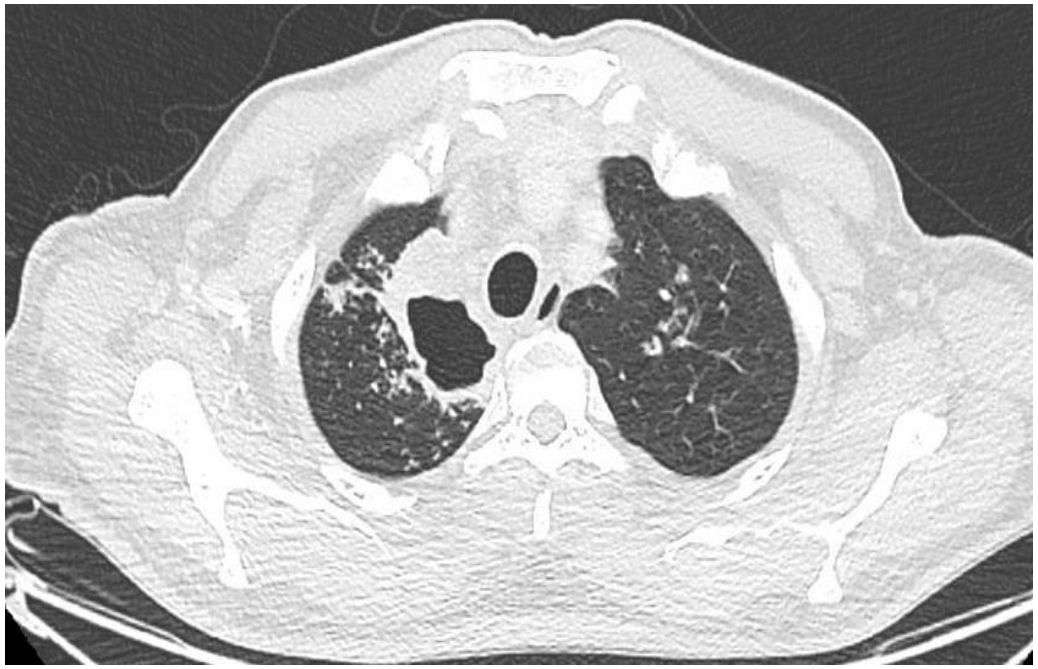
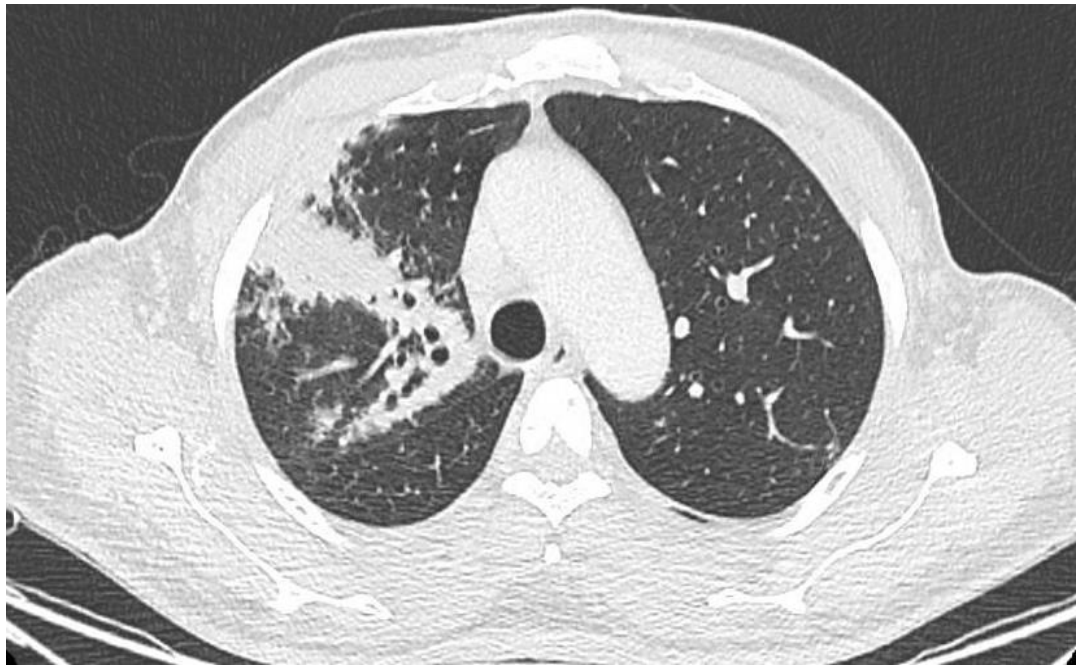
Quelques situations cliniques

DES Pneumologie

17/02/2023

Thomas Maitre





Patient de 69 ans, originaire du Congo, en France depuis 10 ans
ATCD : diabète de type 2
Hospitalisé pour hémoptysie de moyenne abondance, toux chronique et asthénie

>100 BAAR/ champs
PCR *M. tuberculosis* +, *RpoB* WT

A M1
Persistance des symptômes (toux et asthénie)

Des idées ?

A M1
Persistance des symptômes (toux et asthénie)

Des idées ?

Bonne observance
Dosages pics RMP et INH corrects
Vous récupérez l'antibiogramme initial

Culture milieux liquides			
Milieu liquide à 37°C			**Positive**
Culture et ou identification			
–			**1.Mycobacterium tuberculosis complex Présence** **2.Mycobacterium tuberculosis complex Présence** 1. 2.
Mutation dans le gène gyrA			**Absence d...**
Mutation dans le gène gyrB			**Absence d...**
Mutation dans le gène rpoB			**Absente, ...**
kit MTB/RIF (Cepheid)			**Positif**
Mutation dans le gène rrs			**Absence d...**
Mutation dans le gène rpoB			**Absence d...**
Mutation dans le gène katG			**Absence d...**
kit TB MPT64 (Eurobio)			**Complexe... Complexe...**
Kit MTBDRsl (Biocentric)			**Complexe...**
Kit MTBDRplus (Biocentric)			**Complexe...**
Mutation dans le gène inhA			**Présente, ...**
Antibiogramme			**Effectué e...**
Mutation dans le gène embB			**Absence d...**
Isoniazide (0,4 µg/mL)			**R**
Streptomycine (4 µg/mL)			**R**
Isoniazide (0,1 µg/mL)			**R**
Rifampicine (1 µg/mL)			**S**
Pyrazinamide (100 µg/mL)			**S**
Ethambutol (5 µg/mL)			**S**
Streptomycine (1 µg/mL)			**R**

Résistance de haut niveau à l'isoniazide

Mono-résistance à l'INH

Pas si rare :
-**7%** des nouveaux cas
-**8-11%** si ATCD de traitement

FDR : ATCD de traitement, autre résistance, certaines régions géographiques

Phénotype « pré-MDR »
Justifie inclusion EMB dans le régime

Factors associated with isoniazid-monoresistance among 99 case-patients with isoniazid-monoresistant tuberculosis and 99 control-patients with drug-susceptible tuberculosis: multivariable logistic regression.

Explicative variable	OR (95% CI)	*P*
Sex (female)	2.2 [1.002–4.7]	0.05
Birth in WHO West Pacific Region	4.6 [1.1–18.7]	0.03
Psychiatric troubles	0.0	0.99
Miliary tuberculosis	3.2 [0.9–10.7]	0.07
Resistance to streptomycin	77.5 [10.1–594.4]	<0.001

WHO = World Health Organization; OR = odds ratio.

