



Tuberculosis

Telehealth rounds

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11.3.16

Overview

- Epidemiology
- Pathogenesis
- Clinical presentation
 - Latent TB
 - Pulmonary TB
 - Extra-pulmonary TB
- Investigations
- Management

Canadian Epidemiology

- Who:
 - Foreign born
 - Aboriginal children
 - < 5 years old
- Incidence of children <15 years
 - <2 per 100,000 in 2009
 - 6.6 per 100,000 in 1970

Figure 5. Reported TB incidence rate by population group in Canada, 2000-2010*

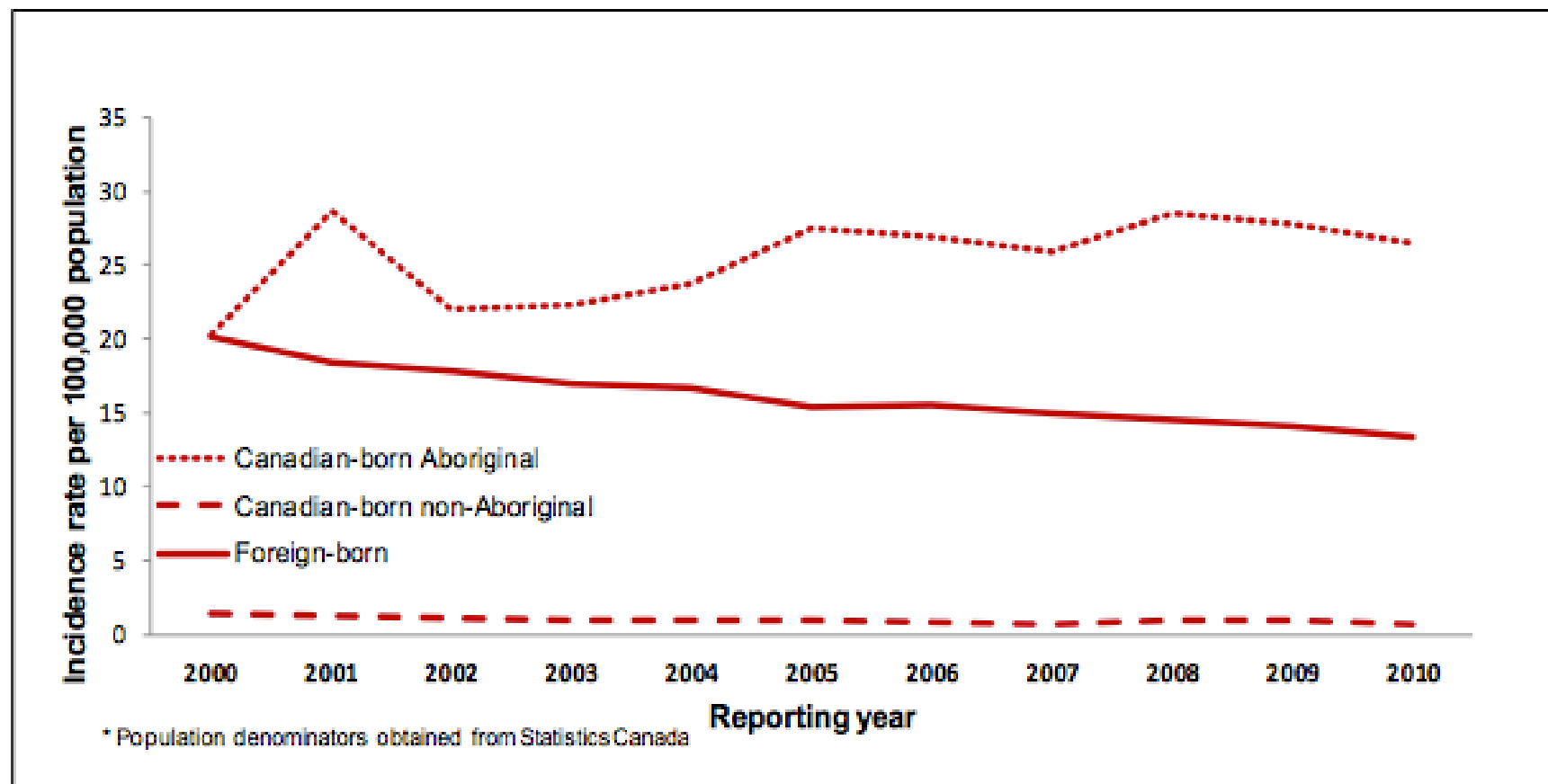
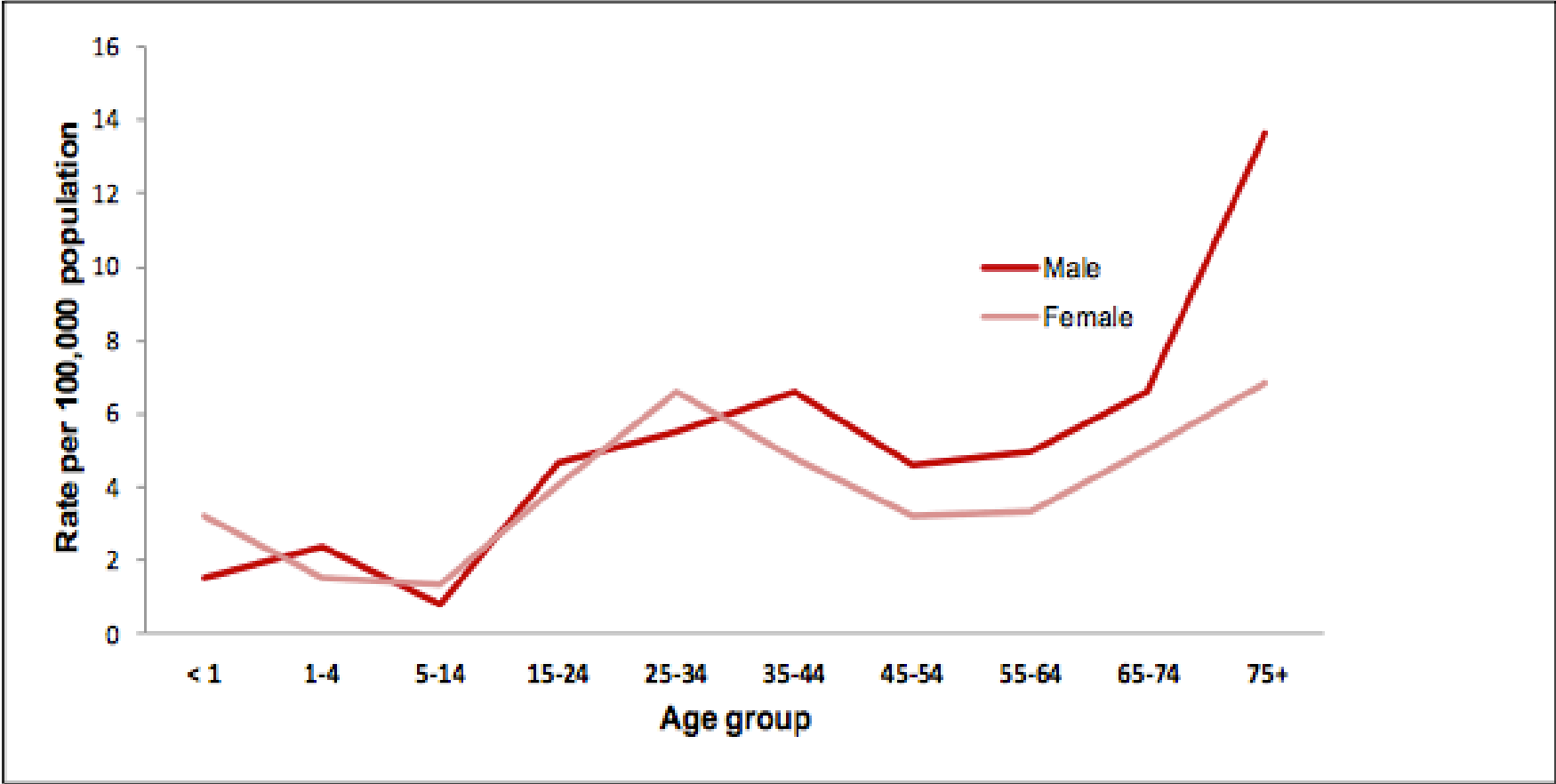


