Herzlich willkommen zur 30. Ausgabe des Tuberkulose-Symposiums

Dr. Jörg Spieldenner
Direktor Lungenliga Schweiz

LUNGENLIGA
LIGUE PULMONAIRE
LEGA POLMONARE


Kinder
ohne Tabak
JA
am 13. Februar


Tausend
Dank!
Kinder
ohne Tabak
am 13. Februar
JA

TB COMMUNITY PERSPECTIVES

75% OF ADVOCATES FROM GLOBAL FUND ELIGIBLE COUNTRIES reported a decrease in TB **testing** during the pandemic

73% reported people with TB to be facing **significant challenges accessing treatment and care**

ADVOCATES

53% FROM GLOBAL FUND IMPLEMENTING COUNTRIES said funding for TB was **diverted** to the COVID-19 response

51% said donor support for TB had decreased

All groups called strongly for additional funding and increased resources to respond effectively and safely to both COVID-19 and TB.

POLICY AND PROGRAM OFFICERS

65% FROM GLOBAL FUND IMPLEMENTING COUNTRIES said funding for TB was being **diverted** for the COVID-19 response

Quelle: April 2021 – Stop TB partnership https://www.iasociety.org/Web/WebContent/File/EduFund/Webinars/3-TB-JamesMalar.pdf

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Spendenaufruf der Lungenliga

Vielen Dank für Ihre Solidarität

Wir sind fassungslos und traurig über die Vorgänge in der Ukraine.

Die Lungenliga Schweiz bittet Sie, unsere Solidaritätsaktion für Menschen mit Lungen- und Atemwegserkrankungen, die durch die Invasion der Ukraine zusätzlich betroffen sind, zu unterstützen.

Vielen Dank für Ihre Solidarität mit den vom Krieg in der Ukraine betroffenen Menschen.

Herzlichen Dank für Ihre Spende!

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BIC POFICHBEXXX

LUNGE ZÜRICH

Hilft. Informiert. Wirkt.

TB-Case Management

oder

Tuberkulose kommt selten allein

LUNGE ZÜRICH
Hilft. Informiert. Wirkt.

Komplexe Fälle

- Fremdsprachigkeit
- Mehrmaliger Wechsel der Abgabestelle
- Psychosoziale Belastung
- Ärztlicher Bericht
- Umgebungsuntersuchung mit >12Personen
- Gesuch an den Tuberkulose-Fonds
- MDR oder i.v.-Therapie

LUNGE ZÜRICH
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Tuberkulose kommt selten alleine

- Sozioökonomischer Status
- Gesundheitskompetenz

LUNGE ZÜRICH
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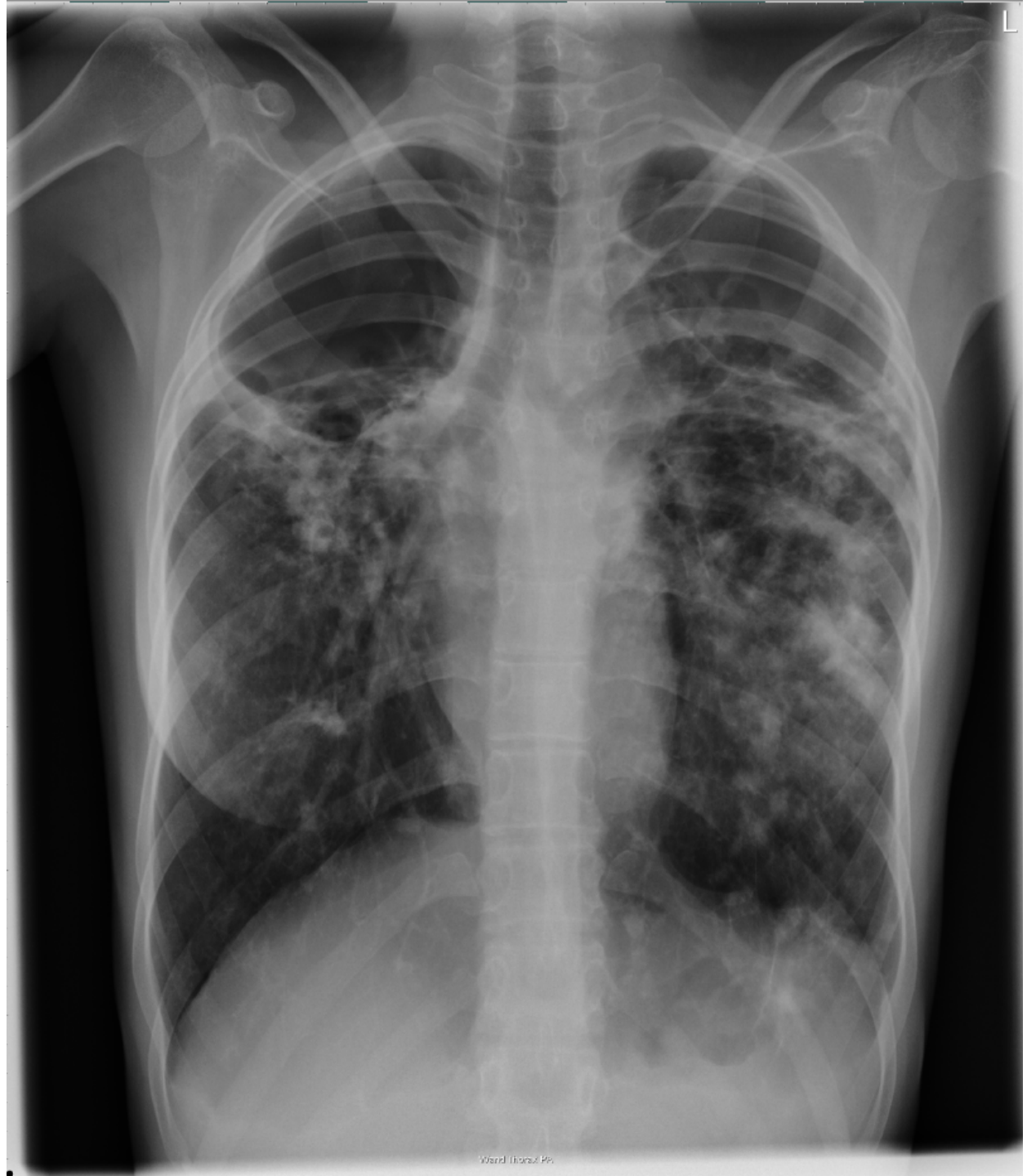
Interdisziplinäres Netzwerk

- Infektiologen und Pneumologen
- Apotheken
- Migrationsämter
- Beratungsstellen
- Kantonsärztlicher Dienst

LUNGE ZÜRICH
Hilft. Informiert. Wirkt.

Tina, 1995

- B-Symptomatik
- GenXpert +, R-sensibel
- Kind und Familie in Rumänien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Die Aufgaben

- Umgebungsuntersuchung
- Ernährung
- Krankenkasse
- Aufenthaltsstatus

LUNGE ZÜRICH
Hilft. Informiert. Wirkt.

Helfersystem

- Spitalsozialdienst
- SansPapier Anlaufstelle
- Isla Victoria
- Etablissement
- Tuberkulose-Fonds LUNGE ZÜRICH

LUNGE ZÜRICH
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Lösung

- UU: 5 Personen
- L-Bewilligung
- TB-Fonds LUNGE ZÜRICH übernimmt Fr. 10’148
- Entlassung nach 6.5 Monaten
- DOT in der Apotheke
- Abschluss Behandlung nach 9 Mte
- Rückreise nach Rumänien

Laura, 1980

- CH
- diverse Nebendiagnosen
- Obdachlos
- Negiert Krankheiten

Keine Lösung

- Umgebungsuntersuchung
- Palliative Care

LUNGE ZÜRICH
Hilft. Informiert. Wirkt.

Blerim, 1996

- Hilfskraft, 100%
- B-Symptomatik
- Pre-XDR-TB

LUNGE ZÜRICH
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Die Aufgaben

- Hospitalismus / Krankheitseinsicht
- Gesuch an TB-Fonds
- Hörverlust unter Amicazin
- UU bei MDR-TB

LUNGE ZÜRICH
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Was wirklich zählt

- Vertrauen gewinnt
- Interdisziplinäre Zusammenarbeit

TB Case-Management

- Umgebungsuntersuchung
- TB kommt selten alleine

Enquêtes d'entourages dans le canton de Vaud, Réalité du terrain

Présenté par Andrée Corbaz et Christophe Chatonnet

Avec la collaboration de la Dresse Jesica Mazza-Stalder, de l'équipe tuberculose de la LPV et de l'équipe du CHUV/DAT

30ème Symposium Tuberculose - Jeudi 24 mars 2022

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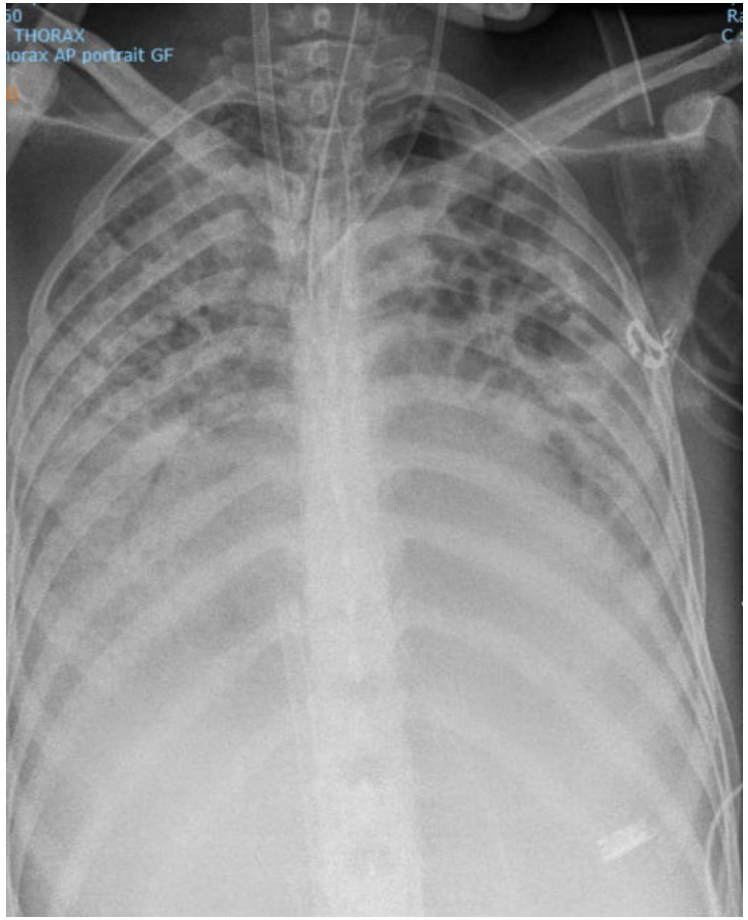
Jeune patient de 22 ans d’origine érythréenne



- Patient arrive aux urgences à Yverdon en raison d’une insuffisance respiratoire hypoxémique sur tuberculose pulmonaire très avancée
- Présente un ACR aux urgences de d’Yverdon avec réanimation, intubation, transfert au CHUV par la REGA
- Patient très bacillaire à l’aspiration bronchique (plus de 10 BAAR par champs), PCR fortement positive pour MTBc sensible
- Il s’installe de multiples complications avec défaillance multi-organes chez un patient hospitalisé pendant près d'un mois aux SI
- Décès

Cas contacts potentiels, EE

- Le patient index vivait avec 2 colocataires
- Cours de français jusqu'à fin mars 2019
- Entourage social
- Cercle familial
- Contacts occasionnels
- Communauté Erythréenne
- Personnel hospitalier

Enquête d'entourage dans la communauté Erythréenne 4

- Patient décédé
- Difficulté de la langue, français pas toujours compréhensible
- Gestion des inquiétudes de la communauté
- Collaboration CHUV et Hôpital d'Yverdon
- Importance de la coordination LPV/DAT
- Emergence de cas contacts tardivement
- Promiscuité dans la communauté, plusieurs personnes dans la même habitation, lit partagé
- Dépistage par Rx thorax pour les personnes contacts symptomatiques
- Méfiance dans la communication, certaines personnes de la communauté recherchées
- RDV pas toujours honorés, rappel des RDV, pas toujours le bon numéro de téléphone, contacts par SMS

Enquête d’entourage et dépistage

Cours de français :

- Inquiétude dans le centre de formation
- Séance d’information et dépistage sur place le même jour, à 8 semaines du dernier contact
- 6 formateurs et 9 participants

Résultats des dépistages

Trois cas de tuberculose active secondaire :

- **Un colocataire** avec une TB pulmonaire; PCR positive, culture positive, ED négatif
  - Déclenchement d'une nouvelle enquête (employé dans un restaurant et famille) :

    Un ami, 7 personnes du restaurant (dont un enfant de 4 ans), 15 personnes de la famille à Berne

    Tous négatifs
- **Deux amis proches** de la communauté avec une TB ganglionnaire intra thoracique, PCR positive

  Pas d'EE

Les trois traitements ont été menés à leur terme.

Résultats des dépistages (suite)

- **5 cas de tuberculose latente ITBL**

  Ce sont 5 amis de la communauté, dont un colocataire : les traitements ont été menés à leur terme.

- 11 amis de la communauté : négatifs au QTF
- Oncle et tante : négatifs au QTF
- 2 enfants : négatifs au Mantoux
- 7 formateurs et 9 étudiants (dont 3 Erythréens) : négatifs au QTF
- 12 membres du personnel de l'hôpital d'Yverdon : négatifs au QTF
- 26 membres du personnel du CHUV : négatifs au QTF

Résultats des dépistages (suite)

Au total, 77 personnes dépistées :

- 23 personnes de la communauté Erythréenne
- 16 personnes ayant participé aux cours de français
- 38 collaborateurs du CHUV et de l'hôpital d'Yverdon

    - 3 cas de tuberculose active
    - 5 cas de tuberculose latente

Conclusions

- Transmission de laTB sous le même toit : 100%
- Dépistage de 5 cas ITBL et 3 TB active (dans la communauté Erythréenne)
- Pas de cas secondaire TB/ITBL dans les cours de français
- Pas de cas secondaire TB/ITBL pour le personnel hospitalier
- Importance de la coordination LPV/DAT (CHUV)
- Trouver et adapter les bons canaux de communication
- Prioriser les informations et dépistages

Merci de votre attention.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Déroulement d'une Enquête d'Entourage (EE) dans le canton de Vaud

REALITE DU TERRAIN (2ème situation)

24.03.2022

Objectif d'une EE : Lutter contre la propagation de la tuberculose

Déclaration d'une nouvelle situation

- Mai 2021, nous recevons la déclaration d'un nouveau cas de tuberculose par le biais de la DGS (Direction Générale de la Santé).
- Il s'agit d'une jeune femme de 26 ans habitant dans l'Est vaudois.
- Atteinte au niveau pulmonaire avec **3 cavités**.
- PCR à l'examen direct du 12 mai 2021 **positive**.
- Microscopie directe **positive**.
- Culture **positive**, **(**qui a poussé en 14 jours).

Démarrage de l'Enquête d'Entourage :

Premier contact avec le cas source

Explications du parcours de Mme jusqu'à son diagnostic :

- En novembre 2020, Mme a eu le Covid. Forte toux, et persistance de la fatigue.
- Fin février, reprise d'une toux sèche, 1ère consultation.
- En avril la toux a repris, 2ème consultation aux urgences.
- Le 12.05.2022, 3ème consultation aux urgences; investigation par RX –Thorax, qui a permis de visualiser des cavernes.
- Hospitalisation avec mise à l'isolement, + scanner qui a confirmé une TB pulmonaire active.
- Début de traitement le 14.05.2021 : avec Isoniazide, Rifampicine, Pyrazinamide et Ethambutol.

Elaboration de la liste des cas contacts potentiels à contrôler et évaluation des cas contacts à risque

- EE sous le même toit : enfant de moins de 5 ans ou personnes à risque ?
- Durée de contact de plus de 8h dans un espace fermé et mal ventilé ?

  - ✓ Sa sœur de 23 ans avec comorbidité (a tester en priorité).
  - ✓ Sa mère souffre d'allergie, mais elle va bien.
  - ✓ Son père est en bonne santé.
  - ✓ Son petit ami est en bonne santé également.
  - ✓ Pas d'enfant de moins de 5 ans.

- EE de son cercle social (les parents du petit ami, amis, cousins lors d'un anniversaire courant avril dans le cadre familial)

  - ✓ Délégation extra-cantonale de contrôle de 2 enfants.

Elaboration de la liste des cas contacts potentiels à contrôler et évaluation des cas contacts à risque (suite)

- EE élargie 2ème cercle – contacts professionnels

- Contacts professionnels : Mme est en dernière année de stage HEP, elle dirige une classe de 3P de 17 enfants âgés entre 8 et 9 ans, à raison de 2 jours/semaine.

- Mme côtoie 10 collègues de travail, à la pause de midi.

Importance de la disponibilité et de la réactivité de l'équipe infirmier-ères de la LPV pour contacter les personnes exposées et déjà informées de la contagiosité du cas index :

- Problème des réseaux sociaux, qui entraînent une dispersion massive des informations incontrôlable sur un état de santé.
- Discrétion au niveau professionnel, transmission de l'information à sa collègue de stage, qu'elle a chargée d'informer la direction scolaire.
- Prise de contact avec les cas contacts dans le but de :

  - ✓ Ecouter les craintes, rassurer.
  - ✓ Prendre les informations sur la personne; âge, état de santé.
  - ✓ Clarifier les temps et lieux d'exposition.
  - ✓ Expliquer le déroulement de l'EE.

Contacts professionnels - Environnement scolaire toujours particulier

- Obtenir les coordonnées de la direction de l'école, adresses des parents référents des enfants.
- Ce qui prend du temps, c'est l'élaboration du courrier malgré des trames existantes.
- Réflexion commune entre les différents intervenants.
- Connaissance et accord du contenu avant d'y apposer leur signature.
- Mode de transmission des courriers à adapter selon besoin.
- Besoin du consentement des parents pour contrôler leurs enfants.

T0 : Organisation du contrôle

- Confirmation des médecins référents de la tuberculose de contrôler les élève de l'école à T0.
- Les 17 élèves de la classe vont être contrôlés, sauf 1 orienté chez son pédiatre, par choix des parents.
- Contacter l'infirmière scolaire, ainsi que la pédiatre référente pour la collaboration.
- Participation de l'enseignante de la classe pour l'organisation du dépistage.
  - ✓ Le mercredi, avant la récréation, application de l'EMLA aux enfants, et après la recréation nous avons commencé les prises de sang.
- 16 enfants ont été contrôlés (tous négatifs).

T2 : Nouvelle organisation pour le contrôle des élèves et des enseignants pendant les vacances d'été

- Elaboration d'un nouveau courrier en lien avec le changement du lieu de contrôle.
- Contexte plus compliqué pour regrouper les contrôles des enfants, avec la présence des parents.

  Disponibilité de l'équipe TB pour le contrôle des enfants :

  ✓ Le T2 a pris 2x plus de temps que le T0 (impossibilité de regrouper les enfants).
  ✓ Impératif de présence minimale de 2 soignants pour contrôler les enfants.

- 13 enfants ont pu être contrôlés par la LPV, 4 enfants auprès des pédiatres ; les 17 enfants étaient négatifs.
- 5 enseignants ont été contrôlés négatifs, les 5 autres n'entrant pas en considération pour l'EE.

Résumé de l'Enquête d'Entourage :

T0 : Contrôle famille et ami(e)s

- Sœur positive, plusieurs examens pour exclure une TB active.

  Traitement : Rifampicine pour 4 mois, suivi jusqu'à son terme.

T2 : Contrôle famille et ami(e)s

- Père positif, traitement pas encore terminé (avril 2022).
- Mère positive, traitement sur 8 mois pas encore terminé (juin 2022).
- Le petit ami, ainsi que ses parents (négatifs).
- 5 personnes dans le cadre des ami(e)s proches : 1 positive (a voyagé dans un pays à risques).

Conclusion

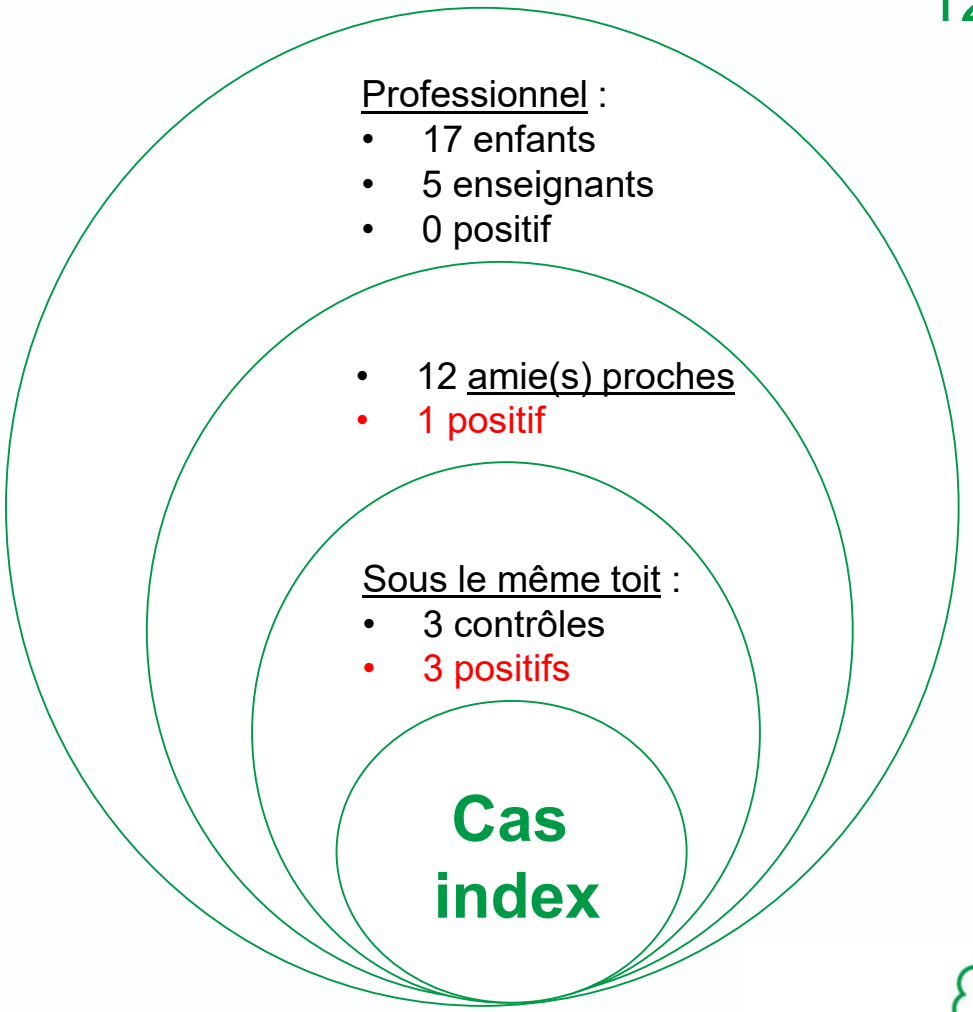
- Dans cette EE, il y avait 61 personnes contacts donné
  - ✓ Nous avons contrôlé 37 personnes, 4 personnes positives sur 37, dont 3 sous le même toit.

Nous avons appris que le grand-père paternel était décédé d'une tuberculose.

La tante a été traitée pour une tuberculose active.

C'est dans cette famille que se passent les vacances d'été et les fête de fin d'année.

- Ce qui confirme bien que les expositions sous le même toit sont les lieux de transmission les plus propices.



Merci de votre attention.

Questions ?

Tuberkulose in der Schweiz

Nathalie Gasser
Leiterin Kompetenzzentrum Tuberkulose
Lungenliga Schweiz

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«Gibt es überhaupt noch Tuberkulose in der Schweiz?»

«Tuberkulose kenne ich nur noch aus historischen Filmen»

«Das ist doch die Krankheit mit den Schirmbildern früher»

Schweizer Strukturen

- **Tuberkulose ist in der Schweiz eine meldepflichtige Erkrankung**
- Verschiedene Akteure spielen eine Rolle in der Prävention und Bekämpfung der Tuberkulose in der Schweiz
- Das Epidemiengesetz gibt die rechtliche Grundlage vor zur Bekämpfung der Tuberkulose

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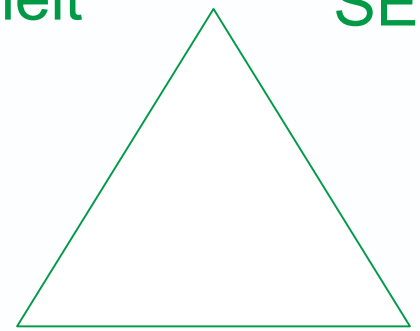
BAG = Bundesamt für Gesundheit

SEM = Staatssekretariat für Migration



KOMPZ TB = Kompetenzzentrum TB

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Departement des Innern EDI
Bundesamt für Gesundheit BAG

Mandatsvergabe

LUNGENLIGA SCHWEIZ
LIGUE PULMONAIRE SUISSE
LEGA POLMONARE SVIZZERA
LIA PULMUNARA SVIZRA

Betrieb

Leitung 35%	Administration und TB-Symposium 25%	Medizinische Beraterinnen und Berater
Nathalie Gasser	Monika Husi-Hostettler	

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Informationsaustausch	Weiterbildung	Beratung	Kollaboration
Kantonale TB-Fachstellen	BAG	The Union/internationale Kontakte	
Medizinische Fachpersonen	SEM	Weitere Partner	
	BWL		

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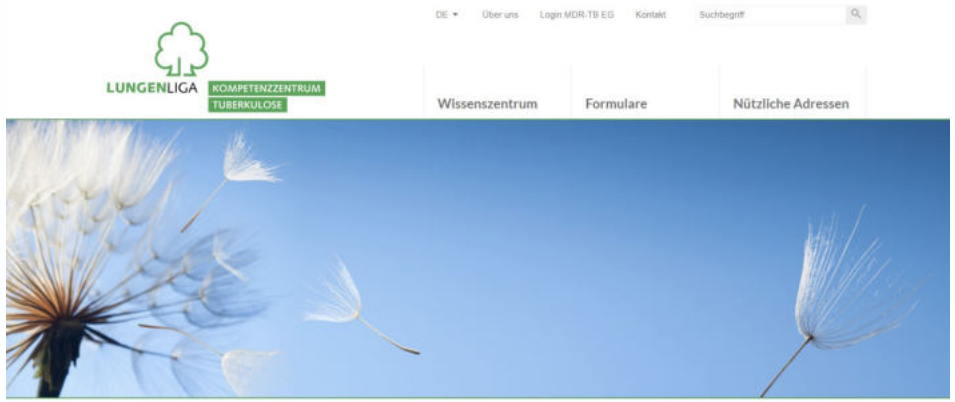
Kompetenzzentrum Tuberkulose

Das **Kompetenzzentrum Tuberkulose** (KOMPZ TB) unterstützt und berät Fachpersonen in ihrer täglichen Arbeit mit TB-Fällen und Kontaktpersonen

- Online-Kompetenzzentrum tbinfo.ch
- TB-Handbuch zum Management der Tuberkulose in der Schweiz
- Betrieb von TB-Hotline, MDR-TB Forum und dem Online-Tool tb-screen.ch
- Sicherung der Medikamentenversorgung und Publikation von Versorgungsengpässen (mit Bundesamt für wirtschaftliche Landesversorgung)
- Jährliche Weiterbildungsveranstaltungen: Basiskurse, Fachtagungen und TB-Symposium



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Jährlicher Tuberkulosebericht

- Teil des Mandatsvertrags zwischen BAG und LLS ist die Publikation eines jährlichen Berichtes zu den kantonalen Aktivitäten im Bereich Tuberkulose
- Der Bericht dient als **Steuerungsinstrument** für die Kantone, als Überblick für Fachpersonen und als Datengrundlage für weitere Projekte im Bereich Tuberkulose
- Der Bericht wird **dreisprachig** (DE, FR und EN) auf tbinfo.ch veröffentlicht

KEY FACTS TUBERKULOSE SCHWEIZ 2020

371 GEMELDETE FÄLLE

2020 wurden dem BAG 371 TB-Fälle gemeldet. Dies sind 13.3% weniger als im Vorjahr.

Swiss incidence
4.7
371

Japanese incidence
12
15'000

WHO global incidence
127
9.9 Mio.

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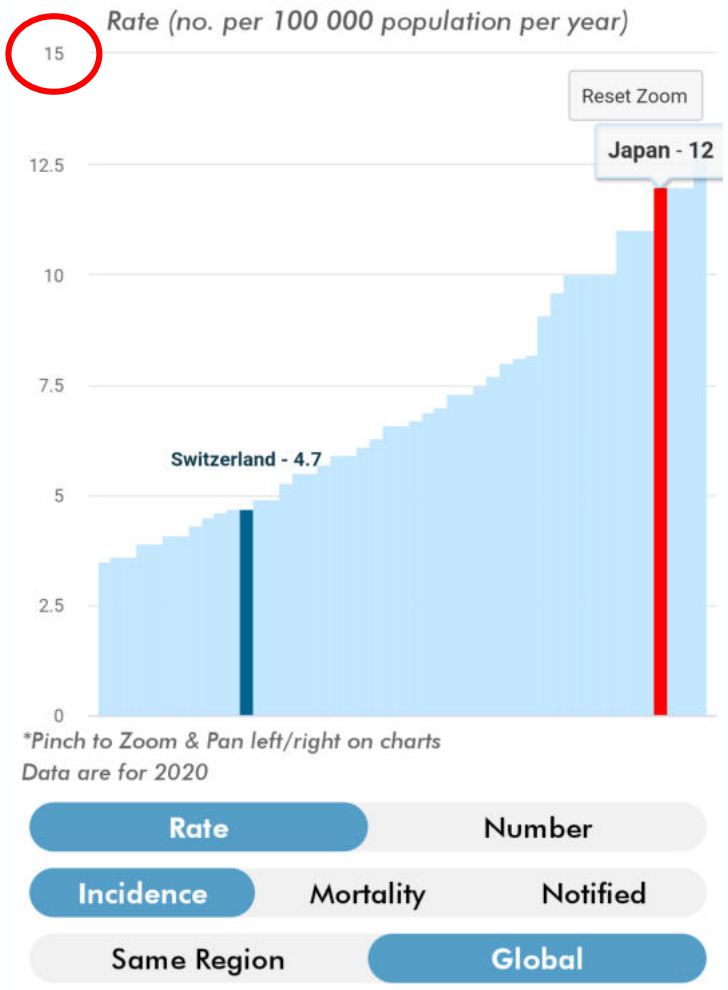
Internationaler Vergleich



Source: WHO Global TB Report App

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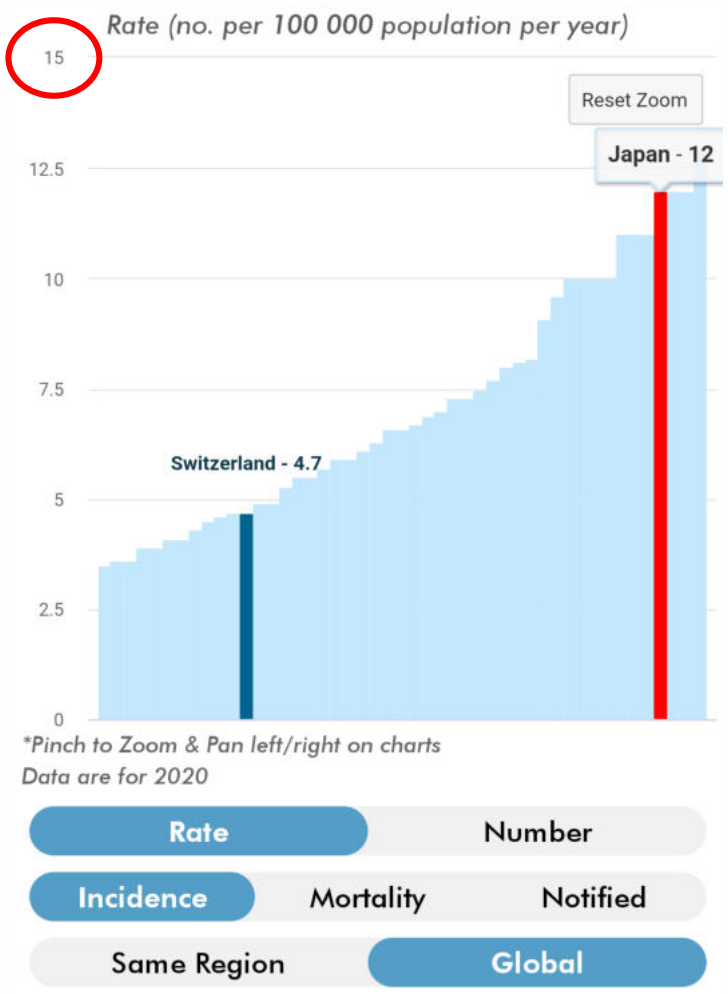
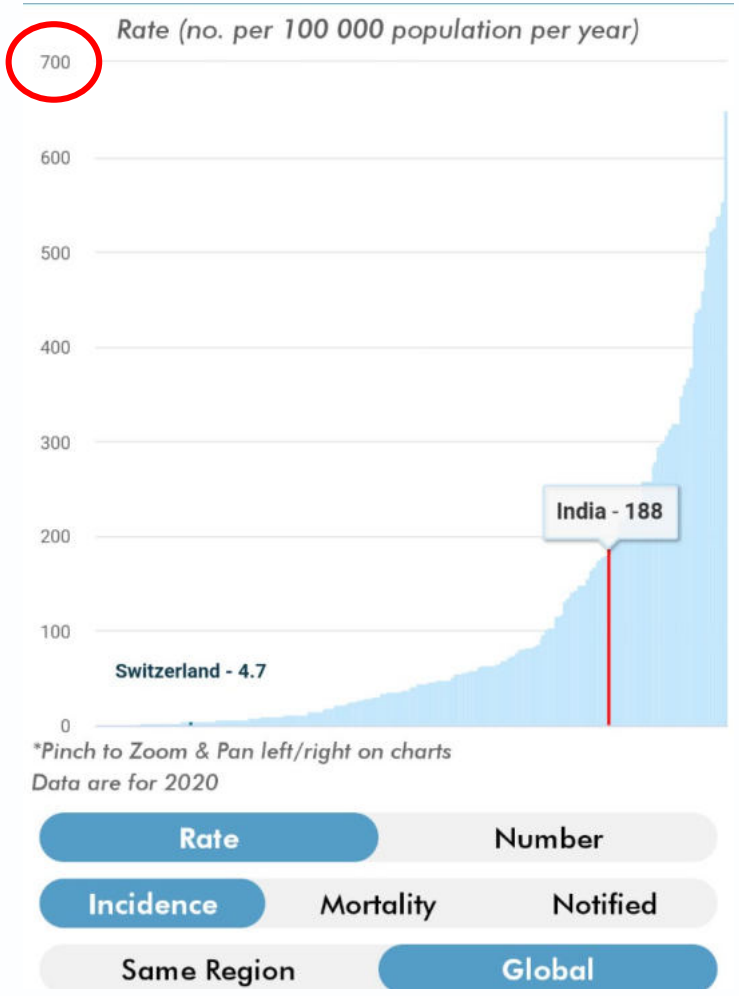
Internationaler Vergleich





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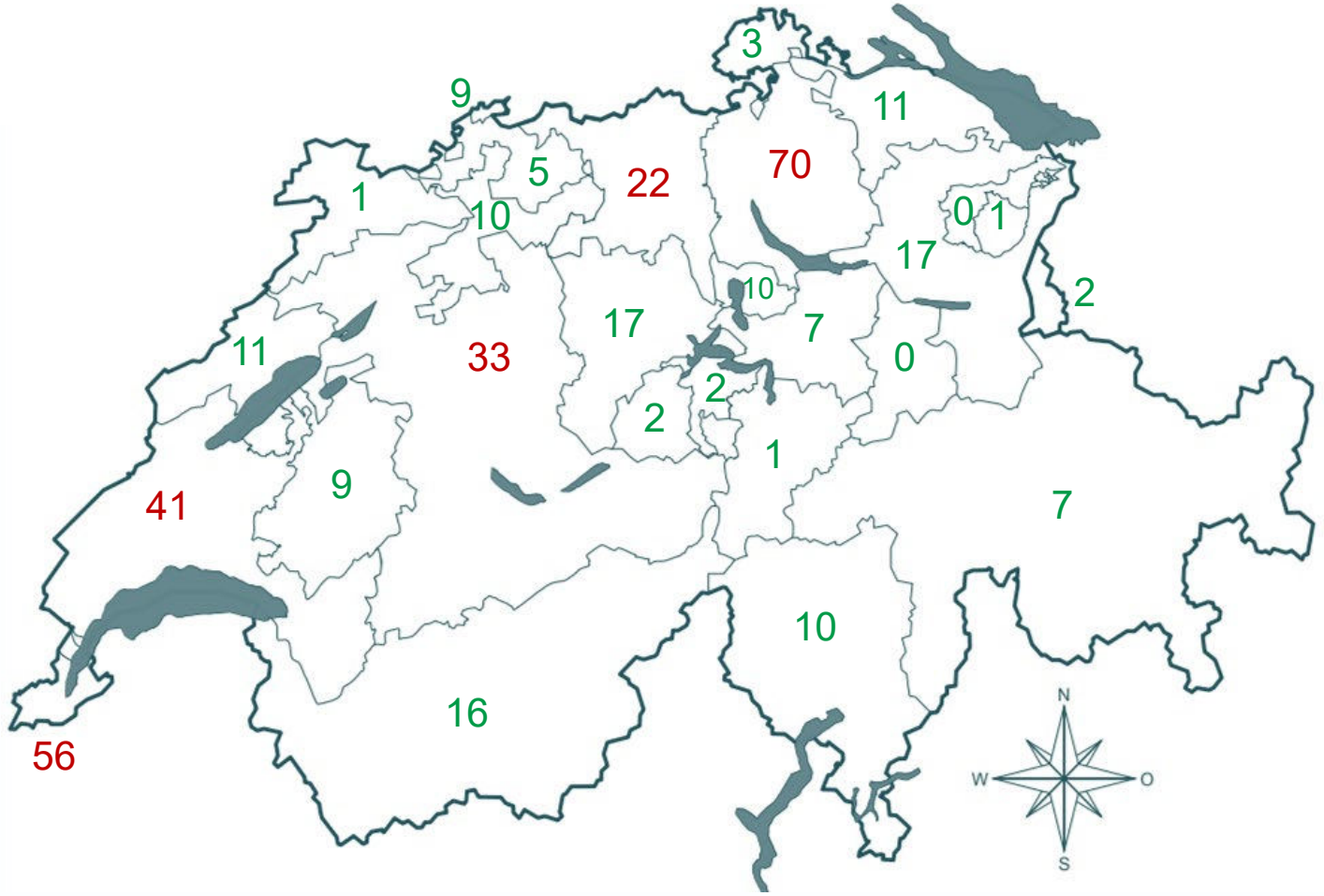
Verteilung TB-Fälle 2020



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KEY FACTS TUBERKULOSE SCHWEIZ 2020

371 GEMELDETE FÄLLE

2020 wurden dem BAG 371 TB-Fälle gemeldet. Dies sind 13.3% weniger als im Vorjahr.

197

UMGEBUNGSUNTERSUCHUNGEN wurden durchgeführt

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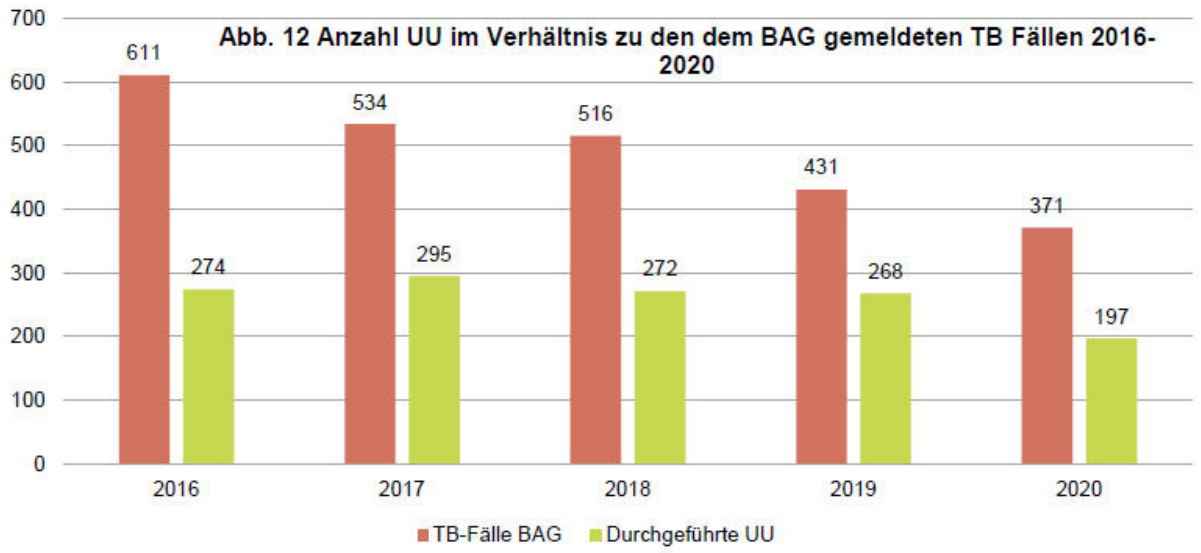


Einflussfaktoren für Verhältnis von gemeldeten Fällen zu UU

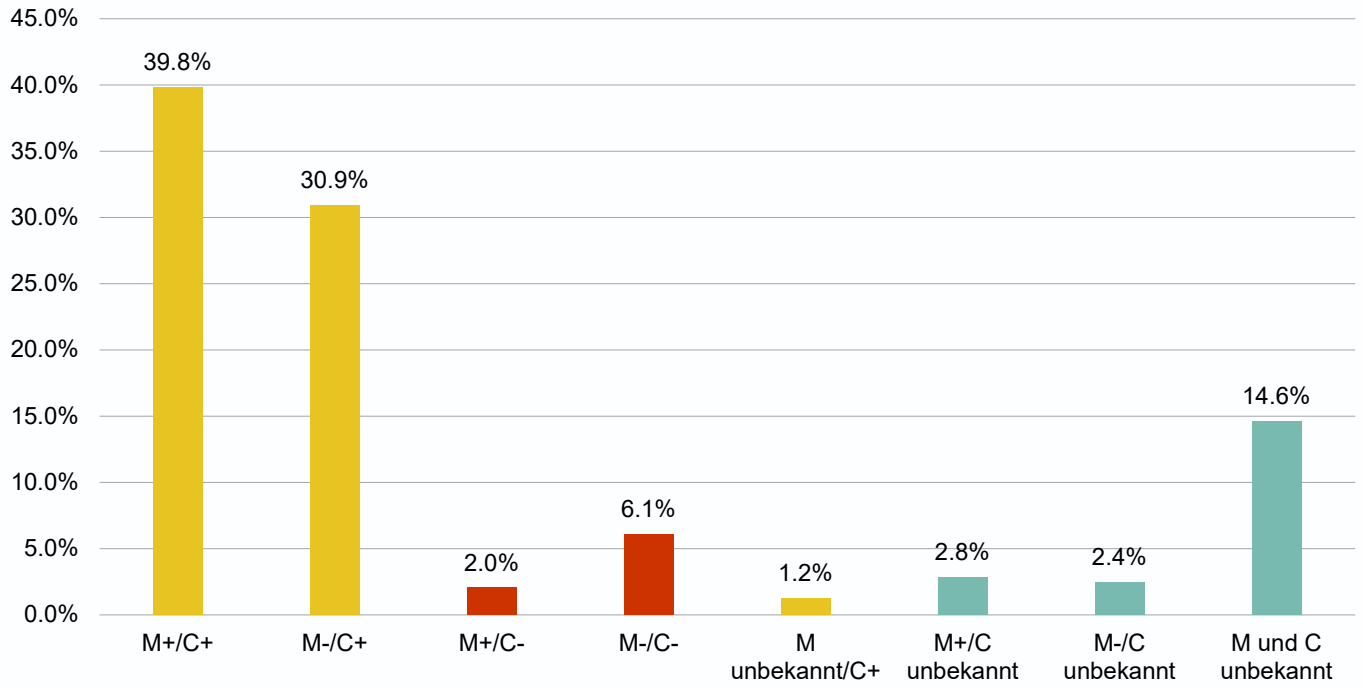
- Anzahl totale Fälle und pulmonale Fälle
- Anzahl pädiatrische Fälle
- Generelle Schutzmassnahmen, z.B. Hygienemasken
- Risikoabschätzung des Kantonsarztamtes

CHARAKTERISTIKA TB-FÄLLE

71 % aller TB-Fälle sind pulmonal,
28 % rein extrapulmonal.

Die Mehrheit der
Indexpatient*innen ist zwischen
20 und 50 Jahre alt.

Abb. 16: Resultate der Bakteriologie in % aller gemeldeten pulmonalen TB-Fälle 2020 (n=246)



Swiss C+ cases
71.9%

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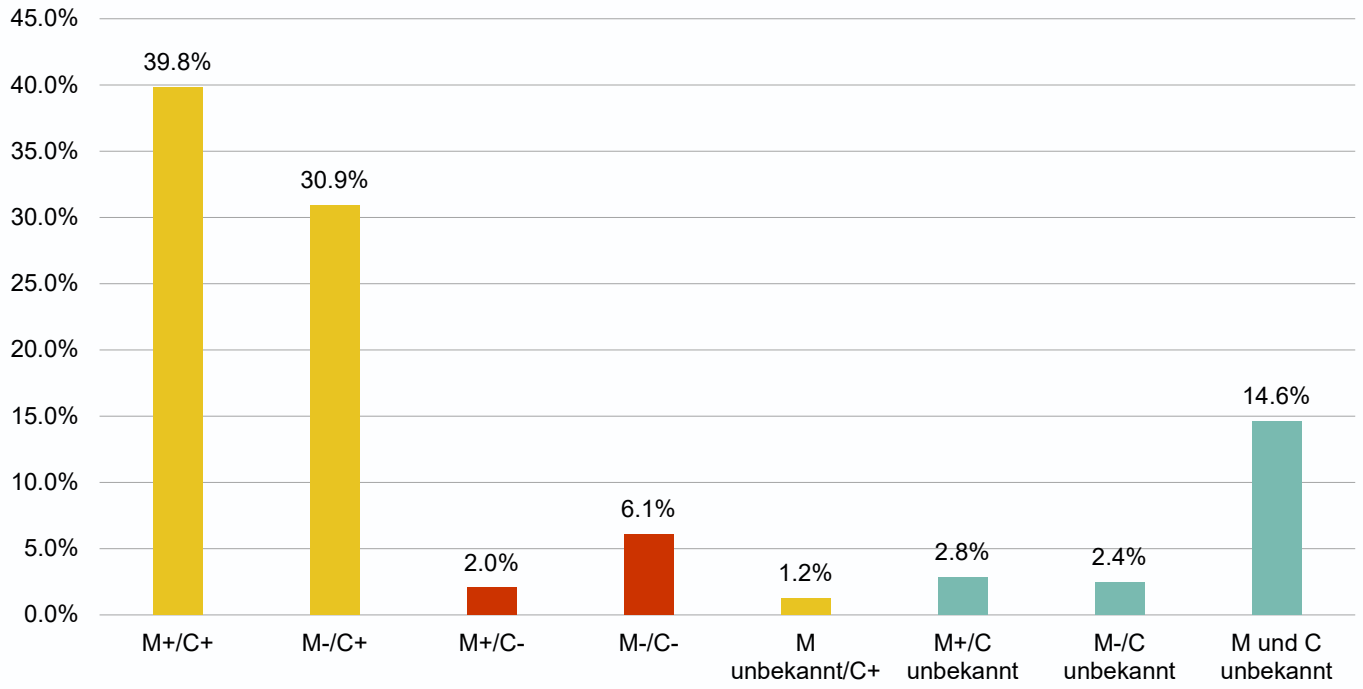
Abb. 16: Resultate der Bakteriologie in % aller gemeldeten pulmonalen TB-Fälle 2020 (n=246)



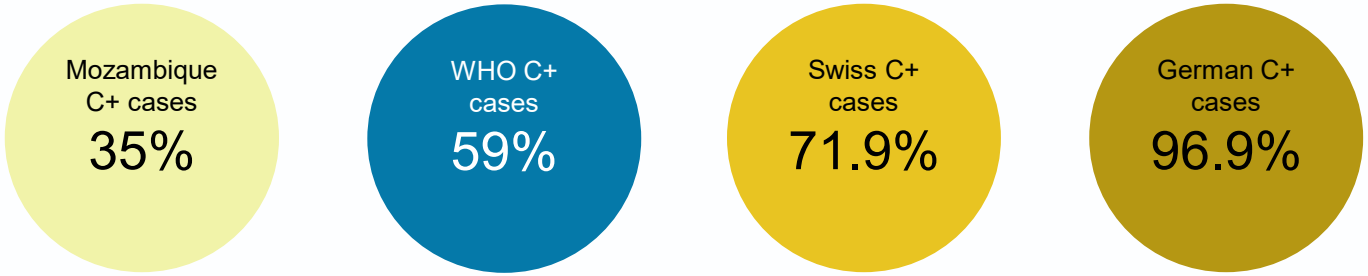


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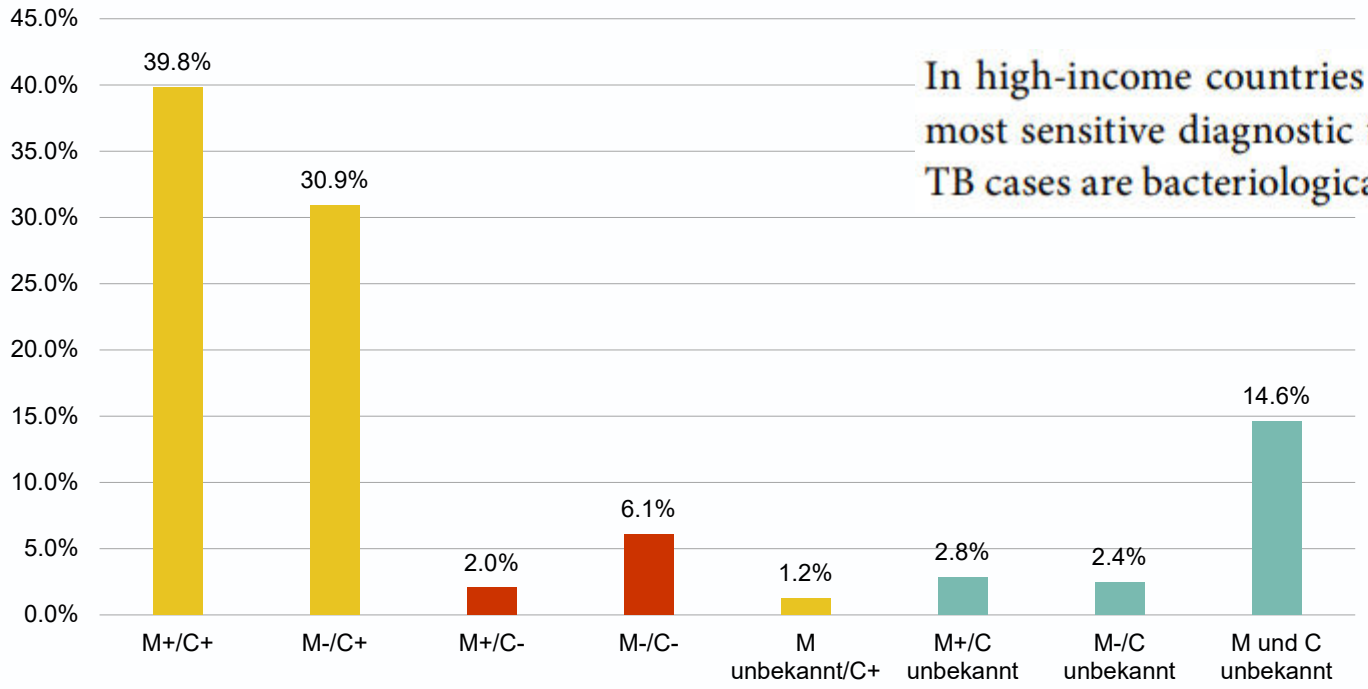
Abb. 16: Resultate der Bakteriologie in % aller gemeldeten pulmonalen TB-Fälle 2020 (n=246)



In high-income countries with widespread access to the most sensitive diagnostic tests, about 80% of pulmonary TB cases are bacteriologically confirmed.

Mozambique C+ cases 35%

WHO C+ cases 59%

Swiss C+ cases 71.9%

German C+ cases 96.9%

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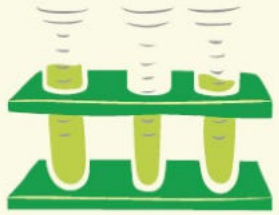
UMGEBUNGSUNTERSUCHUNGEN wurden durchgeführt

Dafür wurden 1353 Kontaktpersonen getestet, 171 davon gelten als infiziert.



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Einflussfaktoren auf Positivitätsrate LTBI (12.6%)

- Restriktionsgrad der UU => wie eng werden die UUs durchgeführt?
- Wie viele Personen befanden sich im engen Umfeld des IP?
- Wie ansteckend war der IP vor Diagnose
- Zeit zwischen Ausbruch der TB und Diagnose
- Sensitivität und Spezifität der Tests

Jahr	**2016**	**2017**	**2018**	**2019**	**2020**
Anzahl Umgebungsuntersuchungen	**274**	**295**	**272**	**268**	**197**
Infizierte					
Anzahl getestete Personen	**2378**	**3207**	**2717**	**2744**	**1353**
Gelten als infiziert: bestätigte THT+ mit IGRA	32	20	14	1	9
Gelten als infiziert: Total THT+ ohne IGRA-Bestätigung	23	24	14	23	11
IGRA+: gelten als infiziert	331	399	297	250	151
Gelten total als infiziert	**386**	**443**	**325**	**274**	**171**
Infizierte in % der get. Personen	**16.2%**	**13.8%**	**12.0%**	**10.0%**	**12.6%**
Nicht Infizierte					
Gelten total als nicht infiziert	**1992**	**2764**	**2382**	**2470**	**1180**
Nicht Infizierte in % der get. Personen	**83.8%**	**86.2%**	**87.7%**	**90.0%**	**87.2%**

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PRÄVENTIVE LTBI THERAPIEN

81.9 % aller infizierten Kontaktpersonen begannen eine LTBI-THERAPIE, 90% davon schlossen ihre Therapie ERFOLGREICH ab.

Swiss TPT completion rate
90%

PRÄVENTIVE LTBI THERAPIEN

81.9 % aller infizierten Kontaktpersonen begannen eine LTBI-THERAPIE, 90% davon schlossen ihre Therapie ERFOLGREICH ab.

WHO TPT completion rate 86%

Swiss TPT completion rate 90%

WHO TPT children (<5) 35%

Swiss TPT children (<5) 100%

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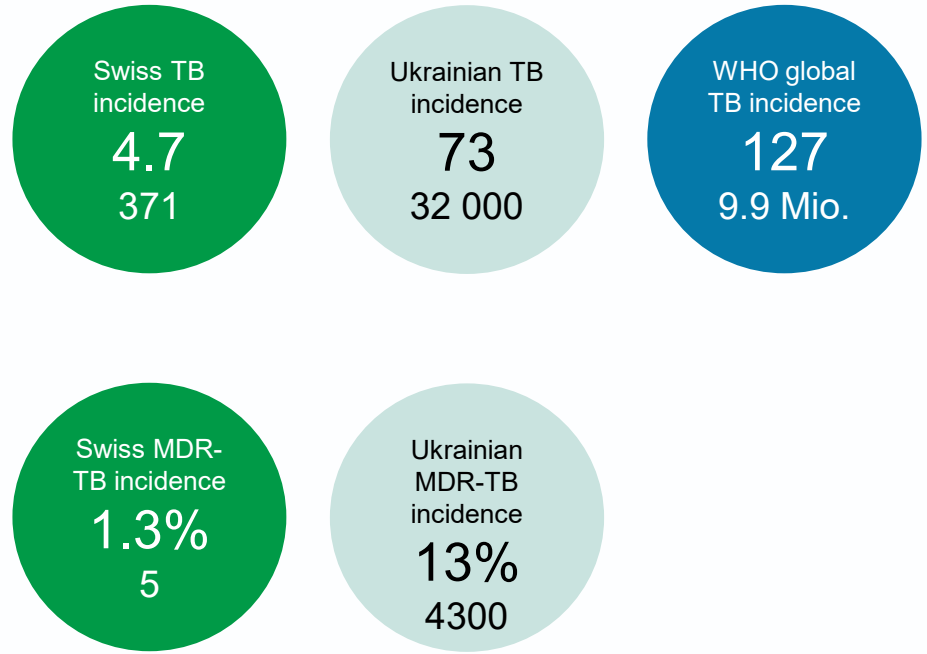
TB und Krieg in der Ukraine

- Aufgrund des aktuelles **Krieges in der Ukraine** kommen viele Personen aus der Ukraine/aus Russland in die Schweiz
- Diese Personen bleiben oft bei Verwandten, Bekannten oder Familienangehörigen und werden so nicht Teil des **Asylsystems**
- Es gibt in der CH keine grenzsanitarischen Massnahmen mehr und keine obligatorischen Arztbesuche für diese Personengruppe
- Die Ukraine und auch Russland gelten als **Hochinzidenzländer für multiresistente Tuberkulose (MDR-TB)**
- Das birgt ein **Public Health Risiko** für die Schweiz und die ankommenden Menschen



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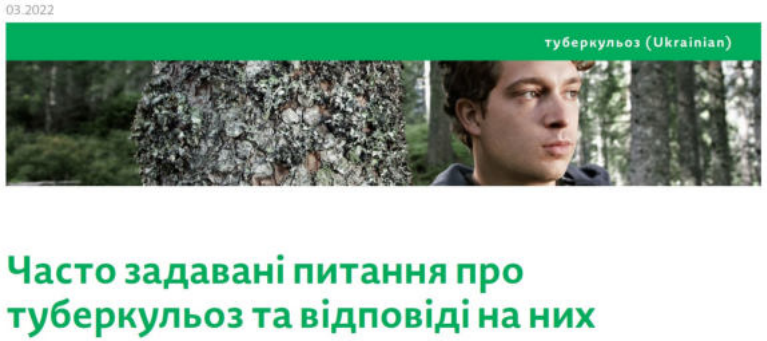
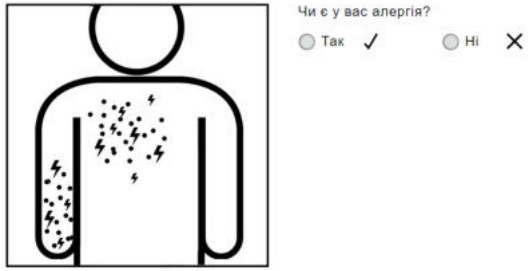
Massnahmen in der Schweiz

- Neue Unterseite auf tbinfo.ch mit allen Informationen zur aktuellen Situation
- FAQ für Betroffene auf Ukrainisch
- Tb-screen.ch auf Ukrainisch
- Infoblatt für Fachpersonen zu Abläufen => **Grundversorger sind zentral**
- Think TB Flyer
- Kommunikation in Absprache mit BAG, SEM und FMH an Fachpersonen und Institutionen im Asylbereich/Gesundheitsbereich
- Sicherung der Medikamentenversorgung für 1st, 2nd und 3rd line drugs zusammen mit BWL
- Sicherstellung der Weiterführung von bereits begonnenen Tuberkulosetherapien





Spendenaufruf der Lungenliga

Vielen Dank für Ihre Solidarität

Wir sind fassungslos und traurig über die Vorgänge in der Ukraine.

Die Lungenliga Schweiz bittet Sie, unsere Solidaritätsaktion für Menschen mit Lungen- und Atemwegserkrankungen, die durch die Invasion der Ukraine zusätzlich betroffen sind, zu unterstützen.

Vielen Dank für Ihre Solidarität mit den vom Krieg in der Ukraine betroffenen Menschen.

Herzlichen Dank für Ihre Spende!

Postcheck 30-289986-9

IBAN CH94 0900 0000 3028 9986 9

BIC POFICHBEXXX

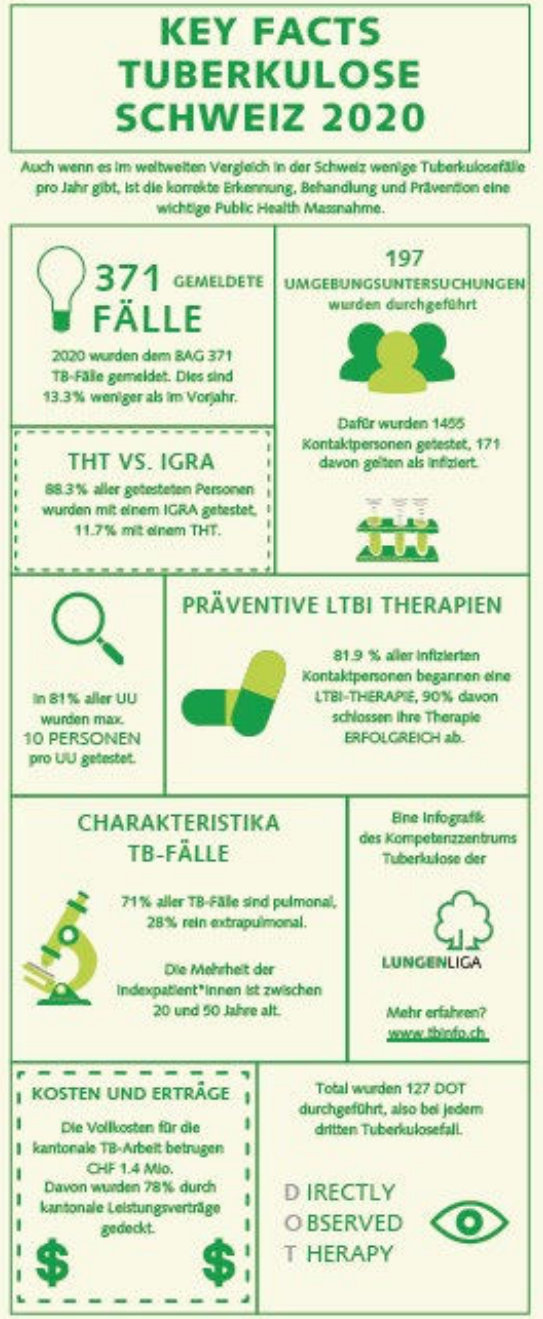
Take Home Message

- Tuberkulose in der Schweiz wird **gut erkannt, behandelt und nachverfolgt**
- Im weltweiten Vergleich schneidet die Schweiz besser ab als viele strukturschwache Länder, aber schlechter als viele unserer Nachbarländer mit vergleichbarem Gesundheitssystem
- Zentral wichtig ist die präventive LTBI Therapie vor allem bei exponierten Kleinkindern und infizierten Jugendlichen sowie Personen mit **erhöhtem Risiko** für eine Progression => PERISKOPE Rechner als Hilfsmittel
- Wichtig bleibt es weiterhin, an TB als **Differentialdiagnose** zu denken, gerade auch in der aktuellen Zeit mit hoher Migrationsaktivität

Mehr Luft fürs Leben

Vielen Dank für Ihre Aufmerksamkeit!

Fragen oder Anmerkungen?



Quellenangaben

Bericht Kantonale Tuberkulose-Aktivitäten 2020

WHO Global TB Report 2021

WHO Global TB Report App

RKI Bericht zur Epidemiologie der Tuberkulose in Deutschland für 2020

Materialien des Kompetenzzentrum Tuberkulose

OCHA Situation Report Ukraine

https://www.loc.gov/pictures/resource/cph.3f05369/

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30. Tuberkulose-Symposium in Bern
Donnerstag, 24. März 2022
Weiterbildung des Kompetenzzentrums Tuberkulose für Ärztinnen und Ärzte,
für das Personal der Lungenligen und weitere Interessierte

30e Symposium Tuberculose de Berne
Jeudi 24 mars 2022
Formation continue du Centre de compétence tuberculose pour médecins,
personnel des Ligues pulmonaires et autres intéressé(e)s

Tests et traitement des contacts pédiatriques des cas de TB en Suisse

Jean-Pierre Zellweger

Centre de compétence TB
Ligue pulmonaire suisse

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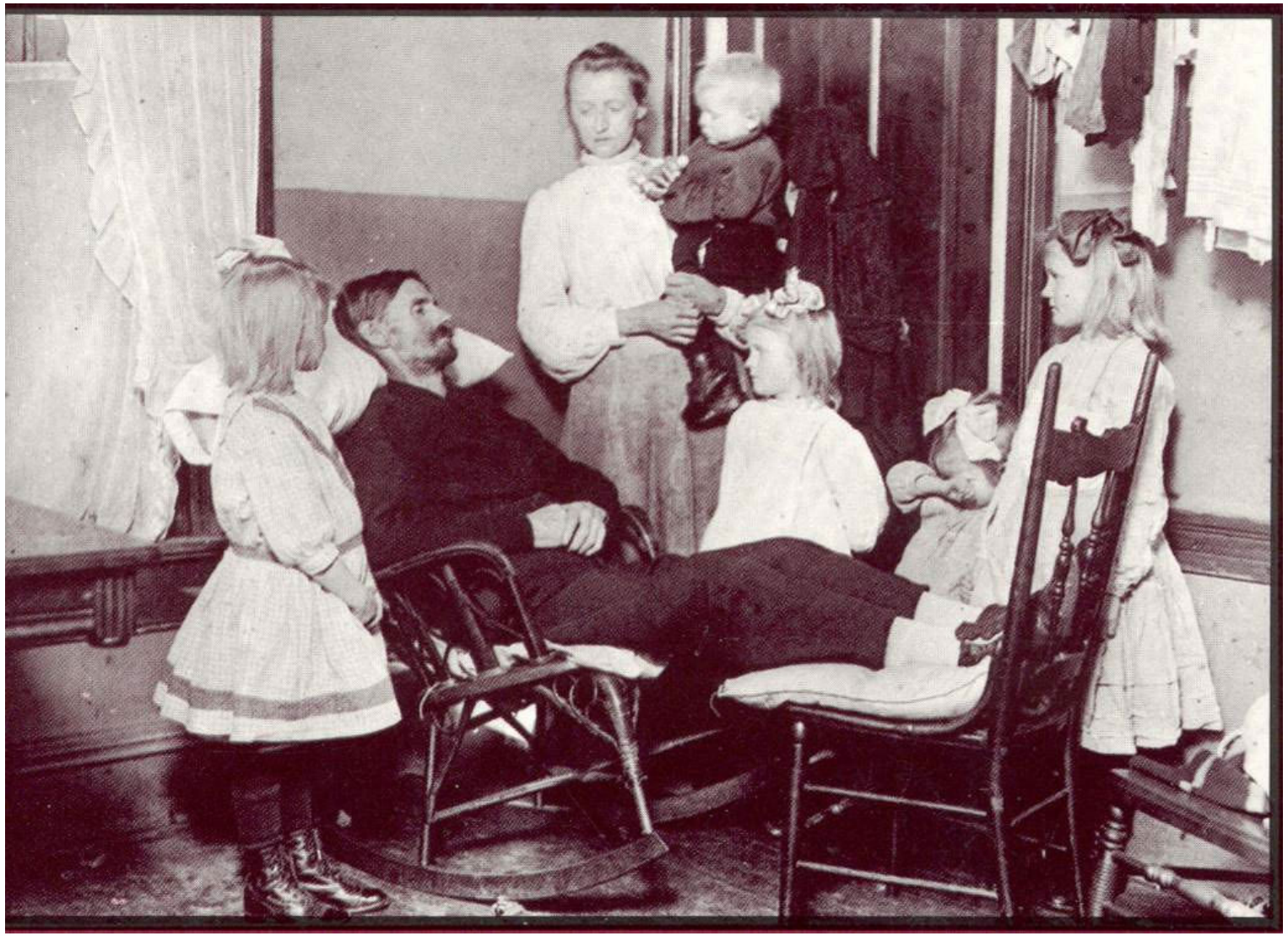
Particularités de la TB de l'enfant

- Rare dans les pays à basse incidence
- Taux élevé d'infection chez les enfants exposés
- Risque élevé de progression rapide chez les enfants en bas âge
- Formes extrapulmonaires fréquentes

- La TB de l'enfant résulte toujours d'une contamination récente, donc représente un marqueur de la transmission dans la population locale



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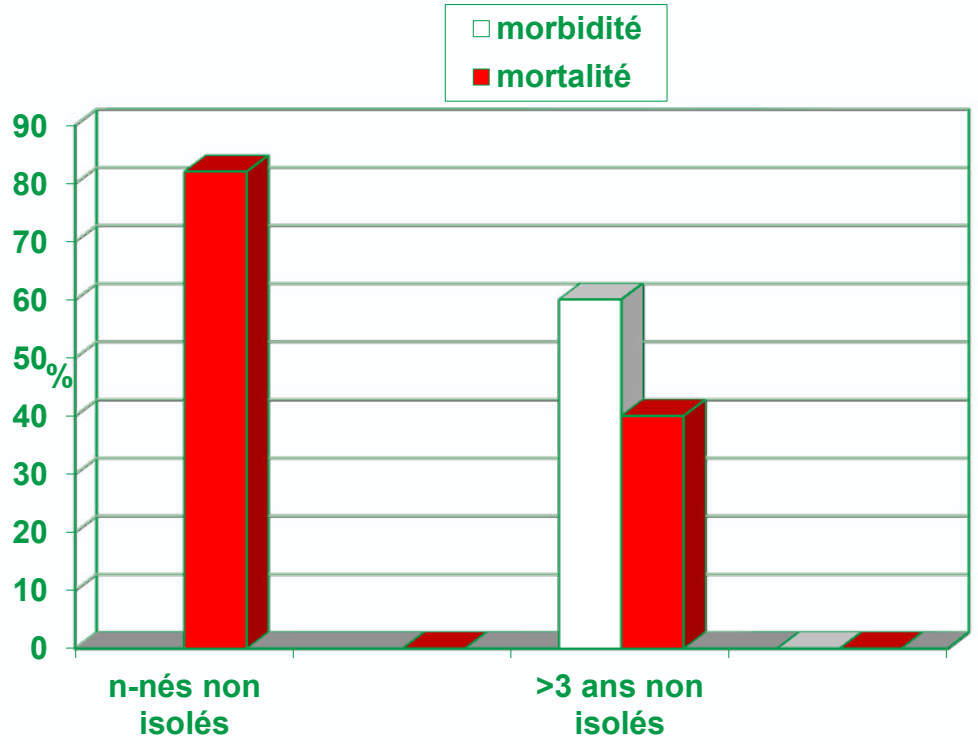
TB chez les enfants nés d'une mère tuberculeuse non traitée, début 20e siècle.



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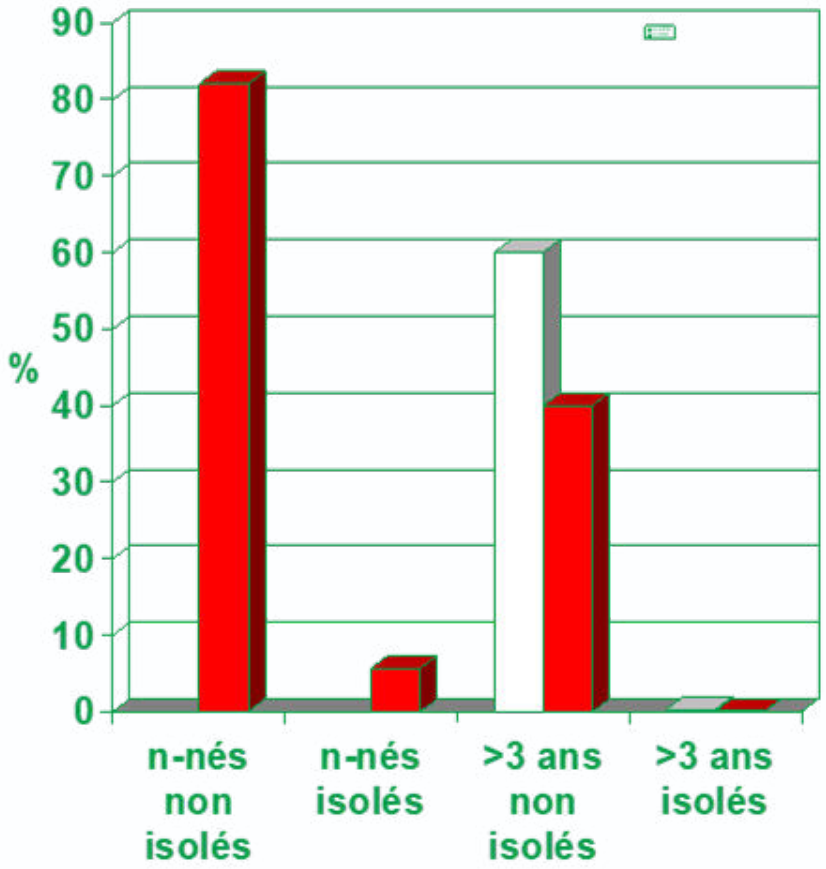
L'Œuvre du Dr Grancher (1903-1923)

- Séparation à la naissance des enfants de mère tuberculeuse
- Eloignement des enfants de parents tuberculeux, isolement à la campagne jusqu'à la guérison ou au décès des parents (!)



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Incidence de la tuberculose chez les contacts non traités, par classes d'âge

Figure 2 TB rate during the 12-year follow-up by age group in contacts who did not receive LTBI treatment (n = 26 542). TB = tuberculosis; LTBI = latent TB infection.