M. Bachir, L. Guglielmetti, S. Tunesi et al.
International Journal of Infectious Diseases 107 (2021) 86–91

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http://dx.doi.org/10.5588/ijtld.16.0843

Isoniazid-monoresistant tuberculosis is associated with poor treatment outcomes in Durban, South Africa

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Mono-résistance à l'INH :
FDR d'évolution défavorable

Table 2 Adjusted logistic regression models for four treatment outcomes, $n = 16\,784$* for each model

	Failed		Died		Failed + died		Success†	
	aOR (95%CI)	*P* value	aOR (95%CI)	*P* value	aOR (95%CI)	*P* value	aOR (95%CI)	*P* value
INH monoresistance	6.84 (4.29–10.89)	<0.001‡	1.81 (1.11–2.95)	0.02‡	3.19 (2.28–4.46)	<0.001‡	0.74 (0.62–0.88)	0.001‡
Age (per year)	1.00 (0.98–1.01)	0.60	1.03 (1.02–1.04)	<0.001‡	1.02 (1.01–1.03)	<0.001‡	1.01 (1.01–1.02)	<0.001‡
Female sex	0.68 (0.45–1.04)	0.08	1.05 (0.82–1.34)	0.71	0.93 (0.75–1.15)	0.52	1.42 (1.33–1.51)	<0.001‡
Race§								
Asian vs. Black	4.38 (2.57–7.47)	<0.001‡	1.01 (0.57–1.80)	0.96	1.84 (1.25–2.72)	0.002‡	0.99 (0.84–1.16)	0.87
Colored vs. Black	1.80 (0.78–4.18)	0.17	0.98 (0.52–1.86)	0.95	1.19 (0.71–1.99)	0.50	0.76 (0.64–0.91)	0.003‡
White vs. Black	1.40 (0.18–10.66)	0.74	0.36 (0.05–2.64)	0.32	0.58 (0.14–2.42)	0.46	0.66 (0.44–0.97)	0.04‡
Pulmonary TB	1.88 (0.59–5.92)	0.28	0.59 (0.39–0.88)	0.01‡	0.72 (0.49–1.06)	0.10	1.49 (1.29–1.72)	<0.001‡
Retreatment	1.08 (0.73–1.60)	0.68	0.93 (0.74–1.18)	0.56	0.97 (0.79–1.19)	0.79	0.56 (0.52–0.60)	<0.001†

Epidemiology of Isoniazid Resistance Mutations and Their Effect on Tuberculosis Treatment Outcomes

Mai N. T. Huyen,[a] Frank G. J. Cobelens,[b] Tran N. Buu,[a] Nguyen T. N. Lan,[a] Nguyen H. Dung,[a] Kristin Kremer,[c,d] Edine W. Tiemersma,[e] Dick van Soolingen[d,f]

Pham Ngoc Thach Hospital, Ho Chi Minh City, Vietnam[a]; Academic Medical Centre, Amsterdam, The Netherlands[b]; World Health Organization, Regional Office for Europe, Copenhagen, Denmark[c]; National Institute of Public Health and the Environment, Bilthoven, The Netherlands[d]; KNCV Tuberculosis Foundation, The Hague, The Netherlands[e]; Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands[f]

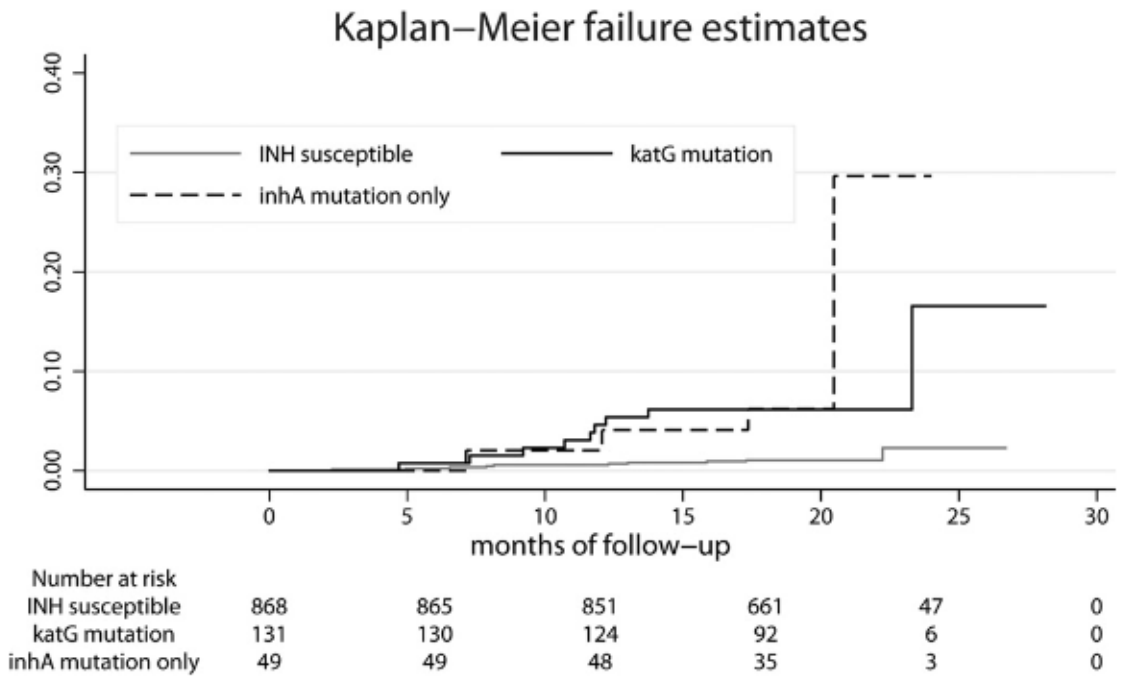

FIG 2 Inverted survival curve for tuberculosis relapse cases among 984 patients after first line TB treatment, isoniazid resistance-conferring mutations. Log-rank test, $P < 0.001$. Solid black line, cases due to *katG* codon 315 mutated strains. Interrupted black line, cases due to *inhA* promoter region-only mutated strains. Gray line, cases due to isoniazid-susceptible strains. *y* axis, proportion of relapse cases. INH, isoniazid.

Plus précisément :

2 mécanismes de résistance à l'INH

- Mutation de la cible (*InhA*)
- Blocage de la métabolisation de l'INH (*KatG*)

Impact variable en fonction du niveau de résistance induit

Antimicrobial Agents and Chemotherapy p. 3620–3627 August 2013 Volume 57 Number 8

« Poids » de l'INH dans le régime de 1ère ligne ?

The Early Bactericidal Activity of Drugs in Patients with Pulmonary Tuberculosis[1, 2]

AMINA JINDANI, V. R. ABER, E. A. EDWARDS, and D. A. MITCHISON

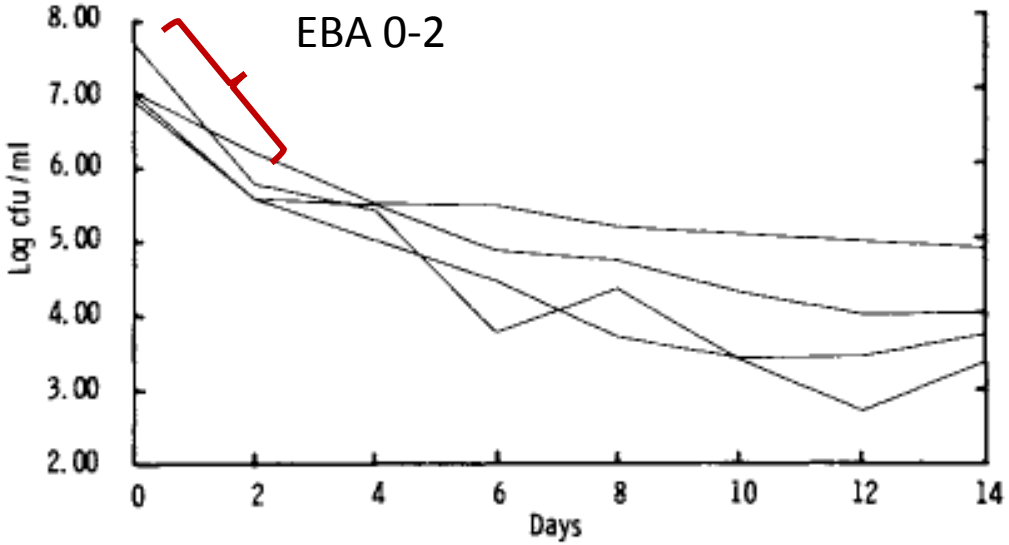

Fig. 1. Colony counts of *M. tuberculosis* in sputum from 4 patients during the first 14 days of chemotherapy with SHRZ. cfu = colony-forming units.

EFFECT OF ISONIAZID ON EARLY FALL IN SPUTUM COLONY COUNTS

Drugs in Regimen (*no.*)	Drugs Other Than H	Mean Fall in Days 0 to 2 (log_{10} cfu/day)		
		No H	H	Mean
1	—	−0.024	0.722	0.349
2	Z	0.048	0.494	0.271
	R	0.090	0.714	0.402
	S	0.094	0.510	0.302
	M	0.246	0.702	0.474
	Mean	0.119	0.605	0.362
3	SZ	0.118	0.799	0.458
	RM	0.558	0.487	0.522
	SR	0.325	0.321	0.323
	Mean	0.334	0.536	0.435

La principale EBA les premiers jours de traitement

AMERICAN REVIEW OF RESPIRATORY DISEASE, VOLUME 121, 1980

Quelle molécule pour remplacer l'EBA de l'INH ?