Figure 3. Reported TB incidence rate by sex and age group in Canada, 2010



High risk kids

RF for TB

- Exposure to high risk adults
- Foreign born
- Aboriginal
- Homeless
- IVDU
- Nursing home
- Correctional institutions

RF for progression from LTBI

- < 4 years of age
- Adolescents
- HIV
- TBST +ve within 1-2 yrs
- Immunocompromised

Estimated Risk of Developing Active TB

High risk	Risk of TB
AIDS	110-170
HIV	50-110
Transplant	20-74
Scoliosis	30
Hemodialysis	10-15
Carcinoma H+N	16
Recent TB infection	15
CXR – fibronodular	16-19

Increased Risk	Risk of TB
Glucocorticoids	2-9
Diabetes Mellitus	3-6
Underweight	3
< 4 years	5
Cigarette smoker	3
CXR - granuloma	2
TNF-alpha inhibitors	4

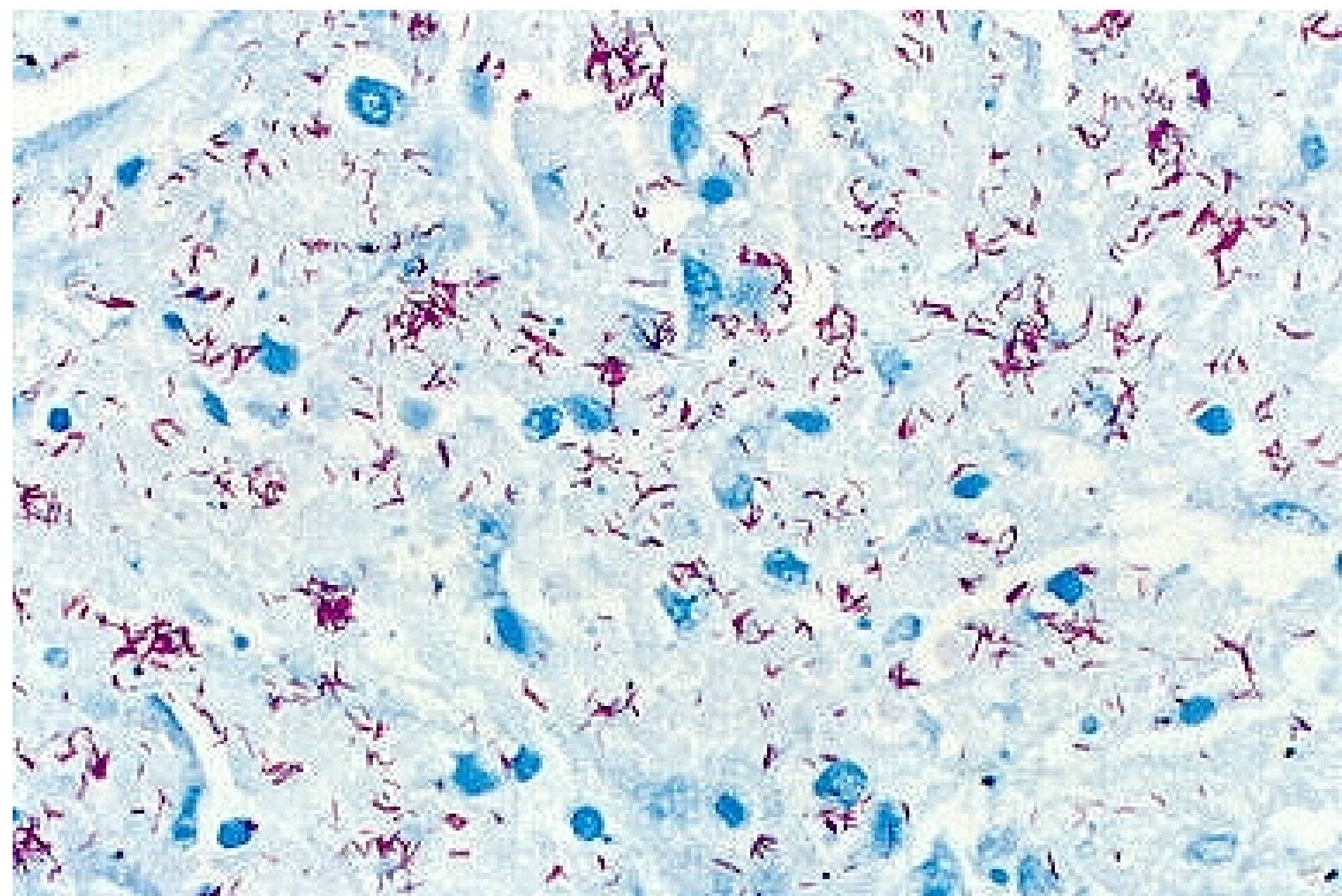
Risk estimated relative to persons with no known risk factors

