

Aspects médico-économiques des test IGRAs

Tristan Ferry
Service de Maladies Infectieuses et Tropicales
Hôpital de la Croix-Rousse
Hospices Civils de Lyon

Rationel

IDR

Injection de tuberculine sous la peau

Lecture dans les 72 heures

Sensibilité : 73%*† (IDR≥10mm)

Peu spécifique : 59%*-60%† en population BCG+ (IDR≥10mm)

2,16 €

quantiFERON

Dosage d'interferons dans le sang total

Lecture dans les 24 heures

Sensibilité : 76%*-80%†

Très spécifique : 96%*† en population BCG+

40,50 €

Isoniazide (300mg/j) pendant 9 mois = 210,60€

*Pai et al, Annals of Internal Medicine, 2008

†Menzies et al, Annals of Internal Medicine, 2007

Sensibilité évaluée chez des sujets TB ou ayant eu un contact étroit avec TB

Spécificité évaluée chez des sujets en bonne santé

Cost-effectiveness of QuantiFERON®-TB test vs. tuberculin skin test in the diagnosis of latent tuberculosis infection

S. Deuffic-Burban,^{*†} K. Atsou,[‡] N. Viget,[§] H. Melliez,[§] E. Bouvet,^{¶#} Y. Yazdanpanah^{†§¶}

*Institut National de la Santé et de la Recherche Médicale (INSERM) U795, Faculté de Médecine, Lille, †INSERM EA2694, Faculté de Médecine, Lille, ‡INSERM Unité Mixte de Recherche en Santé 707, Paris, §Service Universitaire des Maladies Infectieuses et du Voyageur, Centre Hospitalier de Tourcoing, Tourcoing, ¶Groupe d'Etude sur le Risque d'Exposition au Sang, Unité de Formation et de Recherche Médicale, Hôpital Bichat, Paris, #Service d'Infectiologie, Hôpital Bichat-Claude Bernard, Paris, France

INT J TUBERC LUNG DIS 14(4):471-481
© 2010 The Union

Objectifs : Evaluer le rapport cout-efficacité de l'IDR, du QuantiFERON®-TB et de la combinaison IDR- QuantiFERON®-TB pour le diagnostic de la tuberculose latente en France (population vaccinée)