Early and extended early bactericidal activity of levofloxacin, gatifloxacin and moxifloxacin in pulmonary tuberculosis

J. L. Johnson,* D. J. Hadad,† W. H. Boom,* C. L. Daley,‡ C. A. Peloquin,§¶ K. D. Eisenach,# D. D. Jankus,* S. M. Debanne,** E. D. Charlebois,†† E. Maciel,† M. Palaci,† R. Dietze†

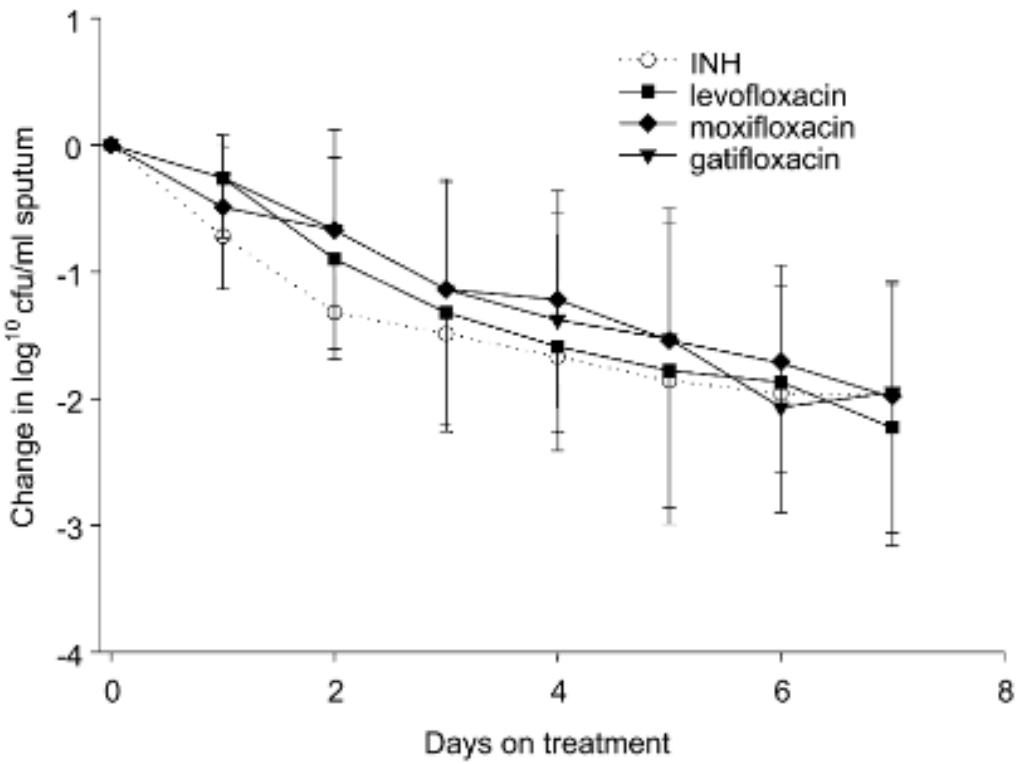

Table 2 Early bactericidal activity (EBA) days 0 to 2

Drug	*n*	Mean EBA (log_{10} cfu/ml/day)	SD	95%CI
INH	10	0.67	0.17	0.55–0.80
Levofloxacin	10	0.45	0.35	0.20–0.71
Gatifloxacin	10	0.35*	0.27	0.15–0.54
Moxifloxacin	10	0.33†	0.39	0.05–0.62

* $P = 0.01$ compared to INH arm.
† $P = 0.02$ compared to INH arm.
SD = standard deviation; CI = confidence interval; INH = isoniazid.

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January 2016 Volume 60 Number 1

Treatment Outcomes with Fluoroquinolone-Containing Regimens for Isoniazid-Resistant Pulmonary Tuberculosis

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FQ = INH dans un régime de 1ère ligne ?

TABLE 2 Treatment regimens and clinical outcomes

Treatment characteristic	Value[a]			
	Total (n = 140)	Patients who received FQs (n = 75)	Patients who did not receive FQs (n = 65)	P value
Drug composition				
With rifampin	134 (95.7)	71 (94.7)	63 (96.9)	0.686
With ethambutol	131 (93.6)	68 (90.7)	63 (96.9)	0.176
With pyrazinamide	124 (88.6)	62 (82.7)	62 (95.4)	0.018
With streptomycin	2 (1.4)	2 (2.7)	0	0.499
Duration (mo)	8.3 (6.1–11.6)	9.1 (6.2–12.1)	7.1 (6.1–9.6)	0.026
Outcome				
Cured	81 (57.9)	42 (56.0)	39 (60.0)	0.633
Treatment completed	52 (37.1)	32 (42.7)	20 (30.8)	0.146
Treatment failure	7 (5.0)	1 (1.3)	6 (9.2)	0.049
Relapse after treatment success	5/133 (3.8)	1/74 (1.4)	4/59 (6.8)	0.170
Favorable outcome[b]	128 (91.4)	73 (97.3)	55 (84.6)	0.007
Unfavorable outcome[c]	12 (8.6)	2 (2.7)	10 (15.4)	0.007
Development of acquired drug resistance	5 (3.6)	1 (1.3)	4 (6.2)[d]	0.183
Acquired resistance to rifampin	3 (2.1)	1 (1.3)	2 (3.1)	0.597

WHO treatment guidelines for isoniazid-resistant tuberculosis

World Health Organization

In patients with <u>confirmed rifampicin-susceptible and isoniazid-resistant tuberculosis</u>, treatment with rifampicin, ethambutol, pyrazinamide and levofloxacin is recommended for a duration of 6 months [Conditional recommendation, very low certainty in the estimates of effects ⊕◯◯◯]

Notes.— The 4-drug "HREZ" fixed-dose combination (FDC) with *isoniazid (H) - rifampicin (R) – ethambutol (E) – pyrazinamide (Z)* -may be used (as there is no approved REZ FDC available), to limit the need of using single drugs. Drug susceptibility to fluoroquinolones should preferably be confirmed ahead of start of treatment (*See text below for other important remarks*).

♦♦♦

In patients with <u>confirmed rifampicin-susceptible and isoniazid-resistant tuberculosis</u>, it <u>is not recommended</u> to add streptomycin or other injectable agents to the treatment regimen [Conditional recommendation, very low certainty in the estimates of effects ⊕◯◯◯]

- **Toujours vérifier sensibilité à RMP et INH sur antibiogramme avant de passer à la bithérapie**
- **Lévofloxacine >> Moxifloxacine**
- **Vérifier absence de mutation GyrA/GyrB avant de débuter la FQ**

WHO 2018 report

Molecular detection of isoniazid monoresistance improves tuberculosis treatment: A retrospective cohort in France

Marwa Bachir[a,*], Lorenzo Guglielmetti[a,b], Simone Tunesi[c], Typhaine Billard-Pomares[d], Sheila Chiesi[a], Jérémy Jaffré[b], Hugo Langris[e], Valérie Pourcher[f,g], Frédéric Schramm[h], Nadine Lemaître[i], Jérôme Robert[a,b], on behalf of the Isoniazid Resistance Group