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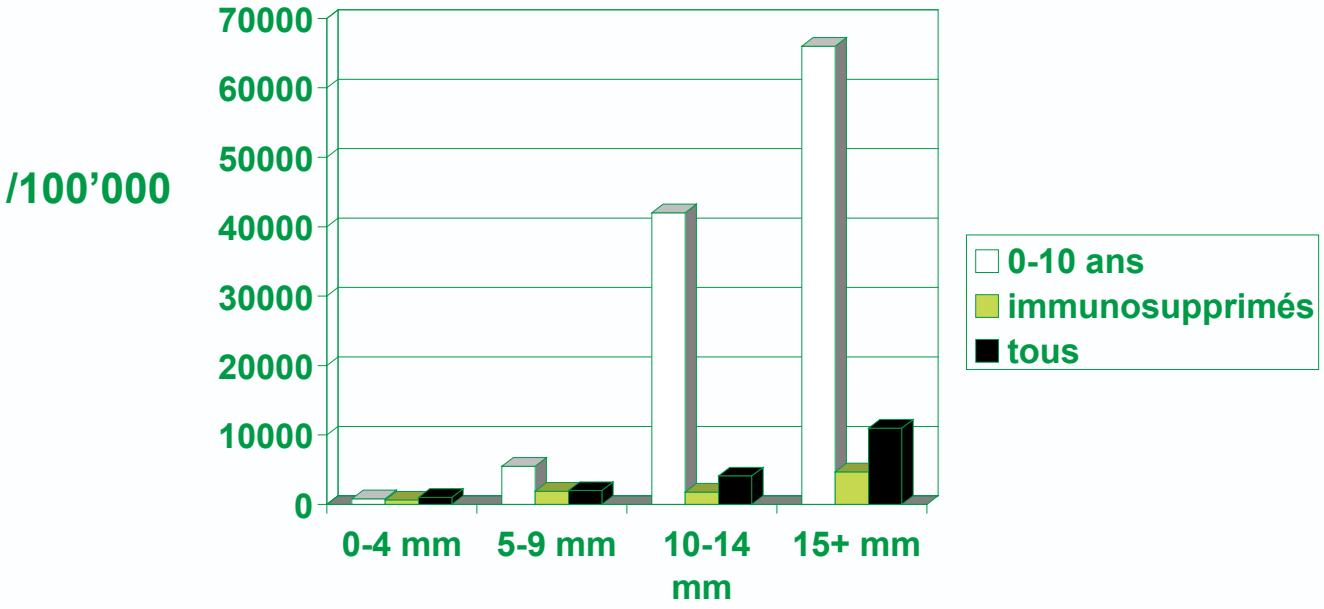
Moran-Mendoza O, IJTLD 2007;11(9):1014-20

Risque de tuberculose chez les contacts selon l'âge et la taille du test tuberculinique



Moran-Mendoza O, IJTLD 2007;11(9):1014-20

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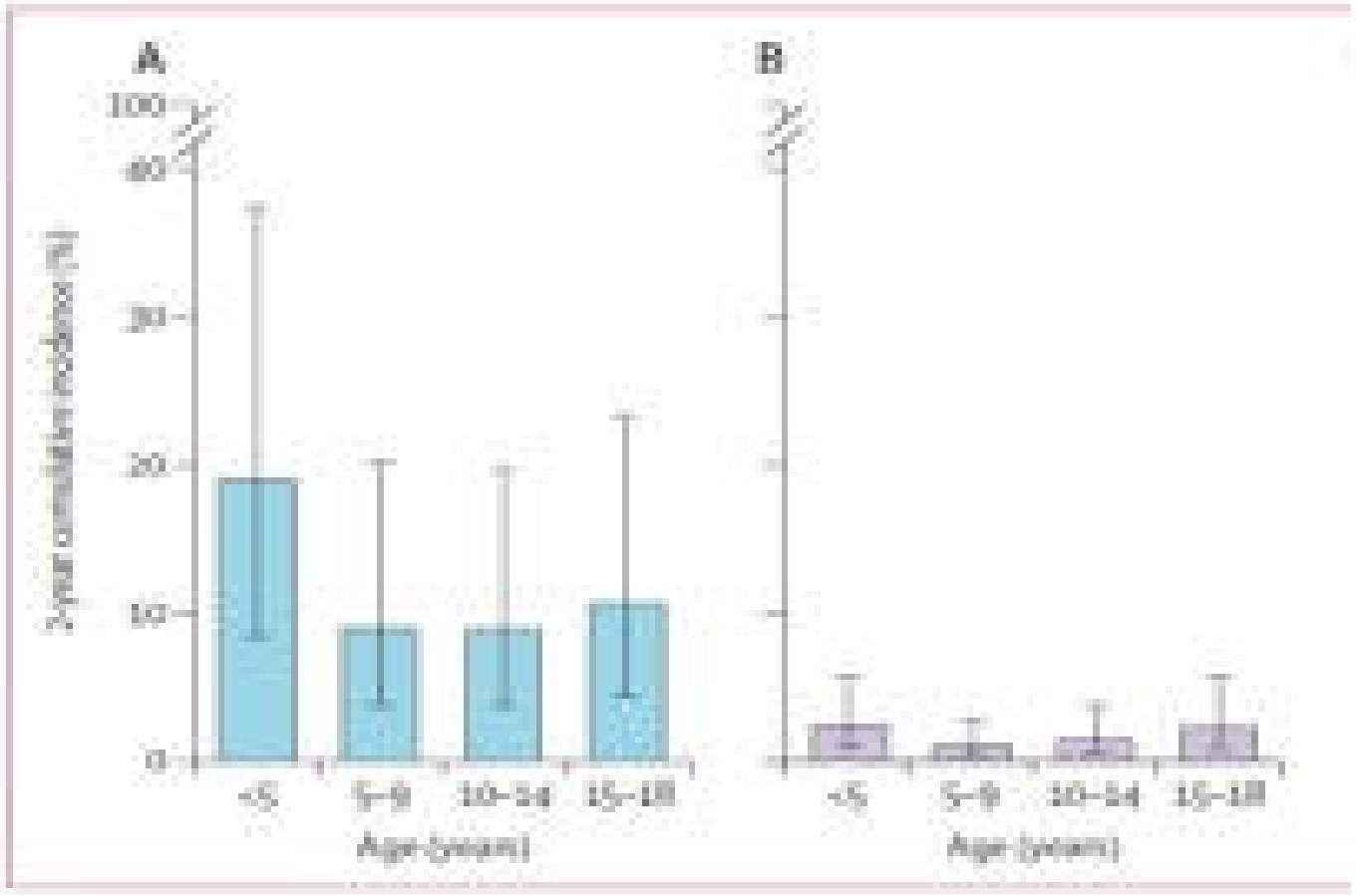
Risque de TB chez les enfants exposés et non traités, selon le résultat du test de dépistage

A) positif B) négatif



Martinez, L., Lancet 2020, 395:973-84

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Risque de TB chez les enfants exposés et non traités, selon le résultat du test et le délai depuis le contact

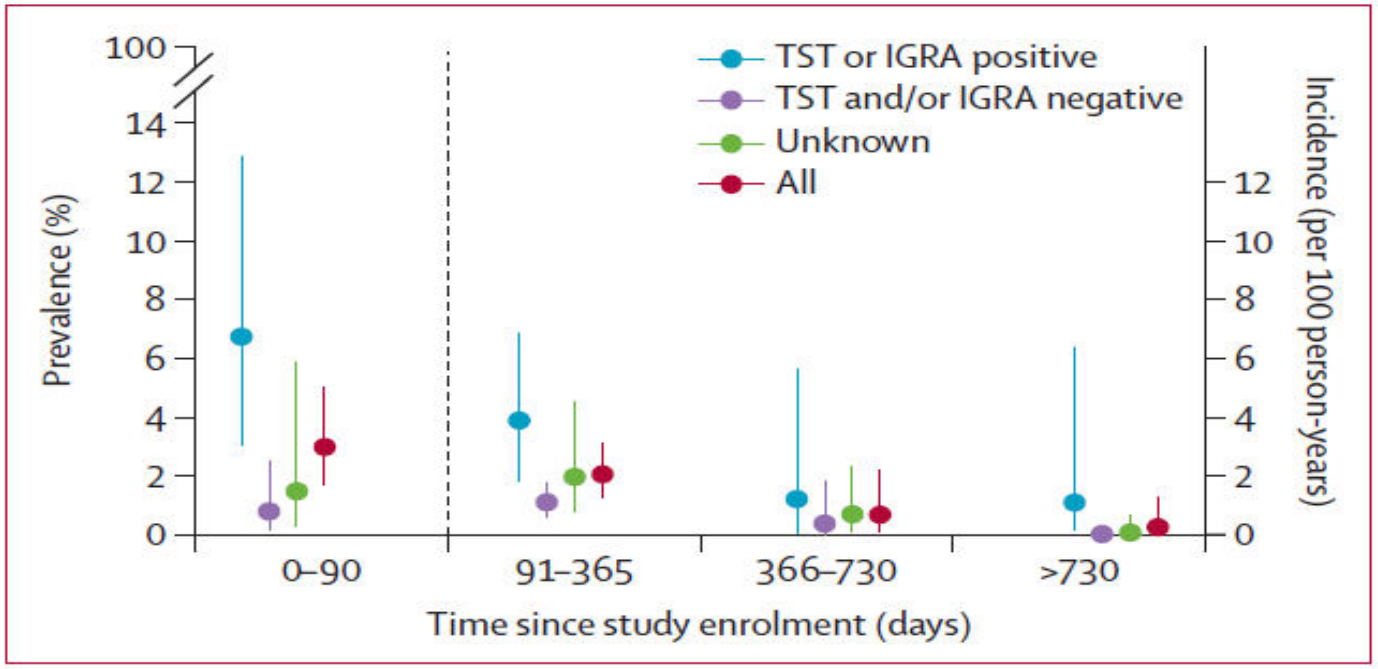

Figure 2: Risk of tuberculosis over time among exposed children not receiving preventive therapy

Martinez, L., Lancet 2020, 395:973-84

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Risque de TB chez les contacts comparé au risque dans la population générale

Table 2. Pooled estimates of risk for active TB among household contacts stratified by age and baseline LTBI status as compared with the general population

Age (years)	LTBI-positive at baseline				Regardless of baseline LTBI status			
	Follow-up < 12 months		Follow-up < 24 months		Follow-up < 12 months		Follow-up < 24 months	
	No. of studies	Risk ratio	No. of studies	Risk ratio	No. of studies	Risk ratio	No. of studies	Risk ratio
General population	–	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)
0–4	2	24.3 (0.73–811.0)	3	22.9 (7.7–68.6)	3	25.9 (16.9–39.7)	5	14.8 (9.8–22.3)
5–14	2	27.1 (17.5–54.1)	3	8.2 (2.3–29.4)	3	24.1 (16.9–34.4)	5	6.3 (2.9–13.7)
≥ 15	1	30.7 (17.5–54.1)	2	13.4 (9.5–18.8)	1	24.7 (14.2–43.0)	3	11.7 (7.6–18.0)

WHO Guidelines on TB 1. Prevention, 2020

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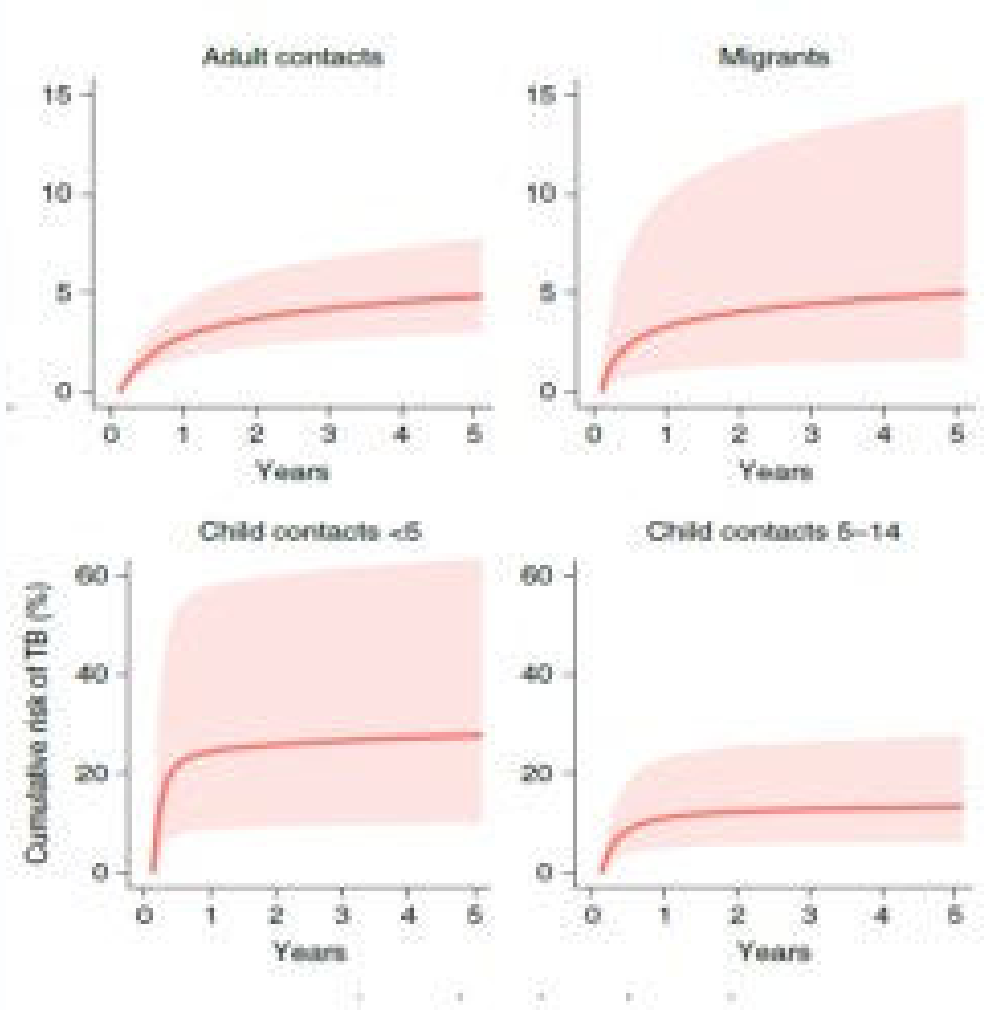
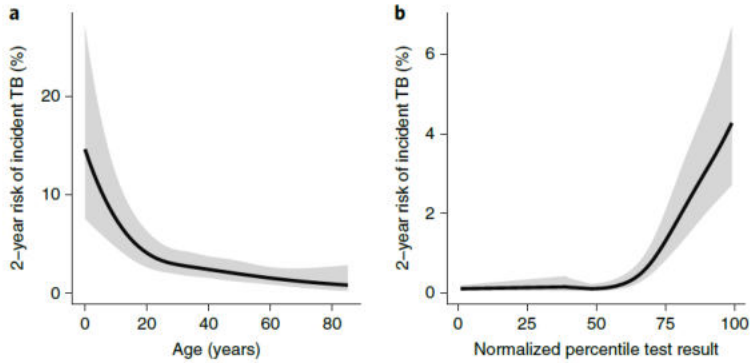
Risque de TB chez les contacts





Gupta , RK., Nature Medicine 2020
https://doi.org/10.1038/s41591-020-1076-0

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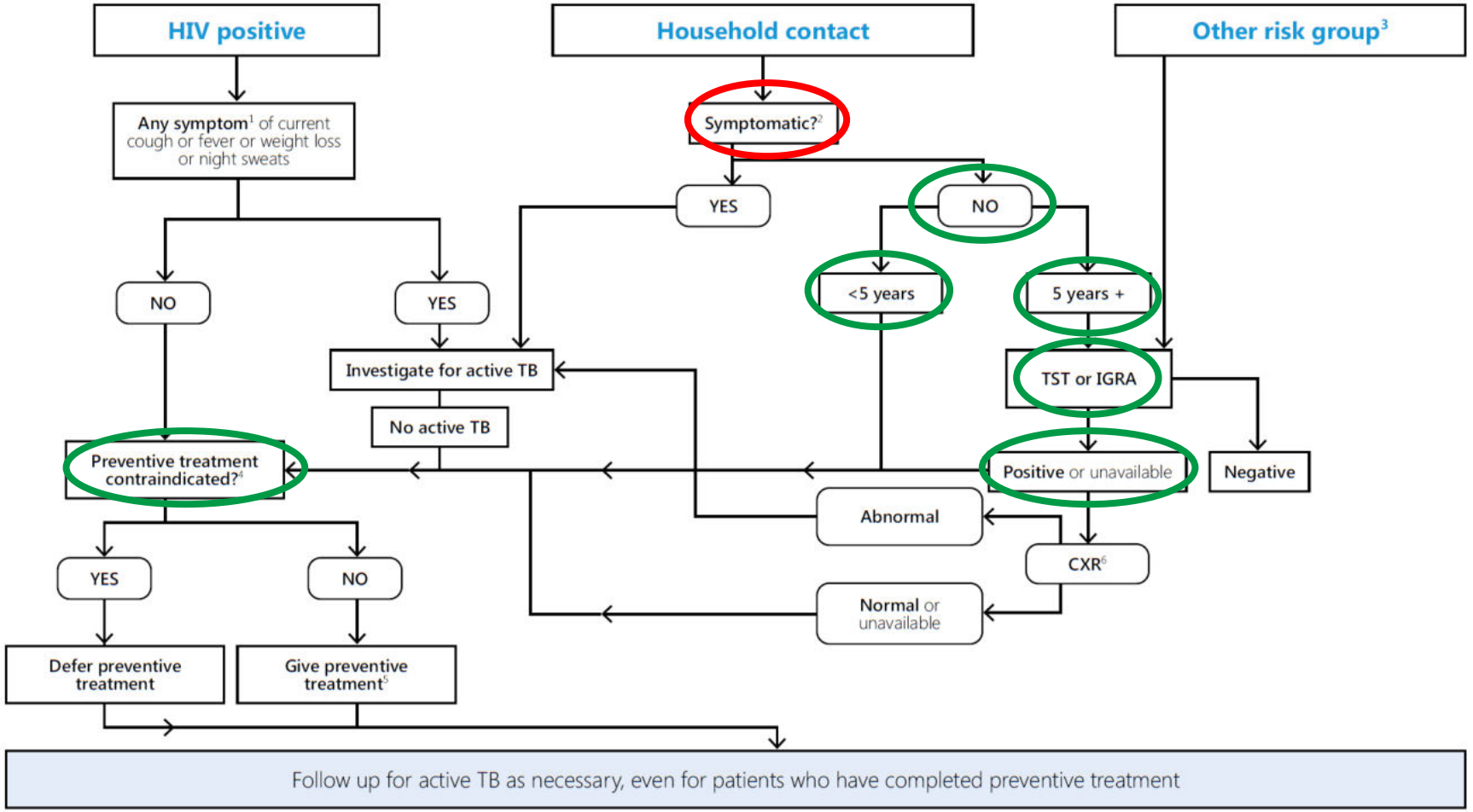
Fig. 1. Algorithm for LTBI testing and TB preventive treatment in individuals at risk



WHO consolidated guidelines on TB. 1. prevention. 2020

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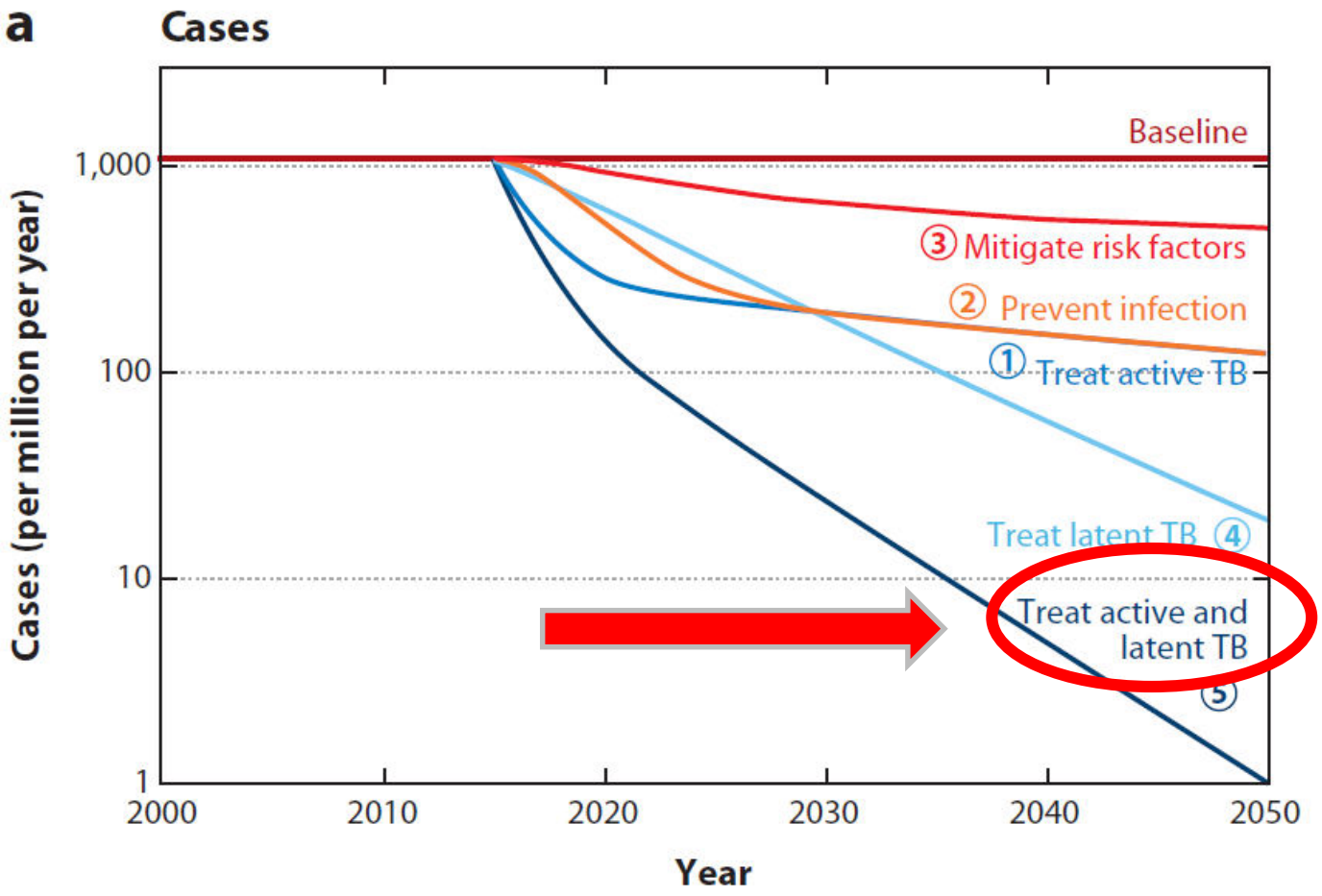
Impact des stratégies de lutte anti-TB sur l'évolution de l'incidence



Dye, C., Ann Rev Public Health 2013;34:271

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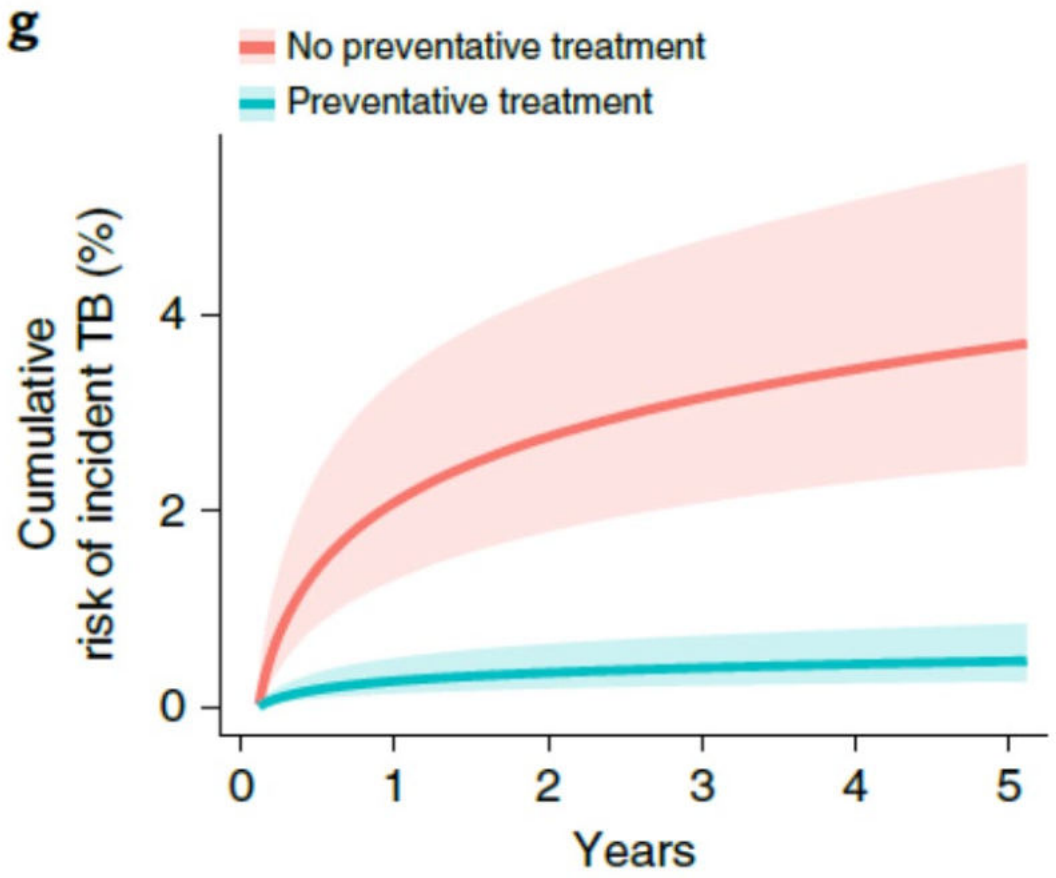
Impact du traitement préventif sur le risque de TB



Gupta , RK., Nature Medicine 2020
https://doi.org/10.1038/s41591-020-1076-0

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Le traitement préventif systématique des enfants < 5 ans et le dépistage et le traitement des adolescents infectés permettrait d'épargner chaque année:

159'000 cas de TB chez les enfants < 15 ans
108'000 décès par TB des enfants < 15 ans

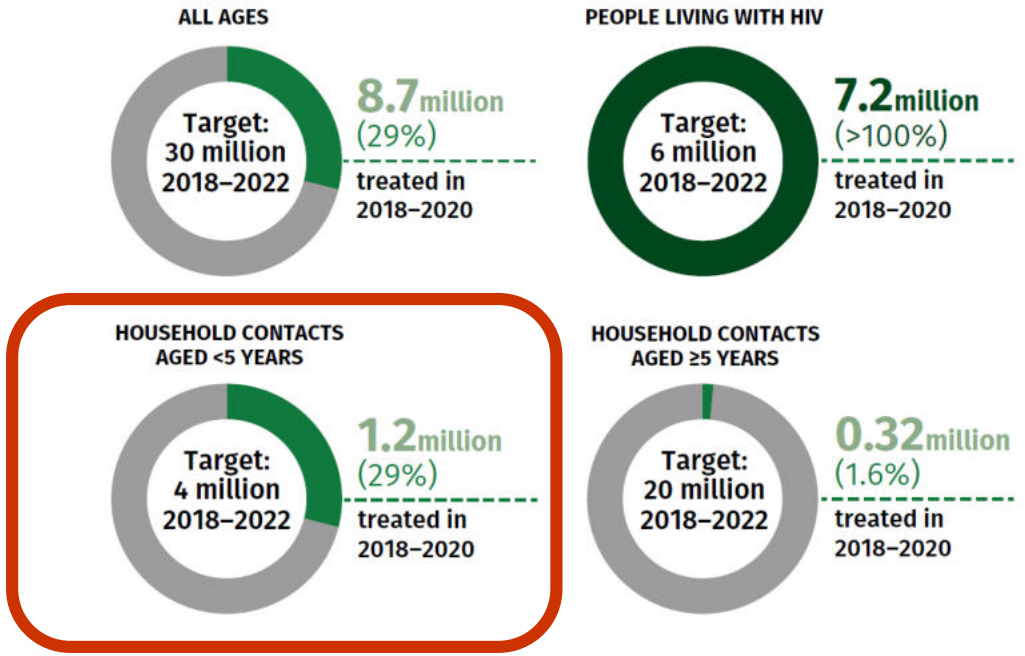
Potential effect of household contact management on childhood tuberculosis: a mathematical modelling study

Peter J Dodd, Courtney M Yuen, Mercedes C Becerra, Paul Revill, Helen E Jenkins, James A Seddon

On est encore loin du but …

FIG. 27

Global progress in provision of TB preventive treatment between 2018 and 2020, compared with cumulative targets set for 2018–2022 at the UN high-level meeting on TB



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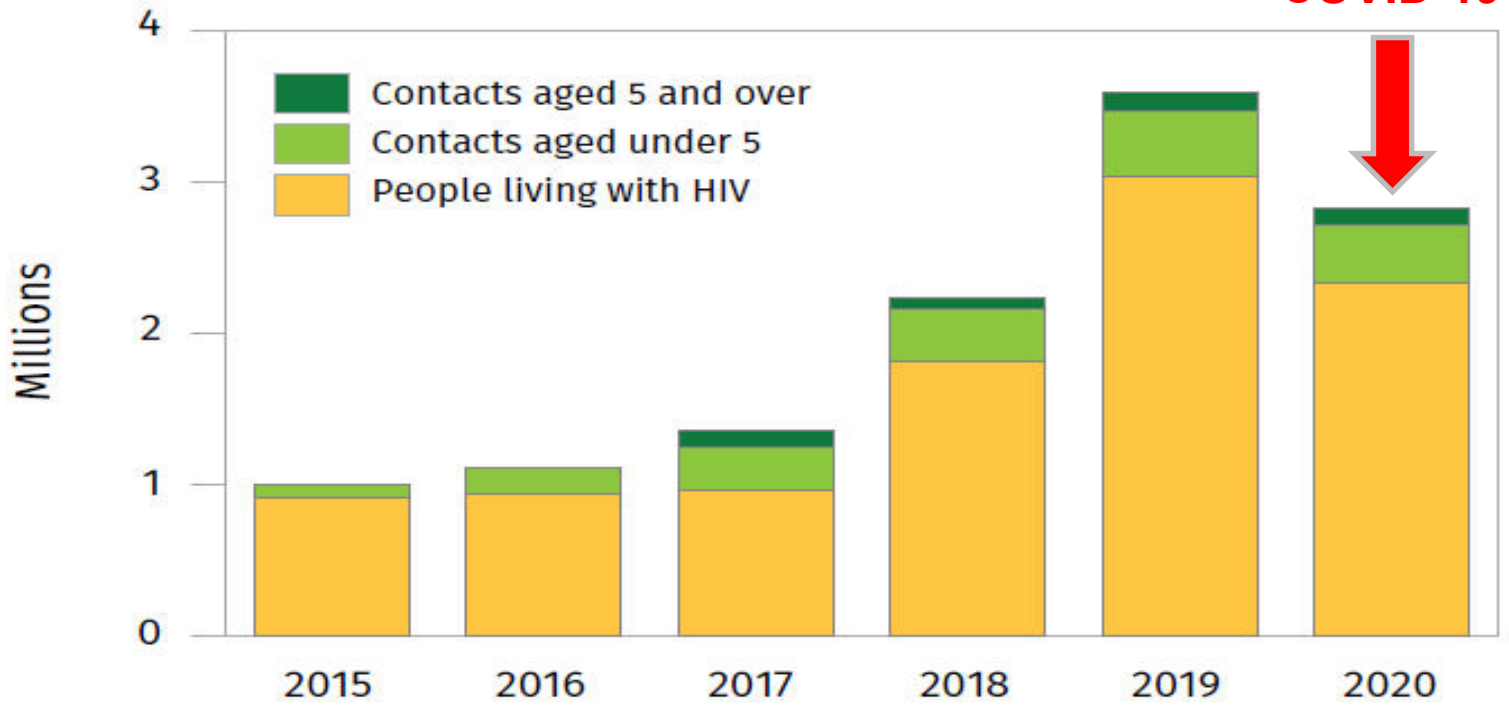
The global number of people provided with TB preventive treatment, 2015–2020[a]

COVID-19



[a] The number of people living with HIV who were provided with TB preventive treatment in 2019 is lower than published in the *Global tuberculosis report 2020*. This is due to an update of the data reported by India.

Les enquêtes d'entourage pour les contacts TB en Suisse

- Les personnes exposées à un cas de TB contagieuse sont contactées et passent un examen destiné à savoir si elles sont malades ou infectées
- Les enfants < 12 ans doivent être examinés immédiatement et ré-examinés à 2 mois
- Pour les enfants < 5 ans sans signe d'infection, un traitement prophylactique d'isoniazide est recommandé jusqu'à preuve de l'absence d'infection (en général 2 mois)
- Les enfants >12 ans et les adultes sont examinés et testés 8 semaines après le dernier contact
- Les personnes infectées reçoivent un traitement préventif, sauf contre-indication

Examens d'entourage: méthode

- Les enquêtes d'entourage sont ordonnées par le médecin cantonal et effectuées par les services cantonaux de lutte antituberculeuse
- Les résultats sont rapportés au service du médecin cantonal et à la Ligue pulmonaire suisse qui les transmets sous forme agrégée à l'Office fédéral de la santé publique dans son rapport annuel
- Depuis 2019, les résultats détaillés de 18 cantons sont enregistrés dans le système RespiGO.
- En 2022, nous avons analysé les résultats détaillés contenus dans le système RespiGO concernant les enfants de <17 ans exposés à la TB en Suisse entre janvier 2017 et juillet 2021
- Les enfants pour lesquels un résultat de test (TST ou IGRA), une Rx ou un diagnostic étaient mentionnés ont été définis comme ayant été examinés

Contacts < 17 ans examinés entre le 01.01.2019 et le 31.07.2021 en Suisse

	0 – 4 years	5 – 11 years	12 – 16 years	total
n	64	108	229	401
Male	17	57	122	196
Female	28	42	100	170
gender unknown	19	9	7	35
Nationality CH	29	55	170	254
Nationality non-CH	35	53	59	147
Household contact	51	68	41	160
School contact	0	25	172	197
Other place of contact (leisure, transportation, workplace)	13	15	17	45

Tests effectués chez 401 enfants exposés, immédiatement après la déclaration du cas index

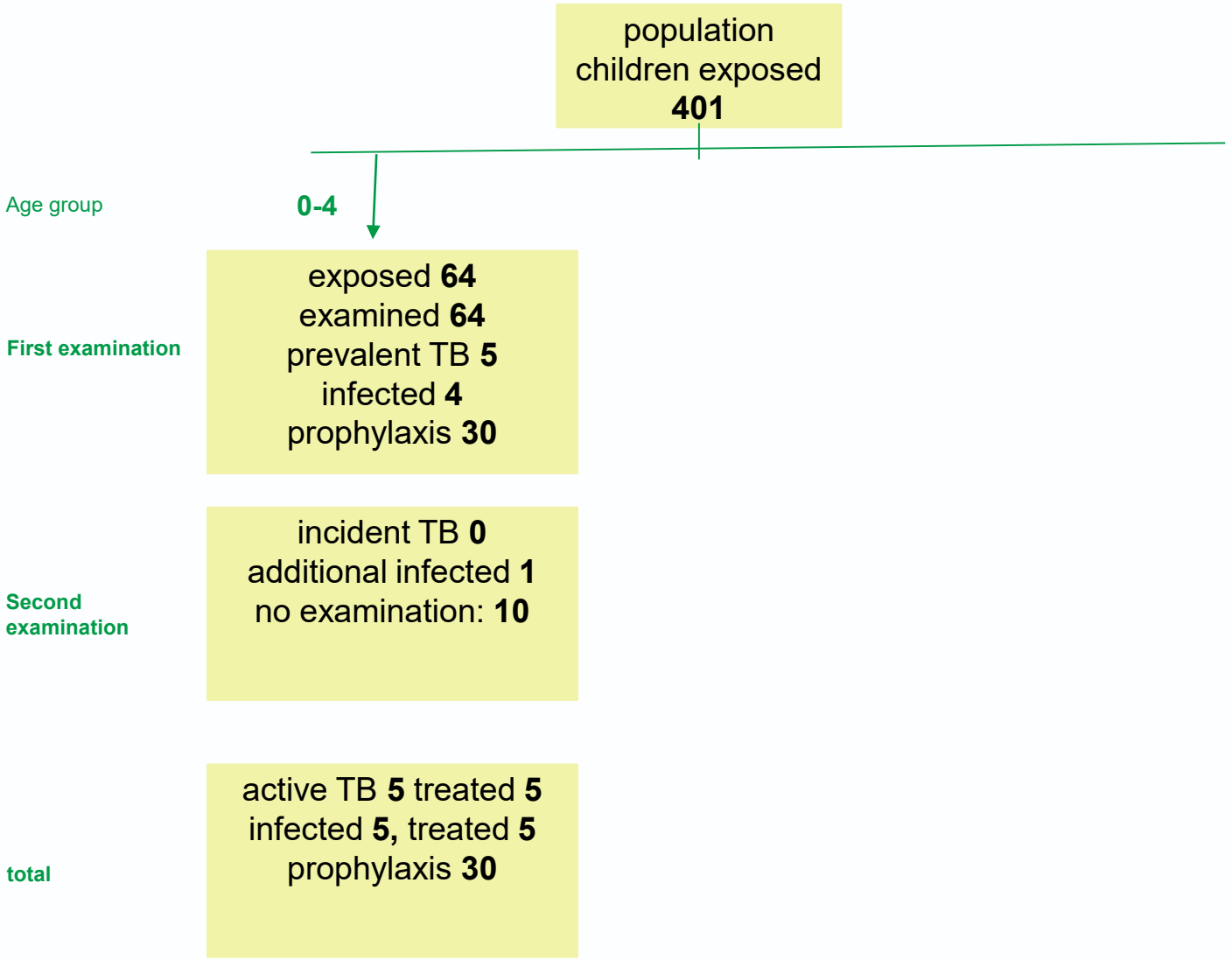
	0 – 4 years	5 – 11 years	12 – 16 years	total children
n	64	108	229	
TST1	27	16	1	72
TST1 +	3	9	0	12
IGRA1	5	32	86	157
IGRA1 +	4	8	7	19
Dual (TST+IGRA)	17	10	2	29

Tests effectués chez 401 enfants exposés 2 mois après le 1er contrôle.

	0 – 4 years	5 – 11 years	12 – 16 years	total children
n	64	108	229	
TST2	33	20	63	130
TST2 +	1	0	1	2
IGRA2	13	53	69	136
IGRA2 +	1	2	8	11
Dual (TST+IGRA)	9	3	2	14

Examens radiologiques effectués chez 401 enfants exposés.

	0 – 4 years	5 – 11 years	12 – 16 years	total children
n	64	108	229	401
Rx 1 normal	35	13	2	50
Rx 1 abnormal	5	2	1	8
Rx 2 normal	15	3	4	22
Rx 2 abnormal	0	0	1	1



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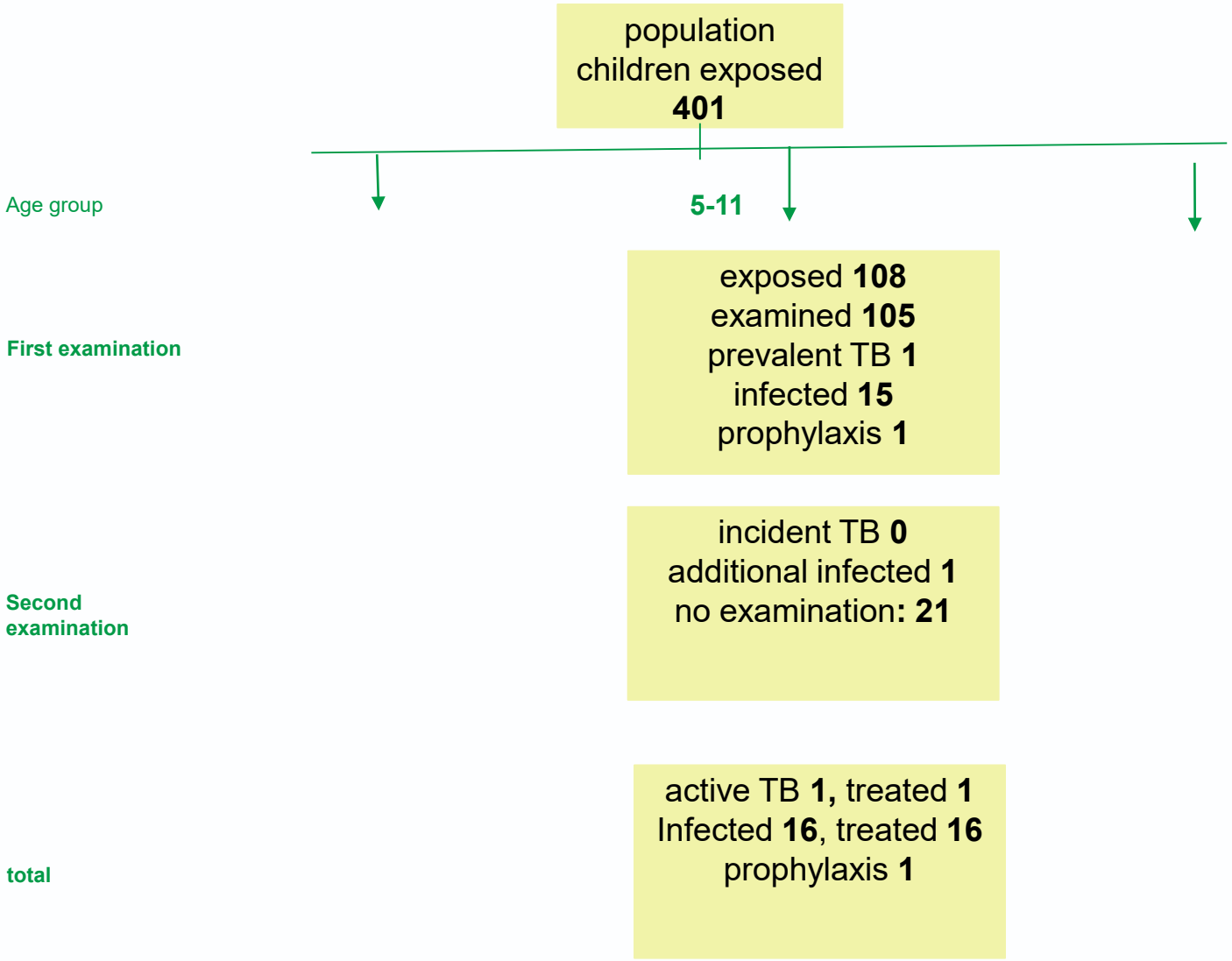

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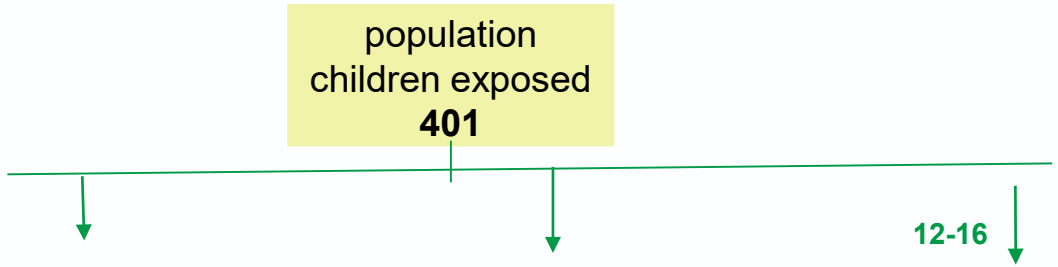

Age group	12-16
First examination	exposed **229** examined **226** prevalent TB **0** infected **7** prophylaxis: **0**
Second examination	incident TB **1** additional infected **8** no examination: **88**
total	active TB **1,** treated **1** Infected **15**, treated **12**

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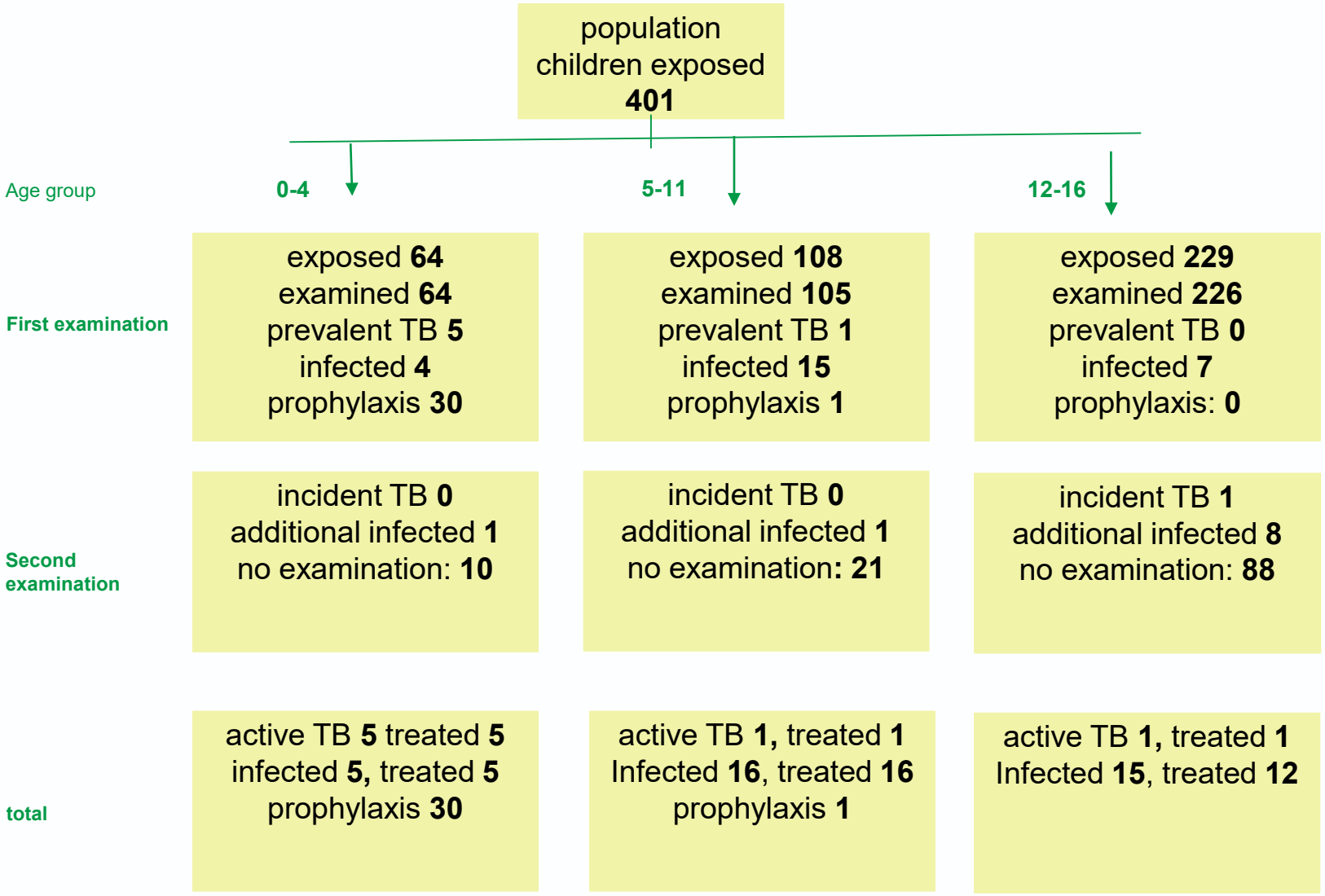

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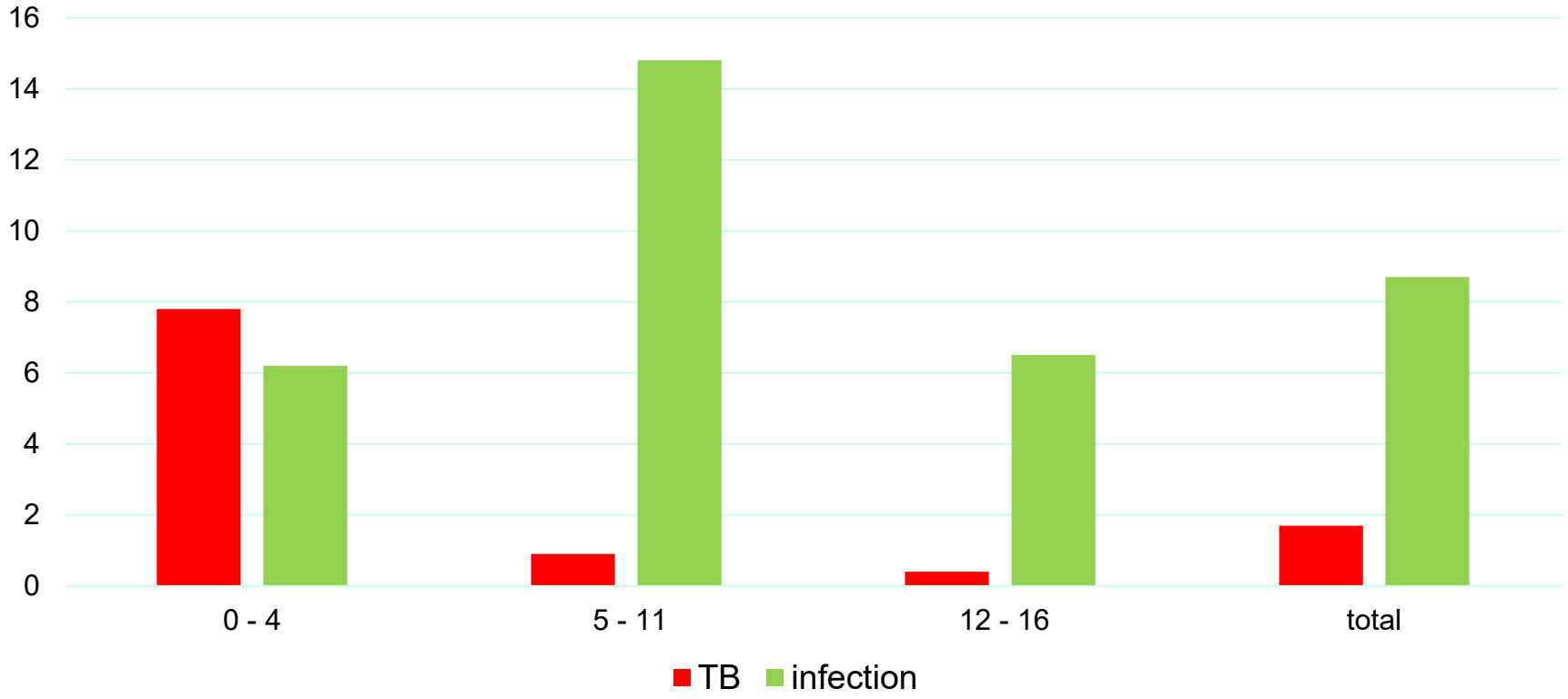
Diagnostic final et traitements administrés

H= isoniazid, R= rifampicin, HRZE: traitement anti-TB complet

	0 – 4 years	5 – 11 years	12 – 16 years	total children
	64	108	229	401
TB (disease)	5	1	1	7
infected	4	16	15	35
2H (prophylaxis)	30	1	0	31
6-9H (prevention)	4	9	1	14
3HR	1	7	4	12
4R	1	0	6	7
HRZE	4	1	1	6
other	0	0	2	2
no therapy	24	90	215	329

Proportion de TB et d'infections chez les enfants exposés, par classe d'âge



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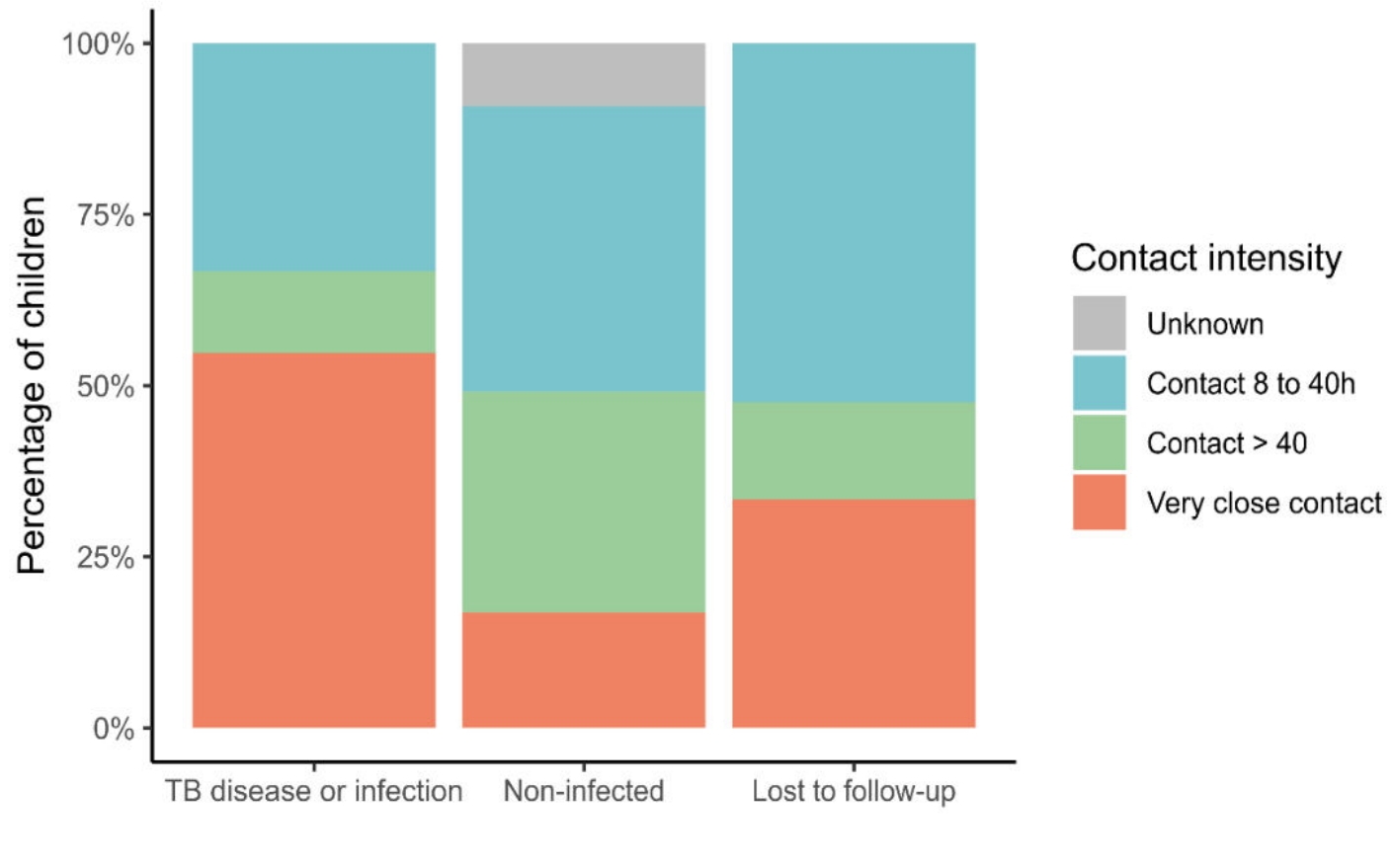
Age et lieu d'exposition des enfants

	Contact place	total	TB disease	TB infection	non-infected	lost to follow-up	p
n		401	7	35	338	21	
Age (median)		13.0	3.0	10.0	13.0	11.0	0.02
Contact place (%)	School	197 (49.1)	0 (0.0)	6 (17.1)	188 (55.6)	3 (14.3)	<0.001
	Home	160 (39.9)	7 (100.0)	26 (74.3)	112 (33.1)	15 (71.4)	
	Leisure	24 (6.0)	0 (0.0)	2 (5.7)	19 (5.6)	3 (14.3)	
	Public Transport	13 (3.2)	0 (0.0)	0 (0.0)	13 (3.8)	0 (0.0)	
	Work	7 (1.7)	0 (0.0)	1 (2.9)	6 (1.8)	0 (0.0)	

Type de contact et risque de TB et d'infection



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Proportion d'enfants examinés et traités, comparaison avec les recommandations LPS/OFSP

Age group	SLA/FOPH recommendations	This survey
0-4 years	Immediate clinical examination including CXR Immediate testing Isoniazid prophylaxis if negative Re-testing at 2 months Preventive treatment if infected	40/64 (63%) 49/64 (77%) 30/59 (51%) 55/60 (92%) 4/4 (100%)
5-11 years	Immediate testing Re-testing at 2 months if negative Preventive treatment if infected	58/108 (54%) 76/92 (83%) 16/16 (100%)
12-17 years	No immediate testing Testing at 2 months Preventive treatment if infected	89/229 (39%) 134/222 (60%) 12/15 (80%)

Conclusions:

- Sur 1557 contacts TB enregistrés entre 2019 et 2021, 401 concernaient des enfants
- 7 enfants étaient atteints d'une TB active,
  - âge médian 3 ans
  - tous contaminés à domicile
  - tous ont été traités
- 35 enfants étaient porteurs d'une infection
  - âge médian 10 ans
  - 32 ont reçu un traitement préventif
- L'examen à 2 mois des enfants 5-11 et 12-16 ans est lacunaire ou incomplet dans une forte proportion de cas

Merci à

- Nathalie Gasser, Otto Schoch, Jean-Marie Egger
  - Ligue pulmonaire Suisse

- Nicole Ritz, Nora Fritschi,
  - Mycobacterial and Migrant Health Research Group, University of Basel Children's Hospital Basel and Department of Clinical Research, University of Basel

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Tuberkulose: Behandlungsresultate in der Schweiz

2016 bis 2020

Was Sie erwartet …

- Epidemiologie der Tuberkulose in der Schweiz
  - Zeitliche Entwicklung
  - Altersverteilung
  - Räumliche Verteilung
  - Organmanifestation
- Behandlungsresultate 2016 bis 2020
- Neues in der Überwachung per 1.1.2022
- Zusammenfassung

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Zeitlicher Verlauf der Fälle von Tuberkulose

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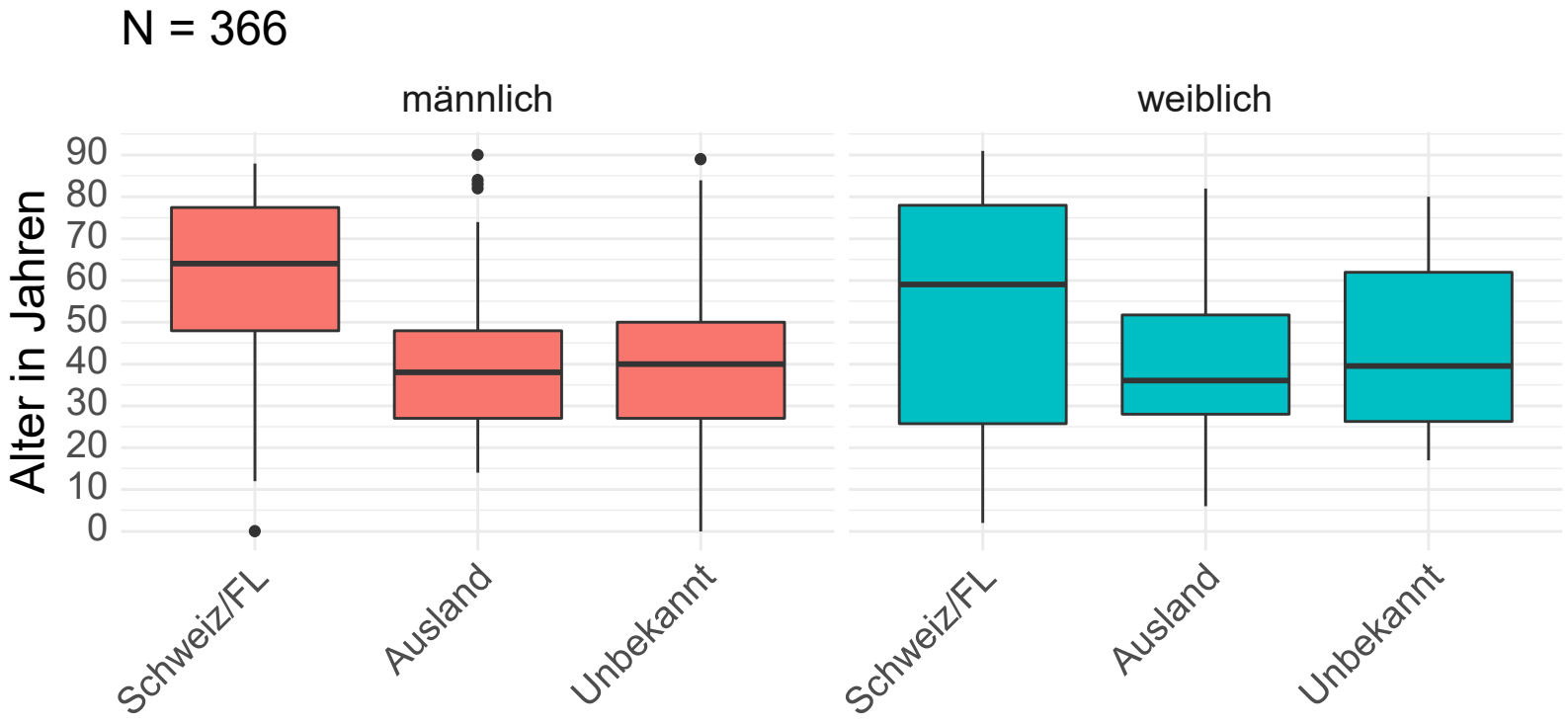
Altersverteilung der Fälle nach Herkunft und Geschlecht im 2021



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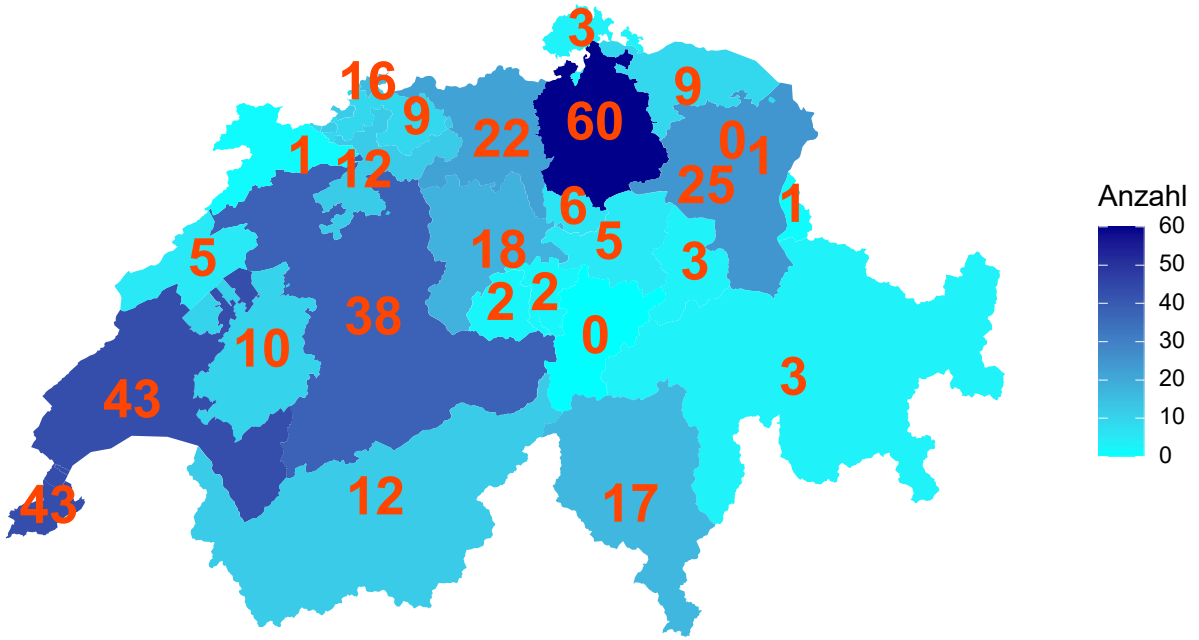
Räumliche Verteilung der Tuberkulose im Jahr 2021

N = 366



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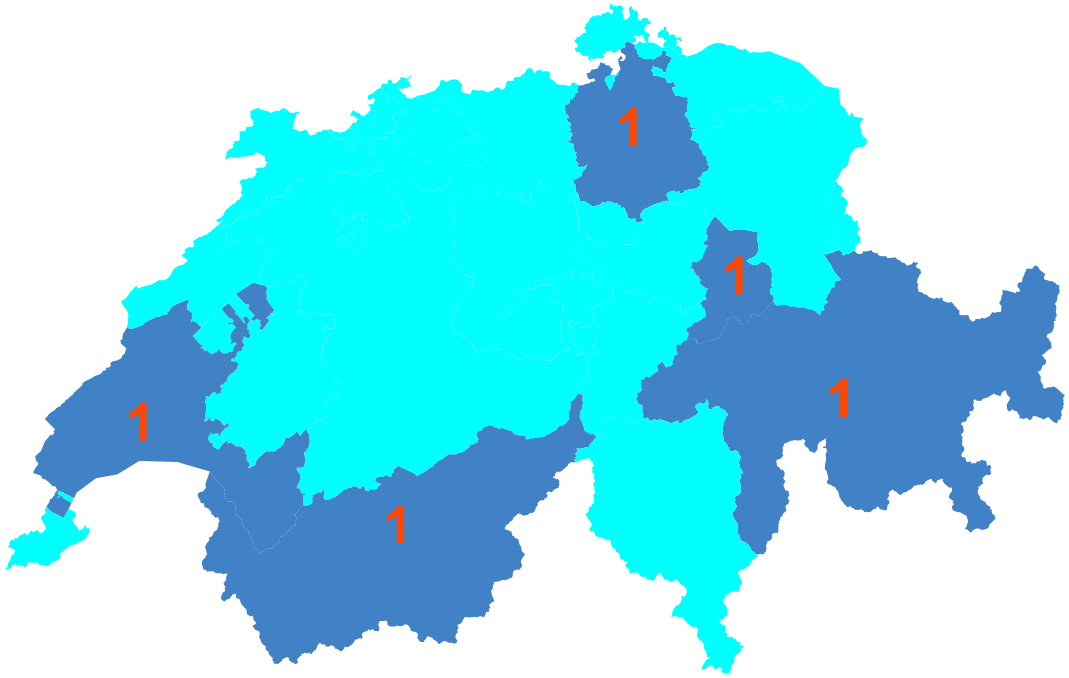
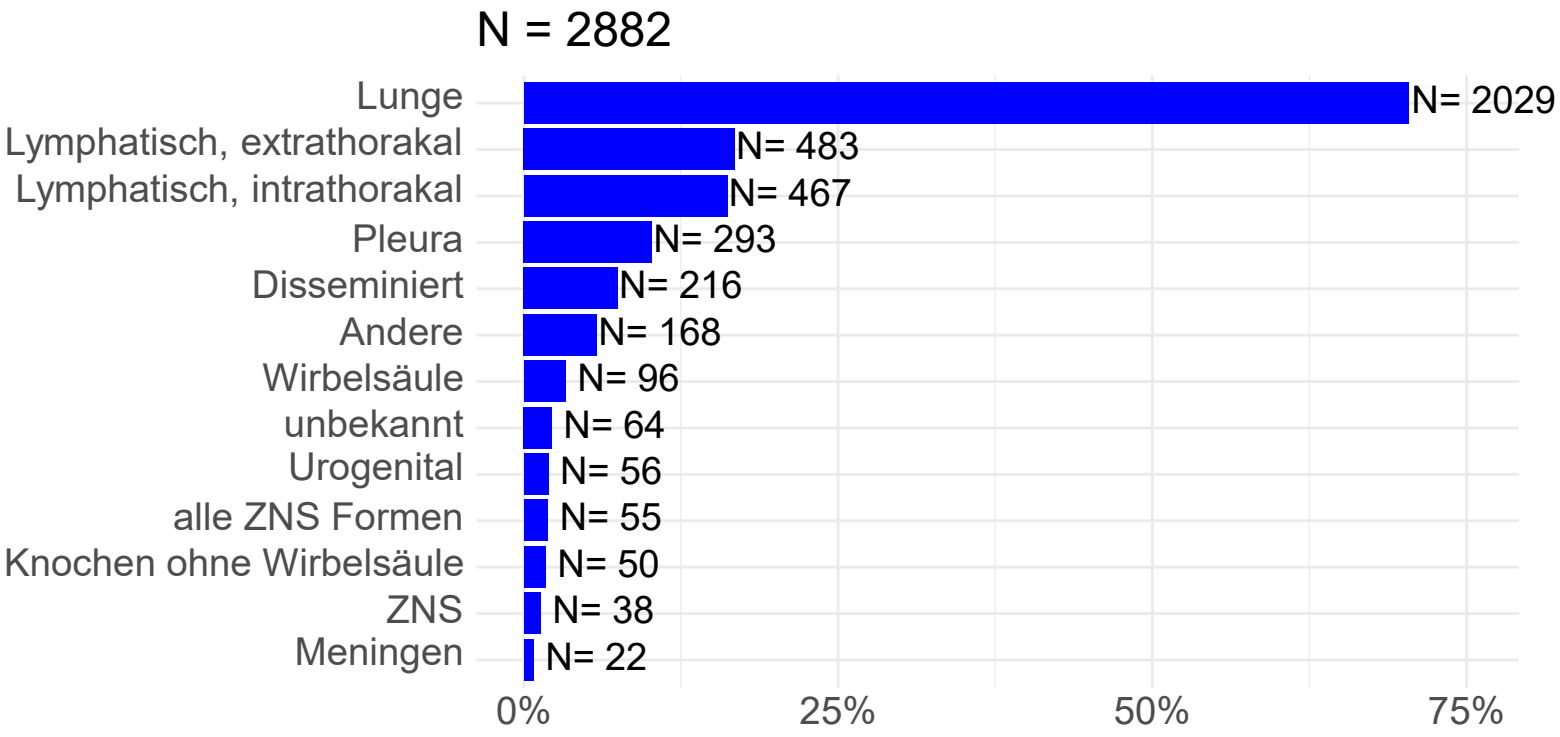
Räumliche Verteilung der RR/MDR-TB Fälle im Jahr 2021



RR-TB: Rifampizin-resistente Tuberkulose, MDR-TB: multiresistente Tuberkulose

TB Symposium 2022
Abteilung übertragbare Krankheiten, Ekkehardt Altpeter
24. März 2022

Manifestation 2016 bis 2021



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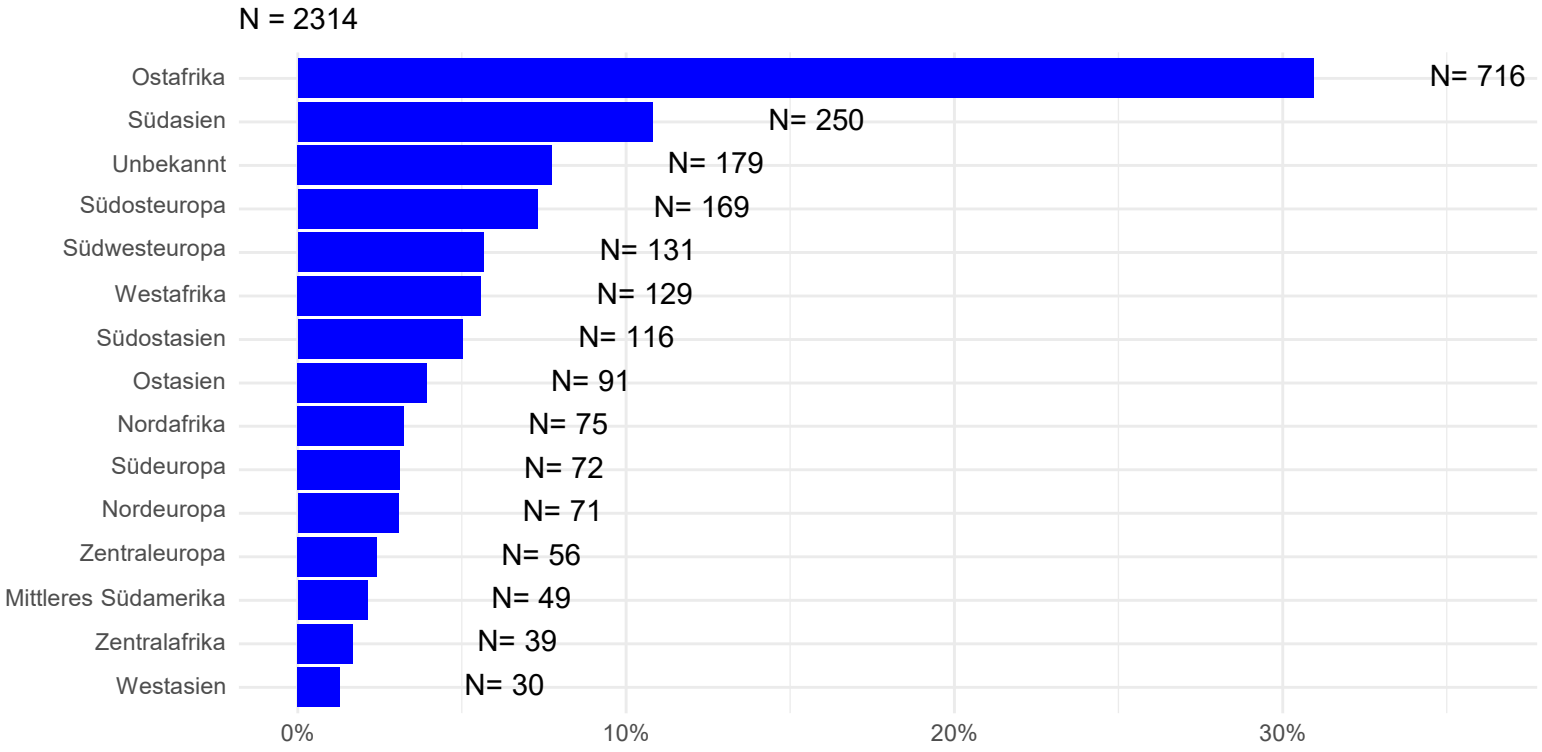
Wichtigste Herkunftsregionen 2016 bis 2021 ohne Schweiz/FL



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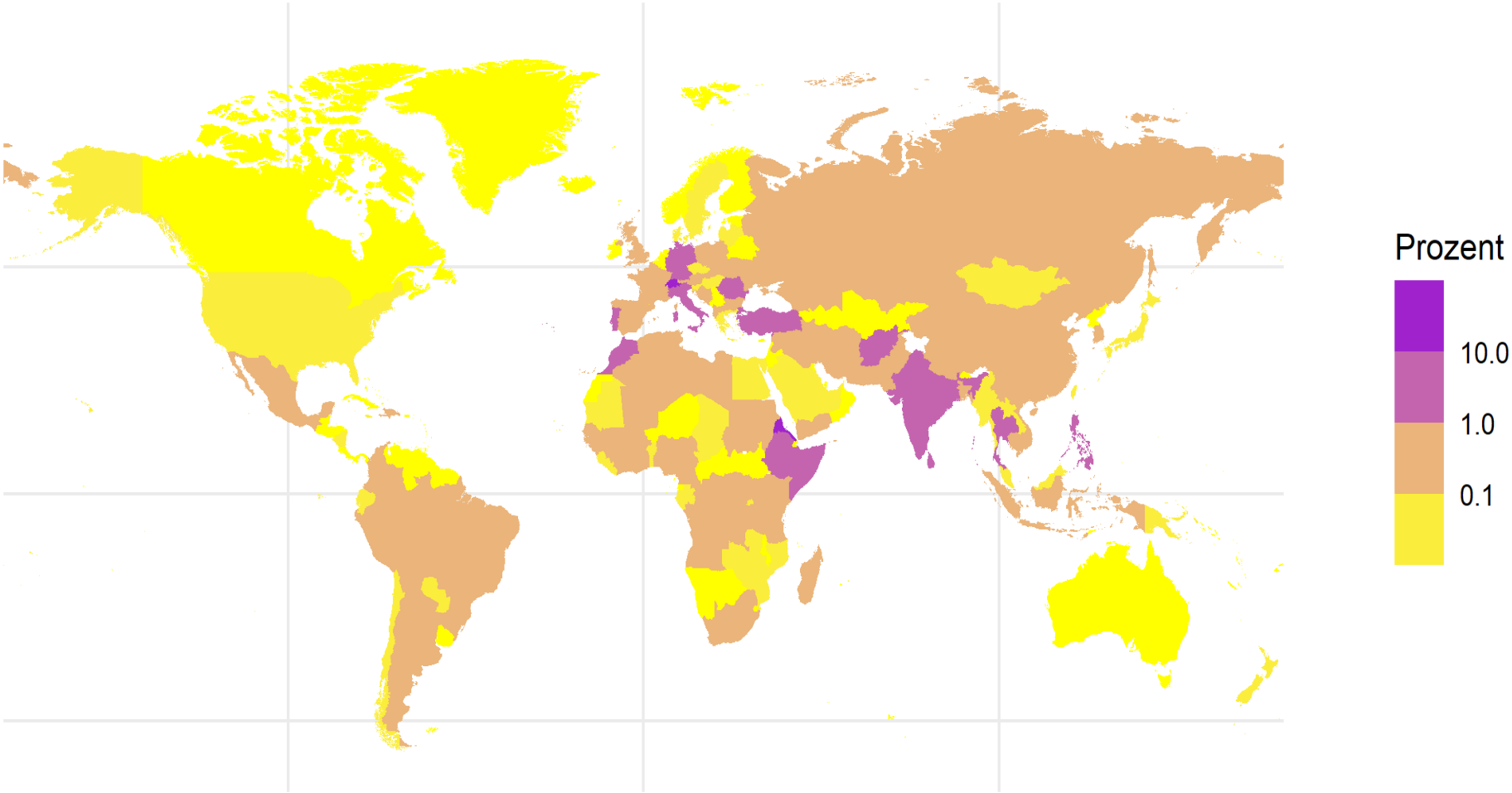
Herkunftsländer 2016 bis 2021

N = 2882



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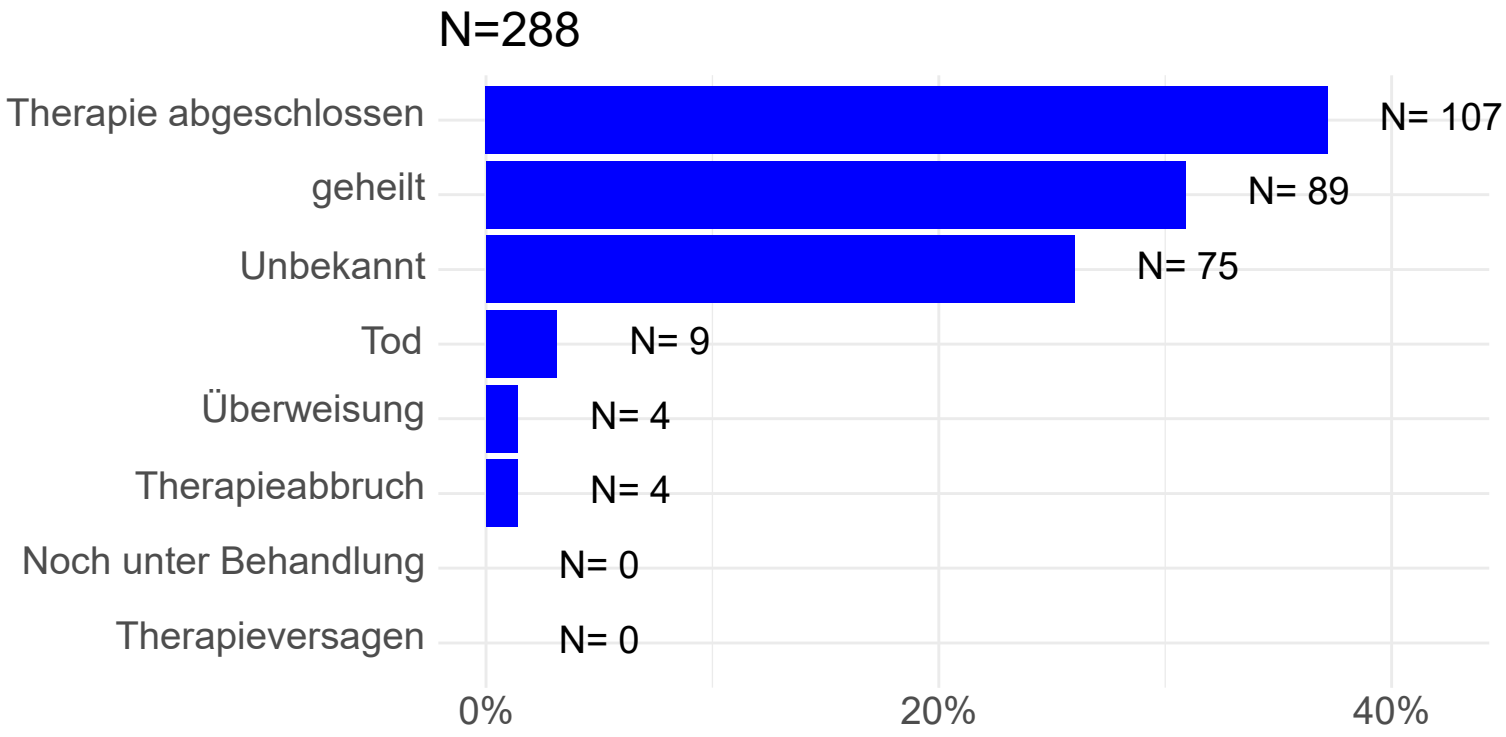
Behandlungsresultate im Jahr 2020



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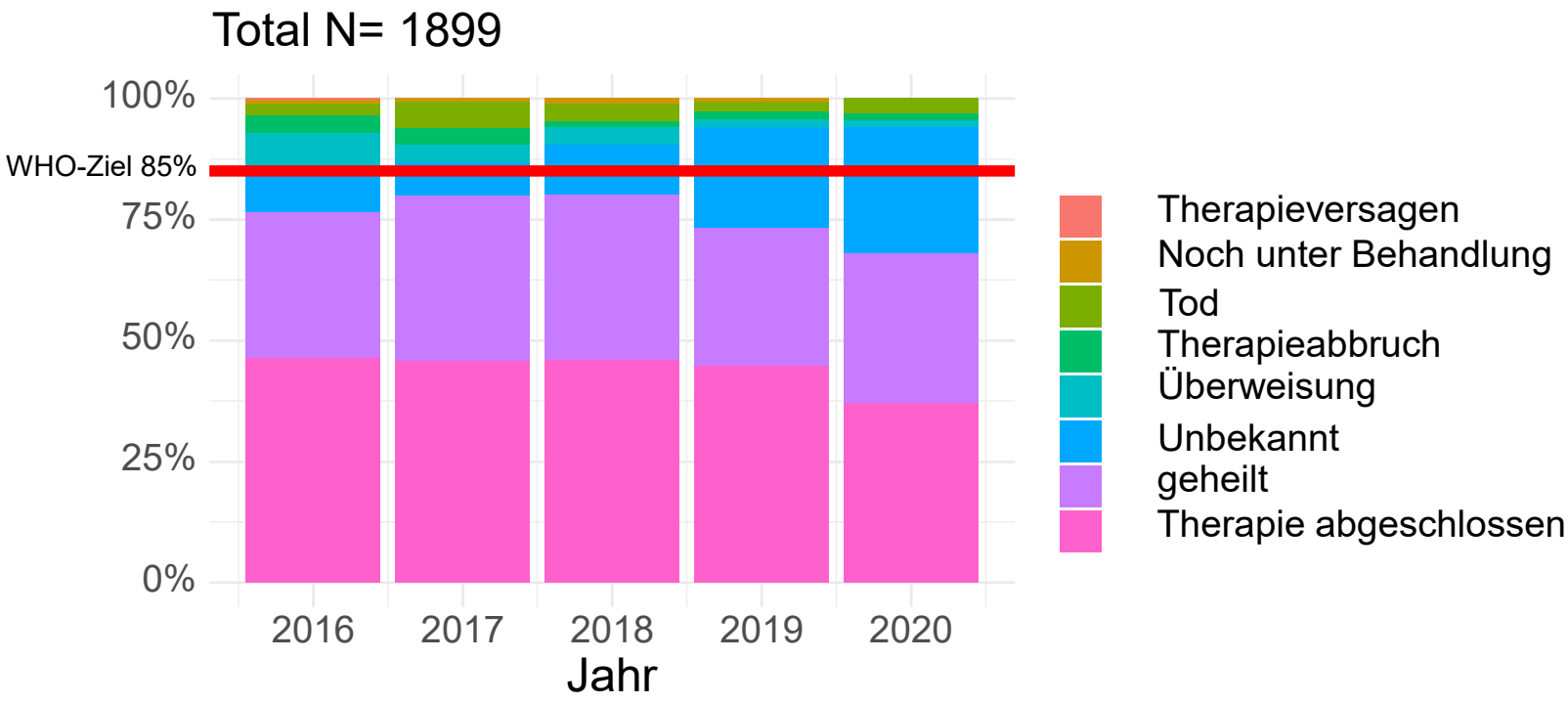
Behandlungsresultate 2016 bis 2020



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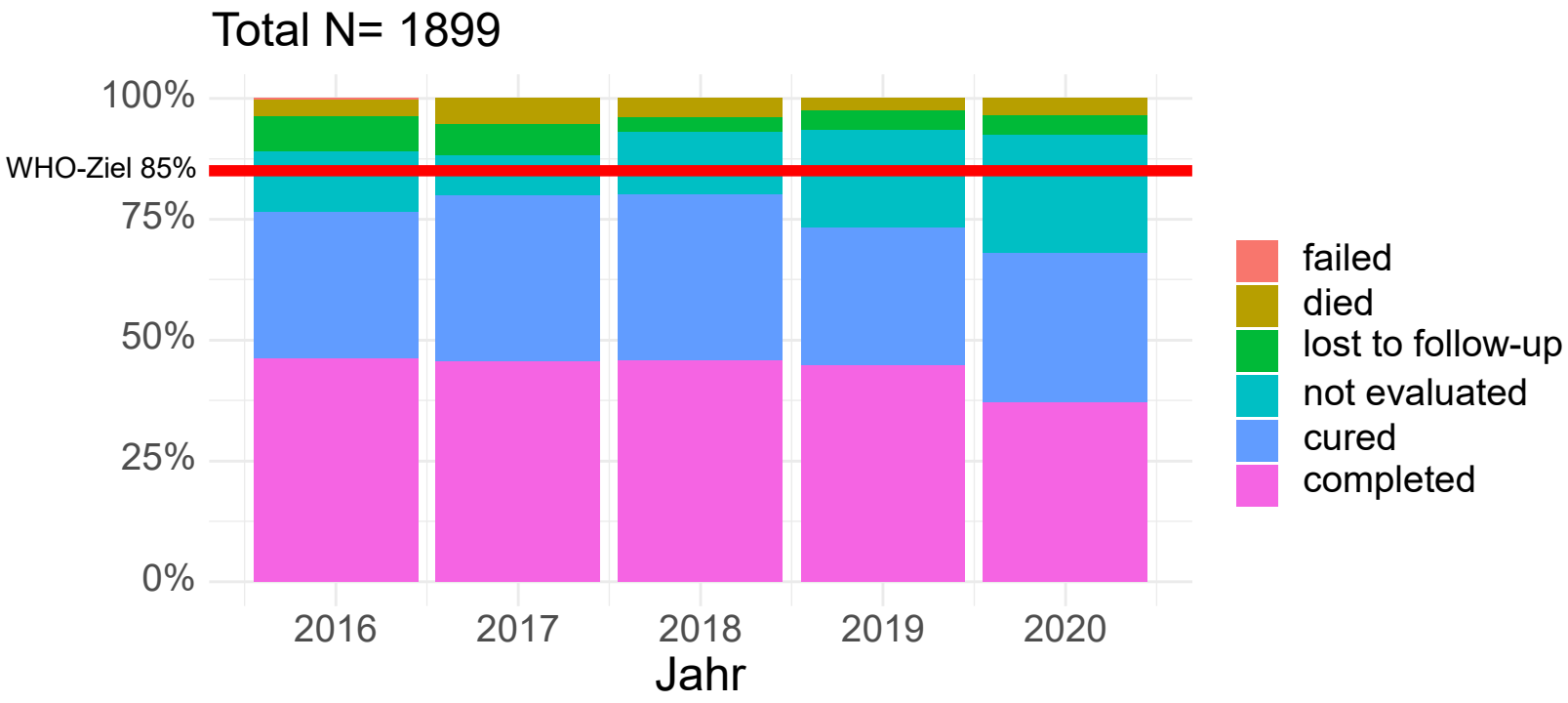
Behandlungsresultate (WHO) 2016 bis 2020



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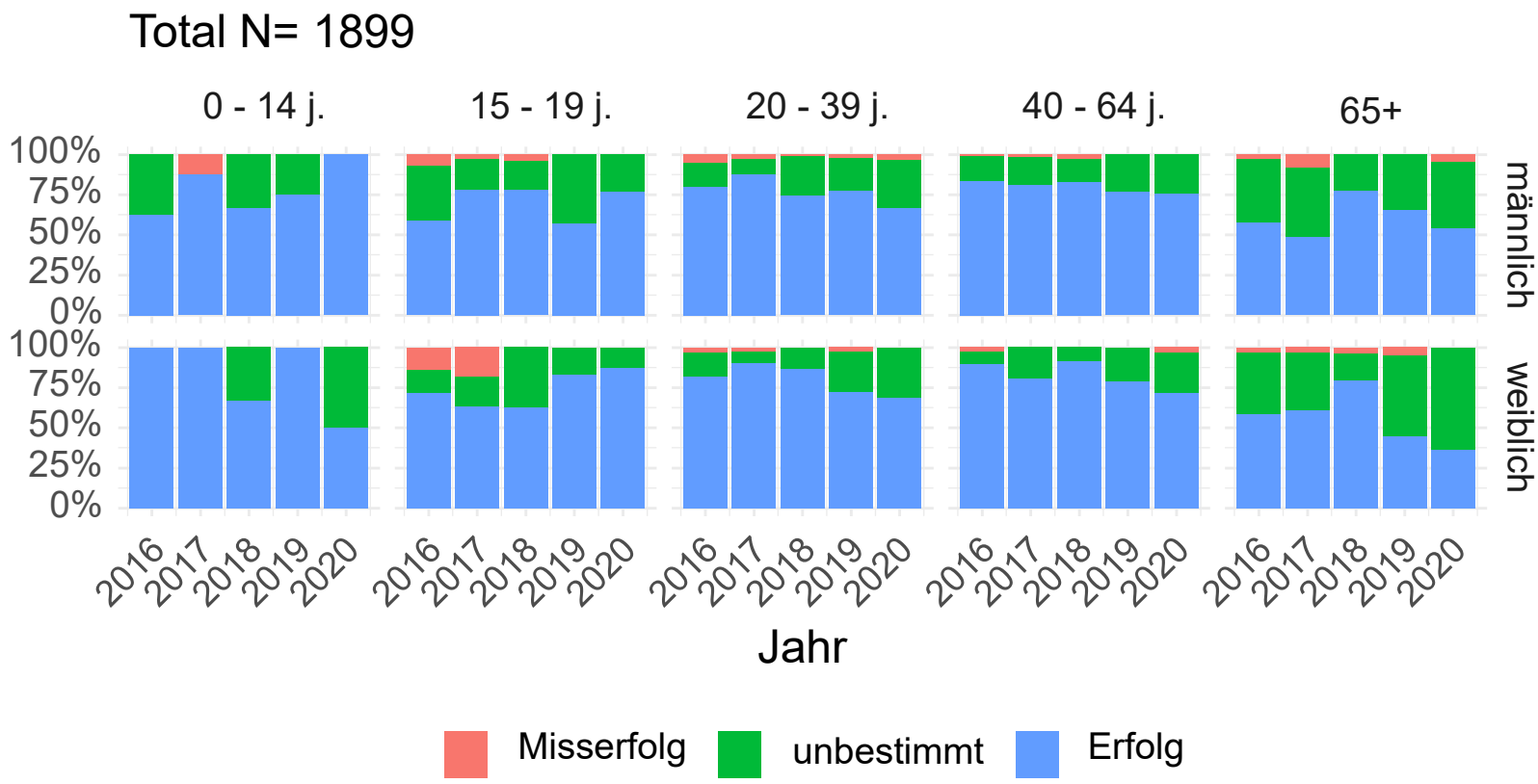
Behandlungserfolg nach Alter und Geschlecht 2016 bis 2020



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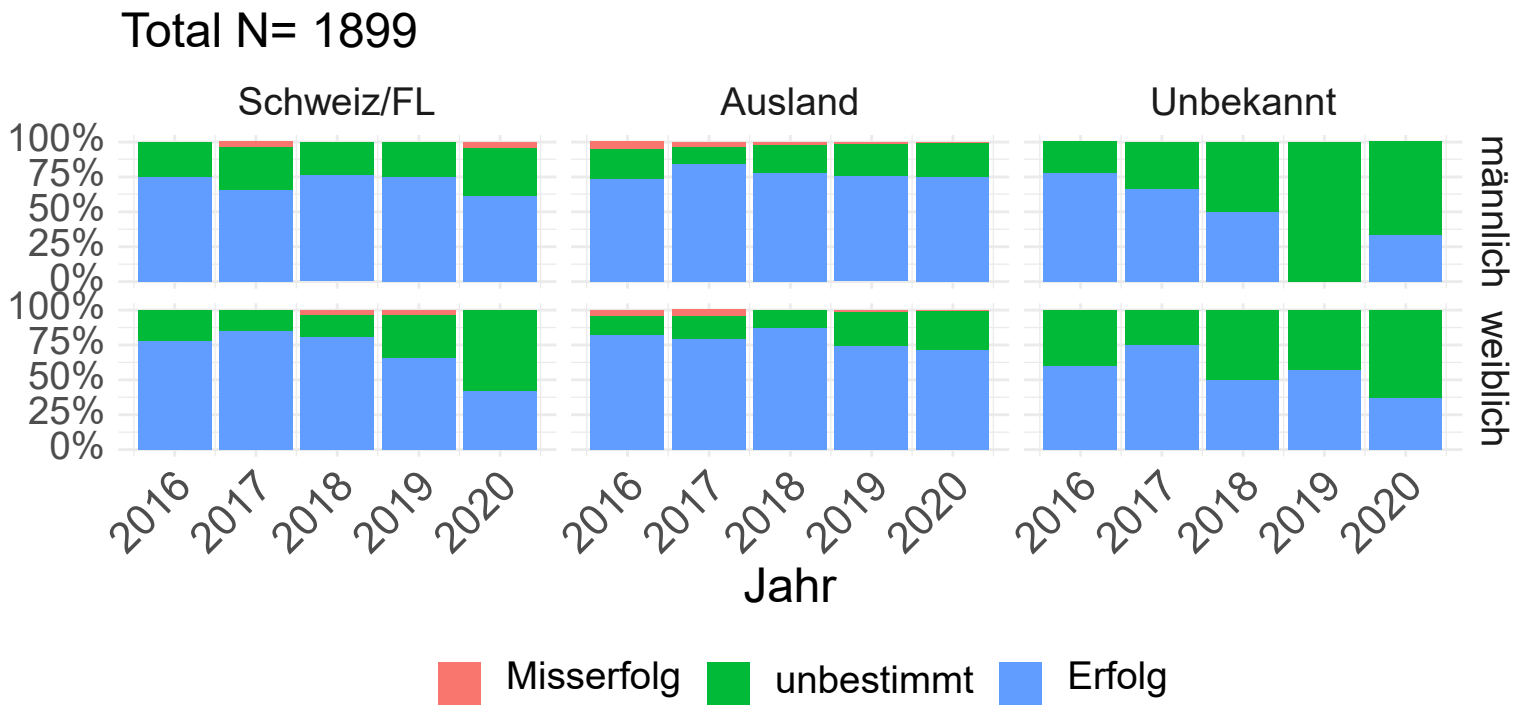
Behandlungserfolg 2016 bis 2020



Neues in der Überwachung per 1.1.2022

- Änderung der Meldekriterien für die Ergänzungsmeldung:
  - Abschluss der Behandlung
  - Überweisung an eine andere Institution
  - Wechsel der Behandlung
  - Auf Aufforderung des kantonsärztlichen Dienstes
- Durch den behandelnden Arzt oder die Ärztin
- Nur noch ein Formular mit Kategorien, die ein Ableiten der seit 2021 gültigen WHO-Kategorien erlaubt.
- Neue Definition von Pre-XDR- und XDR-Tb

Zusammenfassung I

- Der rückläufige Trend bei der Tb in der Schweiz hält an.
- Betroffen sind vor allem junge erwachsene Männer mit Migrationshintergrund. Sie stammen vor allem vom Horn von Afrika
- Die meisten Fälle werden in den bevölkerungsreichen Kantonen beobachtet.
- Die RR/MDR-Tb ist selten.
- Betroffen ist vor allem die Lunge.

Zusammenfassung II

- Der Anteil «unbekannter» Behandlungsresultate ist hoch und nimmt 2020 deutlich zu. Dies vor allem bei den über 64-Jährigen (und hier vor allem bei den Frauen).
- Bei Personen mit unbekannter Herkunft sind unbekannte Behandlungsresultate häufiger als in den anderen Kategorien.
- Dies steht in zeitlichem Zusammenhang mit der Corona-Pandemie.
- Meldekriterien und -kategorien haben auf 1.1.2022 gewechselt.

Dank an

- Die meldende Ärzteschaft
- Die Lungenligen
- Die kantonsärztlichen Dienste der Schweiz und den Landesphysikus des Fürstentums Liechtenstein.
- Meine Kolleginnen und Kollegen am BAG: Philipp Ludin, Liliane Trafelet, Axel Jeremias Schmidt, Marianne Jost, Domenica Perissinotto, Nathalie Vicari, Raphael Rytz, Marcel Brunner.

Subclinical Tuberculosis in Children: Diagnostic Strategies for Identification Reported in a 6-year National Prospective Surveillance Study

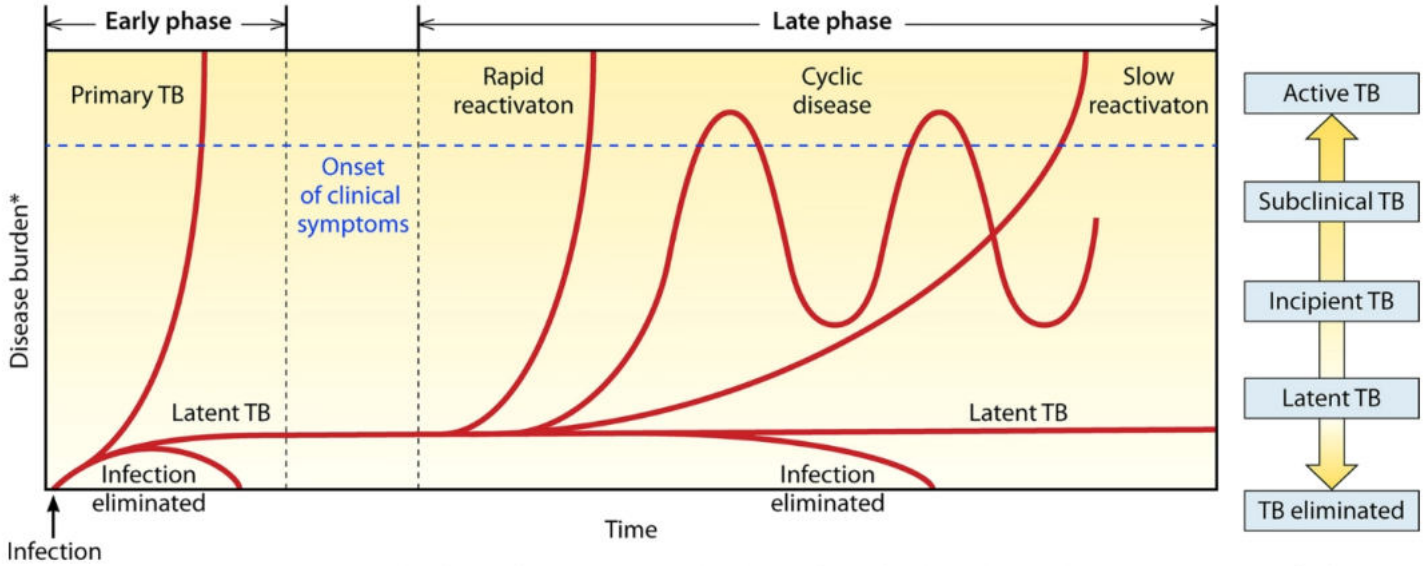
30. Tuberkulose-Symposium in Bern

24.03.2022

Nora Fritschi, MD, PhD student in clinical research
University children's hospital Basel, Switzerland

Background: Clinical presentation of tuberculosis (TB)

- Historically TB was dichotomised in a latent (asymptomatic, non-contagious) and an active (symptomatic, contagious) disease stage.
- A newer understanding emphasized a continuum between latent and active TB.
- Data about the diagnostic strategy in children with subclinical (asymptomatic) TB is limited.