Are kids different?

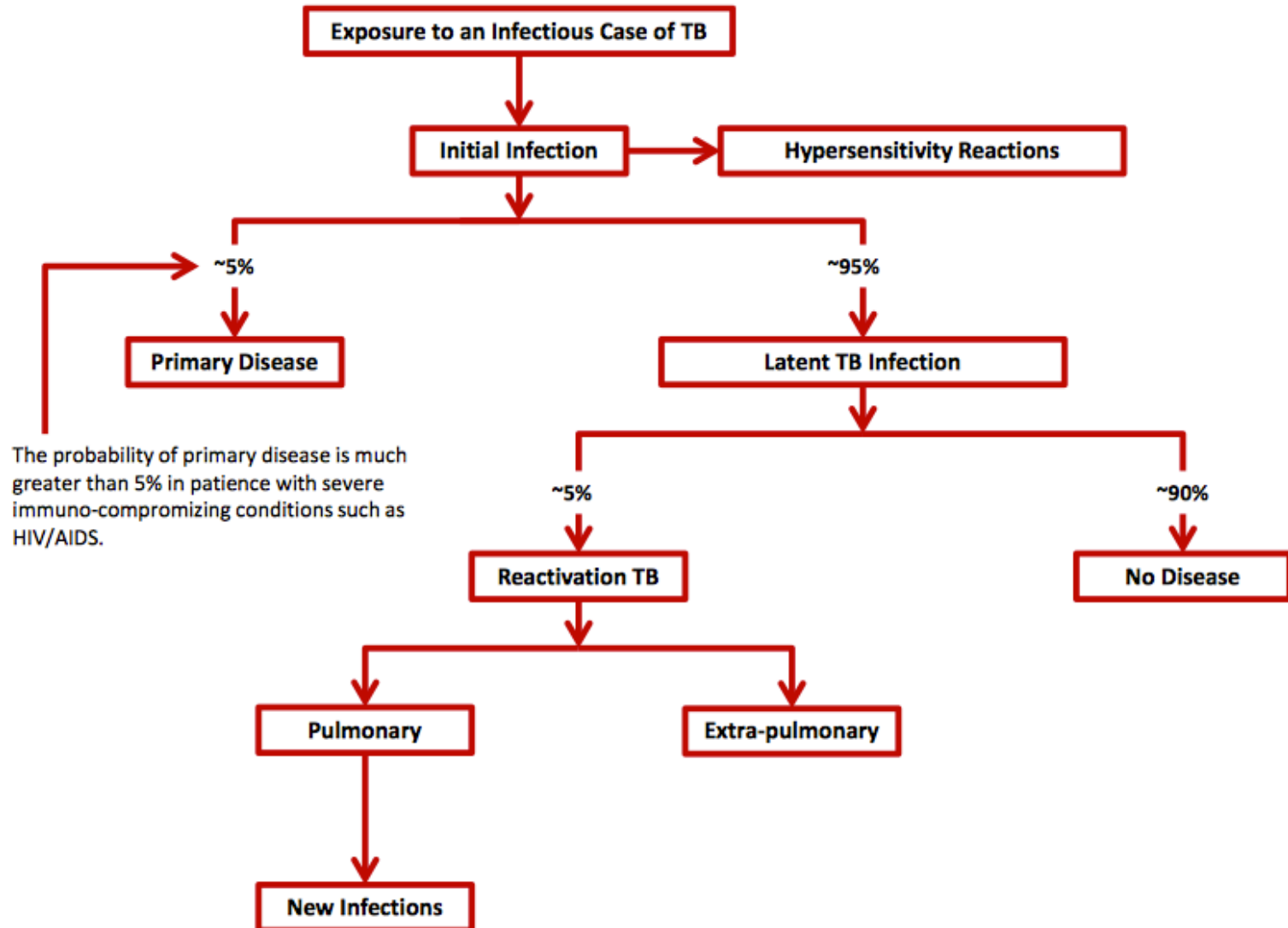
- Nonspecific
- Paucibacillary
- High risk of progression
- Increased miliary, pericardial and CNS disease
- Mimicry: IBD and bone or brain tumours