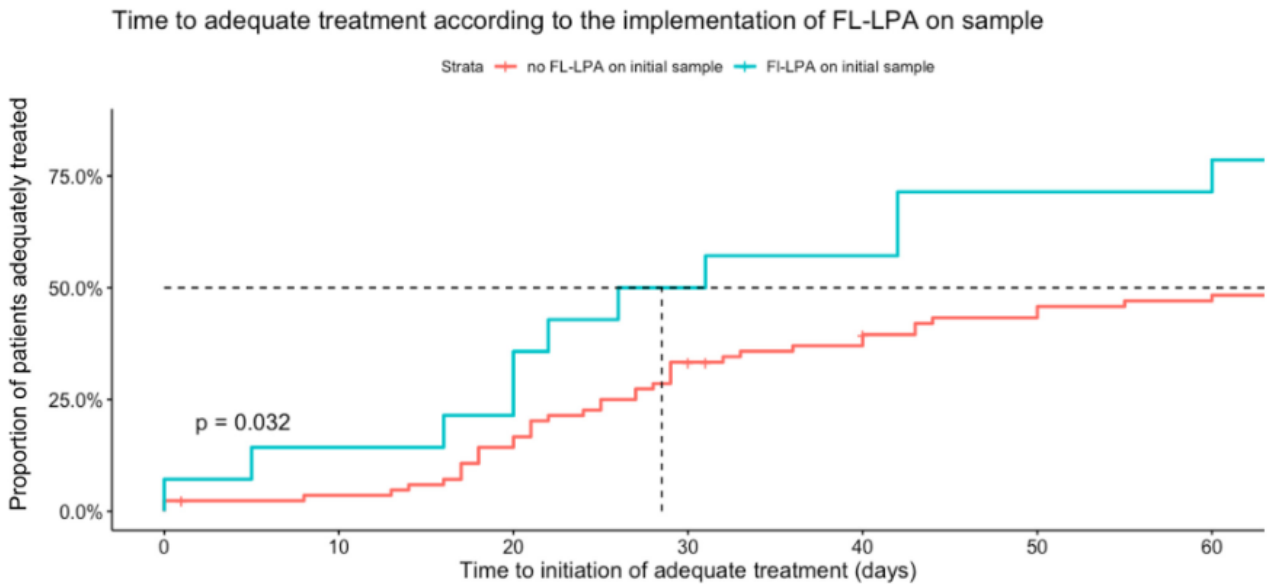


Fig. 2. Reversed Kaplan-Meier curve showing time to adequate treatment according to availability of a first-line probe assay on the initial sample among isoniazid-resistant patients ($N = 99$) ($p = 0.032$ with log-rank test). Time to treatment adaptation starts at tuberculosis diagnosis. The blue curve represents patients for whom first-line probe assay was performed on initial sample ($N = 14$), the red curve those who had no first-line probe assay performed on initial sample ($N = 85$). Discontinued lines represent median time to adequate treatment for both groups.

Table 2
Treatment regimens of isoniazid-monoresistant tuberculosis patients ($N = 98$).

Treatment	Treatment details	Total, N (%)	
Adequate treatment	FQ Addition of a FQ only	35 (35)	52(53)14 (14)
	FQ and prolongation of E	3 (3)	
	FQ and prolongation of Z	4 (4)	
	FQ and prolongation of E and Z	10 (10)	
	Prolongation of E and Z	14 (14)	14 (14)
Inadequate treatment	Standard treatment regimen for DS-TB	20 (20)	32 (32)
	Interruption of H	7 (7)	
	Prolongation of E	5 (5)	

H= isoniazid, FQ= fluoroquinolones, *E* =ethambutol, *Z* = pyrazinamide.
Overall, 13 different regimens were listed when considering treatment changes on isoniazid (continuation or interruption). Treatment data was missing for one patient.

Journal of Infection 85 (2022) 24–30

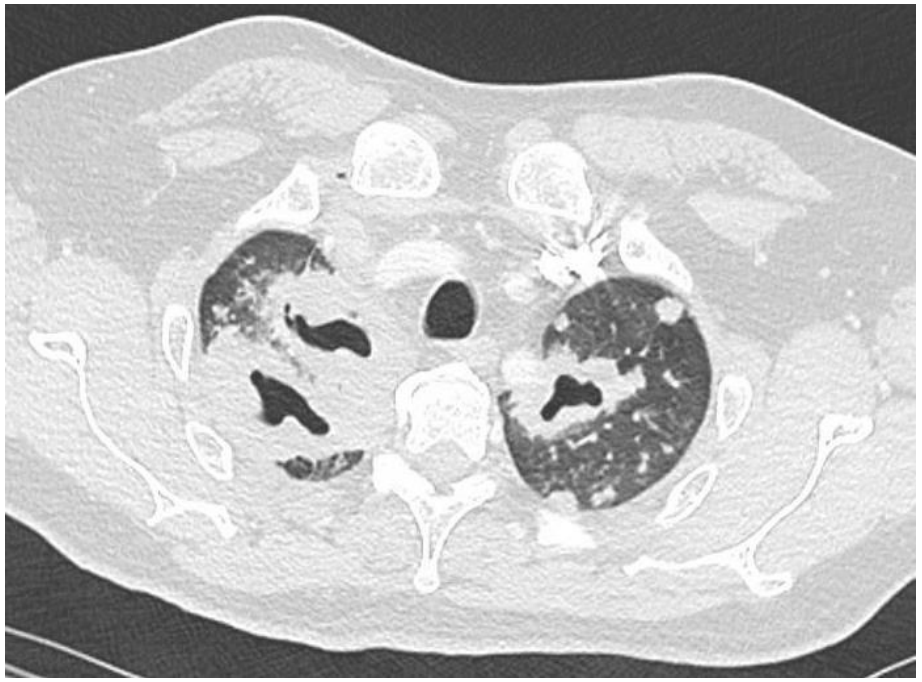
Détection **précoce** de la résistance par test moléculaire (*KatG*, pro-*InhA*)