*Rising TB burden implies an increase in abundance of TB and pathogen biomarkers, compartment-specific changes in immunological responses, and a decrease in the probability of disease resolution in the absence of treatment.

Drain, P. K., et al. (2018). "Incipient and Subclinical Tuberculosis: a Clinical Review of Early Stages and Progression of Infection." Clinical Microbiology Reviews **31**(4): e00021-00018.

Definitions

Inclusion criteria:

Children < 16 years

AND

with culture- or molecular-confirmed TB disease from
M. tuberculosis, M. africanum, M. bovis, M. caprae or "*Mycobacterium complex*"

OR

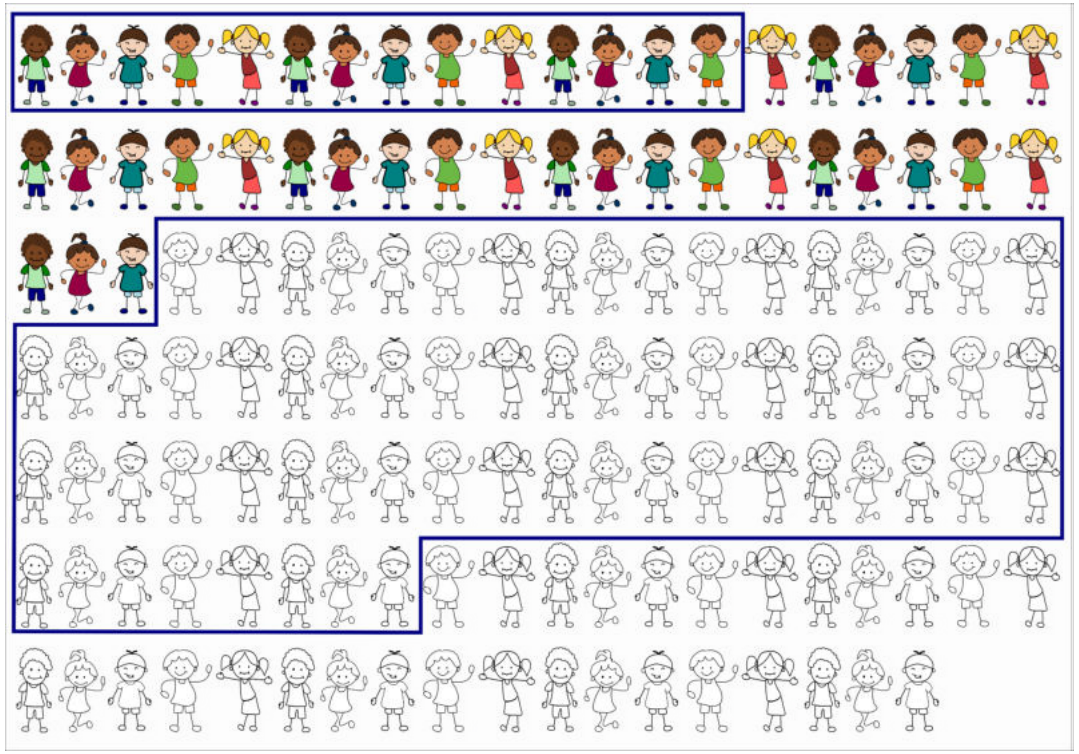
for whom treatment with at ≥ 3 anti-mycobacterial drugs had been initiated.

Subclinical TB:

A child was considered having subclinical TB if the treating physician either reported the child as asymptomatic and/or reported none of the symptoms (including other) listed in the questionnaire (including an open question on "other symptoms") as being present.

Results: Baseline characteristics

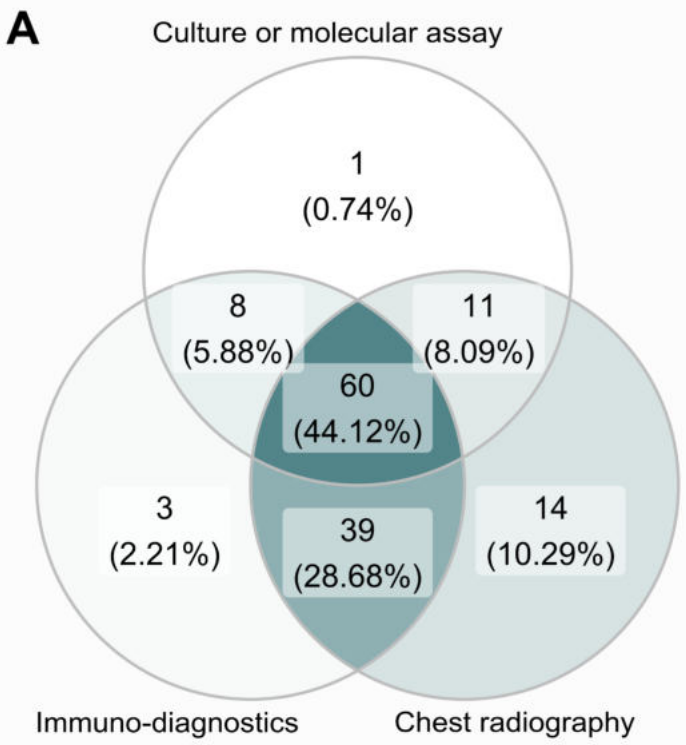
- N = 138 children
- Male: 76 (55%)
- Foreign-born: 64 (47%)
- Confirmed by culture or molecular assay: 80 (58%)
- Subclinical TB: 43 (31%)
- Confirmed by culture or molecular assay: 80 (58%)



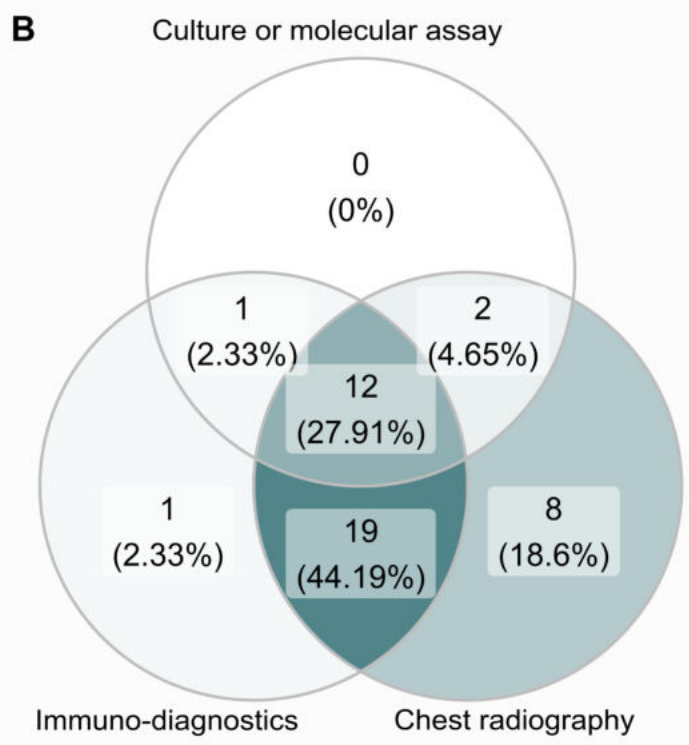
N. Fritschi, A. Wind, J. Hammer, N. Ritz, Clin Infect Dis 2021

Results: Subclinical TB

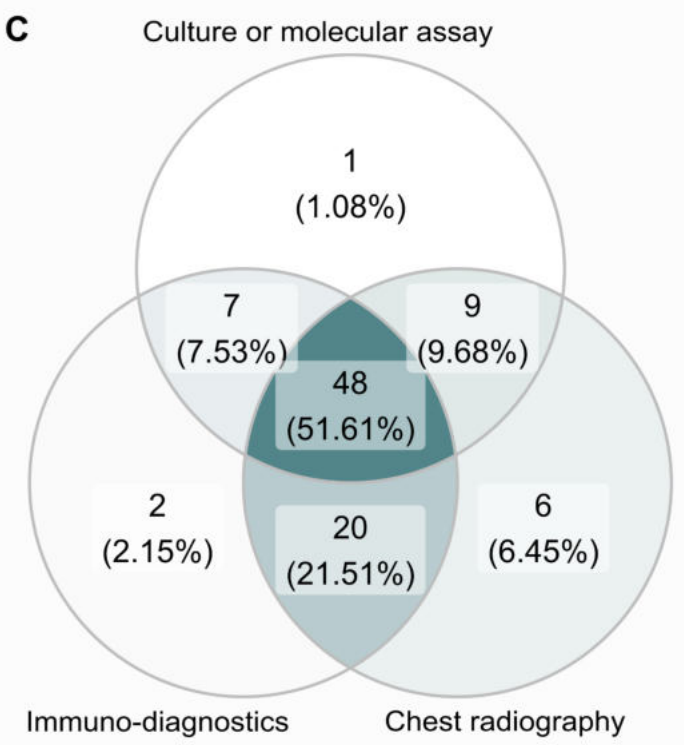
all children



subclinical TB



symptomatic TB



N. Fritschi, A. Wind, J. Hammer, N. Ritz, Clin Infect Dis 2021

Conclusion

- A notable proportion of children in our cohort had subclinical TB.
- This highlights the importance of non-symptom based TB case finding in exposed and refugees from high-TB-prevalence settings.

Thanks to

- the Swiss Paediatric Surveillance Unit
- all paediatric clinics of Switzerland for supporting our study and taking care of children with TB ins Switzerland
- and all Co-Authors

Dr.med. Nora Fritschi

Dr.med. Ante Wind

Prof. Dr.med. Jürg Hammer

PD Dr.med. Nicole Ritz PhD

Post-tuberculosis morbidity: The size of the problem

Dr Jamilah Meghji

Liverpool School of Tropical Medicine

Cambridge University Hospitals NHS Foundation Trust

24/3/22

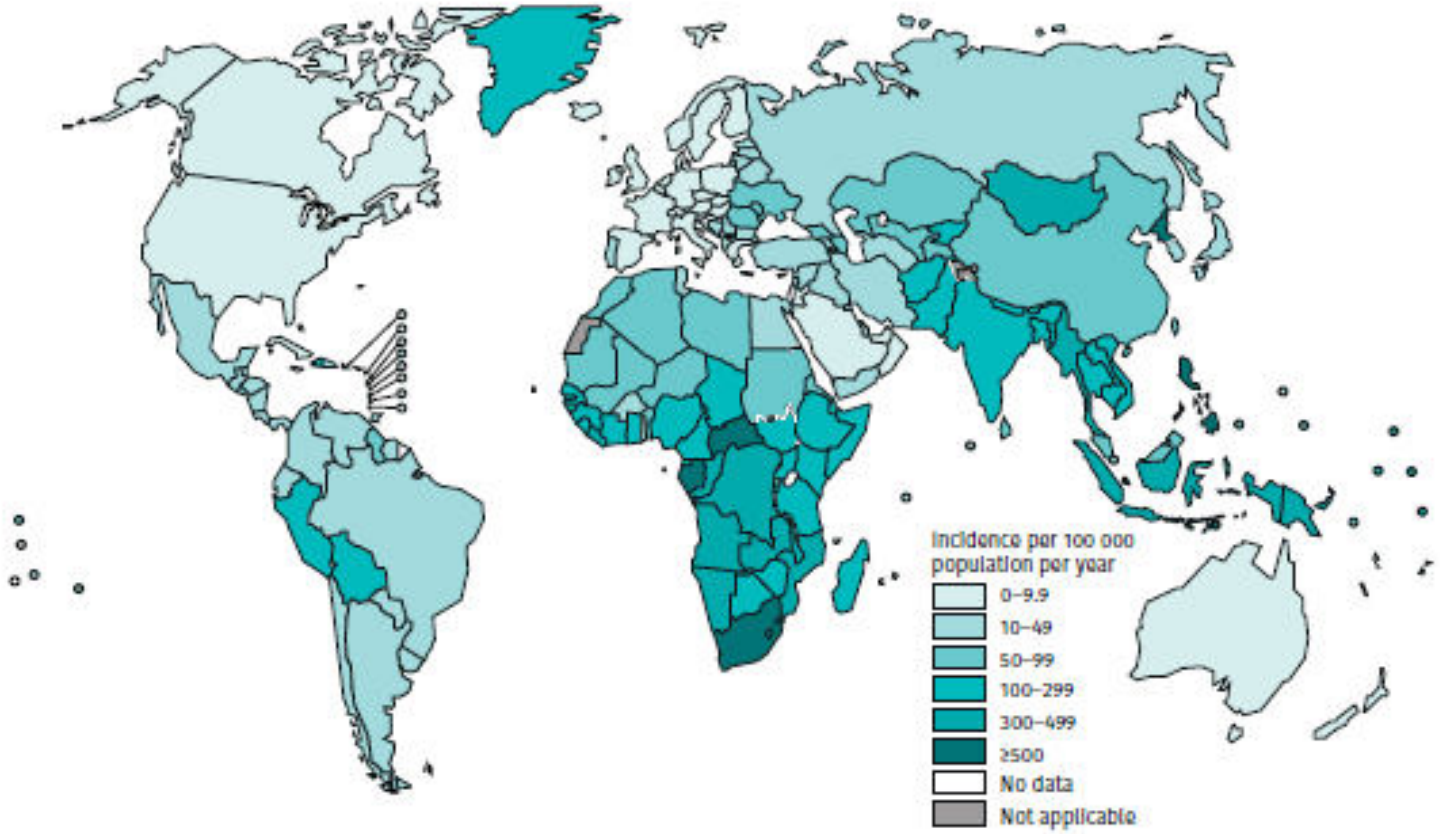
Jamilah.meghji@lstmed.ac.uk

Outline

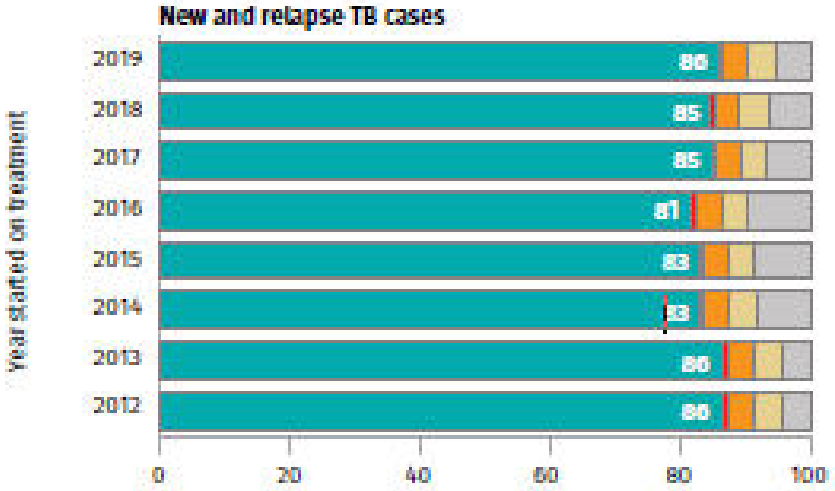
- TB survivors
- Post-TB morbidity
  - Post-TB lung disease
  - Economic morbidity
- Recurrent TB disease
- Post-TB mortality
- Meeting the challenge – health system response

Epidemiology

Estimated TB incidence rates, 2020



Treatment outcomes for new and relapse TB cases, new and relapse HIV-positive TB cases, and MDR/RR-TB cases, globally,[a] 2012–2019



WHO Global TB Report 2021

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Epidemiology

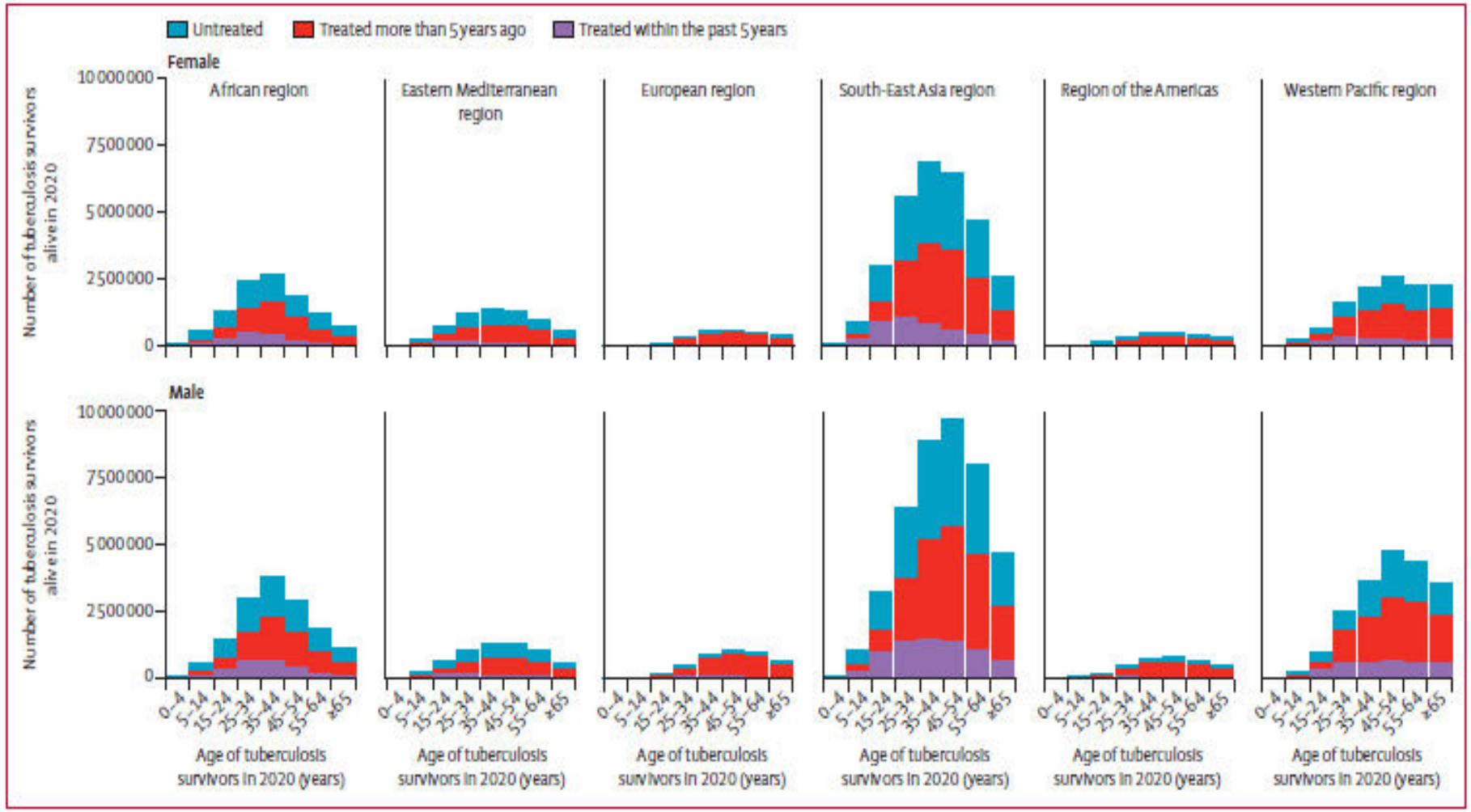
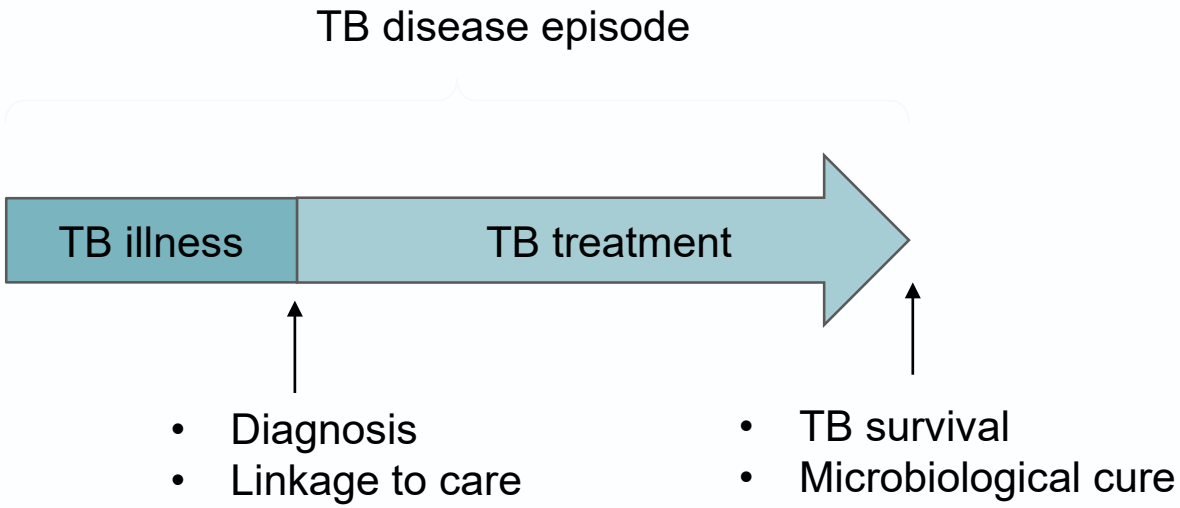


Figure 3: **Numbers of tuberculosis survivors alive in 2020 by age in 2020, sex, WHO region, and tuberculosis treatment status**

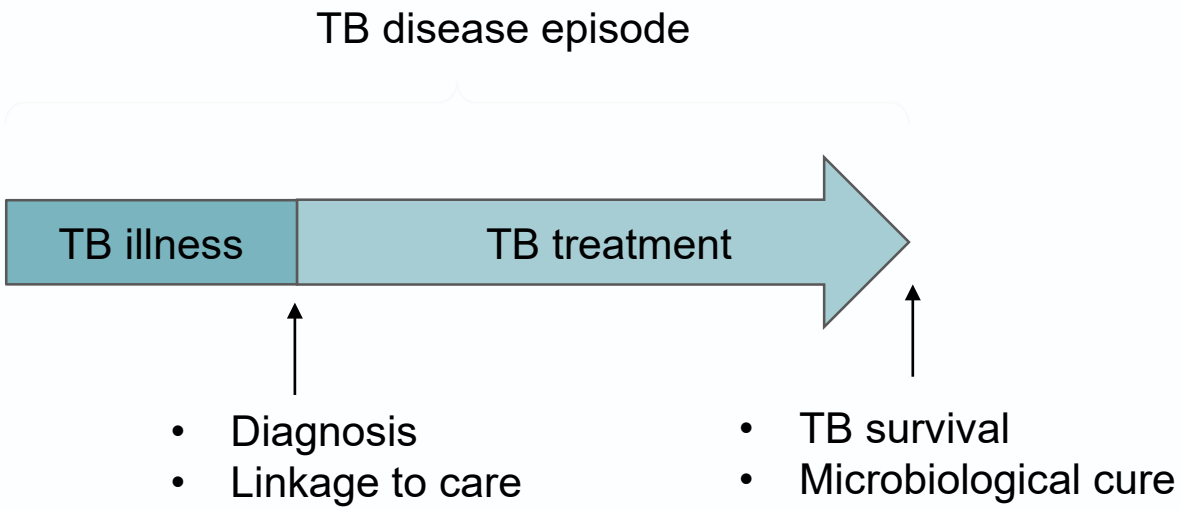
- 155m TB survivors[4] (138 – 171m)
- Half in South-East Asia region
- Economically active age groups
- 18% (16-20%) treated within the past 5-years

Dodd et al, Lancet Infect Dis 2021

Post TB morbidity



Post TB morbidity



A WORLD FREE OF TB

ZERO deaths, disease, and suffering due to TB

END THE GLOBAL TB EPIDEMIC

	MILESTONES		TARGETS	
			SDG*	END TB
	2020	2025	2030	2035
Reduction in number of TB deaths compared with 2015 (%)	35%	75%	90%	95%
Reduction in TB incidence rate compared with 2015 (%)	20%	50%	80%	90%
TB-affected families facing catastrophic costs due to TB (%)	0%	0%	0%	0%

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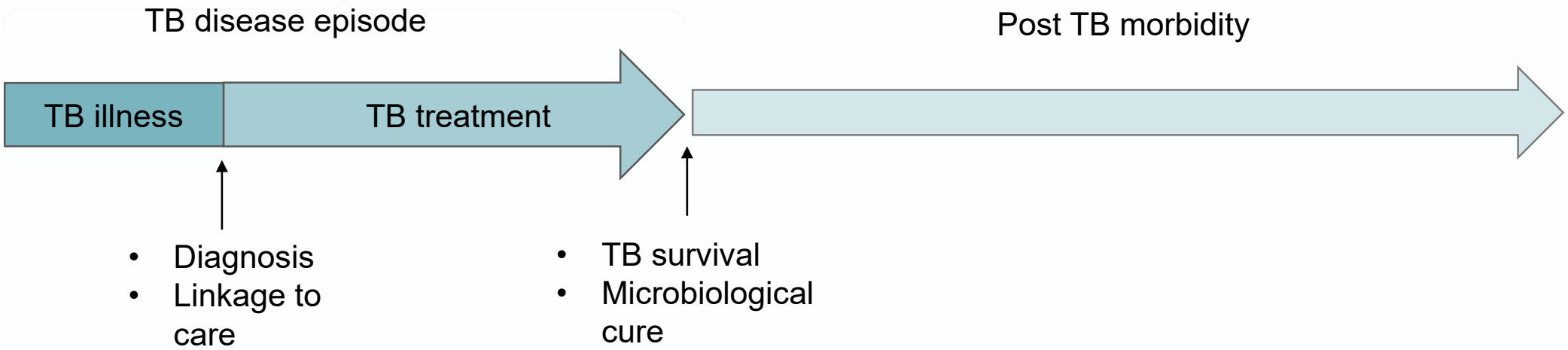
Post TB morbidity



"When we started tuberculosis treatment, no-one told us that it would never leave us"

Schoemen I and Sifumba Z, Lancet Infect Dis 2021

Post TB morbidity

Physical morbidity

Post-TB lung diseases, neurological impairment

Psychosocial morbidity

Social isolation, stigma, Anxiety and depression

Economic morbidity

Loss of income and employment

Comorbidities

Diabetes, smoking, drug and alcohol use, malnutrition, poverty

Recurrent TB disease

Post TB morbidity

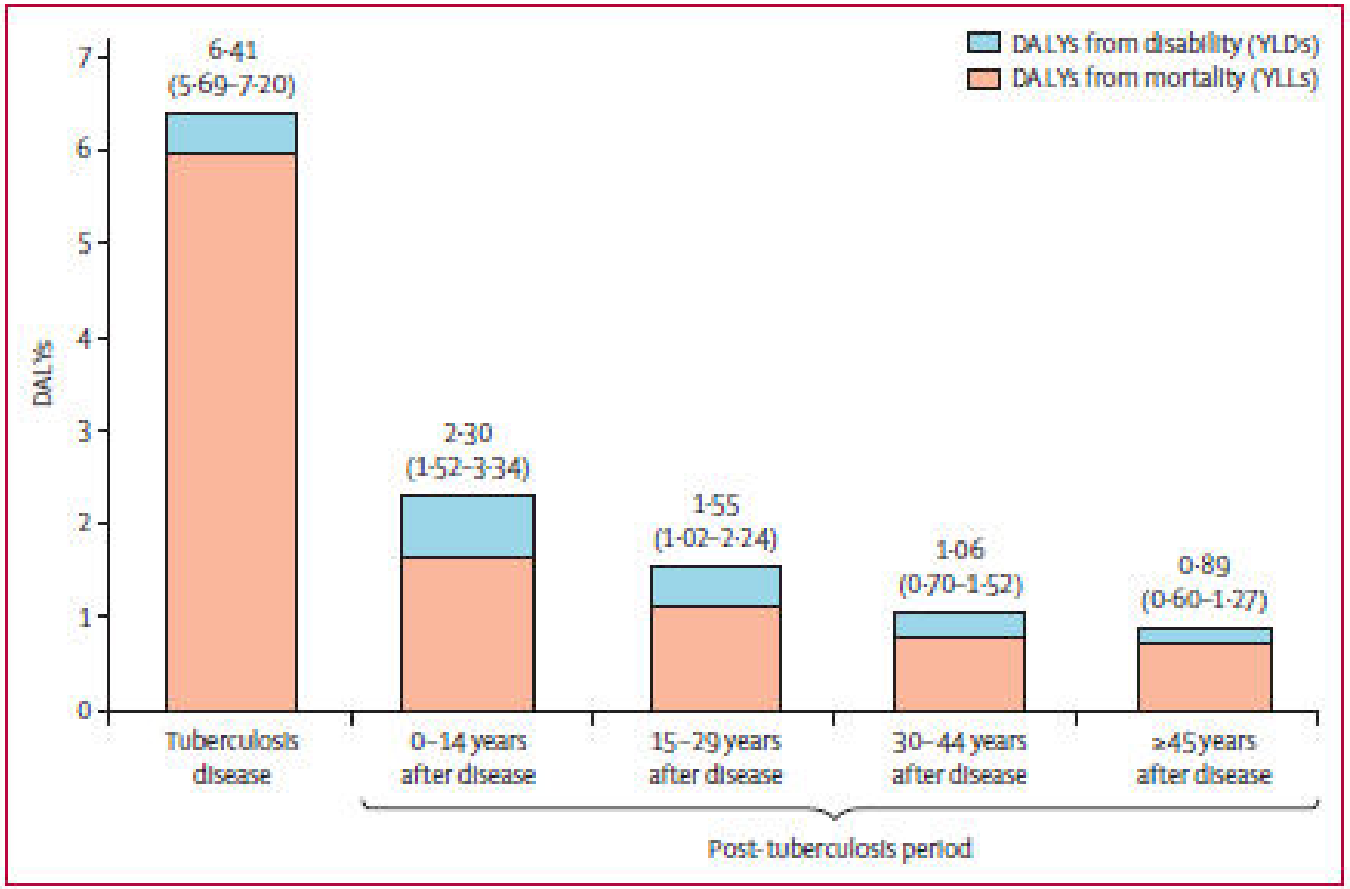


Figure 3: DALYs per incident tuberculosis case, stratified by tuberculosis disease and post-tuberculosis period*
YLL=years of life lost. YLD=years lived with disability. DALYs=disability-adjusted life-years. *Total DALYs per incident tuberculosis case equal to the sum of these values. Values in parentheses represent 95% uncertainty intervals.

Menzies et al, Lancet Infect Dis 2021

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Post-TB lung disease

	n	FVC		FEV_1		FEV_1%		$FEF_{25-75\%}$	
		β	SE	β	SE	β	SE	β	SE
1 episode of TB	2137	−0.120	0.013***	−0.180	0.011***	−2.162	0.165***	−0.441	0.028***
2 episodes of TB	366	−0.328	0.029***	−0.362	0.026***	−2.721	0.380***	−0.709	0.064***
3 episodes of TB	79	−0.404	0.062***	−0.462	0.056***	−3.843	0.810***	−0.862	0.135***
4+ episodes of TB	17	−0.771	0.133***	−0.964	0.120***	−10.995	1.742***	−1.705	0.291***
TB + pneumoconiosis	185	−0.237	0.041***	−0.384	0.037***	−5.707	0.534***	−0.857	0.089***
Pneumoconiosis only	1164	−0.139	0.017***	−0.215	0.015***	−2.917	0.223***	−0.520	0.037***
Total	df = 27659†	R^2 = 0.3801		R^2 = 0.4237		R^2 = 0.1174		R^2 = 0.2241	

Hnidzo et al., Thorax 2000

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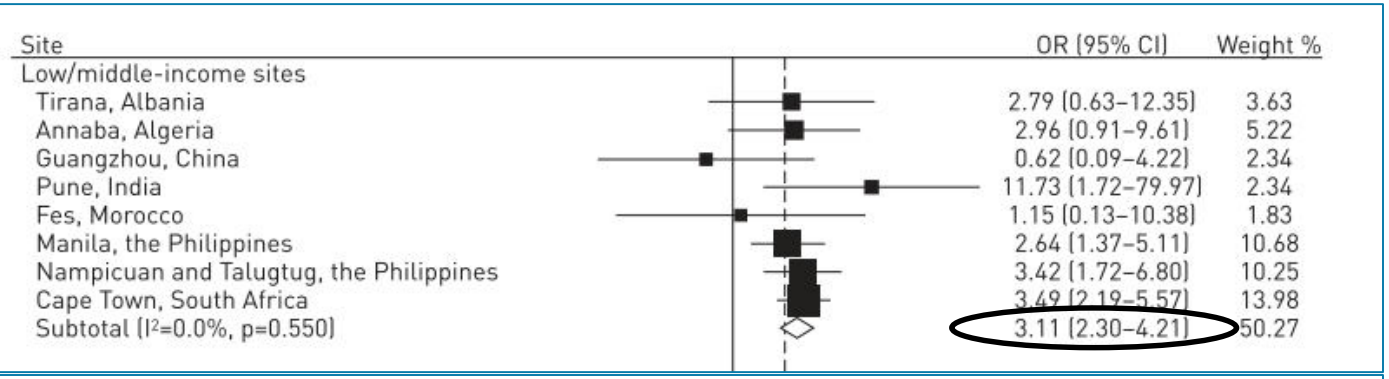
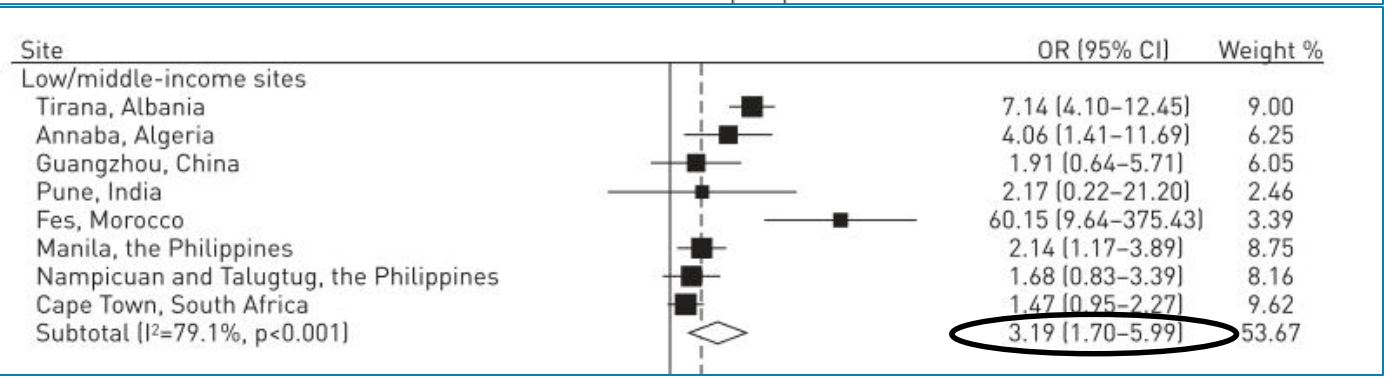
Post-TB lung disease

	n	FVC β	FVC SE	FEV_1 β	FEV_1 SE	FEV_1% β	FEV_1% SE	$FEF_{25-75\%}$ β	$FEF_{25-75\%}$ SE
1 episode of TB	2137	−0.120	0.013***	−0.180	0.011***	−2.162	0.165***	−0.441	0.028***
2 episodes of TB	366	−0.328	0.029***	−0.362	0.026***	−2.721	0.380***	−0.709	0.064***
3 episodes of TB	79	−0.404	0.062***	−0.462	0.056***	−3.843	0.810***	−0.862	0.135***
4+ episodes of TB	17	−0.771	0.133***	−0.964	0.120***	−10.995	1.742***	−1.705	0.291***
TB + pneumoconiosis	185	−0.237	0.041***	−0.384	0.037***	−5.707	0.534***	−0.857	0.089***
Pneumoconiosis only	1164	−0.139	0.017***	−0.215	0.015***	−2.917	0.223***	−0.520	0.037***
Total	df = 27659†	R^2 = 0.3801		R^2 = 0.4237		R^2 = 0.1174		R^2 = 0.2241	





Amaral et al., ERJ 2015

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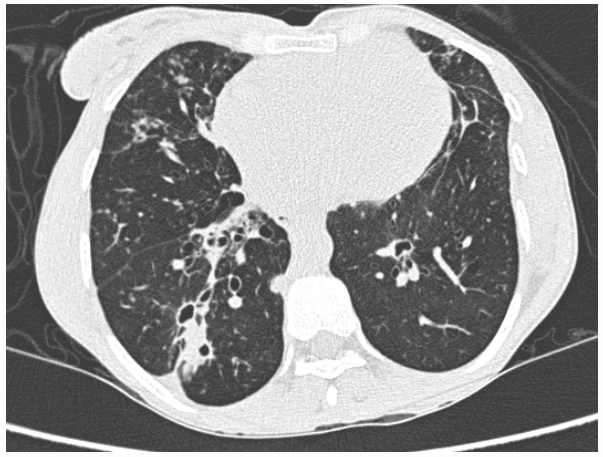
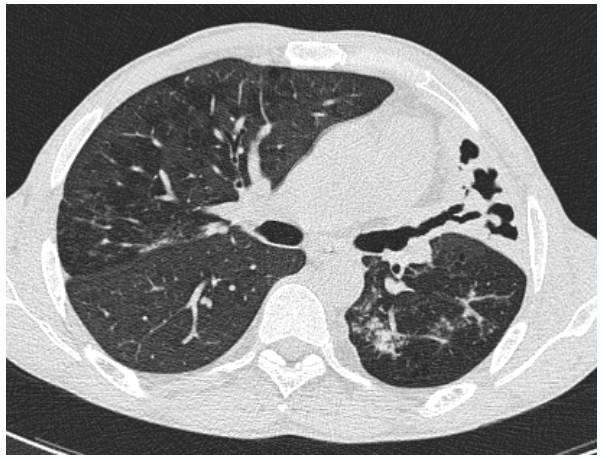
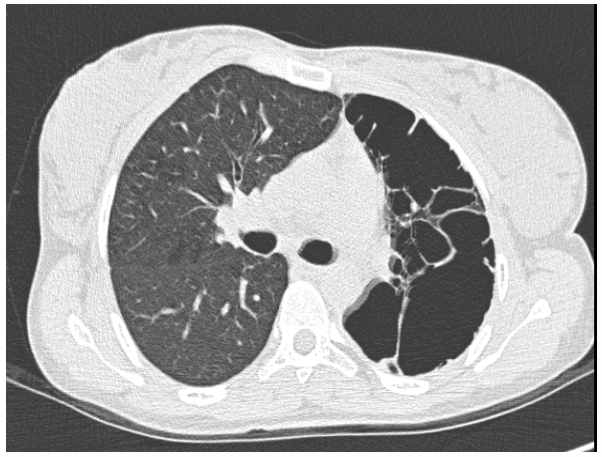
Post-TB lung disease

Bronchiectasis (44%)



Lobar destruction (9%)





Inflammatory change (36-70%)

Meghji et al., PlosOne 2016
Meghji et al., Thorax 2020
Ordonez et al, Nat Med 2020

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Post-TB lung disease - heterogeneity

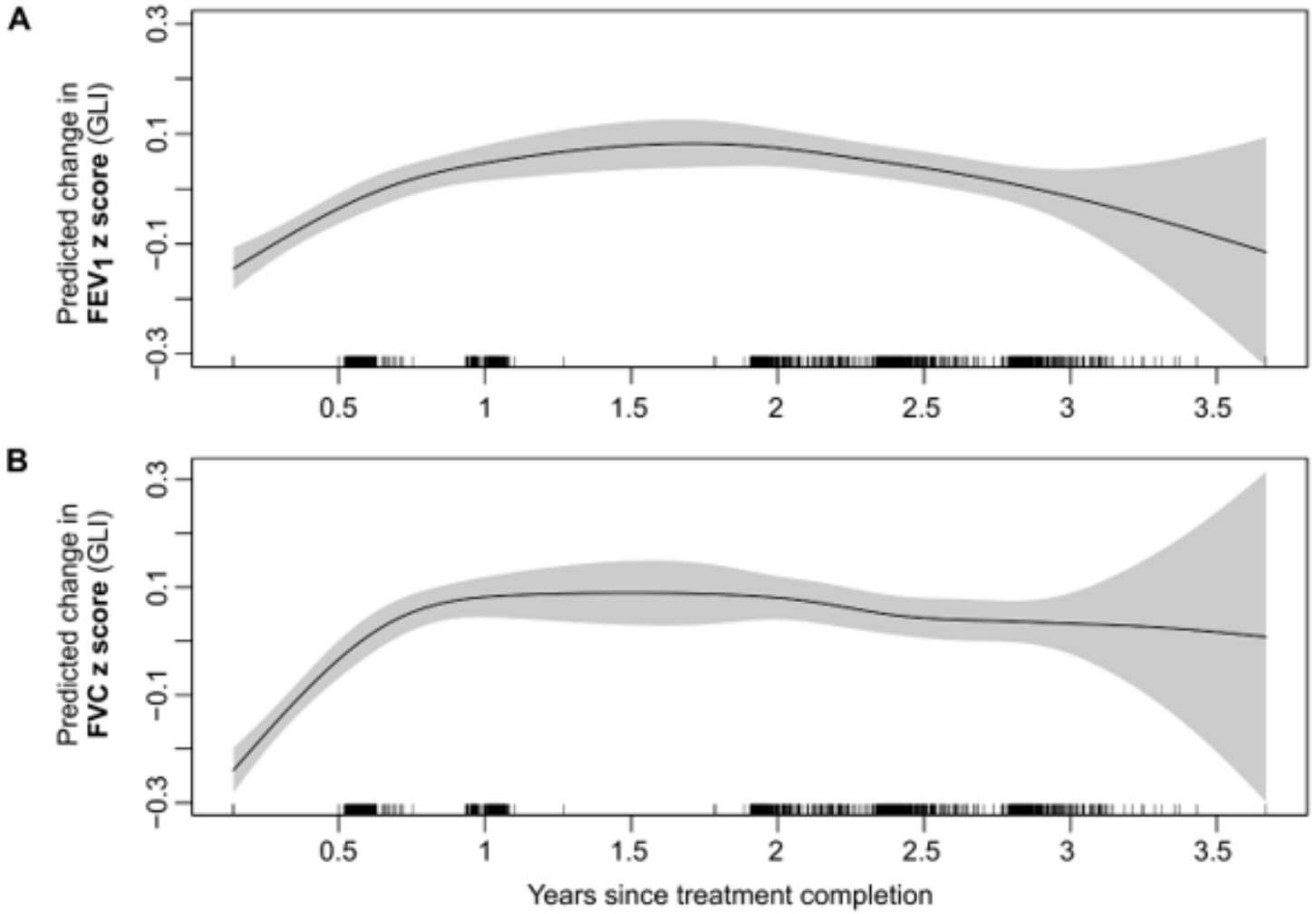
- Common
- Heterogenous
- Restrictive & obstructive spirometry
- Diverse structural pathology
- Multiple compartments

Table 3 Suggested PTLD clinical patterns with preliminary definitions (all categories are assumed to meet basic PTLD minimum case definition)

Compartment	Clinical patterns	Suggested definition*
Airways	TB-associated obstructive lung disease	Airway obstruction (FEV_1/FVC ratio < 0.7 OR < LLN) thought to be primarily related to small airway disease
	Bronchiectasis	CT definition (evidence of airway dilatation) > diameter of adjacent vessel, or non-tapering, OR CXR definition (evidence of ring and tramlines)
Parenchyma	Cavitation	A gas-filled space either within an area of pulmonary consolidation, or surrounded by a thin wall
	Parenchymal destruction	Extensive destruction of lung tissue, with a gas-filled space occupying the volume of ≥1 lobe
	Fibrotic change	Areas of parenchymal scarring, with associated volume loss
	Aspergillus-related lung disease	Evidence of aspergilloma on imaging OR chronic pulmonary aspergillosis on imaging and blood testing
Pleural	Chronic pleural disease	Evidence of pleural thickening on CXR or CT imaging
Pulmonary vascular	Pulmonary hypertension	Elevated pulmonary artery pressures as estimated using doppler echocardiography or measured at right heart catheterisation

Allwood et al, IJTLD 2020

Post-TB lung disease – recovery over time



- Median change in z-scores
  - FVC +0.28 Z-scores
  - FEV_1 +0.16 z-scores

Nightingale et al. Thorax 2021

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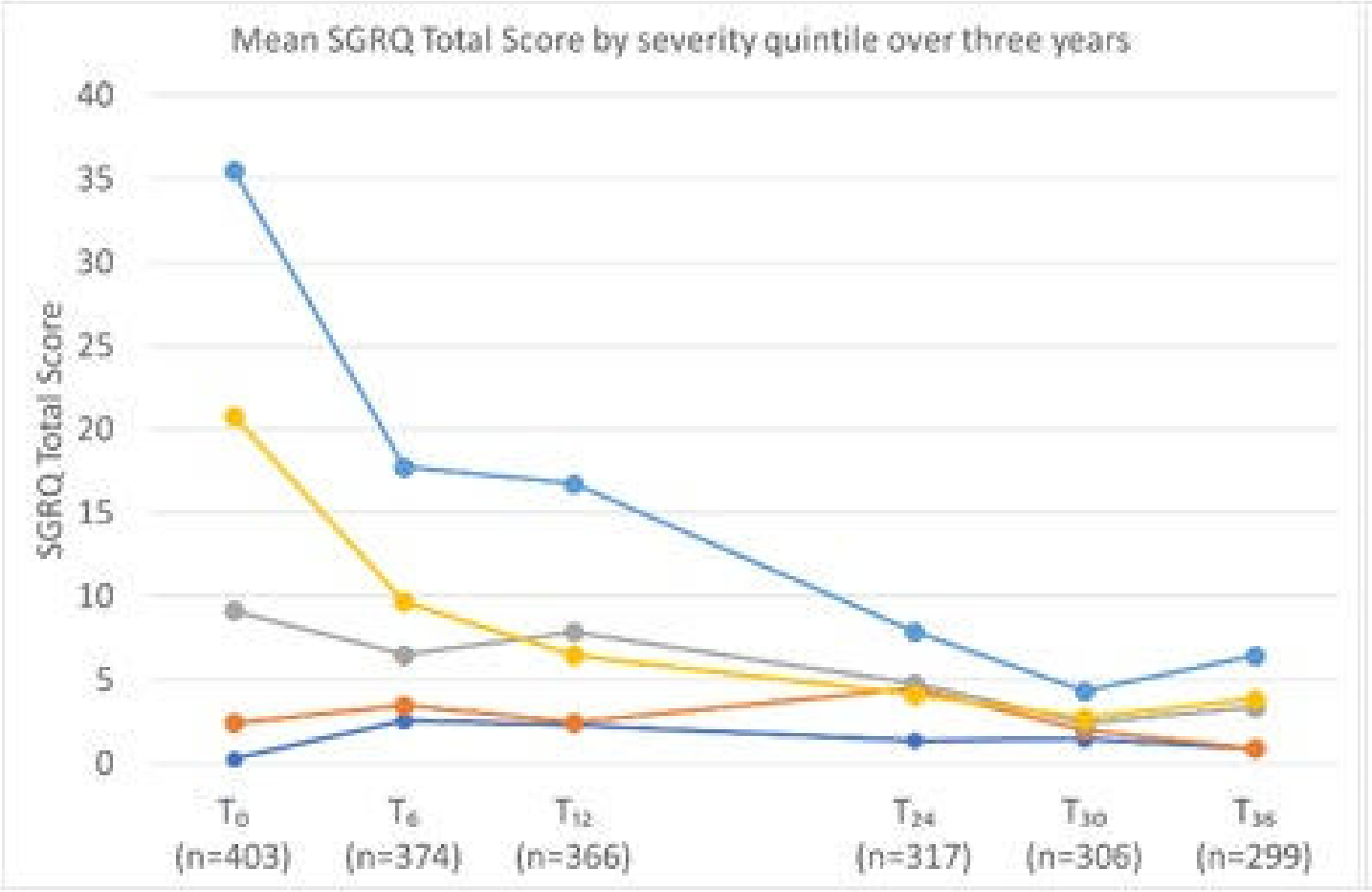
Post TB lung disease – recovery over time



Tomeny et al, Under review

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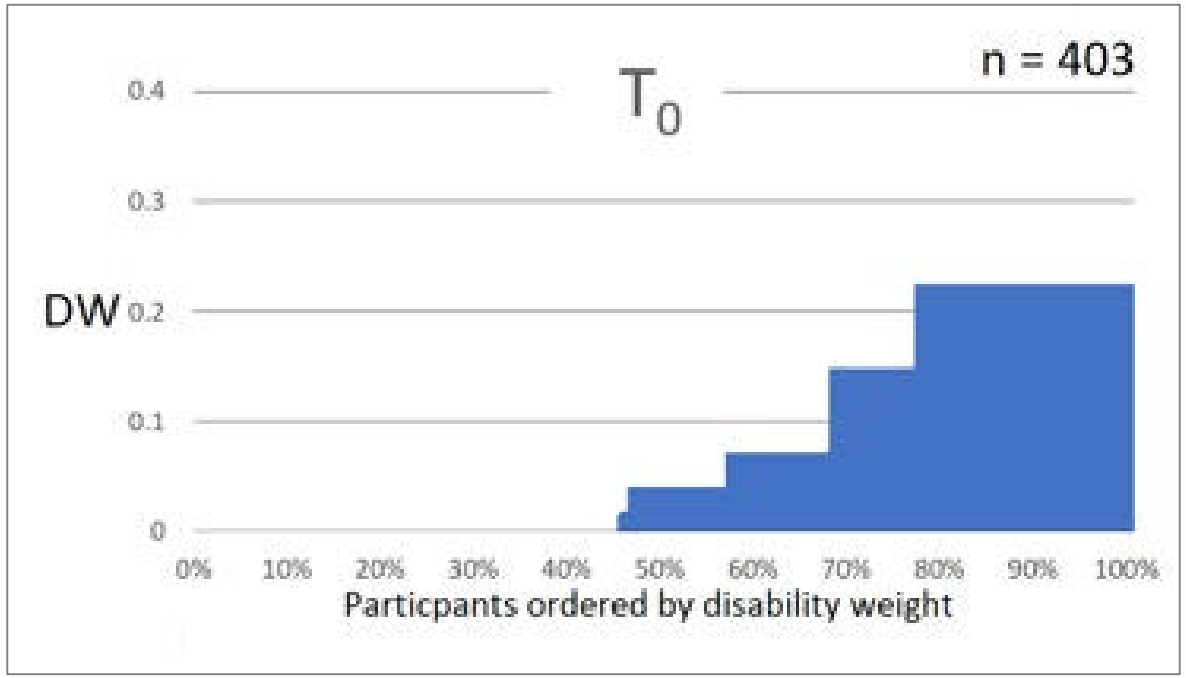
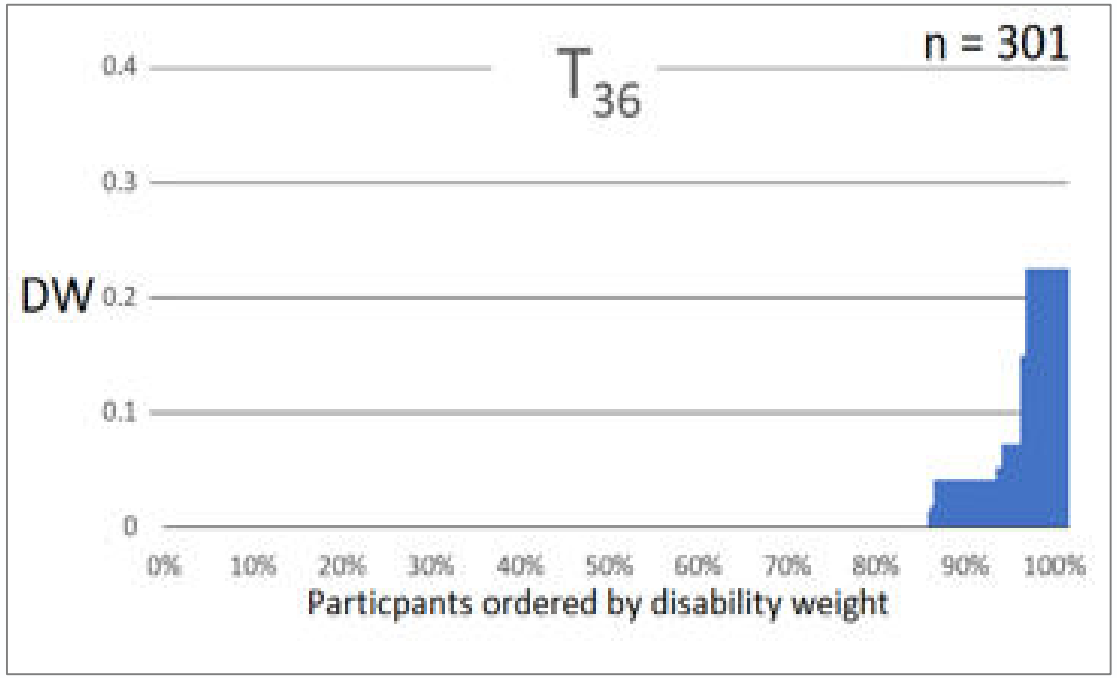
Post TB lung disease – incomplete recovery





Tomeny et al, Under review

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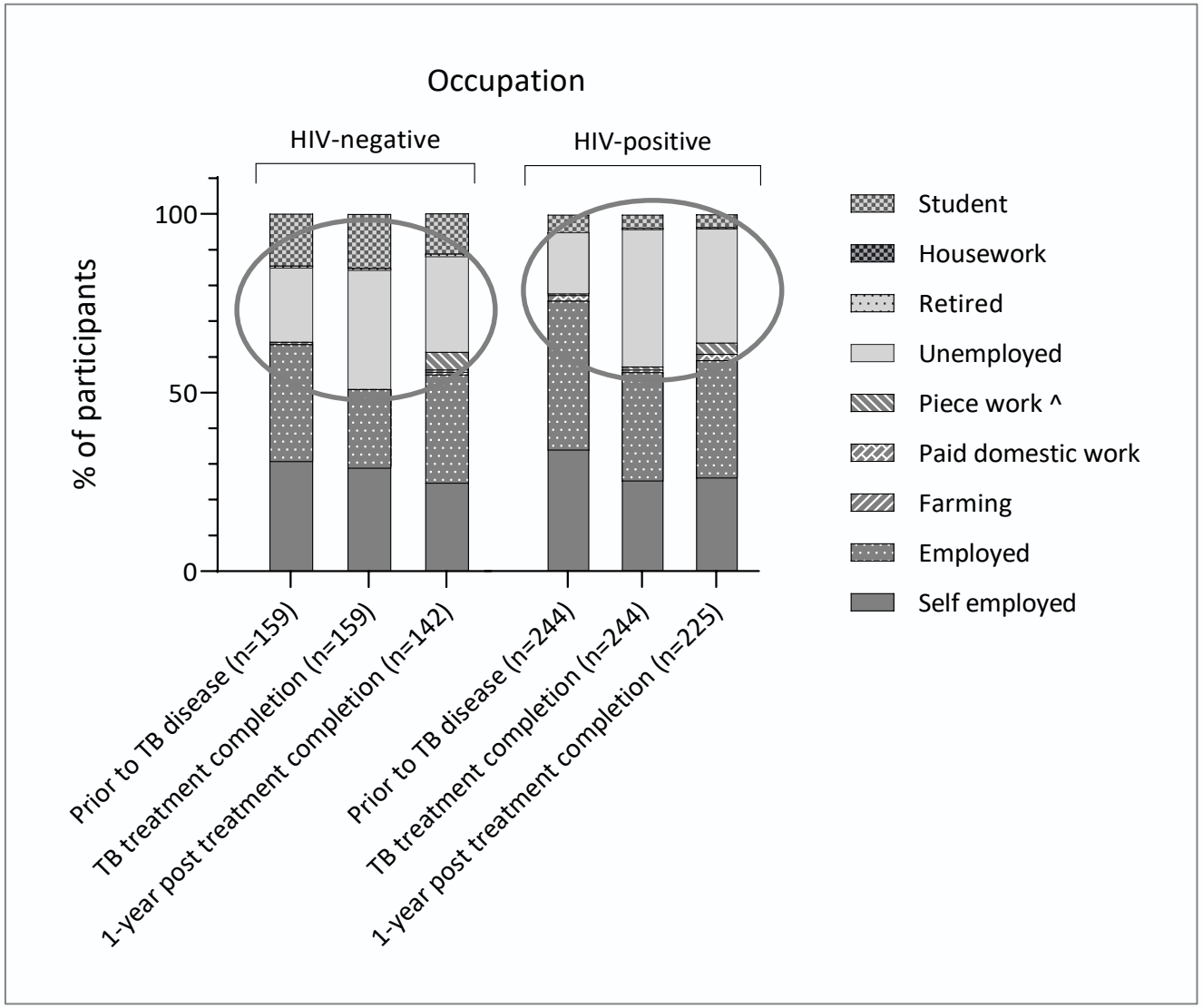
Economic morbidity – income and employment

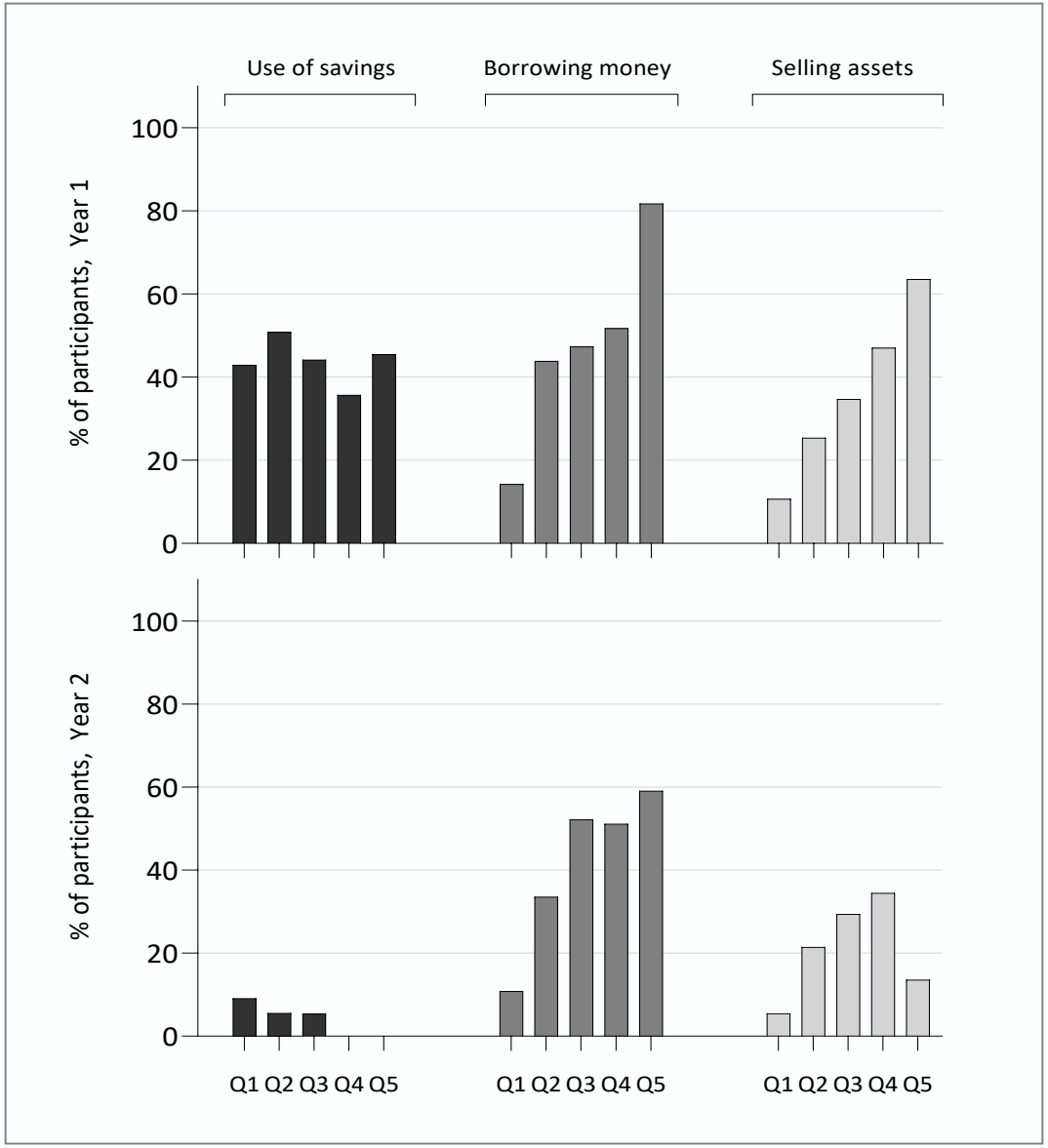


No paid work
- Prior 27.7% (112/495)
- Rx 45.2% (183/405)
- 1yr 37.0% (136/368)

Self employed
- Prior 32.8% (133/405)
- Rx 26.9% (109/405)
- 1yr 25.8% (95/368)

Meghji et al., Thorax 2021

Economic morbidity - dissaving



- Dissaving – use of resources to meet household needs
  - Use of savings
  - Borrowing money
  - Selling assets
- Borrowing money and selling of assets continue in the year after treatment completion
- More common amongst poorer households (Q3 / Q4 / Q5)

Meghji et al., Thorax 2021

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Economic morbidity – barriers to recovery

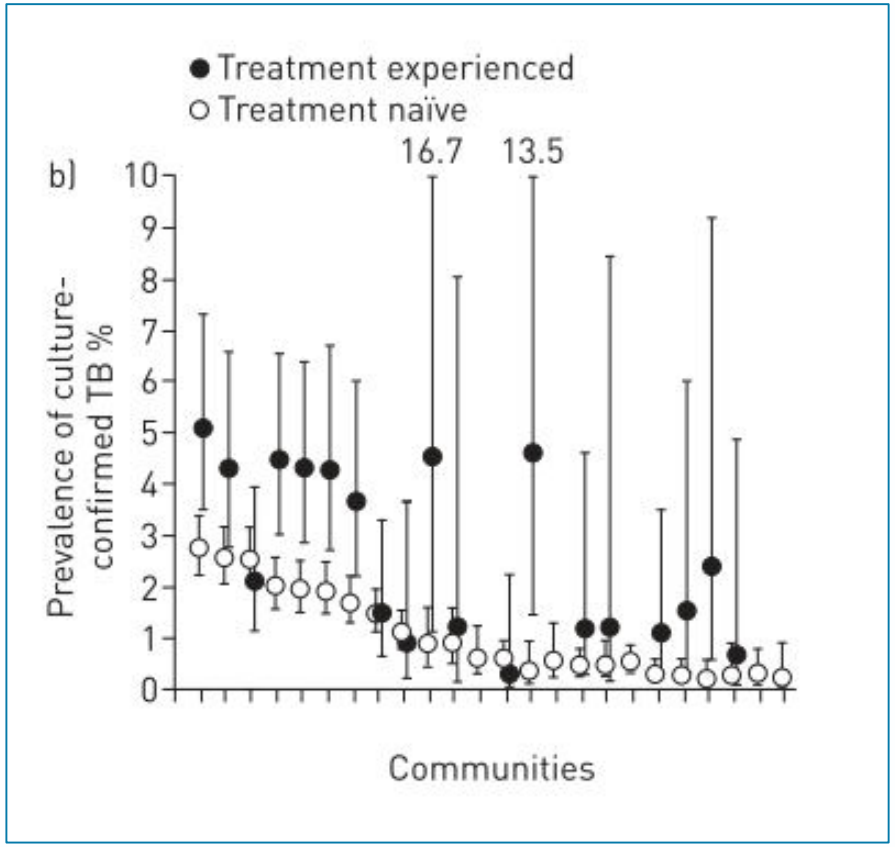
"Our **customers really had forgotten us**, so I think it will take time for me to grow the business again" *(Male participant, 33yrs)*

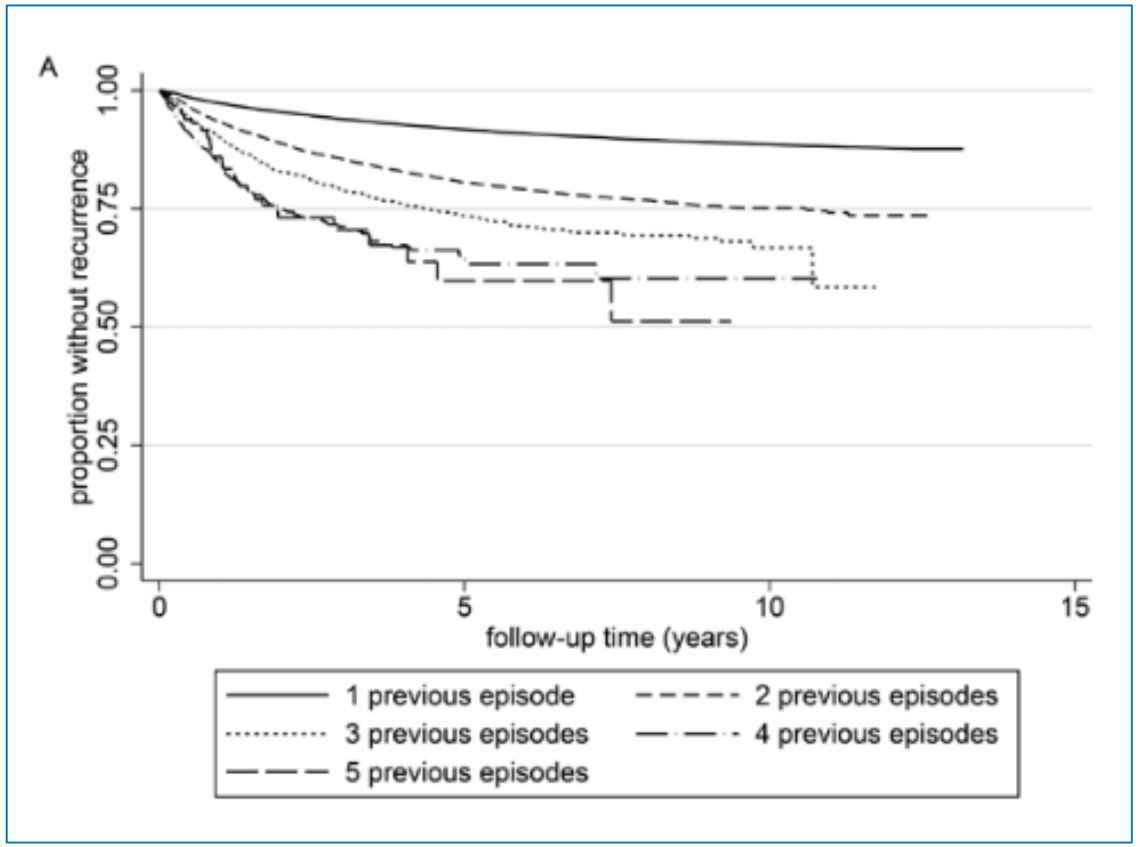
"My boss said that I should wait at home during treatment […]. My boss accepted my TB diagnosis, but **she didn't want me back** after I completed" *(Female participant, 42yrs).*

"The TB symptoms affected my business so much, to the extent that it went down up to date and it's not at all growing, though I was cured […]. **My husband cannot even afford to give me MK 20,000.00 to start up a new business**. I went to borrow money from someone on interest, but I haven't paid the person back. **The capital you have determines what kind of business one engages in**." *(Female participant, 39yrs)*

"The wife of the participant told us that she sells food items in front of the house and noted that **some people don't want to buy from her, because they know that her husband is sick** *(Research assistant, relating to male participant, 32yrs)*

Recurrent TB disease





Sonnenberg, Lancet 2001
Panjabi, IJTLD 2007
Marx, ERJ 2016
Hermans, CID 2020

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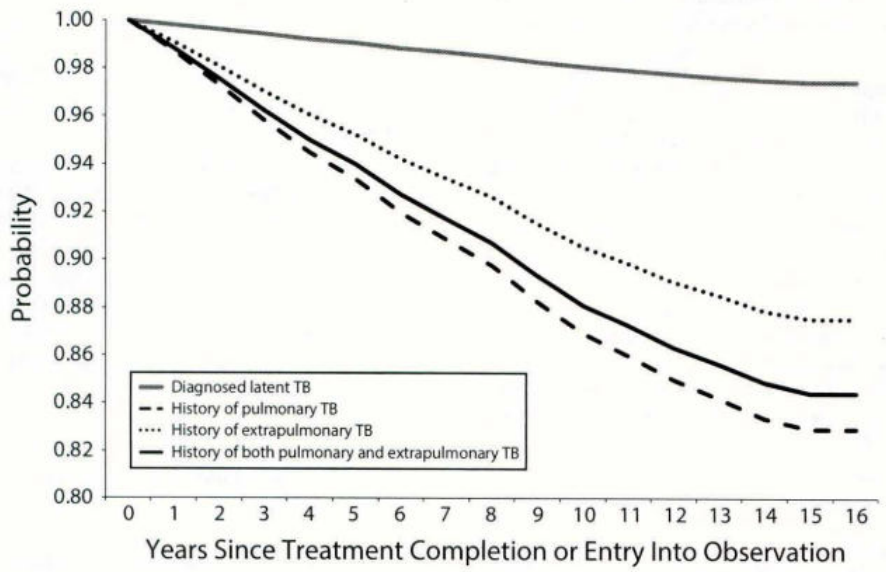
Post-TB mortality



Note. TB = tuberculosis. Treatment completion indicates a history of active TB; entry into observation indicates no history of active TB.

FIGURE 1—Age, gender, race/ethnicity, HIV status, and nativity-adjusted Cox regression survival probability by tuberculosis history: Centers for Disease Control and Prevention's National Death Index; Texas, Massachusetts, and Seattle and King County, WA; 2008.

	Country	Mid-year of enrolment	Deaths (n/N [%])	SMR (95% CI)	Weight
Tocque et al (2005)[26]	UK	1993	104/439 (24%)	4·53 (3·80–5·40)	9·3%
Christensen et al (2014)[19]*	Denmark	1993	2388/6402 (37%)	1·86 (1·77–1·96)	9·6%
Christensen et al (2014)[19]†	Denmark	1993	1379/1889 (73%)	1·24 (1·12–1·37)	9·5%
Miller et al (2015)[24]	USA	1998	799/3853 (21%)	7·63 (4·50–12·94)	7·2%
Kolappan et al (2008)[22]	India	2003	297/2665 (11%)	2·19 (1·96–2·45)	9·5%
Shuldiner et al (2016)[25]	Israel	2005	385/3201 (12%)	3·72 (3·38–4·10)	9·5%
Blöndal et al (2013)[18]	Estonia	2006	388/2058 (19%)	3·76 (3·41–4·15)	9·5%
Dangisso et al (2018)[20]	Ethiopia	2007	238/2272 (10%)	1·20 (0·85–1·70)	8·4%
Liu et al (2018)[23]	China	2010	394/2741 (14%)	2·82 (2·56–3·11)	9·5%
Wang et al (2015)[27]	China	2011	550/4342 (13%)	4·78 (3·29–6·95)	8·2%
Fox et al (2015)[23]	Vietnam	2012	979/10 964 (9%)	4·00 (3·81–4·20)	9·6%
Random effects model				**2·91 (2·21–3·84)**	
Heterogeneity: I^2=99%, p<0·0001					

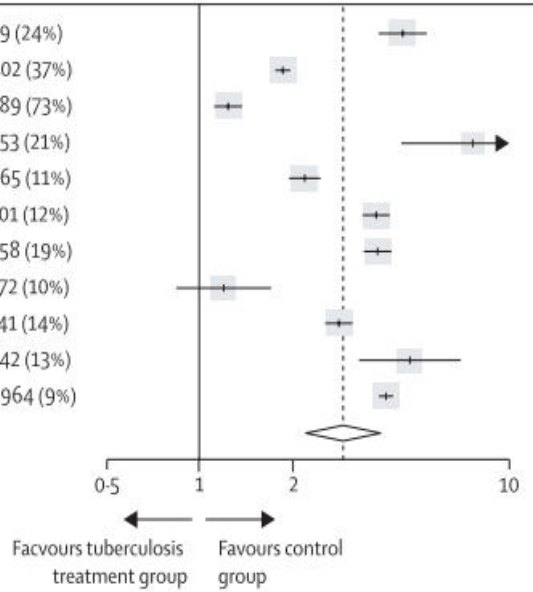


Figure 2: **SMR for all-cause mortality after tubeculosis treatment**
SMR=standardised mortality ratio. *Estimate for pulmonary tuberculosis. †Estimate for extrapulmonary tuberculosis.

Romanawski, Lancet ID 2019
Miller, Am J Pub Health 2015

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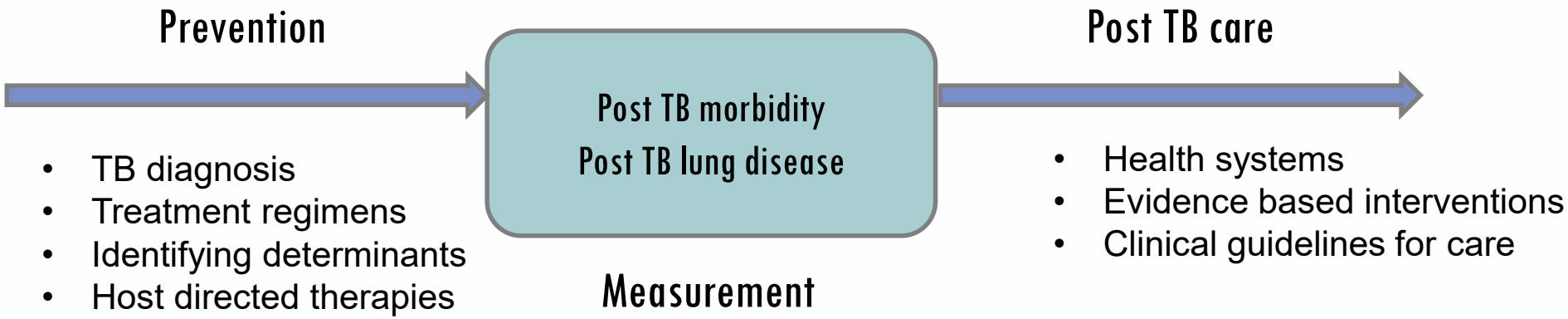
Meeting the challenge



Health system frameworks for post-TB care

Local data Burden of morbidity	**Leadership & Governance** NTP vs. NCD program	**Funding** National vs. donor	**Staffing** Training & capacity
Drugs and equipment Diagnosis and care	**Location of care** Decentralised vs. specialised	**Evidence** Clinical guidelines for care	**Messaging to patients** Not a victim, hope

Karanja et al, under review

Advocacy for post-TB care

INT J TUBERC LUNG DIS 23(12):1253–1256
© 2019 The Union
http://dx.doi.org/10.5588/ijtld.19.0471
E-published ahead of print 21 November 2019

PERSPECTIVES

Should we consider a 'fourth 90' for tuberculosis?