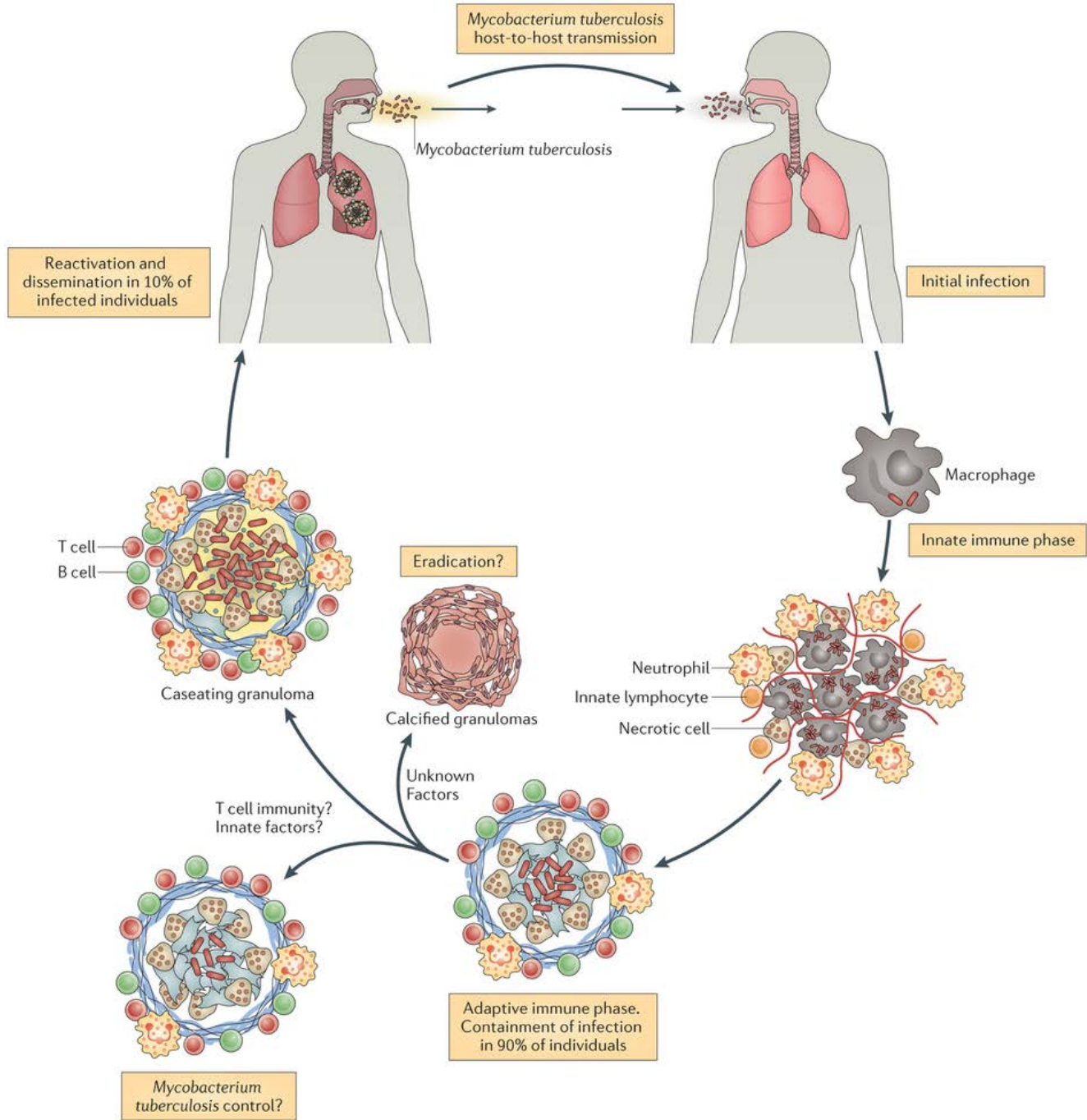






Pathophysiology





Simple

Three options:

- The immune system kills TB → **Success**
- The immune system is unable to kill all of the TB but can “silence” TB → **Latent TB Infection**
- The immune system is unable to kill or silence TB → **Active TB disease**

NB Immune system = CMI and DTH

Clinical Scenarios

1. Latent TB
2. Pulmonary TB – 70 %
3. Extrapulmonary TB – 24 %
4. A contact

Latent TB

- Positive TBST or/and IGRA
 - Normal CXR
 - +/- evidence of fibrosis or calcification in the parenchyma and/or lymph node foci
 - No symptoms or signs of TB
- May be discovered with contact tracing or opportunistic screening

Pulmonary TB

- Asymptomatic
- Young infants: nonspecific
 - Resp signs: distress or wheeze
 - Fever, lethargy or irritability
 - Lymphadenopathy
 - HSM or abdominal distension
 - FTT
- Older children: adult-type disease
 - Fever
 - night sweats
 - weight loss
 - +/- respiratory symptoms

