

TUBERCULOSIS DIAGNOSTICS

AUTOMATED REAL-TIME DNA AMPLIFICATION TEST FOR RAPID AND SIMULTANEOUS DETECTION OF TB AND RIFAMPICIN RESISTANCE

XPERT® MTB/RIF ASSAY

BACKGROUND

- The first pillar of the WHO End TB strategy calls for early and rapid diagnosis of TB, universal drug susceptibility testing (DST), systematic screening of contacts and high-risk groups, and treatment of all people with TB, including drug-resistant and HIV-associated TB;
- In 2015, 6.1 million new TB cases were notified globally and reported to WHO. A significant gap of 4.3 million remains between incident and notified TB cases and only one in five estimated cases of multidrug-resistant (MDR) TB is currently detected;
- Xpert MTB/RIF assay is the only WHO-recommended diagnostic test that simultaneously detects TB and rifampicin resistance (a good proxy for MDR-TB) and is suitable for use at lower levels of the health system.



ABOUT THE TEST

- The Xpert MTB/RIF assay is an automated, cartridge-based nucleic acid amplification test that uses the multi-disease GeneXpert platform;
- The assay can be performed directly on sputum, on processed sputum sediment and on selected extrapulmonary specimens, from both adults and children.

KEY DOCUMENTS

- The 2010 WHO policy recommendations on Xpert MTB/RIF were updated in 2013 to expand its use as **the initial diagnostic test in all persons (adults and children) with signs and symptoms of TB;**
- The WHO “how to” *Xpert MTB/RIF Implementation Manual* was subsequently updated and describes the operational aspects and practical considerations related to Xpert MTB/RIF introduction and scale-up;
- Incorporation of Xpert MTB/RIF into diagnostic algorithms at different levels of TB laboratory networks is outlined in the 2015 **WHO Policy Framework for Implementing TB Diagnostics.**

BENEFITS OF THE XPERT MTB/RIF ASSAY

- The Xpert MTB/RIF assay simultaneously detects *Mycobacterium tuberculosis* and rifampicin resistance in less than two hours;
- The sensitivity of the Xpert MTB/RIF assay for detecting TB is superior to that of microscopy and comparable to that of solid culture, along with high specificity;
- The biosafety precautions required for Xpert MTB/RIF are similar to those for smear microscopy and allows the use of the assay outside of conventional laboratories;
- Training requirements are minimal, which allows testing by non-laboratory staff;
- Several Xpert cartridges for other diseases are available which can all be used on the same GeneXpert platform, facilitating integrated testing.



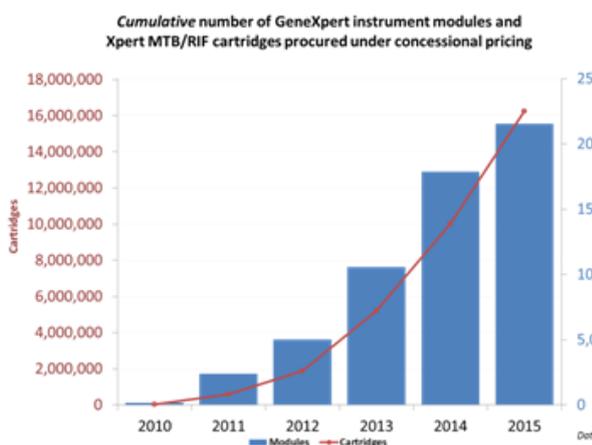
WHO RECOMMENDATIONS ON THE USE OF XPERT MTB/RIF



http://www.who.int/tb/areas-of-work/laboratory/policy_statements

POLICY RECOMMENDATIONS

- WHO recommends the use of Xpert MTB/RIF as the **initial diagnostic test** to detect pulmonary TB and rifampicin resistance, instead of conventional microscopy, phenotypic culture and drug-susceptibility testing (DST), for all patients with signs and symptoms of TB;
- WHO recommends the use of Xpert MTB/RIF as the **initial diagnostic test** in patients with suspected TB meningitis, instead of conventional microscopy, phenotypic culture and DST; treatment should follow immediately if the result is positive; additional testing is needed if the initial Xpert MTB/RIF result is negative;
- WHO recommends the use of Xpert MTB/RIF as the initial diagnostic test, instead of conventional microscopy, culture and histopathology for testing lymph nodes or other tissue from patients with suspected extrapulmonary TB; treatment should follow immediately if the result is positive; additional testing is needed if the initial Xpert MTB/RIF result is negative.



COSTS

- Preferential pricing is available to the public sector in eligible countries, comprising USD17,000 for the GeneXpert four-module device with desktop computer) and USD9,98 for the Xpert MTB/RIF cartridges;
- The list of eligible countries, information on warranty, maintenance and ordering is available at (<http://www.finddx.org/pricing/>).

IMPLEMENTATION CONSIDERATIONS

- Stable uninterruptable electrical supply is needed to run the GeneXpert instrument; in settings where extended power outages may occur, uninterrupted power devices (UPS) and/or additional batteries may be needed;
- The ambient operating temperature of the instrument should not exceed 30°C. Cartridges must be stored below 28°C;
- As of 2016, the shelf-life of the cartridges ex-works is over 18 months. Careful planning and management of supplies are essential, in order to prevent them from expiring;
- Security measures must be put in place to prevent the theft of the accompanying laptop or desktop computer;
- The GeneXpert modules require annual check performed with a Xpert Check kit. Every single module is tested with one Xpert Check cartridge (no sample added) to validate the performance of the module for the coming year;
- The implementation of Xpert MTB/RIF does not eliminate the need for conventional microscopy, culture and DST, which are required to monitor the progress of treatment and to detect resistance to anti-TB agents other than rifampicin.

The new **Framework of Indicators and Targets for Laboratory Strengthening** under the WHO End TB strategy calls for all countries to have algorithms with a WHO-recommended rapid diagnostic (WRD) as the initial diagnostic test by 2020 (2018 for high burden countries), with 80% of all notified new and relapse cases tested with a WRD as the initial diagnostic test.

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