Innovative solutions for TB infection screening in decentralised settings

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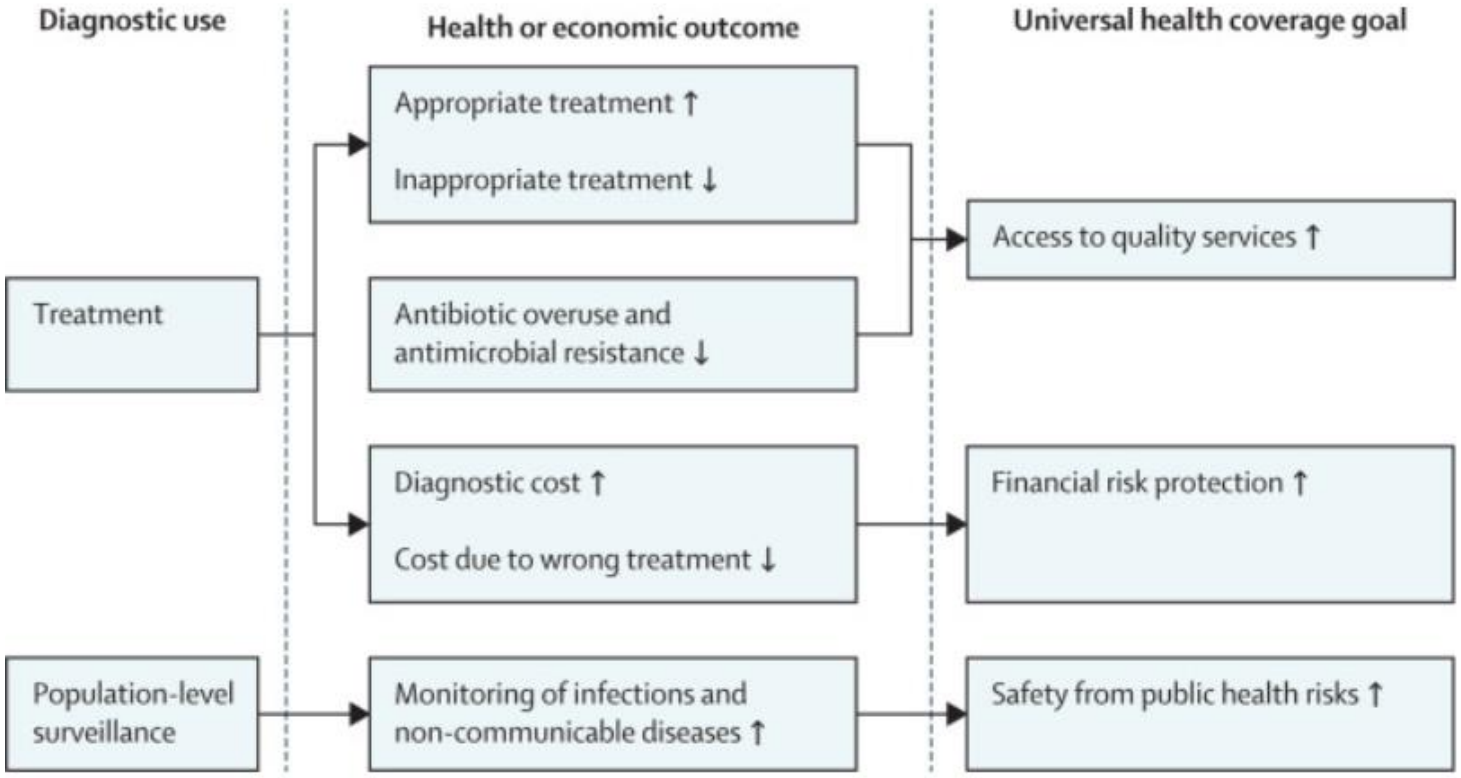
Diagnostic are essential for universal health coverage