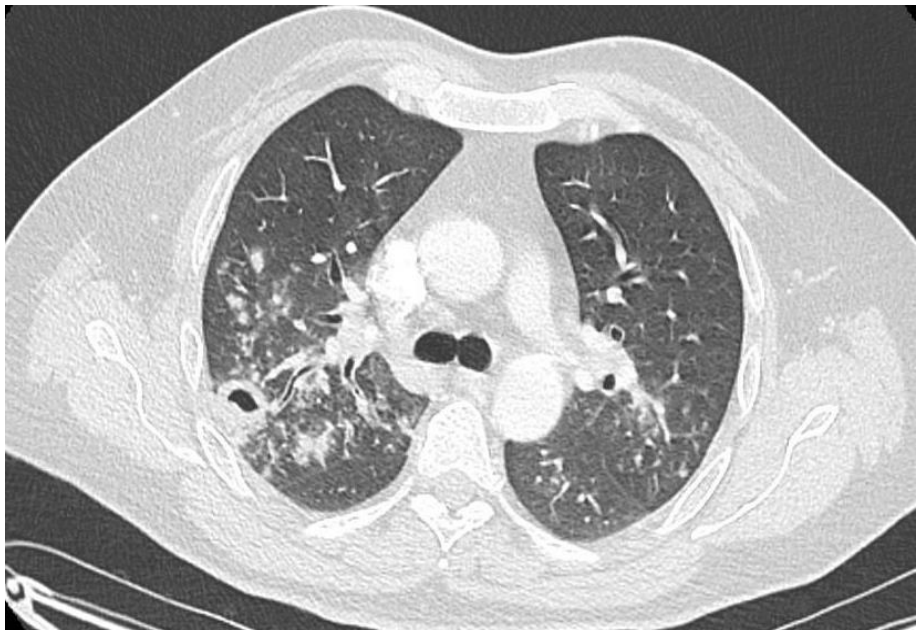
↓

Traitement adapté : switch INH => LVF

↓

Evolution favorable

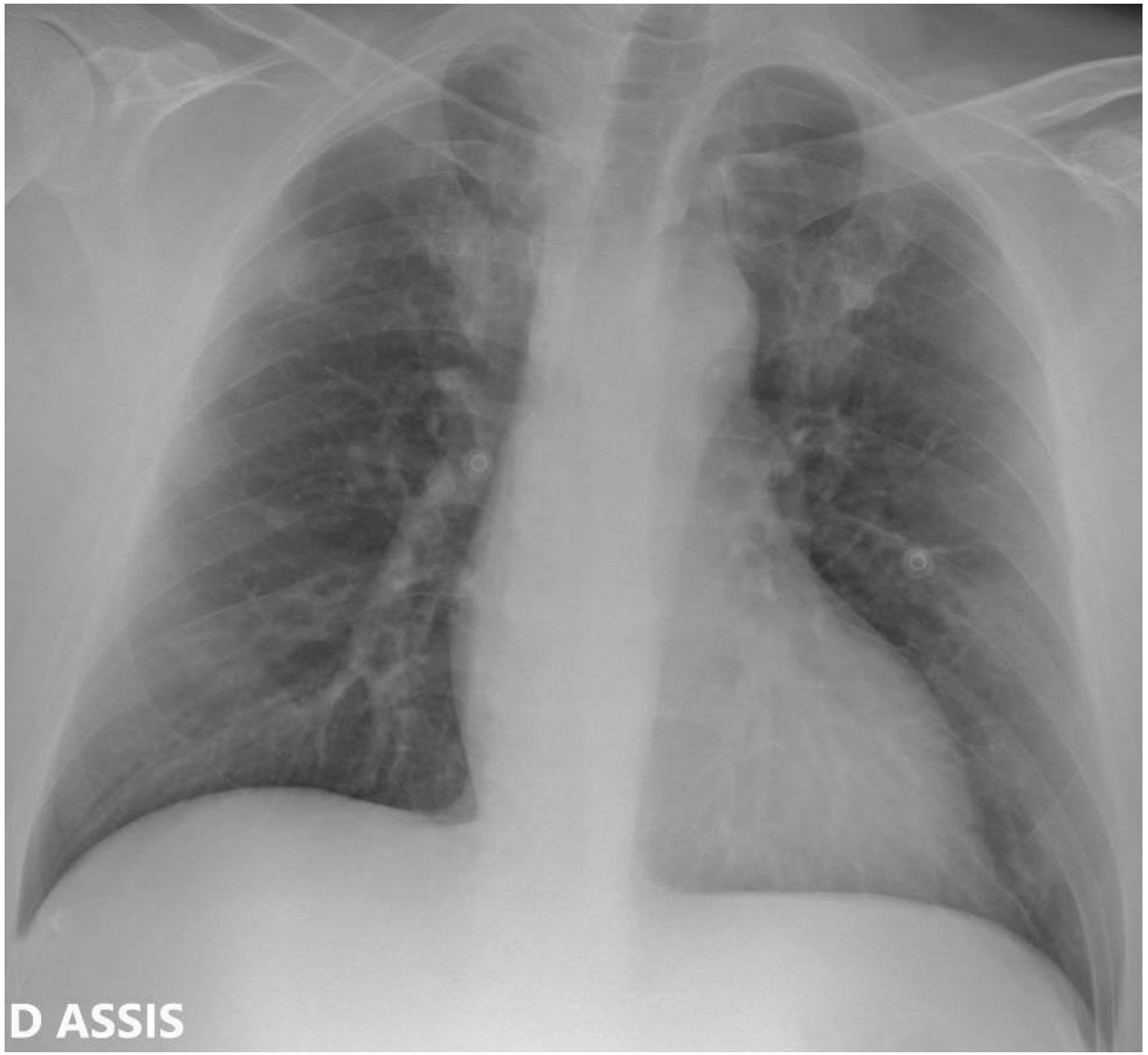




Patient d’origine portugaise. Découverte en janvier 2022 d’une pneumopathie excavée

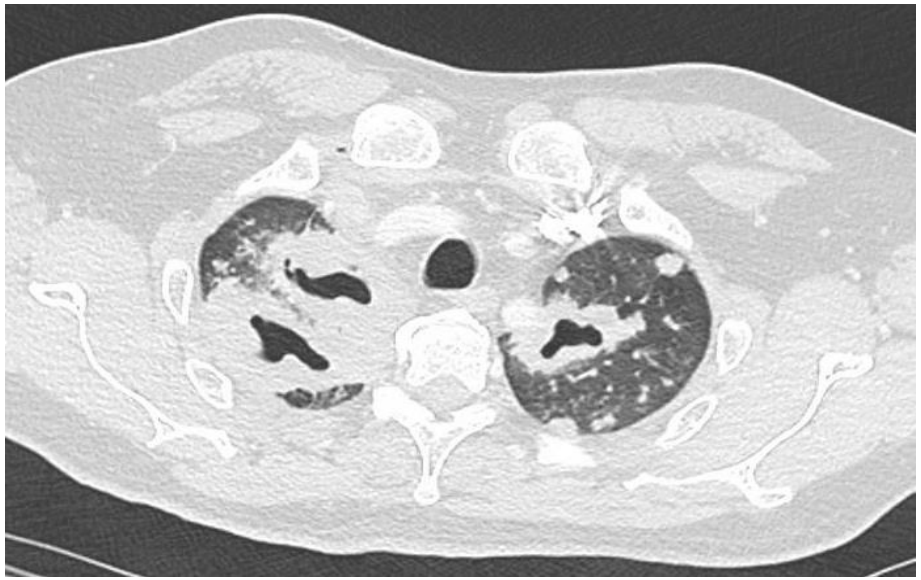
Broncho-pulmonaire(Expecto...				
MYCOBACTERIES - BRONCHO...				
Examen microscopique				
Coloration Auramine			**POSITIF ++++ (>100 BAAR /champ)**	
Culture milieux solides				
Milieu solide à 37°C			**Négative**	
Culture milieux liquides				
Milieu liquide à 37°C			**Positive**	
Culture et ou identification				
_			**1.Mycobacterium tuberculosis complex Présence**	
Isoniazide (0,1 µg/mL)			**S**	
Rifampicine (1 µg/mL)			**S**	
Pyrazinamide (100 µg/mL)			**S**	
Ethambutol (5 µg/mL)			**S**	
Streptomycine (1 µg/mL)			**S**	

Sérologie VIH neg
Régime de 1ère ligne
Régression des symptômes à M1
Bonne observance et bonne tolérance

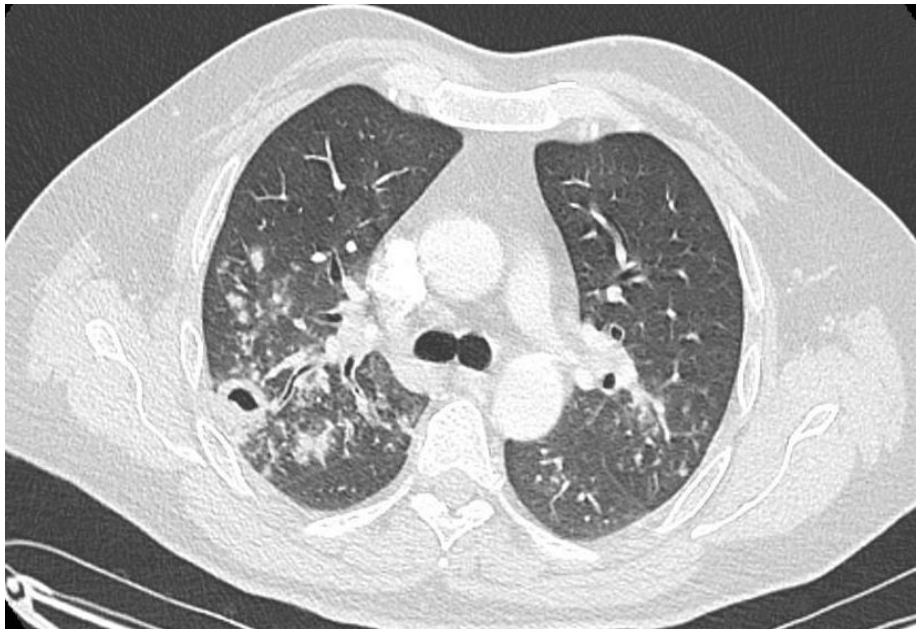


M6
Radio de thorax seule, cavités sequellaires
Asymptomatique
Arrêt bithérapie RMP et INH

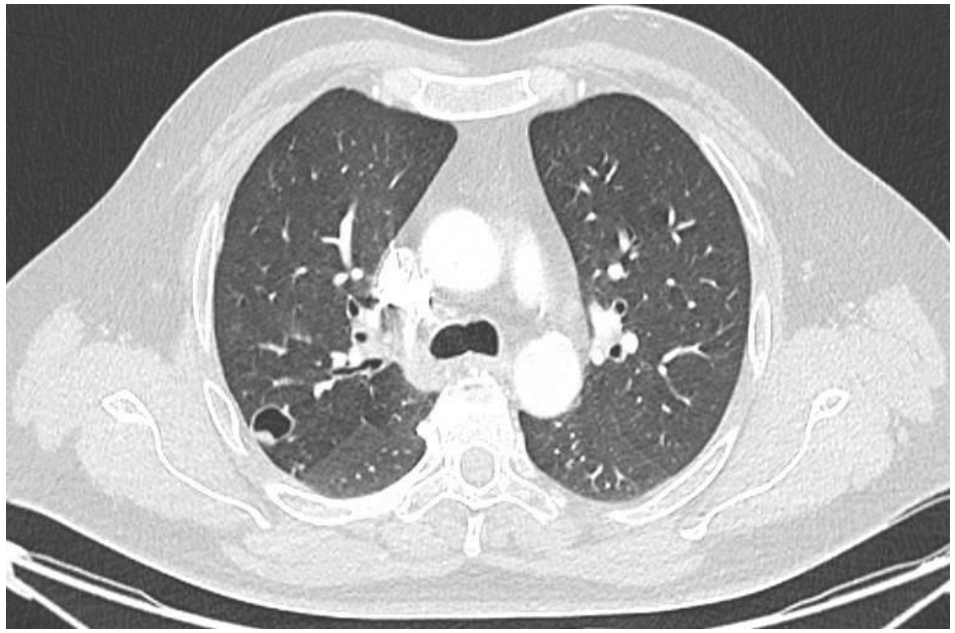
Après 6 mois de surveillance post traitement : SAU pour hémoptysie



6 mois de traitement +
6 mois post traitement



Vos hypothèses ?