Pulmonary TB

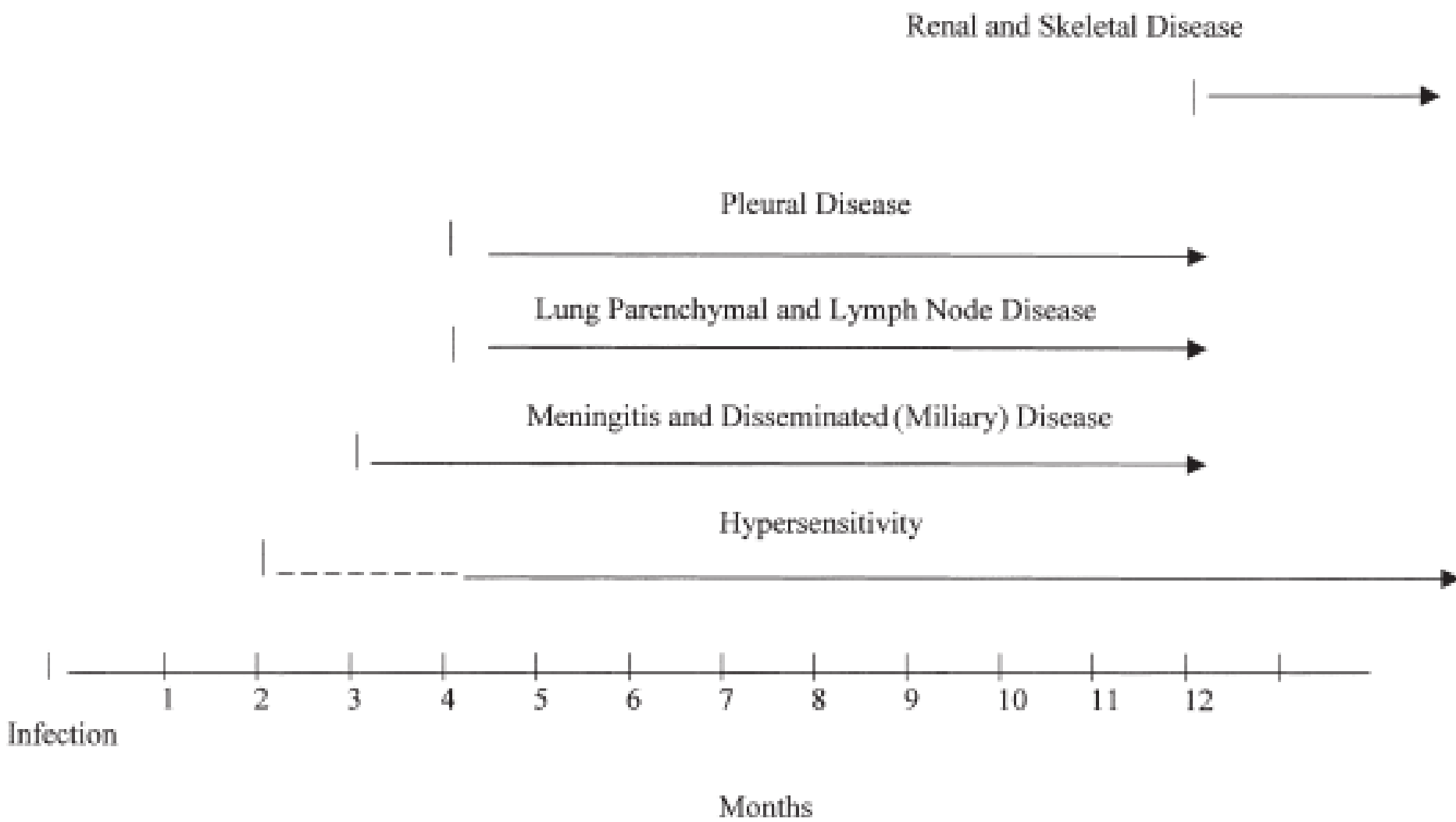
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Diagnosis:

1. Abnormal CXR/exam
- AND
2. +ve TB specific test
 3. A contact

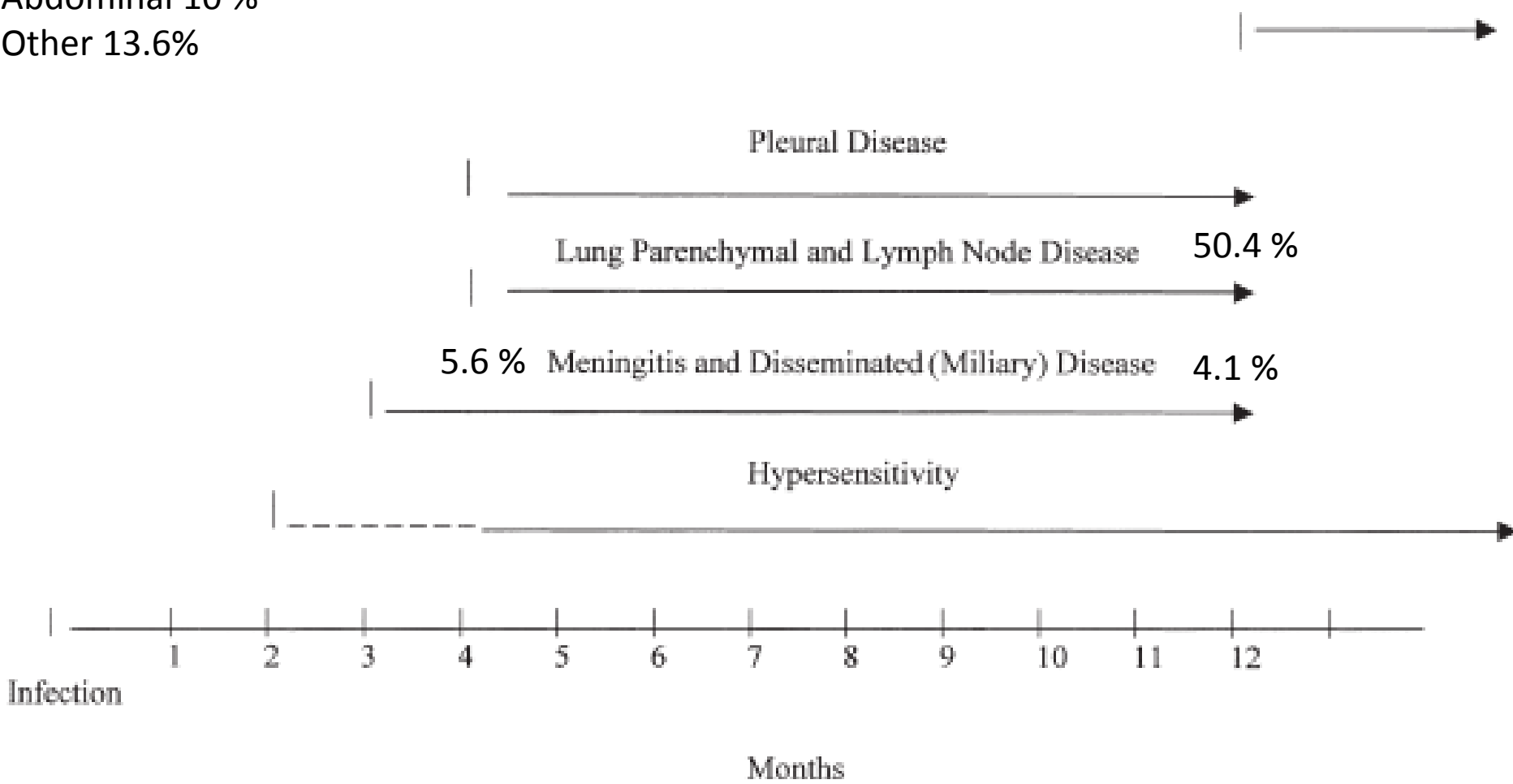






Abdominal 10 %
Other 13.6%

6.2 % Renal and Skeletal Disease 10 %



Extrapulmonary TB

Lymphadenitis: Scrofula

- 66 %
- Cold abscess
- Chronic sinus
- Nodes:
 - Supraclavicular
 - Anterior cervical
 - Tonsillar
 - Submandibular

Meningitis

- 13 %
- 4% of children with TB
- Mortality: 13 - 40 %
- Morbidity:
 - 50% have neurological sequelae
- Brain stem involvement with CN deficits

Extrapulmonary TB

Lymphadenitis: Scrofula

- 66 %
- Cold abscess
- Chronic sinus

Diagnosis:

1. Clinical suspicion

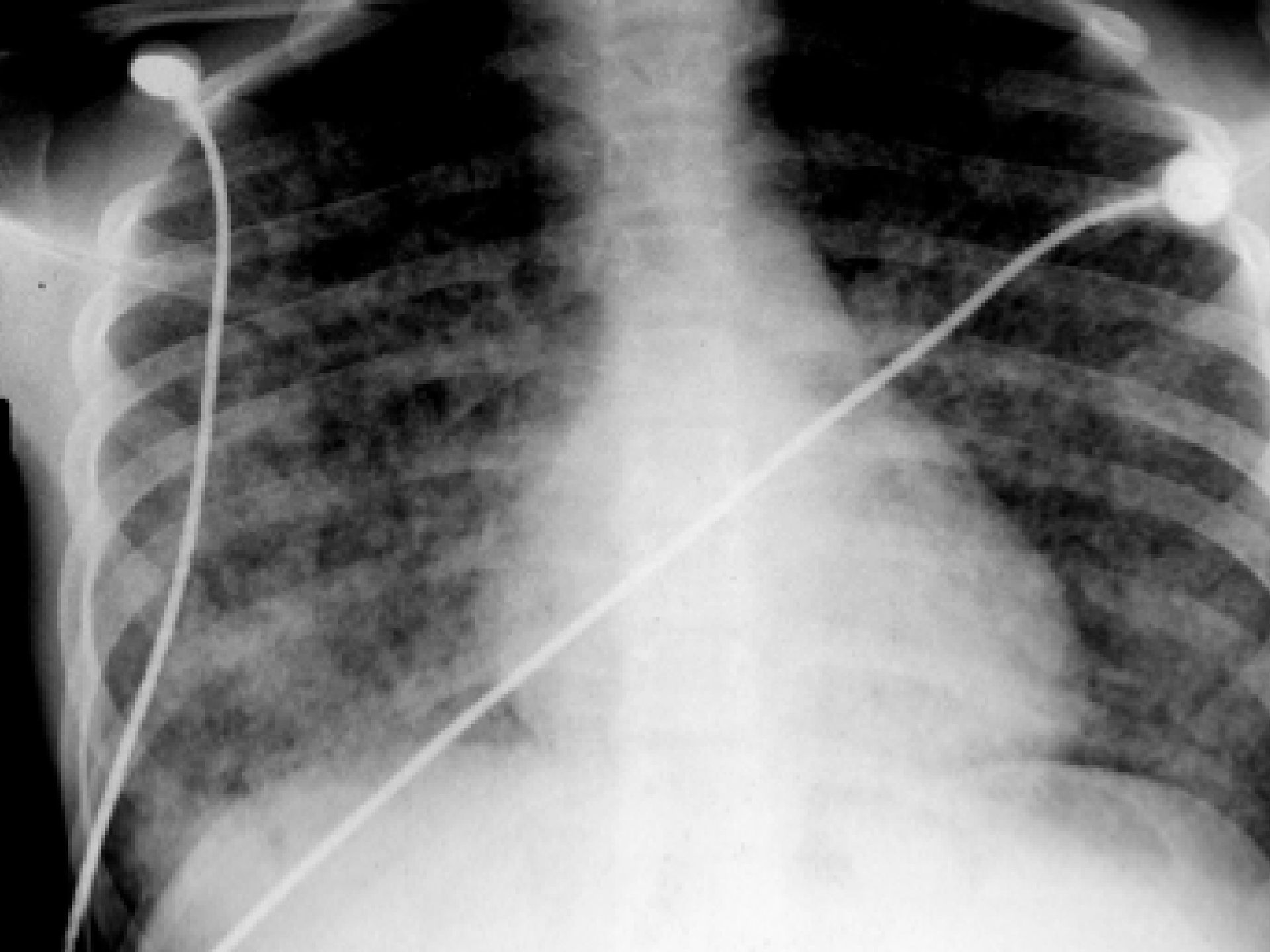
AND

2. +ve TB specific test

Meningitis

- 13 %
- 4% of children with TB
- Mortality: 13 - 40 %
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NB: MUST ASSES FOR PULMONARY TB