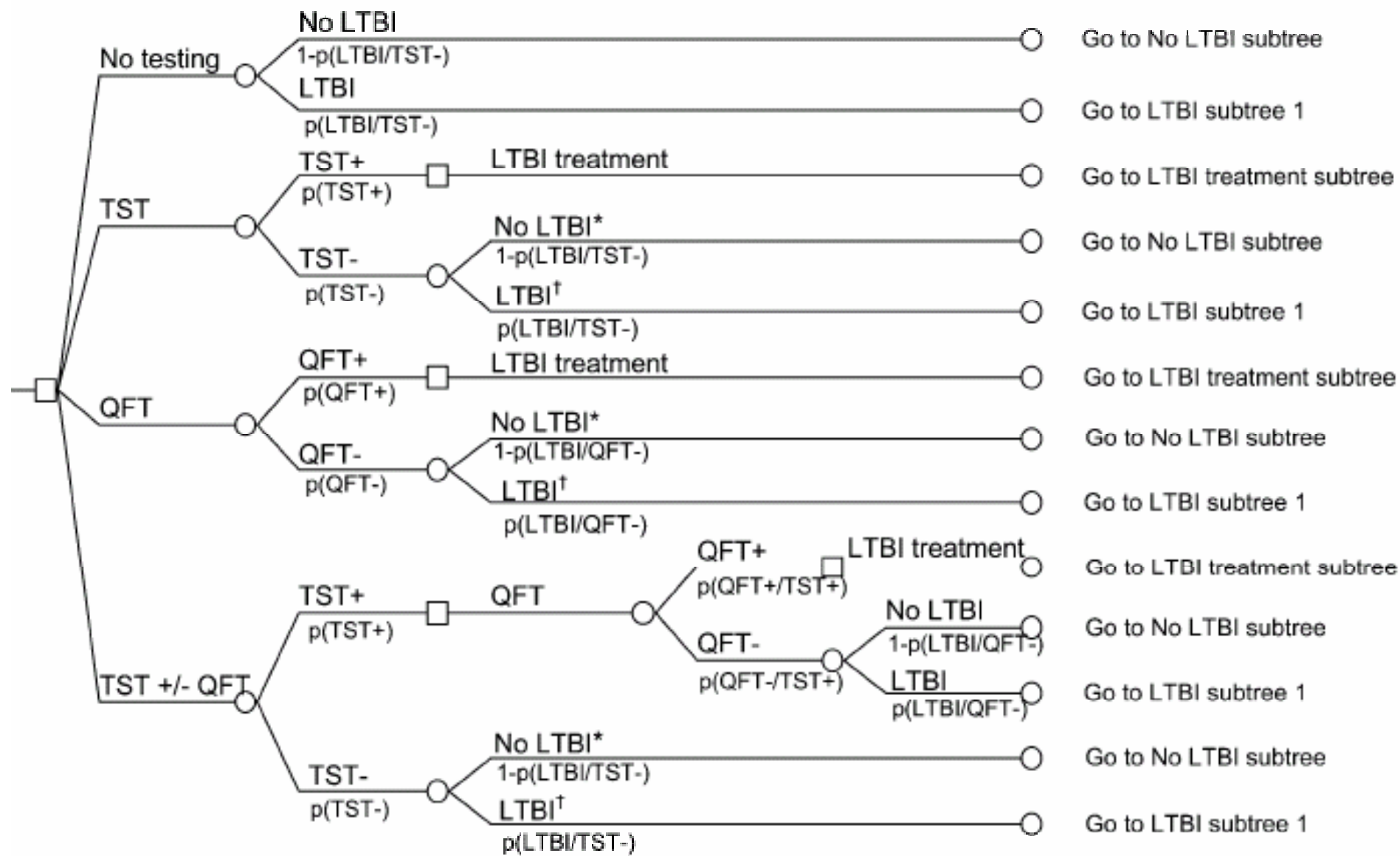
Méthode : Modèle de décision analytique évaluant les 3 stratégies en situation clinique de contagé tuberculeux

Simulation concernant 15 000 patients :

Nombre de patients contacts en France en 2007, moyenne d'âge de 35 ans

Table 1 Estimates of the probability of events

| | Probability % (range)* | Reference |
|--|---------------------------|-----------|
| Prevalence of LTBI | | |
| Close contact | 41 (5–41) | 13 |
| TST, cut-off ≥ 10 mm | | |
| Sensitivity | 73 (57–95) | 2,3 |
| Specificity | 60 (35–90) | |
| Positive predictive value | 56 (4–87) [†] | |
| Negative predictive value | 76 (65–98) [†] | |
| QFT, using ESAT-6 and CFP-10 antigens | | |
| Sensitivity | 76 (55–99) | 2,3 |
| Specificity | 96 (89–99) | |
| Positive predictive value | 93 (9–99) [†] | |
| Negative predictive value | 85 (75–99) [†] | |
| Proportion of patients adherent to LTBI treatment (pObs) [‡] | 57 (53–76) | 14–18 |
| Annual risk of TB after untreated LTBI in year | | |
| 1 | 8.66 (8.17–9.05) | 19,20 |
| 2 | 3.55 (3.35–3.71) | |
| 3 | 1.13 (1.06–1.18) | |
| 4 | 0.74 (0.70–0.78) | |
| ≥ 5 | 0.24 (0.23–0.25) | |
| LTBI treatment efficacy [‡] | 69 (45–93) | 21 |
| Annual risk of TB after treated LTBI in year | | |
| 1 | 2.63 | 19,20 |
| 2 | 1.08 | |
| 3 | 0.34 | |
| 4 | 0.23 | |
| ≥ 5 | 0.07 | |
| Risk of severe toxicity associated with LTBI treatment [‡] | 0.001 (0.001–0.013) | 22–26 |
| Efficacy of anti-tuberculosis treatment [§] | 91 (88–94) | 27 |
| Risk of severe toxicity associated with anti-tuberculosis treatment [§] | 0.07 (0.07–0.30) | 28,29 |



