MAYO CLINIC

Center for Tuberculosis

Challenges Managing the Young Child Exposed to TB: Case-Based Discussion

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- 1.00 ACPE,
- 1.00 *AMA PRA Category 1 Credit*™
- 1.00 ANCC
- 1.00 Attendance
- 1.00 IPCE

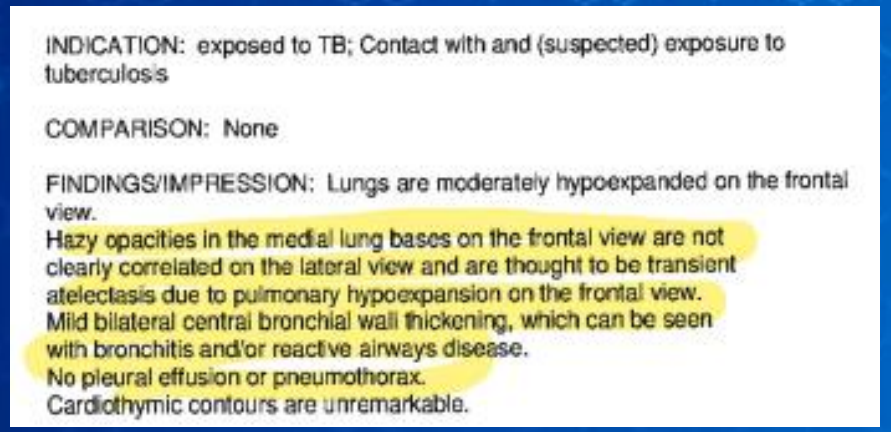
Disclosure:

No relevant financial disclosures to report and no mention of off-label use of any medications or products

Learning Objectives

- Review fundamental diagnostic and treatment strategies for a child exposed to an infectious case of TB
- Identify key challenges and strategies for navigating risk and uncertainty
- Apply emerging data and guidance on management of MDR-TB exposure in children

Case details



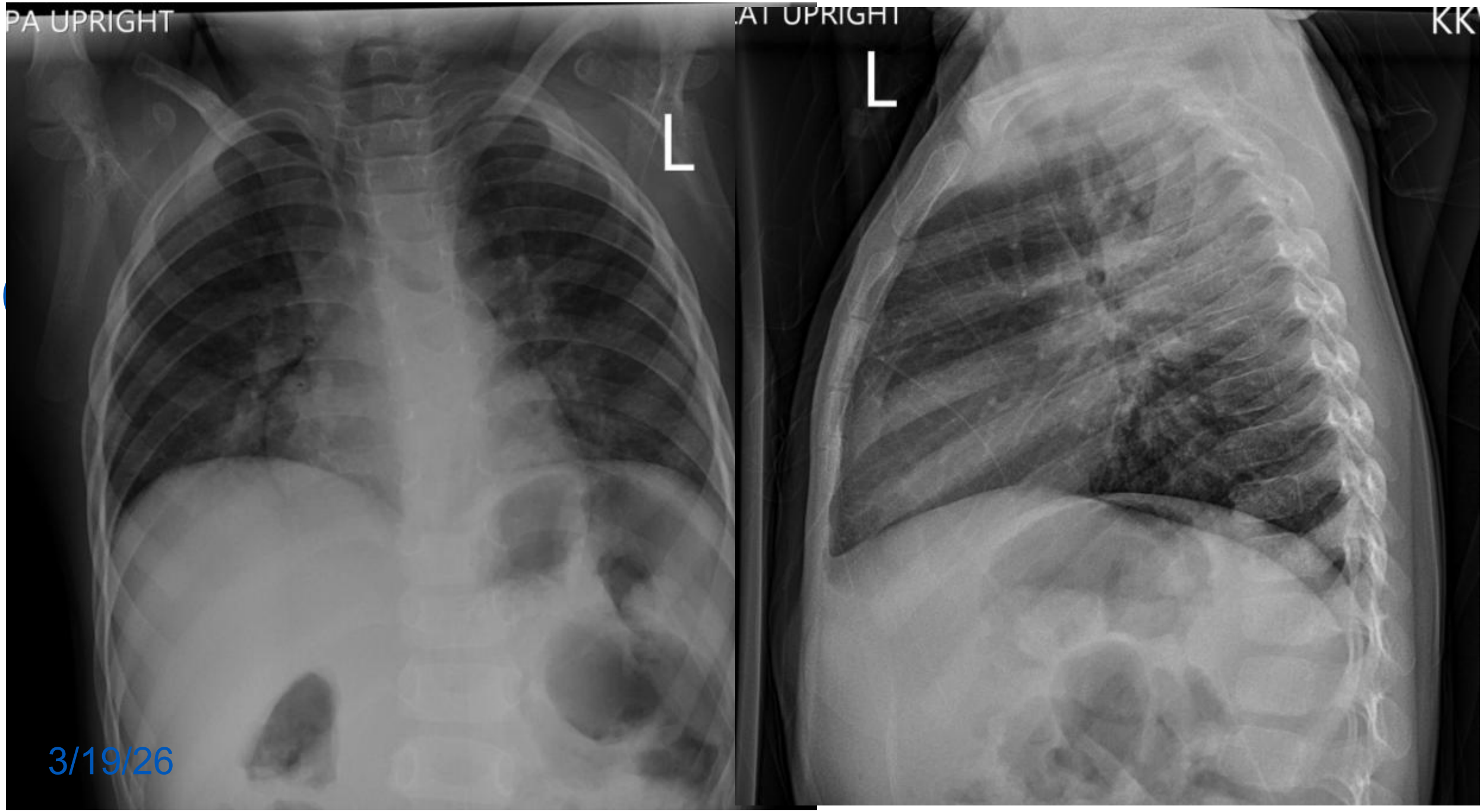
INDICATION: exposed to TB; Contact with and (suspected) exposure to tuberculosis