A. D. Harries,[1,2] R. A. Dlodlo,[1] G. Brigden,[1] K. Mortimer,[1,3] P. Jensen,[1] P. I. Fujiwara,[1] J. L. Castro,[1] J. M. Chakaya[1,4]

[1]International Union Against Tuberculosis and Lung Disease, Paris, France; [2]Department of Clinical Research, Faculty of Infectious and Tropical Diseases, London School of Hygiene & Tropical Medicine, London, [3]Liverpool School of Tropical Medicine, Liverpool, UK; [4]Department of Medicine, Therapeutics, Dermatology and Psychiatry, Kenyatta University, Nairobi, Kenya

We suggest that the 'fourth TB 90' should be as follows: 'Ensuring that 90% of all people successfully completing treatment for TB can have a good health-related quality of life'. This means that important

Harries et al., IJTLD 2019
Li et al, Trop med Int Health 2019

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LEGA POLMONARE

Thank you!

https://www.post-tuberculosis.com/

Jamilah.meghji@lstmed.ac.uk

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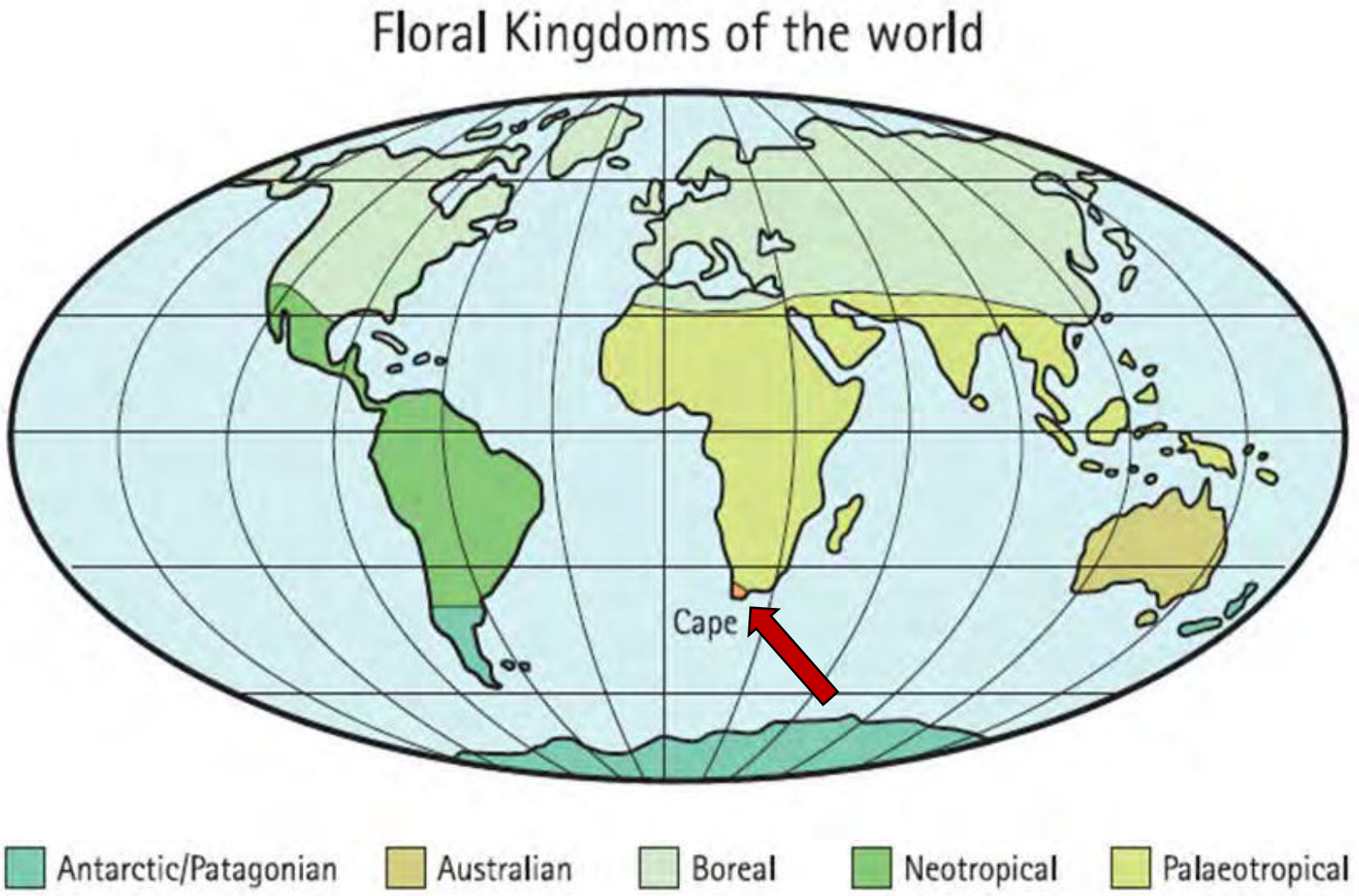
The clinical spectrum of post-TB lung disease

Brian Allwood

Stellenbosch University & Tygerberg Hospital, South Africa

18.04.2011

South Africa : lesser known facts



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Little Foot skeleton unveiled in South Africa

6 December 2017 Share

Remains are 3.67 million years old

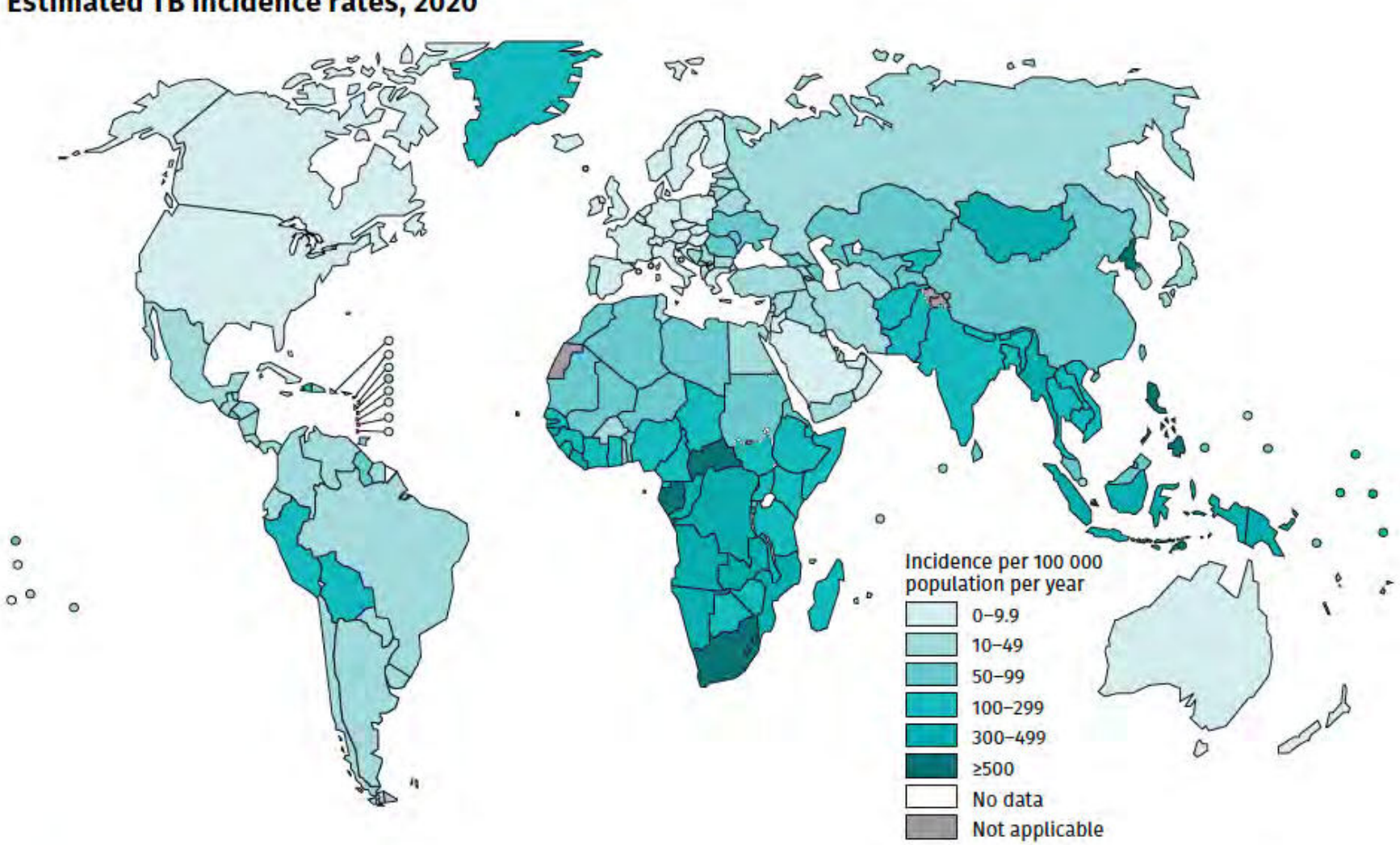
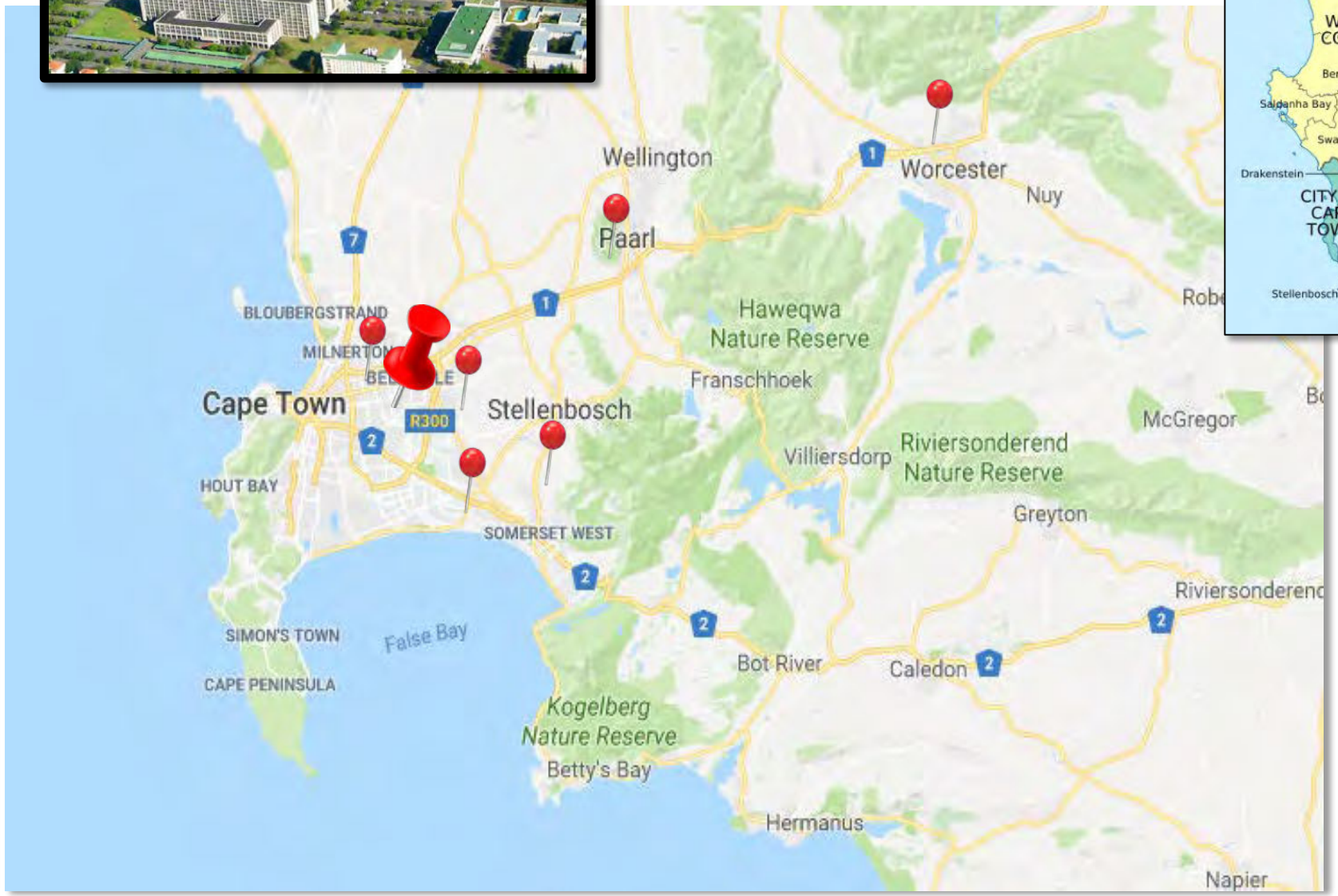
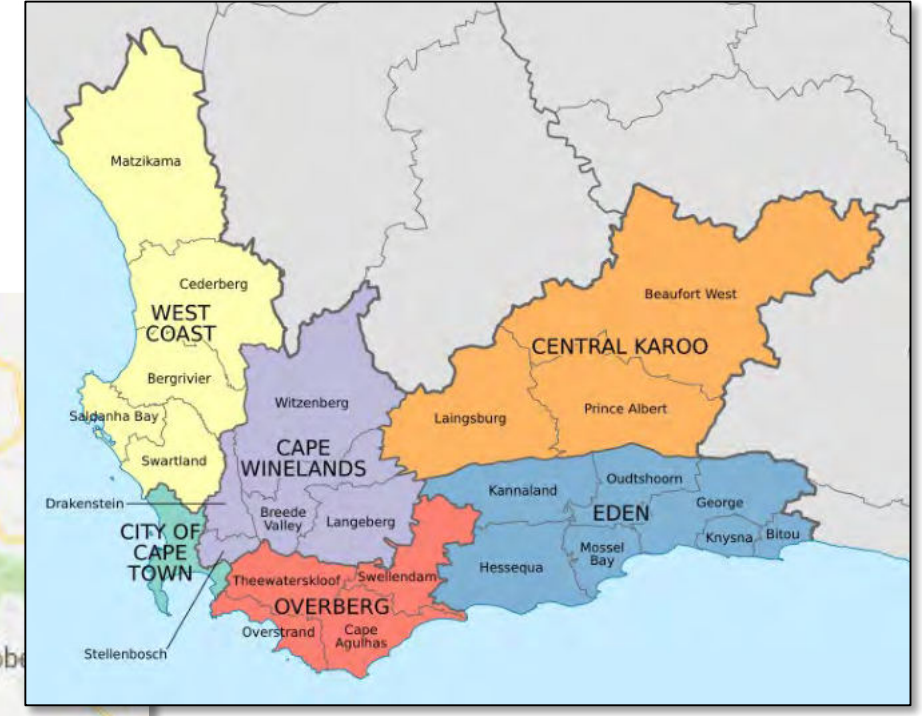


FIG. 14

High TB burden and global TB watchlist countries estimated to have achieved the End TB Strategy 2020 milestone of a 35% reduction in the absolute number of TB deaths between 2015 and 2020

WHO Report Card 2021





Tertiary Referral Hospital
Six Secondary Hospitals

3 Pulmonologists

Drainage population:

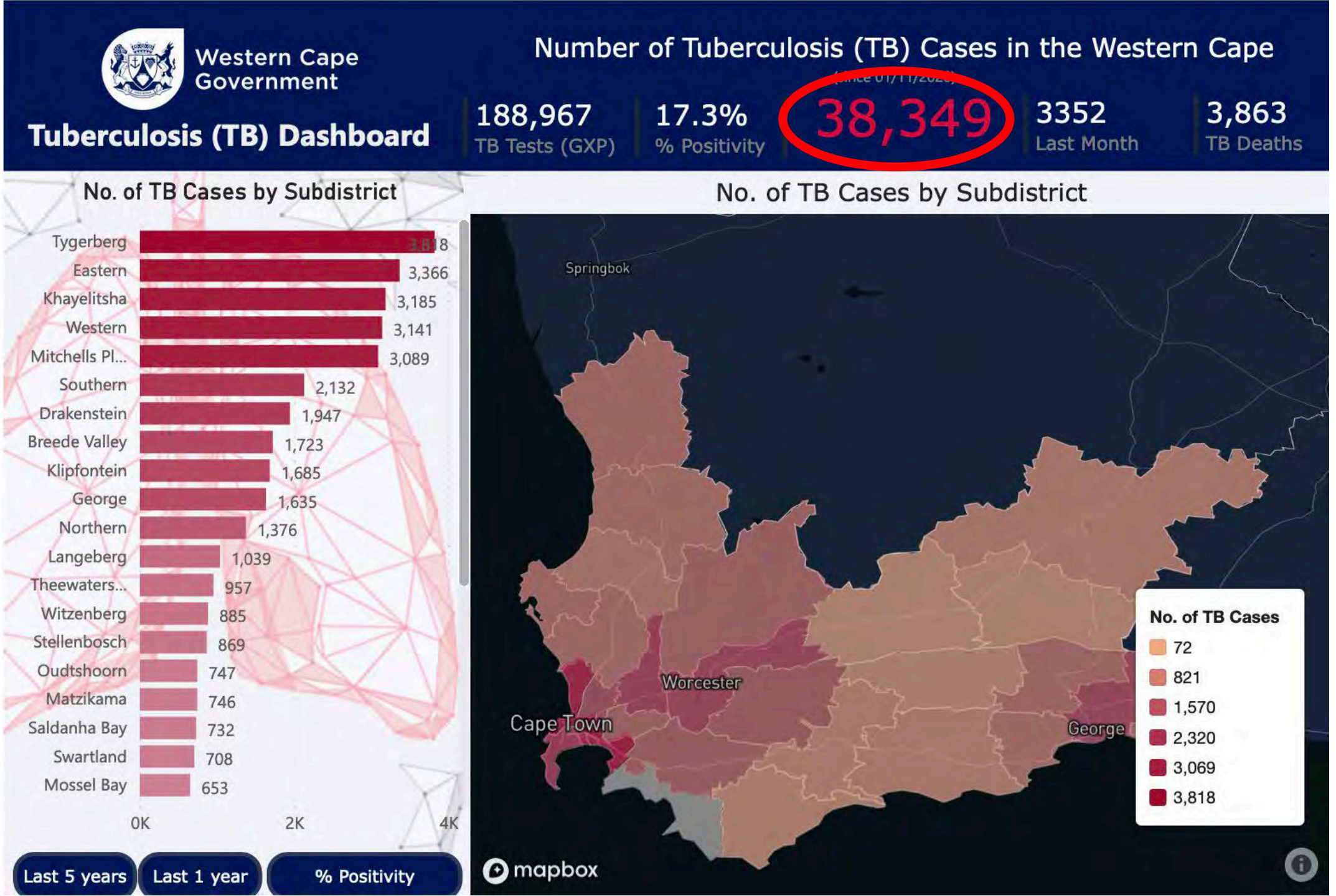
± 3.5 million

Estimated prevalence (2018) : **737** (580 – 890) per 100,000

The First National TB Prevalence Survey

South Africa 2018

Short Report


Western Cape Government
Tuberculosis (TB) Dashboard
Number of Tuberculosis (TB) Cases in the Western Cape
188,967
TB Tests (GXP)
17.3%
% Positivity
38,349
3352
Last Month
3,863
TB Deaths
No. of TB Cases by Subdistrict
Tygerberg 3,818
Eastern 3,366
Khayelitsha 3,185
Western 3,141
Mitchells Pl... 3,089
Southern 2,132
Drakenstein 1,947
Breede Valley 1,723
Klipfontein 1,685
George 1,635
Northern 1,376
Langeberg 1,039
Theewaters... 957
Witzenberg 885
Stellenbosch 869
Oudtshoorn 747
Matzikama 746
Saldanha Bay 732
Swartland 708
Mossel Bay 653
0K
2K
4K
Last 5 years
Last 1 year
% Positivity
No. of TB Cases by Subdistrict
Springbok
Worcester
Cape Town
George
No. of TB Cases
72
821
1,570
2,320
3,069
3,818
mapbox

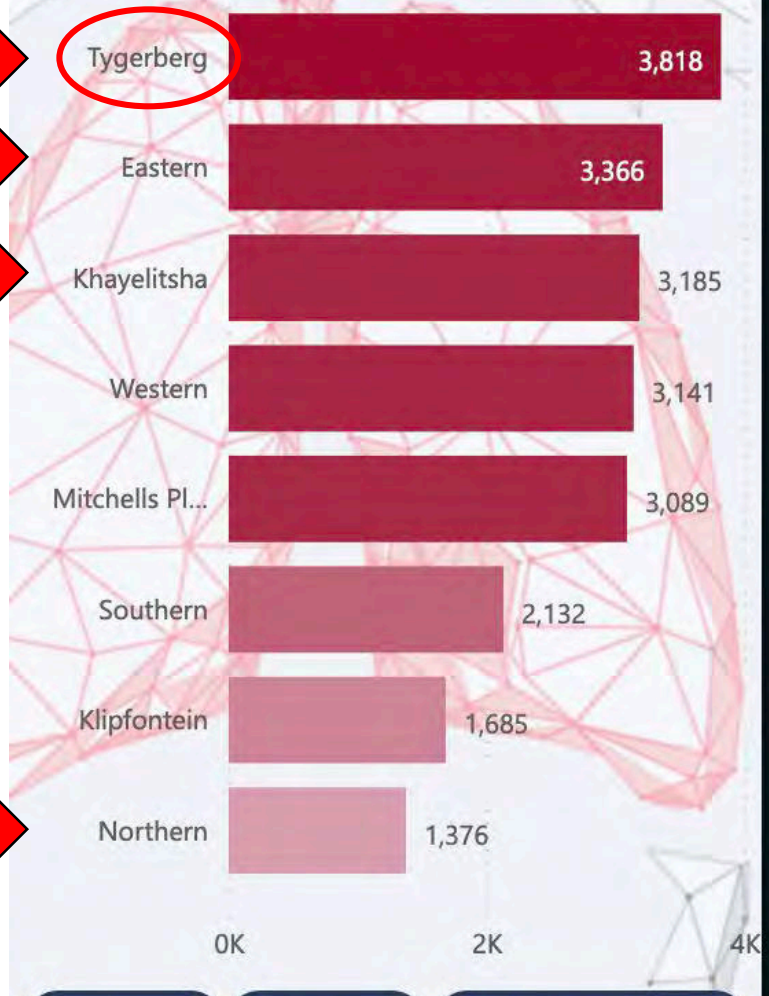
Western Cape Government

Tuberculosis (TB) Dashboard

Number of Tuberculosis (TB) Cases in the Western Cape

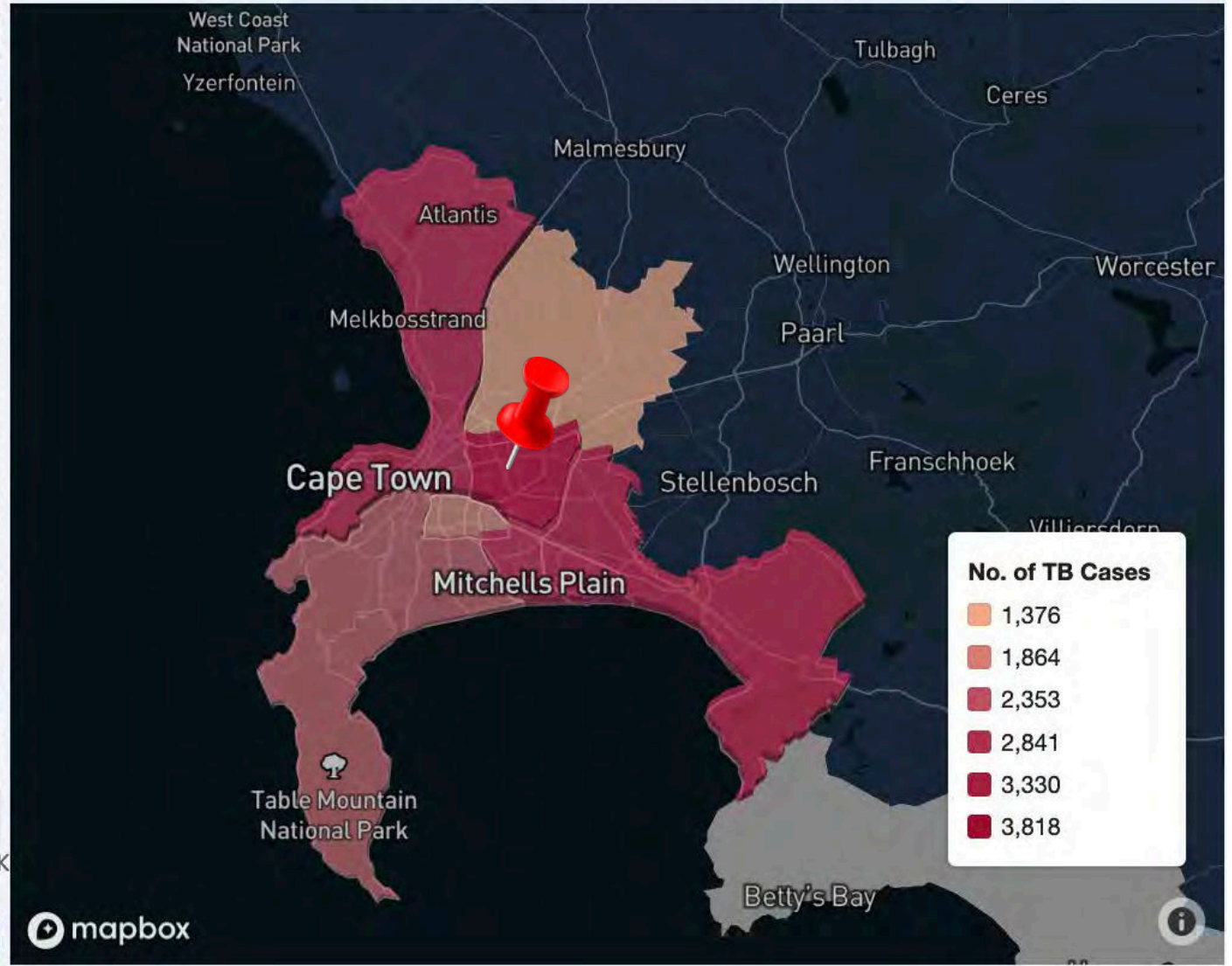
106,002	17.9%	21,792	1953	2,049
TB Tests (GXP)	% Positivity		Last Month	TB Deaths

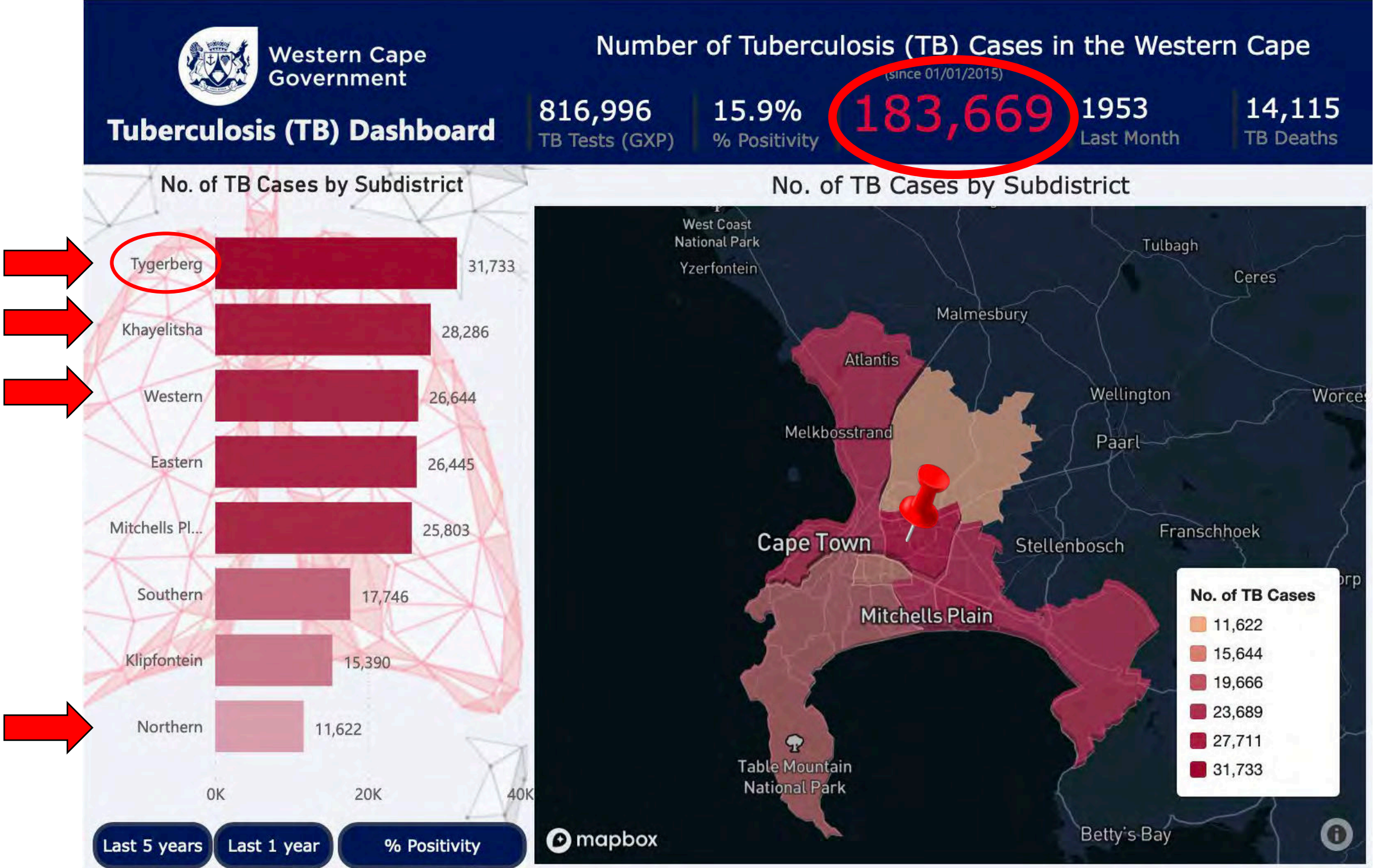
No. of TB Cases by Subdistrict



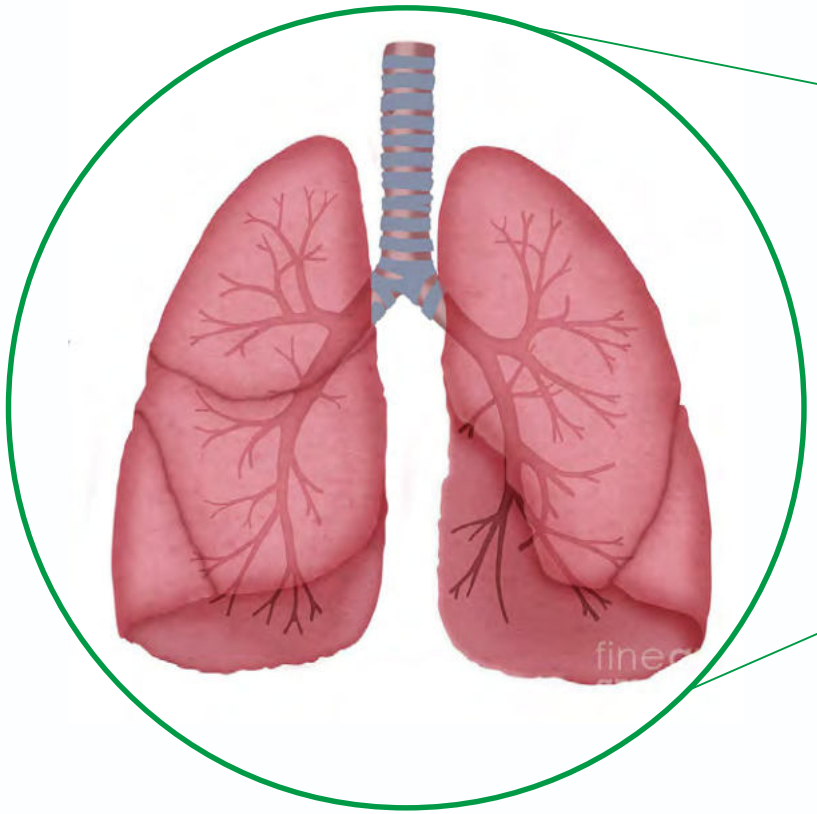
Last 5 years | Last 1 year | % Positivity

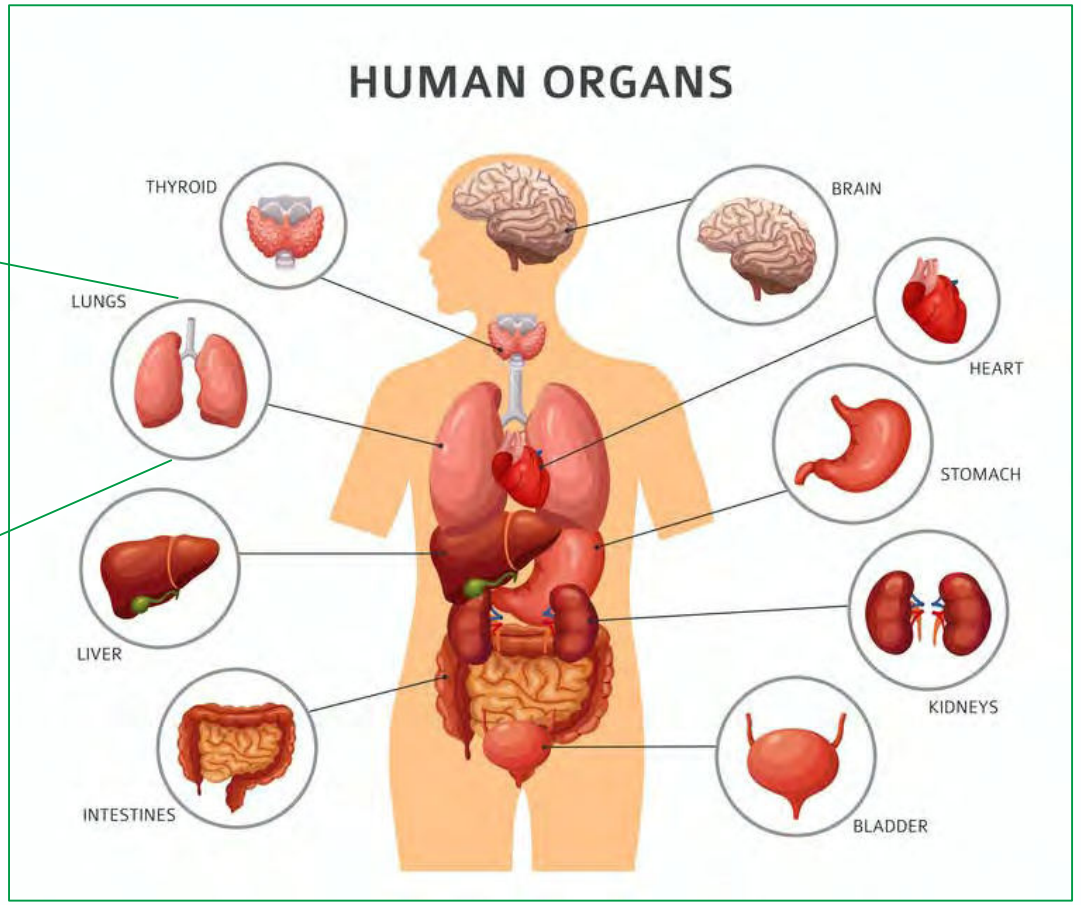
No. of TB Cases by Subdistrict




Western Cape Government
Tuberculosis (TB) Dashboard
Number of Tuberculosis (TB) Cases in the Western Cape
816,996
TB Tests (GXP)
15.9%
% Positivity
(since 01/01/2015)
183,669
1953
Last Month
14,115
TB Deaths
No. of TB Cases by Subdistrict
Tygerberg
31,733
Khayelitsha
28,286
Western
26,644
Eastern
26,445
Mitchells Pl...
25,803
Southern
17,746
Klipfontein
15,390
Northern
11,622
0K
20K
40K
Last 5 years
Last 1 year
% Positivity
No. of TB Cases by Subdistrict
West Coast National Park
Yzerfontein
Tulbagh
Ceres
Malmesbury
Atlantis
Wellington
Melkbosstrand
Paarl
Cape Town
Stellenbosch
Franschhoek
Mitchells Plain
Table Mountain National Park
Betty's Bay
mapbox
No. of TB Cases
11,622
15,644
19,666
23,689
27,711
31,733

What does post-tuberculosis lung disease look like to you?





The prevalence of mental health disorders* was 23.1%

Low-income countries	*42%*
Low-& Middle-income	*31%*
Upper middle-income	*31%*
High-income countries	*4%*

RESEARCH ARTICLE Open Access

Check for updates

Alene, Colquhoun, Viney et al. BMC Medicine 2021 (Sep);19:203

*Depression, anxiety & mood disorders, post-traumatic stress disorder, psychosis

PTBS2019
(Stellenbosch)

Proposed clinical patterns *

Airway

- Bronchiectasis
- TB-associated obstructive pulmonary disease (TOPD)

Parenchyma

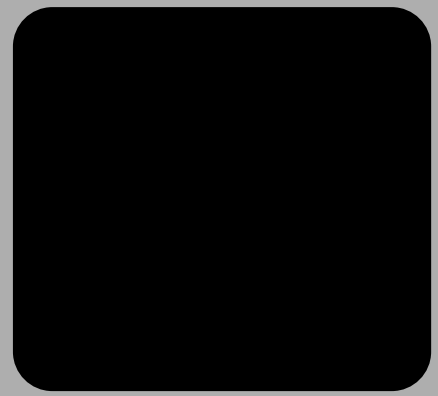
- Cavitation
- Destruction
- Fibrosis
- Aspergillus-related

Pleura

- Chronic pleural disease

Pulmonary vascular

- Pulmonary Hypertension



Other

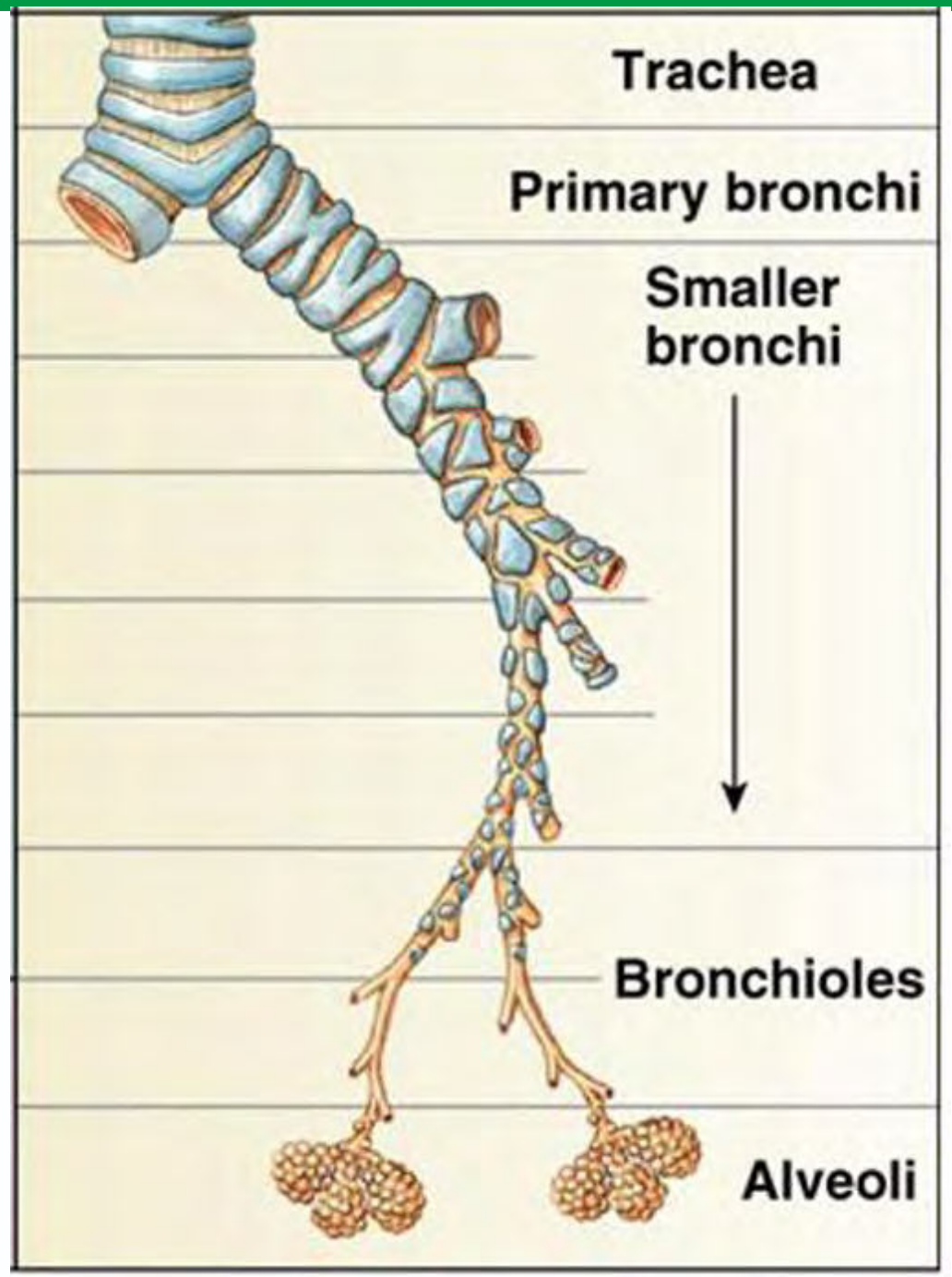
*Delphi consensus process

Airway Disease

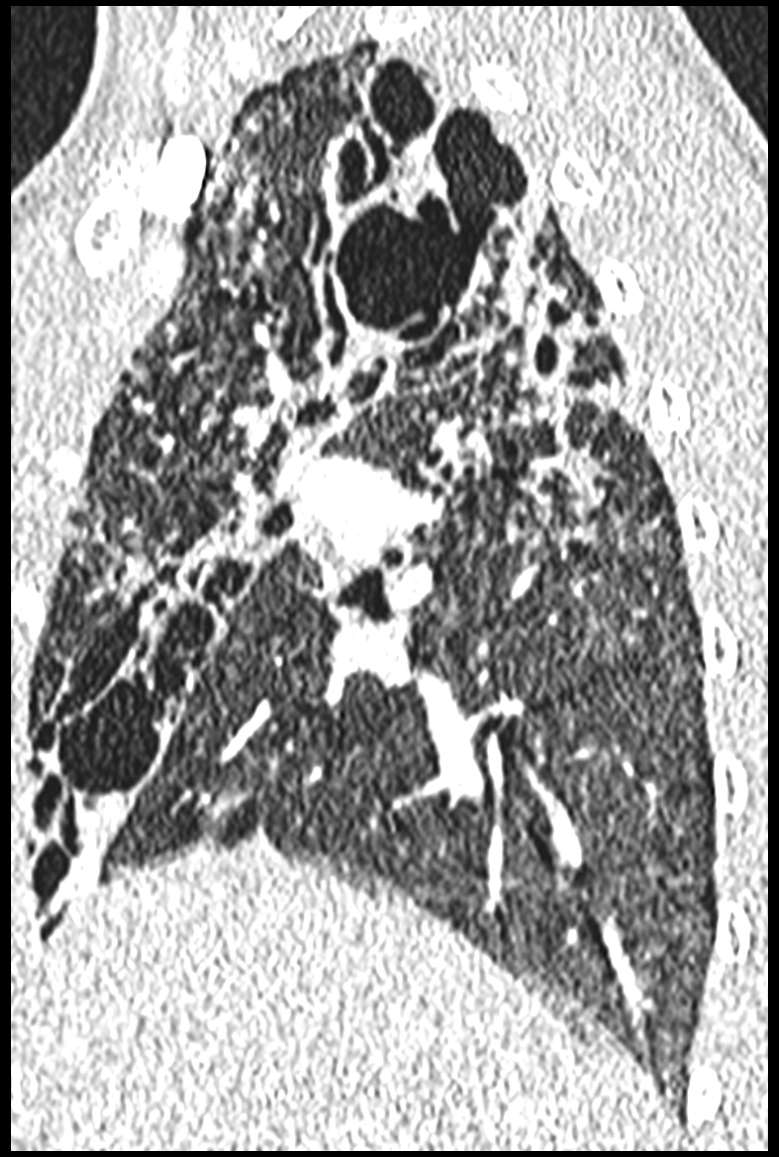
- Parenchymal
- Pleural
- Pulmonary Vascular

Large

Small



Bronchiectasis



16F

MDR-TB in 2012 & 2021

Mother died of MDR-TB in 2013

Never smoked, HIV negative

Fatigue and ongoing dyspnoea

Spirometry:

FEV1: 1.41L (44%)

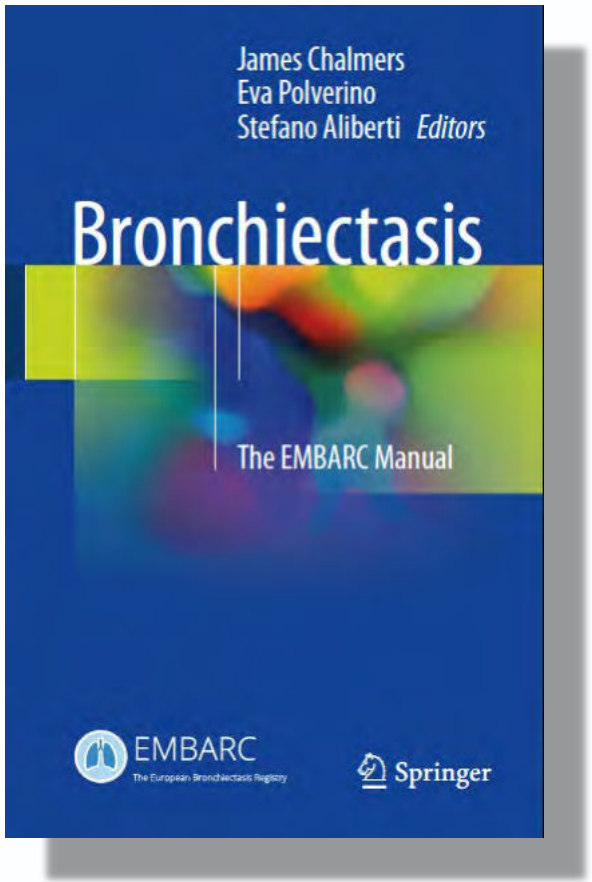
FVC: 1.48L (42%)

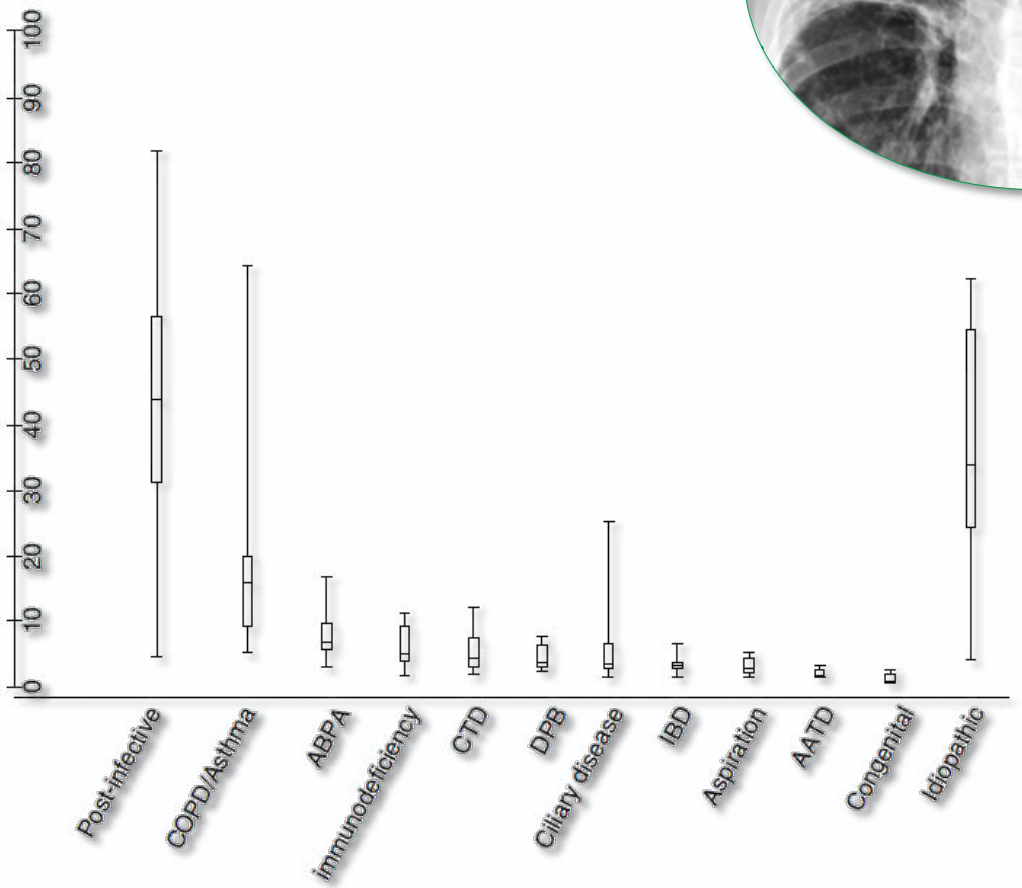
RATIO: 95,2%

Sats 99% on RA

Airway Disease

Large





Post-infective aetiology, especially due to tuberculosis, greatly varies across the globe in consideration of social and economic conditions as well as access to antibiotic therapy or vaccination programmes. (p69)

Post-TB Bronchiectasis

Bronchiectasis in India: results from the European Multicentre Bronchiectasis Audit and Research Collaboration (EMBARC) and Respiratory Research Network of India Registry

Raja Dhar, Sheetu Singh, Deepak Talwar, Murali Mohan, Surya Kant Tripathi, Rajesh Swarnakar, Sonali Trivedi, Srinivas Rajagopala, George D'Souza, Arjun Padmanabhan, Archana Baburao, Padukudru Anand Mahesh, Babaji Ghewade, Girija Nair, Aditya Jindal, Gayathri Devi H Jayadevappa, Honney Sawhney, Kripesh Ranjan Sarmah, Kaushik Saha, Suresh Anantharaj, Arjun Khanna, Samir Gami, Arti Shah, Arpan Shah, Naveen Dutt, Himanshu Garg, Sunil Vyas, Kummannoor Venugopal, Rajendra Prasad, Naveed M Aleemuddin, Saurabh Karmakar, Virendra Singh, Surinder Kumar Jindal, Shubham Sharma, Deepak Prajapat, Sagar Chandrashekaria, Melissa J McDonnell, Aditi Mishra, Robert Rutherford, Ramanathan Palaniappan Ramanathan, Pieter C Goeminne, Preethi Vasudev, Katerina Dimakou, Megan L Crichton, Biiligere Siddaiah Jayaraj, Rahul Kungwani, Akanksha Das, Mehneet Sawhney, Eva Polverino, Antoni Torres, Nayan Sri Gulecha, Michal Shteinberg, Anthony De Soyza, Anshul Mangala, Palak Shah, Nishant Kumar Chauhan, Nikita Jajodia, Ashutosh Singhal, Sakshi Batra, Ashfaq Hasan, Sneha Limaye, Sundeep Salvi, Stefano Aliberti, James D Chalmers

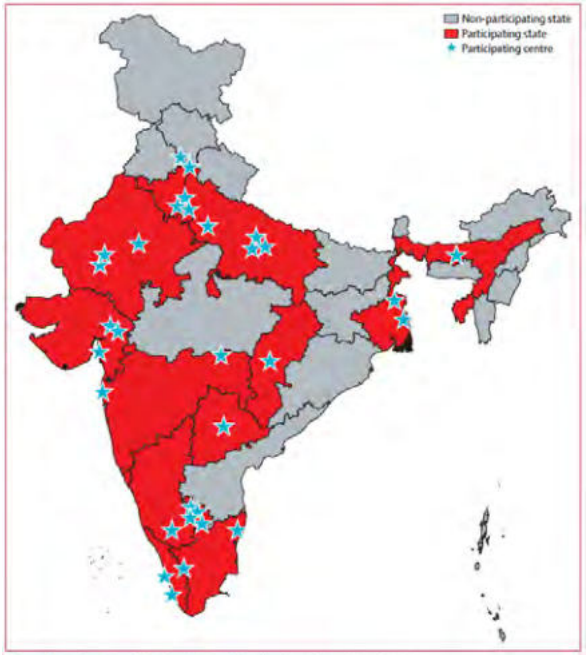
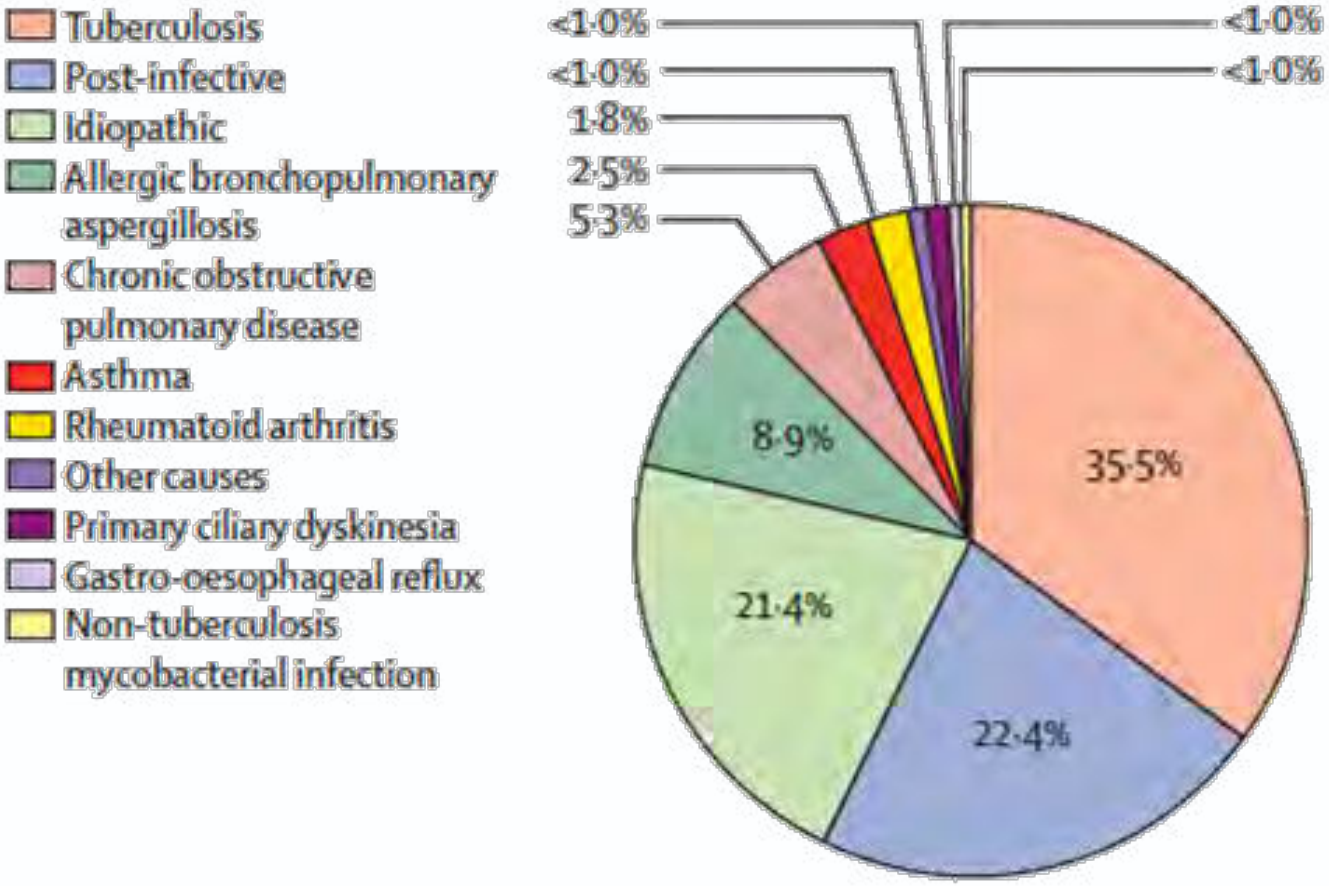


Figure 1: Location of participating sites in the Indian bronchiectasis registry

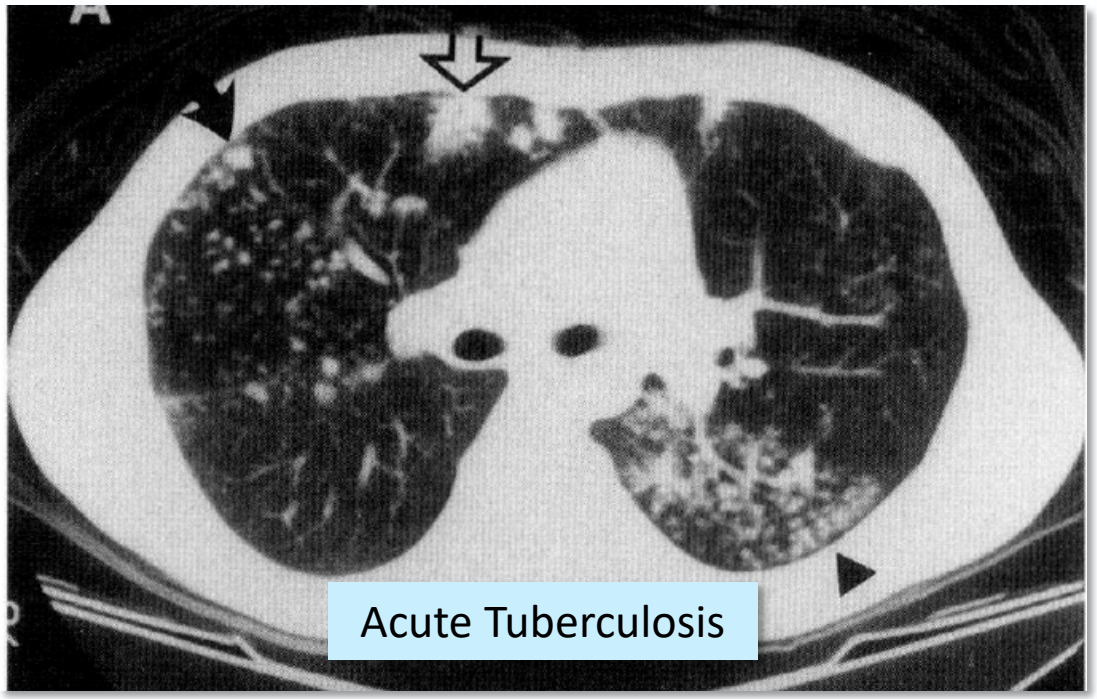


N = 2195

31 Centres

Lancet Glob Health 2019; 7: e1269–79

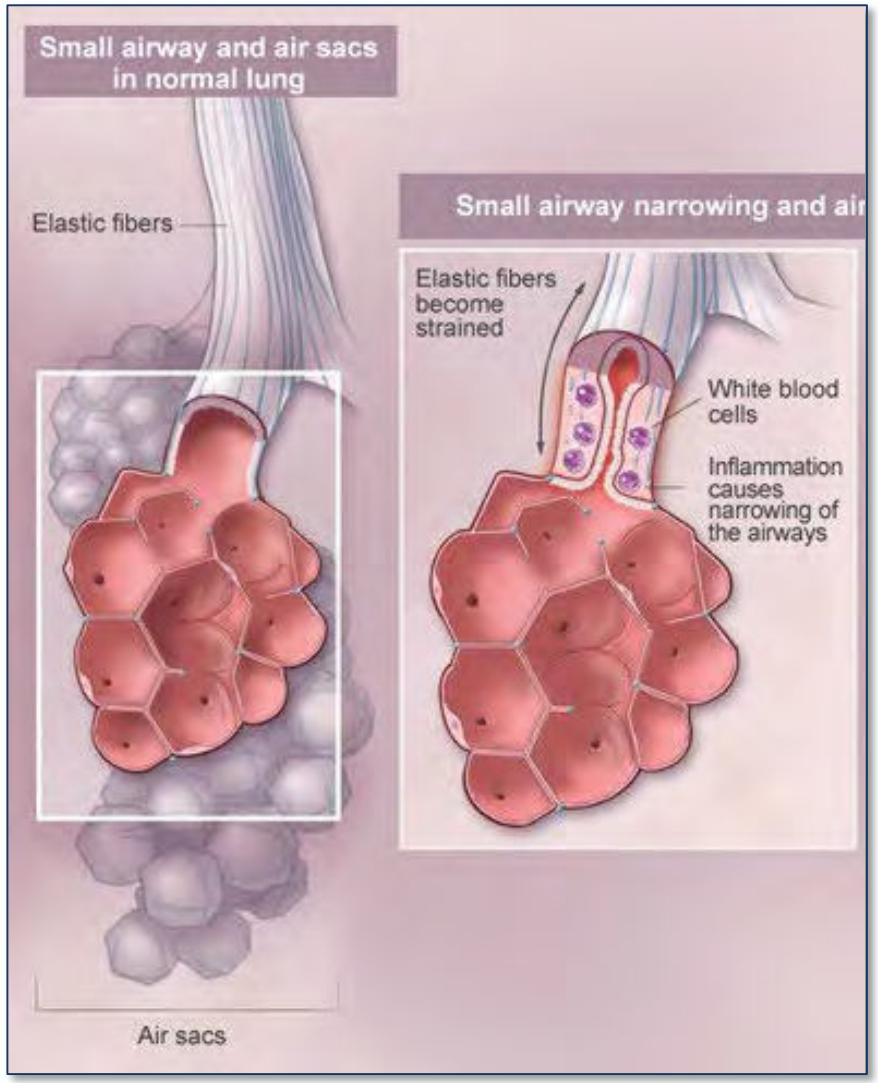
Airway Disease | Small



Pulmonary Tuberculosis Treated With Directly Observed Therapy*

Serial Changes in Lung Structure and Function

Richard Long, MD, FCCP; Bruce Maycher, MD; Anil Dhar, MD, FCCP; Jure Manfreda, MD; Earl Hershfield, MD; and Nicholas Anthonisen, MD, PhD



Tuberculosis-associated Obstructive Pulmonary Disease “ TOPD ”

Airway Disease

Small

SAMJ RESEARCH

Obstructive pulmonary disease in patients with previous tuberculosis: Pathophysiology of a community-based cohort

B W Allwood,[1,2] PhD; **R Gillespie**,[1] MSc (Nursing); **M Galperin-Aizenberg**,[3] PhD; **M Bateman**,[1] MD; **H Olckers**,[1] BTech Hons; **L Taborda-Barata**,[4] PhD; **G L Calligaro**,[1] MD; **Q Said-Hartley**,[5] MD; **R van Zyl-Smit**,[1] PhD; **C B Cooper**,[6] PhD; **E van Rikxoort**,[7] PhD; **J Goldin**,[6] PhD; **N Beyers**,[8] PhD; **E D Bateman**,[1] PhD

[1] *University of Cape Town Lung Institute, Cape Town, South Africa*
[2] *Division of Pulmonology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, South Africa*
[3] *Department of Radiology, Hospital of the University of Pennsylvania, Philadelphia, USA*
[4] *CICS – Health Sciences Research Centre, University of Beira Interior, Covilhã, Portugal*
[5] *Department of Radiology, Faculty of Health Sciences, University of Cape Town, South Africa*
[6] *David Geffen School of Medicine, University of California, Los Angeles, USA*
[7] *Radboud University Medical Center, Nijmegen, Netherlands*
[8] *Desmond Tutu TB Centre, Department of Paediatrics and Child Health, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, South Africa*

Corresponding author: *B W Allwood (brianallwood@gmail.com)*

Background. An association between chronic airflow limitation (CAL) and a history of pulmonary tuberculosis (PTB) has been confirmed in epidemiological studies, but the mechanisms responsible for this association are unclear. It is debated whether CAL in this context should be viewed as chronic obstructive pulmonary disease (COPD) or a separate phenotype.
Objective. To compare lung physiology and high-resolution computed tomography (HRCT) findings in subjects with CAL and evidence of previous (healed) PTB with those in subjects with smoking-related COPD without evidence of previous PTB.
Methods. Subjects with CAL identified during a Burden of Obstructive Lung Disease (BOLD) study performed in South Africa were studied. Investigations included questionnaires, lung physiology (spirometry, body plethysmography and diffusing capacity) and quantitative HRCT scans to assess bronchial anatomy and the presence of emphysema (<–950 HU), gas trapping (<–860 HU) and fibrosis (>–200 HU). Findings in subjects with a past history and/or HRCT evidence of PTB were compared with those in subjects without these features.
Results. One hundred and seven of 196 eligible subjects (54.6%) were enrolled, 104 performed physiology tests and 94 had an HRCT scan. Based on history and HRCT findings, subjects were categorised as no previous PTB (NPTB, n=31), probable previous PTB (n=33) or definite previous PTB (DPTB, n=39). Subjects with DPTB had a lower diffusing capacity (Δ=–17.7%; p=0.001) and inspiratory capacity (Δ=–21.5%; p=0.001) than NPTB subjects, and higher gas-trapping and fibrosis but not emphysema scores (Δ=+6.2% (p=0.021), +0.36% (p=0.017) and +3.5% (p=0.098), respectively).
Conclusions. The mechanisms of CAL associated with previous PTB appear to differ from those in the more common smoking-related COPD and warrant further study.

S Afr Med J 2017;107(5):440-445. DOI:10.7196/SAMJ.2017.v107i5.12118

The major burden of both chronic obstructive pulmonary disease (COPD) and pulmonary tuberculosis (PTB) occurs in low- and middle-income countries. Ninety percent of the estimated 3 million

of bronchiectasis, large-airway (bronchial) stenosis and distortion of large airways,[9-12] but detailed study of the pathophysiology is lacking. We have examined the pathophysiology of CAL in patients

A 23-year-old Male

Football player

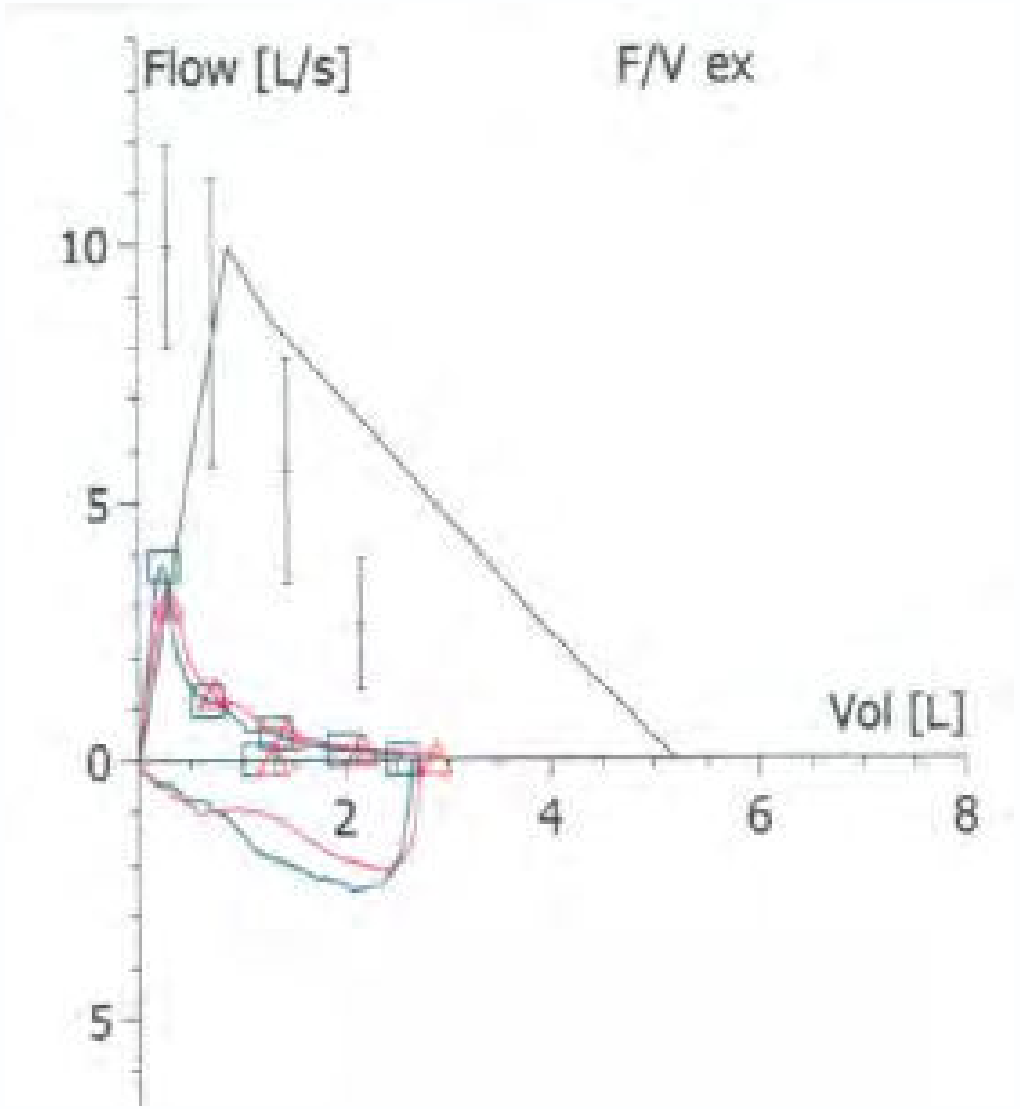
HIV negative
Non-smoker (occasional cannabis)
No history of asthma
No exposures

Diagnosed with drug-sensitive TB
Completed 6months therapy

3-months later referred for residual dyspnoea

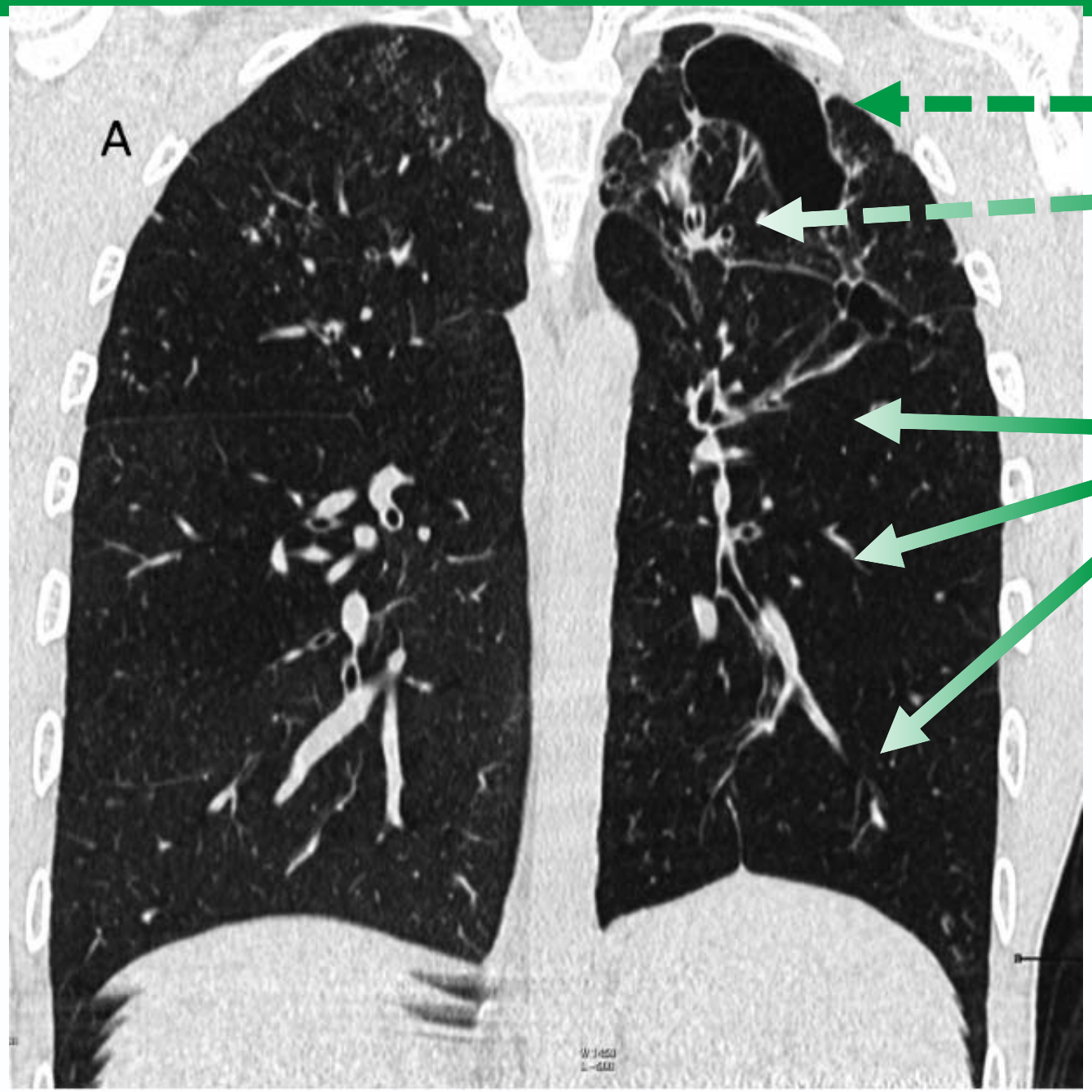
Allwood et al. Int J Tuberc Lung Dis 2019;23:552

TOPD : a Case Report



	Spirometry:	
FEV_1 :	1.11L	(25.2% pred)
FVC :	2.11L	(41.6% pred)
FEV_1:FVC :	51.2%	
	Diffusing Capacity:	
DLco :	17.58ml/min/mmHg	(49.1% pred)
DLco/VA :	4.49ml/min/mmHg	(88.6% pred)
	Plethysmography:	
TLC:	6.55L	(93% pred)
IC:	1.69L	(43% pred)
FRC:	4.87L	(149% pred)
RV:	0.86L	(288% pred)
RV:TLC	64%	

Allwood et al. Int J Tuberc Lung Dis 2019;23:552

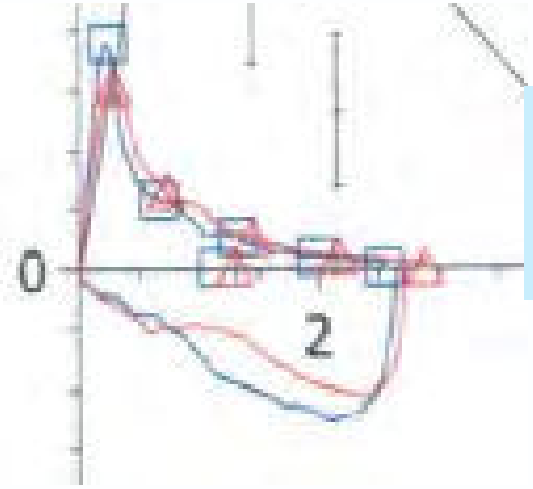


Cavity

Bronchiectasis

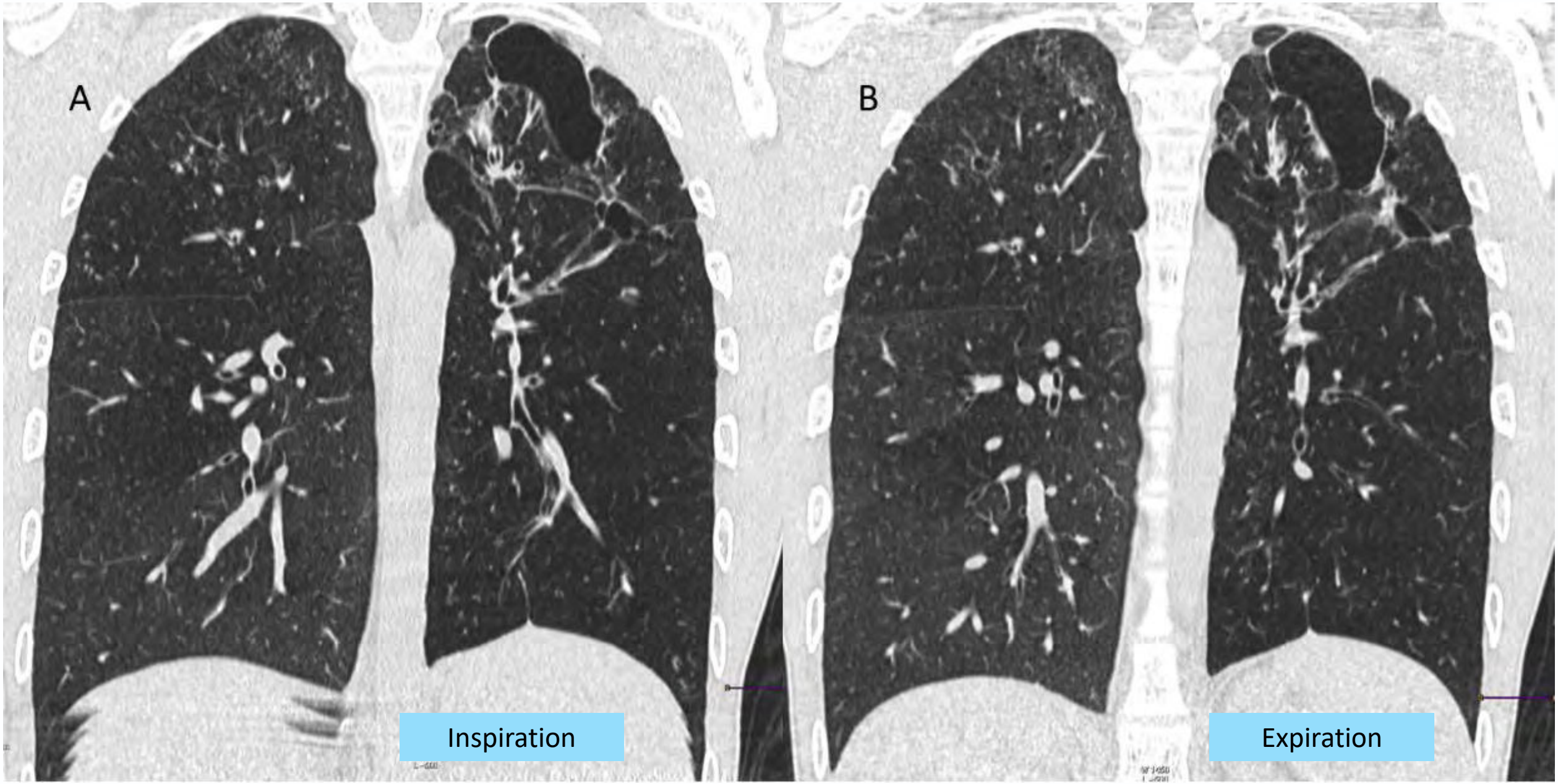
T.O.P.D.

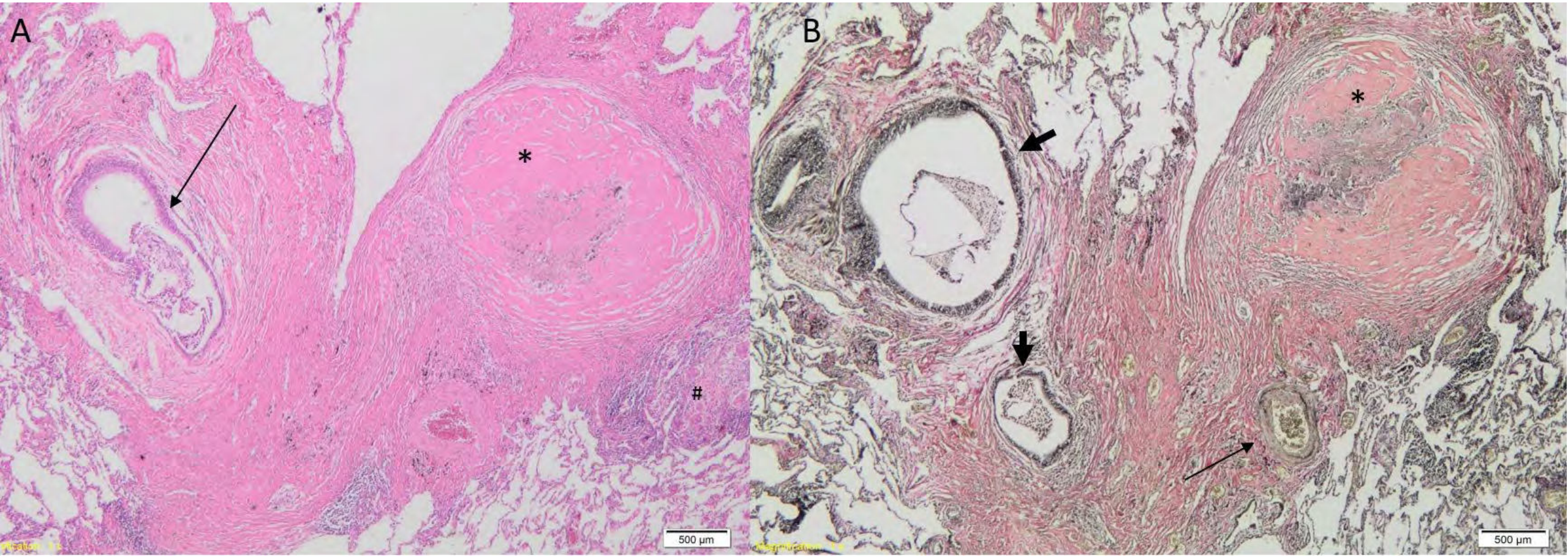
(small airway disease)



FEV_1 :	25.2%
FVC :	41.6%
FEV_1:FVC :	51.2%

Allwood et al. Int J Tuberc Lung Dis 2019;23:552


A
B
Inspiration
Expiration



Six months **after** completing TB treatment

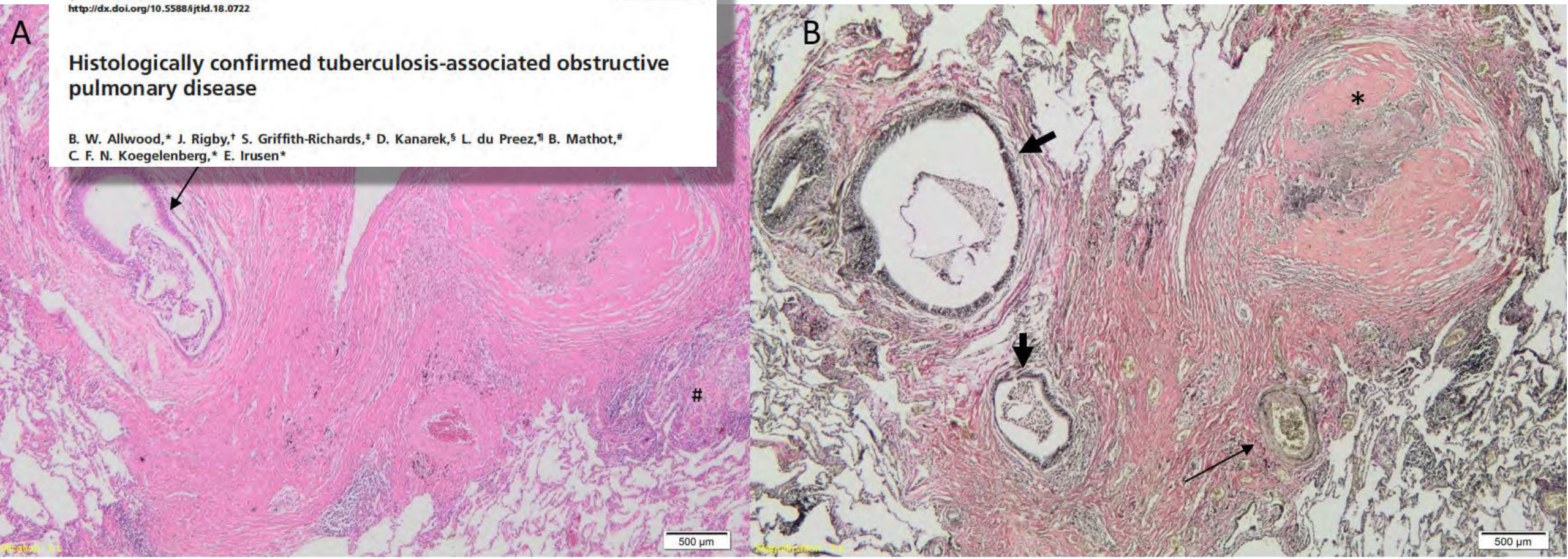
INT J TUBERC LUNG DIS 23(5):552–554

http://dx.doi.org/10.5588/ijtld.18.0722

CASE STUDY

Histologically confirmed tuberculosis-associated obstructive pulmonary disease

B. W. Allwood,* J. Rigby,† S. Griffith-Richards,‡ D. Kanarek,§ L. du Preez,¶ B. Mathot,#
C. F. N. Koegelenberg,* E. Irusen*



First histologically-proven case of
"Tuberculosis-associated Obstructive Pulmonary Disease"

59y Male
HIV positive on ARVs (CD_4 239)

Three previous episodes of TB
(unsure when)

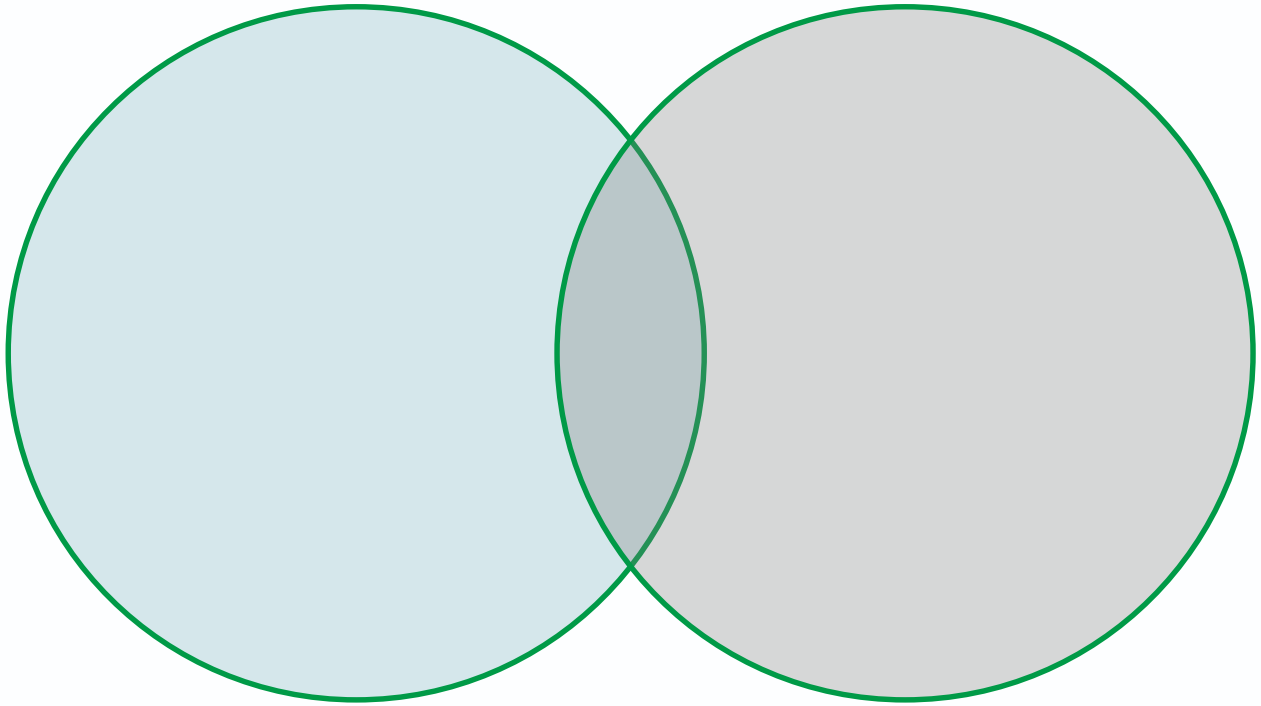
Ex-smoker
- 10 pack years (cigarettes)
- 15 years of cannabis

Onset of respiratory symptoms 5yrs ago
Recently admitted to hospital with
type 2 respiratory failure

MMRC grade 4 (Dyspnea at rest)

The post-TB patient with chronic airflow obstruction

?



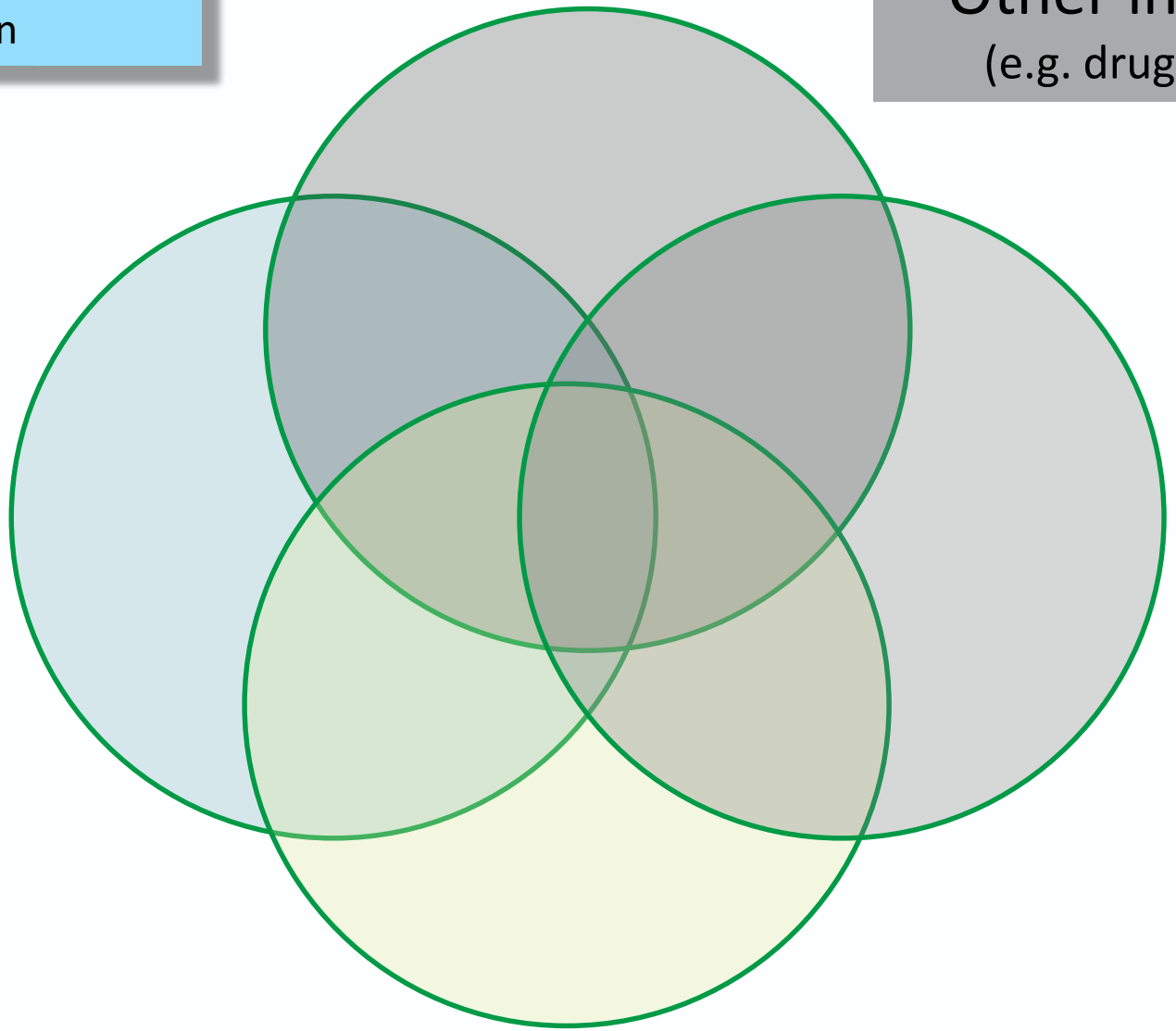
Smoking

“TOPD”

The post-TB patient with chronic airflow obstruction

?

Other inhalations
(e.g. drugs, biomass)



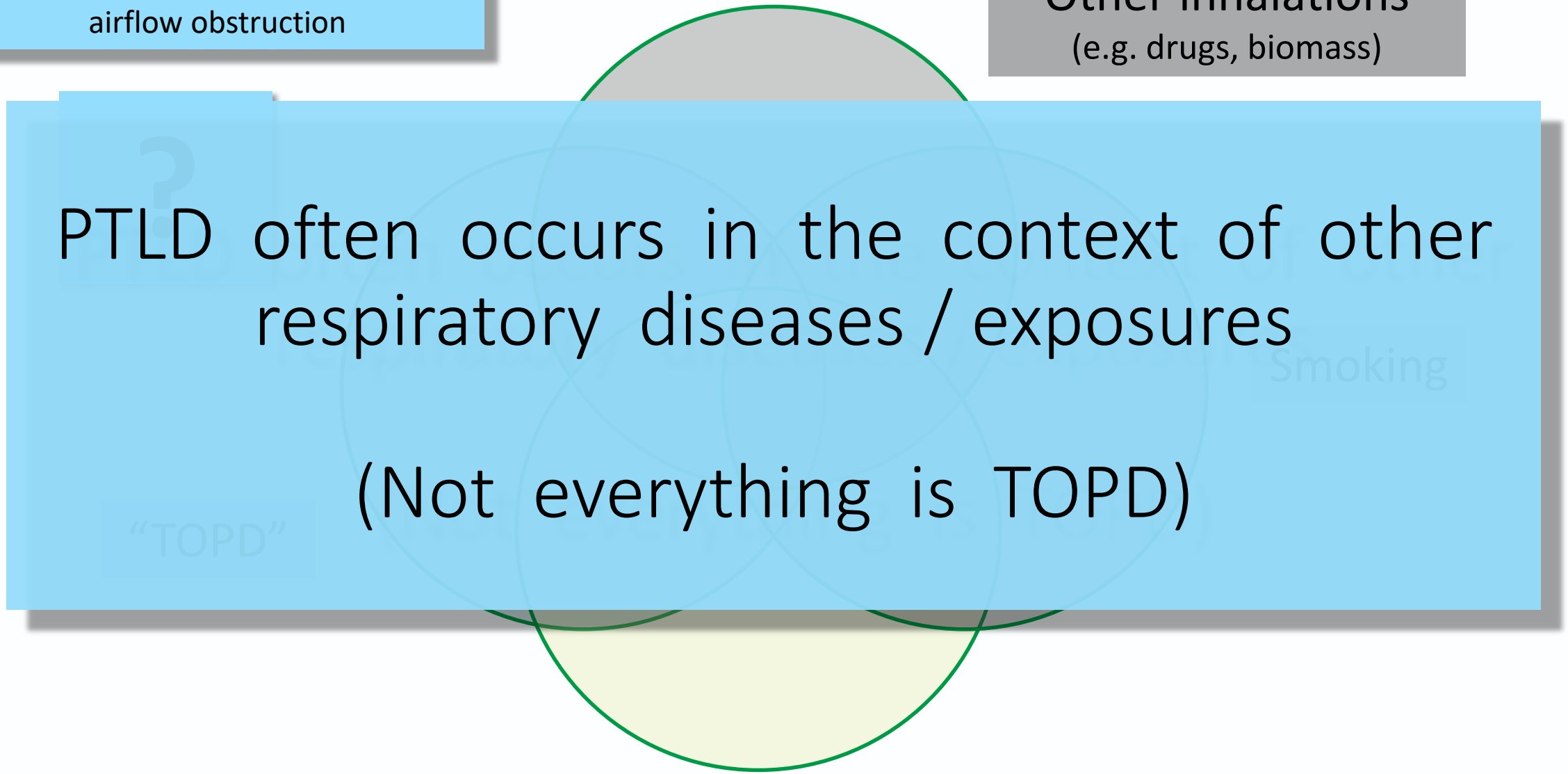
Smoking

"TOPD"

Bronchiectasis

The post-TB patient with chronic airflow obstruction

Other inhalations
(e.g. drugs, biomass)



PTLD often occurs in the context of other respiratory diseases / exposures

(Not everything is TOPD)

Bronchiectasis

Post-TB lung disease definition

"Evidence of chronic respiratory abnormality,

with or without symptoms,

attributable at least in part to previous tuberculosis."