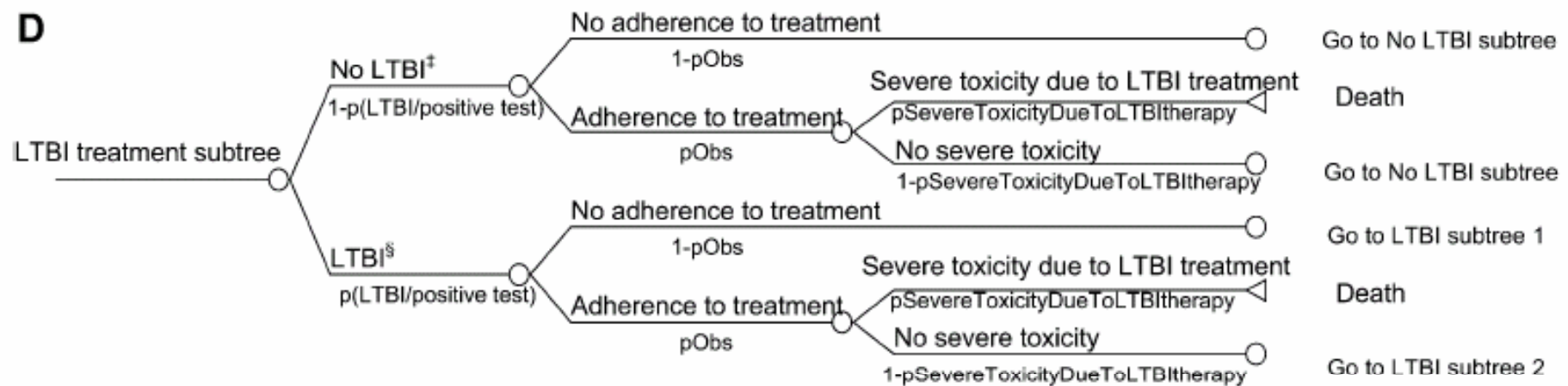
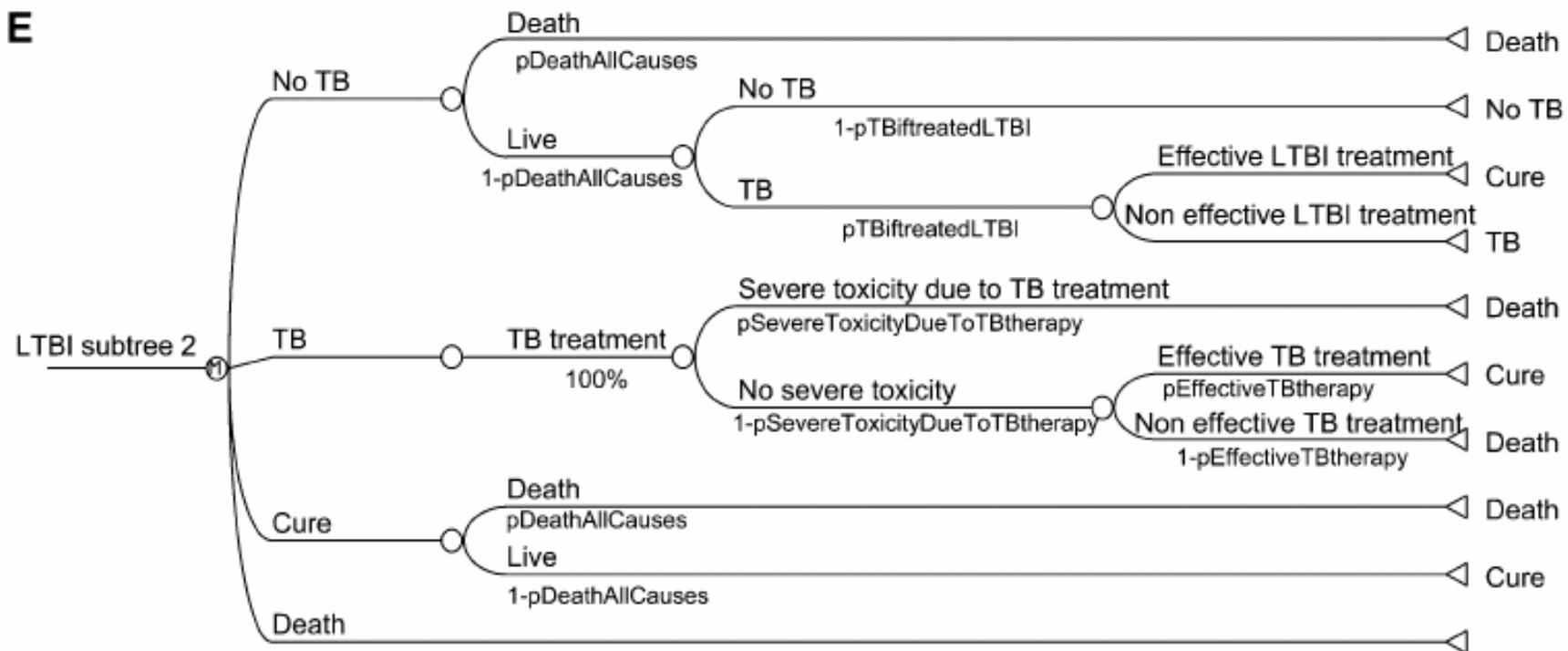
D**E**