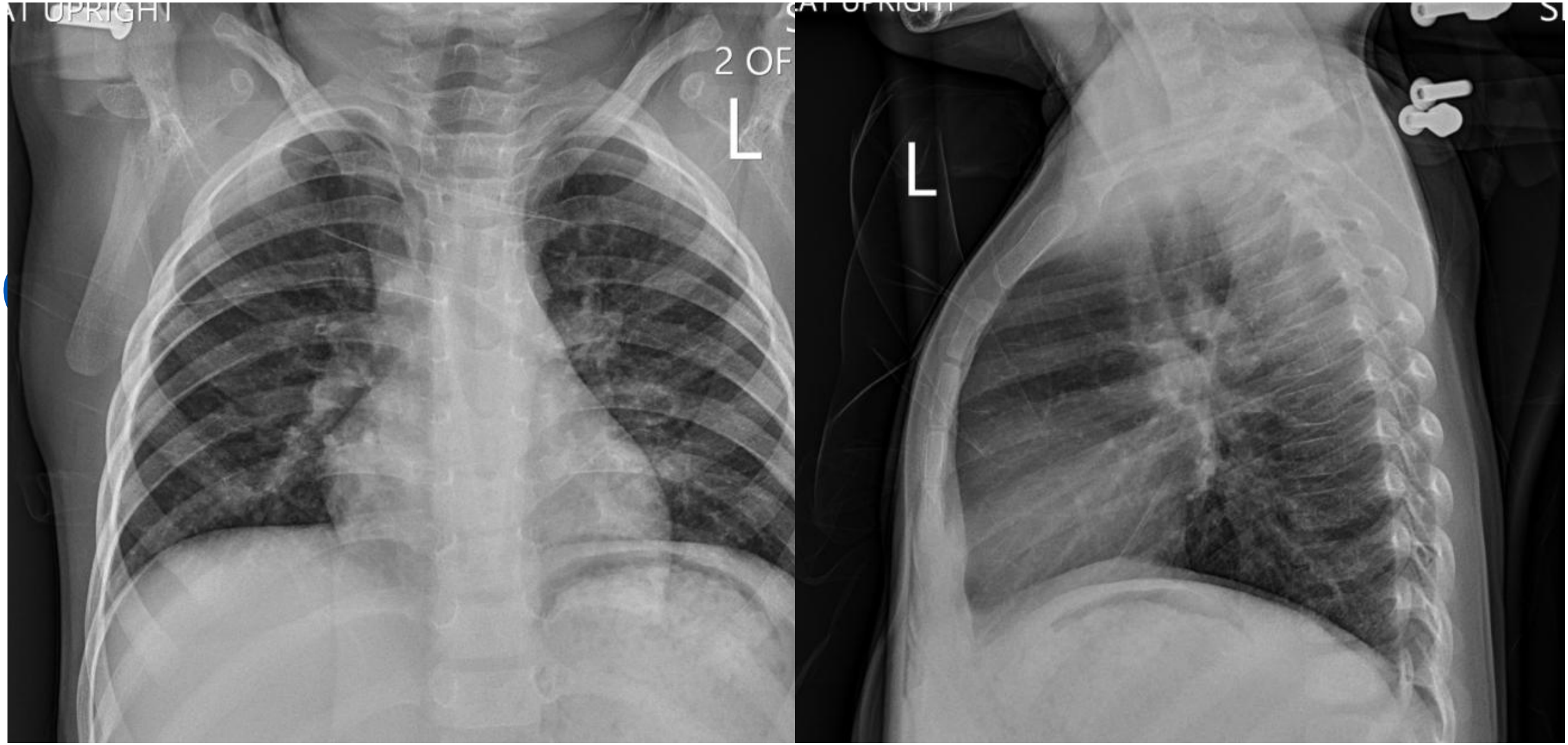
COMPARISON: None

FINDINGS/IMPRESSION: Lungs are moderately hypoexpanded on the frontal view.
Hazy opacities in the medial lung bases on the frontal view are not clearly correlated on the lateral view and are thought to be transient atelectasis due to pulmonary hypoexpansion on the frontal view.
Mild bilateral central bronchial wall thickening, which can be seen with bronchitis and/or reactive airways disease.
No pleural effusion or pneumothorax.
Cardiothymic contours are unremarkable.

I have a 3 /y/o that lives with a new, infectious, lab confirmed active tb disease patient. Index case tested positive MTB NAAT and positive AFB smears 3+/4+ (3-17-26) with no Rifampin mutation in the rpob gene.

This child does not have any s/s at this time. He saw a pediatrician yesterday, TST pending, CXR is abnormal. Child is at home at this time. Should we have the child admitted for TB work up? Or can you view the images and case information and give us your recommendation


PA UPRIGHT
L
AT UPRIGHT
L
KK
3/19/26



4/1/26

Case details

QFT collected 4-15-26 is NEG.

NIL 0.14

TB1 antigen minus Nil 0.032

TB2 antigen minus Nil -0.012

Mitogen minus Nil >10

Unable to get CT scan

5/16: Now 8 weeks from last exposure…

Case details

Image licensed from Getty Images

Unique challenges navigating the child exposed to TB

Age-related Progression from Infection to Active Disease

Age	Pulmonary TB	Disseminated TB/ TB meningitis	No Disease
< 1 year	30-40%	10-20%	50%
1-2 years	10-20%	2-5 %	75-80%
2-5 years	5%	0-5%	95%
5-10 years	2%	< 0-5%	98%
> 10 years	10-20%	< 0-5%	80-90%

Adapted from Cruz et al, Clinical manifestations of tuberculosis in children. *Paediatr Resp Rev. 2007* Jun;8(2):107-17

Age-related Extrapulmonary Disease

TABLE 1 Childhood tuberculosis cases with any extrapulmonary involvement by age group and selected sites of disease, United States, 1993 to 2015[a]

Site of disease	% occurrence among children in indicated age group			
	<1 yr (*n* = 2,160)	1–4 yrs (*n* = 10,328)	5–9 yrs (*n* = 4,753)	10–14 yrs (*n* = 3,982)
Lymphatic	7.8	19.2	22.3	19.5
Meningeal	8.4	4.0	1.7	2.1
Miliary	4.5	1.1	0.5	1.1
Bone/joint	0.4	1.3	1.8	2.4
Other	3.3	2.6	4.5	9.0
Total	24.4	28.2	30.8	34.2

a Provided by the CDC. Data from reference 13.

Lamb, G. S., & Starke, J. R. (2017). Tuberculosis in infants and children. Microbiology Spectrum, 5(2). https://doi.org/10.1128/microbiolspec.tnmi7-00372016[1] (https://journals.asm.org/doi/10.1128/microbiolspec.tnmi7-0037-2016)

Age-related Rapidity of Progression and Window Prophylaxis

- Children <5 years
- Time from enrollment to diagnosis
- No preventative treatment (controls)

IGRA or TST + children:
Cumulative incidence at 2 years:
19%
96% of children whodeveloped TB did so within3 months

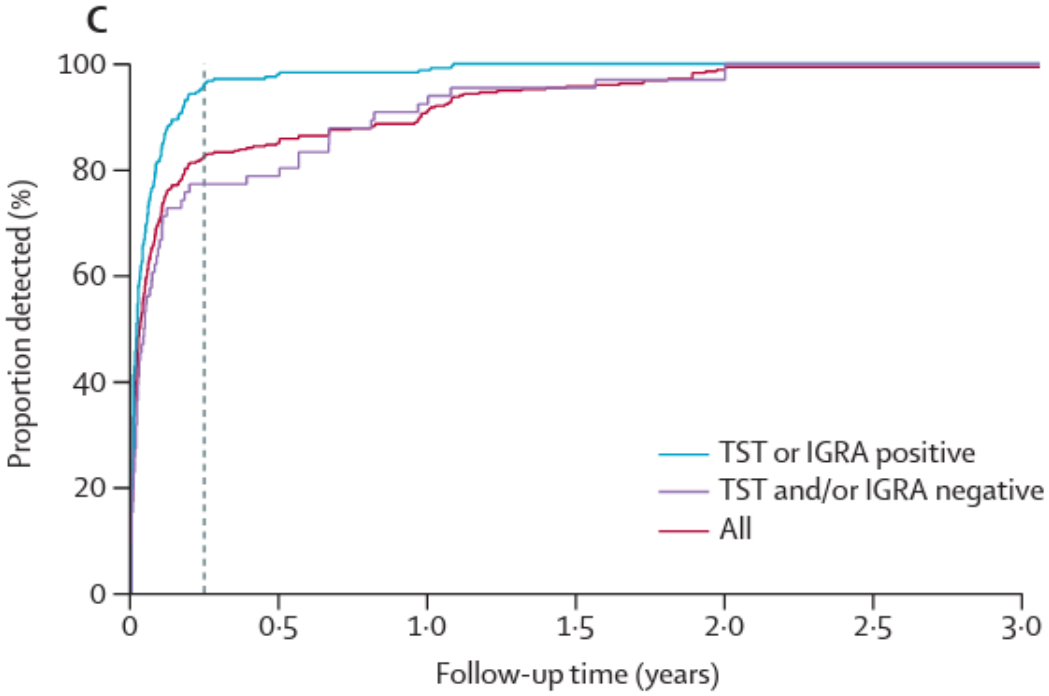


Figure 3: **Tuberculosis cases diagnosed over follow-up time**

Martinez et al. The risk of tuberculosis in children after close exposure: a systematic review and individual-participant meta-analysis. Lancet 2020; 395: 973–84

Clinical Presentation of Pediatric TB: Young Children (<2 years)

- Symptomatic: 64%
- Failure to thrive (51%)
- Persistent non-remitting cough (17%)
- Wheezing (12.6%)
- Weight loss (3%)
- Fever (2%)
- Lethargy (1%)
- Frequently, early pulmonary intrathoracic lymph node TB will be asymptomatic!

Randomized Controlled Trial > Pediatr Infect Dis J. 2015 Nov;34(11):1157-62.
doi: 10.1097/INF.0000000000000847.

