

DIAGNOSIS OF MYCOBACTERIUM TB INFECTION WITH GENE XPERT TEST ALONG WITH RIFAMPICIN RESISTANCE (rpoB)

HUMAIRA ZAFAR

According to a published report by WHO for the year 2011, it was highlighted that the infection with mycobacterium tuberculosis is taking one life every 17 seconds. It is responsible for the highest mortality rate around the globe and about 3 million deaths annually. The main reason behind this is the negligence in diagnosis and the emergence of drug resistance strains.¹ The diagnosis of Tuberculosis always remained a challenging task for all the health care providers around the globe. However, for pediatric age group it becomes more difficult to diagnose and hence manage the pathology.²

According to a published report of WHO for the year 2012, Gene Xpert Test for Mycobacterium TB with Rifampicin resistance (rpoB), are amongst the recommended diagnostic protocols especially for TB endemic areas. A study report by Small et al; had highlighted that this test should be amongst the major milestones for TB diagnosis and hence the management options. Rifampicin resistance is in fact a hallmark for diagnosing multidrug resistant strains of Mycobacterium TB³ Van et al; by their studies have supplemented the finding that this test had revolutionized the diagnosis of TB.³

The Gene Xpert MTB/RIF test detects the DNA sequences of Mycobacterium tuberculosis complex along with the resistance for first line drug i.e rifampicin. This can well be identified with the help of Polymerase Chain Reaction (PCR). The principle of this test is based upon nucleic acid amplification (NAAT). The preferred sample is sputum; however any biopsy sample, fluid, pus, urine or stool with suspected infection can be used for the diagnosis of pulmonary or extra pulmonary tuberculosis. This simple and rapid test with minimal biohazards only requires 90 minutes and harbors high sensitivity (88%) and specificity (98%).⁴ However, this test is even highly sensitive for smear negative patients. The reported sensitivity and specificity in such cases is about 67% and 98% respectively. This test has the ability to detect <10 mycobacterium per ml of liquid sample. While for other specimens, it can even detect 100-130 colony forming unit per ml of sample. The sensitivity and specificity of test increase to double when performed on three consecutive early morning sputum samples. The accuracy of test increases with the presence of increased no. of mycobacteria per ml of sample. Therefore even in cases with less no., the centrifugation techniques can improve the results upto 35%. The other advantages of this test includes maximum automation in sample processing, ultimately reducing the hands on time and risk of cross-contamination.⁵

A comparative analysis with Quantiferon Tb Gold (detection of gamma interferon by ELISA) test has shown that latent TB infection can easily be confirmed by this test. However, the diagnosis and identification of an active disease can well be achieved by Gene Xpert test. While in HIV seronegative patients the accuracy of Quantiferon TB Gold and Gene Xpert tests are almost equal. For settings/ areas with high prevalence of HIV and MDR (multi drug resistant TB strains), WHO (2010), had recommended and endorsed the replacement of sputum smear microscopy with specific test.⁶

Steingart et al (2011); carried out a study in Cochrane and had shown that the sensitivity of Gene Xpert test (rpoB) is 88% and specificity of 98%, when compared with culture. Which takes about 4-6 weeks to obtain the growth of mycobacteria. Although still a gold standard, but in order to start the treatment and to reduce the morbidity of TB sufferers, timely and accurate diagnosis will be required based upon the results of said test. As per newly published report for the year 2014 and in order to fight against TB, WHO has provided the facility of this test to about more than 95 countries globally.⁷

In view of all the available latest guidelines and WHO recommendations, there is a dire need to revise the diagnostic criteria for MTB. This Gene Xpert test imparts a significant role in the management of TB patients. The resultant of all this will be definitely a step forward to reduce the miseries of TB sufferers and to combat against this disease.

REFERENCES

1. World Health Organization (2014) WHO monitoring of Xpert MTB/RIF roll-out. Website: [http://who.int/tb/laboratory/GeneXpert_rollout_large.jpg]. Retrieved on 15th March 2015.
2. Sekadde MP, Wobudeya E, Joloba ML, Sengooba W, Kitembo H, Kitaka SB. Evaluation of the Xpert MTB/RIF test for the diagnosis of childhood pulmonary tuberculosis in Uganda: a cross-sectional diagnostic study. BMC Infect Dis. 2013; 13:133
3. WHO endorses new rapid tuberculosis test. Website: [http://www.who.int/mediacentre/news/release/2010/tb_test20101208/en/index.html] Retrieved on 13th March 2015.
4. Nicol MP, Spiers K, Workman L, Isaacs W, Munro J, Black F, et al. Xpert MTB/RIF testing of stool samples for the diagnosis of pulmonary tuberculosis in children. Expert Rev Anti Infect Ther. 2012; 10(6): 631-35.
5. Steingart KR. Xpert MTB/RIF assay for pulmonary tuberculosis and rifampicin resistance in adults". Cochrane Database of Systematic Reviews. 2013: Cochrane Database Syst Rev. 2013; 31:1.
6. Lawn SD, Zumla AI. Diagnosis of extrapulmonary tuberculosis using the Xpert® MTB/RIF assay. Expert Rev Anti Infect Ther. Jun 2012; 10(6): 631-635.

7. Steingart KR, Sohn H, Schiller I, Kloda LA, Boehme CC, Pai M, et al.. Xpert® MTB/RIF assay for pulmonary tuberculosis and rifampicin resistance in adults. Cochrane Database Syst Rev 2013;1: 9593.

Correspondence to:

Humaira Zafar
Assistant Professor of Microbiology,
Al-Nafees Medical College & Hospital
Isra University Islamabad Campus
Email: dr.humairazafar@yahoo.com