Table 2 Direct medical costs per patient*

| Details of costs | Costs, € |
|---|----------|
| TST | |
| Test | 2.16 |
| Two hospital staff visits | 8.70 |
| QFT | |
| Test | 40.50 |
| One hospital staff visit | 4.35 |
| LTBI | |
| 3 out-patient visits | 69 |
| 3 liver function tests | 34.02 |
| INH 300 mg/day for 9 months | 210.60 |
| TB disease | |
| Hospitalisation for TB disease (GHS [†] 1108) | 4346.45 |
| 8 out-patient visits | 184 |
| 1 ophthalmologist visit | 140.90 |
| 3 chest X-rays | 63.84 |
| 3 sputum cultures | 194.40 |
| 3 liver function tests | 34.02 |
| Treatment with INH (300 mg/day) + RMP (600 mg/day) + PZA (1500 mg/day) + EMB (1200 mg/day) for 2 months, followed by INH + RMP for 4 months | 268.20 |
| TB-induced hospitalisation leading to death (GHS [†] 1109) | 6403.62 |
| Severe treatment-associated toxicity | |
| Fulminant hepatitis leading to death (GHS [†] 2506) | 4291.16 |

Au final...

| | | Coût incrémental | |
|----------------------------|---|-------------------------|-------------------------|
| | | + | - |
| Efficacité incrémentale | + | Estimer le ratio C/E | Non |
| | - | Non | Estimer le ratio C/E |

ICERs

Incremental cost-effectiveness ratios

Coûts additionnels par année de vie gagnée

Table 3 Costs, discounted and undiscounted life expectancies and ICERs associated with each LTBI diagnosis strategy

| | Cost* € | Life expectancy | | ICER €/YLG |
|---|------------|---------------------|-----------------------|---------------------------------|
| | | Discounted years | Undiscounted years | |
| A Base-case scenario, TST-positive if ≥ 10 mm [†] | | | | |
| No testing | 417 | 25.030 | 47.634 | |
| TST+QFT | 435 | 25.062 | 47.700 | 560 |
| QFT | 443 | 25.073 | 47.724 | 730 |
| TST | 476 | 25.071 | 47.721 | Strongly dominated [‡] |
| B Alternative scenario, TST-positive if ≥ 5 mm [§] | | | | |
| No testing | 417 | 25.030 | 47.634 | |
| TST+QFT | 441 | 25.062 | 47.701 | Weakly dominated [¶] |
| QFT | 443 | 25.073 | 47.724 | 600 |
| TST | 507 | 25.072 | 47.722 | Strongly dominated [‡] |

* Costs expressed in 2007 euros (€1 = US\$1.45 on 5 November 2007).