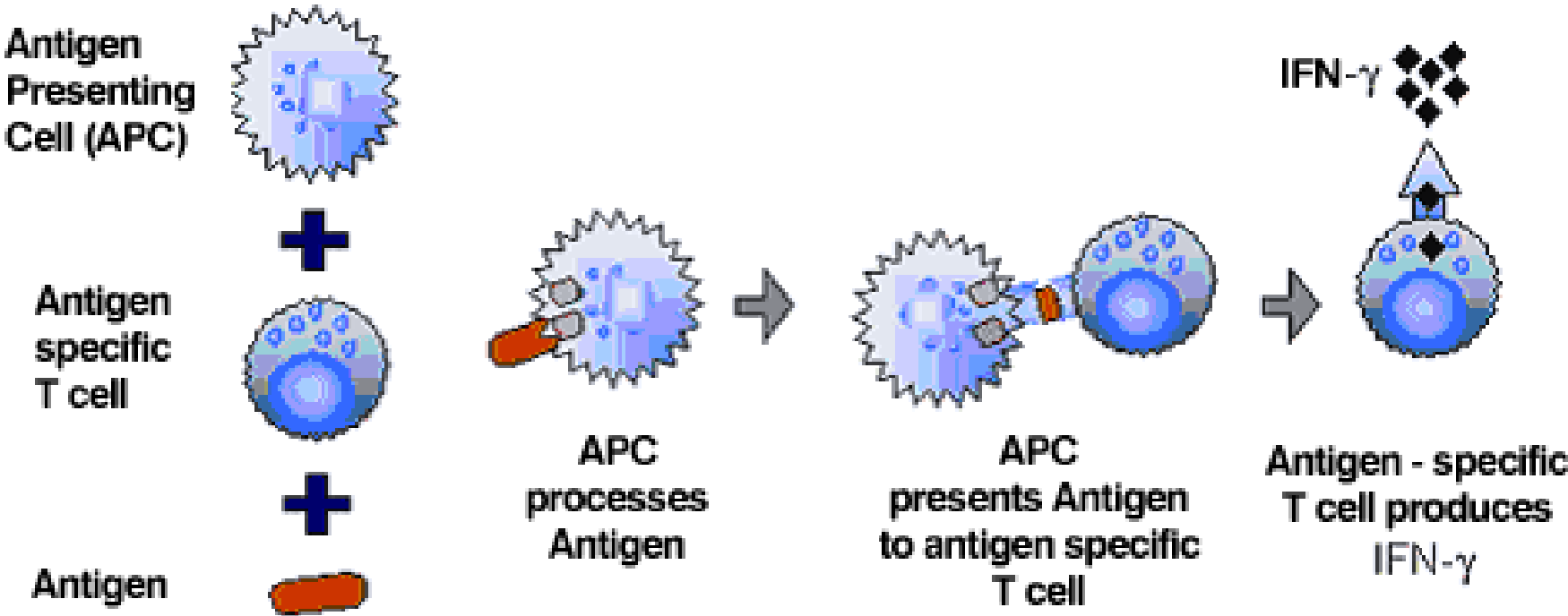


Investigations

- TB specific tests:
 - Gold standard: culture of *M. tuberculosis*
 - TB Skin Test (TBST)
 - Interferon-gamma-release assays (IGRA)
 - Gastric aspirates AFB
 - Biopsy for AFB
- CXR
- Other considerations: CT, MRI, sputum induction



Interferon-Gamma-Release Assays



When to use which?

TST

- High risk patients:
 - Travel
 - Immigration
 - Close contact
- Young
- Immunocompromised
- Annual for HIV +ve
- AbN CXR

NB: a negative TST does not exclude TB

IGRA

- Low risk patients
- In conjunction with TST
 - Positive TST but low risk
 - Negative TST but high risk
 - Immunocompromised patients

