td>
<td></td>
</tr>
<tr>
<td>0-4 years</td>
<td>1,615 (58.9%)</td>
<td>7%</td>
</tr>
<tr>
<td>5-14 years</td>
<td>1,124 (41.1%)</td>
<td>4.9%</td>
</tr>
<tr>
<td>Smear-positive PTB</td>
<td>127 (4.6%)</td>
<td>1.3%</td>
</tr>
<tr>
<td>Smear-negative PTB</td>
<td>1,804 (65.9%)</td>
<td>21.3%</td>
</tr>
<tr>
<td>EPTB</td>
<td>808 (29.5%)</td>
<td>15.9%</td>
</tr>
</tbody>
</table>
Child TB accounts for 33% of total TB case-load

<table>
<thead>
<tr>
<th>Pulmonary TB</th>
<th>1208 (61%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smear positive</td>
<td>18</td>
</tr>
<tr>
<td>Smear negative</td>
<td>138</td>
</tr>
<tr>
<td>Smear not done</td>
<td>1052</td>
</tr>
<tr>
<td>EPTB</td>
<td>769 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>1977</td>
</tr>
</tbody>
</table>
# Types of childhood EPTB disease

<table>
<thead>
<tr>
<th></th>
<th>Malawi NTP, 1998</th>
<th>PNG, 2005-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPTB cases</td>
<td>808</td>
<td>1097</td>
</tr>
<tr>
<td>Lymphadenitis</td>
<td>331 (41%)</td>
<td>342 (31%)</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>101 (12%)</td>
<td>94 (9%)</td>
</tr>
<tr>
<td>Spinal</td>
<td>83 (10%)</td>
<td>41 (4%)</td>
</tr>
<tr>
<td>Pericarditis</td>
<td>60 (7%)</td>
<td>12 (1%)</td>
</tr>
<tr>
<td>Abdominal</td>
<td>39 (5%)</td>
<td>173 (16%)</td>
</tr>
<tr>
<td>Miliary</td>
<td>34 (4%)</td>
<td>64 (6%)</td>
</tr>
<tr>
<td>Meningitis</td>
<td>30 (4%)</td>
<td>257 (23%)</td>
</tr>
<tr>
<td>Bone disease</td>
<td>12 (1%)</td>
<td>15 (1%)</td>
</tr>
<tr>
<td>Not indicated/others</td>
<td>118 (14.6%)</td>
<td>99 (9%)</td>
</tr>
</tbody>
</table>

EPTB represented 30% and 39% of childhood TB cases in Malawi and PNG respectively.
Protective effect of BCG

• Stronger protective efficacy against disseminated disease than against pulmonary disease

• Primarily aims to protect against tuberculosis – and has protective efficacy against leprosy

• Recent evidence suggests may also have some protective efficacy against infection when exposed Roy A, et al. BMJ 2014

• Efficacy variable between populations and perhaps between strains used

• In high burden settings, routinely given to newborns

• Practice and coverage variable www.bcgatlas.org
Burden of TB in Australia

- Incidence 5-6 cases/100,000 population per year

- 85% of cases are overseas born – majority present within 2 years of arriving in Australia

- Children < 2% TB caseload

- In 2005-9, there were only 5 cases of TB meningitis notified in Australia, which is equivalent to less than 1 per 20 million general population per year.
These outcomes meet the International Union Against TB and Lung Disease (IUATLD) criteria for low prevalence countries, in determining BCG policy, which are:

- average annual notification rate of pulmonary sputum smear positive cases of 5 per 100,000 or less in the preceding 3 years; OR

- average annual notification rate of TB meningitis in children under 5 years of less than 1 case per 10 million general population; OR

- an average annual risk of TB infection of 0.1% or less
Key recommendations

BCG vaccination is not recommended for general use in the Australian population or for most health care workers (HCWs).

BCG vaccination is contraindicated in HIV infected persons.

BCG vaccination is recommended for:
• Aboriginal and Torres Strait Islander neonates in communities with a high incidence of TB;
• Neonates and children 5 years of age and under who will be travelling to or living in countries or areas with a high prevalence of TB (>50 per 100,000) for extended periods;

BCG vaccination may be considered in the following:
• Children over 5 years of age who will be travelling to or living in countries or areas with a high prevalence of TB for extended periods;
• HCWs who may be at high risk of exposure to drug resistant TB.
Half of the world’s 20 high burden TB countries are in the Asia-Pacific region.
Contraindications to BCG vaccination

• patients with current or previous tuberculosis
• patients with a current febrile illness
• patients with skin conditions such as eczema or dermatitis
• patients who have had a previous live vaccination within the past four weeks
• patients with a history of a positive reaction to a Mantoux test
• people who are HIV infected, or are in a high risk group for HIV and have not been tested
• patients receiving immunosuppressive medication such as corticosteroids or cancer chemotherapy or with other conditions likely to suppress immunity.
Risk of BCG

- Very low risk from vaccine
- Local reaction +/- regional adenitis – varies between strains
- Suppurative adenitis 0.03-0.5%
- Disseminated disease 0.3-0.4 per 1 million
- Increased risk of disseminated BCG in HIV-infected newborns – 1% in pre-ART era
- BCG IRIS with early ART
Thank you