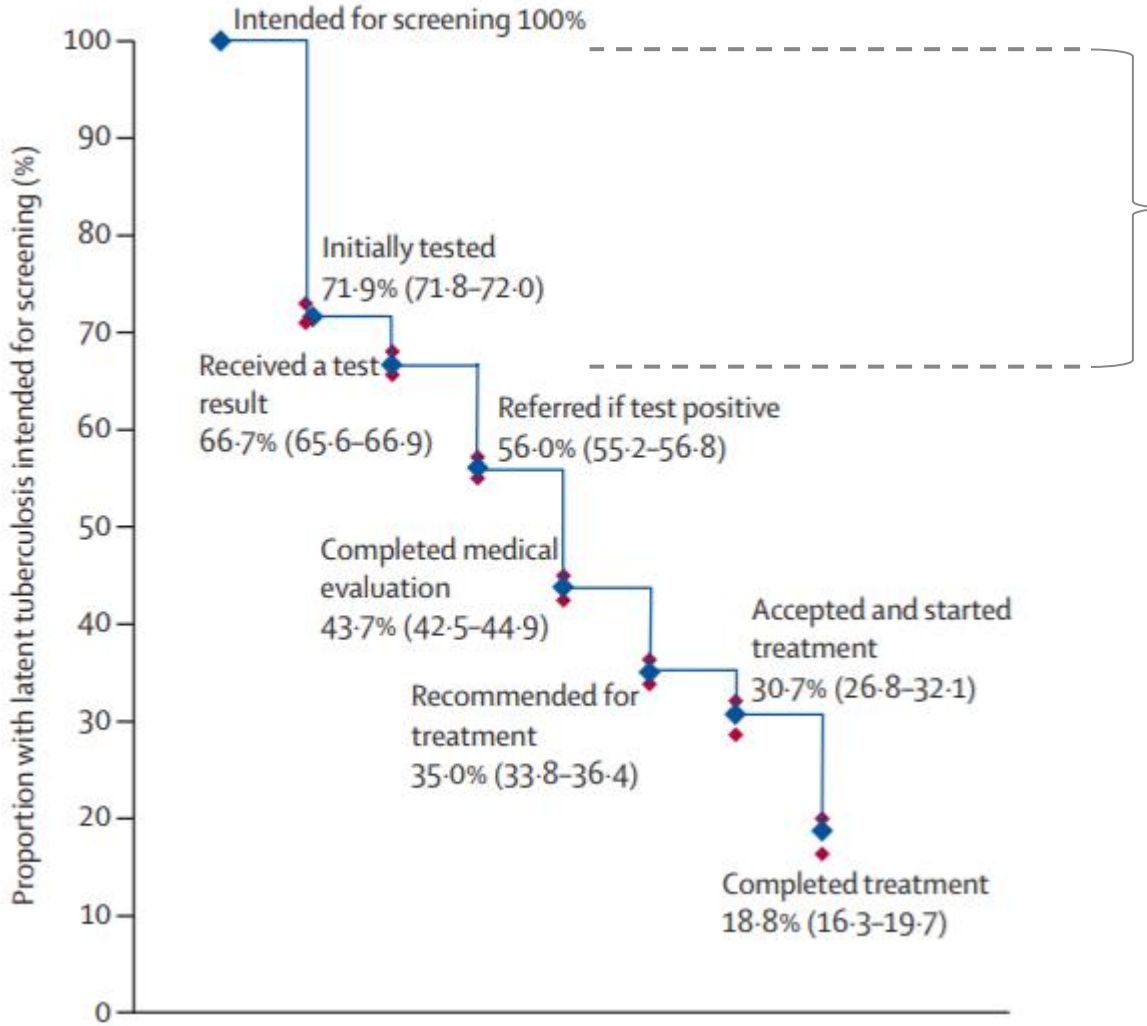
47%

Of people around the world still don't have access to basic diagnostics



The *Lancet* Commission on diagnostics: transforming access to diagnostics

Current TB infection care cascade gaps

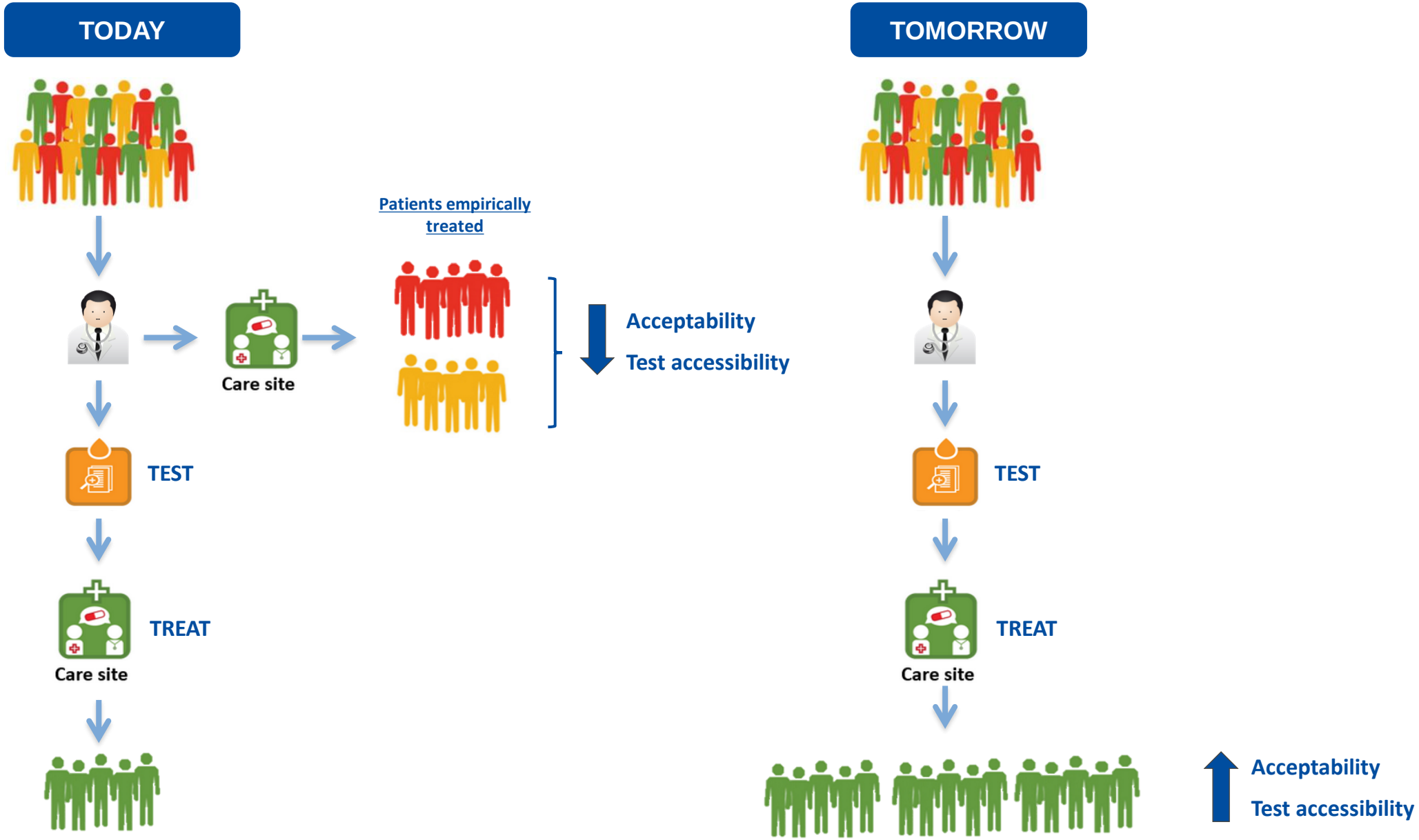


- **Steps in the cascade associated with greater losses included completion of testing**

- Among the reasons associated with losses for completing screening and testing:
  - Health systems issues (lack of human resources, hard to access clinic, health insurance etc..)
  - Social issues (wrong perception of the disease, stigma, mistrust etc…)

Alsdurf H, et al. Lancet Infect Dis. 2016 Nov;16(11):1269-1278. doi: 10.1016/S1473-3099(16)30216-X.