- 1st International Post-Tuberculosis Symposium (2019)

Broad and inclusive
Sensitivity > Specificity

Low and high resource settings

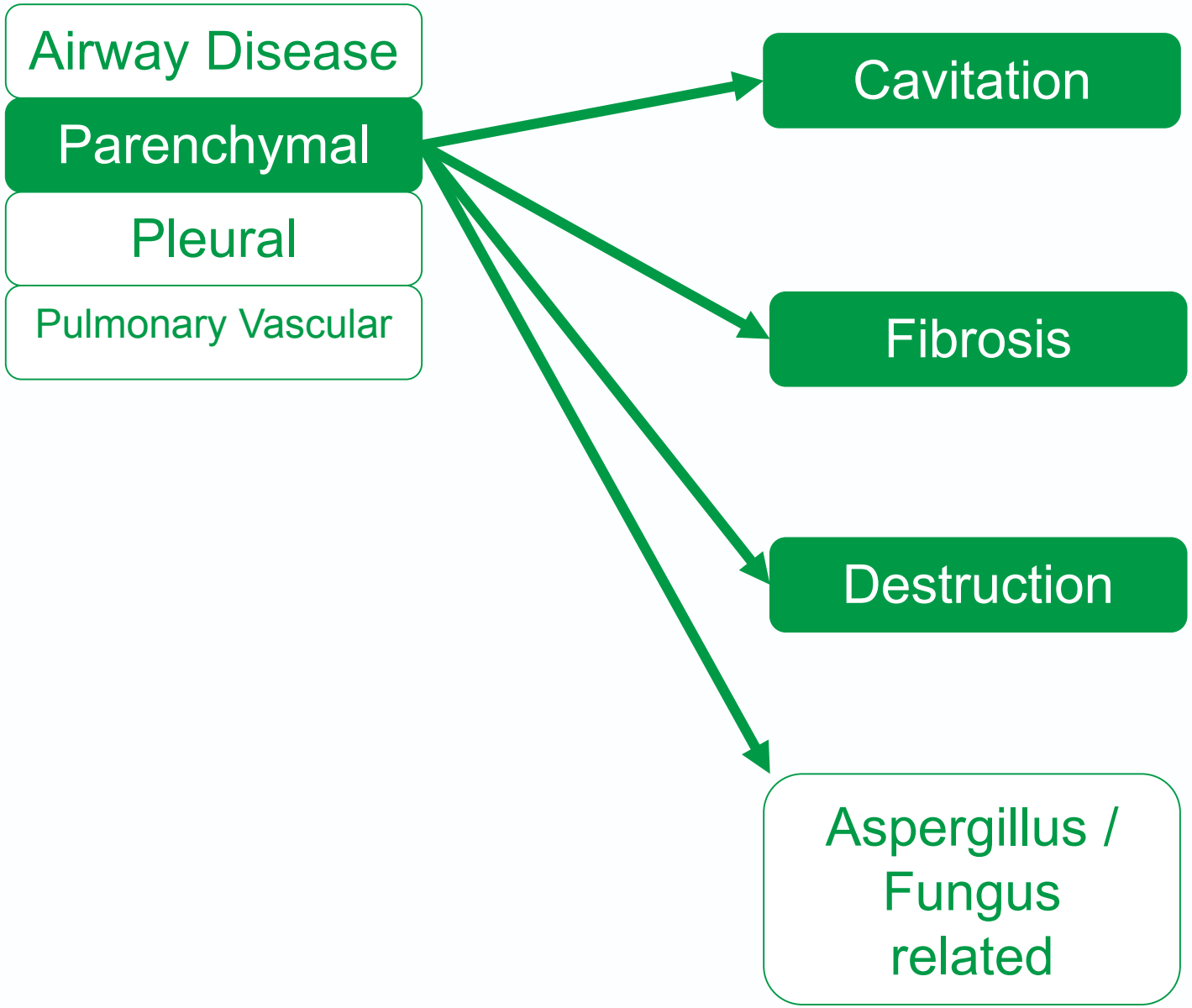
Dual-pathology
(?Which is dominant)

Lung damage can be asymptomatic
?still relevant to patient outcomes

Old TB disease and recurrent active TB

Previously undocumented or untreated TB
may still have PTLD

Allwood, van der Zalm et al. Int J Tuberc Lung Dis. 2020 Aug 1;24(8):820-828


Airway Disease
Parenchymal
Pleural
Pulmonary Vascular
Cavitation
Fibrosis
Destruction
Aspergillus / Fungus related

Cavitation

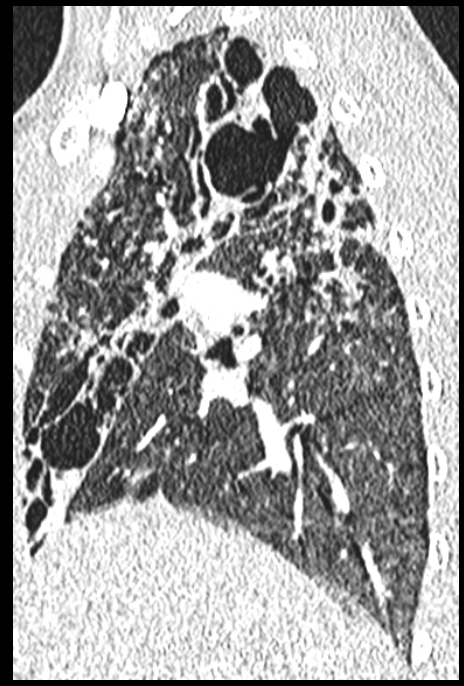
16F

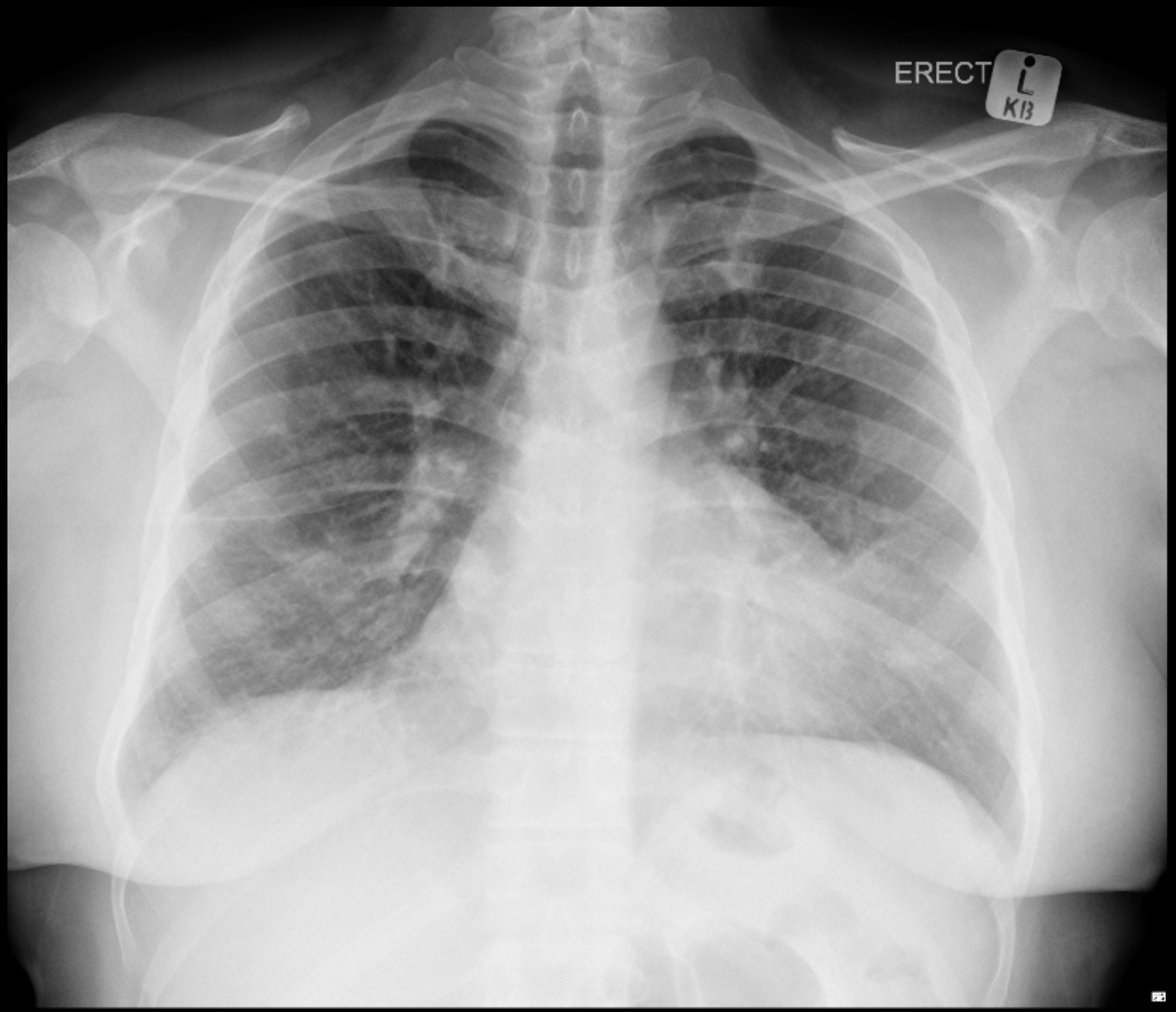
MDR TB in 2012 & 2021 (competing treatment)

Mother died of MR in 2013

Never smoked, HIV negative

Fatigue and ongoing dyspnoea





51M

Type 2 Diabetes
TB in 2017 (drug sensitive)

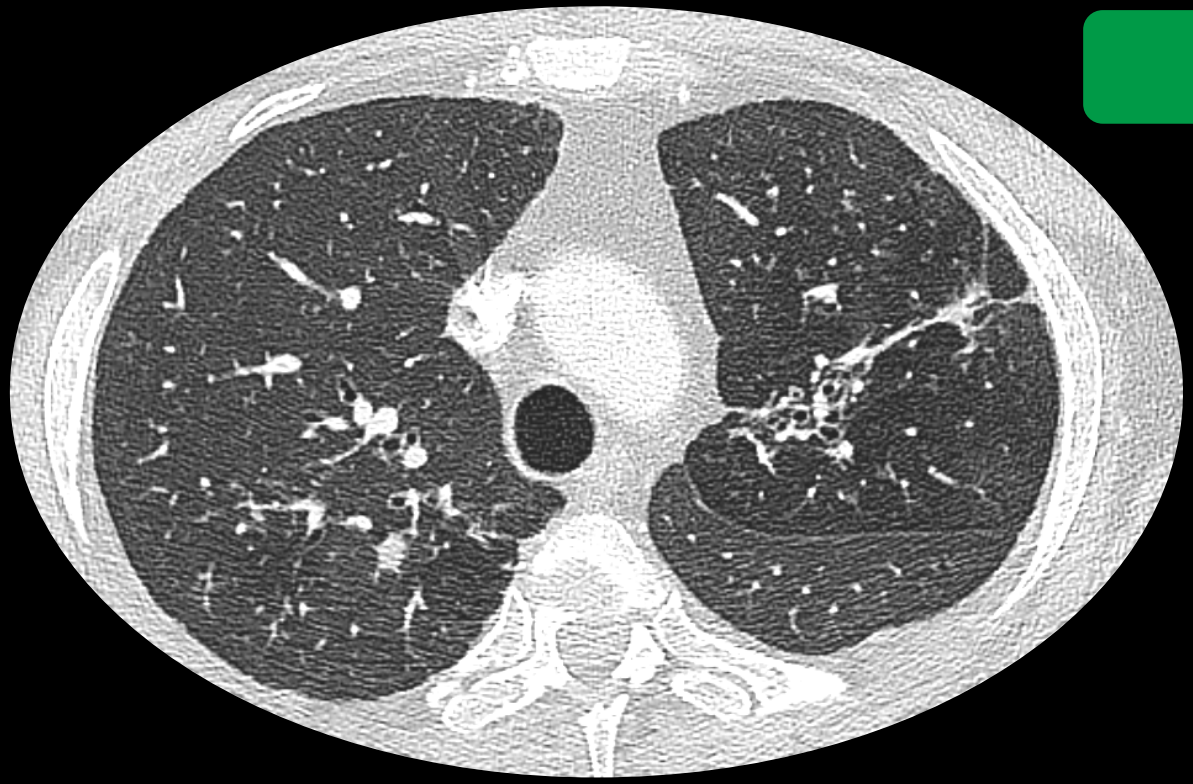
Ex-smoker (20 pack years)

MMRC Grade 2 Dyspnoea
No Cough

Spirometry:

FEV1: 1.68L (53.2%)
FVC: 2.22L (56,1%)
RATIO: 75.7%

Sats: 95% on RA



Fibrosis

51M

Type 2 Diabetes
TB in 2017 (drug sensitive)

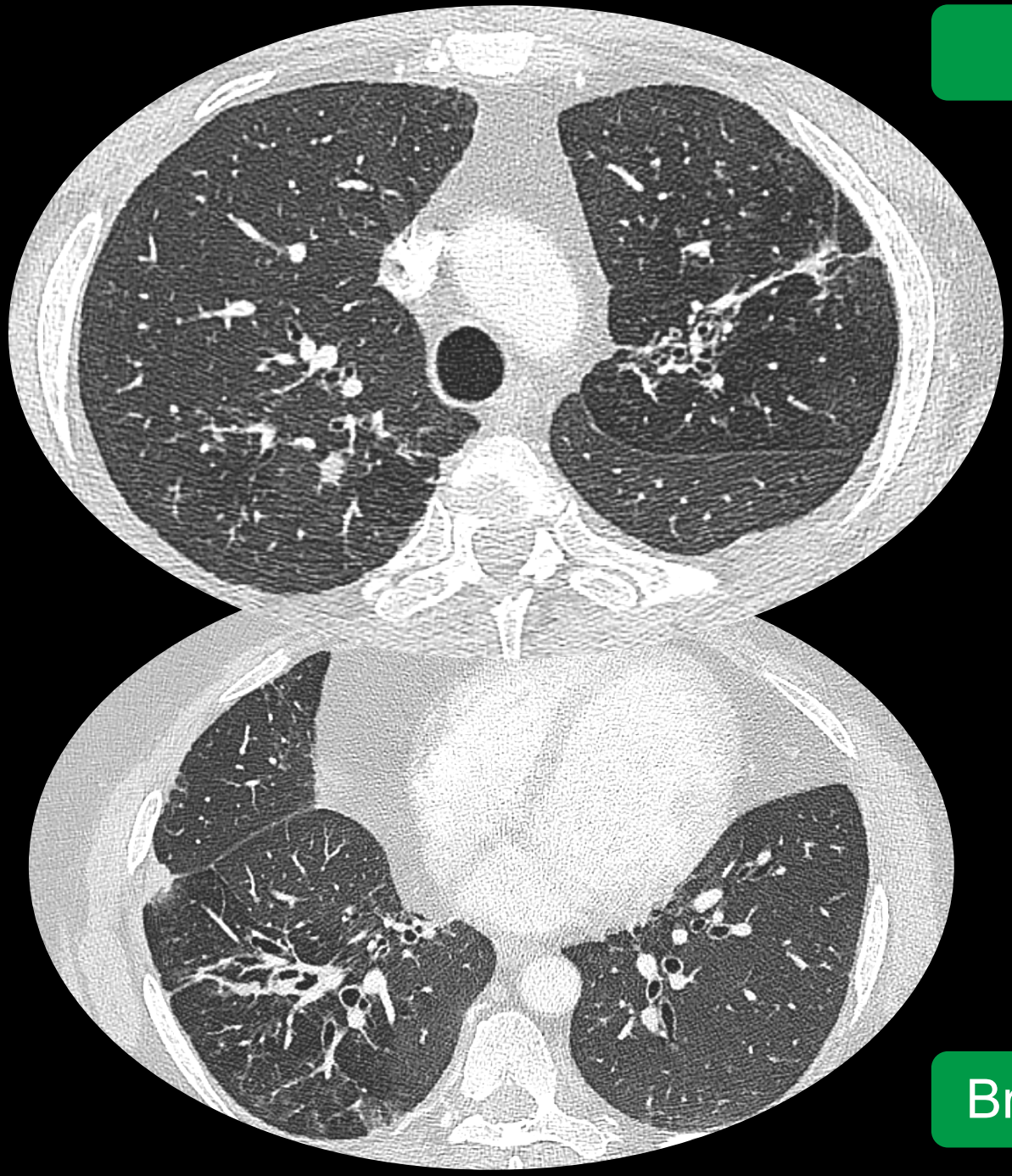
Ex-smoker (20 pack years)

MMRC Grade 2 Dyspnoea
No Cough

Spirometry:

FEV1: 1.68L (53.2%)
FVC: 2.22L (56,1%)
RATIO: 75.7%

Sats: 95% on RA



Fibrosis

Bronchiectasis

51M

Type 2 Diabetes
TB in 2017 (drug sensitive)

Ex-smoker (20 pack years)

MMRC Grade 2 Dyspnoea
No Cough

Spirometry:

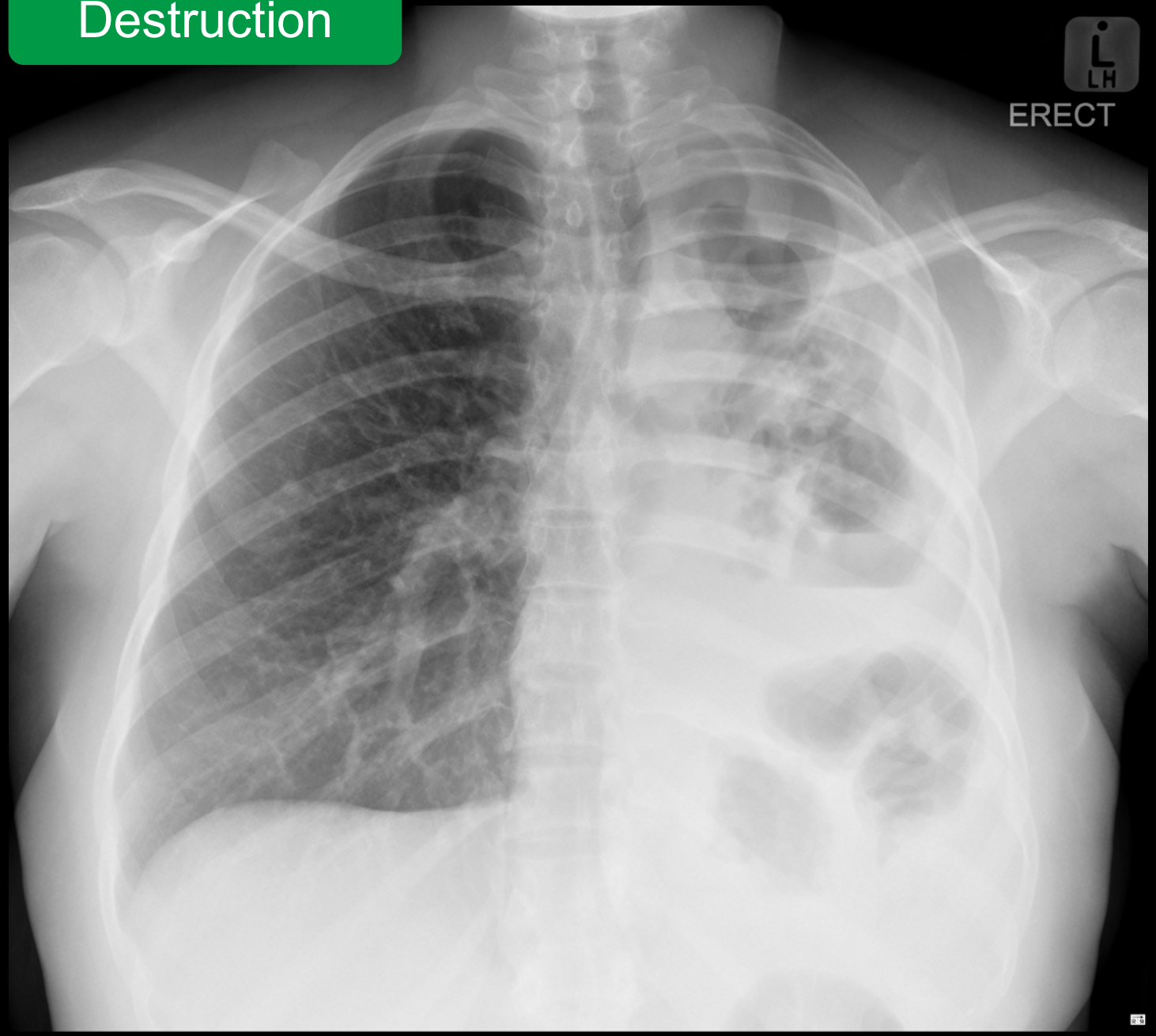
FEV1: 1.68L (53.2%)

FVC: 2.22L (56,1%)

RATIO: 75.7%

Sats: 95% on RA

Destruction



31y Male
HIV +ve (on 2nd line ARVs)

Two previous episode of TB
@ age 21 & 30yr

Symptoms:
Chest pain
Haemoptysis

Never smoker
No occupational exposure

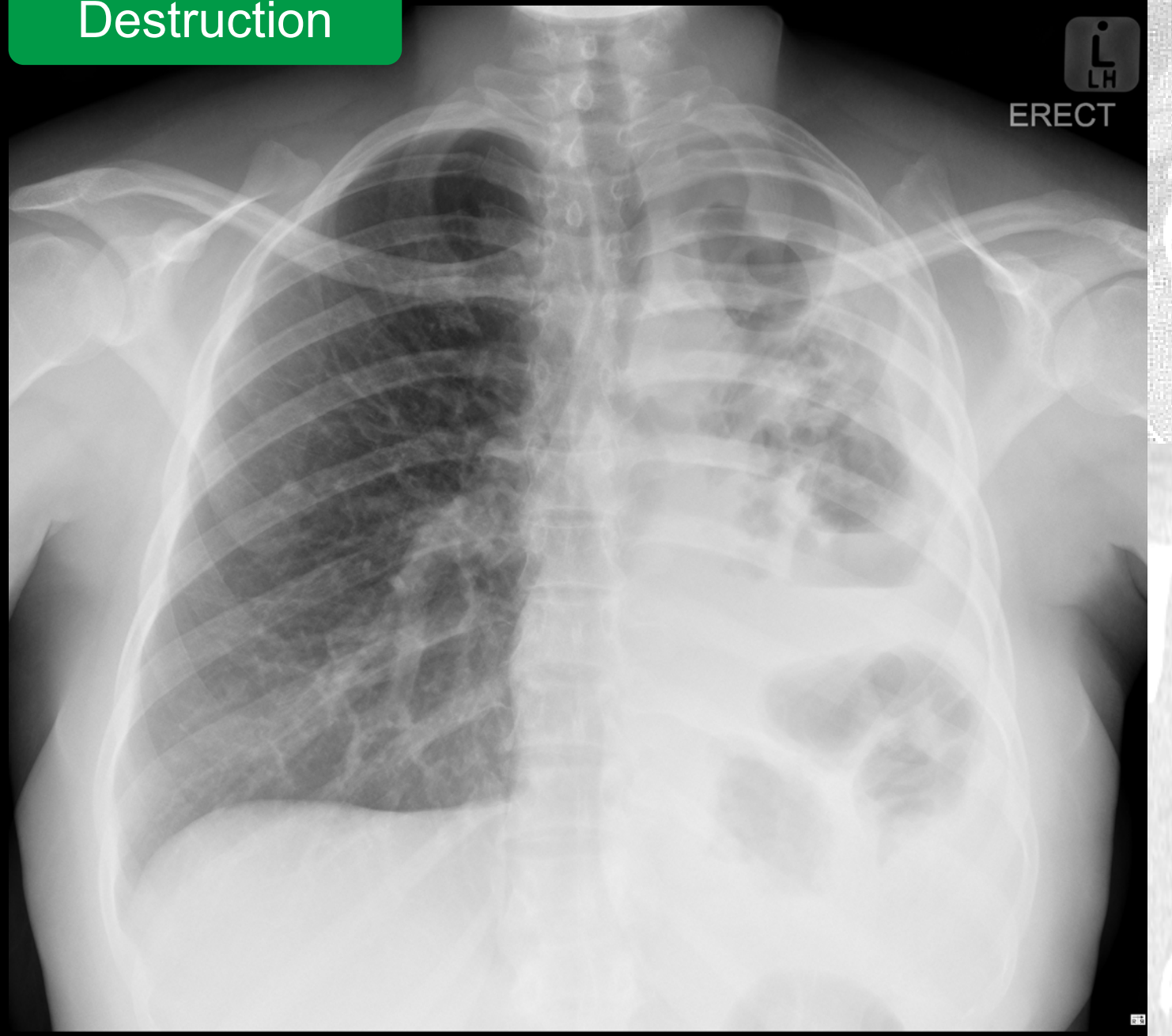
Spirometry:
FEV1: 1.68L (56.7% pred)
FVC: 2.15L (63.2% pred)
RATIO: 78.51%

DLCO: 12.34 (46.7% pred)

Plethysmography:
RV: 1.04L (73.1% pred)
TLC: 2.83L (58.6% pred)
RV%TLC 36.8%

6 min walk: 550m

Destruction



Airway Disease

Parenchymal

Pleural

Pulmonary Vascular

Pleural

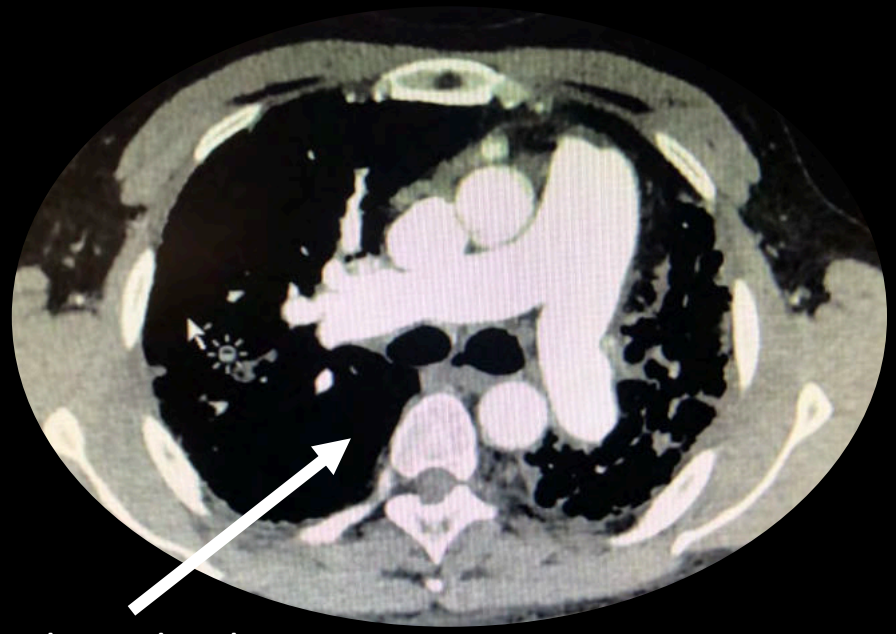
58M

HIV negative
Ex-miner

Two episodes of TB
Completed TB treatment
Dec 2021

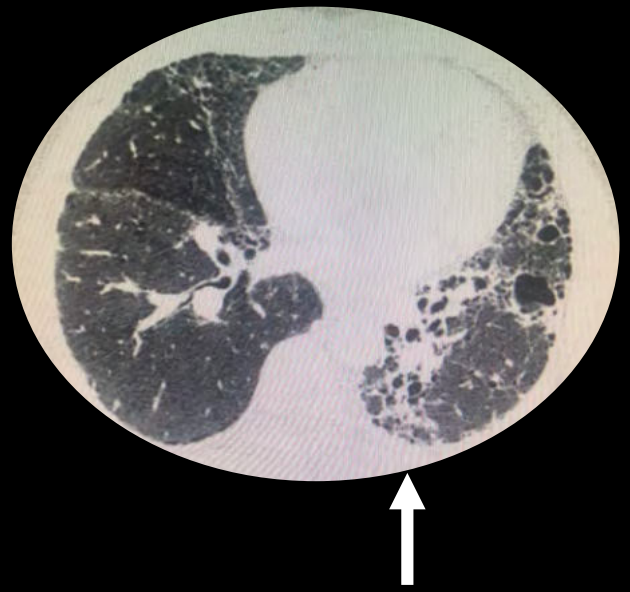
- Airway Disease
- Parenchymal
- Pleural
- **Pulmonary Vascular**

Pulmonary Vascular

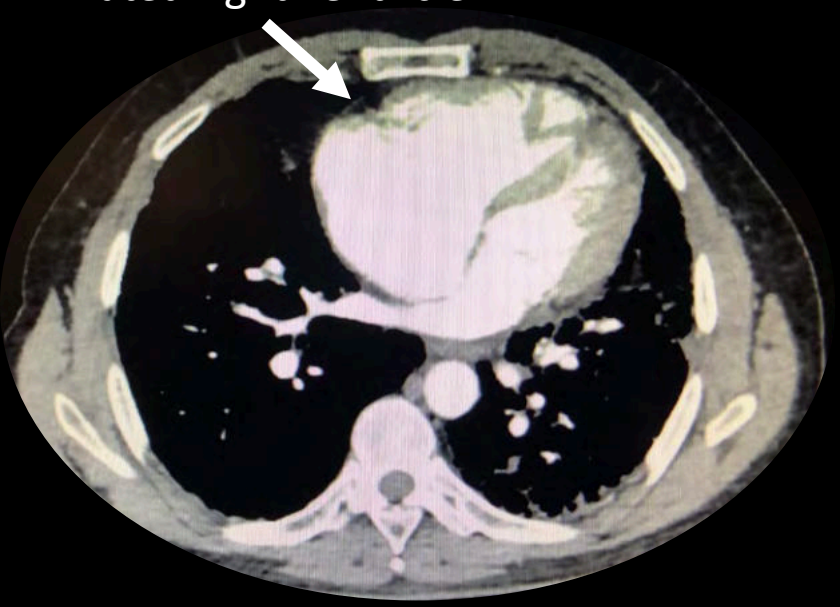


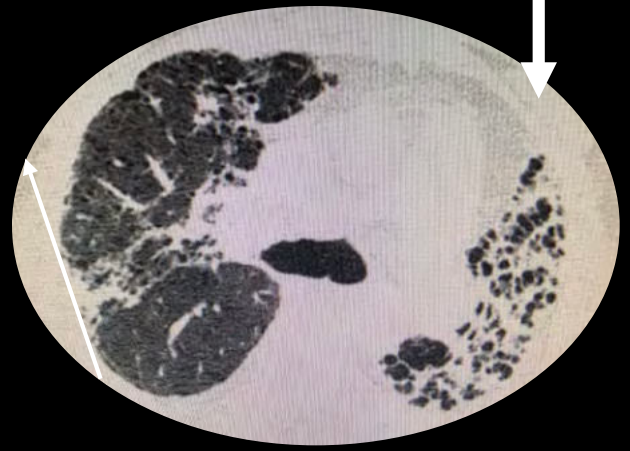
Enlarged pulmonary artery

Dilated right ventricle



Extensive bronchiectasis and destruction



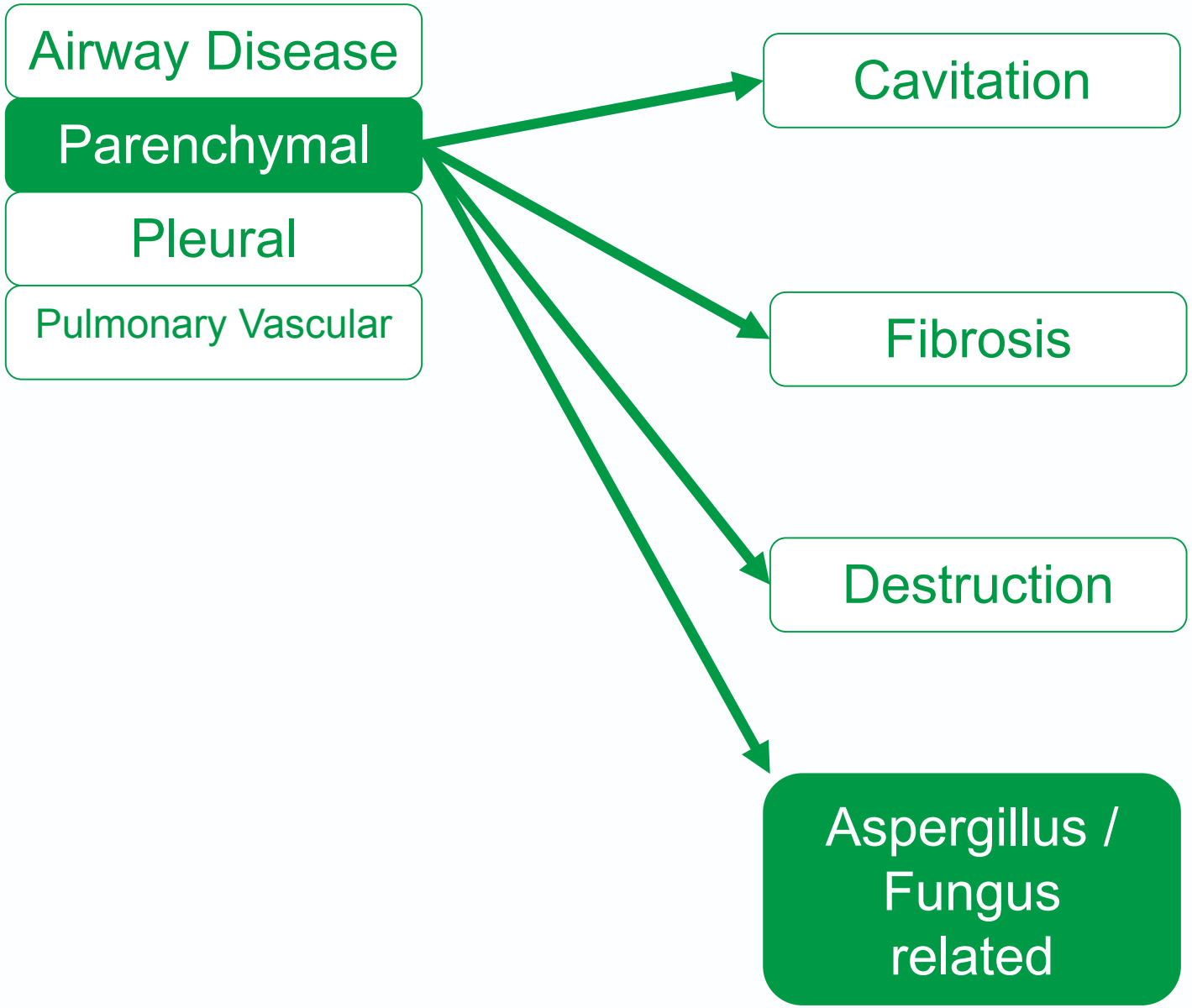


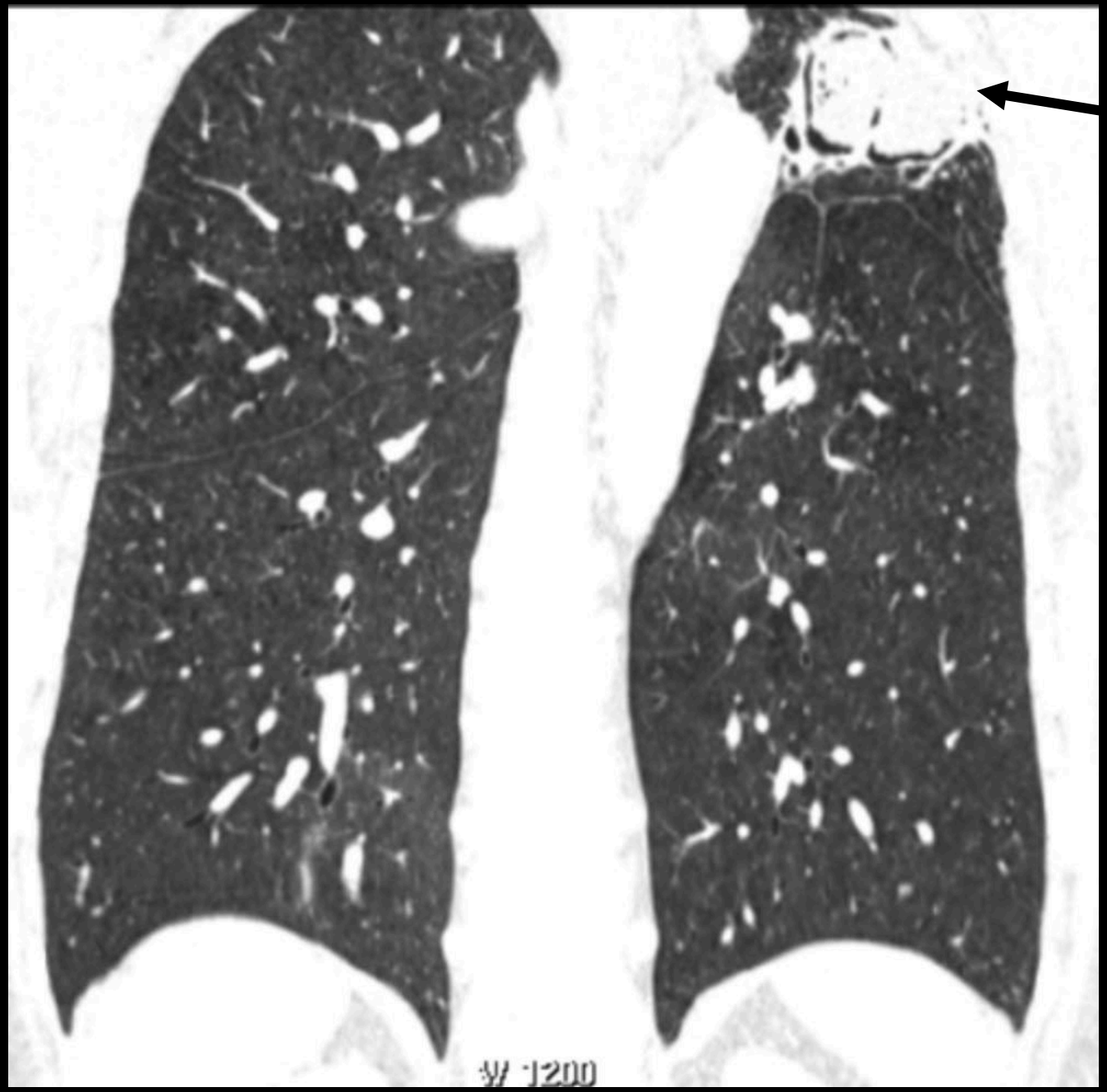
52M

HIV negative
Previous TB x 4

1 pack year history of smoking
ECOG 0 (Fully active)
Now worsening effort tolerance

Sats: 98% on RA


Airway Disease
Parenchymal
Pleural
Pulmonary Vascular
Cavitation
Fibrosis
Destruction
Aspergillus / Fungus related



Haemoptysis

42 F, prisoner

Previous massive haemoptysis
Ongoing haemoptysis

Fully active (not restricted)
Referred for LUL Lobetomy

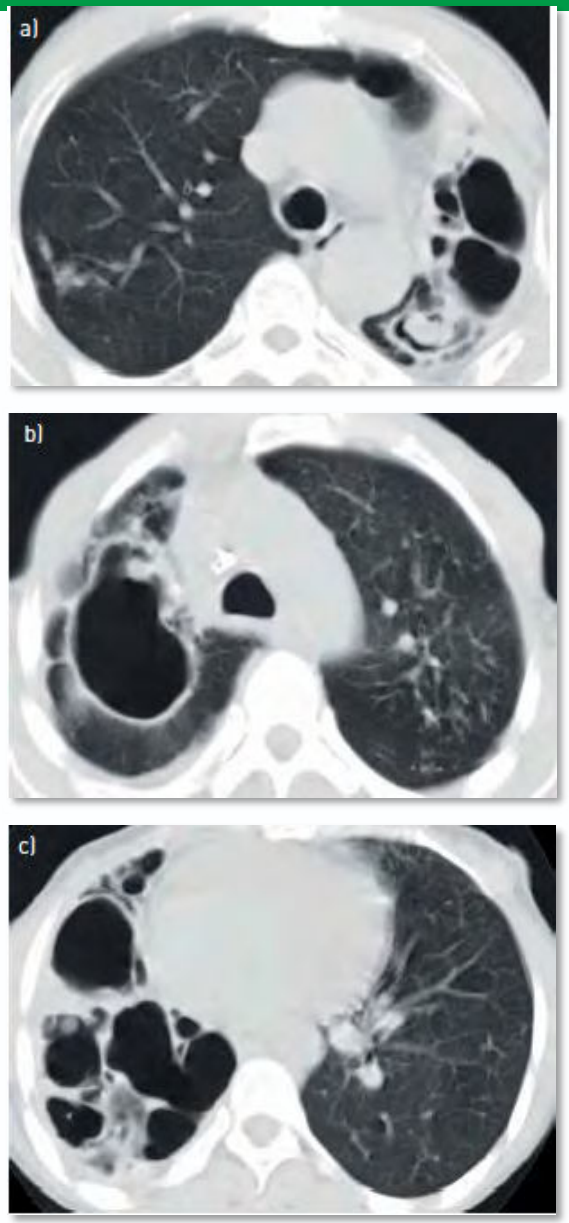
Spirometry:	
FEV1:	79%
FVC:	78%
DLco:	76%
TLC:	70%
VO2max:	29.9ml/min/kg

ORIGINAL ARTICLE
INFECTION AND TUBERCULOSIS

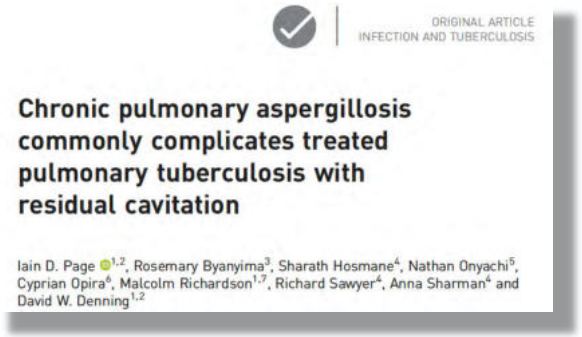
Chronic pulmonary aspergillosis commonly complicates treated pulmonary tuberculosis with residual cavitation

Iain D. Page[1,2], Rosemary Byanyima[3], Sharath Hosmane[4], Nathan Onyachi[5], Cyprian Opira[6], Malcolm Richardson[1,7], Richard Sawyer[4], Anna Sharman[4] and David W. Denning[1,2]

Population: 43 Million
86,000 cases
Incid: 201 per 100,000 pop



Eur Respir J 2019; 53: 1801184



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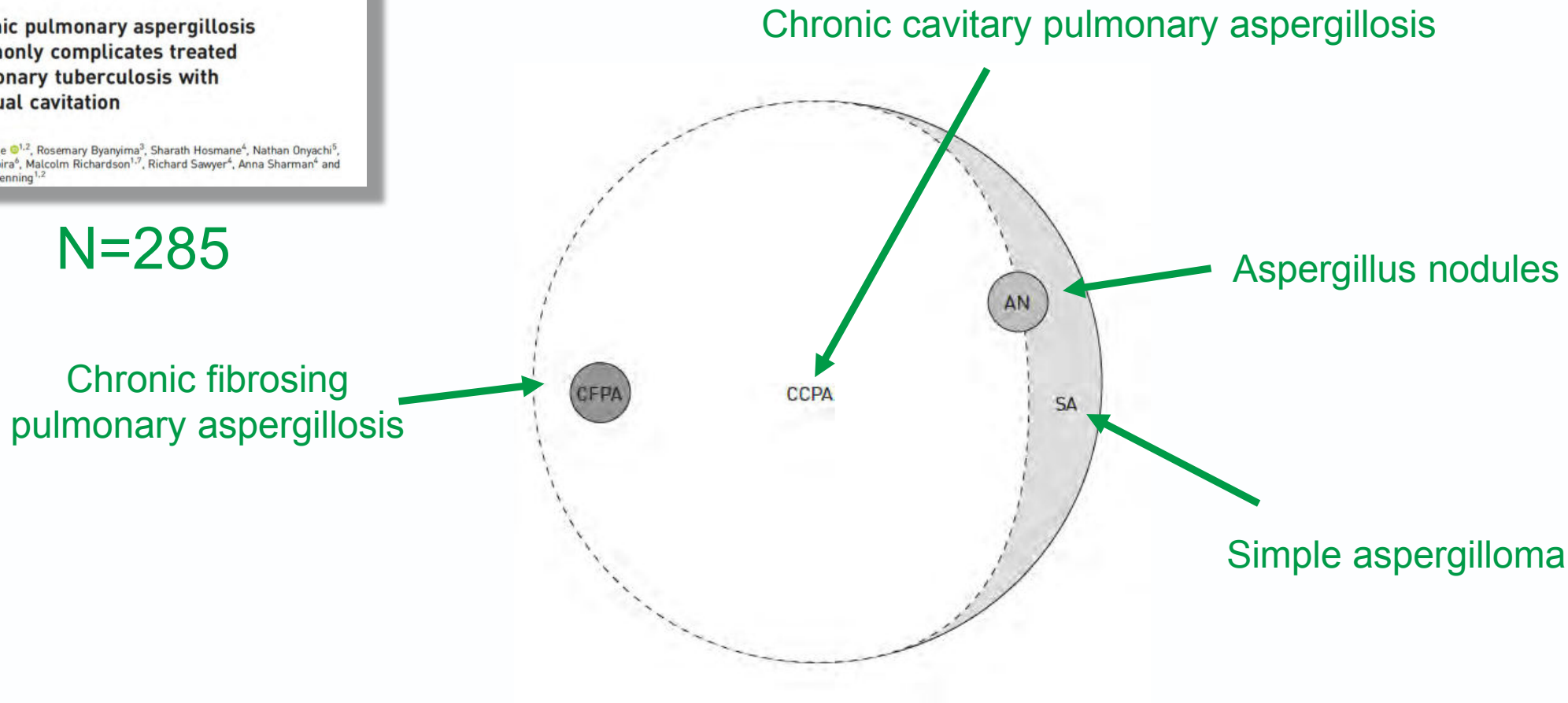
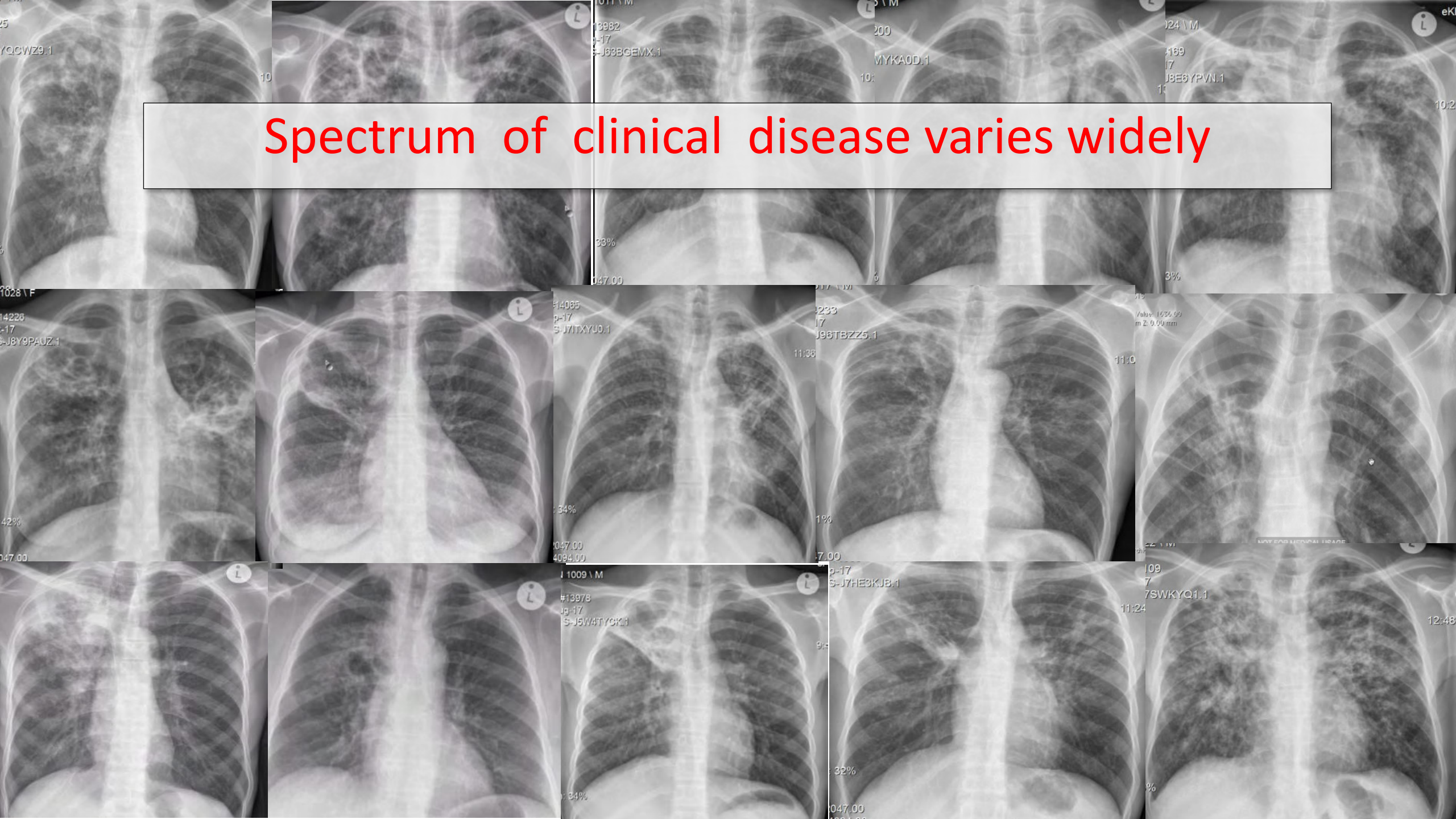
N=285



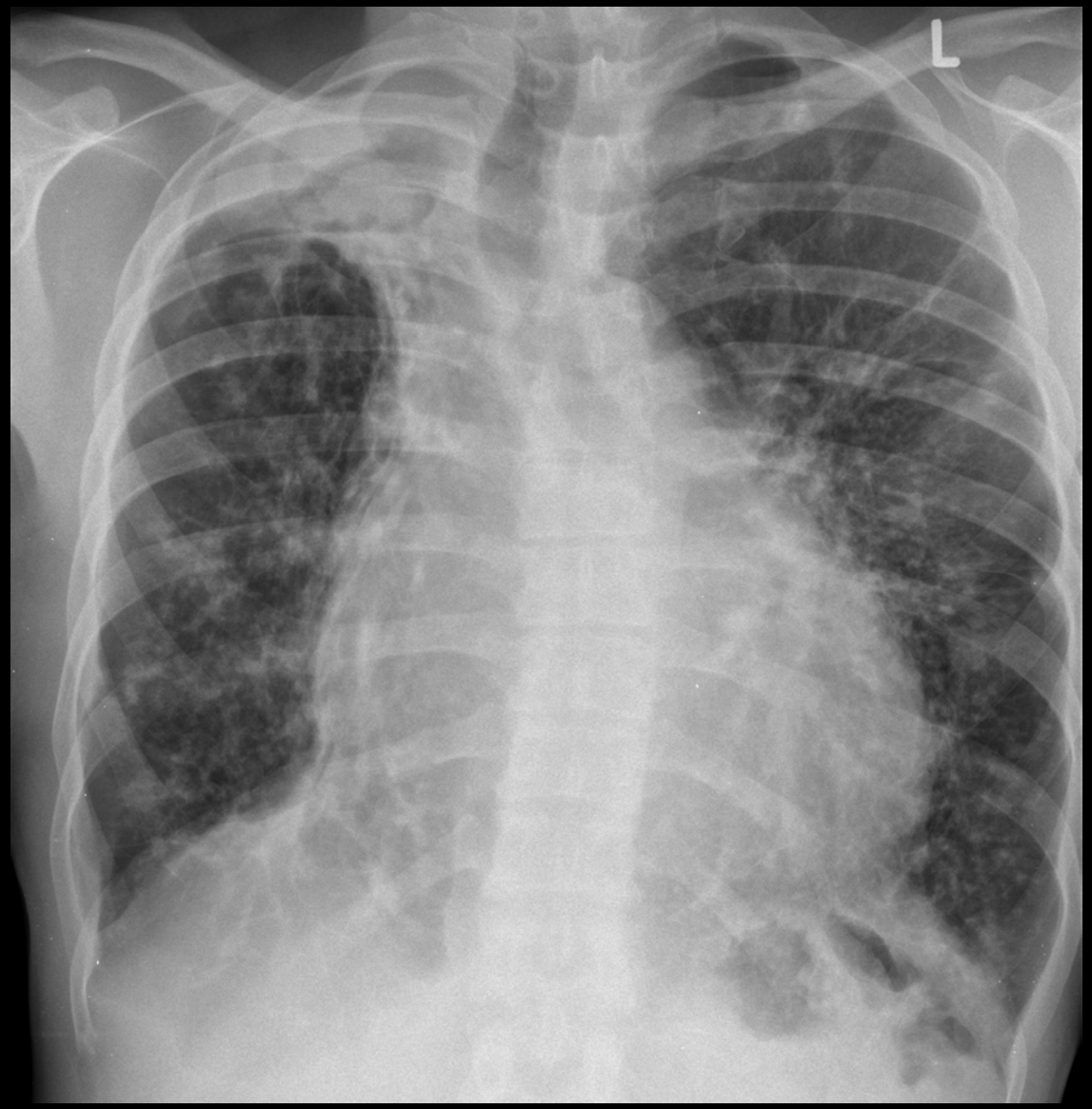
CPA develops in 4.9-6.3% of all treated Pulmonary TB
(26% of patients with cavitation (12 of 46 patients))

The annual incidence rate of CPA is 6.5% if cavitation, and 1.25% in all patents
Does not appear to be an association with bronchiectasis or nodules

Eur Respir J 2019; 53: 1801184


Spectrum of clinical disease varies widely

- Bronchiectasis
- TOPD
- Parenchymal disease
- Haemoptysis
- Aspergilloma
- Pulmonary Hypertension



39y Male, smoked

PTB – 2013,2015 (MDR Treated)

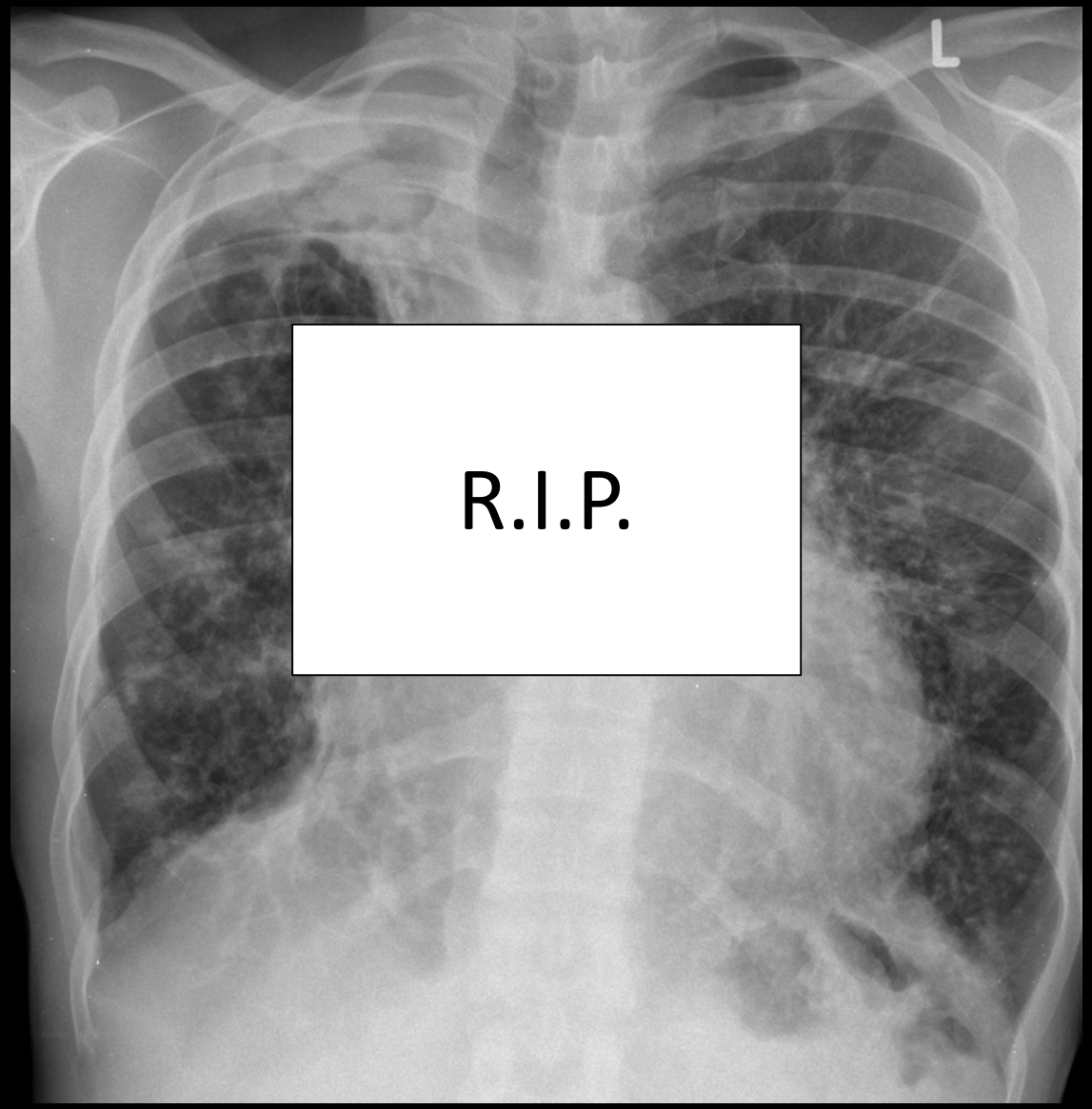
Severe airflow obstruction

FEV1: 0.86L (23.6%)
FVC: 1.93L (44.0%)
Ratio: 44.6%

Massive Haemoptysis requiring BAE
Aspergilloma

Pulmonary Hypertension with
Cor Pulmonale
(PAPm 47 with PVR of 10 Qp 2.51)

- Bronchiectasis
- TOPD
- Parenchymal disease
- Haemoptysis
- Aspergilloma
- Pulmonary Hypertension



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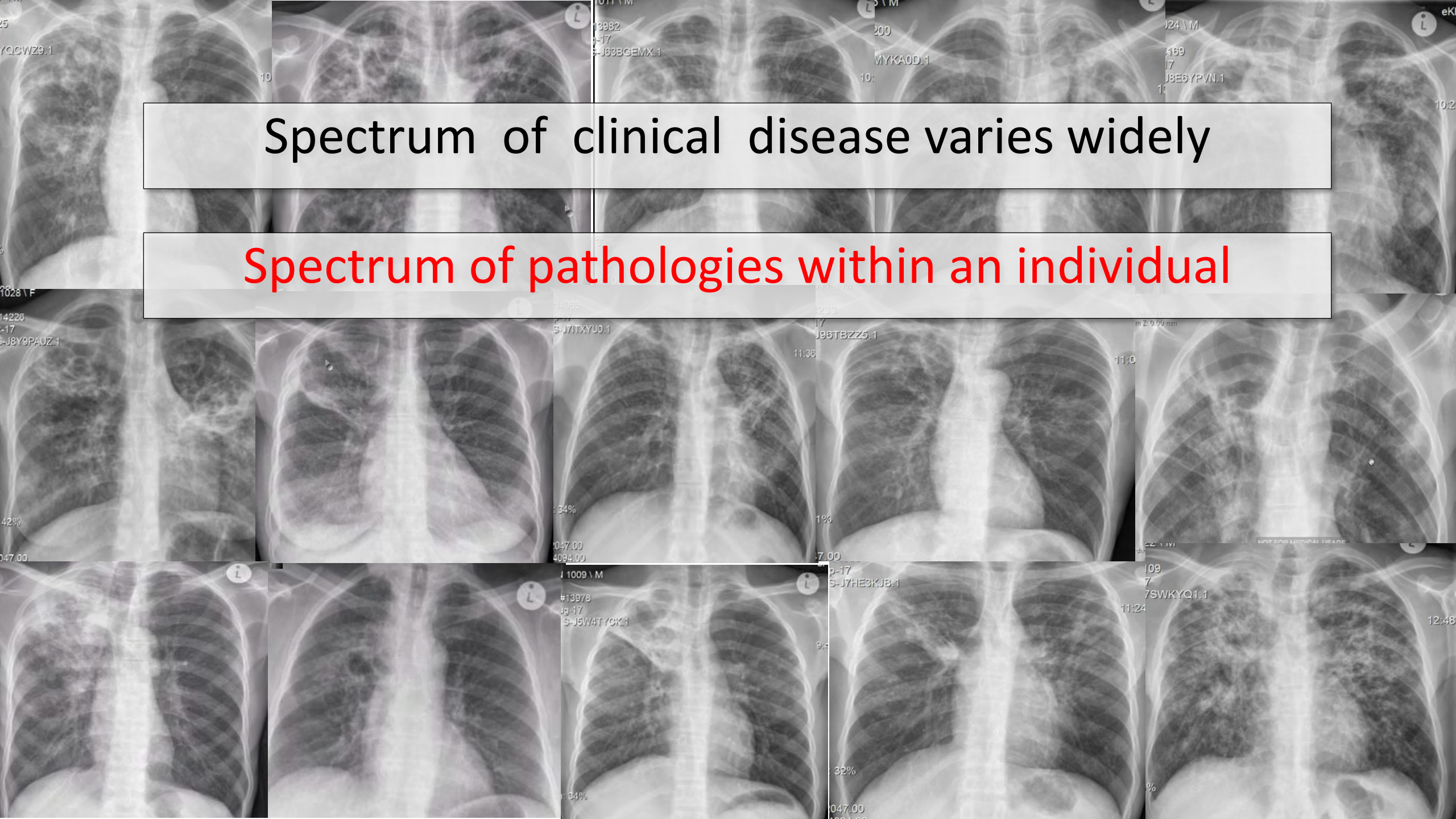
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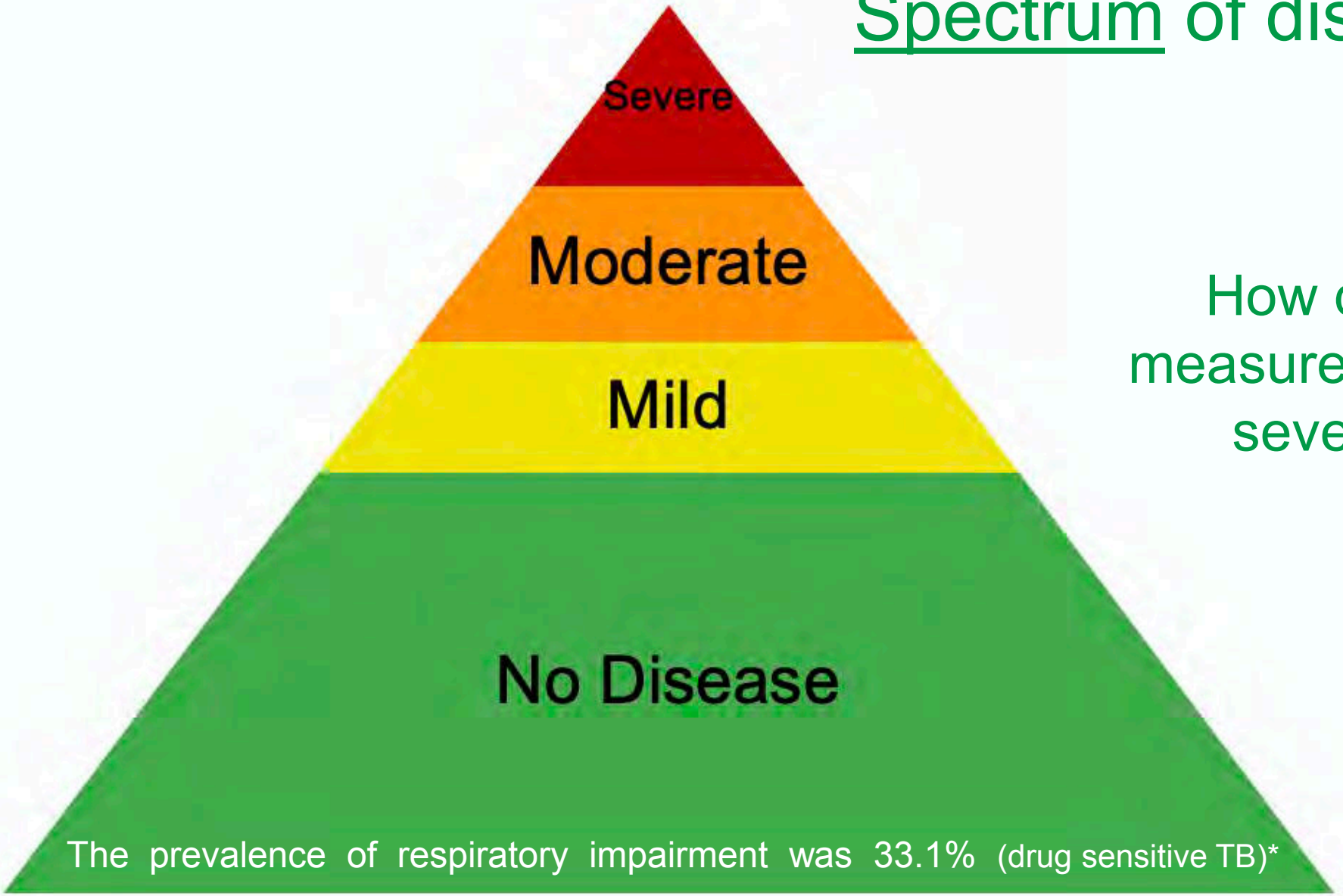
Spectrum of pathologies within an individual

Spectrum of disease severities



How do we measure/quantify severity?

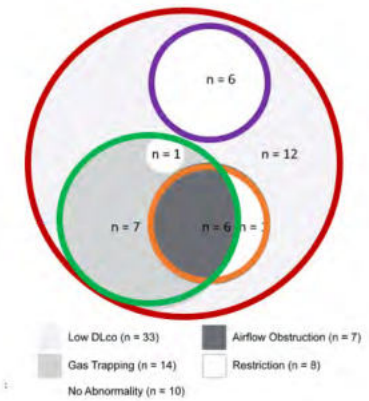
The prevalence of respiratory impairment was 33.1% (drug sensitive TB)*

Research:

Clinicians/Scientists: What are your intervention end-points?

Epidemiologists: what parameters are you constructing your models on?

Lung function



?

Cough

Wheeze

Dyspnoea

Symptoms

INT J TUBERC LUNG DIS 25(4):262–270
© 2021 The Union
http://dx.doi.org/10.5588/ijtld.20.0906

Persistent chronic respiratory symptoms despite TB cure is poorly correlated with lung function

B. W. Allwood,[1] M. Stolbrink,[2] N. Baines,[1] E. Louw,[1] D. T. Wademan,[3] A. Lupton-Smith,[4] S. Nel,[5] D. Maree,[1] S. Mpagama,[6] M. Osman,[3] F. M. Marx,[3,4] G. Hoddinott,[3] M. Lesosky,[7,9] J. Rylance,[8,9] K. Mortimer;[9] on behalf of the Lung health in Africa across the Life course collaboration

[1]Division of Pulmonology, Department of Medicine, Stellenbosch University & Tygerberg Hospital, Tygerberg, South Africa; [2]Institute of Infection, Veterinary and Ecological Sciences, University of Liverpool, Liverpool, UK; [3]Desmond Tutu TB Centre, Department of Paediatrics and Child Health, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, [4]Department of Science and Innovation-National Research Foundation South African Centre for Excellence in Epidemiological Modelling and Analysis (SACEMA), Faculty of Science, Stellenbosch University, Stellenbosch, South Africa; [5]Department of Physical Medicine and Rehabilitation, School of Medicine, Faculty of Health Sciences, University of Namibia, Windhoek, Namibia; [6]Kibong'oto Infectious Diseases Hospital, Kilimanjaro, Tanzania; [7]Division of Epidemiology & Biostatistics, School of Public Health & Family Medicine, University of Cape Town, South Africa; [8]Lung Health Group, Malawi-Liverpool-Wellcome Trust Clinical Research Programme, Blantyre, Malawi; [9]Liverpool School of Tropical Medicine, Liverpool, UK

SUMMARY

BACKGROUND: Persistent respiratory symptoms and lung function deficits are common after patients with TB. We aimed to define the burden of post-TB lung disease (PTLD) and assess associations between symptoms and impairment in two high TB incidence communities.

METHODS: This was a cross-sectional survey of adults in Cape Town, South Africa who completed TB treatment 1–5 years previously. Questionnaires, spirometry and 6-minute walking distance (6MWD) were used to assess relationships between outcome measures and associated factors.

RESULTS: Of the 145 participants recruited (mean age: 42 years, range: 18–75; 55 [38%] women), 55 (38%) had airflow obstruction and 84 (58%) had low forced vital capacity (FVC); the mean 6MWD was 463 m (range: 240–723). Respiratory symptoms were common: chronic cough ($n = 27$, 19%), wheeze ($n = 61$, 42%) and dyspnoea (modified MRC dyspnoea score 3 or 4: $n = 36$, 25%). There was poor correlation between FVC or obstruction and 6MWD. Only low body mass index showed consistent association with outcomes on multivariable analyses. Only 19 (13%) participants had a diagnosis of respiratory disease, and 16 (11%) currently received inhalers.

CONCLUSION: There was substantial burden of symptoms and physiological impairment in this "cured" population, but poor correlation between objective outcome measures, highlighting deficits in our understanding of PTLD.

KEY WORDS: post-TB; spirometry; restriction; physiology; obstruction

TB is one of the most common respiratory infections, and South Africa has one of the highest TB incidence rates in the world—around 615 per 100,000 population.[1,2] There is a growing understanding that the effects of TB do not end with the completion of anti-TB chemotherapy.[3,4] Residual, post-TB lung disease (PTLD) includes fibrosis, lung volume loss, cavitation, pleural disease, gas trapping and bronchiectasis, and can manifest with varying severity.[5] In the multinational burden of obstructive lung disease study, people who completed TB treatment had a two-fold higher risk of developing both obstructive and restrictive lung disease compared to the general population.[6]

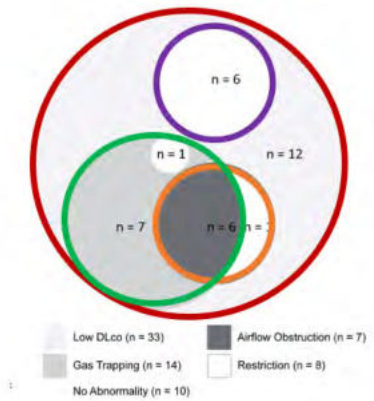
There is currently little evidence about how PTLD phenotypes progress or relate to symptoms. A prospective study of 405 patients in Malawi found 44% with bronchiectasis and 9% with one destroyed lobe on high-resolution computed tomography scanning.[7] After 1 year, almost a third reported residual respiratory symptoms, one in five had a decline in forced expiratory volume in 1 sec (FEV_1) of ≥100 ml, and 16% reported at least one respiratory exacerbation. In a cross-sectional study in suburban Cape Town, South Africa, approximately half of participants who had completed TB treatment in the

BA and MS are joint first authors.

Allwood, Stolbrink et al. Int J Tuberc Lung Dis. 2021 Apr 1;25(4):262-270

Auld et al. BMC Pulm Med 2021;21:19

Lung function



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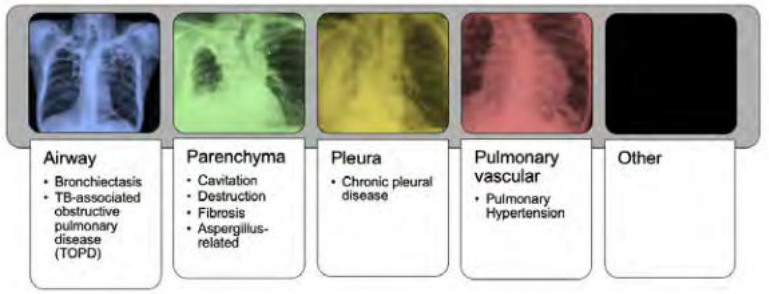
Radiology



?

Cough

Wheeze

Dyspnoea

Symptoms

Auld et al. BMC Pulm Med 2021;21:19
Allwood, Stolbrink et al. Int J Tuberc Lung Dis. 2021 Apr 1;25(4):262-270

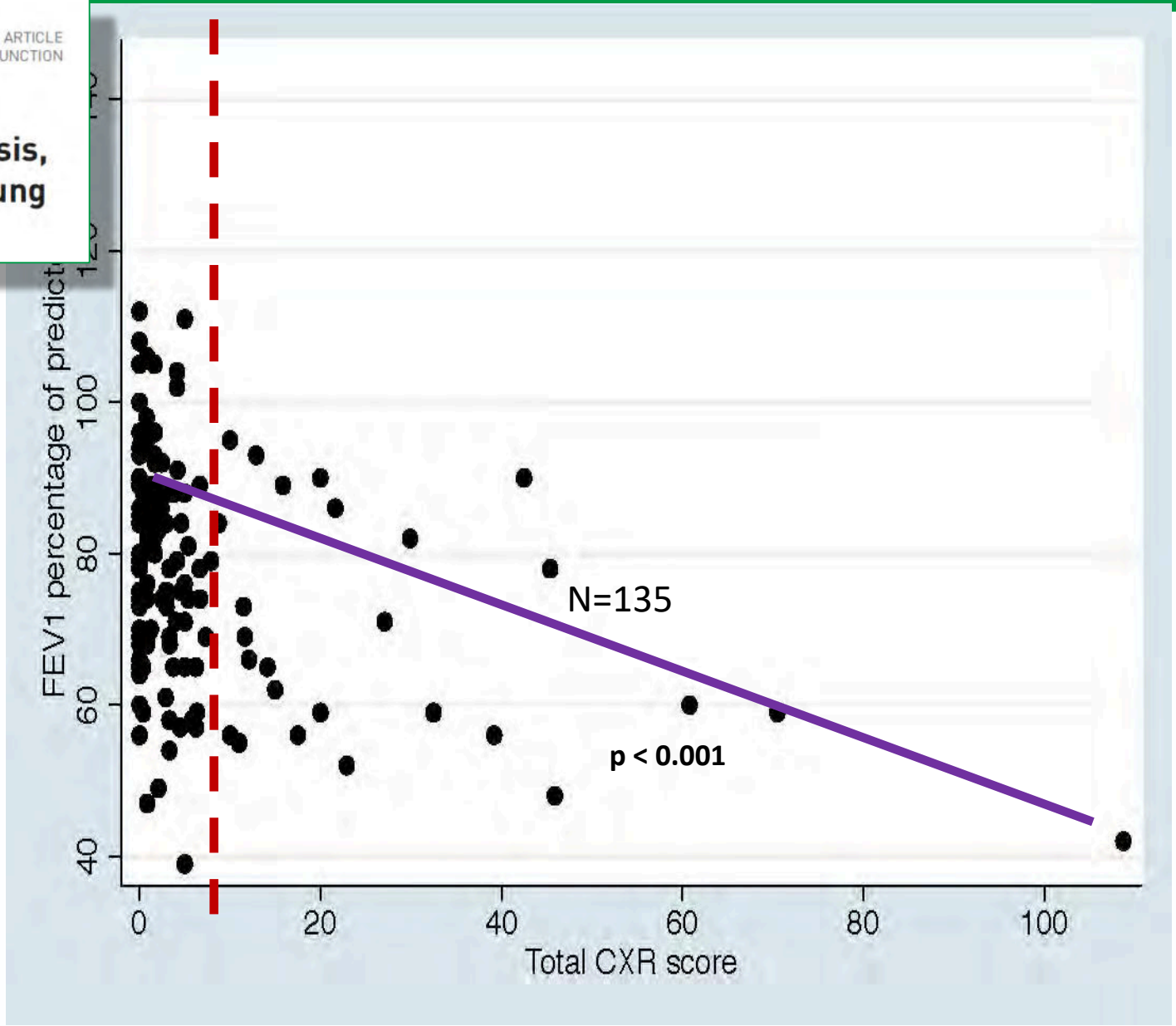
ORIGINAL ARTICLE
LUNG STRUCTURE AND FUNCTION

CrossMark

The effect of HIV-associated tuberculosis, tuberculosis-IRIS and prednisone on lung function

Not always good correlation between:

spirometry,
radiology (CXR)



Stek, Allwood et al. ERJ 2020 (Supplement)

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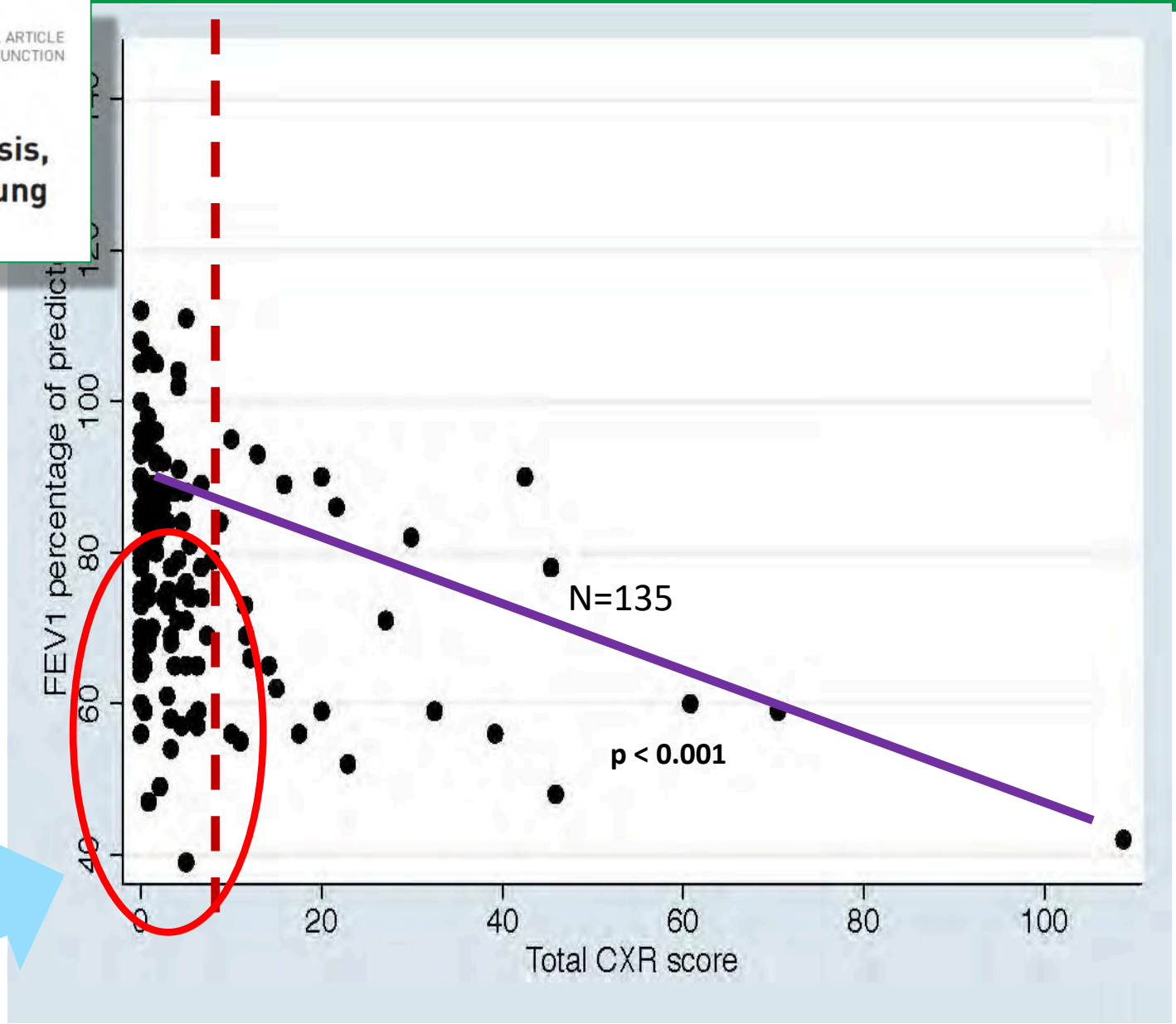


Stek, Allwood et al. ERJ 2020 (Supplement)

Semi-quantitative CT analysis

Fibrosis

Bronchiectasis

r=0.35,
P=0.006

Dyspnoea

Extent of CT changes did not correlate with spirometry

Spirometry

Original Article

Correlation of chest computed tomography findings with dyspnea and lung functions in post-tubercular sequelae

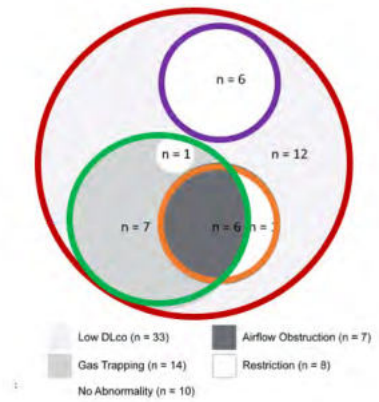
Ananya Panda, Ashu Seith Bhalla, Raju Sharma, Anant Mohan[1], Vishnu Sreenivas[2], Umasankar Kalaimannan[1], Ashish Dutt Upadhyay[2]

Departments of Radiodiagnosis, [1]Pulmonary Medicine and [2]Biostatistics, All India Institute of Medical Sciences, New Delhi, India

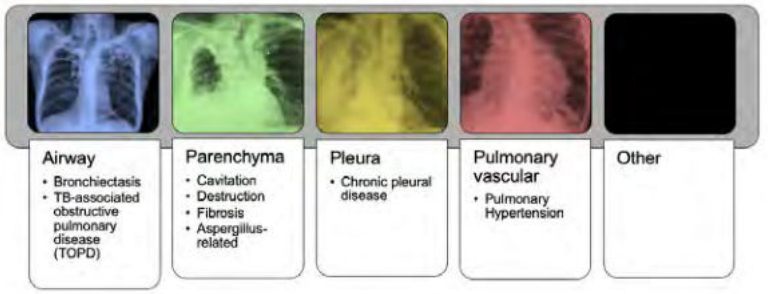
defect. **Conclusion:** Both fibrosis and bronchiectasis correlated with dyspnea and with PFT. However, this correlation was not linear. The overall extent of radiological abnormalities correlated only with dyspnea but not with PFT.

Panda et al. Lung India 2016;33:592-9

Lung function



Radiology



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?

?

?

Cough

Wheeze

Dyspnoea

6-min walk distance

Incremental shuttle walk, etc

VO2 peak

Symptoms

Exercise Capacity

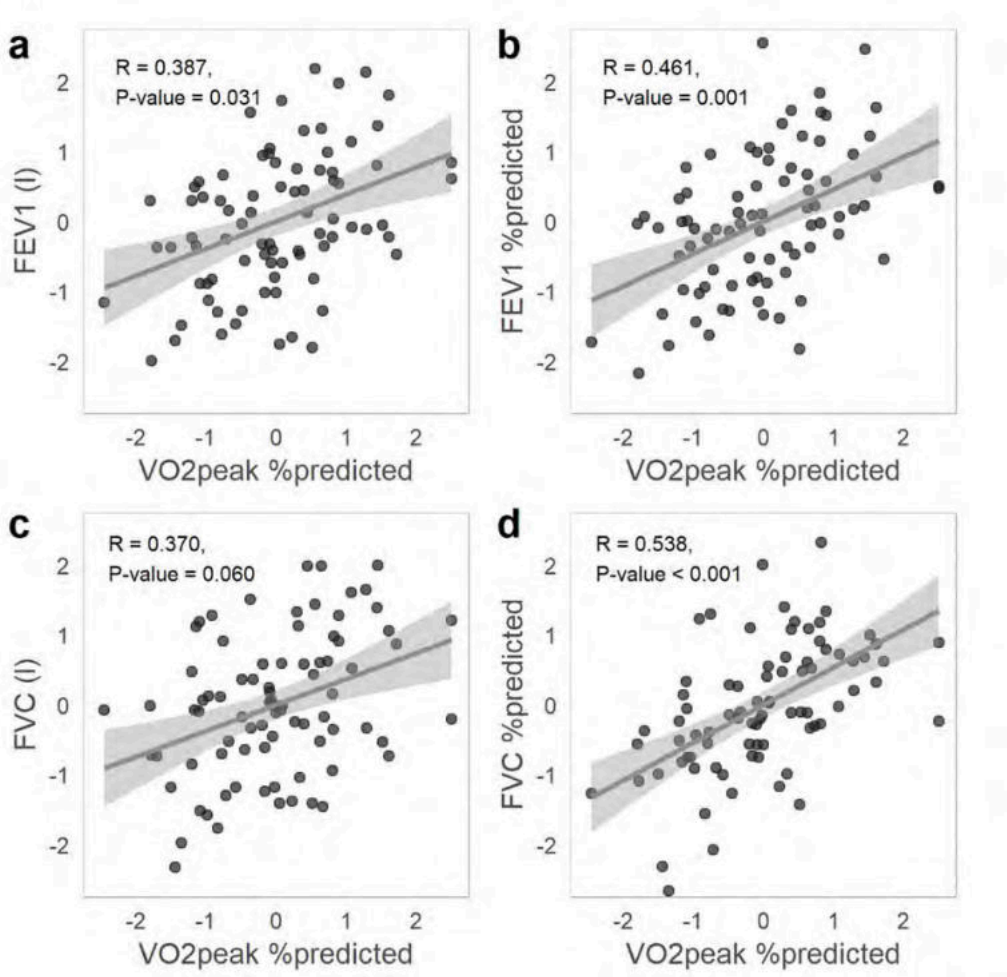
Allwood, Stolbrink et al. Int J Tuberc Lung Dis. 2021 Apr 1;25(4):262-270
Curry, Allwood et al. Int J Tuberc Lung Dis 2021 (in press)

VO2peak

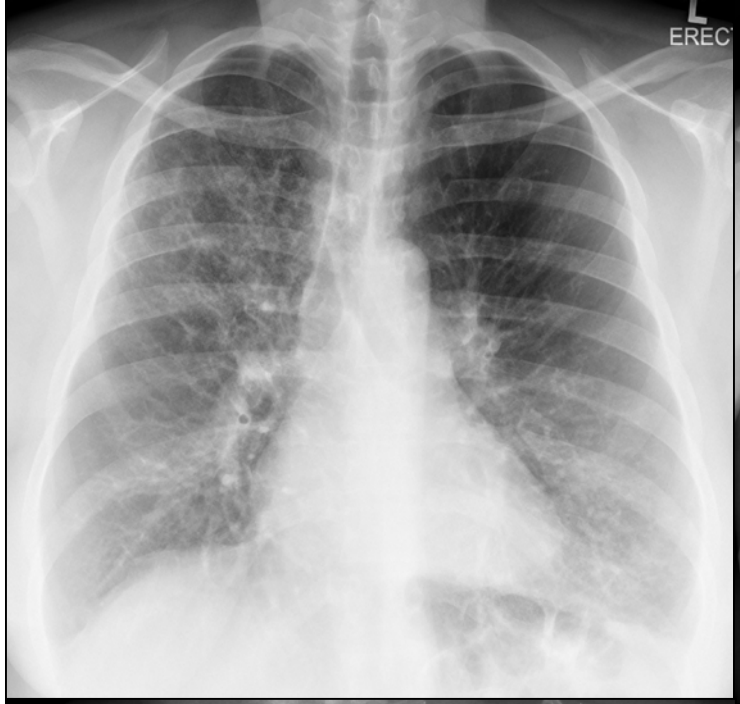
Only **weak** associations with FEV_1, FVC & diffusing capacity

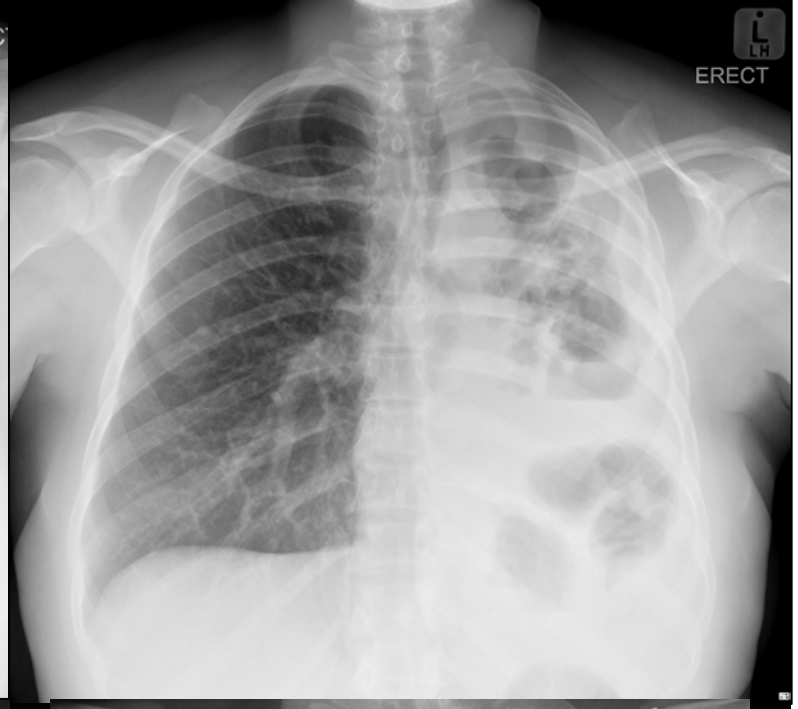
Only around 30% of VO_2max(%pred) could be accounted for.