Lancet Glob Health 2021;
9: e1679–87

Lifetime burden of disease due to incident tuberculosis: a global reappraisal including post-tuberculosis sequelae

Nicolas A Menzies, Matthew Quaife, Brian W Allwood, Anthony L Byrne, Anna K Coussens, Anthony D Harries, Florian M Marx, Jamilah Meghji, Debora Pedrazzoli, Joshua A Salomon, Sedona Sweeney, Sanne C van Kampen, Robert S Wallis, Rein M G J Houben, Ted Cohen

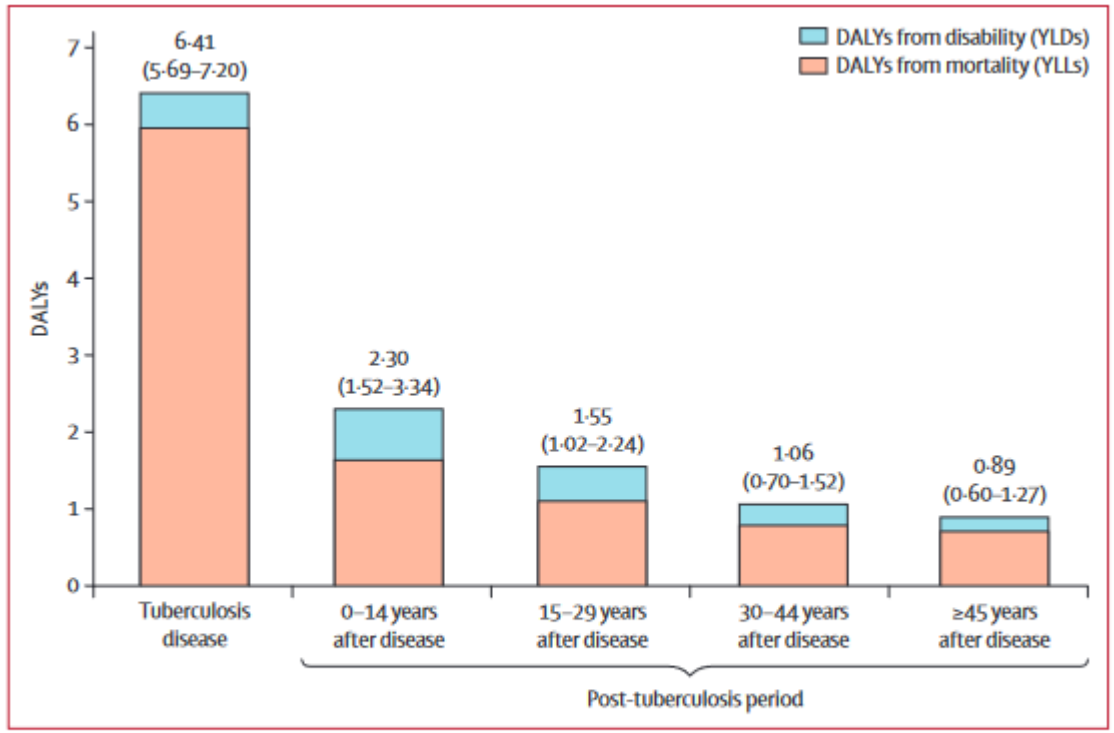


Figure 3*: DALYs per incident tuberculosis case, stratified by tuberculosis disease and post-tuberculosis period
YLL=years of life lost. YLD=years lived with disability. DALYs=disability-adjusted life-years. *Total DALYs per incident tuberculosis case equal to the sum of these values. Values in parentheses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

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http://dx.doi.org/10.5588/ijtld.20.0488

EDITORIAL

Post-tuberculosis sequelae: the need to look beyond treatment outcome

Table The most frequent TB sequelae

Complications	Type of sequelae
Structural complications	Bronchiectasis
	Tracheobronchial stenosis
	Broncholithiasis
	Residual cavitation
	Lung fibrosis
	Tubercoloma
	Pulmonary/bronchial arteritis or thrombosis
	COPD
	Rasmussen aneurysm
	Bronchopleural fistula
	Pneumothorax
	Pleural fibrosis
	Other organ impairment (depending on site of TB)
Infectious complications	Exacerbations of COPD
	Colonisation and infection with *Aspergillus fumigatus*
	Colonisation and infection with non-tuberculous mycobacteria
	Pneumonia
	Empyema
	TB recurrence
Psychosocial morbidities	Anxiety and/or depression
	Social isolation
	Persistent socio-economic impairment
	'Catastrophic' costs

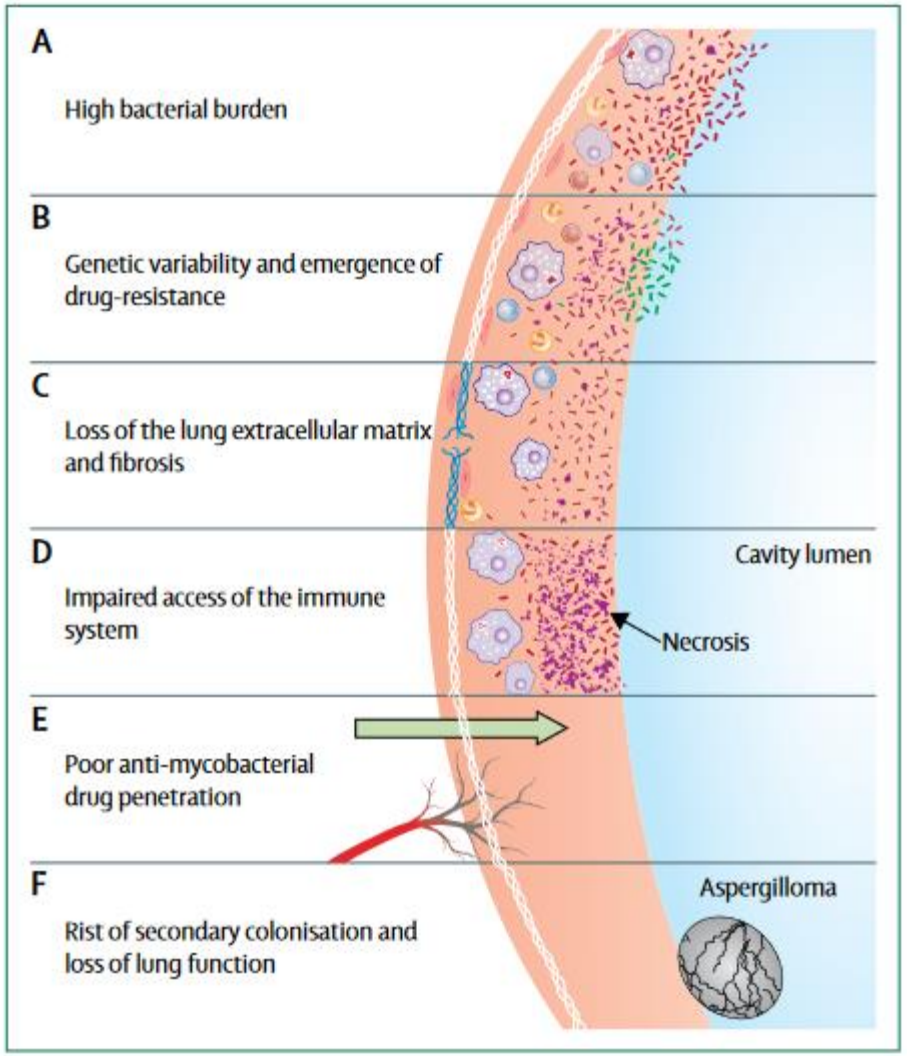
TB = tuberculosis; COPD = chronic obstructive pulmonary disease.