[†] Base-case scenario, TST positive if ≥ 10 mm: TST sensitivity = 73%, TST specificity = 60%.^{2,3}

[‡] TST strongly dominated by QFT when QFT resulted in a higher life expectancy and lower overall cost than TST.

[§] Alternative scenario, TST positive if ≥ 5 mm: TST sensitivity = 74%, TST specificity = 43%.^{2,3} Base-case and alternative scenarios assumed close contact with TB (LTBI prevalence = 41%).¹³

[¶] TST+QFT weakly dominated by QFT when the ICER of TST+QFT vs. no testing was higher than the ICER of QFT vs. TST+QFT.

LTBI = latent TB infection; ICER = incremental cost-effectiveness ratio; YLG = years of life gained; TST = tuberculin skin test; QFT = Quantiferon-TB test.

Table 4 Sensitivity analyses of costs of LTBI treatment and management and costs of TB disease treatment and management

| | Cost* € | Life expectancy years | ICER €/YLG |
|---|------------|-----------------------------|---------------------------------|
| Base-case scenario | | | |
| Costs of LTBI treatment and management = €418.16 | | | |
| Costs of TB disease treatment and management = €5231.81 | | | |
| No testing | 417 | 25.030 | |
| TST+QFT | 435 | 25.062 | 560 |
| QFT | 443 | 25.073 | 730 |
| TST | 476 | 25.071 | Strongly dominated [†] |
| Costs of LTBI treatment and management | | | |
| Reducing costs by 50% (= €209.08) | | | |
| QFT | 376 | 25.073 | |
| TST | 378 | 25.071 | Strongly dominated [†] |
| TST+QFT | 383 | 25.062 | Strongly dominated [†] |
| No testing | 397 | 25.030 | Strongly dominated [†] |
| Reducing costs by 75% (= €104.54) | | | |
| TST | 329 | 25.071 | |
| QFT | 343 | 25.073 | 7 000 |
| TST+QFT | 356 | 25.062 | Strongly dominated [†] |
| No testing | 387 | 25.030 | Strongly dominated [†] |
| Reducing costs by 90% (= €41.82) | | | |
| TST | 300 | 25.071 | |
| QFT | 323 | 25.073 | 11 500 |
| TST+QFT | 341 | 25.062 | Strongly dominated [†] |
| No testing | 381 | 25.030 | Strongly dominated [†] |
| Costs of TB disease treatment and management | | | |
| Reducing costs by 50% (= €2616.91) | | | |
| No testing | 229 | 25.030 | |
| TST+QFT | 251 | 25.062 | Weakly dominated [‡] |
| QFT | 258 | 25.073 | 780 |
| TST | 258 | 25.071 | Strongly dominated [†] |
| Reducing costs by 75% (= €1307.95) | | | |
| No testing | 135 | 25.030 | |
| TST | 149 | 25.071 | 340 |
| TST+QFT | 159 | 25.062 | Strongly dominated [§] |
| QFT | 166 | 25.073 | 8 500 |
| Reducing costs by 90% (= €523.18) | | | |
| No testing | 78 | 25.030 | |
| TST | 83 | 25.071 | 120 |
| TST+QFT | 103 | 25.062 | Strongly dominated [§] |
| QFT | 110 | 25.073 | 13 500 |

CONCLUSIONS: In France, for the diagnosis of LTBI after close contact with TB, the TST is more expensive and less effective than QFT. Although it is more expensive, QFT is more effective and cost-effective than TST+QFT under a wide range of realistic test performance scenarios.