The Role of Clinical Symptoms in the Diagnosis of Intrathoracic Tuberculosis in Young Children

Humphrey Mulenga [1], Michele D Tameris, Kany Kany A Luabeya, Hennie Geldenhuys, Thomas J Scriba, Gregory D Hussey, Hassan Mahomed, Bernard S Landry, Willem A Hanekom, Helen McShane, Mark Hatherill

Clinical Presentation of Pediatric TB: Ages 2-10

- Lower rates of progression to active disease
- Bronchial and intrathoracic disease most common
- Often asymptomatic

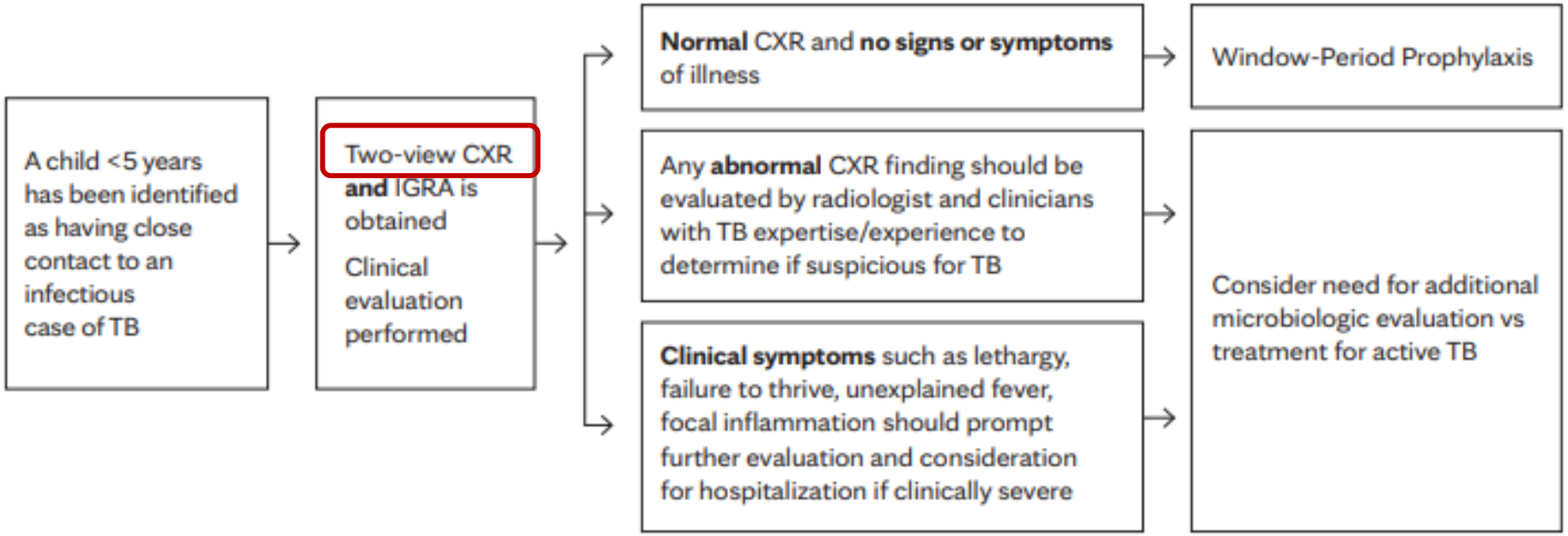
Marais, B. J., Gie, R. P., Schaaf, H. S., Hesseling, A. C., Obihara, C. C., Starke, J. J., Enarson, D. A., Donald, P. R., & Beyers, N. (2004). The natural history of childhood intra-thoracic tuberculosis: A critical review of literature from the pre-chemotherapy era. *International Journal of Tuberculosis and Lung Disease, 8*(4), 392–402.

Diagnosis and Management Guide

Children Under 5 Exposed to Infectious Tuberculosis (TB)

https://centerfortuberculosis.mayo.edu/media/studio-sites/center-for-tuberculosis-website/products/mc8011-09.pdf

TYPICAL EVALUATION PATHWAY FOR EXPOSED CHILDREN

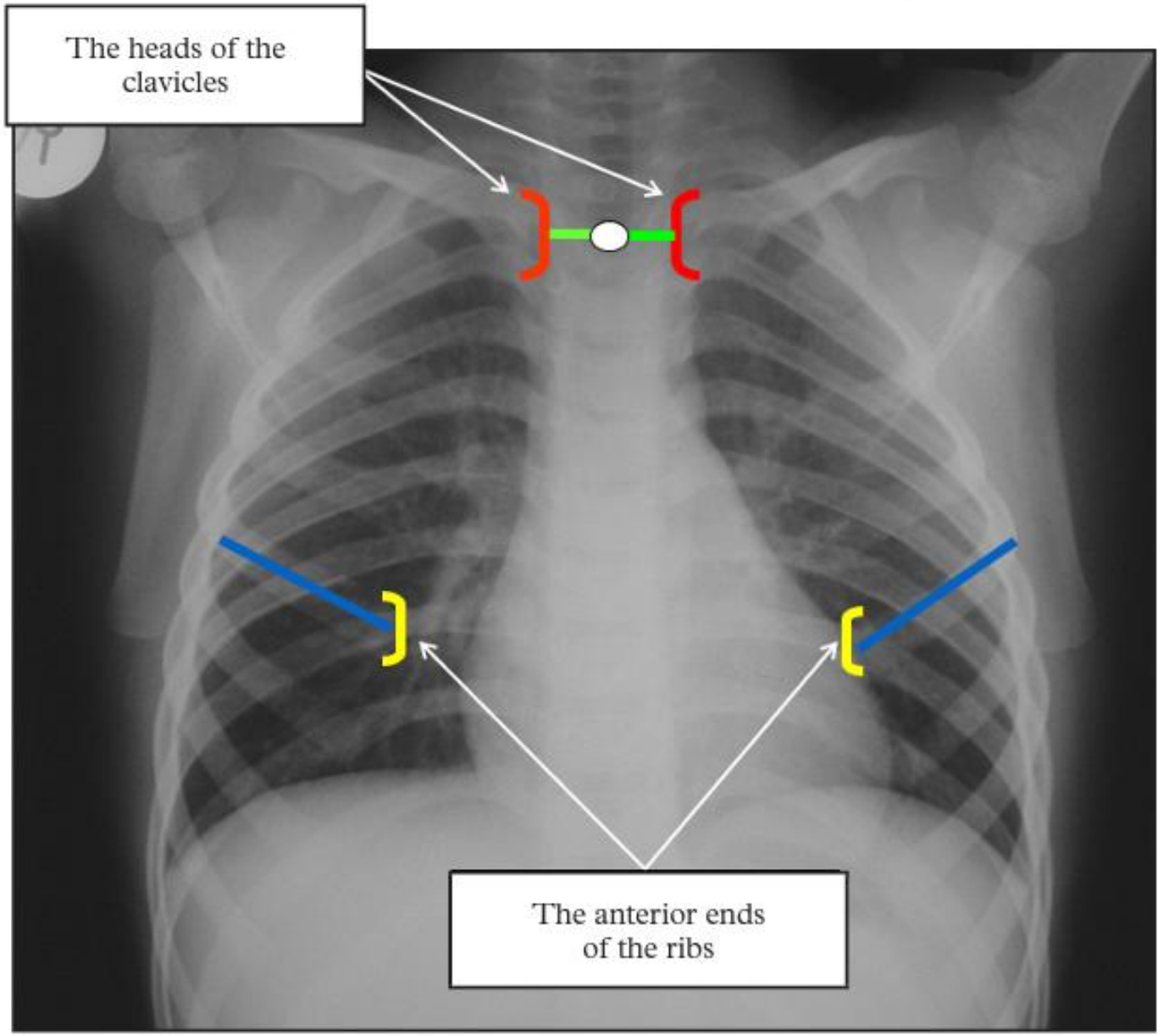


Pediatric TB Radiology

https://theunion.org/technical-publications/diagnostic-cxr-atlas-for-tuberculosis-in-children