Implementation of TB infection Test & Treat is essential for TB elimination



We want to bring the potential of QFT-plus performances in low- and middle-income countries and make it **accessible** to those in need

QIAreach QuantiFERON-TB

Evolution of QFT Technology

Latest generation offer

First generation
QuantiFERON-TB

2001: FDA approved

- Measured cell-mediated immunity to tuberculin purified protein derivative (PPD)
- Breakthrough: TST becomes a blood test

Second generation
QuantiFERON-TB
Gold

2004: FDA approved

- Liquid antigen version
- Antigens specific for M.tb with 99% specificity
- Clinical benchmark: No cross reactivity with BCG

Third generation
QuantiFERON-TB
Gold In-Tube

2007: FDA approved

- Logistical advantage – remote incubation
- Lab benchmark: Scalable
- >1500 peer reviewed publications
- >30 million tests sold

Fourth generation
QuantiFERON-TB
Gold Plus (QFT-Plus)

2014: CE-IVD
2017: FDA approved

- Addition of patented CD8 antigens – potential biomarker of intracellular TB burden
- New flexible blood draw options

QIAreach
QuantiFERON-TB*

Expected in Q3 2021

- Using QFT-Plus technology to increase access to IGRA testing in high burden / Low resource settings

* Currently under development

QIAreach Solution to address testing needs in low resource settings

No maintenance required

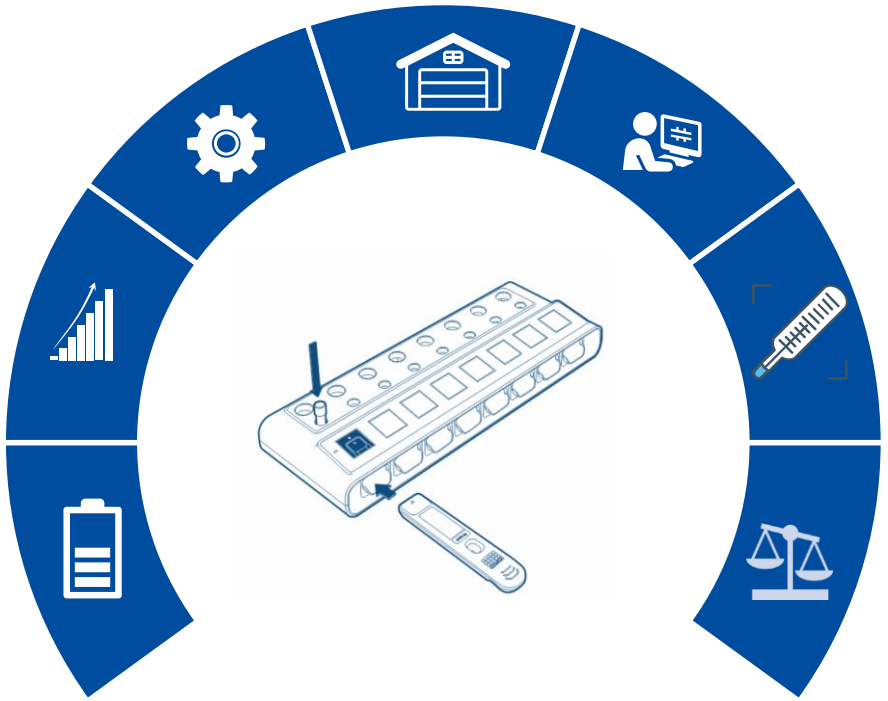
- No maintenance or calibration of the eHub
- Dust protection guard provided and easy to clean ports

Scalable solution

- Scalable from 1 to 8 samples, up to 24 samples/h

Up to 8 h battery backup

Allow uninterrupted operation when the power goes out or an external power source is not available