Rest unexplained.



Curry, van'tWout, Allwood et al. Int J Tuberc Lung Disease 2022 (accep


ERECT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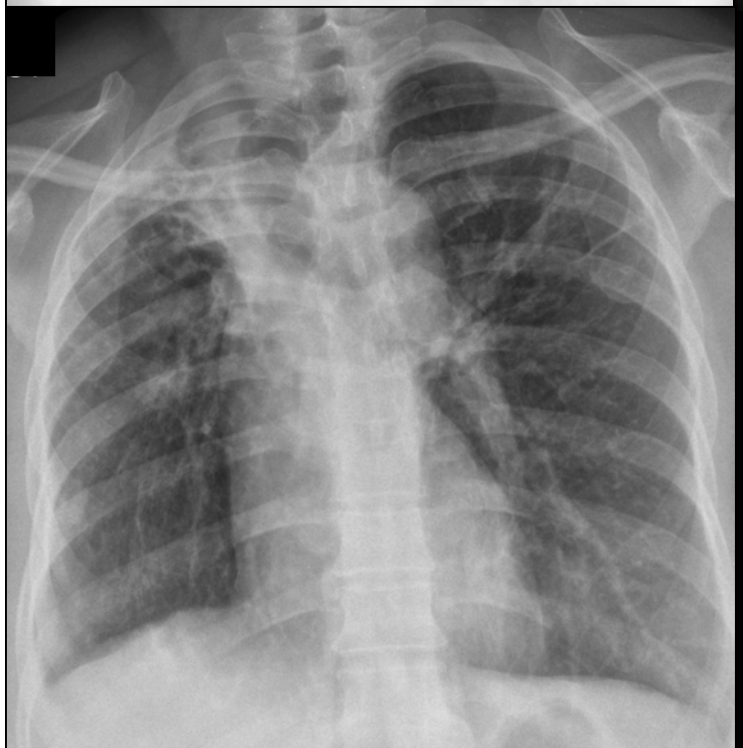
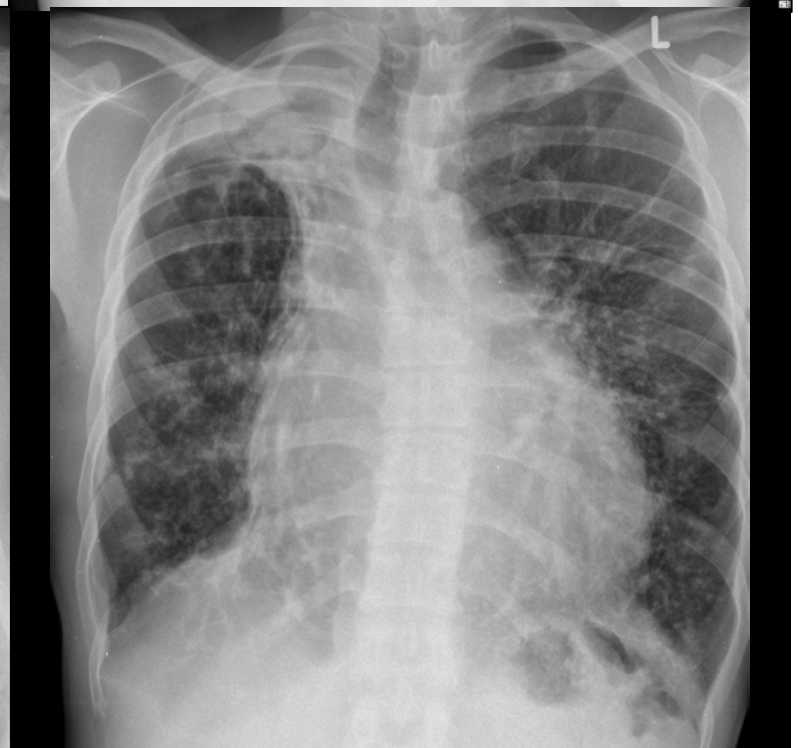
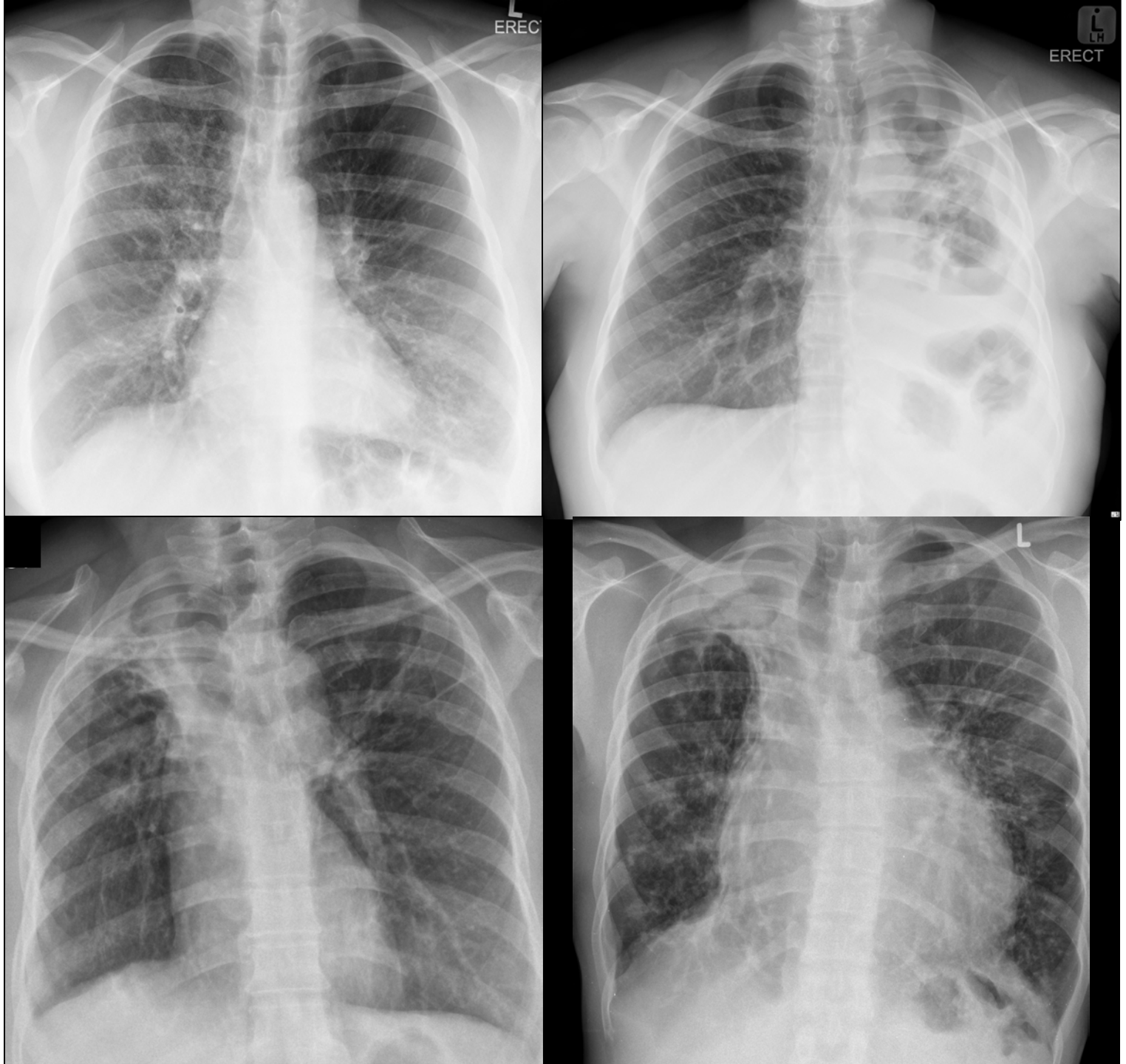



L

36y Female, HIV positive
Three episodes of TB

FEV1: 25%
FVC: 67%
Ratio: 33%

Oxygen saturation 78%



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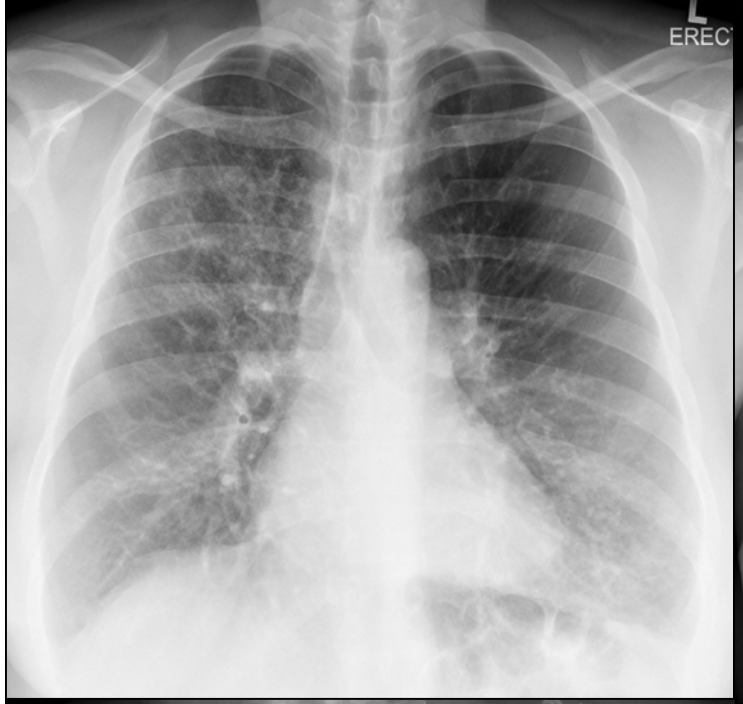
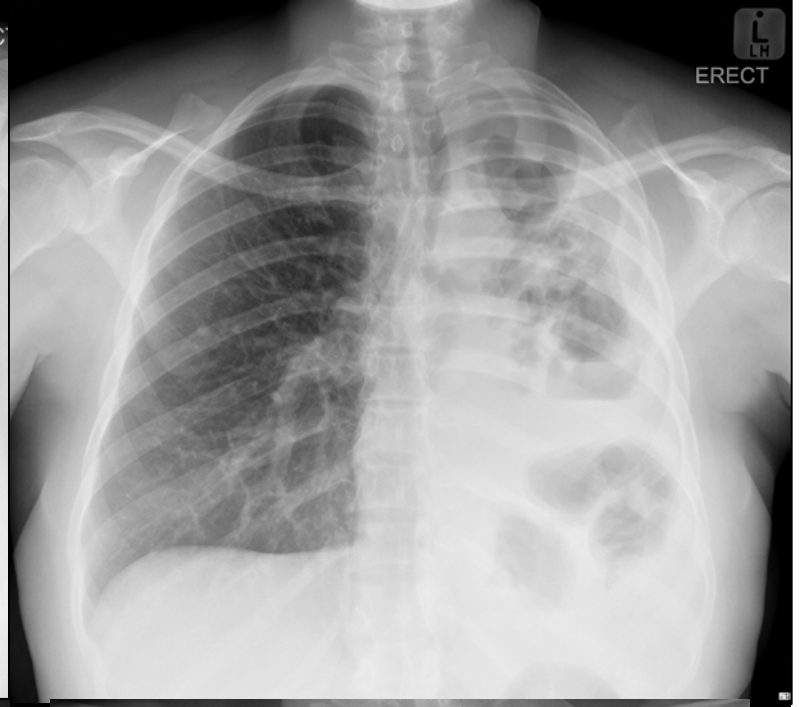


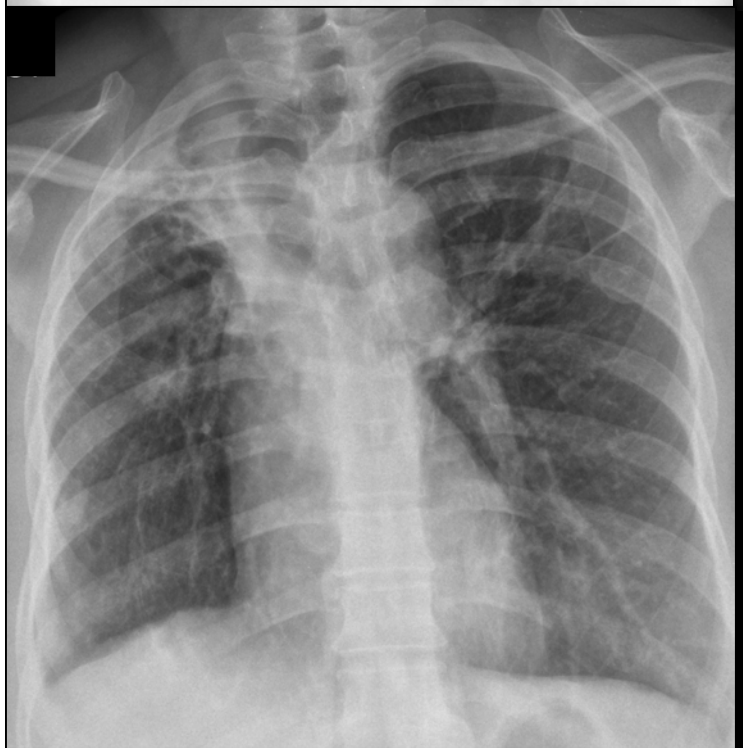


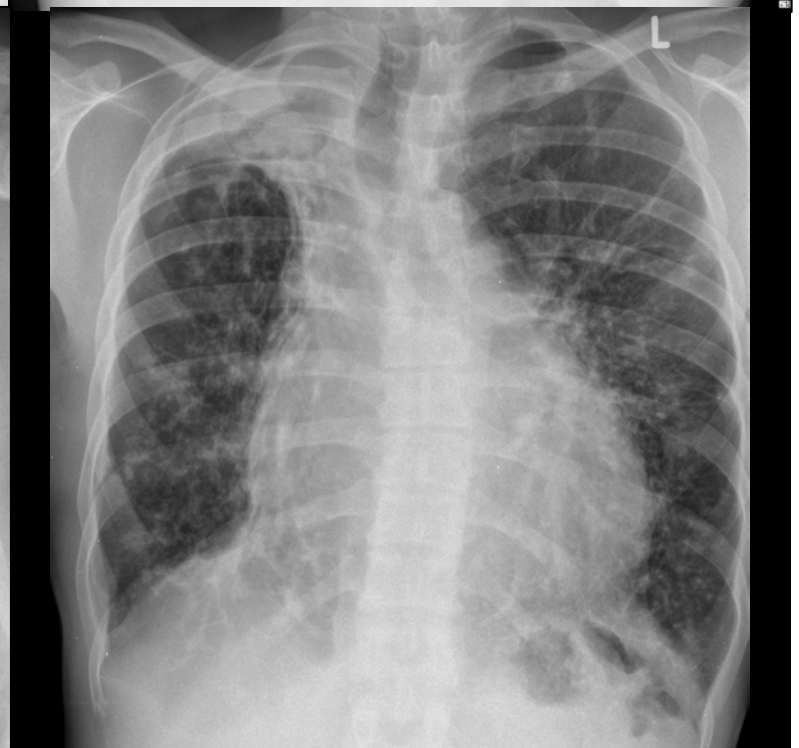
59y Female, HIV negative
One episode of TB

FEV1: 66%
FVC: 67%
Ratio: 88.%

DLCO: 21%

6MWD: 330m





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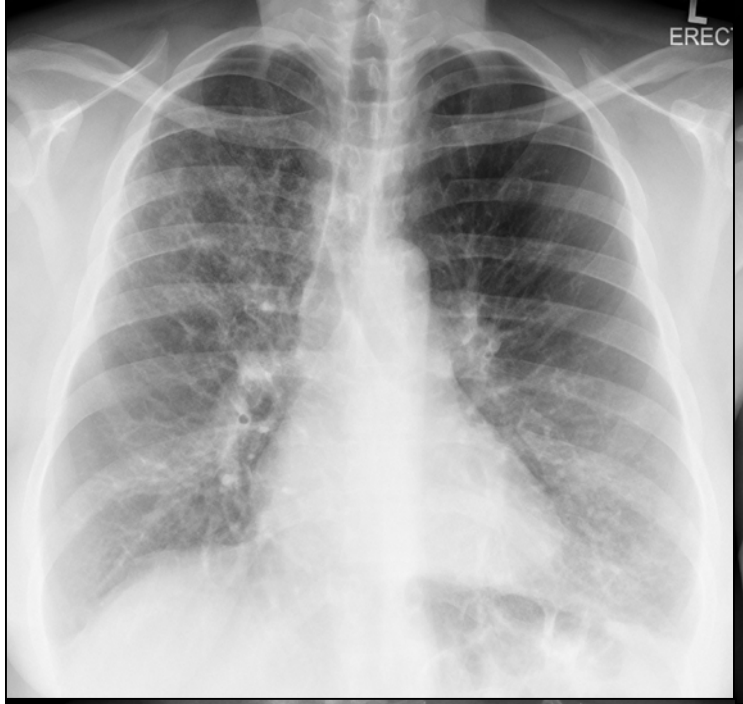

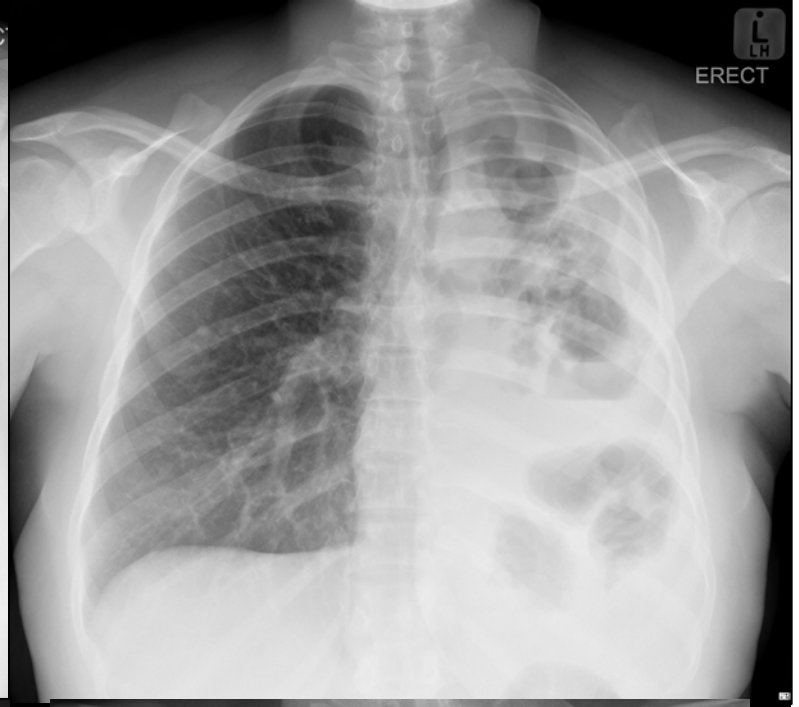

31y Male, HIV positive
Two episode of TB

FEV1: 56.7%
FVC: 63.2%
RATIO: 78.51%

DLCO: 46.7%

6MWD: 550m

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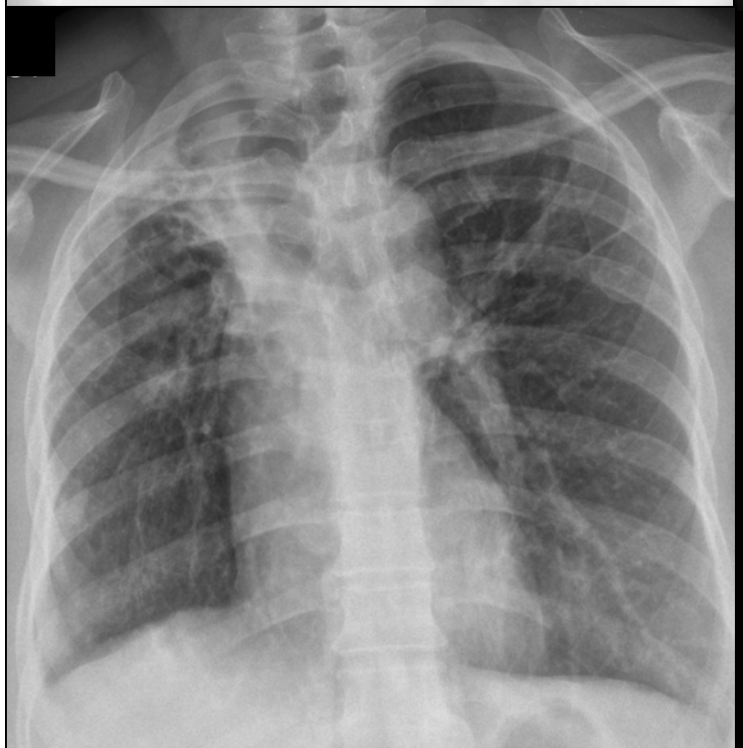
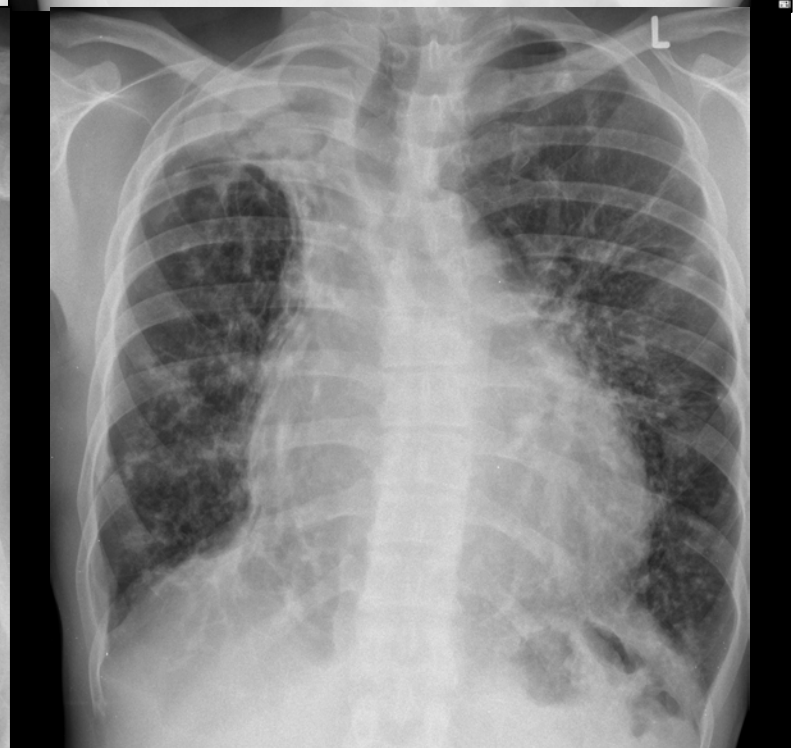
6MWD: 330m





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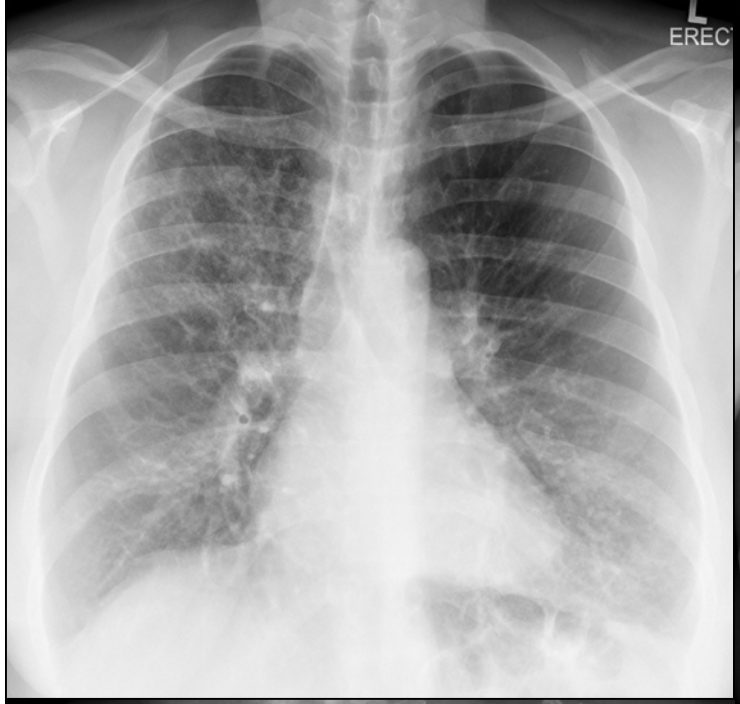

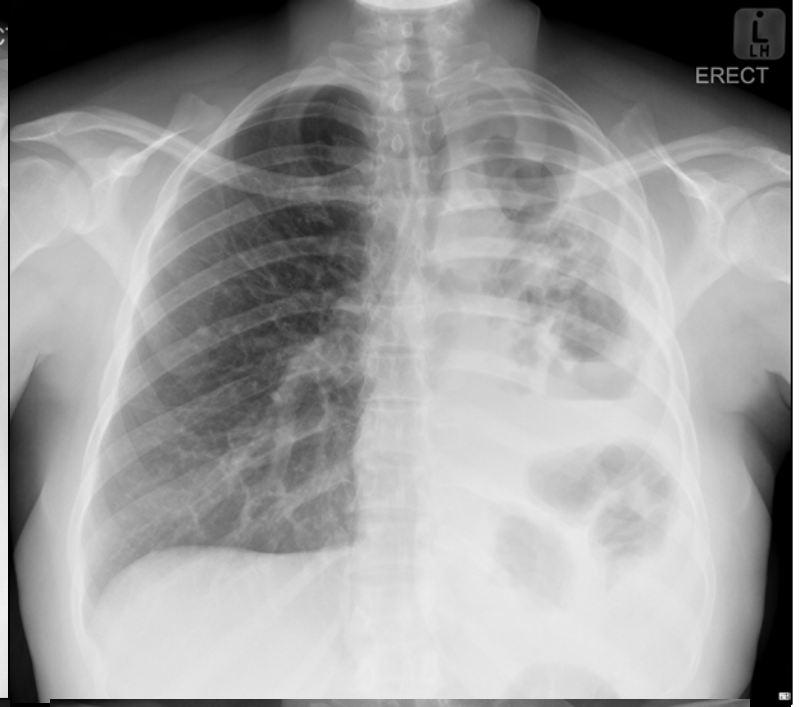

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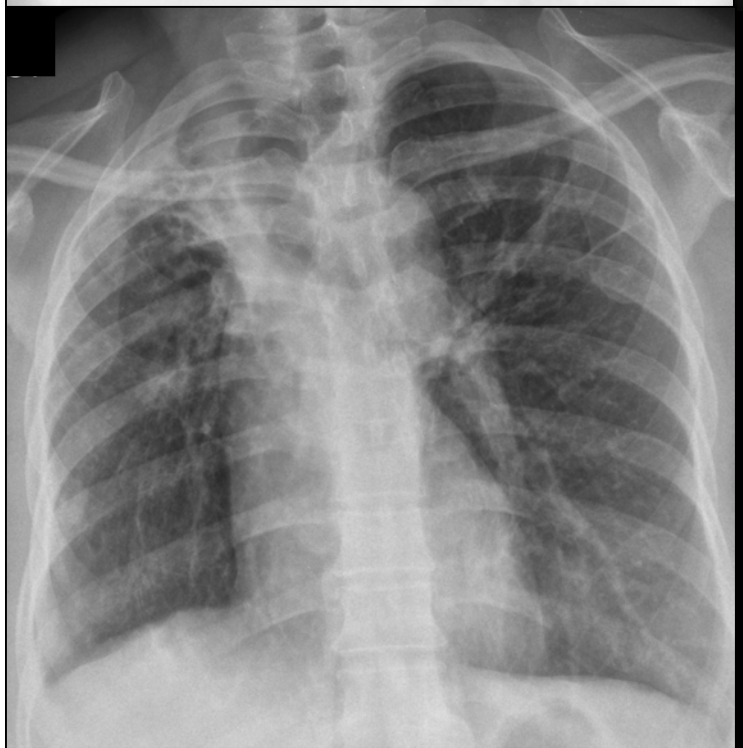
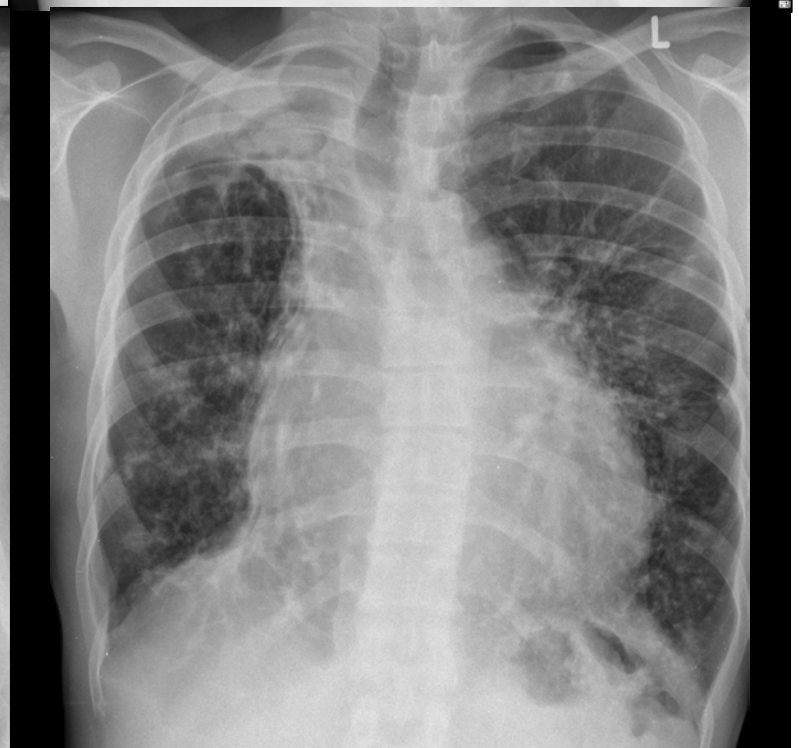


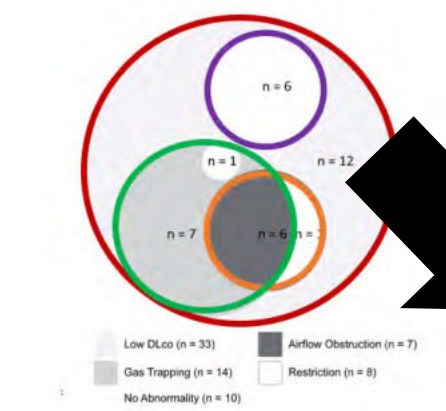


39y Male, smoked
Two episode of TB
(One MDR)

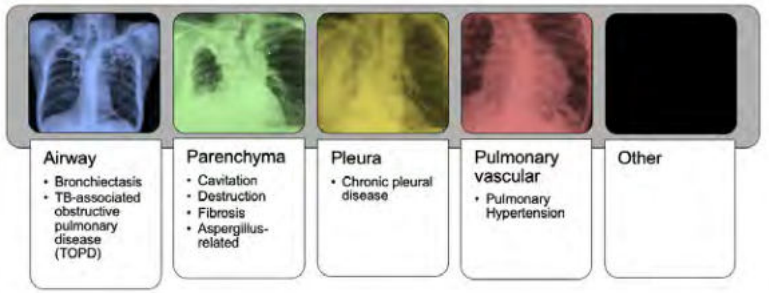
FEV1: 23.6%
FVC: 44.0%
Ratio: 44.6%

PHT (PVR 10WU)

Lung function



Radiology



Symptoms

Cough

Wheeze

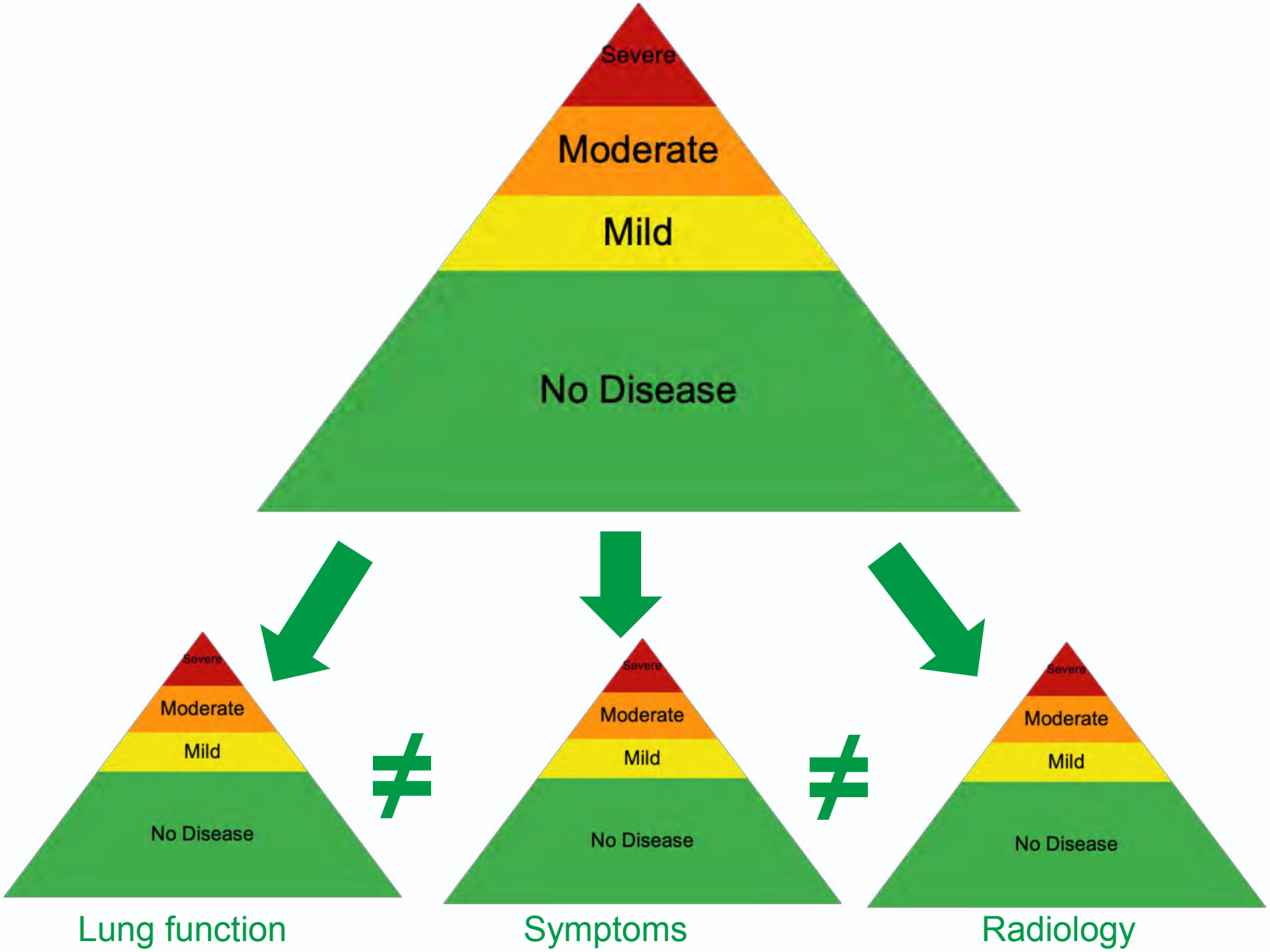
Dyspnoea

Exercise Capacity

6-min walk distance

Incremental shuttle walk, etc

VO2 peak


Severe
Moderate
Mild
No Disease
Severe
Moderate
Mild
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Severe
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Severe
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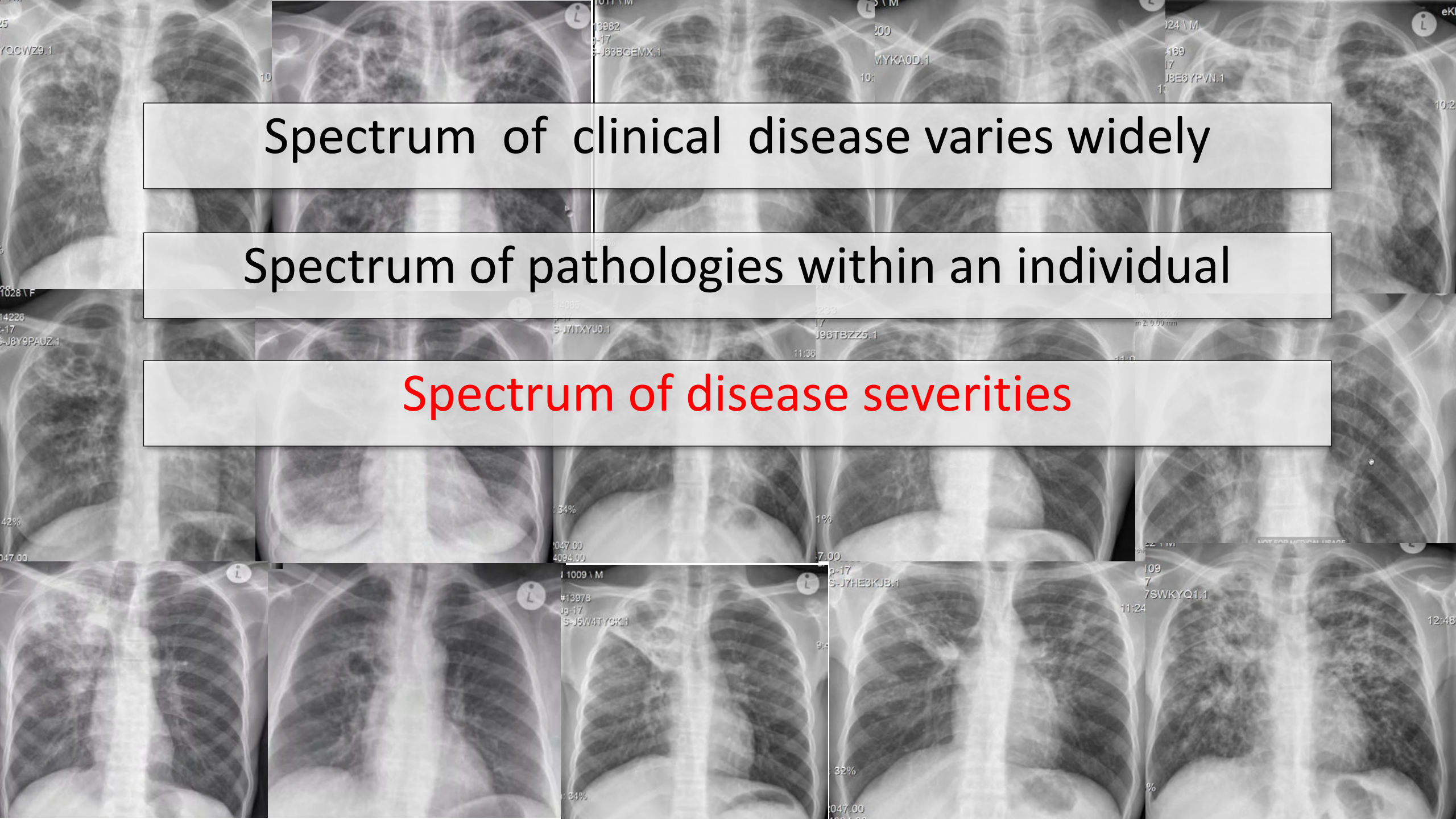
No Disease
Lung function
Symptoms
Radiology

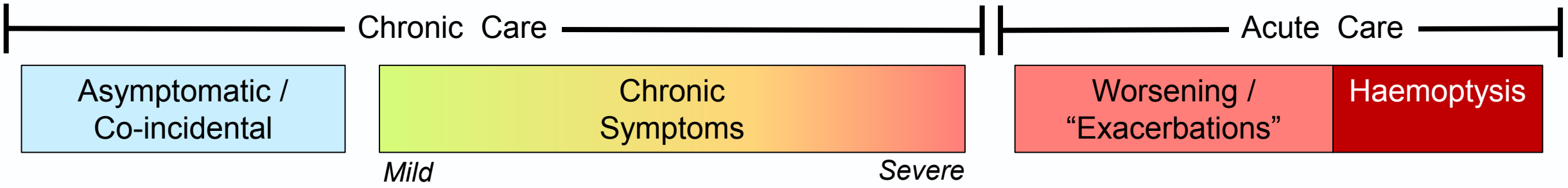


Spectrum of clinical disease varies widely

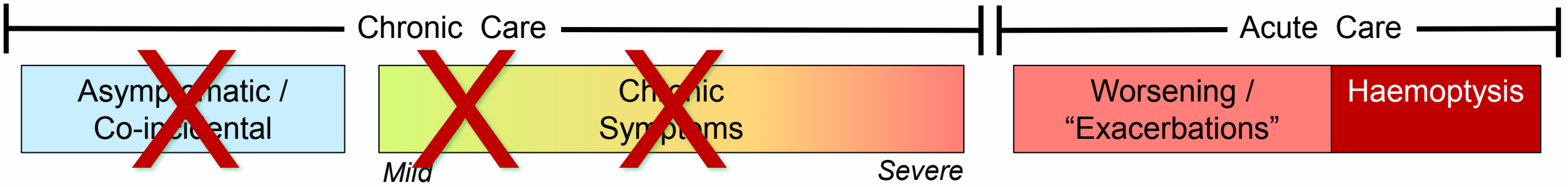
Spectrum of pathologies within an individual

Spectrum of disease severities

Spectrum of presentation



Spectrum of presentation



Exacerbations

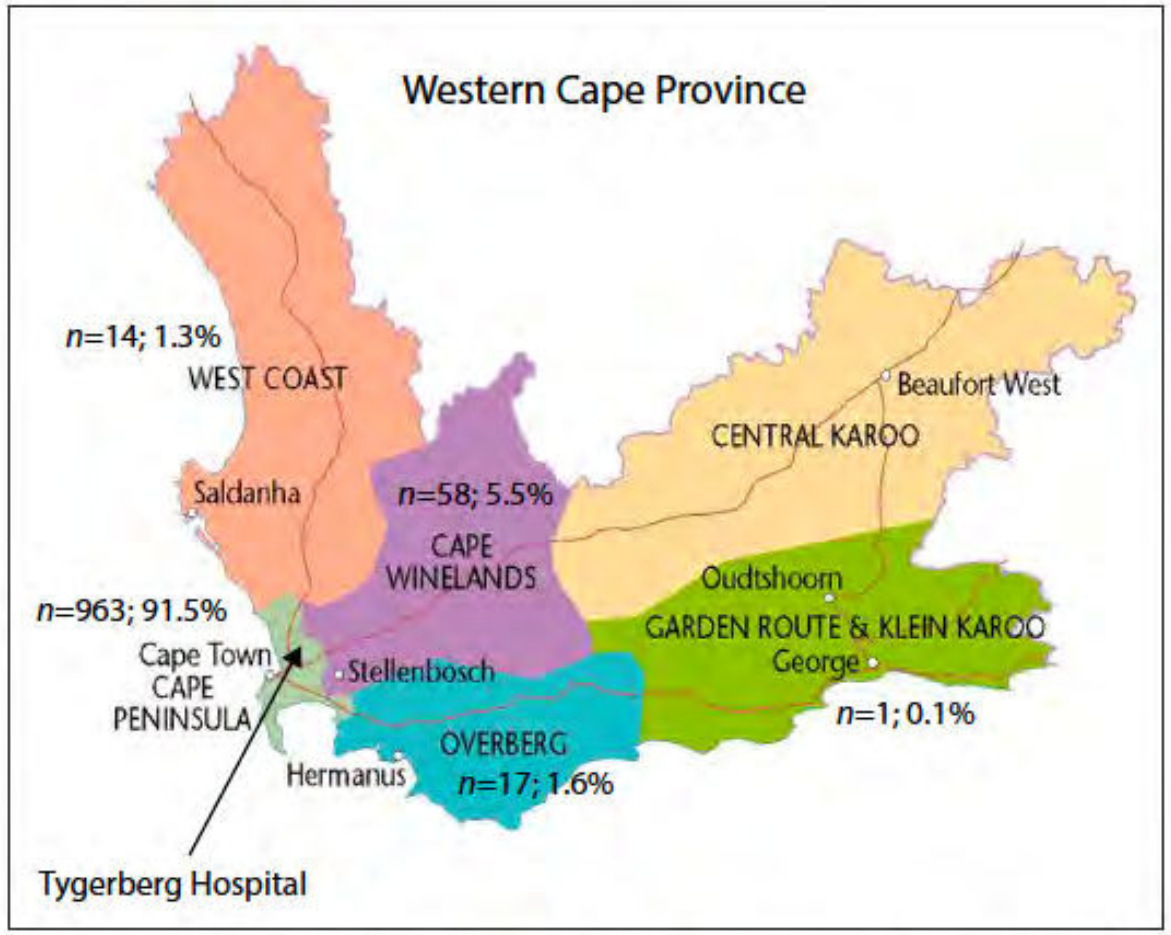


Fig. 1. Numbers and proportions of patients presenting for acute medical services from the five health districts.

SAMJ RESEARCH

Respiratory presentations to acute services at a tertiary hospital in South Africa

V Ngah,[1] BNS, PGD, MScMed; P Maud,[1] MB ChB; N Baines,[1] BSc;
R Mistry,[2] MB ChB, DCH (SA), Dip Allergy (SA), Dip HIV Man (SA), MBA; N Schrueder,[3] MB ChB, FCP (SA);
C F N Koegelenberg,[1] MB ChB, MMed (Int), FCP (SA), FRCP (UK), Cert Pulm (SA), PhD; E M Irusen,[1] MB ChB, FCP (SA), FCCP, PhD;
K Mortimer,[4] MB BChir, FRCP, PhD; B W Allwood,[1] MB BCh, FCP (SA), Cert Pulm (SA) MPH, PhD

n = 1053

21.5% of patients with a known chronic respiratory disease

Over 9 months (pre-COVID)

Ngah , Allwood et al. S Afri Med J 2021 (Nov); 11: 1104

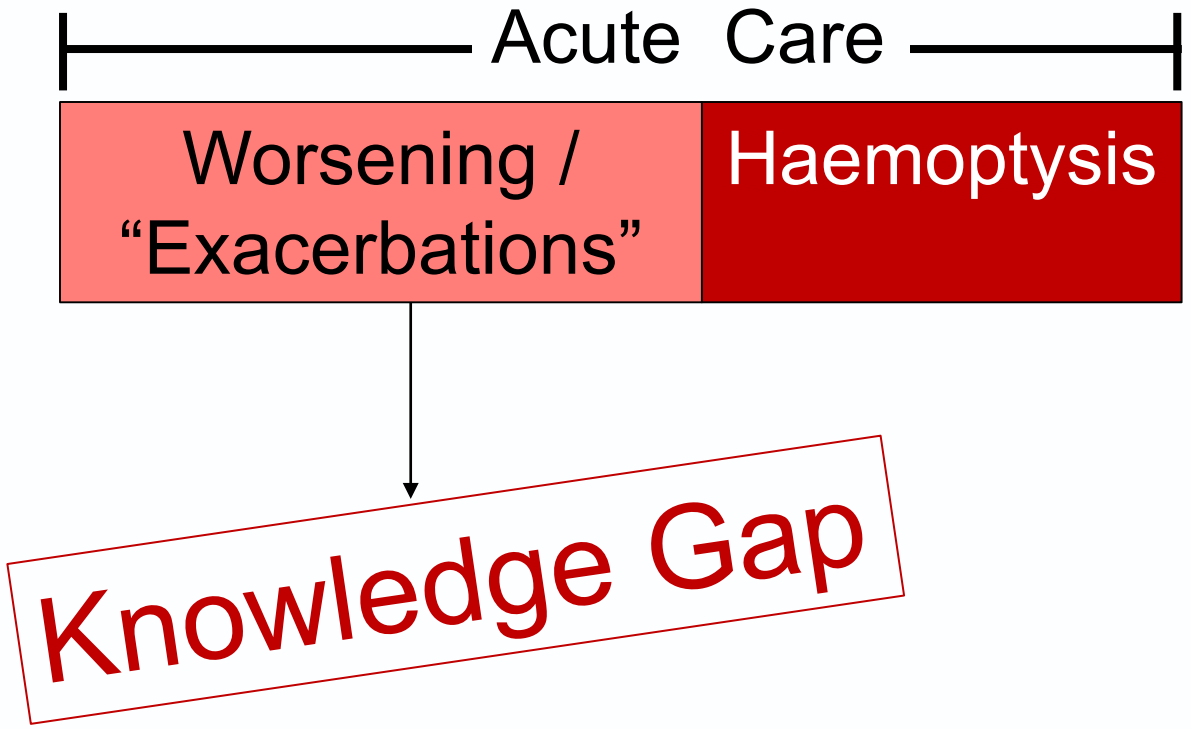
Exacerbations

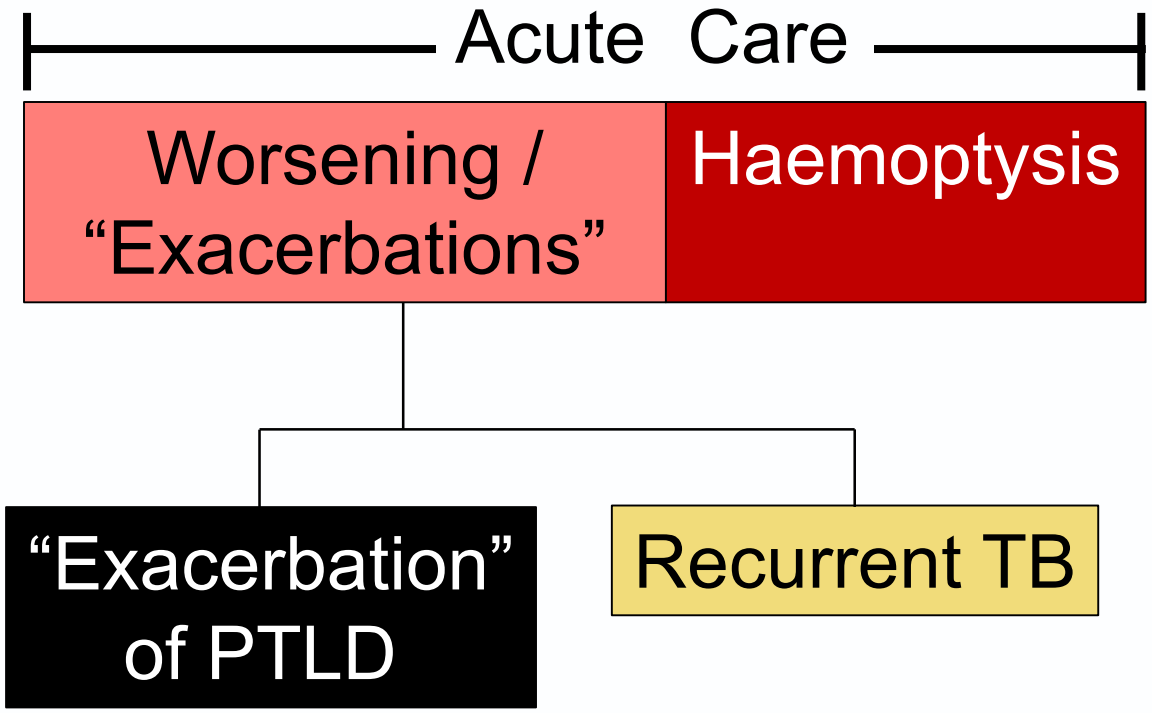
Readmissions

Respiratory Diagnosis	Total number of patients presenting	Number of readmissions	Number of patients with readmission	Proportion of patients being readmitted	No. of readmissions per 100 patients
COPD	192	73	33	17.2%	38.0
PTLD	88	28	9	10.2%	31.8
Asthma	52	8	6	11.5%	15.4
ILD	37	4	3	8.1%	10.8
PHT	40	6	2	5%	15
PTB	225	21	9	4%	9.3
Infections	272	38	25	9.2%	14
Cancer	140	23	8	5.7%	16.4
Haemoptysis	103	20	11	10.7%	19.4

Ngah , Allwood et al. S Afri Med J 2021 (Nov); 11: 1104

Spectrum of presentation




Acute Care
Worsening / "Exacerbations"
Haemoptysis
"Exacerbation" of PTLD
Recurrent TB

TB survivors are at increased risk of recurrent TB

INT J TUBERC LUNG DIS 11(8):828–837

REVIEW ARTICLE

Recurrent tuberculosis and its risk factors: adequately treated patients are still at high risk

R. Panjabi,*† G. W. Comstock,* J. E. Golub*‡

* Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland, † School of Medicine, University of North Carolina-Chapel Hill, Chapel Hill, North Carolina, ‡ School of Medicine, Johns Hopkins University, Baltimore, Maryland, USA

(32 Studies)

Recurrence rate:

6 months: 3010/100,000 person years

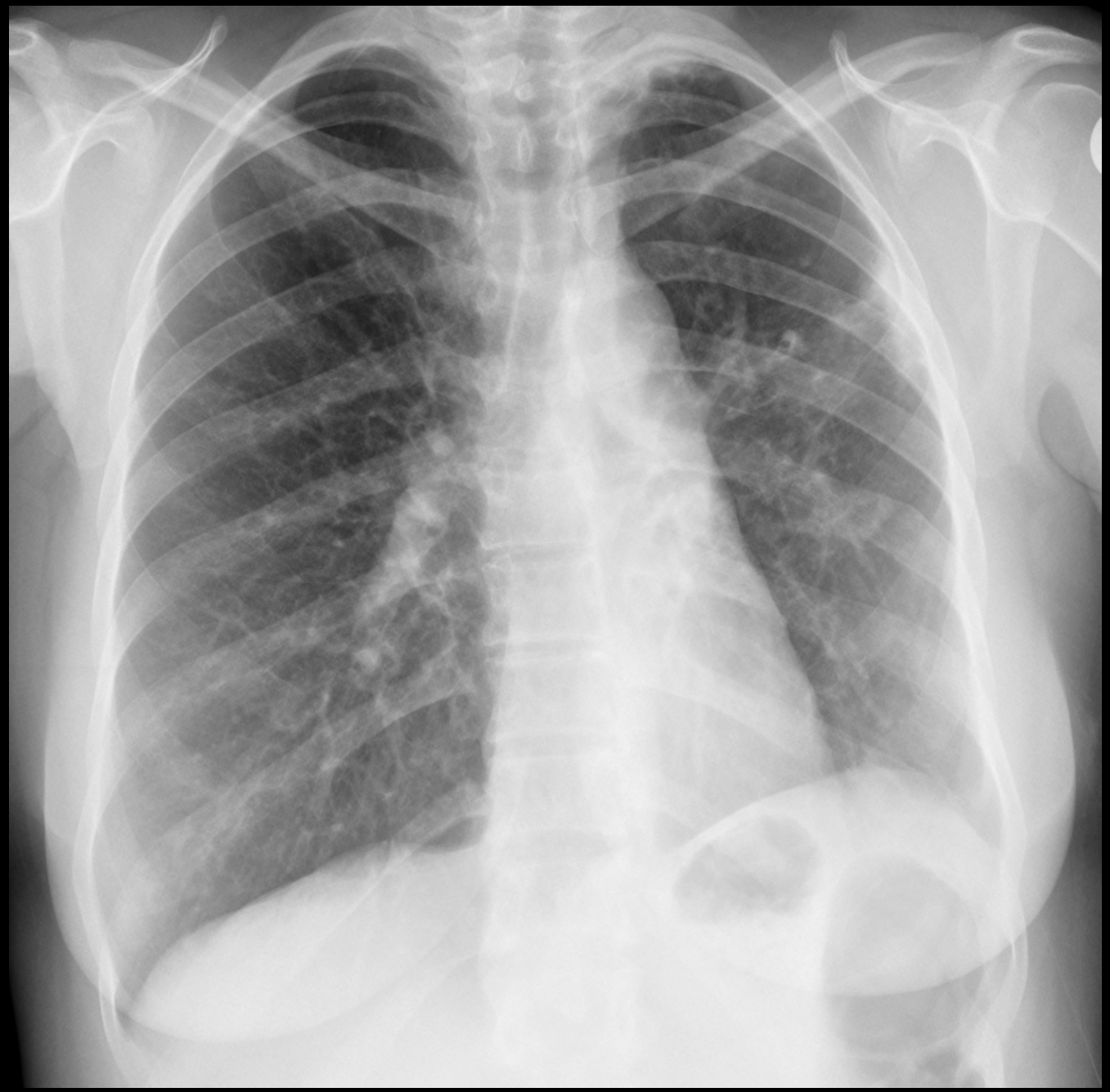
12 months: 2290/ 100,000 person years

SA incidence: ±737/100,000 population

Table 4 Risk factors for recurrent TB

- Smoking[9]
- Poor treatment adherence[12]
- Clinical
  - Residual cavitation[3,30]
  - Greater area of involved lung tissue[20,30,36]
  - Positive sputum culture at 2 months of treatment[16,36]
  - HIV infection[3,12,30]
    - low initial CD_4 count[32]
    - less than 37 weeks of anti-tuberculosis treatment[12,32]

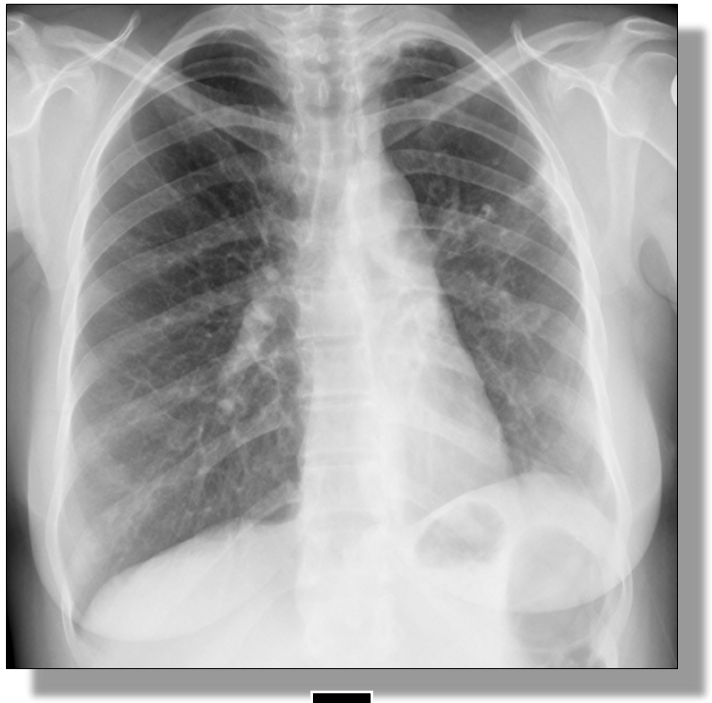
TB = tuberculosis; HIV = human immunodeficiency virus.



38yr Female
HIV negative
Previous TB

10 day history of productive cough and sweating

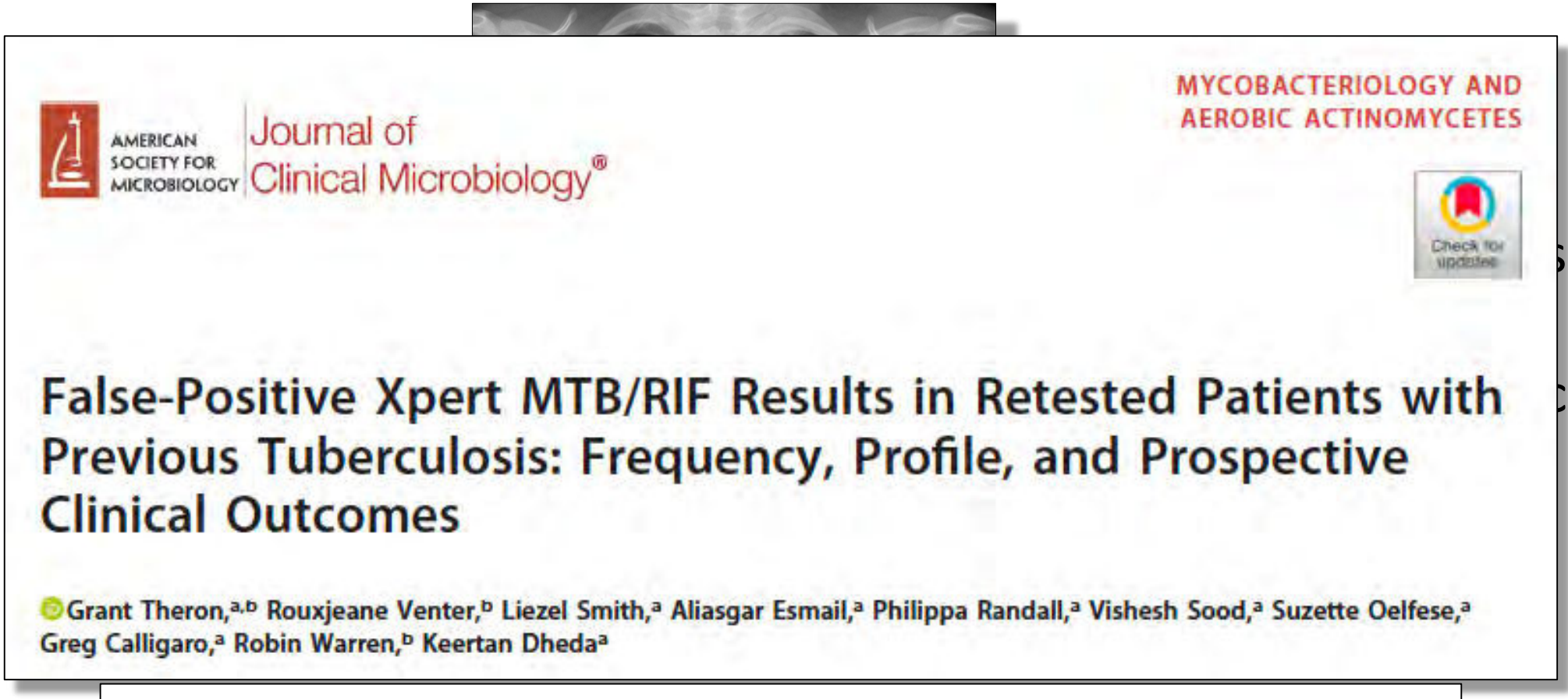
Increased risk
of
TB recurrence



Increased risk
of
TB recurrence

Problems with false
positive GeneXpert

GeneXpert Negative		GeneXpert Positive	
True negative	False Negative	True Positive	False Positive

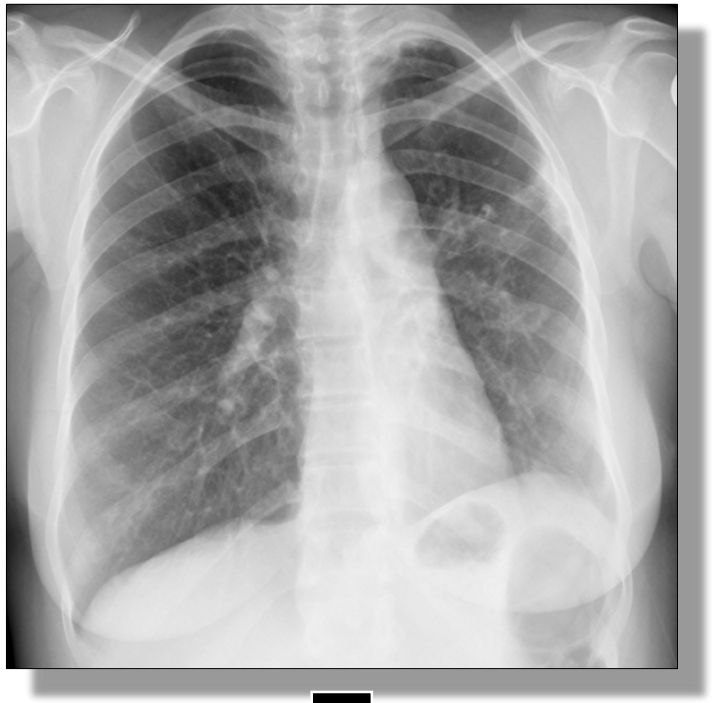


N=238 successfully treated TB patients

7% were Xpert false-positive @ median 11 months

1/3rd were >2years after treatment

J of Clin Mircobiol. March 2018;56:e01696-17

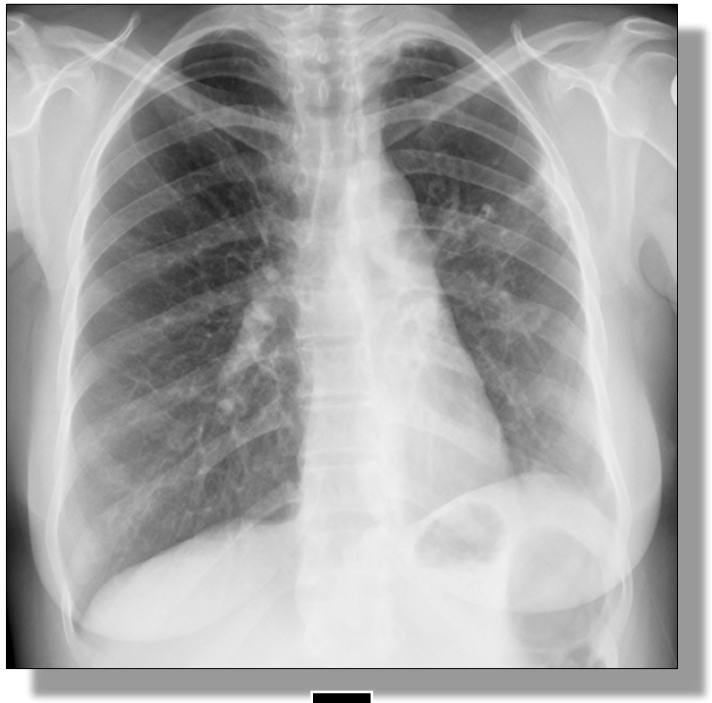


Increased risk
of
TB recurrence

Problems with false
positive GeneXpert

GeneXpert Negative		GeneXpert Positive	
True negative	False Negative	True Positive	False Positive

Post-tuberculosis lung disease



Increased risk of TB recurrence

Problems with false positive GeneXpert

Post-tuberculosis lung disease

Post-TB Bronchiectasis

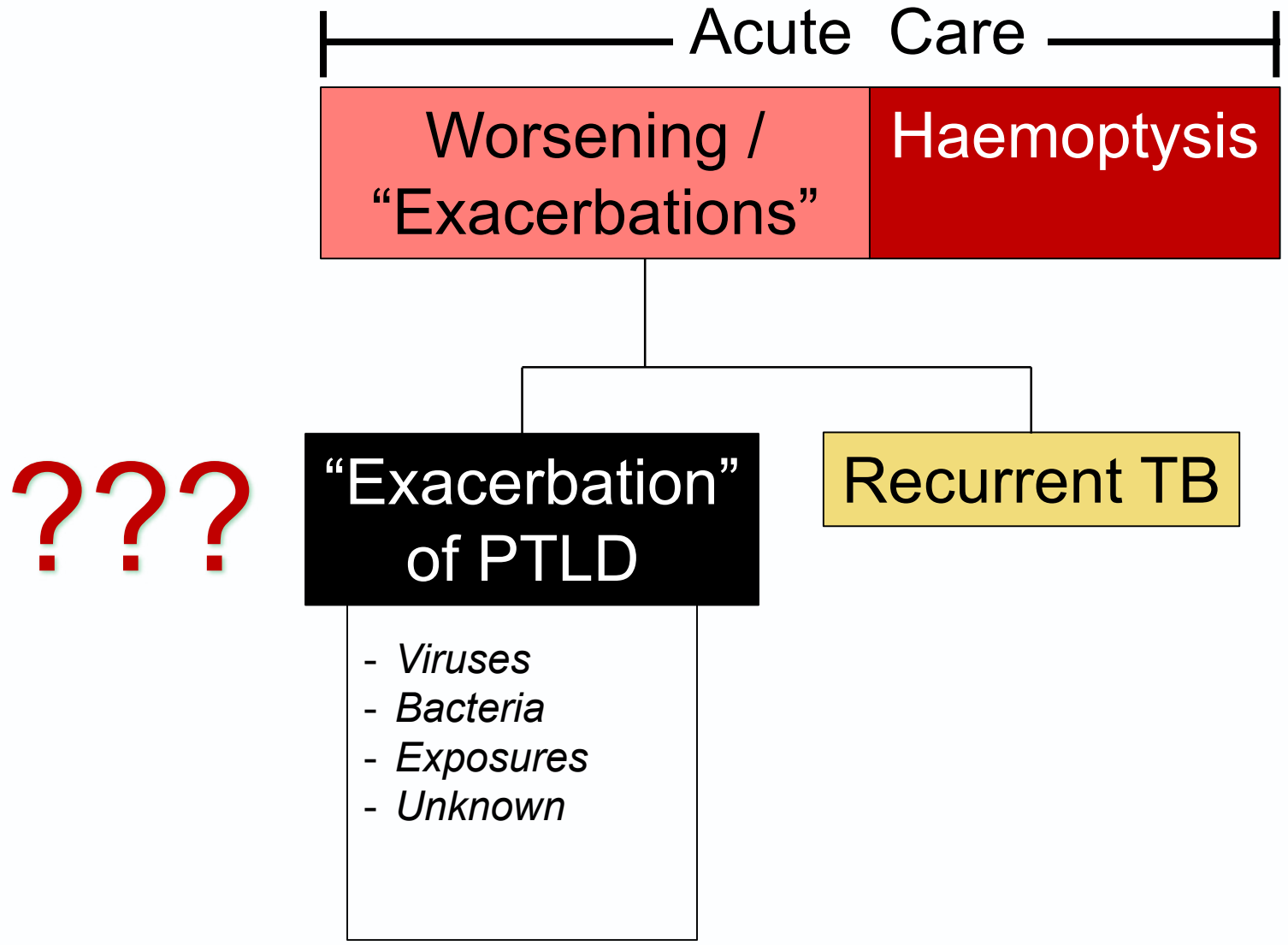
Labelled as "Asthmatic"

12 exacerbations in the last year

FEV1	0.72L (20%)
FVC	2.55L (56.1%)
FEV1:FVC	28.1%

Problems with false positive GeneXpert

Increased risk of TB recurrence


Acute Care
Worsening / "Exacerbations"
Haemoptysis
???
"Exacerbation" of PTLD
Recurrent TB
- Viruses
- Bacteria
- Exposures
- Unknown

↑ Risk#

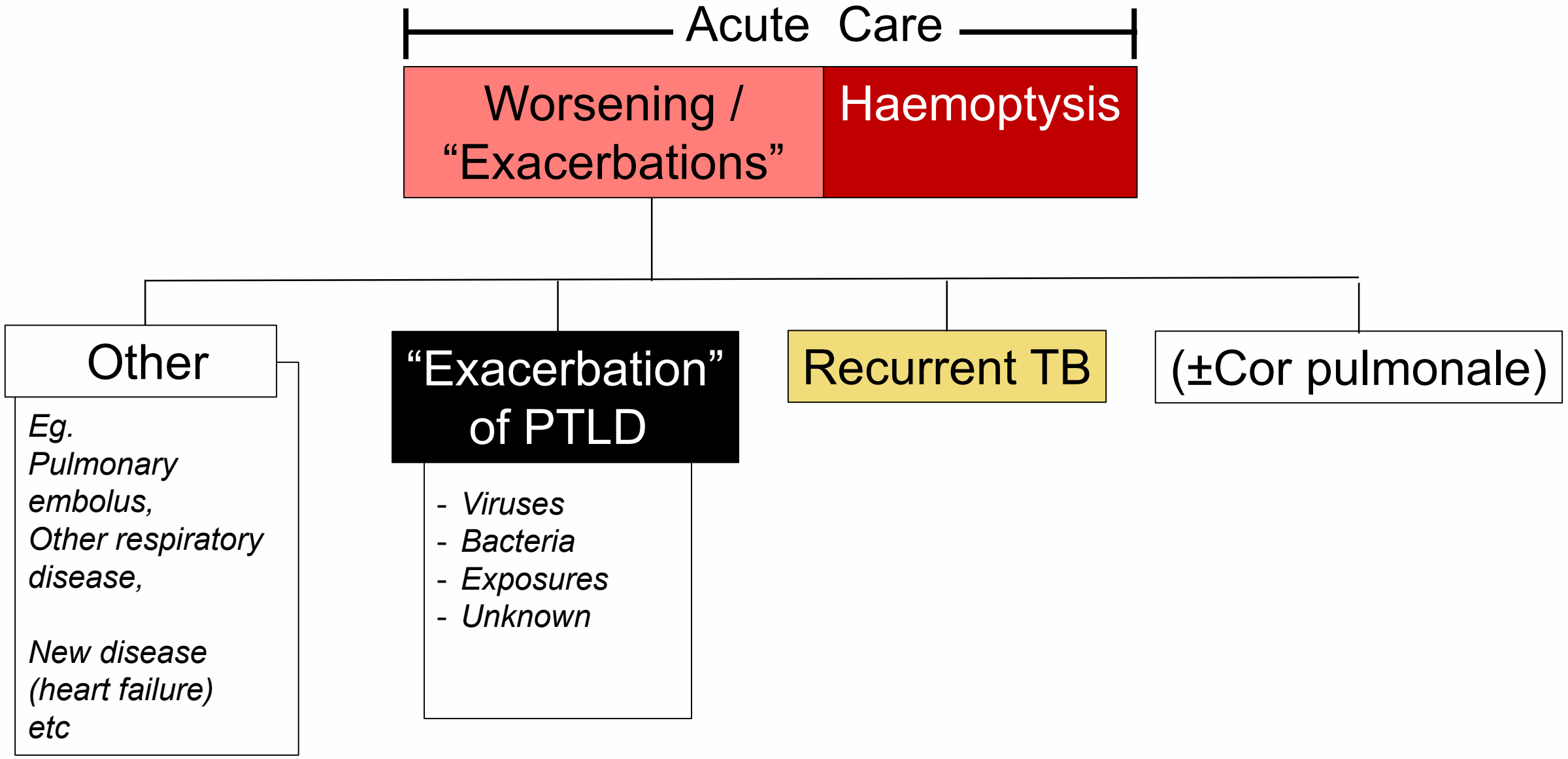
Exacerbations

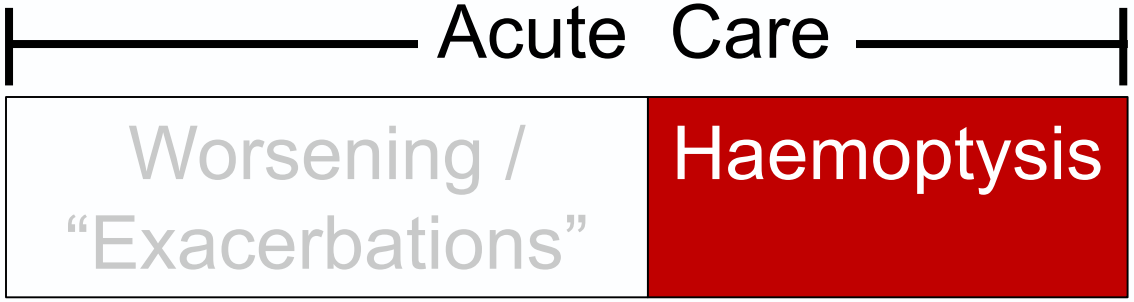
Recurrent TB

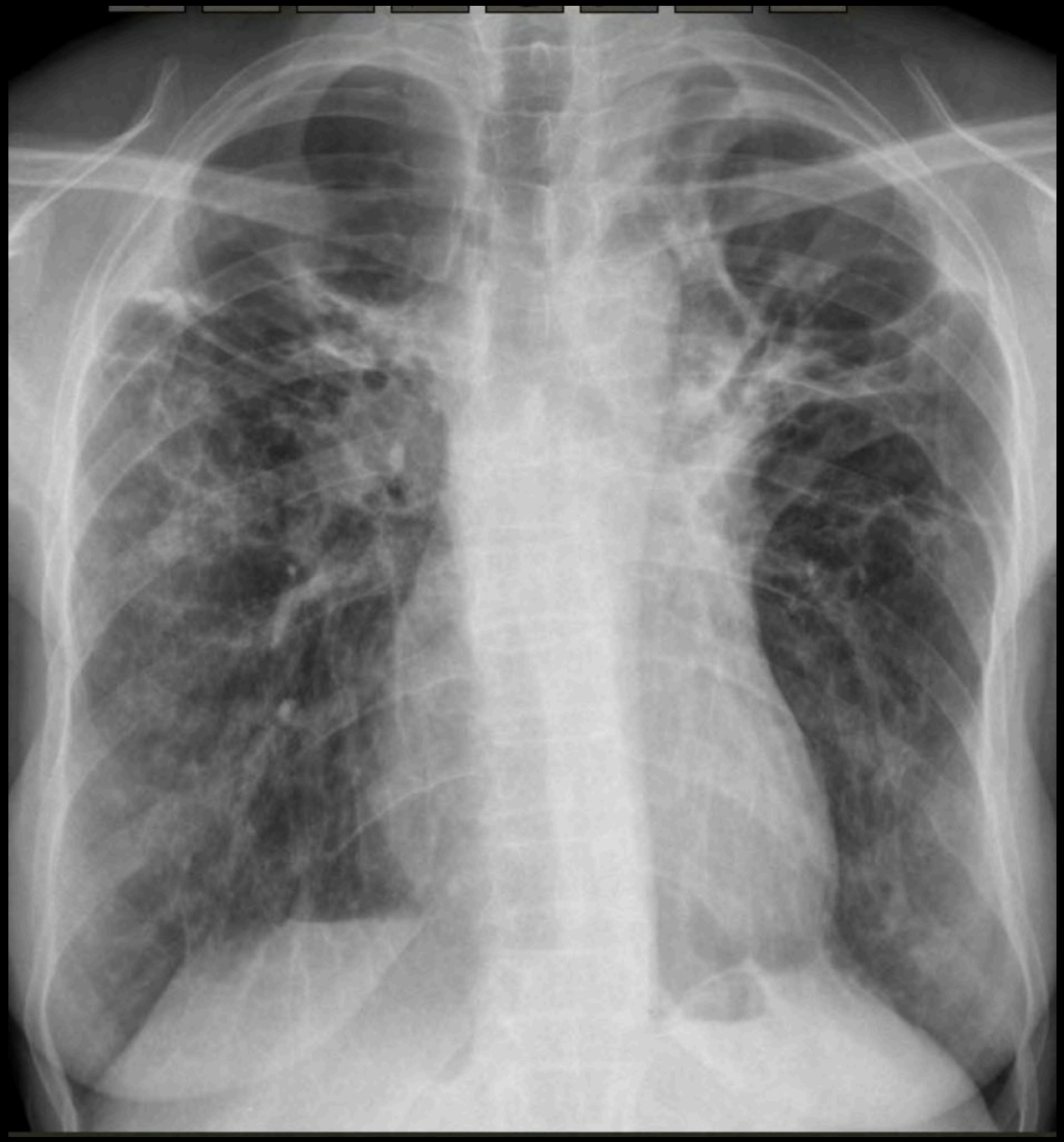
↑ Risk*

PTLD

*Vega et al. Thorax 2021;76:494 - 502
Cudahy et al. BMC Infectious Diseases 2020;20:789
Panjabi R et al. Int J Tuberc Lung Dis 2007;11:828-837
#Mkoko et al. S Afr Med J 2019; 109(3): 169


Acute Care
Worsening / "Exacerbations"
Haemoptysis
Other
Eg. Pulmonary embolus, Other respiratory disease,
New disease (heart failure) etc
"Exacerbation" of PTLD
- Viruses
- Bacteria
- Exposures
- Unknown
Recurrent TB
(±Cor pulmonale)


Acute Care
Worsening / "Exacerbations"
Haemoptysis



51F

HIV positive – on ARVs
Previous TB x 4

Never smoker
MMRC 3 (walks 100m)