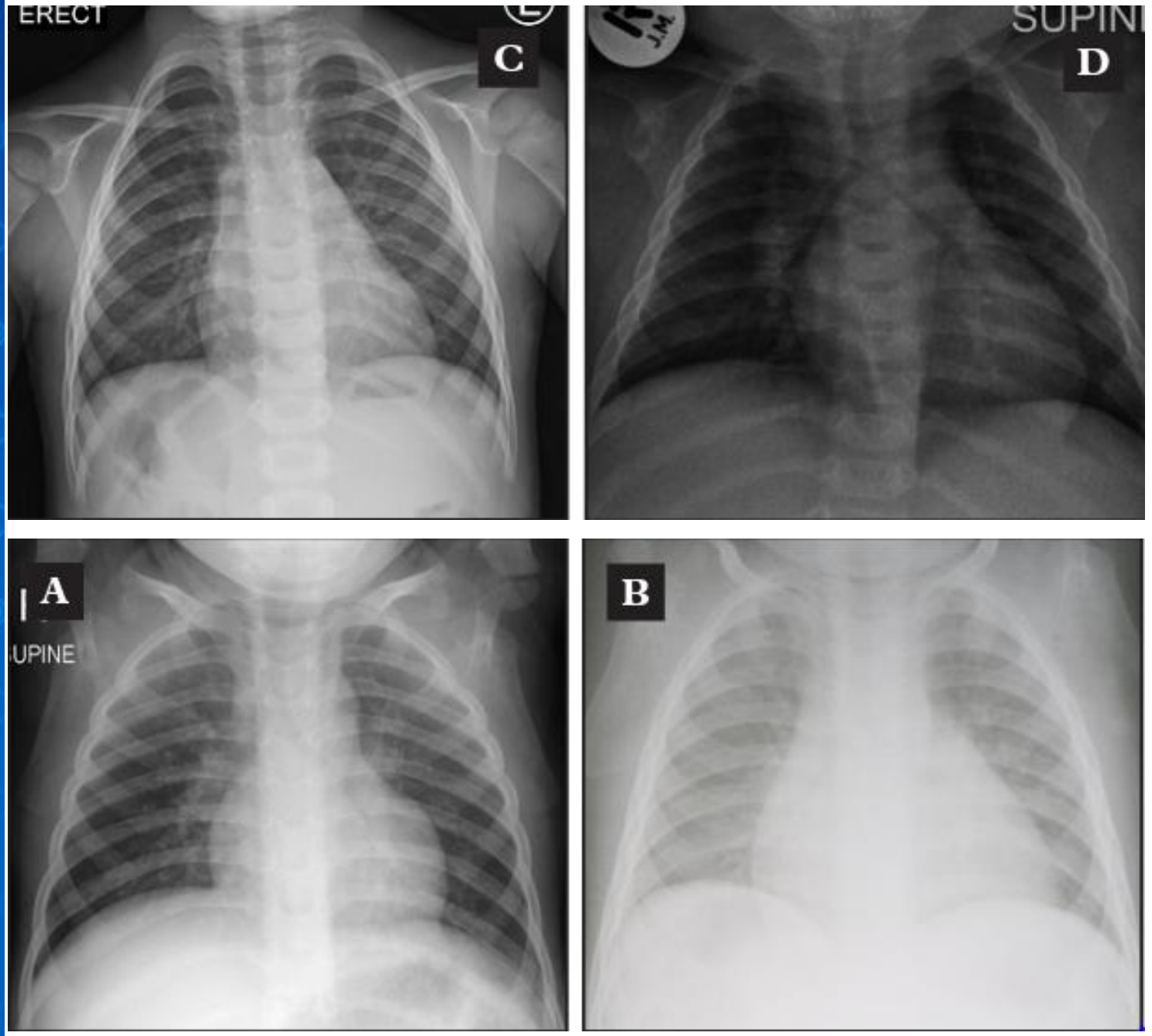
Assuring the quality of the pediatric CXR

Rotation

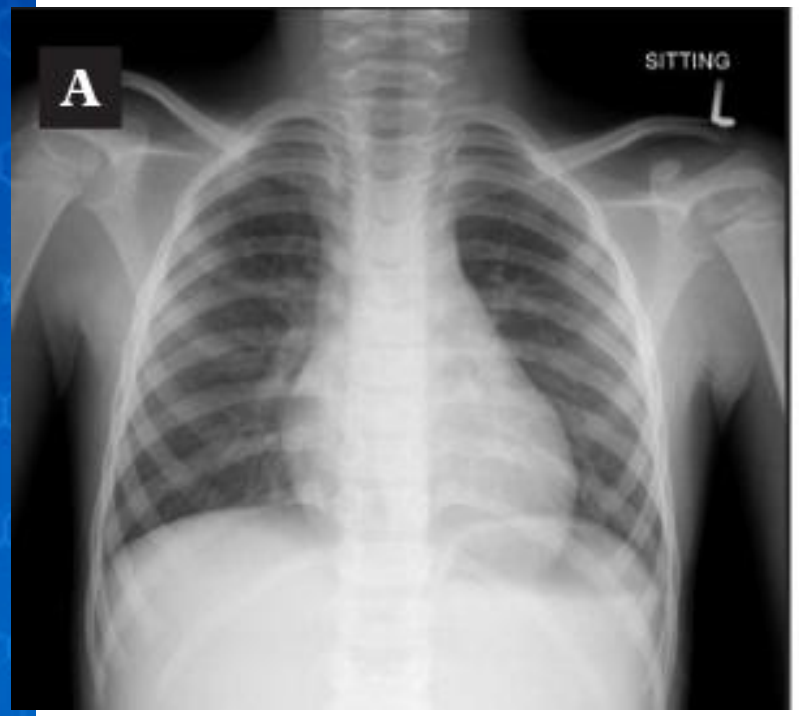


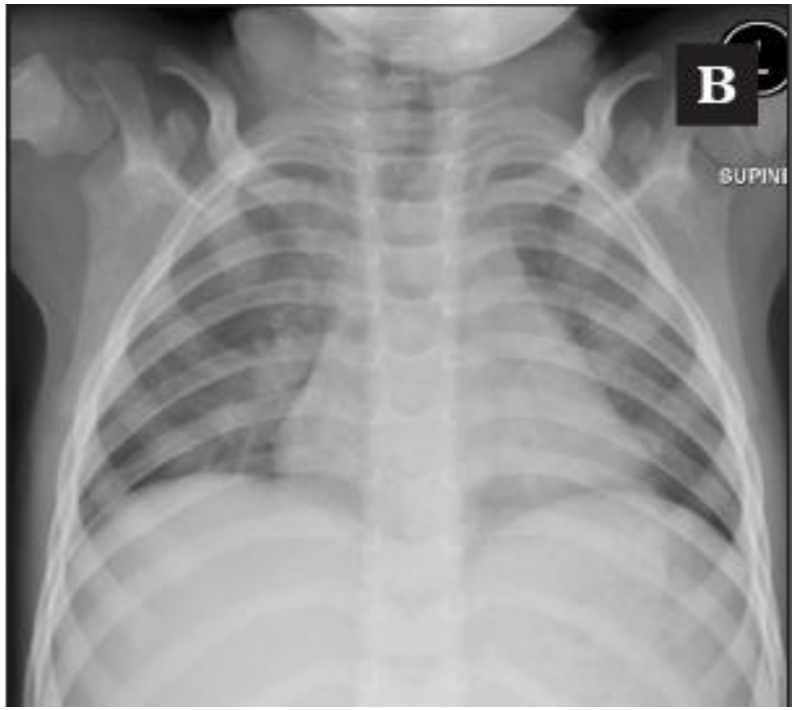
Assuring the quality of the pediatric CXR