Digital and connected

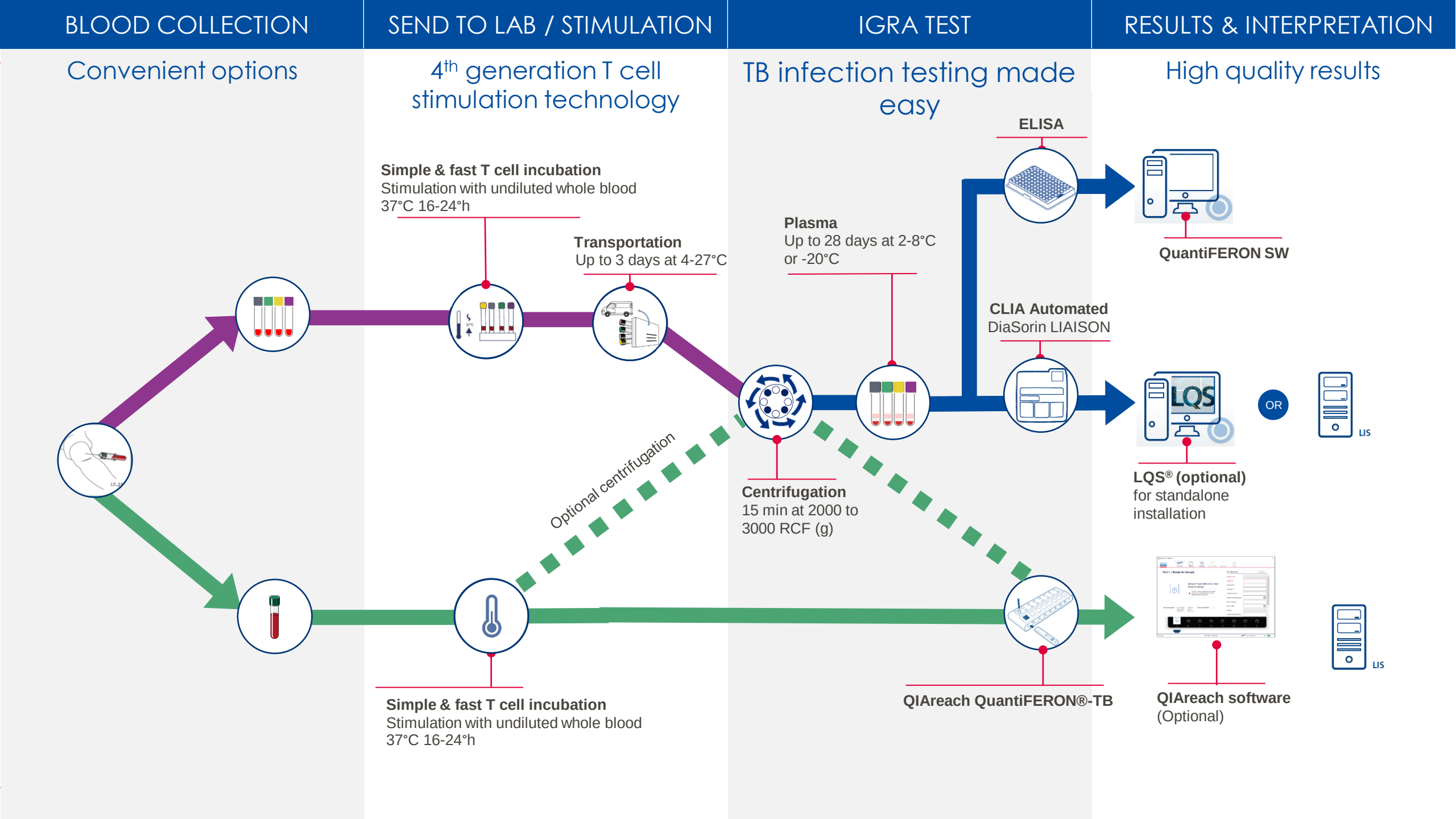
- Optional software for results traceability
- Ability to send the results to LIMS

No cold chain

- No cold chain required for any test components

Portable

- eHub < 1 kg and portable


BLOOD COLLECTION
SEND TO LAB / STIMULATION
IGRA TEST
RESULTS & INTERPRETATION
Convenient options
4th generation T cell stimulation technology
TB infection testing made easy
High quality results
Simple & fast T cell incubation
Stimulation with undiluted whole blood
37°C 16-24°h
Transportation
Up to 3 days at 4-27°C
Plasma
Up to 28 days at 2-8°C
or -20°C
ELISA
QuantiFERON SW
CLIA Automated
DiaSorin LIAISON
LQS® (optional)
for standalone
installation
OR
LIS
Optional centrifugation
Centrifugation
15 min at 2000 to
3000 RCF (g)
Simple & fast T cell incubation
Stimulation with undiluted whole blood
37°C 16-24°h
QIAreach QuantiFERON®-TB
QIAreach software
(Optional)
LIS