NB: IGRA should not be used in isolation

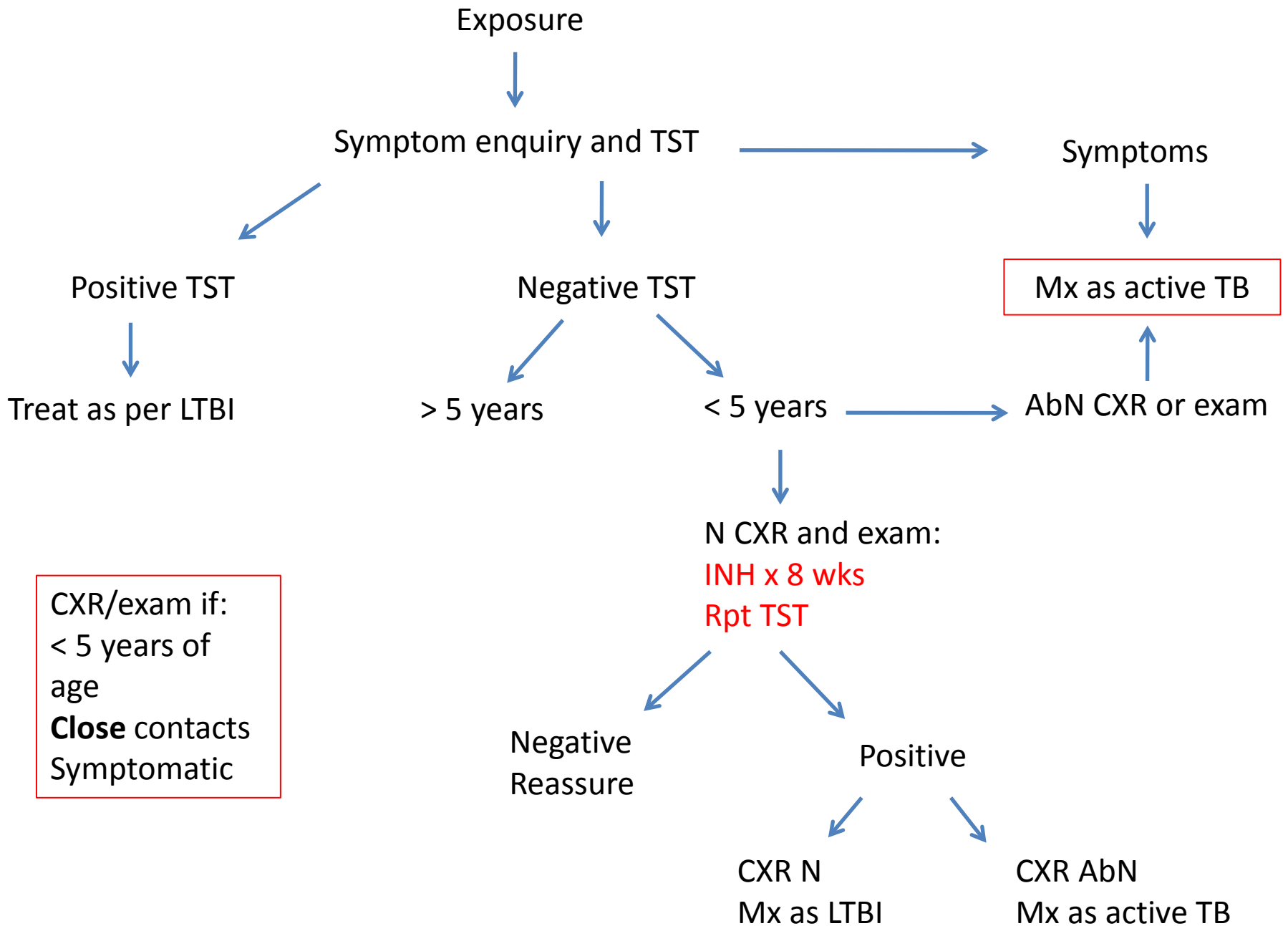
Management Principles

- Before starting therapy:
 - ALT, AST, Bilirubin +/- HIV
 - Except for LTBI on INH
- Monitor monthly
- Daily > intermittent
- CXR 2 months into treatment
- Consider risk of MDR-TB
- Contact tracing

Drugs	Daily dose (range)		Thrice weekly dose [†] (range)		Available dosage forms	Principal side effects
	By weight (mg/kg)	Max (mg)	By weight (mg/kg)	Max (mg)		
INH	10 (10-15) [‡]	300	20-30	600-900	10 mg/mL suspension 100 mg tablet 300 mg tablet	<ul style="list-style-type: none"> - Mild liver transaminase elevation - Hepatitis - Gastritis - Peripheral neuropathy - Hypersensitivity
RMP	15 (10-20)	600	10-20	600	10 mg/mL suspension 150 mg capsule 300 mg capsule	<ul style="list-style-type: none"> - Orange discoloration of secretions - Vomiting - Hepatitis - Flu-like illness
PZA	35 (30-40)	2000	70 (60-80)	*	500 mg scored tablet	<ul style="list-style-type: none"> - Hepatotoxicity - Hyperuricemia - Arthralgia
EMB	20 (15-25)	**	40 (30-50)	***	100 mg tablet 400 mg tablet	<ul style="list-style-type: none"> - Optic neuritis with decreased visual acuity and decreased red-green colour discrimination - Gastrointestinal disturbance
Pyridoxine (used to prevent INH neuropathy; has no anti-TB activity)	1 mg/kg	25			25 mg tablet 50 mg tablet	<ul style="list-style-type: none"> - Few

Management

- Latent TB:
 - INH x 9 months
 - Monitor clinically for hepatic SE
- Intrathoracic and hilar TB:
 - Empiric: INH, rifampin, EMB and PZA,
 - Fully susceptible:
 - INH, rifampin and PZA x 2 months
 - INH and rifampin x 4 months
- Extrapulmonary TB:
 - INH, Rifampin, PZA, **Streptomycin & Aminoglycoside**
 - +/- corticosteroids
 - Longer duration for meningitis



CXR/exam if:
 < 5 years of age
Close contacts
 Symptomatic

Excluded: < 6m, immunocompromised

Congenital TB

- Consider in:
 - Neonate of mother or close contact with active TB at or close to the time of delivery
- Neonatal evaluation:
 - Clinical examination
 - TST + CXR
 - Cultures, including an LP
 - AUS +/- HUS
- Breastfeed: allowed after 2 weeks maternal Tx
- Management of asymptomatic:
 - High risk: 6 months INH → TST at 6m
 - Low risk: 4 months INH → TST at 4m and 6m
- Management of symptomatic
 - As per active TB

Key Messages

- Pediatric TB is largely a disease of Aboriginal and foreign-born children.
- Active TB in children is a sentinel event that should prompt a search for the source case.
- After infection in children under the age of 5 there is a high risk of progression to severe disease
- High clinical suspicion is essential
- Every efforts should be made to obtain a culture
- Close follow up is essential

Any questions?

THANK YOU