Penetration



Assuring the quality of the pediatric CXR

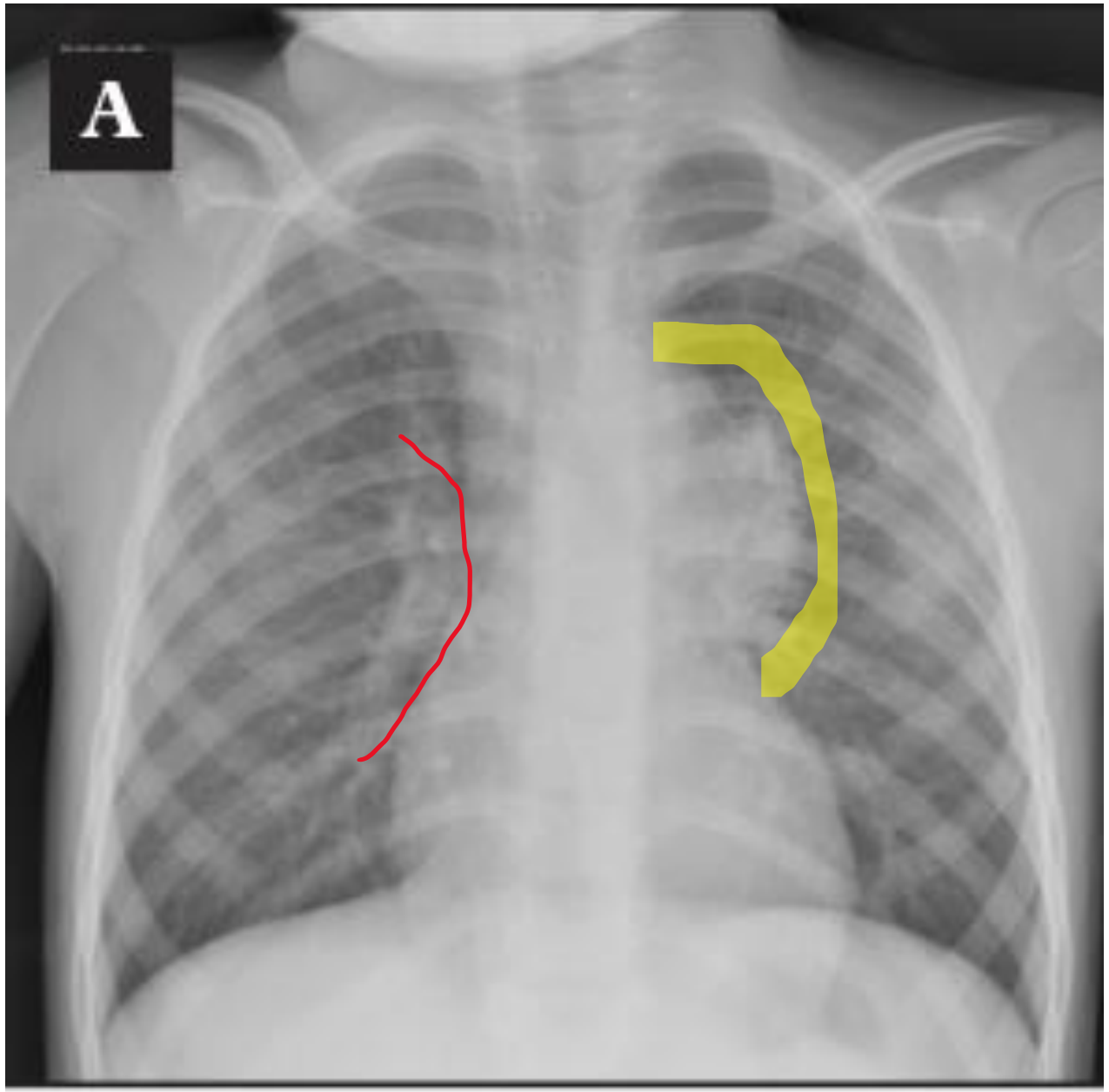




Inspiration

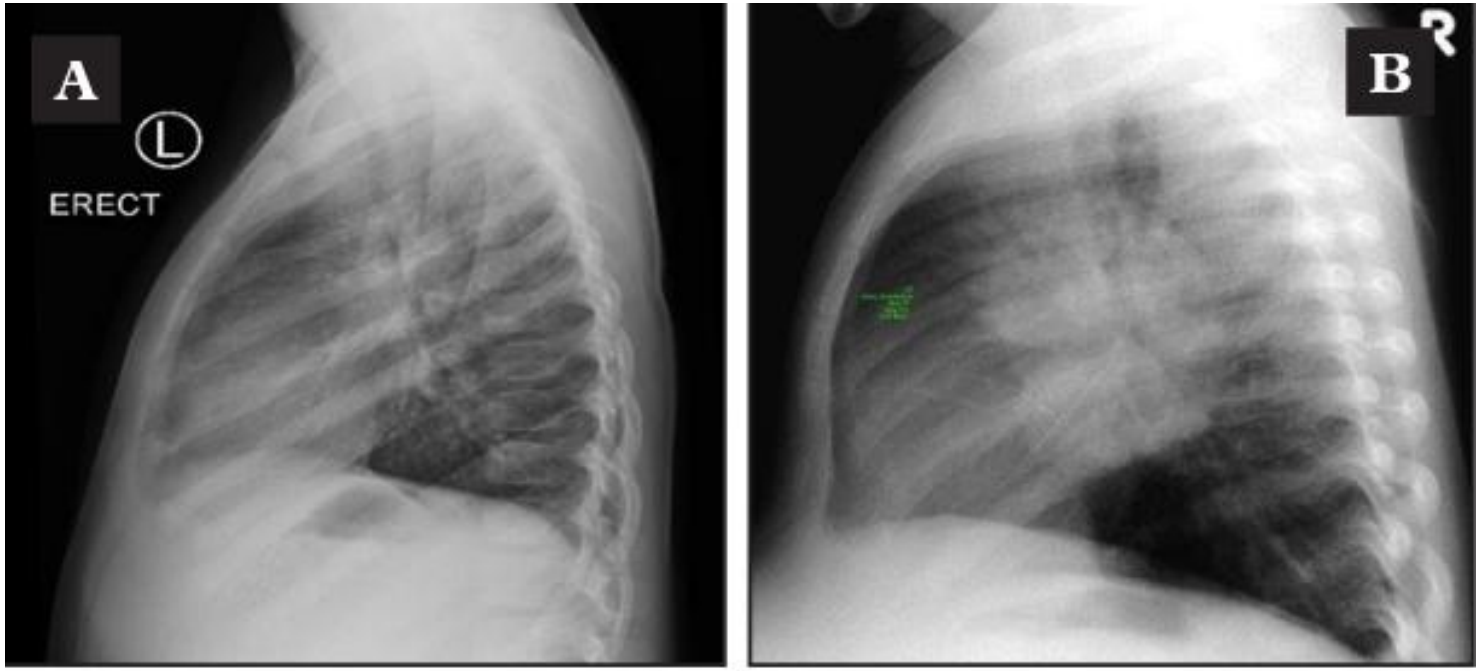
Radiographic TB disease patterns in children

Hilar adenopathy



Radiographic TB disease patterns in children

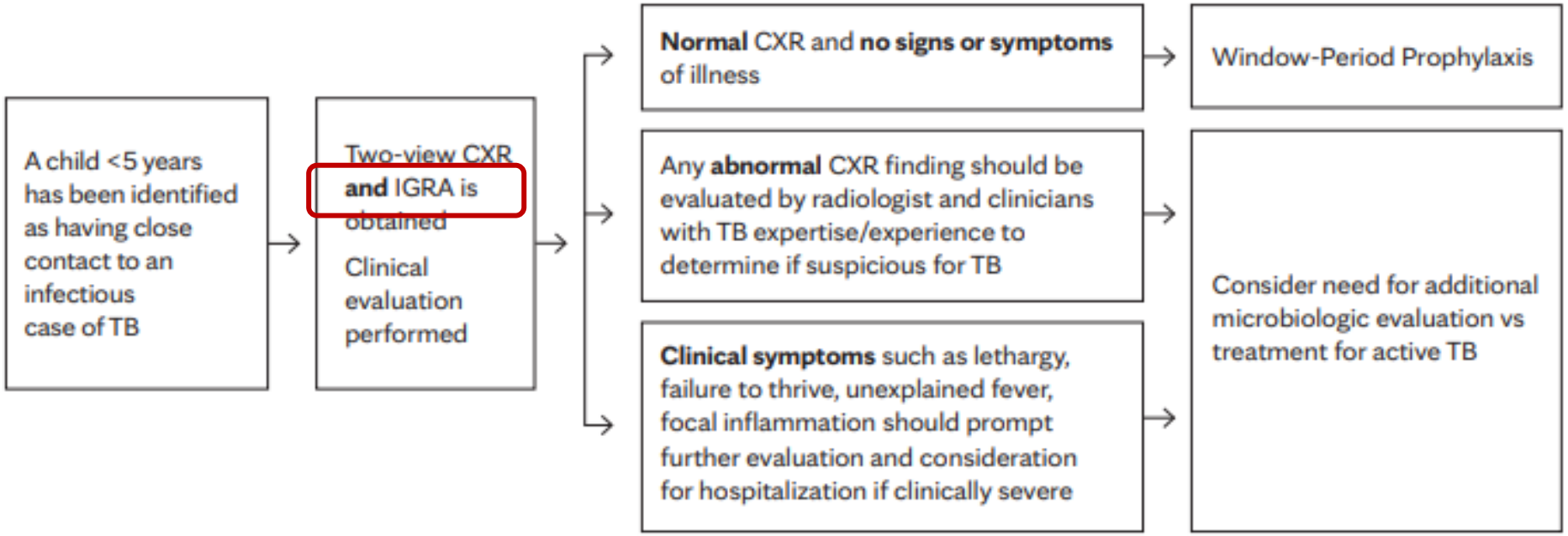
Hilar adenopathy: importance of lateral film