QIAreach QuantiFERON-TB is an accurate solution for diagnosing TB infection

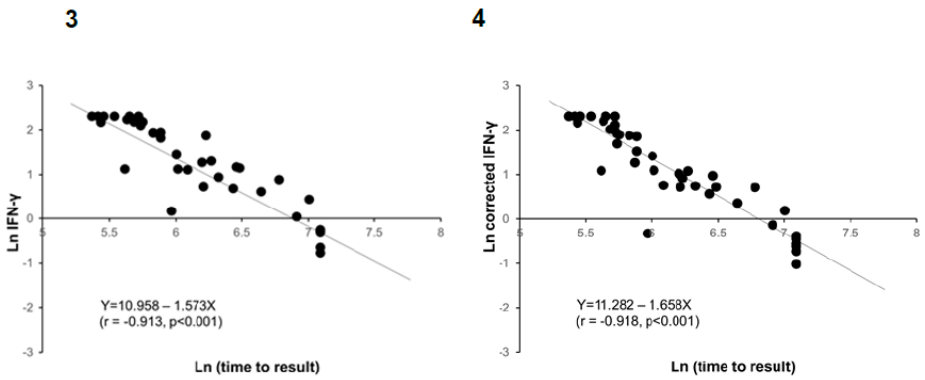
Clinical performances (Japan)

Objective

- To compare the QIAreach QuantiFERON-TB (QIAreach QFT) vs. QuantiFERON-TB Gold Plus assay (QFT-Plus) to detect tuberculosis (TB) infection;
- To evaluate diagnostic sensitivity of QIAreach QFT using active TB as surrogate for TB infection;
- To preliminarily evaluate QIAreach QFT in immunocompromised individuals

Results

	Healthy controls		Active TB		
	QFT-Plus positive	QFT-Plus negative	QFT-Plus positive	QFT-Plus negative	Total
Positive QIAreach QFT result	0	1	41	0	42
Negative QIAreach QFT result	0	41	0	0	41
Total	0	42	41	0	83



Conclusion

- This study demonstrates that QIAreach QFT test has high clinical performance: 100% sensitivity, 97.6% specificity, and **98.8% overall concordance using QFT-Plus as the reference standard**
- There is a statistically significant relationship between levels of IFN-γ in plasma of active TB patients and TTR suggesting that TTR could be used as a surrogate marker of IFN-γ concentration in plasma when using QIAreach QFT assay
- Seven cases in the active TB group who were immunocompromised (CD4 <200/μL) returned positive results on QIAreach QFT

Fukushima K, et al. Pulmonology. 2021 Aug 3:S2531-0437(21)00151-3. doi: 10.1016/j.pulmoe.2021.07.003

QIAreach QuantiFERON-TB is an accurate solution for diagnosing TB infection

Clinical performances (Internal study)

