The role of Xpert MTB/RIF testing in infection control of Tuberculosis

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Introduction: Tuberculosis (TB) remains a leading cause of death among infectious diseases worldwide, with an estimated 10.4 million new cases and 1.4 million deaths in 2015. As TB is an airborne infection, the level of bacterial excrection is important symptome of disease and characteristic of patients danger, that usually asessed by positive/negative smear or amount of Mycobacterium tuberculosis (MTB) colonies in culture. But bacterioscopy has low sensitivity and specificity and 6-8 weeks for consuming of culture test (and the same time to provide Drug sensitivity test). The Xpert MTB/RIF assay automated cartridge-based method of simultaneously detecting MTB and resistance to rifampicin (Rif) within 2 hours.

Objective: to estimate the role of Xpert MBT/RIF testing to assess the danger degree of the tuberculosis (TB) patient.

Materials and methods: A comparison of 142 sputum specimens with positive culture test on Löwenstein-Jensen media and Xpert MTB/RIF test was performed. The standard assessment of positive inoculation: - single colonies– 1-19 colonies; - 1+ - 20-100 colonies; - 2+ - 100-200 colonies; - 3+ - 200-500 colonies; - 4+ - over 500 colonies (too numerous to count). The bacterial excretion is assessed as: scanty for single colonies, moderate for 20 to 100 colonies (1+), massive for 100 and over (2+,3+,4+). Evaluation of the positive Xpert MTB/RIF test was made according to the number of copies of DNA: very small, small, medium, great quantity. In 1 group there were 52 specimens with scanty, in group 2 - 40 specimens with moderate, in group 3 - 50 specimens with massive bacterial excrection. Correlation analysis was performed in the statistical program SPPS.

Results: Xpert MTB/RIF: in 1 group 26.9% - negative results, 23.1% - very small, 38.5% - small, 7.7%, - medium, 3.8% - great quantity; in the 2 group 2.5% - negative results, 5.0% - very small, 35.0% - small, 47.5% - the medium quantity, 10.0% - a great quantity; in 3 group - very small and small had 2.0% of the results, 34.0% - the medium quantity, 62.0% - a great quantity. Correlation analysis showed a strong and significant correlation between the indicated results $r=0.75$, with the reliability level $p<0.01$.

Discussions: According to results we can propose to set the degree of patients' danger:

- low - very small, small, medium quantity of MTB without resistance to Rif;

- moderate – great quantity of MTB without resistance to Rif or very small, small, medium quantity of MTB with resistance to Rif;

- high – great quantity of MTB with resistance to Rif.

The result of correlation analysis gives an opportunity to recommend the use of the data of genotyping test Xpert MTB/RIF with indication of quantitative characteristics for prediction of level of bacterial excrection, early assessment of the TB patients danger for planning infection control.