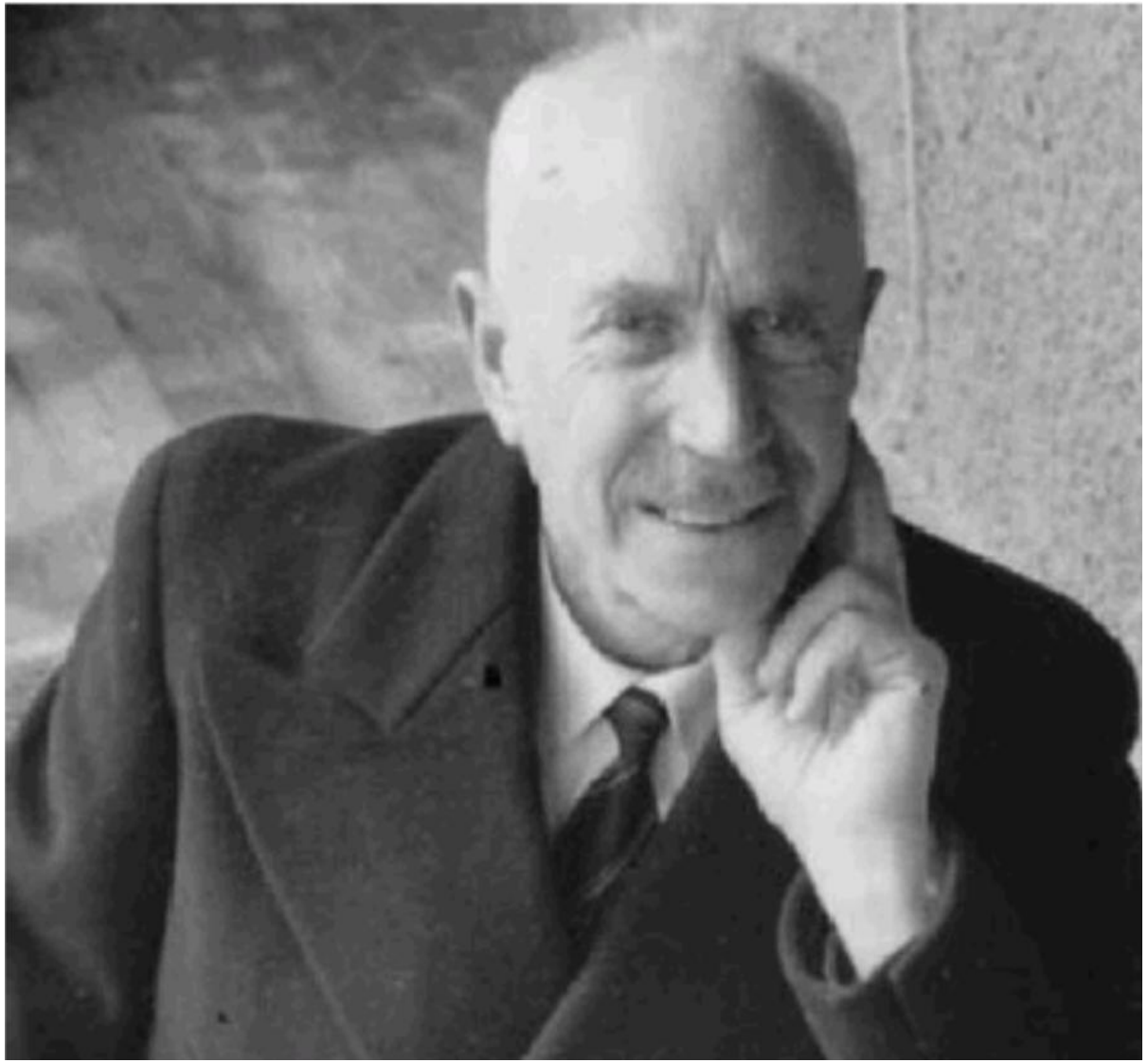


Radiographic TB disease patterns in children

Discriminating Non-TB abnormalities

TYPICAL EVALUATION PATHWAY FOR EXPOSED CHILDREN



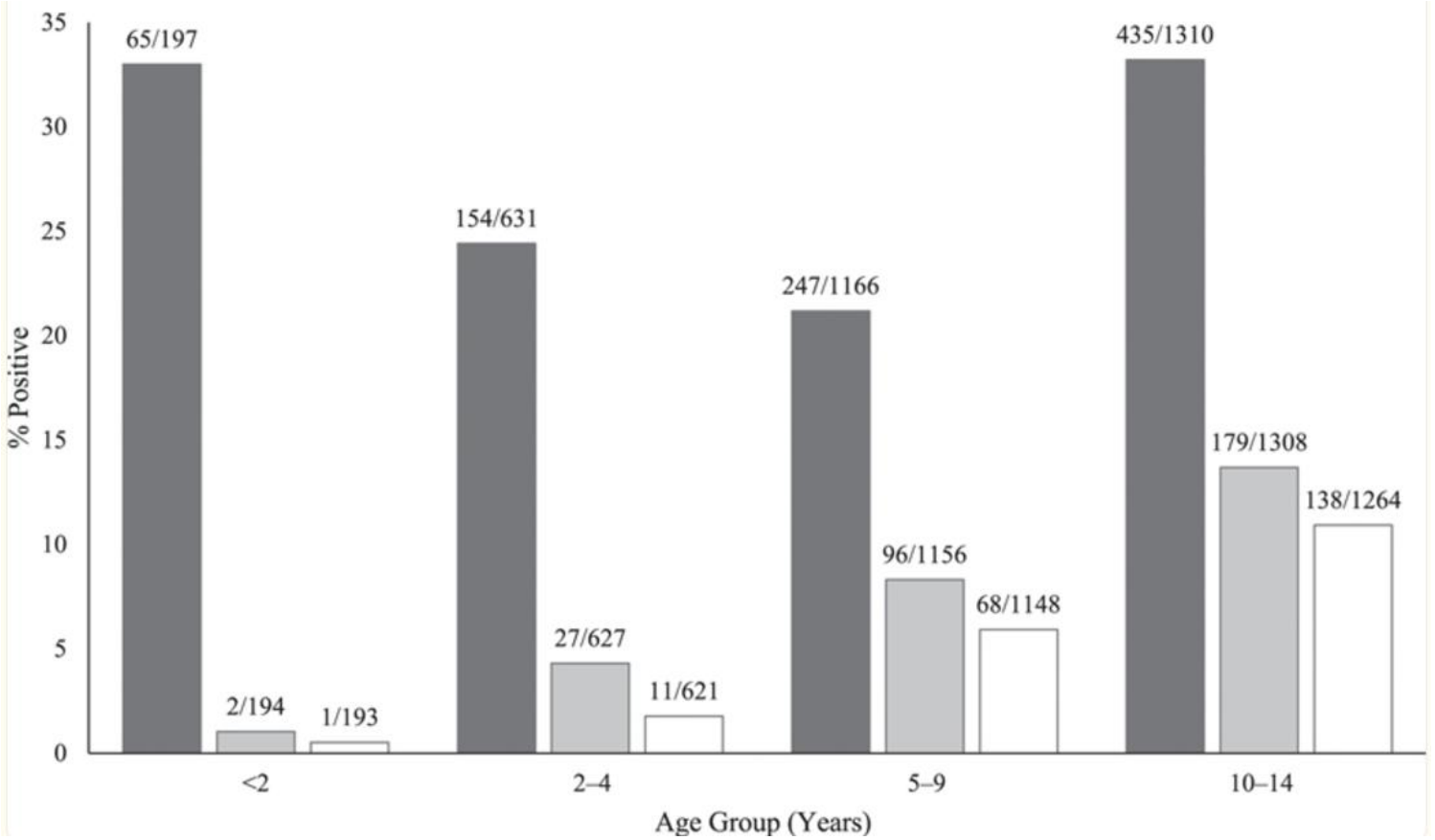


TST

Charles Mantoux

Developed the TST in 1908

TST vs IGRA in BCG-Vaccinated Children

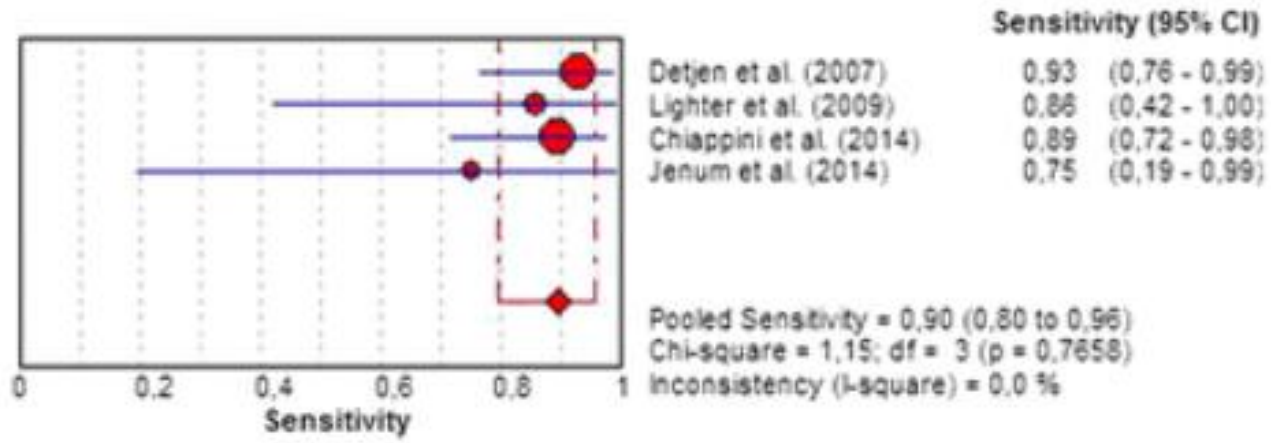


Interferon-γ Release Assays in Children <15 Years of Age

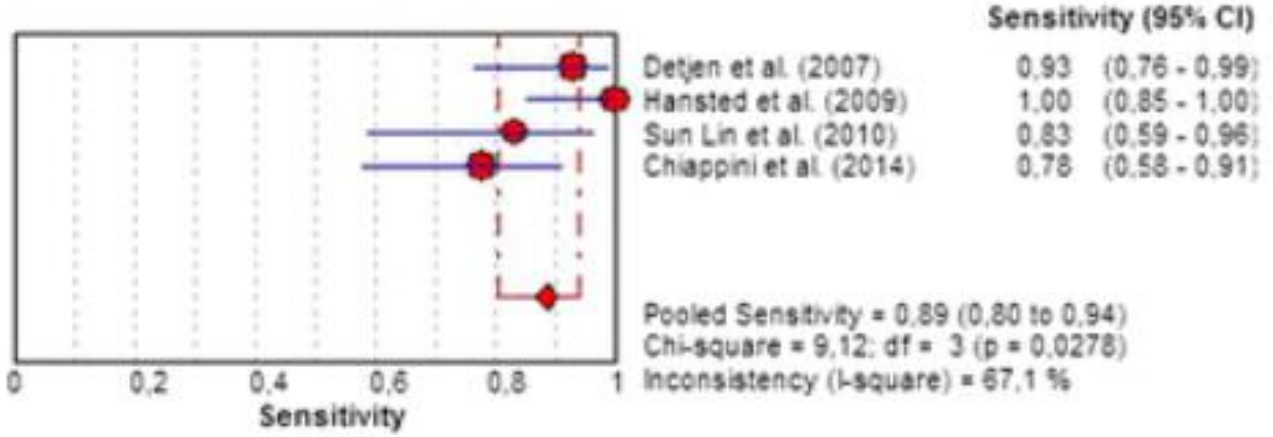
Amina Ahmed [a], Pei-Jean I Feng [b], James T Gaensbauer [c], Randall R Reves [c], Renuka Khurana [d], Katya Salcedo [e], Rose Punnoose [f], Dolly J Katz [b]; TUBERCULOSIS EPIDEMIOLOGIC STUDIES CONSORTIUM

Sensitivity in TB disease

- Most studies conducted in high-incidence countries