Objective

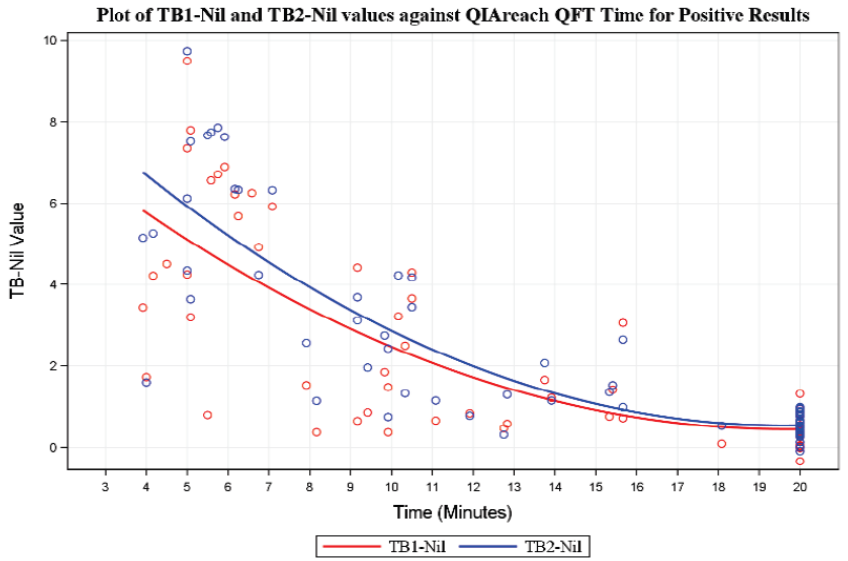
Agreement between QuantiFERON-TB Gold Plus and QIAreach QuantiFERON-TB: Performance of QIAreach QuantiFERON-TB (QIAreach QFT) was compared to QuantiFERON-TB Gold Plus (QFT-Plus) in a population with a mix of risk factors for TB infection. Specimens were collected from a total of 4 sites. All QFT-Plus ELISA testing and QIAreach QFT testing was performed at a single site. A total of 225 samples were included in the final performance comparison

Preliminary performance assessment

Counts	Frequency	Agreement	Upper 95% CI	Lower 95% CI
OPA*	219/225	97.3%	99.0%	94.3%
PPA	71/75	94.7%	98.5%	86.9%
NPA	148/150	98.7%	99.8%	95.3%

OPA: Overall percent agreement; PPA: Positive percent agreement; NPA: Negative percent agreement

* When factoring in 15 QFT-Plus indeterminate results, the OPA between QFT-Plus and QIAreach QFT is 91.3% (95% CI: 86.9 – 94.5%).



Conclusion

- In a preliminary performance evaluation versus QFT-Plus (n = 225), QIAreach QFT showed an OPA of 97.3% (95% CI: 99.0 – 94.3%), with a PPA of 94.7% (95% CI: 98.5–86.9%) and an NPA of 98.7% (95% CI: 99.8% – 95.3%).
- Significant correlation was observed between the QIAreach QFT time to result and IU/ml responses of QFT-Plus-positive samples.
- **QIAreach QFT shows a high level of agreement with QFT-Plus** and has the potential to overcome key hurdles for TB screening in high-burden, low-resource settings.

Stieber, et al. IJTLD. 2021 on Press

QIAreach QuantiFERON-TB is an accurate solution for diagnosing TB infection

Usability study (Zambia)

Objective

Assess usability the QIAreach QFT and training needs for the assay implementation were assessed across three domains: (1) effectiveness, (2) efficiency, and (3) user satisfaction

Preliminary performance assessment

Effectiveness
Pass rate of 4 tasks

Efficiency
Completion of all tasks in less than 1 hour

Satisfaction
Likert scale 1-5

Conclusion

The characteristics of the platform together with our usability finding make the QIAreach-QFT assay suitable to be implemented in the remote area where limited infrastructure has hampered the accessibility of IGRA technologies to those in needs.

QFT-Plus demonstrated comparative cost-effectiveness with skin-based tests; *high potential for QIAreach to exceed*

Article | Open Access | Published: 11 December 2020

Cost-effectiveness of newer technologies for the diagnosis of *Mycobacterium tuberculosis* infection in Brazilian people living with HIV

Ricardo E. Steffen, Marcia Pinto, Afranio Kritski & Anete Trajman

Scientific Reports **10**, Article number: 21823 (2020) | Cite this article

Strategy	Cost	Incremental cost	QALY	Incremental QALY
Diaskintest	884.70		8.386	
EC skin test	886.60	1.90	8.386	0
QFT-Plus	902.10	17.40	8.385	− 0.00055
TST PPD RT 23	925.50	40.80	8.356	− 0.02967

- Some operational aspects can have great impact on final test costs and, consequently, its cost-effectiveness
- No societal costs were included (indirect costs, loss of productivity or cost of death)
- No cost-effectiveness of opportunity cost were included

QIAreach – QFT: Hierarchy of effectiveness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