Multiple presentation for haemoptysis since July 2021

Productive Cough

Spirometry:
FEV1: 0.79L (34%)
FVC: 1.71L (61%)
RATIO: 46.6%

Sats: 94% on RA

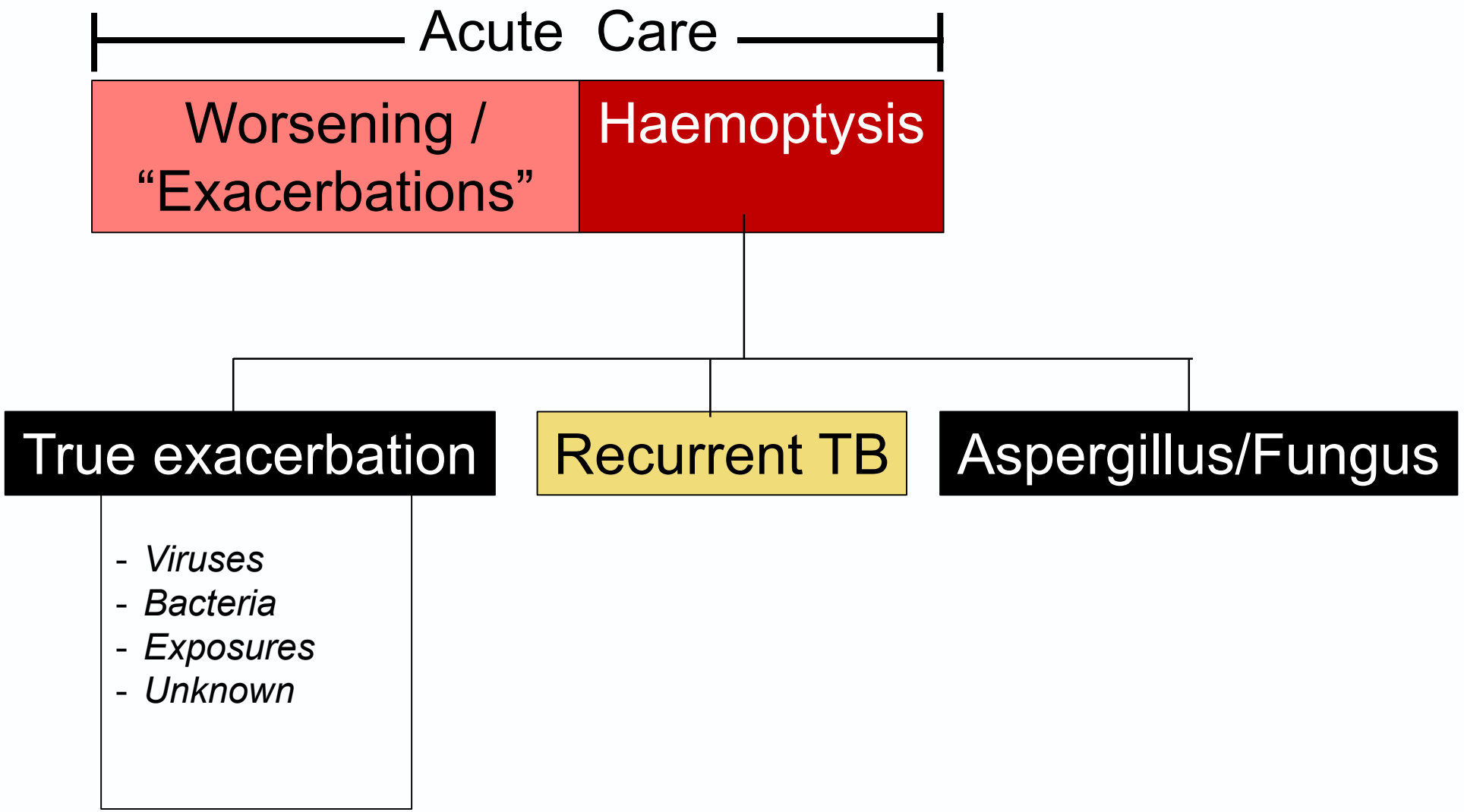
Haemoptysis

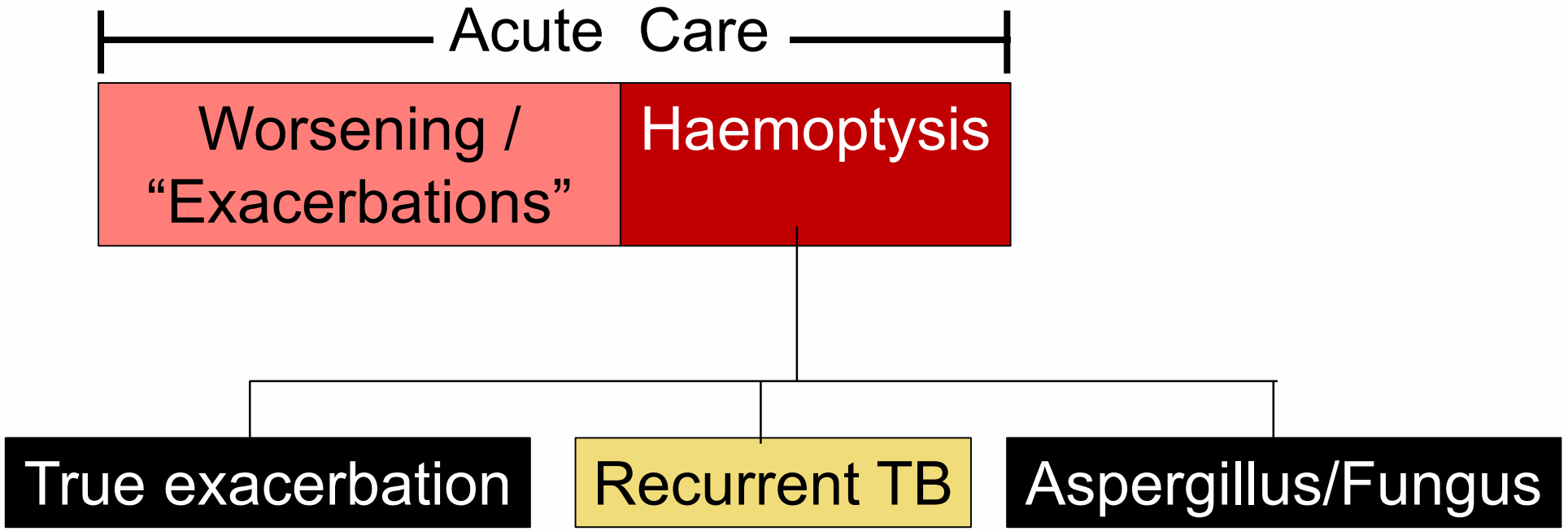
57M

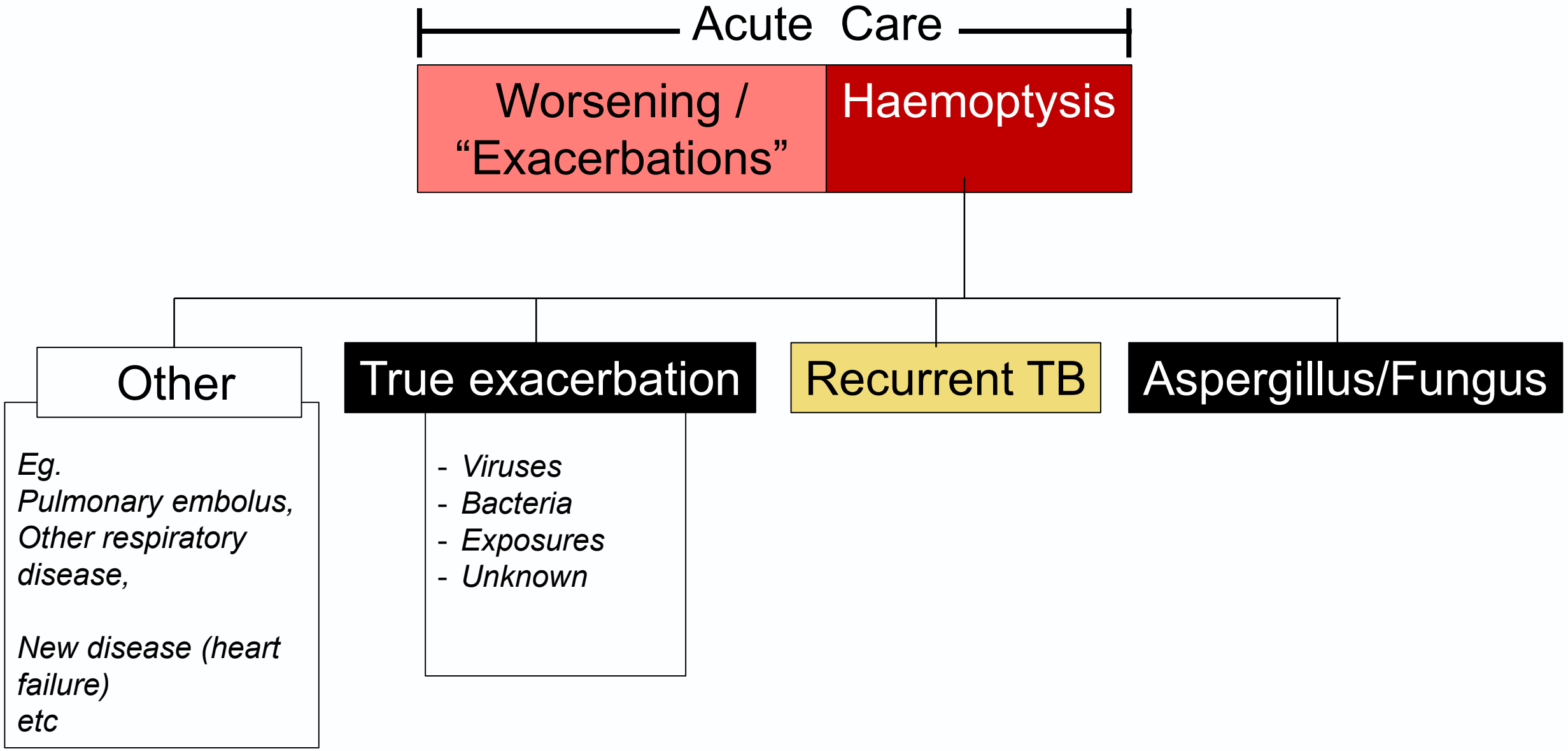
Ongoing chronic haemoptysis
Unable to do strenuous activity

Presented for RUL lobectomy

Spirometry:	
FEV1:	82%
FVC:	84%
RATIO:	75%
VO2max:	18.9ml/min/kg


Acute Care
Worsening / "Exacerbations"
Haemoptysis
True exacerbation
Recurrent TB
Aspergillus/Fungus
- Viruses
- Bacteria
- Exposures
- Unknown


Acute Care
Worsening / "Exacerbations"
Haemoptysis
True exacerbation
Recurrent TB
Aspergillus/Fungus


Acute Care
Worsening / "Exacerbations"
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Other
Eg.
Pulmonary embolus,
Other respiratory disease,
New disease (heart failure)
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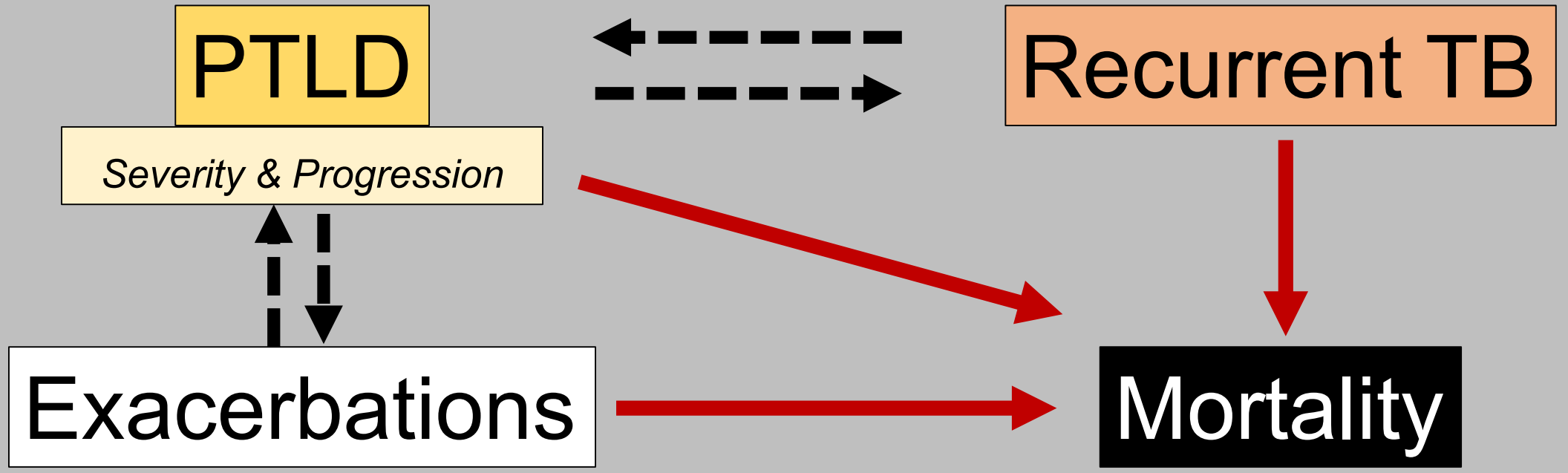
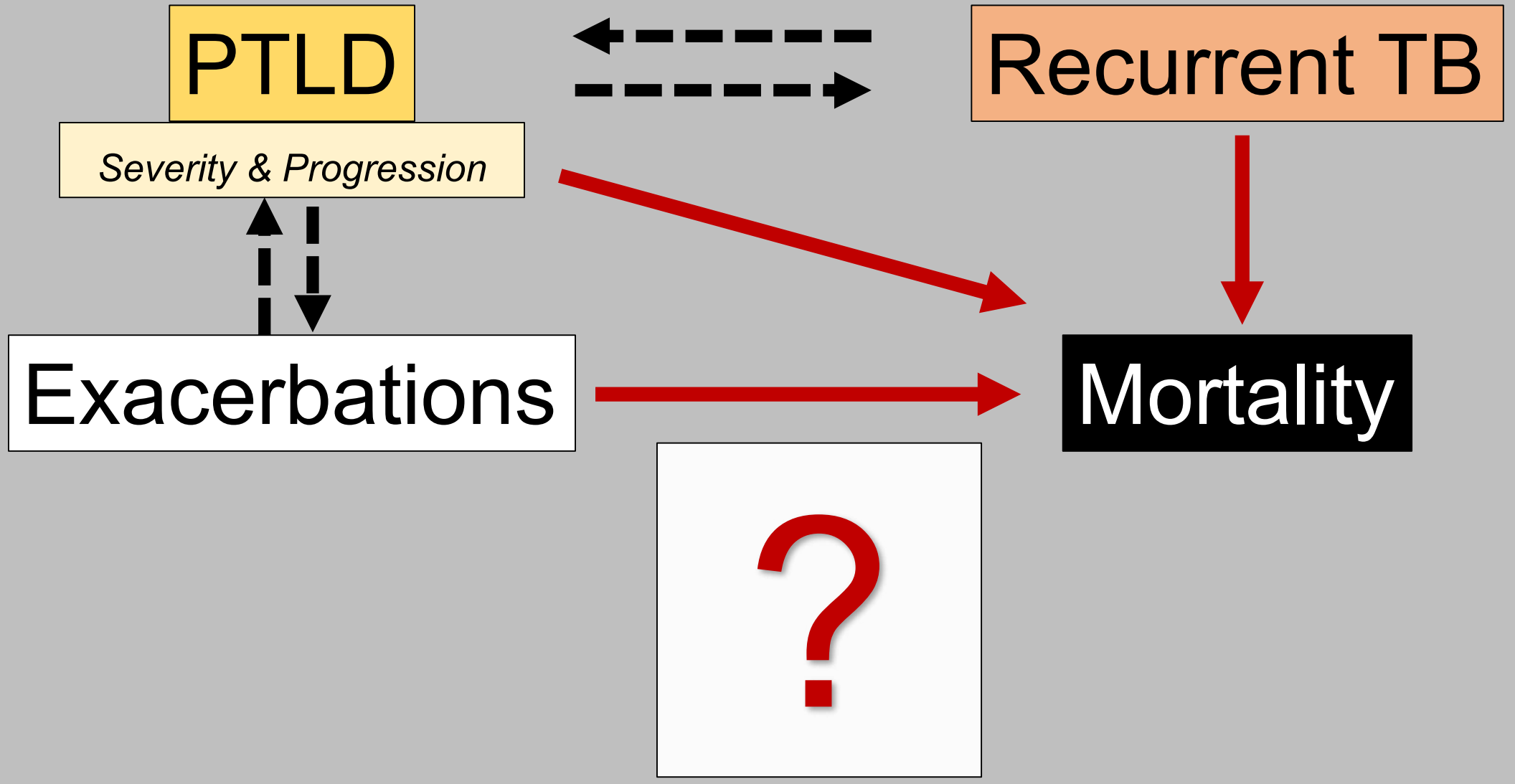
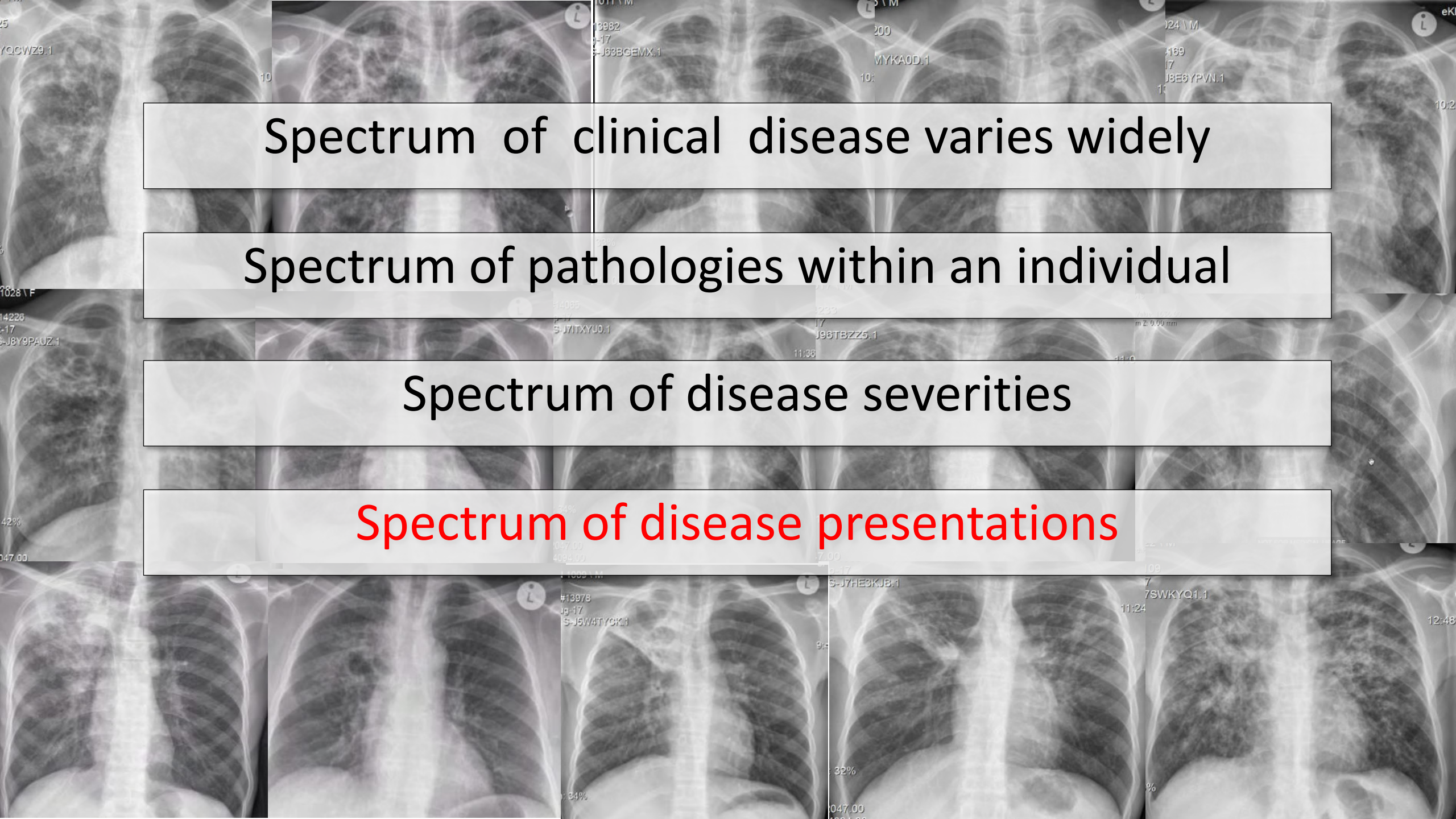
True exacerbation
- Viruses
- Bacteria
- Exposures
- Unknown
Recurrent TB
Aspergillus/Fungus

“The Four Horsemen” of PTLD

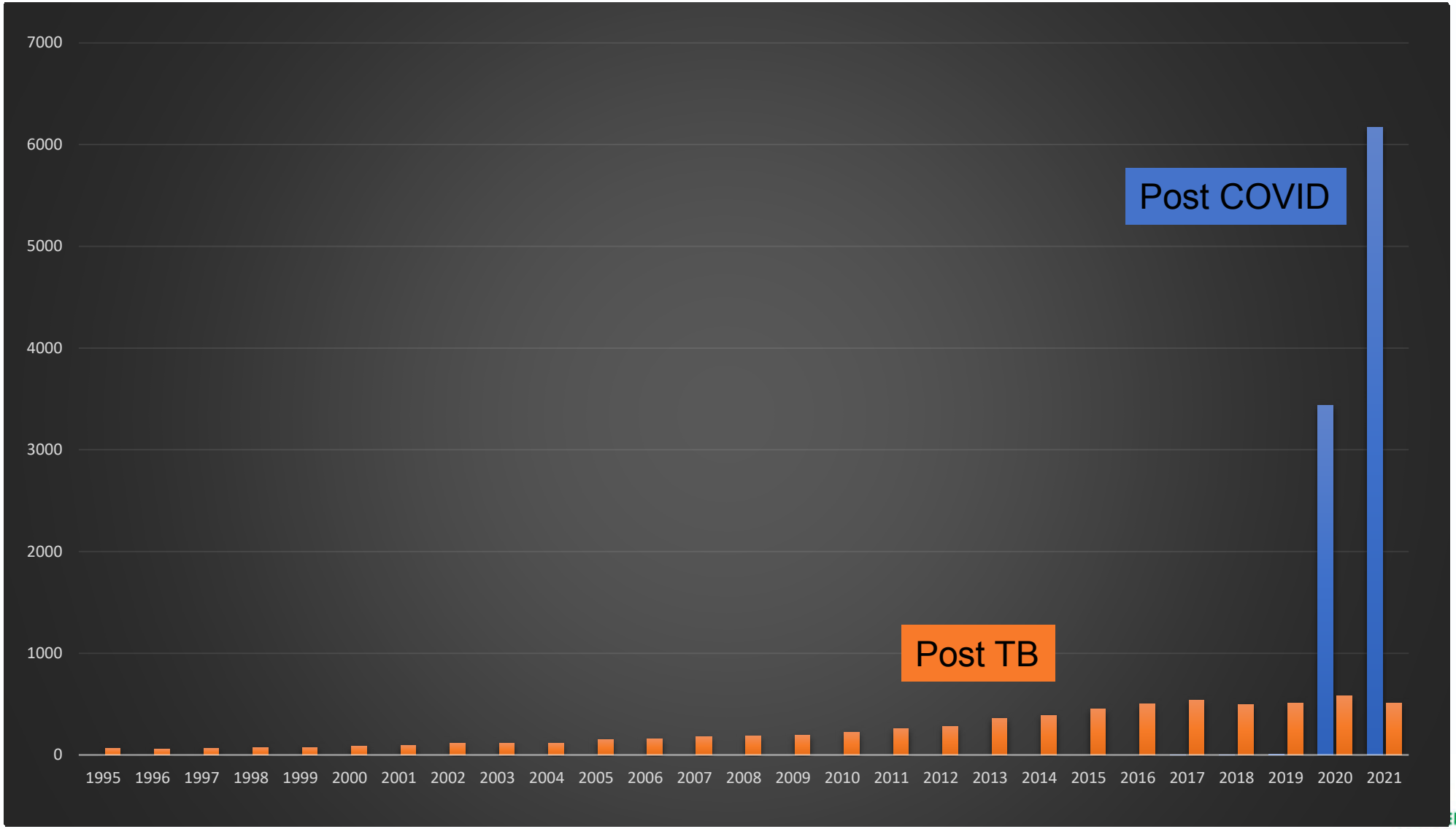


“The Four Horsemen” of PTLD



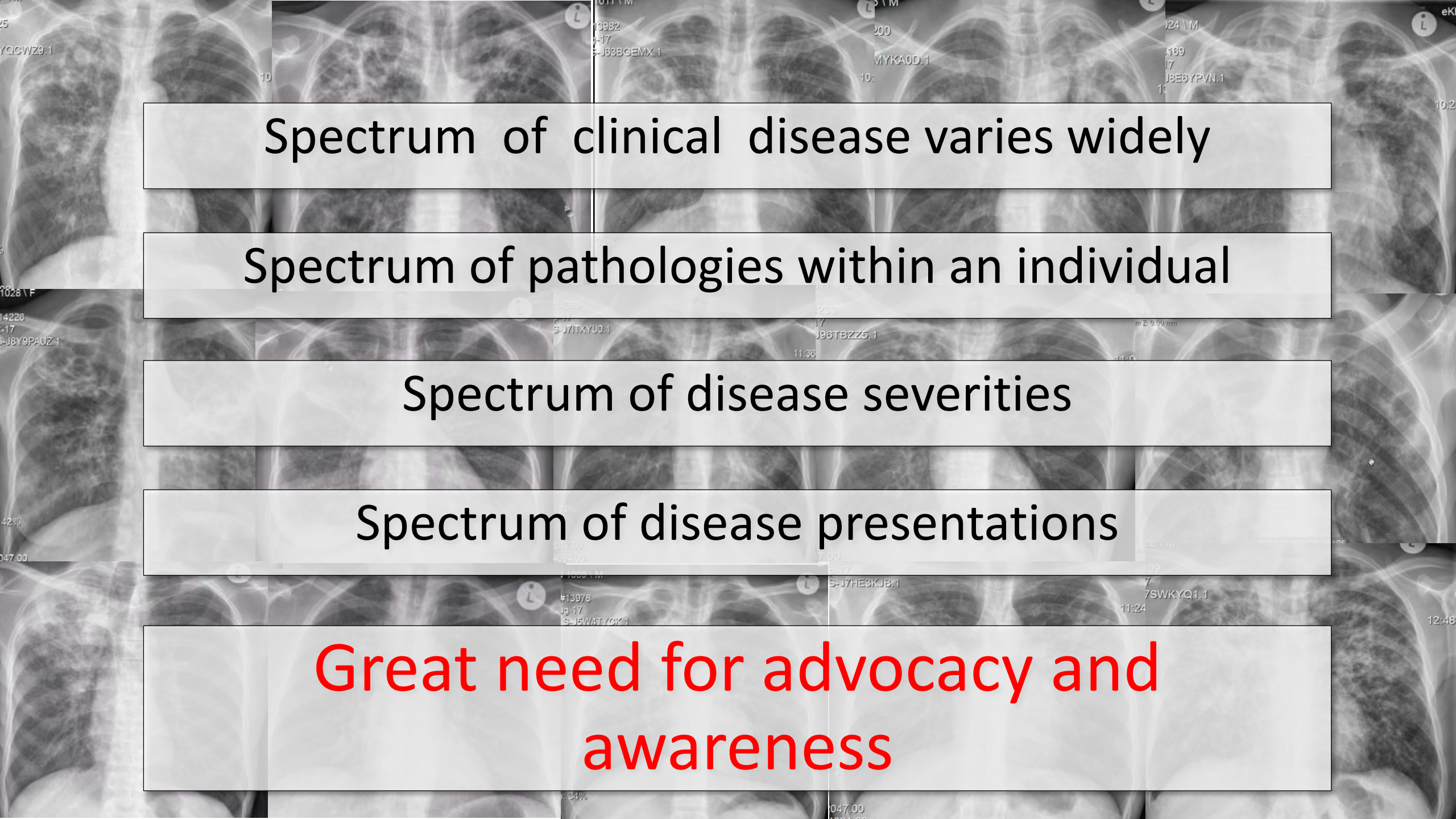

Spectrum of clinical disease varies widely
Spectrum of pathologies within an individual
Spectrum of disease severities
Spectrum of disease presentations

Publications by year



M.tb discovered 1882

SARS-COV-2 identified in 2020


Spectrum of clinical disease varies widely
Spectrum of pathologies within an individual
Spectrum of disease severities
Spectrum of disease presentations
Great need for advocacy and awareness

Acknowledgements

Stellenbosch University

Elvis Irusen
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Helena Olckers
Shamila Manie

Desmond Tutu TB Centre

Nulda Beyers
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Muhammed Osman
Graeme Hoddinott
Dillon Wademan

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Bertie Squire

University of California, Los Angeles

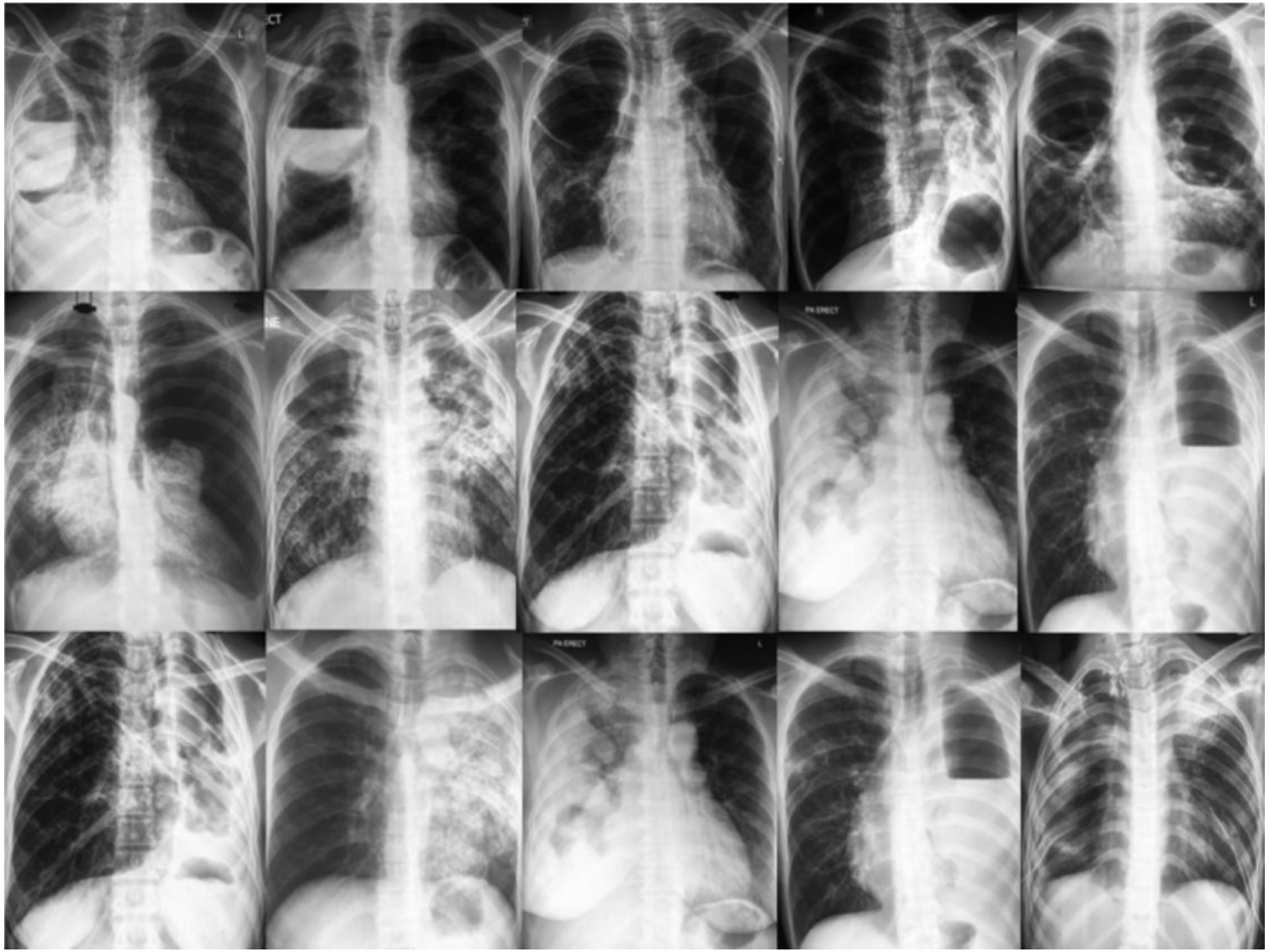
Jonathan Goldin
Christopher Cooper
Grace Hyun Kim

Radbound University, Nijmegen, Netherlands

Eva van Rixkoort

Massachusetts General Hospital

Rich Channick
Josanna Rodriguez-Lopez
Alison Witkin
David Kanarek

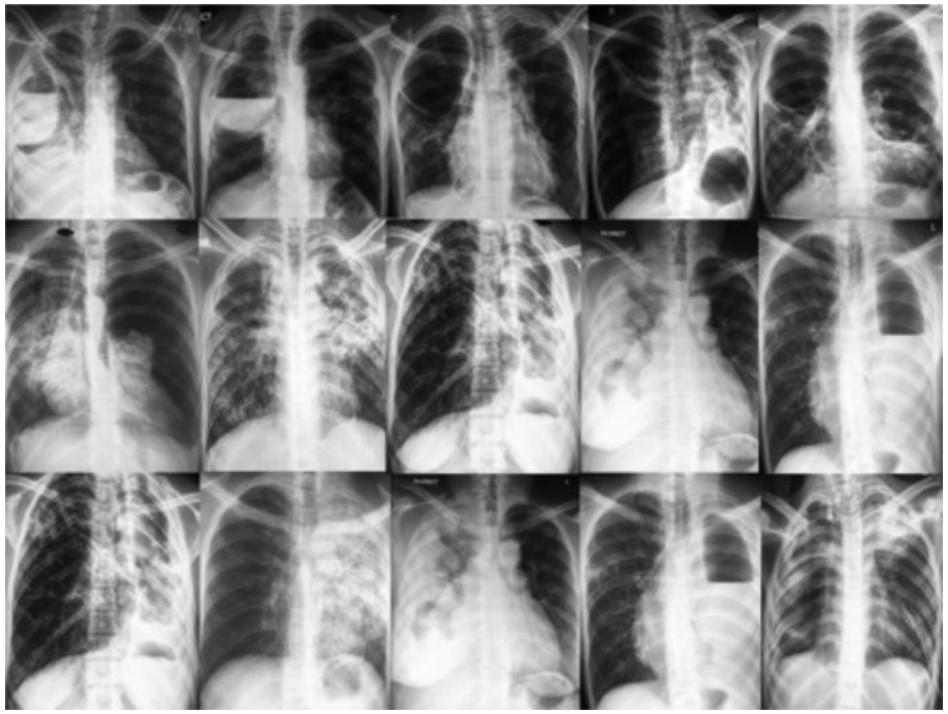


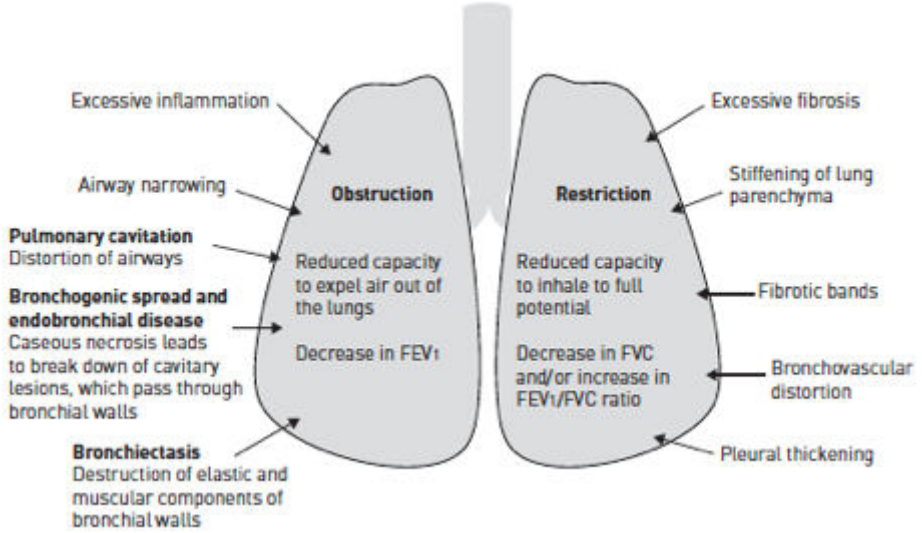
Management of post- TB lung disease

Gunar Günther

INSELSPITAL
UNIVERSITÄTSSPITAL BERN
HÔPITAL UNIVERSITAIRE DE BERNE

UNAM
UNIVERSITY OF NAMIBIA



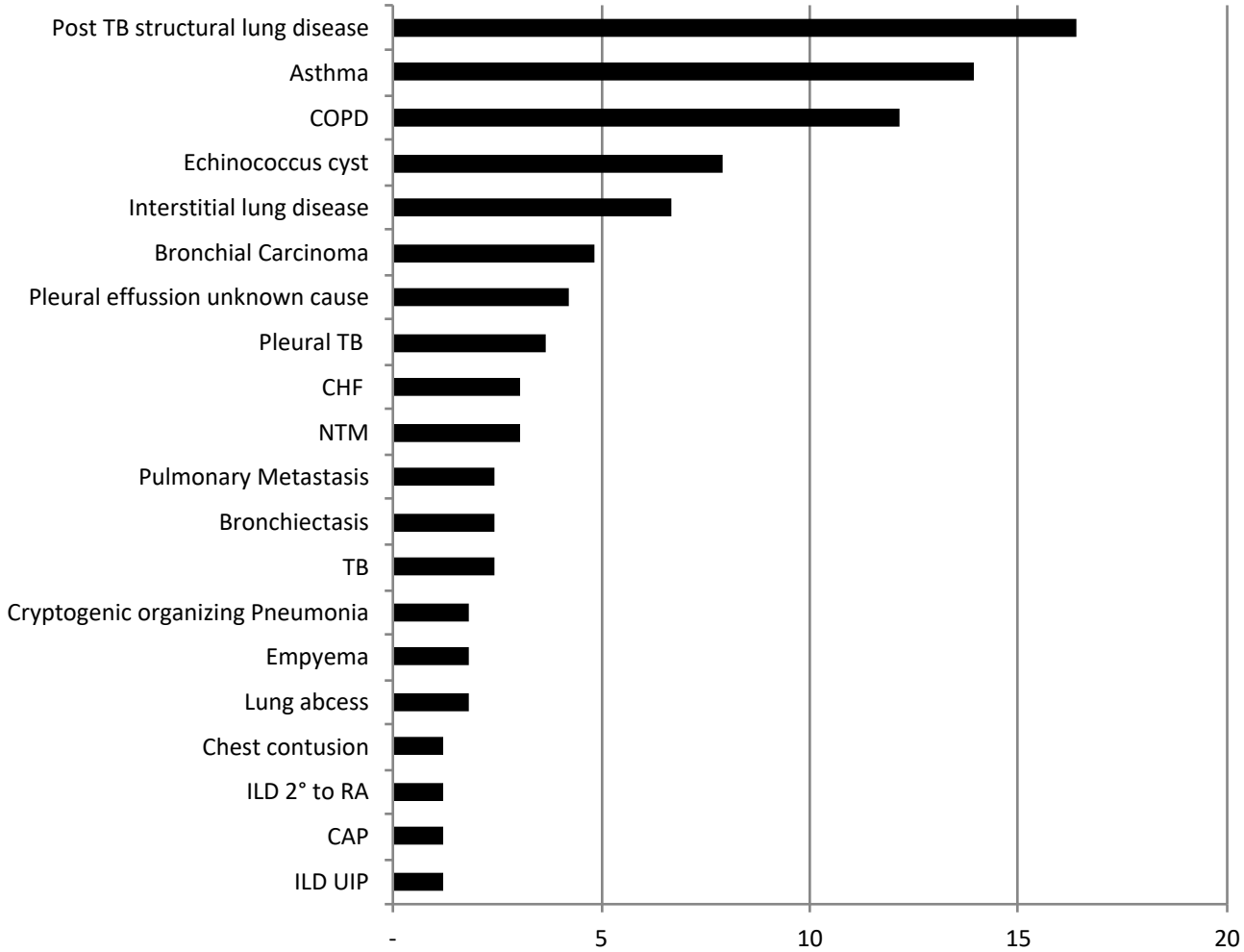


Evidence base for PTLD treatment:

Not existant

Ravimohan et al. ERR 2017

TB sequelae:
Frequent diagnosis in the pulmonary OPD in Katutura hospital



Günther G, Ithete S, IJTLD 2021

Raimundo

born:15.10.91

Overture

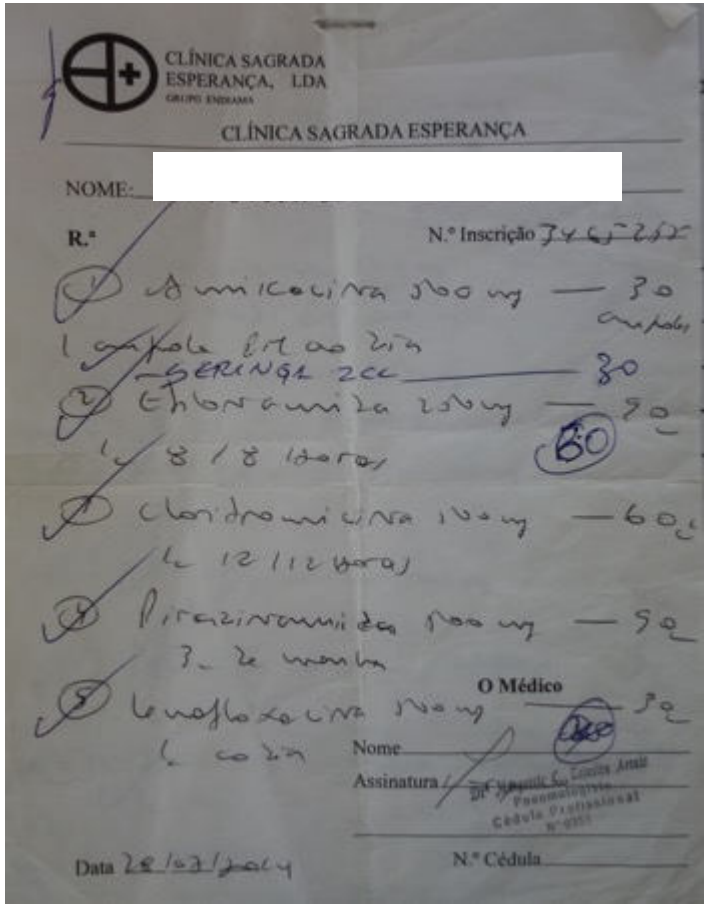
Arrival from Luanda – Angola
in February 2015

Treatment:

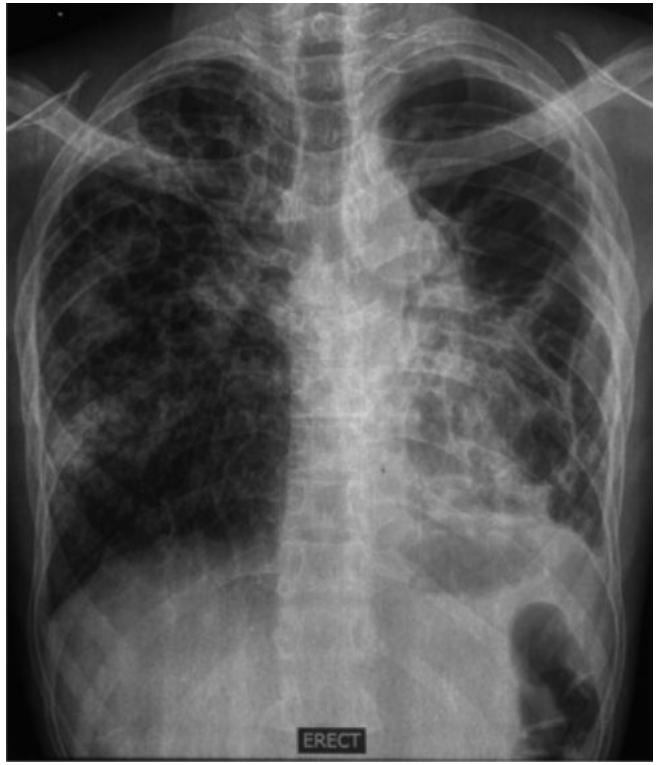
- Amikacin 500 mg od
- Ethionamide 250 mg tds
- Clarithromycin 100 mg bd
- Pyrzinamide 500 mg od
- Moxifloxacin 400 mg od.

- on ART: TDF, FTC, EFV
- VL: TND

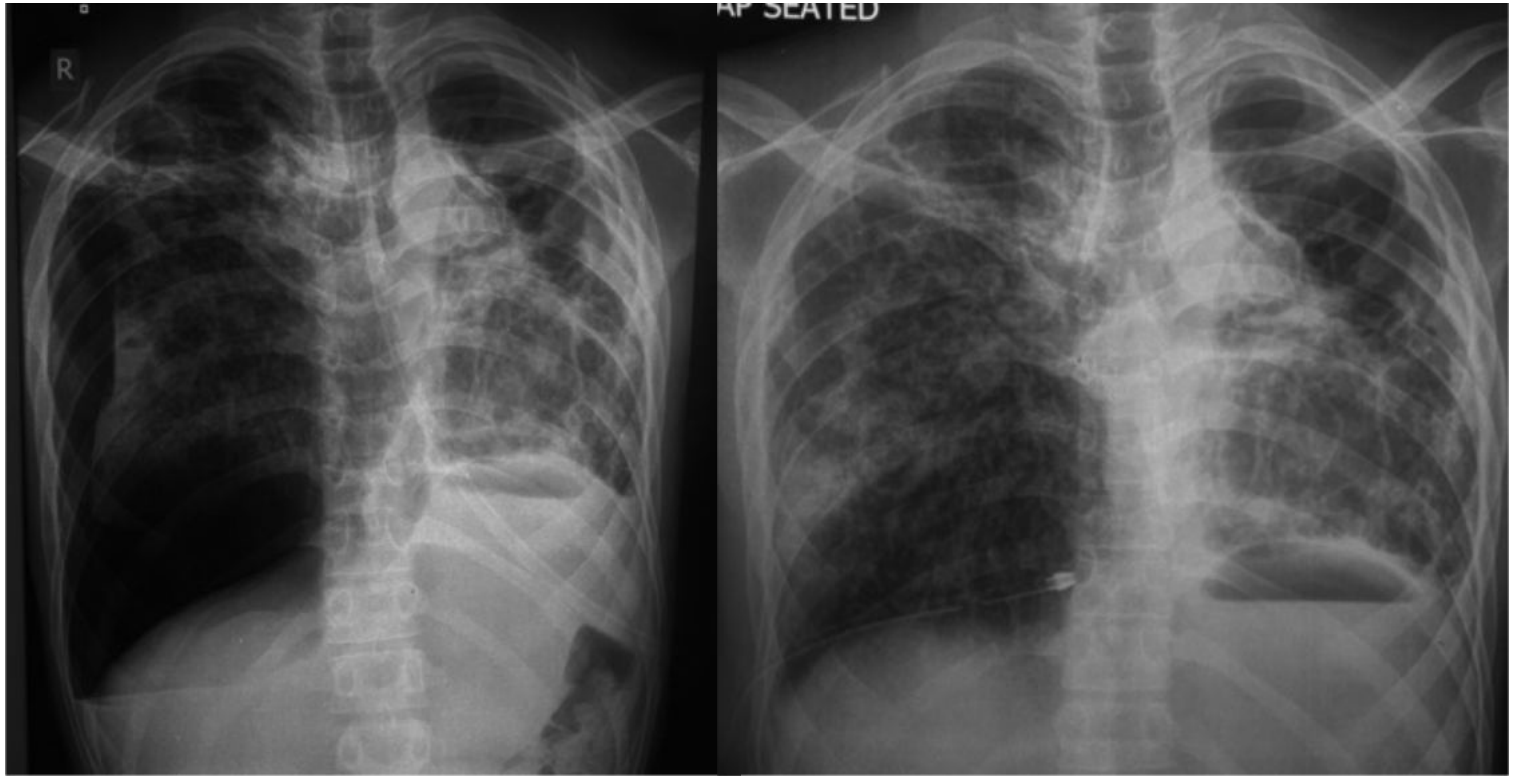
- Date 24.07.14


CLÍNICA SAGRADA ESPERANÇA, LDA
GRUPO ENDIAMA
CLÍNICA SAGRADA ESPERANÇA
NOME:
R.ª
N.º Inscrição
O Médico
Nome
Assinatura
Cédula Profissional
Data
N.º Cédula

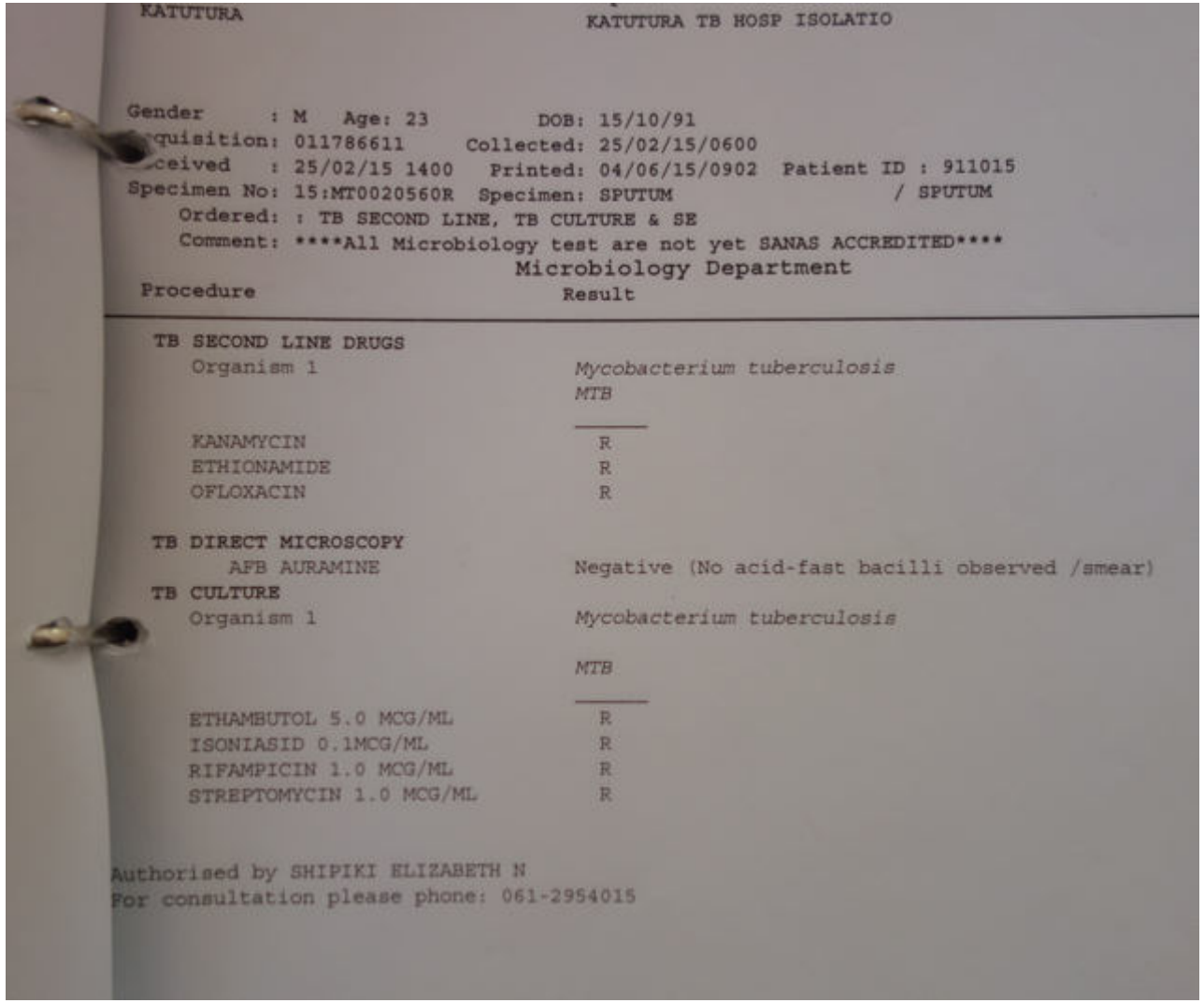
First CXR February 2015



First major complication



DST from 25.02.2015



KATUTURA

KATUTURA TB HOSP ISOLATIO

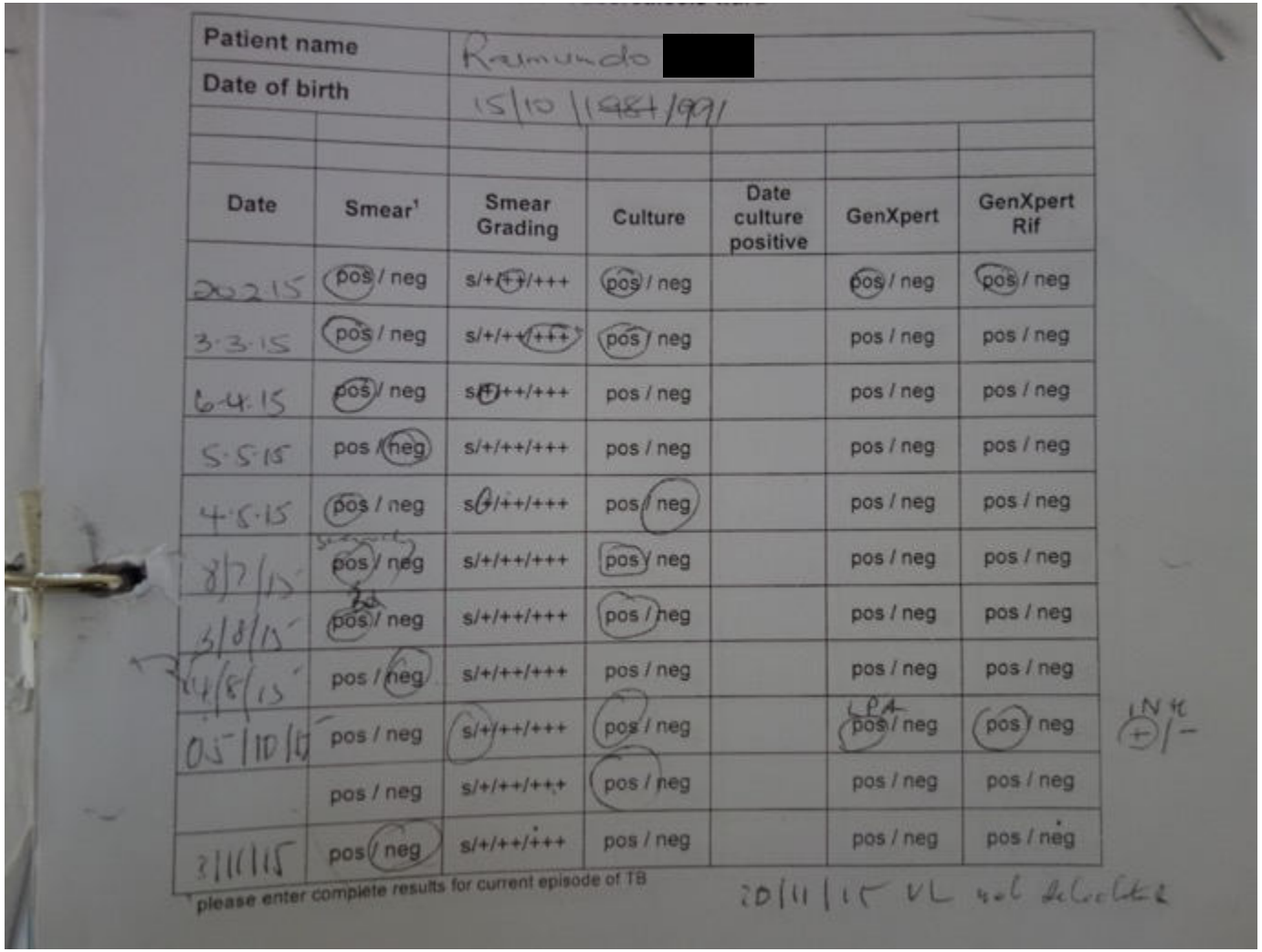
Gender : M Age: 23 DOB: 15/10/91
quisition: 011786611 Collected: 25/02/15/0600
ceived : 25/02/15 1400 Printed: 04/06/15/0902 Patient ID : 911015
Specimen No: 15:MT0020560R Specimen: SPUTUM / SPUTUM
Ordered: : TB SECOND LINE, TB CULTURE & SE
Comment: ****All Microbiology test are not yet SANAS ACCREDITED****

Microbiology Department

Procedure	Result
TB SECOND LINE DRUGS	
Organism 1	*Mycobacterium tuberculosis*
	MTB
KANAMYCIN	R
ETHIONAMIDE	R
OFLOXACIN	R
TB DIRECT MICROSCOPY	
AFB AURAMINE	Negative (No acid-fast bacilli observed /smear)
TB CULTURE	
Organism 1	*Mycobacterium tuberculosis*
	MTB
ETHAMBUTOL 5.0 MCG/ML	R
ISONIASID 0.1MCG/ML	R
RIFAMPICIN 1.0 MCG/ML	R
STREPTOMYCIN 1.0 MCG/ML	R

Authorised by SHIPIKI ELIZABETH N
For consultation please phone: 061-2954015

Treatment response 2015 on
Mfx, Cm, hH, Pza, Cfz, Eth, PAS

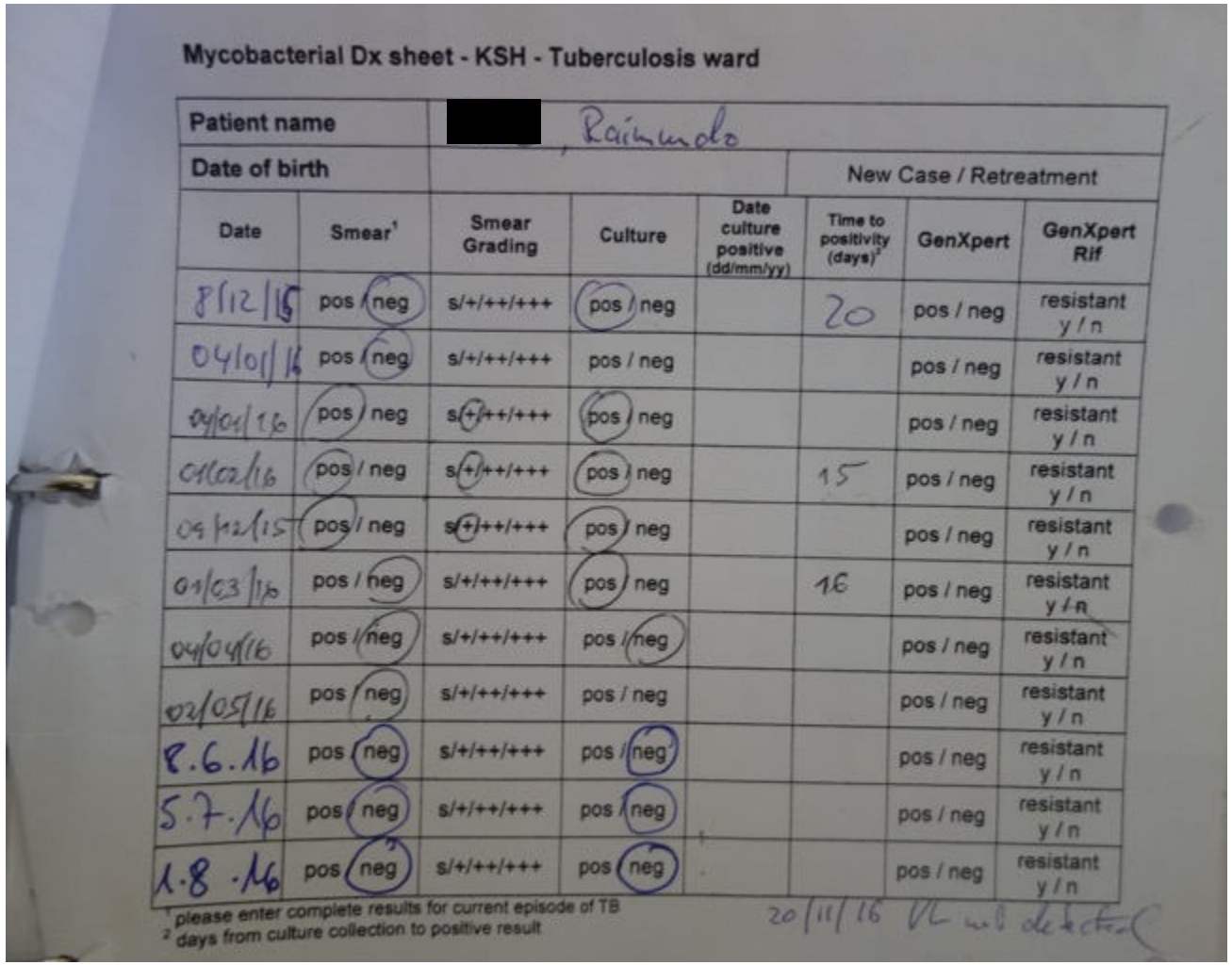


Patient name	Raimundo [redacted]					
Date of birth	15/10/1984/1991					
Date	Smear[1]	Smear Grading	Culture	Date culture positive	GenXpert	GenXpert Rif
2.2.15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
3.3.15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
6.4.15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
5.5.15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
4.6.15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
8/7/15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
3/8/15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
4/8/15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
05/10/15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg
2/11/15	pos / neg	s/+/++/+++	pos / neg		pos / neg	pos / neg

[1] please enter complete results for current episode of TB

20/11/15 VL not detected

Treatment response 2016 on
Bdq, Mpm, Am/Clv, Mfx, Lzd, Eto, PAS



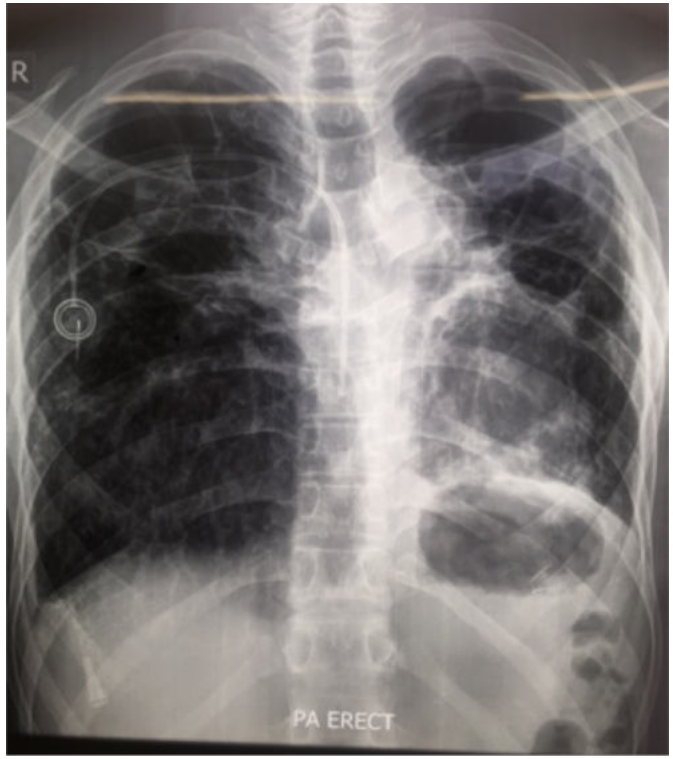
Mycobacterial Dx sheet - KSH - Tuberculosis ward

Patient name	[redacted], Raimundo						
Date of birth						New Case / Retreatment	
Date	Smear[1]	Smear Grading	Culture	Date culture positive (dd/mm/yy)	Time to positivity (days)[2]	GenXpert	GenXpert Rif
8/12/15	pos / (neg)	s/+/++/+++	(pos) / neg		20	pos / neg	resistant y / n
04/01/16	pos / (neg)	s/+/++/+++	pos / neg			pos / neg	resistant y / n
04/01/16	(pos) / neg	s/+/++/+++	(pos) / neg			pos / neg	resistant y / n
01/02/16	(pos) / neg	s/+/++/+++	(pos) / neg		15	pos / neg	resistant y / n
04/12/15	(pos) / neg	s/+/++/+++	(pos) / neg			pos / neg	resistant y / n
01/03/16	pos / (neg)	s/+/++/+++	(pos) / neg		16	pos / neg	resistant y / n
04/04/16	pos / (neg)	s/+/++/+++	pos / (neg)			pos / neg	resistant y / n
02/05/16	pos / (neg)	s/+/++/+++	pos / neg			pos / neg	resistant y / n
8.6.16	pos / (neg)	s/+/++/+++	pos / (neg)			pos / neg	resistant y / n
5.7.16	pos / (neg)	s/+/++/+++	pos / (neg)			pos / neg	resistant y / n
1.8.16	pos / (neg)	s/+/++/+++	pos / (neg)			pos / neg	resistant y / n

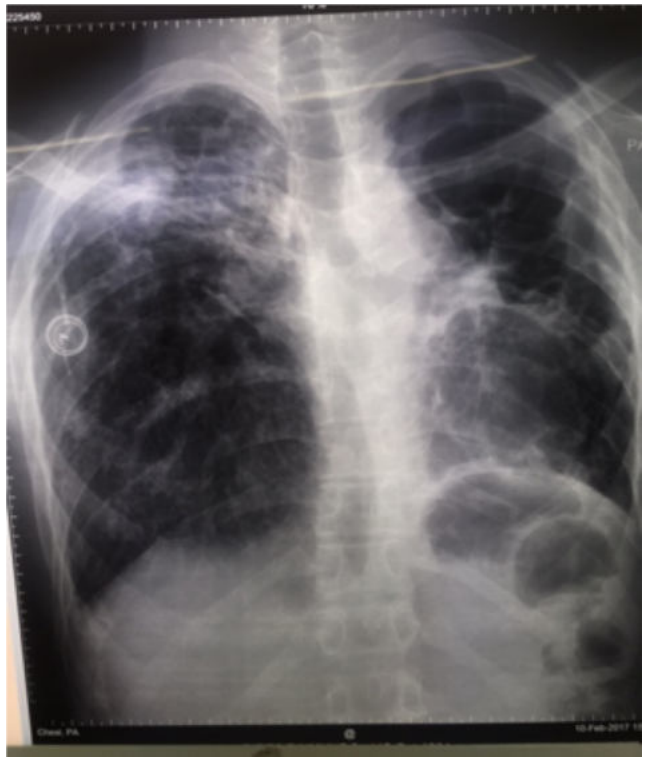
[1] please enter complete results for current episode of TB
[2] days from culture collection to positive result

20/11/16 VL nd detected

Treatment response 2016

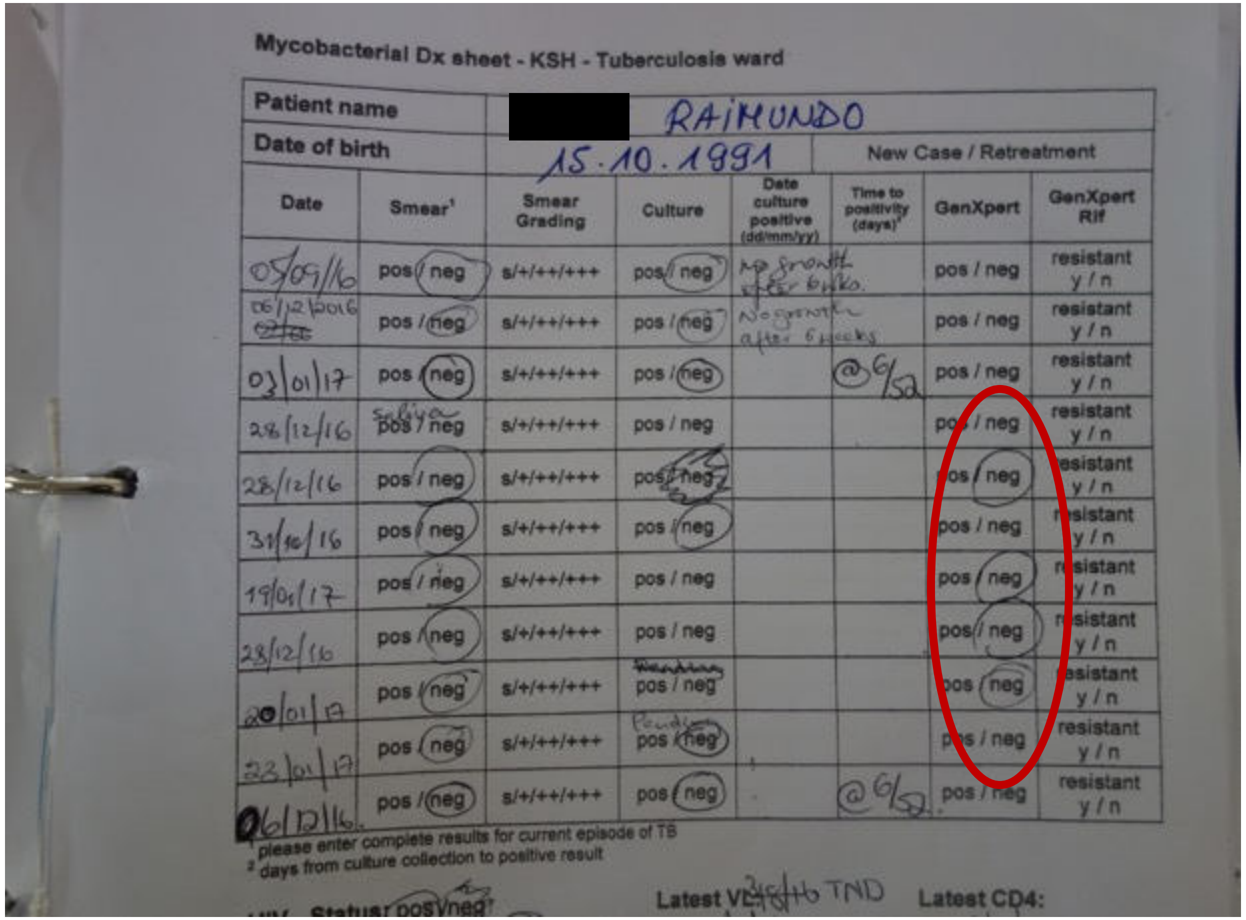


October 2016



December 2016

Treatment response 2017



Mycobacterial Dx sheet - KSH - Tuberculosis ward

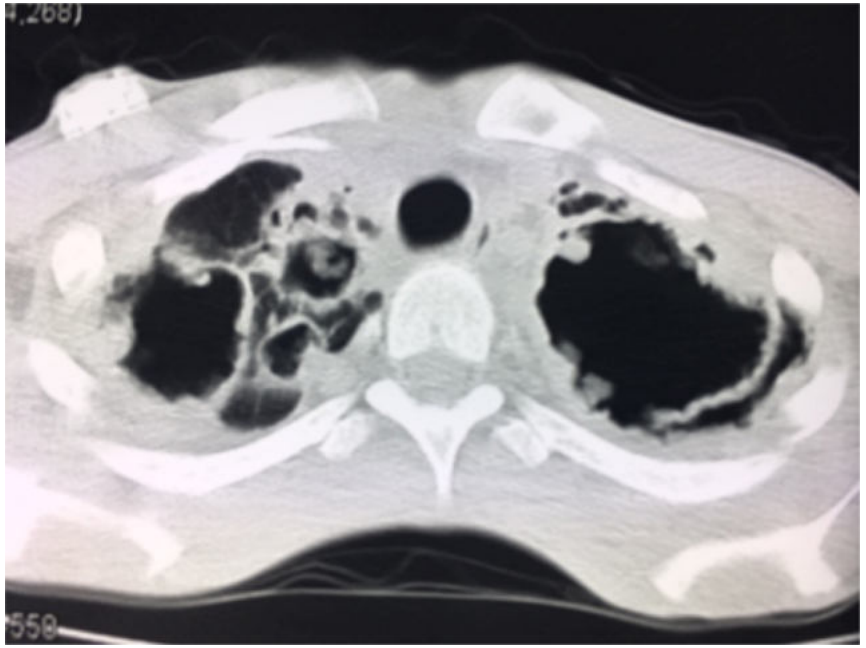
Patient name	[redacted] RAIMUNDO	
Date of birth	15.10.1991	New Case / Retreatment

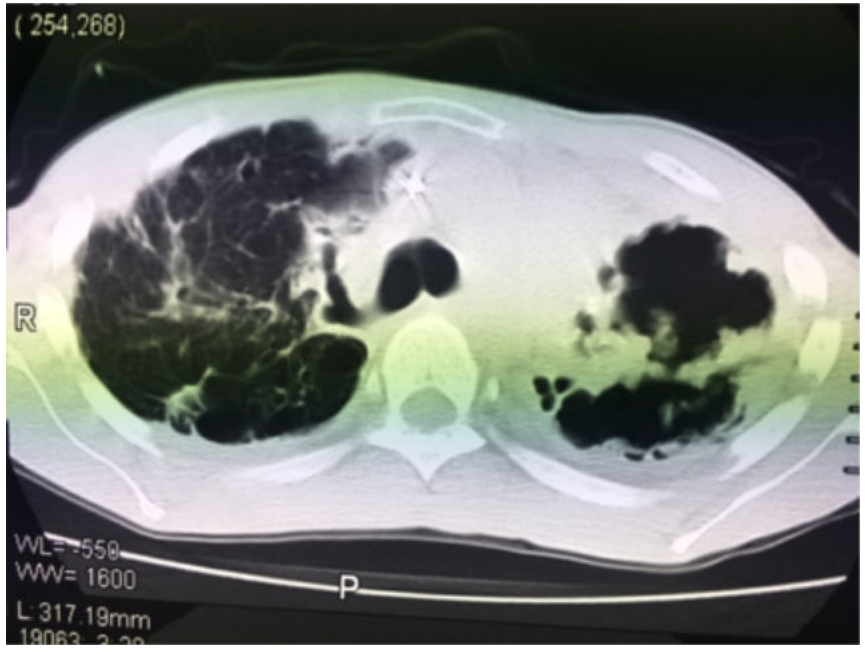
Date	Smear[1]	Smear Grading	Culture	Date culture positive (dd/mm/yy)	Time to positivity (days)[2]	GenXpert	GenXpert Rif
05/09/16	pos / neg	s/+/++/+++	pos / neg	No growth after 6 wks		pos / neg	resistant y / n
06/12/2016	pos / neg	s/+/++/+++	pos / neg	No growth after 6 weeks		pos / neg	resistant y / n
03/01/17	pos / neg	s/+/++/+++	pos / neg		@ 6/52	pos / neg	resistant y / n
28/12/16	saliva pos / neg	s/+/++/+++	pos / neg			pos / neg	resistant y / n
28/12/16	pos / neg	s/+/++/+++	pos / neg			pos / neg	resistant y / n
31/10/16	pos / neg	s/+/++/+++	pos / neg			pos / neg	resistant y / n
19/01/17	pos / neg	s/+/++/+++	pos / neg			pos / neg	resistant y / n
28/12/16	pos / neg	s/+/++/+++	pos / neg			pos / neg	resistant y / n
20/01/17	pos / neg	s/+/++/+++	pos / neg			pos / neg	resistant y / n
23/01/17	pos / neg	s/+/++/+++	Pending pos / neg			pos / neg	resistant y / n
06/12/16	pos / neg	s/+/++/+++	pos / neg		@ 6/52	pos / neg	resistant y / n

[1] please enter complete results for current episode of TB
[2] days from culture collection to positive result

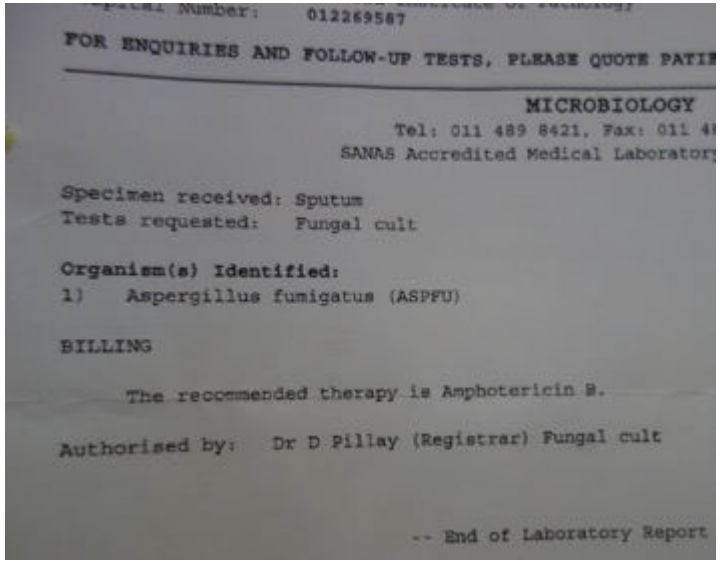
HIV Status: pos/neg Latest VL: 24/8/16 TND Latest CD4:

CT chest 2017





Dx: Chronic pulmonary aspergillosis



012269587

FOR ENQUIRIES AND FOLLOW-UP TESTS, PLEASE QUOTE PATI

MICROBIOLOGY

Tel: 011 489 8421, Fax: 011 4

SANAS Accredited Medical Laborator

Specimen received: Sputum
Tests requested: Fungal cult

Organism(s) Identified:
1) Aspergillus fumigatus (ASPFU)

BILLING

The recommended therapy is Amphotericin B.

Authorised by: Dr D Pillay (Registrar) Fungal cult

-- End of Laboratory Report

Hi Gunar,

Er hat einen IgG Wert von 54 mg/L, wir nehmen als cutt-off 40 mg/L d.h die CPA ist auch mykologisch bestätigt!

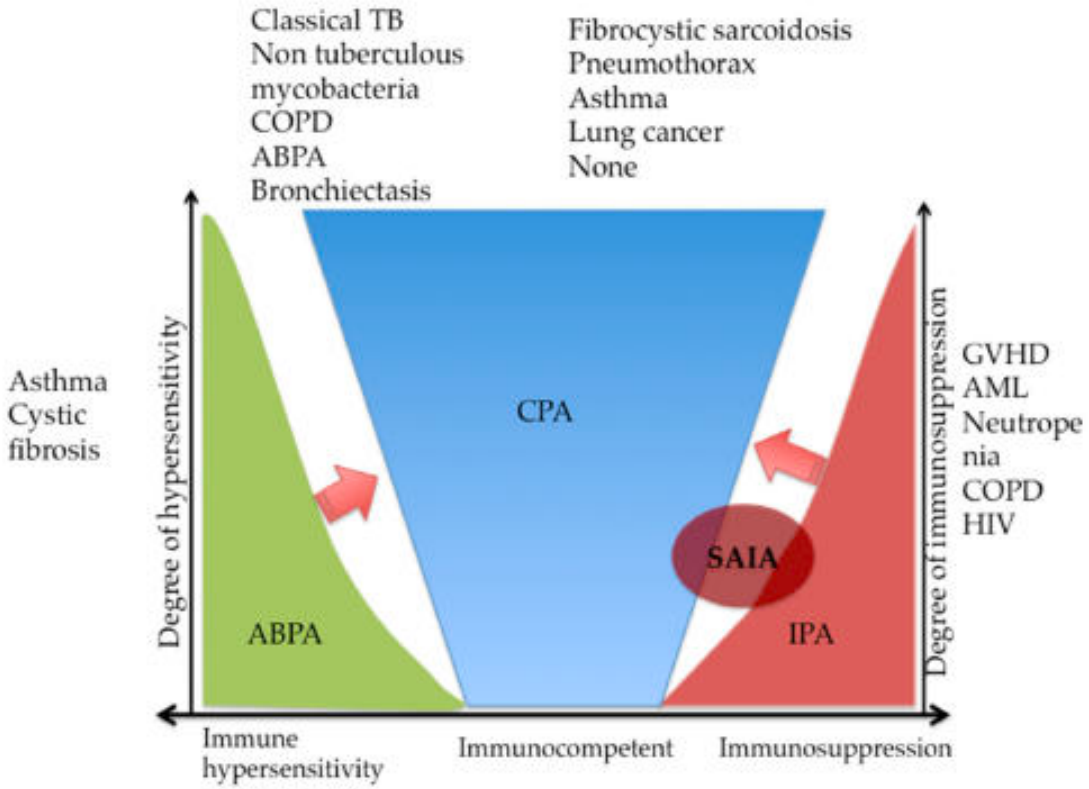
Lg,
Helmut

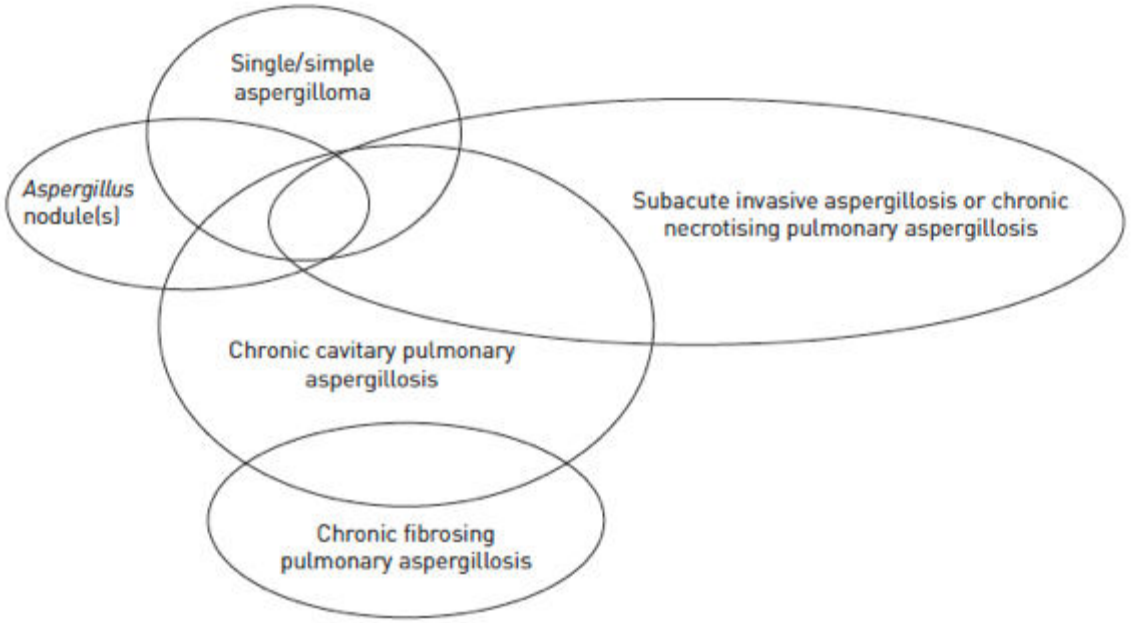
Definition of CPA

- One of more cavities with or without fungal ball or nodules
- Direct evidence of Aspergillus infection (microscopy or culture from biopsy)
- Immunological response to Aspergillus spp.
- Exclusion of alternative dx.
- All at least for 3 months

Denning et al. ERJ 2015

Dx: Chronic pulmonary aspergillosis





Denning et al. ERJ 2015
Bongomin et al. Fungi 2020

Chronic pulmonary aspergillosis – treatment goals

1. To improve symptoms and patients' 'functional status'—quality of life
2. To prevent the progressive destruction of lung tissue and the development of pulmonary fibrosis
3. To arrest or prevent haemoptysis
4. To prevent the emergence of antifungal resistance
5. To avoid antifungal toxicity
6. To reduce death rates and morbidity

Bongomin et al; Fungi 2020

Chronic pulmonary aspergillosis – treatment options
Aspergilloma

Watch and wait
- if no complications

Surgical resection
- if good pulmonary function

Bronchial artery embolisation
- if unfit for surgery and haemotysis

Pharmcotherapy (if no other option)
- preferred azole antifungals

TASK FORCE REPORT
ESCMID/ERS GUIDELINES

CrossMark

Chronic pulmonary aspergillosis: rationale and clinical guidelines for diagnosis and management

David W. Denning[1], Jacques Cadranel[2], Catherine Beigelman-Aubry[3], Florence Ader[4,5], Arunaloke Chakrabarti[6], Stijn Blot[7,8], Andrew J. Ullmann[9], George Dimopoulos[10] and Christoph Lange[11,12] on behalf of the European Society for Clinical Microbiology and Infectious Diseases and European Respiratory Society

Denning et al. ERJ 2015
Monk et al. Thorax 2021

Chronic pulmonary aspergillosis – treatment options
Chronic cavernous pulmonary aspergllosis (CCPA)
Chronic fibrosing pulmonary aspgerillosis (CFPA)

Drug therapy:
Itraconazole
Posacoanzole
Voriconazole

Micafungin
Amphotericin B - liposomal

Surgery:

Experimental therapies:
Interferon gamma
Radiotherapy

Chronic pulmonary aspergillosis: rationale and clinical guidelines for diagnosis and management

- Duration – 6 months to lifelong

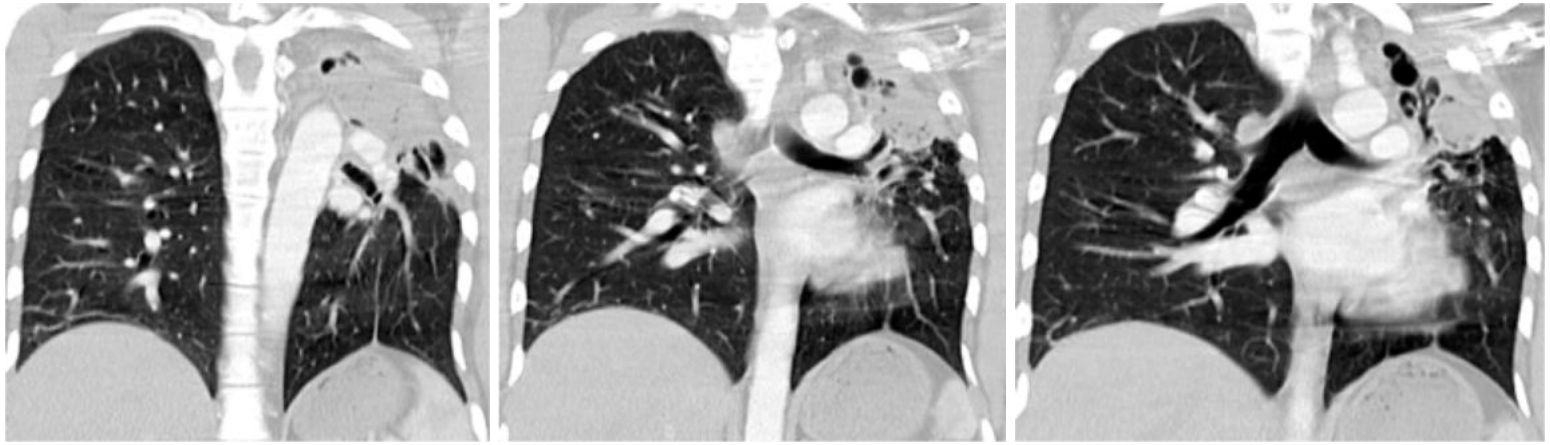
- Co- infection TB / CPA is possible – !! DDI Rifamycin/ Azoles
- Monitoring of Asp. IgG Ab level for treatment response
- Relapse

Denning et al. ERJ 2015
Monk et al. Thorax 2021

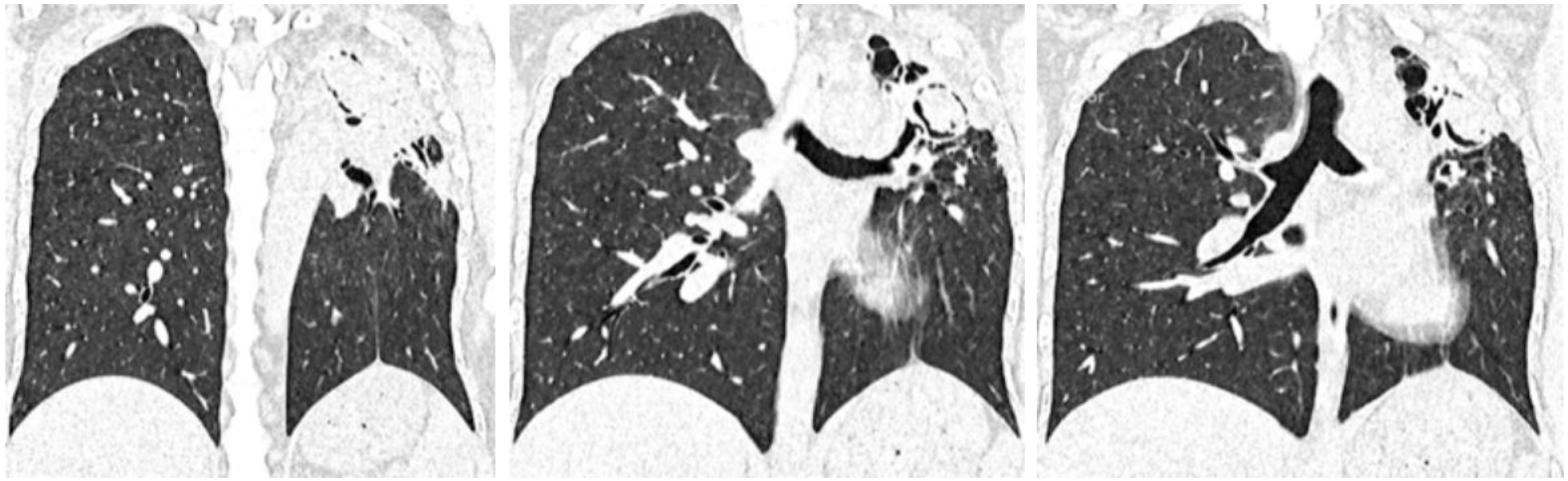
BUT: Chronic pulmonary aspergillosis – treatment options

BL, 34 years, TB in 2013, mMRC 1, never haemoptysis HIV neg.