- Heterogeneity in design: particularly re. culture proven vs. clinical case
- Error in one early meta-analysis
- Reported sensitivity as low as 62% (T SPOT) and 70% (QFT)



c Sensitivity of QFT



e Sensitivity of T-SPOT

BMC Infectious Diseases

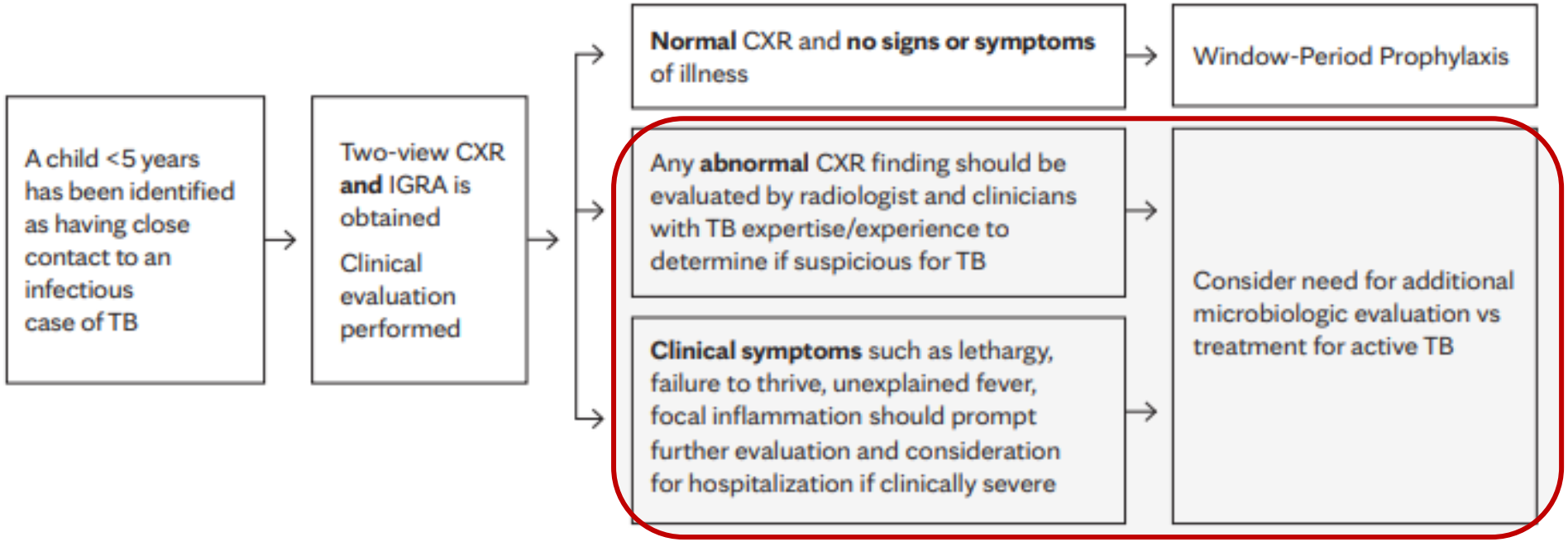
Performance of interferon-γ release assays in the diagnosis of confirmed active tuberculosis in immunocompetent children: a new systematic review and meta-analysis

Patrizia Laurenti, Matteo Raponi ✉, Chiara de Waure, Marta Marino, Walter Ricciardi and Gianfranco Damiani

BMC Infectious Diseases BMC series - open, inclusive and trusted 2016 16:131

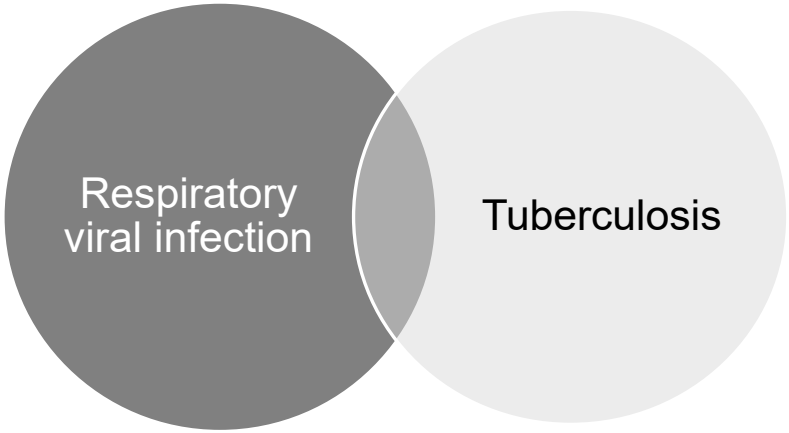
Pooled sensitivity: 90% QFT and 89% T SPOT