Vaste champs des complications post tuberculeuses

Cavitary tuberculosis: the gateway of disease transmission

Lancet Infect Dis 2020; 20: e117–28

Michael E Urbanowski, Alvaro A Ordonez*, Camilo A Ruiz-Bedoya, Sanjay K Jain, William R Bishai*



Particularités des séquelles cavitaires

Risque de colonisation/infection chronique

Discussion médico/chirurgicale de résection pour prévenir le risque d'hémoptysie

Complications post TB : MNT en France

RESEARCH Open Access

Non-tuberculous mycobacterial pulmonary diseases in France: an 8 years nationwide study

Nicolas Veziris[1], Claire Andréjak[2,3], Stéphane Bouée[4*], Corinne Emery[4], Marko Obradovic[5] and Raphaël Chiron[6,7]

Veziris *et al. BMC Infectious Diseases* (2021) 21:1165
https://doi.org/10.1186/s12879-021-06825-x

Table 2 Risk factors for NTM-PD patients and matched controls

	Cases n (%)	Controls n (%)	p-value cases/ controls
Incident population	4447 (25.0)	13,341 (75.0)	
Charlson comorbidity index score (SD)	1.6 (2.5)	0.2 (0.9)	< 0.0001
Risk factors before NTM-PD diagnosis			
Chronic lower respiratory diseases	1529 (34.4)	359 (2.7)	< 0.0001
COPD (J44)	836 (18.8)	168 (1.3)	< 0.0001
Bronchiectasis (J47)	472 (10.6)	16 (0.1)	< 0.0001
Other lower respiratory Chronic diseases	927 (20.8)	245 (1.8)	< 0.0001
HIV infection	389 (8.7)	30 (0.2)	< 0.0001
Lung cancer and lung graft	252 (5.7)	55 (0.4)	< 0.0001
Bone marrow transplant	60 (1.3)	3 (0.0)	< 0.0001
Gastro-esophageal reflux disease	131 (2.9)	120 (0.9)	< 0.0001
Smoking	164 (3.7)	112 (0.8)	< 0.0001
Other infectious pneumonia	1085 (24.4)	184 (1.4)	< 0.0001
Tuberculosis	628 (14.1)	14 (0.1)	< 0.0001
Malnutrition	978 (22.0)	261 (2.0)	< 0.0001
Corticoids	2550 (57.3)	4504 (33.8)	< 0.0001
Cystic fibrosis	143 (3.2)	1 (0.0)	< 0.0001

Table 3 Cox multivariate analysis for mortality in NTM-PD patients and matched controls

Covariates		Hazard ratio
NTM-PD case/matched controls (Reference: controls)	NTM-PD case/matched controls	2.804
Age (reference < 10 years)	10–19 years	0.818
	20–29 years	1.571
	30–39 years	2.283
	40–49 years	2.704
	50–59 years	5.736
	60–69 years	9.204
	70–79 years	16.081
	80–89 years	33.654
	≥ 90 years	56.860
Sex (reference: males)	Female	0.668
Universal Health Coverage	yes	1.423
HIV infection	Yes	1.592
Lung cancer and graft	Yes	2.492
Other infectious pneumonia	Yes	1.353
Tuberculosis	Yes	0.904
Malnutrition	Yes	2.042
Corticoids	Yes	1.040
Cystic fibrosis	Yes	1.508
Mucopurulent chronic bronchitis	Yes	0.726
Unspecified chronic bronchitis	Yes	1.227
Emphysema	Yes	1.080
Other chronic obstructive pulmonary disease	Yes	1.651
Bronchiectasis	Yes	0.713

Chronic pulmonary aspergillosis: prevalence, favouring pulmonary diseases and prognosis

Complications post TB : APC en France

Thomas Maitre [1], Jonathan Cottenet [2,3], Cendrine Godet [4], Adrien Roussot [2,3], Nafiz Abdoul Carime [2,3], Vichita Ok [5], Antoine Parrot [1,6], Philippe Bonniaud [3,7], Catherine Quantin [2,3,8,9,10,11] and Jacques Cadranel [1,6,11]

TABLE 2 Proportion of incident cases of underlying CPD or conditions in the 5 years preceding the diagnosis of CPA

	2014	2015	2016	2017	2018	p-value
CPA incident cases n	1642	1792	1755	1910	2022	<0.01
Underlying CPD						
COPD	689 (42.0)	729 (40.7)	689 (39.3)	833 (43.6)	888 (43.9)	0.05
Emphysema	290 (17.7)	286 (16.0)	298 (17.0)	401 (21.0)	449 (22.2)	<0.01
Bronchiectasis	300 (18.3)	325 (18.1)	313 (17.8)	361 (18.9)	354 (17.5)	0.77
Lung cancer	171 (10.4)	204 (11.4)	208 (11.9)	226 (11.8)	254 (12.6)	0.05
Lung TB	99 (6.0)	63 (3.5)	75 (4.3)	68 (3.6)	59 (2.9)	<0.01
Lung TB scarring	132 (8.0)	104 (5.8)	122 (7.0)	125 (6.5)	104 (5.1)	0.01
NTM lung infection	48 (2.9)	46 (2.6)	48 (2.7)	57 (3.0)	59 (2.9)	0.72
Lung sarcoidosis	24 (1.5)	21 (1.2)	35 (2.0)	36 (1.9)	27 (1.3)	0.67
Lung fibrosis	112 (6.8)	102 (5.7)	118 (6.7)	117 (6.1)	120 (5.9)	0.47
Interventions in the thorax						
Pneumothorax	110 (6.7)	105 (5.9)	128 (7.3)	159 (8.3)	151 (7.5)	0.06
Thoracic surgery	199 (12.1)	202 (11.3)	196 (11.2)	229 (12.0)	221 (10.9)	0.49
Radiotherapy	36 (2.2)	41 (2.3)	35 (2.0)	55 (2.9)	57 (2.8)	0.10
CRF	792 (48.2)	848 (47.3)	837 (47.7)	919 (48.1)	1044 (51.6)	0.03
Diabetes	271 (16.5)	283 (15.8)	268 (15.3)	294 (15.4)	316 (15.6)	0.45
Malnutrition	621 (37.8)	696 (38.8)	785 (44.7)	862 (45.1)	894 (44.2)	<0.01

Data are presented as n (%), unless otherwise indicated. CPD: chronic pulmonary disease; CPA: chronic pulmonary aspergillosis; COPD: chronic obstructive pulmonary disease; TB: tuberculosis; NTM: nontuberculous mycobacteria; CRF: chronic respiratory failure.

Chronic pulmonary aspergillosis: prevalence, favouring pulmonary diseases and prognosis

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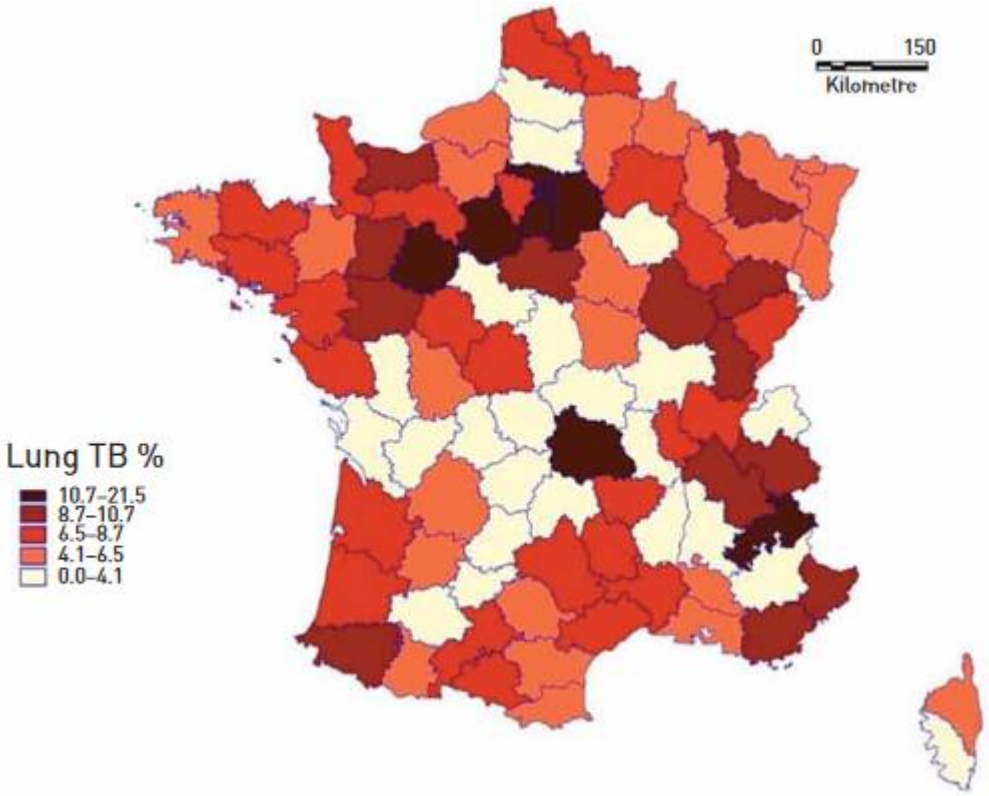