September 2021



March 2022 after 6 months Itraconazole

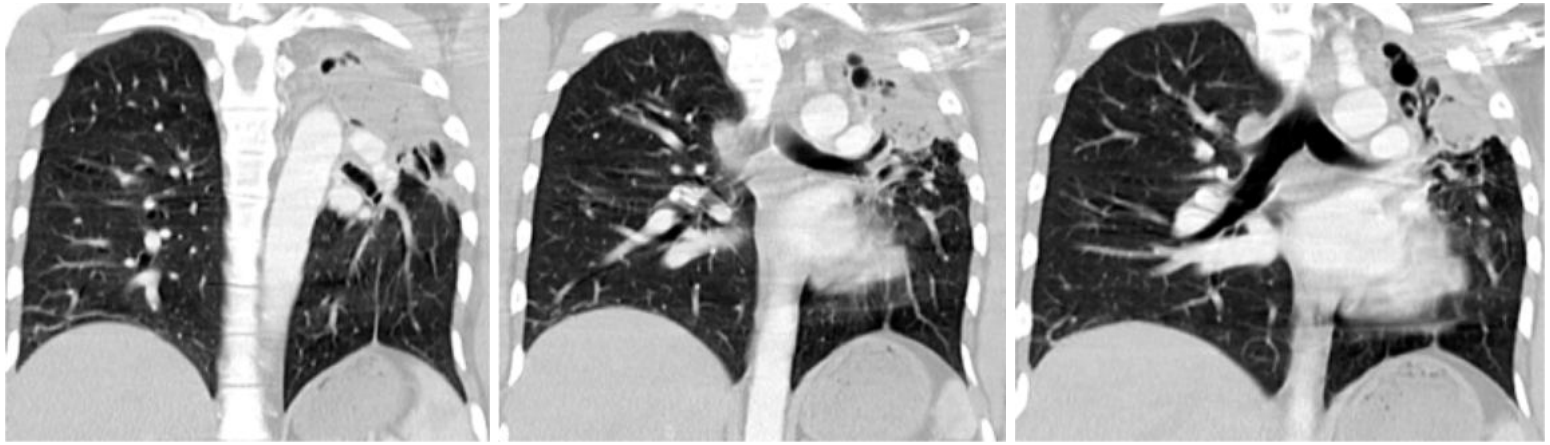


Spirometrie 18.02.22: Tiffenau 79%, FEV1 1.47l (57%), FVC 1.87l (63%)

BUT: Chronic pulmonary aspergillosis – treatment options

BL, 34 years, mMRC 1, never haemoptysis

September 2021



March 2022 after
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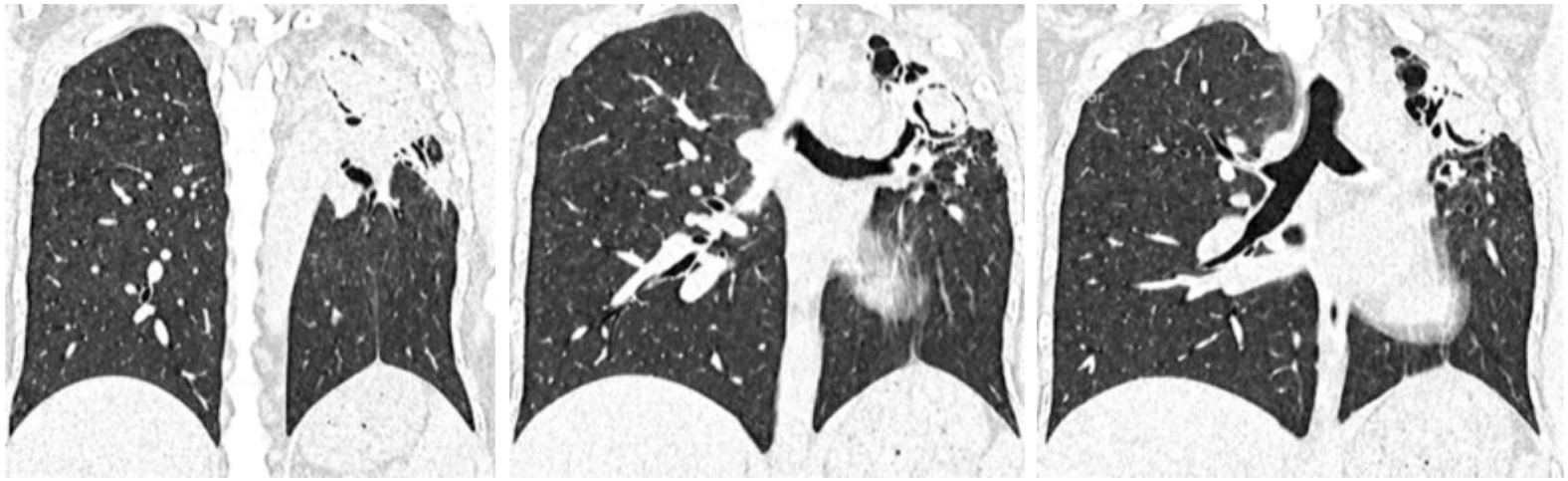
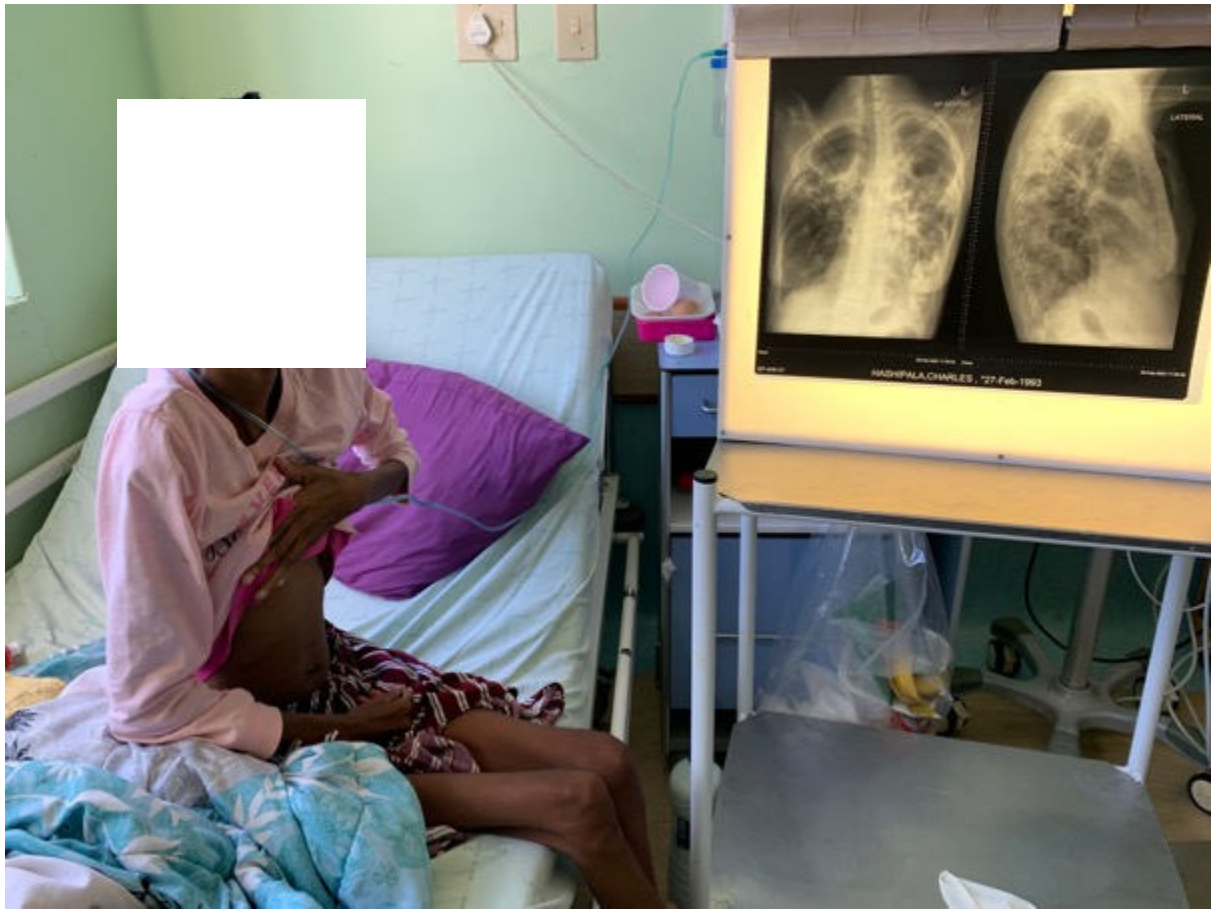
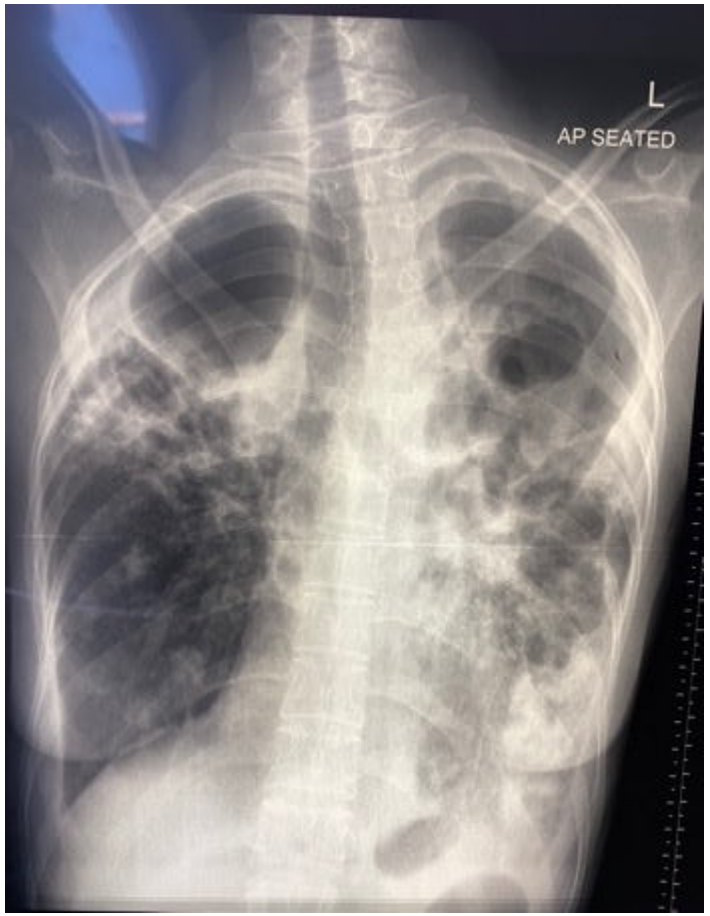


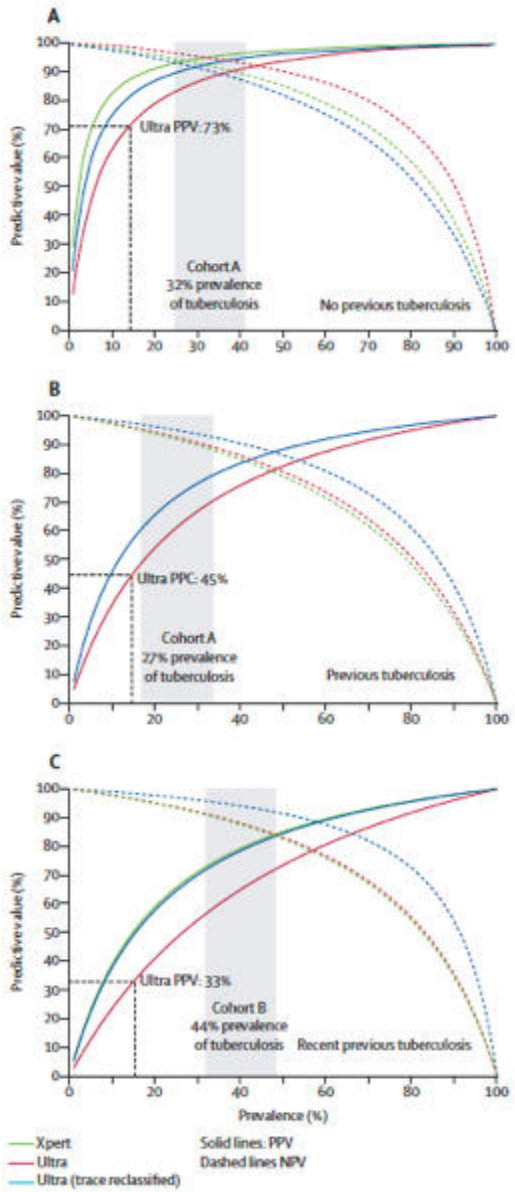
What next??

22 years, 22 kg, completed TB treatment 8 months ago – now Xpert Ultra positive





NAAT positivity post treatment



Xpert and Xpert ultra are often positive in cases with recent TB treatment

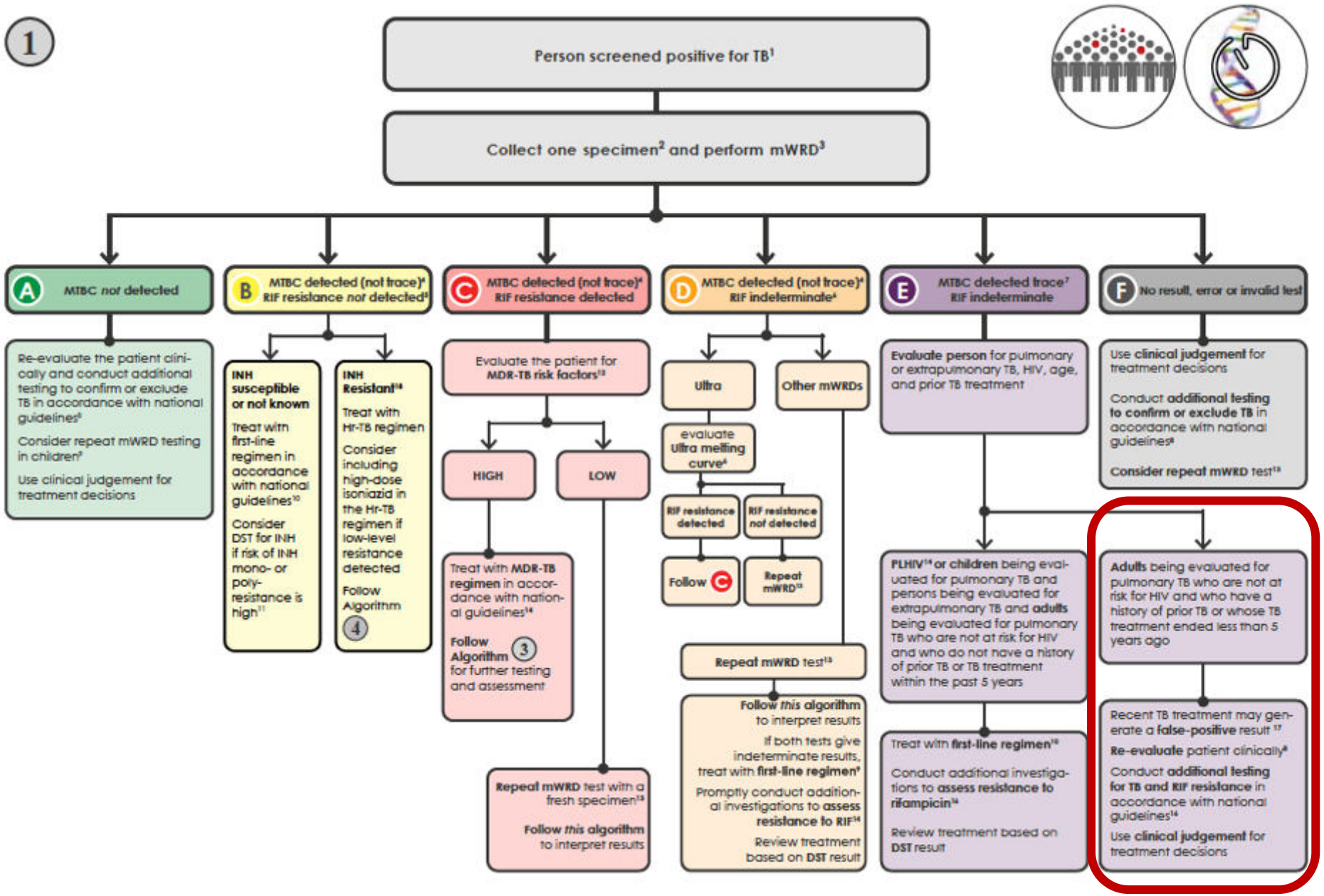
25% patients in screening cohort Xpert ultra + / culture –

50% patients with previous TB (2 y) Xpert ultra + /culture –

Assessing need for treatment is ***very difficult*** in cases of recent TB.

Mishra, Lancet Resp Med 2020

WHO TB diagnostic algorhythm



WHO 2021

Post – TB bronchiectasis

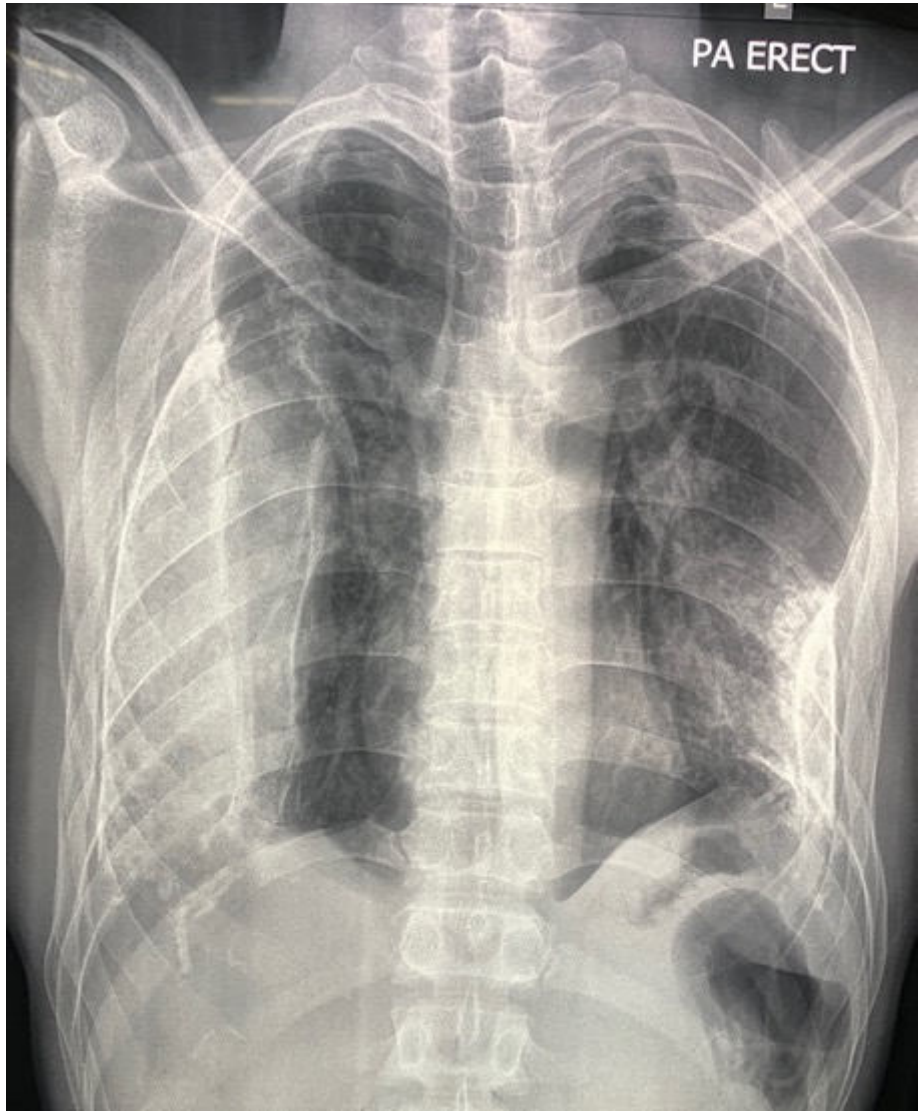
Non tubercoulous mycobacteria

- no data
- in my opinion common
- identified by smear positivity – and negative NAAT (Mtb)
- treatment following ATS/ERS guidelines (Dalay et al, AJRCCM 2021)

Bacterial infections

- analogue COPD / non – CF – bronchiectasis guideline (Polverino, ERJ 2017)
- Pseudomonas aeroginosa

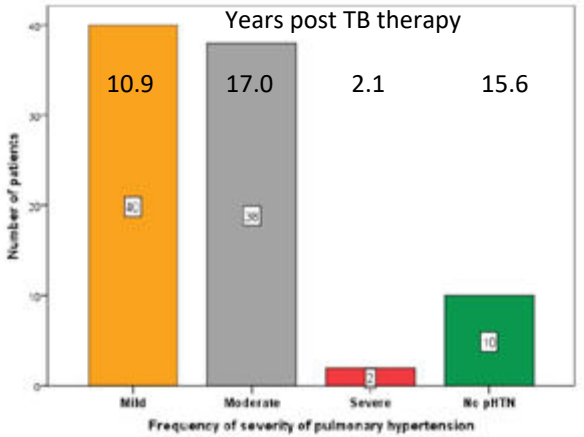
Pleural calcification



Post – TB hypoxia and secondary cor pulmonale

- Very limited data on cardiac consequences of TB

- Ongoing studies:
  - TB Sequel
  - IeDEA consortium
  - StatinTB

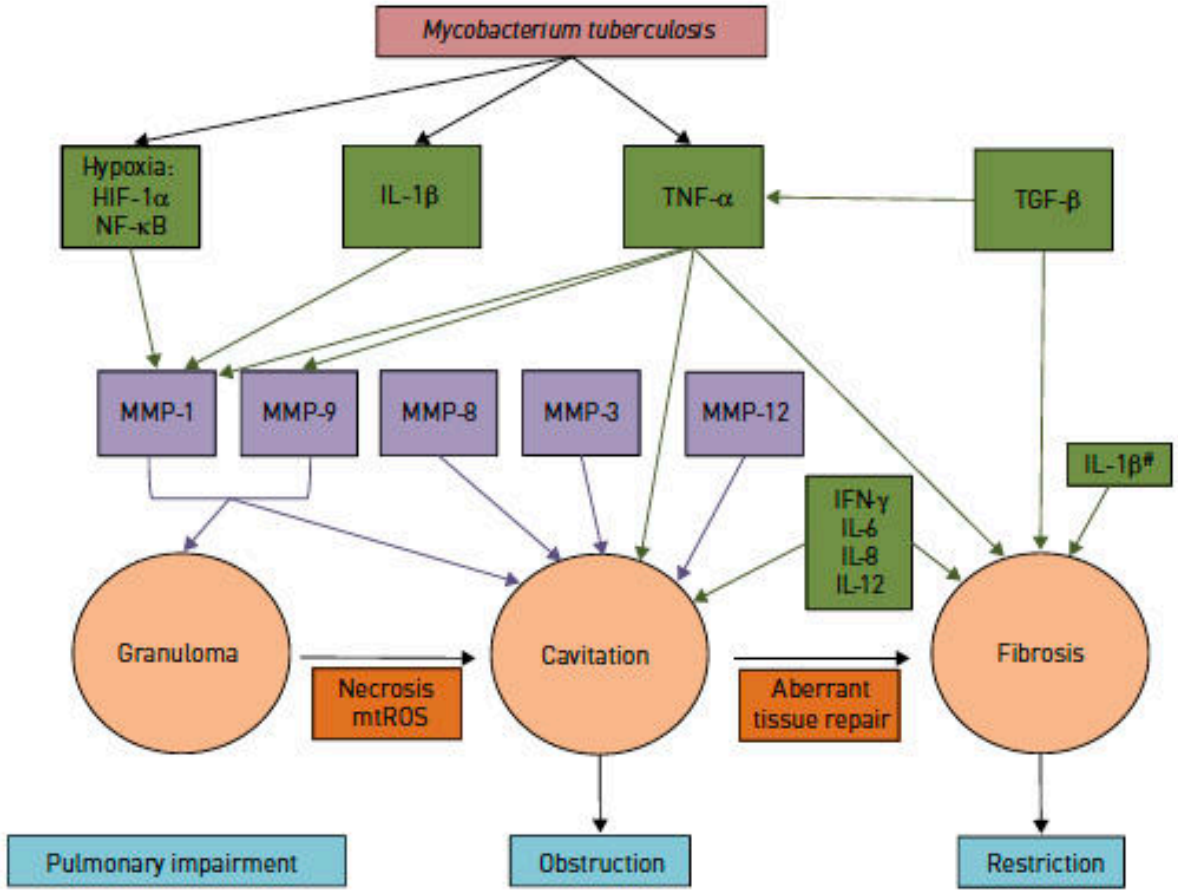


n=90 (Karachi, Pakistan)

- Tx: oxygen, diuretics

Jafri et al, Biology and Medicine 2021

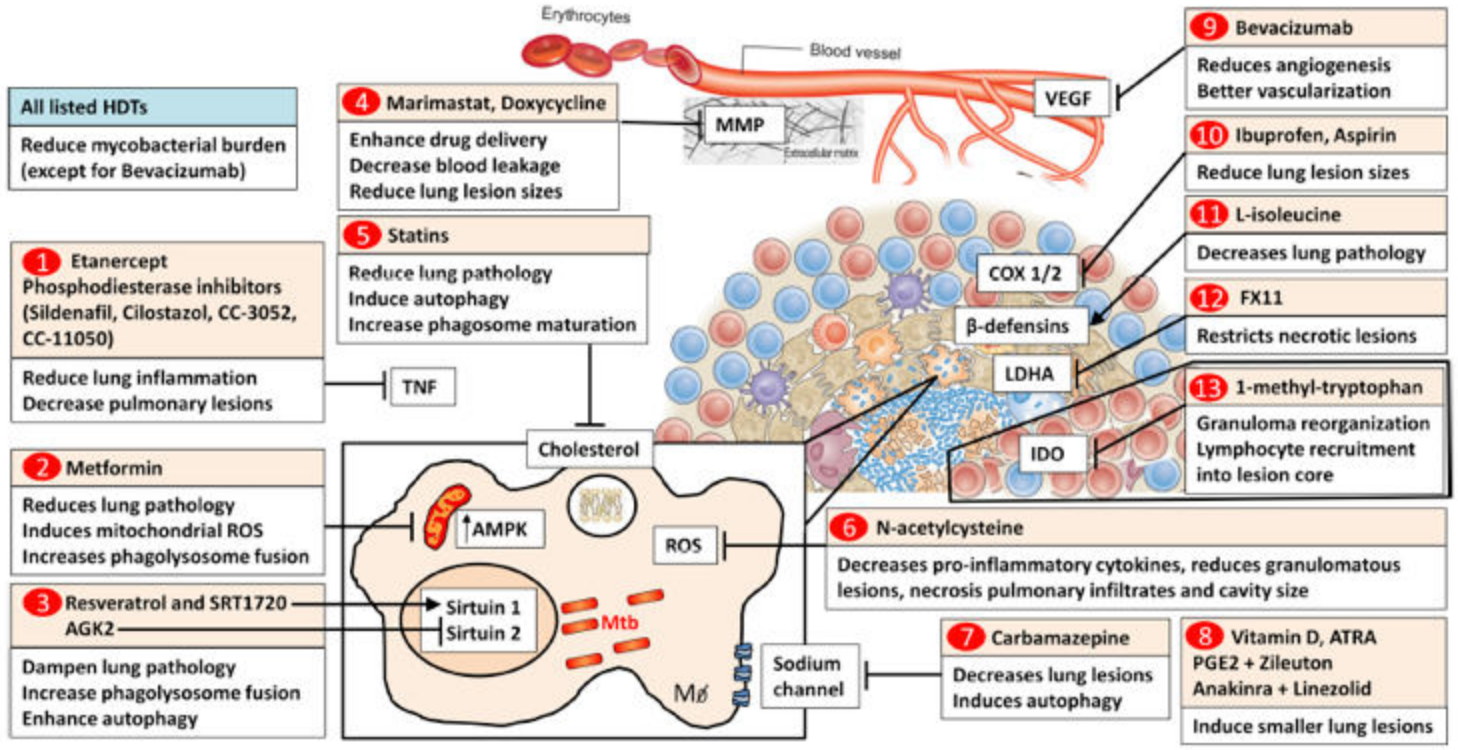
Pathogenesis of PTLD



Host directed therapies

Ravimohan et al, ERR 2017

Host directed therapy of TB/PTLD



Host directed therapies

1. reduce inflammation or interrupt specific mechanisms for tissue damage

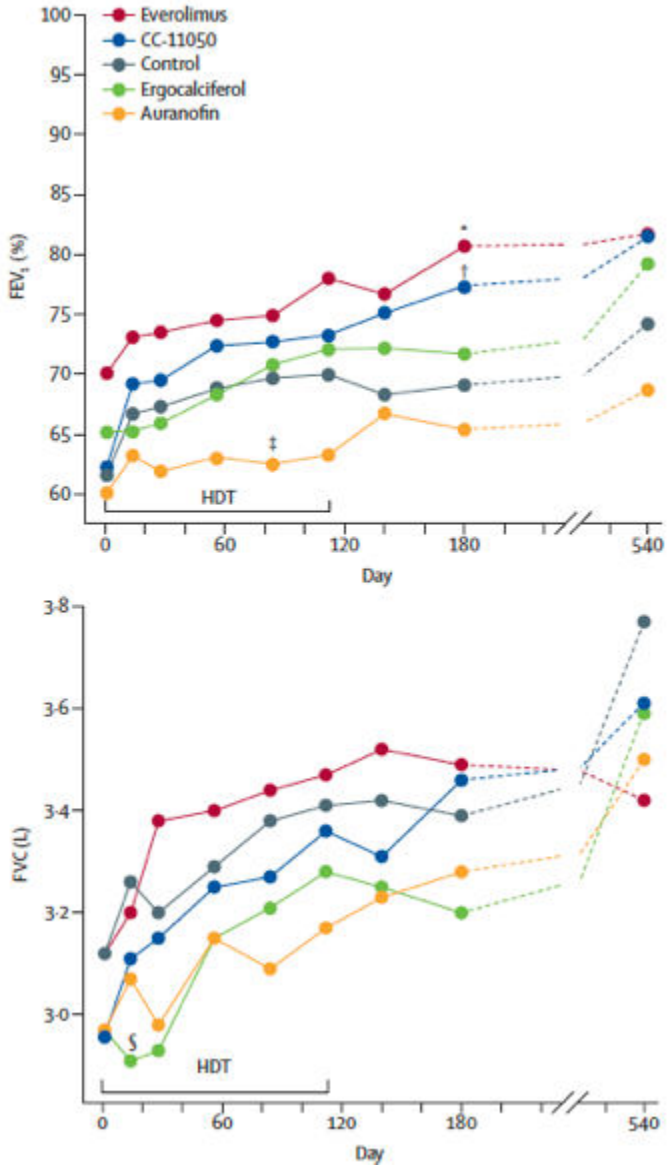
2. induce antimicrobial activity in phagocytic cells.

Guler et al, Front Immunol 2021

Everolimus, CC 10050, (Ergocalciferol, Auranfin) as HDT

RCT – phase II open label

Endpoints:
- safety
- microbiology
- spirometry



- FEV1: 61.7% at baseline
  69.3% at d 180

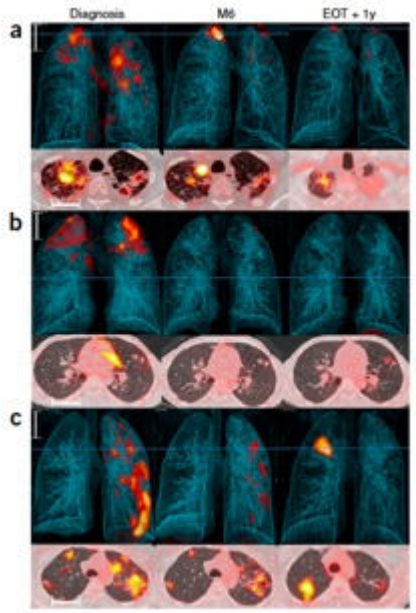
- Everolimus 6.3%
  CC10050 6.5%
  higher FEV1 after 180 d

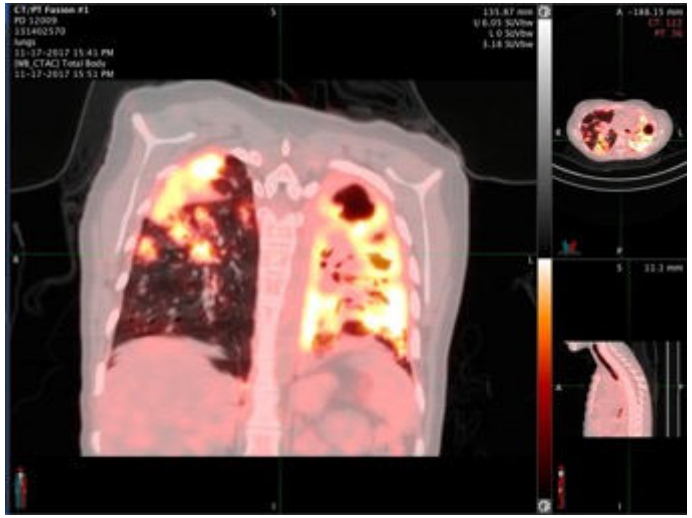
- no effect on culture conversion

- no effect on FVC

Wallis et al, Lancet Inf Dis 2021

Statins in TB HDT

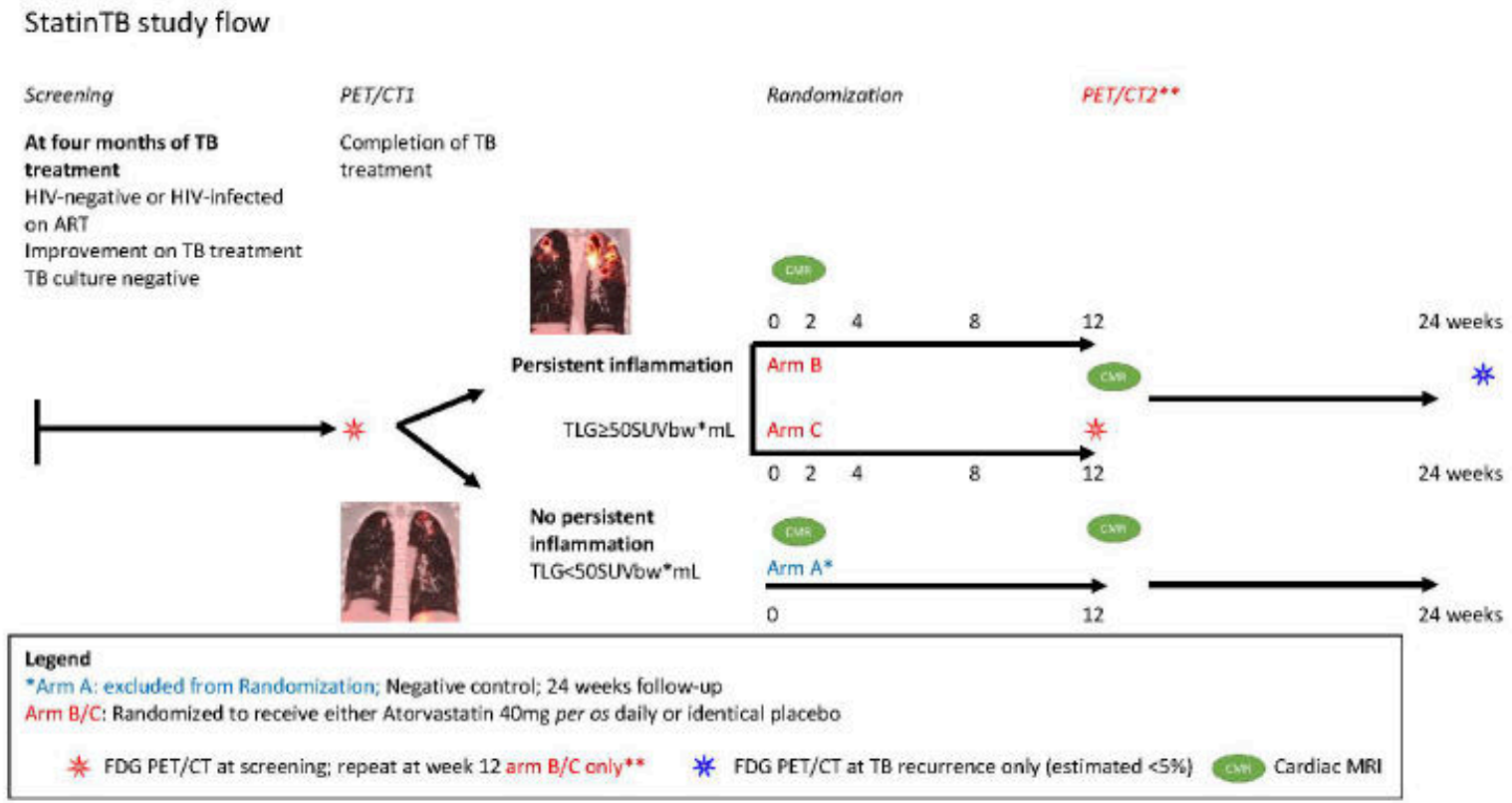




1. Mtb accumulates host cholesterol ester in foamy macrophages
2. Mtb utilizes cholesterol for its persistence within macrophages
3. Statins lower cholesterol in cardiovascular diseases through inhibition of HMG-CoA reductase
4. Statins have broad-range immune-modulatory and anti-inflammatory properties.
5. Pre-clinical models: statins reduced Mtb burden by enhancing autophagy, phagosomal maturation and decreasing pulmonary pathology > suggesting a role for statins as HDT in TB
6. Statins as adjunctive therapy reduces time for TB cure and decreases lung pathology in mice
7. Population-based study of 1 million people: concomitant statin treatment was associated with a decreased risk of active TB

Malherbe et al, Nature Medicine 2016
Parihar et al. Nature Rev Imm 2019

Statins in TB HDT



Courtesy F. Thienemann

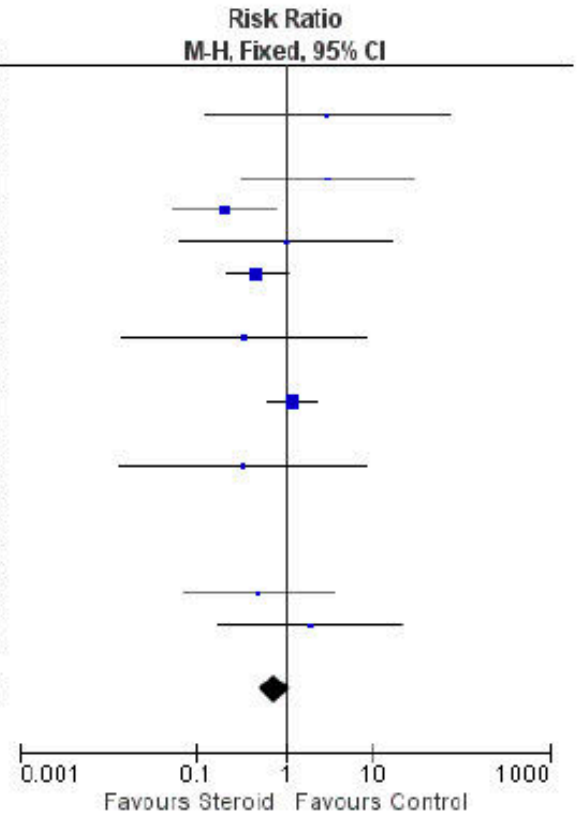
Steroids in Tx of pulmonary TB

Figure 4. Forest plot of comparison: 1 Steroid therapy comparative to either no therapy or placebo, outcome: 1.1 All-cause mortality.

Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Angel 1960	0	54	0	50		Not estimable
Bell 1960	1	45	0	46	1.1%	3.07 [0.13, 73.32]
Bilaceroglu 1999	0	91	0	87		Not estimable
BTA 1961	3	116	1	119	2.1%	3.08 [0.32, 29.16]
De Alemquer 1955	2	14	9	13	20.0%	0.21 [0.05, 0.78]
Horne 1960	1	87	1	90	2.1%	1.03 [0.07, 16.28]
Johnson 1965	7	52	14	50	30.6%	0.48 [0.21, 1.09]
Keidan 1961	0	8	0	8		Not estimable
Malik 1969	0	46	1	48	3.2%	0.35 [0.01, 8.32]
Marcus 1962	0	49	0	51		Not estimable
Mayanja-Kizza 2005	17	93	14	94	29.9%	1.23 [0.64, 2.34]
McLean 1963	0	10	0	11		Not estimable
Nemir 1967	0	58	1	59	3.2%	0.34 [0.01, 8.15]
Park 1997	0	17	0	16		Not estimable
TBRC 1993	0	261	0	269		Not estimable
Toppett 1990	0	15	0	14		Not estimable
USPHS 1965	2	1108	2	566	5.7%	0.51 [0.07, 3.62]
Weinstein 1959	2	51	1	49	2.2%	1.92 [0.18, 20.52]
Total (95% CI)		**2175**		**1640**	**100.0%**	**0.77 [0.51, 1.15]**
Total events	35		44			

Heterogeneity: Chi² = 10.48, df = 9 (P = 0.31); I² = 14%

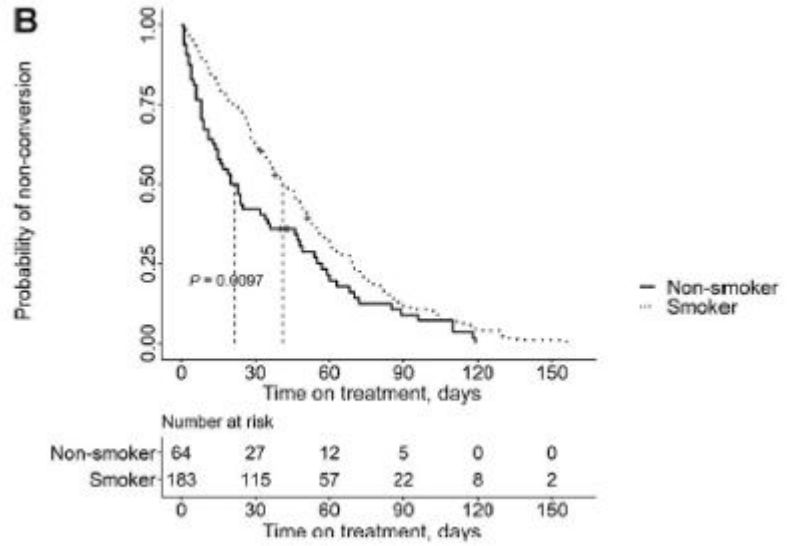
Test for overall effect: Z = 1.30 (P = 0.20)

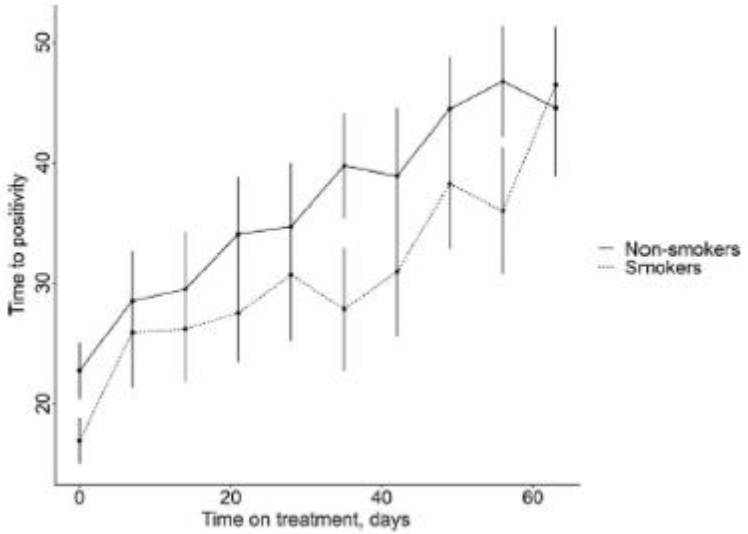


Critchlay et al, Cochrane Review 2014

Rehabilitation, smoking cessation

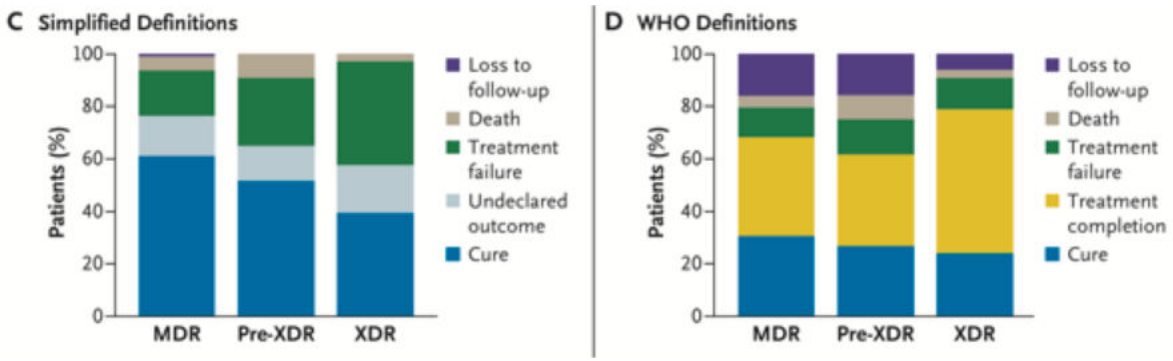
Pulmonary function	Patients with impaired respiratory pattern[#] (n=34)			Patients with normal respiratory pattern (n=9)		
	Pre-pulmonary rehabilitation	Post-pulmonary rehabilitation	p-value	Pre-pulmonary rehabilitation	Post-pulmonary rehabilitation	p-value
Lung function tests						
FEV_1 L	1 [0.8–1.3]	1.1 [0.9–1.4]	<0.0001	2.3 [1.9–2.6]	2.5 [1.9–2.9]	0.21
FEV_1 %	48.3 [38.3–59.6]	53.4 [44.0–65.0]	<0.0001	85.2 [81.0–95.4]	98.1 [85.7–105.6]	0.21
FVC L	2.3±0.9	2.4±0.9	0.09	2.5±0.7	2.8±0.8	0.08
FVC %	73.7±17.7	78.8±16.9	0.003	94.6±16.7	89.5±37.3	0.70
FEV_1/FVC	51.4±15.1	52.4±14.8	0.23	77.6±6.2	81.1±13.8	0.41





Visca et al, ERJ 2019
Reimann et al, IJTLD 2019

Follow up after end of treatment
- When/how to assess TB outcome?-



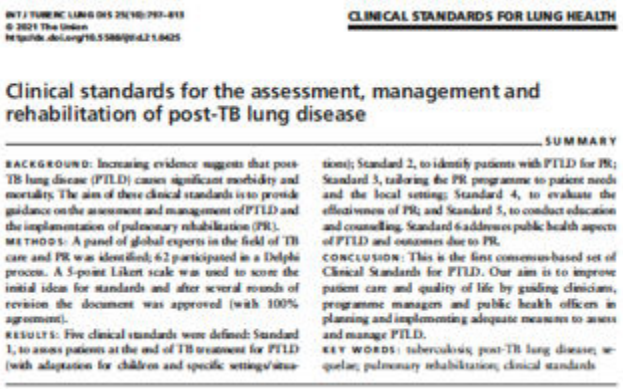
TBNET - Cure: neg. culture at 6 months, no positive culture thereafter and no relapse until 1 year post treatment

An optional definition proposed for use in operational research only

Sustained treatment success

at 6 months (for DR-TB and DS-TB) and at 12 months (for DR-TB only) after successful TB treatment, who is alive and free of TB.

- imaging at end of treatment
- diagnostic tests in post – treatment period
- Post TB treatment essential part of guidelines



CLINICAL STANDARDS FOR LUNG HEALTH

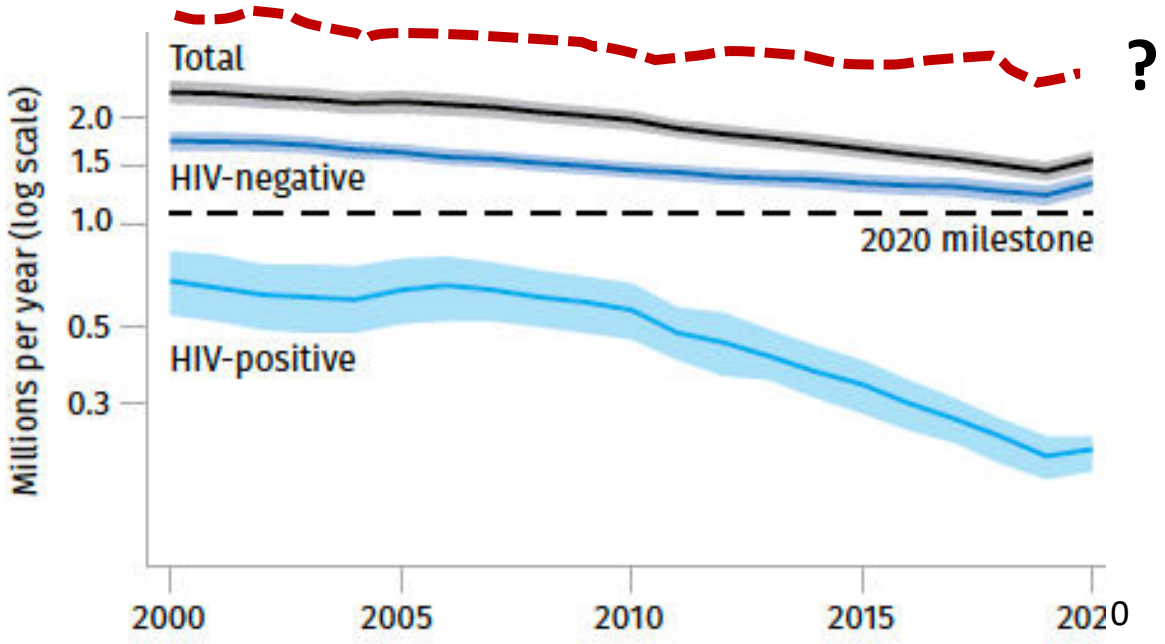
Clinical standards for the assessment, management and rehabilitation of post-TB lung disease

SUMMARY

BACKGROUND: Increasing evidence suggests that post-TB lung disease (PTLD) causes significant morbidity and mortality. The aim of these clinical standards is to provide guidance on the assessment and management of PTLD and the implementation of pulmonary rehabilitation (PR).
METHODS: A panel of global experts in the field of TB care and PR was identified; 62 participated in a Delphi process. A 5-point Likert scale was used to score the initial ideas for standards and after several rounds of revision the document was approved (with 100% agreement).
RESULTS: Five clinical standards were defined: Standard 1, to assess patients at the end of TB treatment for PTLD (with adaptation for children and specific settings/situations); Standard 2, to identify patients with PTLD for PR; Standard 3, tailoring the PR programme to patient needs and the local setting; Standard 4, to evaluate the effectiveness of PR; and Standard 5, to conduct education and counselling. Standard 6 addresses public health aspects of PTLD and outcomes due to PR.
CONCLUSION: This is the first consensus-based set of Clinical Standards for PTLD. Our aim is to improve patient care and quality of life by guiding clinicians, programme managers and public health officers in planning and implementing adequate measures to assess and manage PTLD.
KEY WORDS: tuberculosis; post-TB lung disease; sequelae; pulmonary rehabilitation; clinical standards

Günther et al, NEJM 2016
WHO 2020
Migliori et al. IJTLD 2020

Summary



- PTLD very heterogenous – often quite severe and chronic
- No evidence – only extrapolation
- Management approach should be part of TB guidelines
- Dont forget pyscho-social / occupational aspects

Bienvenue à la 30e édition du symposium sur la tuberculose

- Dr. Jörg Spieldenner: Direktor Lungenliga Schweiz
- Impact of COVID-19 on funds allocated to TB: undertreatment? Unidentified cases?
- Success of the initiative against publicity for tobacco products in CH
- Reminder of situation in Ukrania

LUNGENLIGA SCHWEIZ
LIGUE PULMONAIRE SUISSE
LEGA POLMONARE SVIZZERA
LIA PULMUNARA SVIZRA

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LIA PULMUNARA SVIZRA

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Service de Pneumologie

Hôpitaux Universitaires Genève

Hôpital de La Tour

UNIVERSITÉ DE GENÈVE

TB case management or tuberculosis rarely comes alone
Bea Zacek, LPZ

- Definition of complex cases (language issues, DOT, living conditions, comorbidities, psychosocial issues, MDR/XDR, CT > 12 pers, financial support required..)
- 15-20% of cases in ZH
- Importance of multidisciplinary network : insight regarding specific risk groups/communities..
- Illustrative cases: Tina, Laura, Blerim…

Contact tracing in the canton of Vaud: Reality of the field

Andrée Corbaz, Christophe Chatonnet, and the CUV/DAT team

- Contact tracing after the death of a young erythrean woman at Yverdon's main hospital (ARDS and MOF)

A few points:

- Late discovery of several contacts; multiple sites
- Promiscuity in this community
- Contacts sometimes difficult (language barrier, lack of trust..): communication is a major issue
- 3 secondary active cases , and 5 LTBI out of 77 persons tested

LUNGENLIGA SCHWEIZ
LIGUE PULMONAIRE SUISSE
LEGA POLMONARE SVIZZERA
LIA PULMUNARA SVIZRA

Contact tracing in the canton of Vaud: Part 2

- Index case: F26, S+,PCR+,C+, cavitary
- Diagnosis 6 months after COVID with persisting symptoms
- *Organizing the contact tracing/testing: a time-consuming process*
- *Importance of reassuring the environment*
- 61 persons announced as contacts: 37 screened, 4 LTBI
- No case of LTBI in professionnal environment

LUNGENLIGA SCHWEIZ
LIGUE PULMONAIRE SUISSE
LEGA POLMONARE SVIZZERA
LIA PULMUNARA SVIZRA

LUNGENLIGA SCHWEIZ
LIGUE PULMONAIRE SUISSE
LEGA POLMONARE SVIZZERA
LIA PULMUNARA SVIZRA

LUNGENLIGA SCHWEIZ
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LEGA POLMONARE SVIZZERA
LIA PULMUNARA SVIZRA

Tuberculosis in Switzerland

Nathalie Gasser

- Actors in TB screening and detection:
  - BAG/OFSP; SEM; TB competence center (LPS)
- Functions of the TB competence center (LPS) and ist members
- 2020: 371 TB cases (-13%/2019), incidence of 4.7/10E5 (vs 127 worldwide)
- 71%: pulmonary; 28% ET; most cases between 20 & 50 yrs
- 40 %: S+/C+; 6%: S-/C-; 72% confirmed bacteriologically
- In high-income countries, about 80% of cases are bacteriologically confirmed
- 197 CT procedures: 1353 tested, 171 infected (12.6%)
- 82% of those infected started a treatment; 90% completed it
- Ukraine-Info

Jahr	2016	2017	2018	2019	2020
Anzahl Umgebungsuntersuchungen	**274**	**295**	**272**	**268**	**197**
Infizierte					
Anzahl getestete Personen	**2378**	**3207**	**2717**	**2744**	**1353**
Gelten als infiziert: bestätigte THT+ mit IGRA	32	20	14	1	9
Gelten als infiziert: Total THT+ ohne IGRA-Bestätigung	23	24	14	23	11
IGRA+: gelten als infiziert	331	399	297	250	151
Gelten total als infiziert	**386**	**443**	**325**	**274**	**171**
Infizierte in % der get. Personen	**16.2%**	**13.8%**	**12.0%**	**10.0%**	**12.6%**
Nicht Infizierte					
Gelten total als nicht infiziert	**1992**	**2764**	**2382**	**2470**	**1180**
Nicht Infizierte in % der get. Personen	**83.8%**	**86.2%**	**87.7%**	**90.0%**	**87.2%**

Tuberculosis in Switzerland

TB and Ukrania

- Incidence TB in Ukrania: 73/100’000
- MDR: 13% (CH: 1.3%)
- Info on home page TB Competence Center
- Call for donations

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Tests and treatments of pediatric contacts of TB cases in Switzerland: JP Zellweger

TB in children:

- Rare in low incidence countries
- High risk of progression in younger children (cf mortality in newborn from mothers with untreated TB: 100%)
- Risk very high < 5 yrs, decreases in teenagers, increases in young adults
- Risks of TB increases with size of TST
- TST: good NPV
- ET forms rare
- Emerge from recent exposure: marker of transmission in local population
- High preventive efficacy of treating LTBI in children < 5 years
- Still a long way to go…

Tests and treatments of pediatric contacts of TB cases in Switzerland
JP Zellweger

Swiss Recommendations:

- Children < 5 years: immediate treatment (INH) until LTBI/TB excluded
- Children 5 - 12 years: immediate assessment and at 2 months
- Children > 12 years: assessment at 2 months
- High impact of treatment for LTBI
- Worldwide, ≈ 25% of treatments indicated are implemented

Proportion of children examined and treated in comparison with recommendations of LPS/OFSP/BAG: JP Zellweger

Age group	SLA/FOPH recommendations	This survey
0-4 years	Immediate clinical examination including CXR Immediate testing Isoniazid prophylaxis if negative Re-testing at 2 months Preventive treatment if infected	**40/64 (63%)** **49/64 (77%)** **30/59 (51%)** 55/60 (92%) 4/4 (100%)
5-11 years	Immediate testing Re-testing at 2 months if negative Preventive treatment if infected	**58/108 (54%)** 76/92 (83%) 16/16 (100%)
12-17 years	No immediate testing Testing at 2 months Preventive treatment if infected	89/229 (39%) **134/222 (60%)** **12/15 (80%)**

2019-2021

1557 TB contacts

401 children among TB contacts

7(1.7%) active TB cases exposed at home, Med age: 3
All infected at home

35 (9%) LTBI cases;
Med age: 10; 32 treated
Mixed origin of infection

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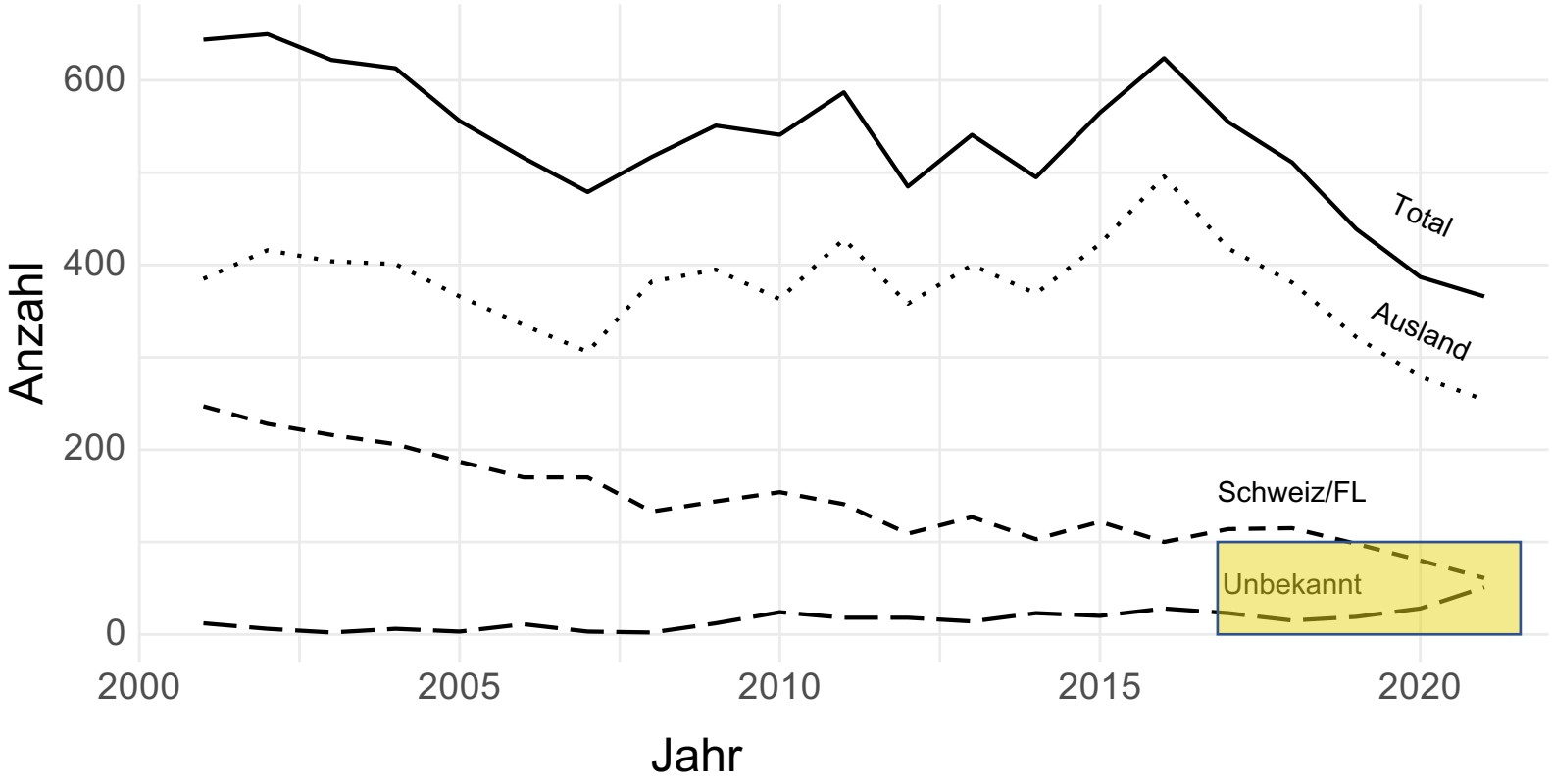
Tuberculosis: Treatment Outcomes in Switzerland: 2016-2020

Time course of cases of tuberculosis

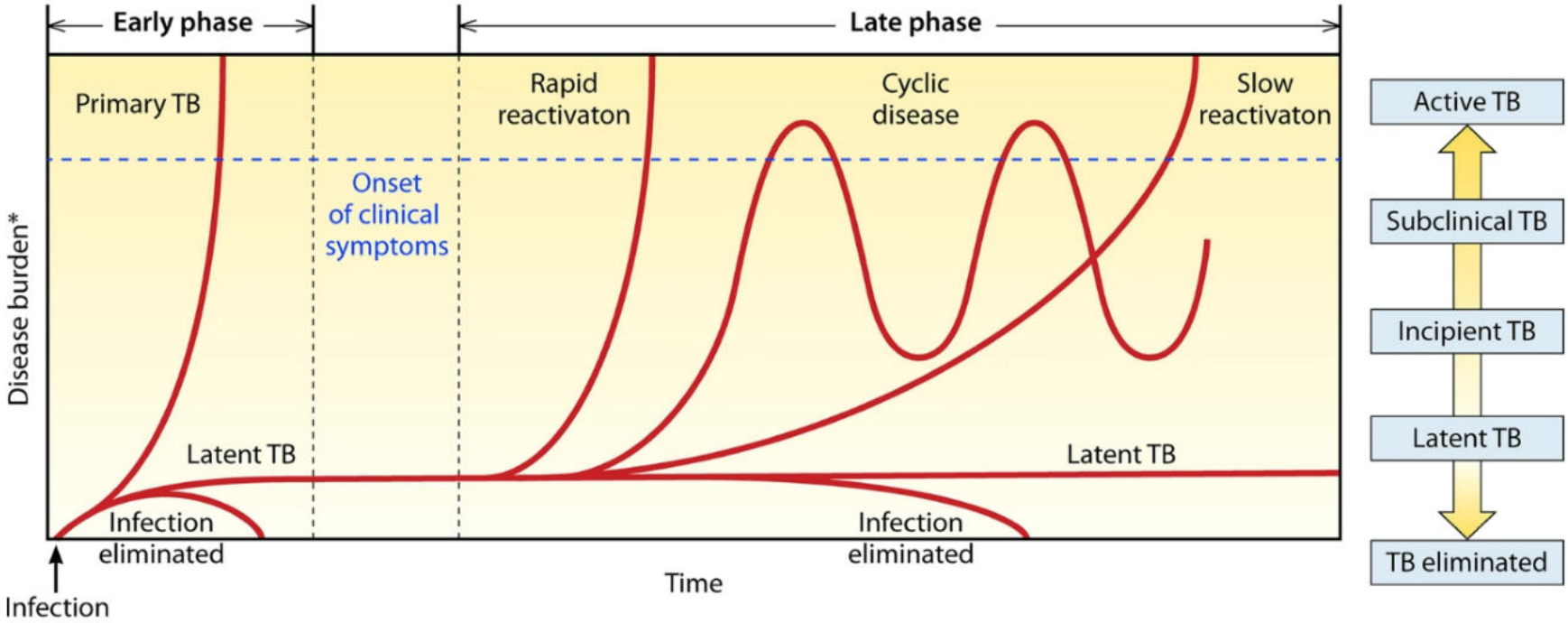


Summary

- The downward trend in TB in CH continues. 2021: 366 cases, 5 MDR; 9 died over 5 years
- Young adult men with a migration background are particularly affected. They come mainly from the Horn of Africa
- Most cases are observed in the populous cantons (ZH, BE, GE, VD).
- RR/MDR-TB is rare.
- TB mainly affects the lungs (70%). The proportion of "unknown" treatment outcomes is high and will increase significantly in 2020. This is particularly the case for the over-64s (F>M).
- ***Results of treatment in CH under WHO target of 85% for combination of cured and completed***

Subclinical Tuberculosis in Children: Diagnostic Strategies for Identification Reported in a 6-year National Prospective Surveillance Study

Swiss-TB award: Nora Fritschi, Basel

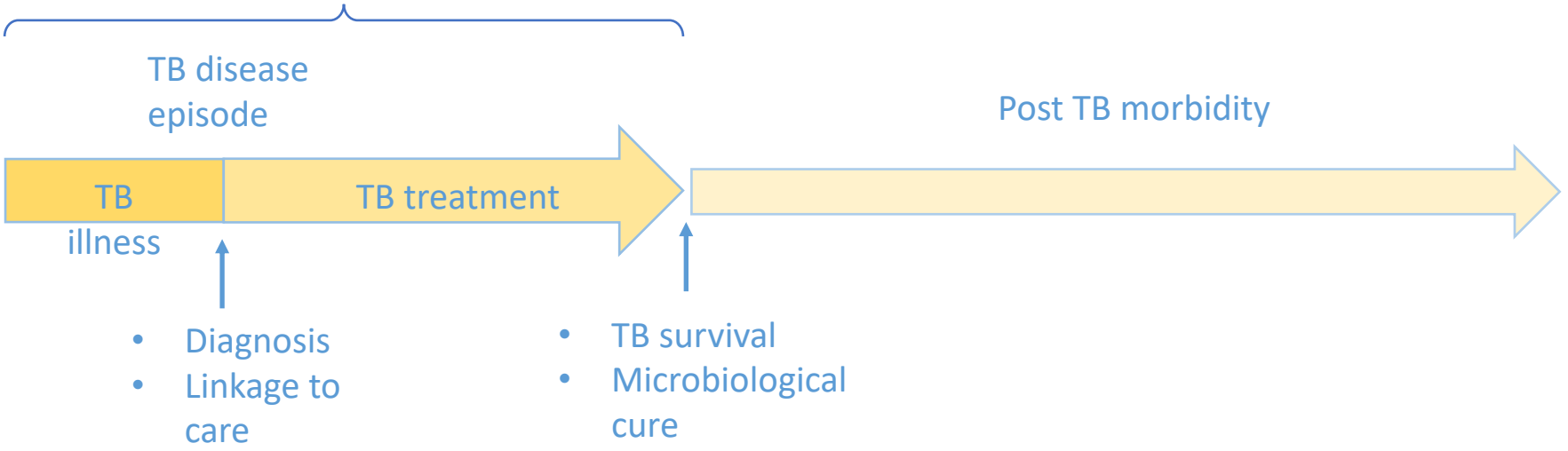


*Rising TB burden implies an increase in abundance of TB and pathogen biomarkers, compartment-specific changes in immunological responses, and a decrease in the probability of disease resolution in the absence of treatment.

Subclinical Tuberculosis in Children: Diagnostic Strategies for Identification Reported in a 6-year National Prospective Surveillance Study
Swiss-TB award: Nora Fritschi, Basel

- A notable proportion of children in our cohort had subclinical TB.
- This highlights the importance of non-symptom based TB case finding in exposed and refugees from high-TB-prevalence settings.
- (N=138 children: sub-clinical in 1/3 of children (43), 94 symptomatic)

Post-tuberculosis morbidity: The size of the problem
Dr Jamilah Meghi, Cambridge University Hospitals & Liverpool School of Tropical Medicine



"When we started tuberculosis treatment, no-one told us that it would never leave us"

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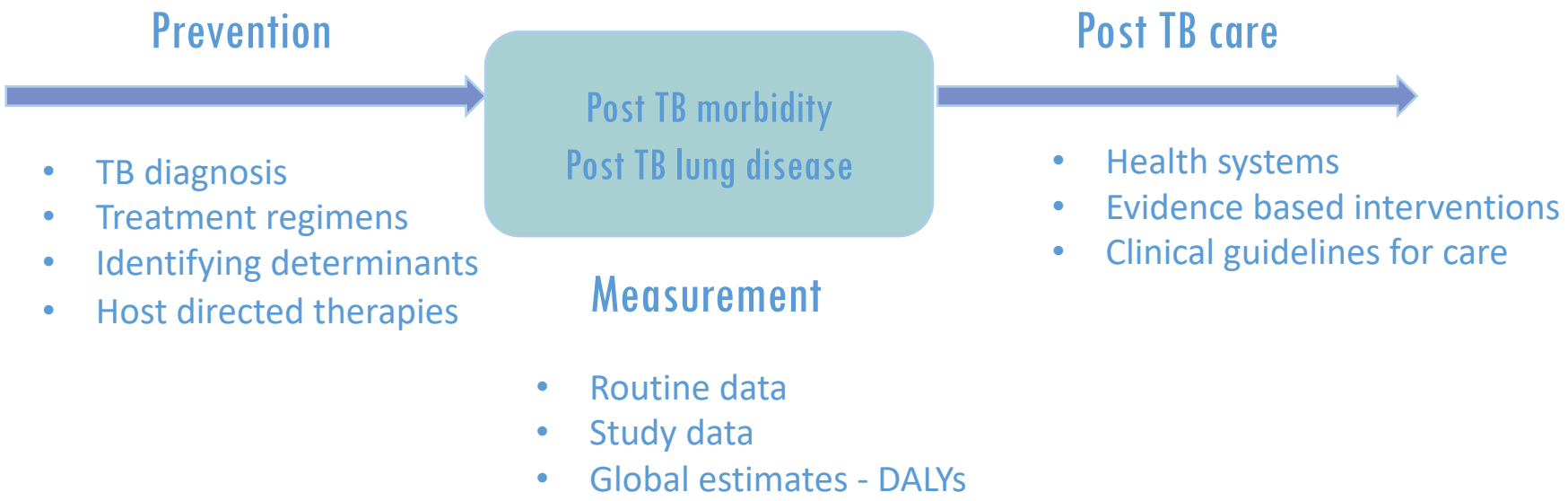

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Dr Jamilah Meghi

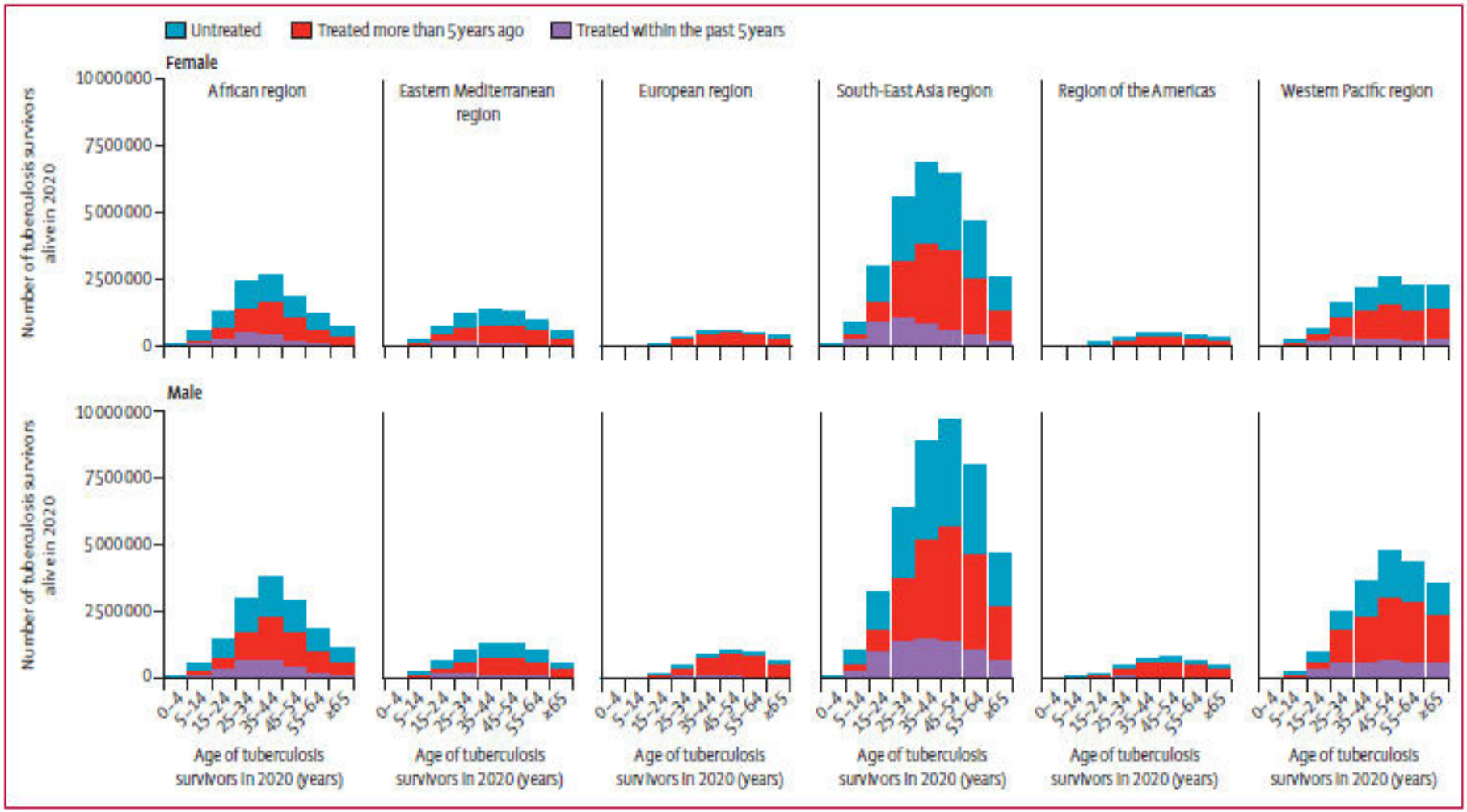


Figure 3: **Numbers of tuberculosis survivors alive in 2020 by age in 2020, sex, WHO region, and tuberculosis treatment status**

Dodd et al, Lancet Infect Dis2021

155 million TB survivors worldwide in 2020

Dr Jamilah Meghi

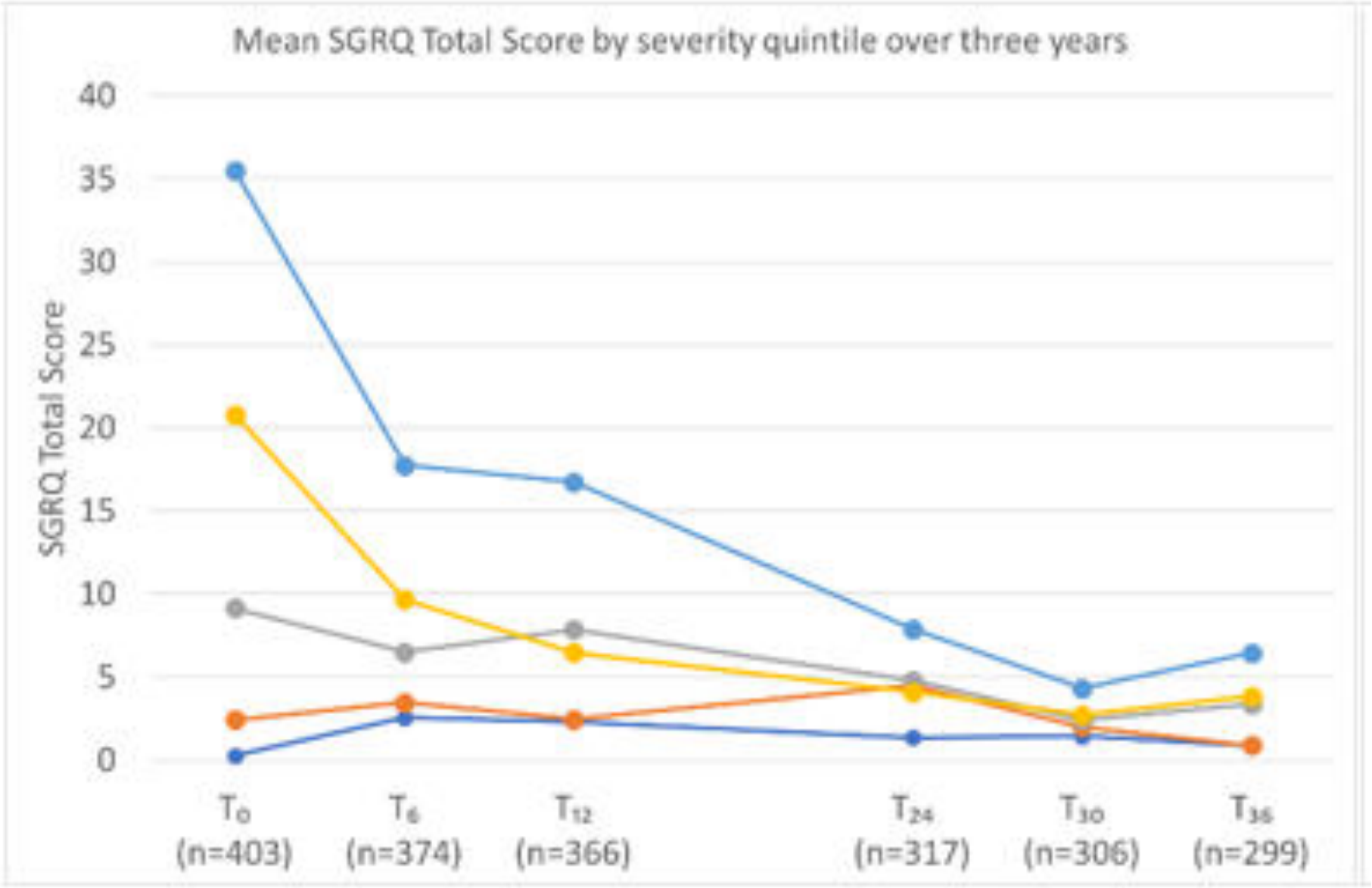
Table 3 Suggested PTLD clinical patterns with preliminary definitions (all categories are assumed to meet basic PTLD minimum case definition)

Compartment	Clinical patterns	Suggested definition*
Airways	TB-associated obstructive lung disease	Airway obstruction (FEV_1/FVC ratio < 0.7 OR < LLN) thought to be primarily related to small airway disease
	Bronchiectasis	CT definition (evidence of airway dilatation) > diameter of adjacent vessel, or non-tapering, OR CXR definition (evidence of ring and tramlines)
Parenchyma	Cavitation	A gas-filled space either within an area of pulmonary consolidation, or surrounded by a thin wall
	Parenchymal destruction	Extensive destruction of lung tissue, with a gas-filled space occupying the volume of ≥1 lobe
	Fibrotic change	Areas of parenchymal scarring, with associated volume loss
	Aspergillus-related lung disease	Evidence of aspergilloma on imaging OR chronic pulmonary aspergillosis on imaging and blood testing
Pleural	Chronic pleural disease	Evidence of pleural thickening on CXR or CT imaging
Pulmonary vascular	Pulmonary hypertension	Elevated pulmonary artery pressures as estimated using doppler echocardiography or measured at right heart catheterisation

Allwood et al, IJTLD 2020

Post-TB Morbidity

- Physical morbidity (Post TB lung disease, ET TB, CNS)
- Psychosocial morbidity
- Economic morbidity, unemployment..
- Comorbidities
- Recurrent TB disease
- Post TB mortality
- Frequent disability at T0, incomplete recovery,
- «Fourth TB 90»



Dr Jamilah Meghi

Tomeny et al, Under review

The clinical spectrum of post-TB lung disease

Brian Altwood
Stellenbosch University & Tygerberg Hospital, South Africa

- Prevalence of mental health disorders (depression, PTSD, A&D, psychosis..): 23%
- Airway disease: bronchiectasis, TB-associated OLD*, small airway disease
- Parenchyma: cavitation, destruction, fibrosis, aspergillus related (CPA, hemoptysis, aspergilloma..)
- Pleura: chronic pleural disease, calcifications, restriction
- Pulmonary hypertension
- Other…
- Poor correlation between symptoms, lung function and radiology
- Risk of recurrent TB: 2290/100'000 person years vs. PTLD exacerbation..
- Issue of false + GeneXpert results..

*: Airway trapping on CT

INT J TUBERC LUNG DIS 23(5):552–554
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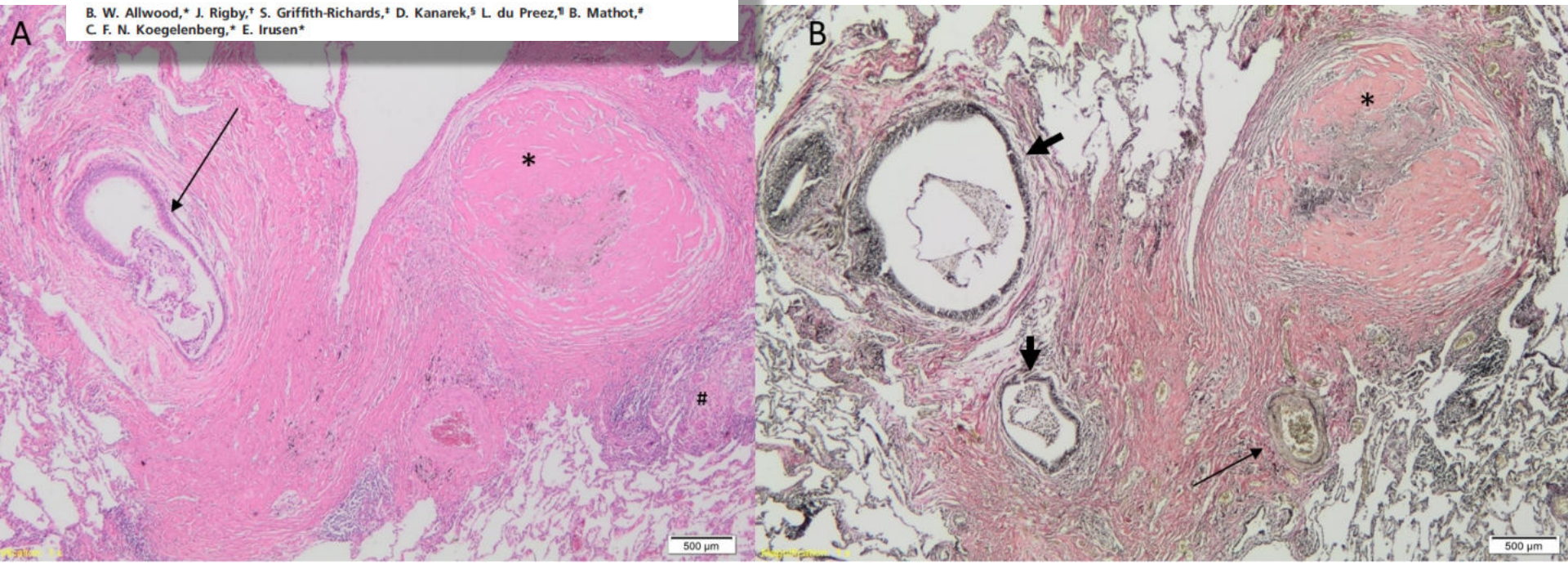
CASE STUDY

Histologically confirmed tuberculosis-associated obstructive pulmonary disease

B. W. Allwood,* J. Rigby,† S. Griffith-Richards,‡ D. Kanarek,§ L. du Preez,¶ B. Mathot,# C. F. N. Koegelenberg,* E. Irusen*

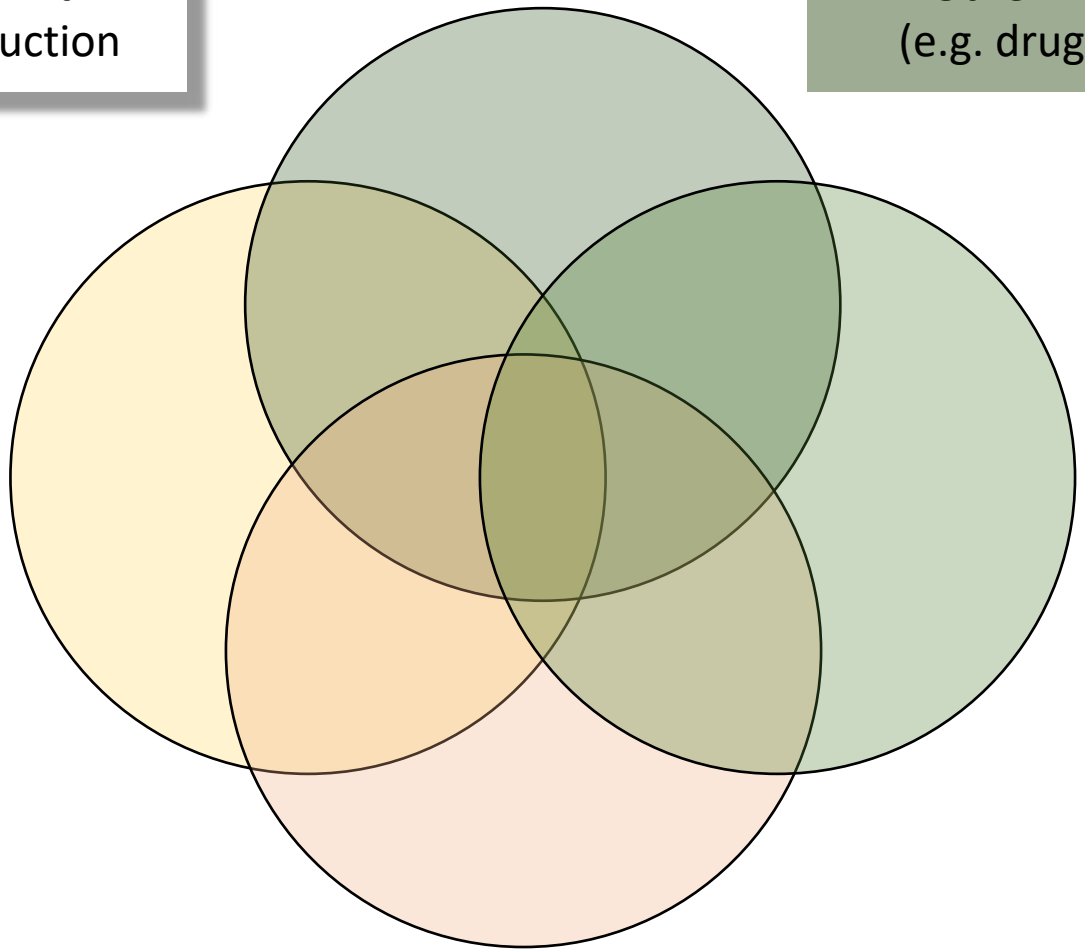


Brian Altwood

The post-TB patient with chronic airflow obstruction

?

Other inhalations (e.g. drugs, biomass)



Smoking

"TOPD"

Bronchiectasis

Brian Altwood

Mangament of pateints with post-TB lung disease

Gunar Günther
Inselspital, Bern and Katutura Hospital Windhoek, Namibia

- Excellent review of representative cases of post-TB sequellae in young adults in Namibia

Summary

- Have a safe trip home!
- See you next year!!

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