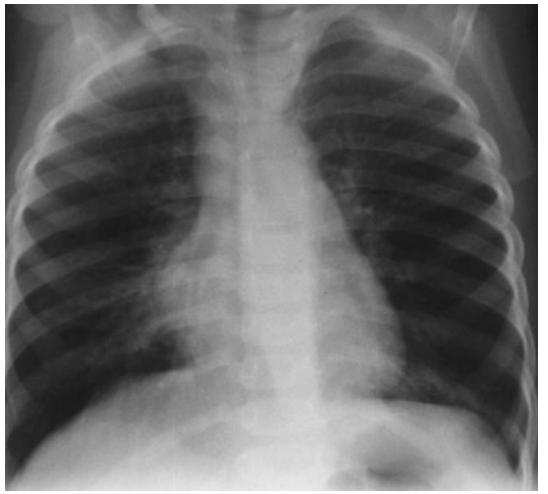
TYPICAL EVALUATION PATHWAY FOR EXPOSED CHILDREN



Navigating Uncertainty

Child with household exposure, positive IGRA, cough





"Streaky RML density, potentially not inconsistent with an infectious etiology, which may not be exclusory of tuberculosis in the right clinical circumstances"

Navigating Uncertainty

What is the role for chest CT?

Microbiologic Diagnosis of Active TB in Children

Difficult, frequently negative or not performed—

…particularly in an exposure scenario where disease is in early stages if present at all.

- **Globally: only 10-30% of cases of pediatric TB are microbiologically confirmed**
- Use all available information on source case when available
- Collect multiple samples, use Xpert MTB/RIF
- Sample collection methods
  - Induced sputum (including infants)
  - Gastric aspirates, less preferred
  - Tissue, CSF, other specimens if indicated

Pediatric Diagnostic Considerations

Gastric aspirate

CURRY INTERNATIONAL TUBERCULOSIS CENTER

A) Moisten the tube in the child's mouth to avoid bacteriostatic lubricants.

B) Place NG tube into child's nose - stay away from the septum and aim directly perpendicular to the bed as you advance the tube.

C) Pass the tube into child's throat.

Lumbar puncture in infants?

JOURNAL OF THE
Pediatric Infectious Diseases Society

Volume 15, Issue 3
March 2026

JOURNAL ARTICLE

Where Did this Come From: Lumbar Puncture for All Infants with Suspected Tuberculosis Disease?

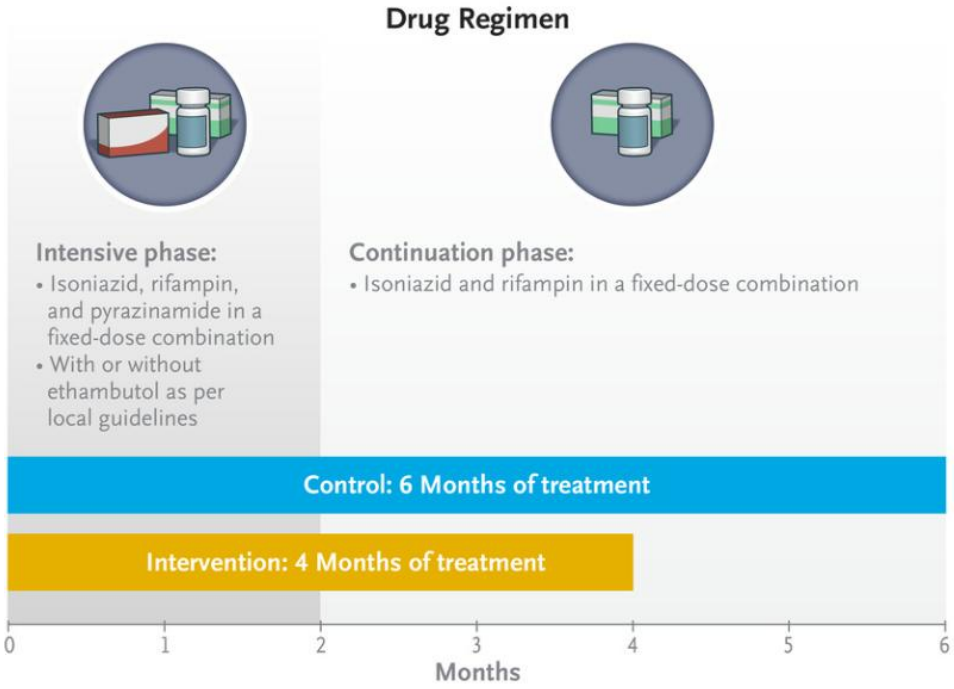
Collin Dubick ✉, Marcos C Schechter, Frank Berkowitz, Andi L Shane

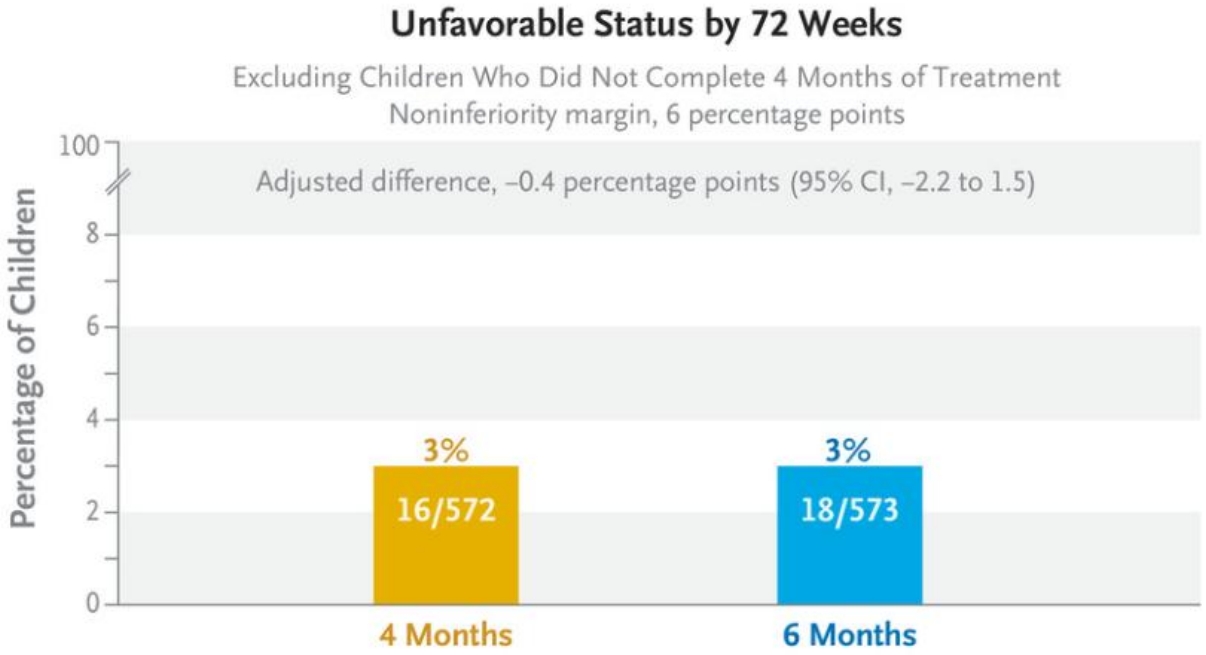
Journal of the Pediatric Infectious Diseases Society, Volume 15, Issue 3, March 2026, piag013, https://doi.org/10.1093/jpids/piag013
Published: 02 March 2026 **Article history** ▾

RESEARCH SUMMARY

Shorter Treatment for Nonsevere Tuberculosis in African and Indian Children

Turkova A et al. DOI: 10.1056/NEJMoa2104535





CONCLUSIONS

Among children with nonsevere, drug-susceptible, smear-negative TB, a 4-month treatment regimen was noninferior to a 6-month regimen at 72 weeks of follow-up.

Case details: what are the implications of MDR-TB exposure?

I have a 3 /y/o that lives with a new, infectious, lab confirmed active tb disease patient. Index case tested positive MTB NAAT and positive AFB smears 3+/4+ (3-17-26) with no Rifampin mutation in the rpob gene.

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THANK YOU