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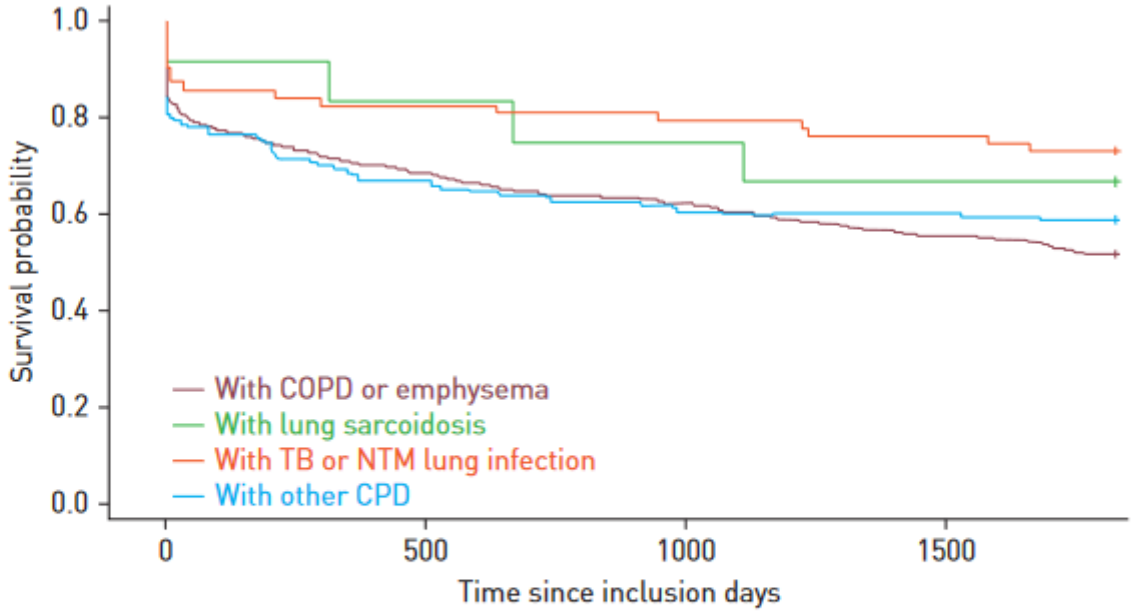

Number at risk

With COPD or emphysema	444	304	276	246
With lung sarcoidosis	12	10	9	8
With TB or NTM lung infection	63	52	50	48
With other CPD	150	100	91	90

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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]

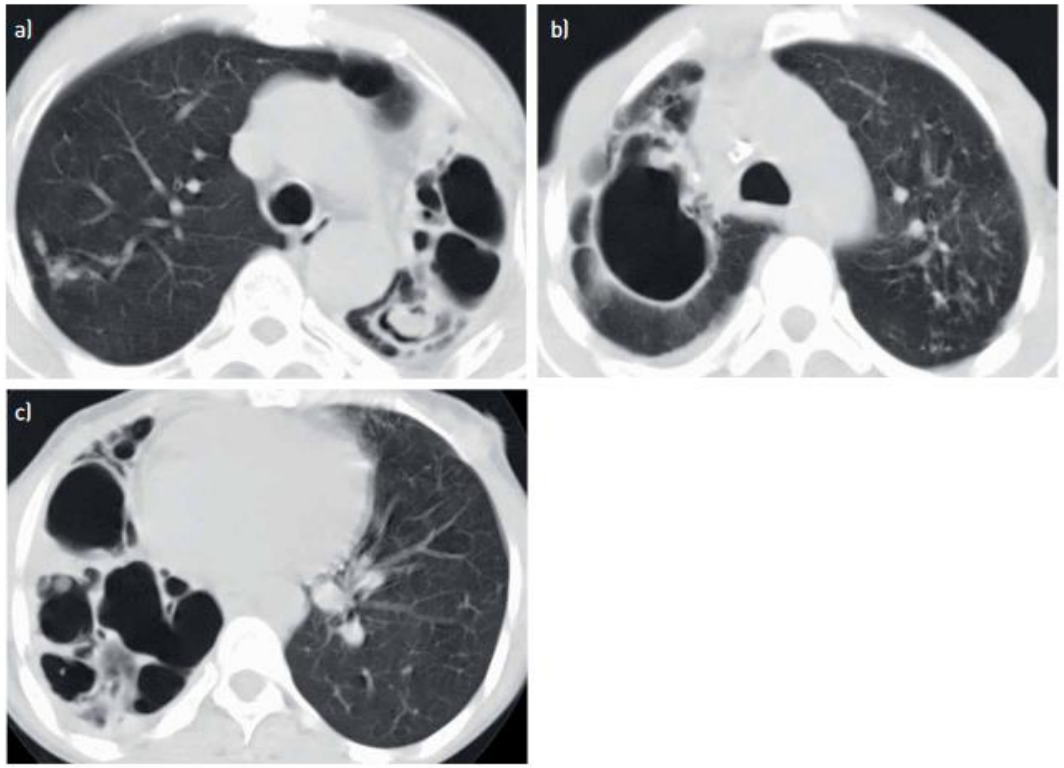

FIGURE 2 Radiological presentations of chronic pulmonary aspergillosis (CPA) in Gulu. a) Chronic cavitary pulmonary aspergillosis (CCPA) with multiple cavities and a fungal ball. b) CCPA with a large cavity, paracavitary fibrosis and adjacent pleural thickening, but no fungal ball. c) Chronic fibrosing pulmonary aspergillosis with complete destruction of the whole right lung with multiple cavities and surrounding fibrosis.

TABLE 6 Accuracy of test combinations for chronic pulmonary aspergillosis (CPA) diagnosis in the absence of computed tomography of the thorax

Test	n	Sensitivity %	Specificity %	PPV %	NPV %
Serology	28	100	94.8	50.0	100[#]
Symptoms	101	92.9	67.5	12.9	99.5
Serology plus symptoms	18	92.9	98.2	72.2	99.6
Chest radiography fungal ball	13	28.6	96.7	30.8	96.3
Chest radiography cavitation	50	85.7	86.0	24.0	99.1
Chest radiography pleural thickening	50	71.4	85.2	20.0	98.3
Chest radiography cavitation or pleural thickening	73	100	78.2	19.2	100
Chest radiography cavitation plus symptoms	30	85.7	93.4	40.0	93.4
Chest radiography cavitation or pleural thickening plus symptoms	41	92.9	89.7	31.7	99.6
Serology plus chest radiography cavitation	17	85.7	98.2	70.6	99.3
Serology plus chest radiography cavitation plus symptoms	13	85.7	99.6	92.3	99.3
Serology plus chest radiography cavitation or pleural thickening plus symptoms	17	92.3	98.5	76.5	99.6

PPV: positive predictive value; NPV: negative predictive value. [#]: positive serology was a mandatory diagnostic criterion for CPA in this study.

398 TB Uganda, surveillance 2 ans post traitement

Incidence : 7% par année post TB si cavité

- Balle fongique, épaississement cavité/plèvre
- Symptômes
- Sérologie aspergillaire

- En fin de traitement antituberculeux, quelques recommandations :

1. Scanner thoracique de référence
2. Sérologie aspergillaire de référence
3. Adapter le rythme de suivi en fonction des séquelles (nodules vs. DDB / cavités)
4. Discuter avec les chirurgiens « à froid »
5. Nutrition +++ réhabilitation