The Application of Interferon Gamma Release Assay in the Assessment of Latent Tuberculosis Infection (LTBI) among Healthcare Workers in Hong Kong

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Introduction

In-vitro Interferon Gamma Release Assay (IGRA), including the QuantiFERON-TB Gold In-Tube (QFT-GIT) is a specific marker for the diagnosis of Latent Tuberculosis Infection (LTBI). Unlike Tuberculin Skin Test, IGRA is specific and not affected by BCG inoculation. Serial testing had been utilized for contact investigation overseas. Our study investigated its application in contact investigations for healthcare workers.

Objectives

Primary objective is to assess the conversion of QFN-TB Gold In-Tube after significant exposure to a smear positive TB patients. Secondary objective is to assess the baseline prevalence of LTBI among local health-care workers.

Methodology

We performed two-year prospective cohort study. Healthcare workers were recruited from QEH, UCH, and PMH between 1st Jan 2010 and 30th Jun 2011. Eligible participants were those exposed to smear positive pulmonary TB patients. Matched non-exposed participants were also recruited. Blood specimens for QFT-GIT were taken on recruitment, 3 months, 6 months and 12 months.

Result

159 exposed and 120 non-exposed participants were recruited. Overall demographics is as follows: age (Mean: 39.2; range 22-63); gender (Male: Female – 17.6: 82.4);
years of experience as HCW (mean 11.5; range 0 – 43), and; baseline QFT-GIT positivity (20.7%). There was no difference between the two groups. Baseline QFT-GIT positivity is associated with age ≥ 40 (RR 1.62, 95% CI: 1.23 – 2.11), and working as healthcare workers for ≥ 10 years (RR 1.44, 95% CI: 1.15-1.79). Using the FDA approved manufacturer’s cut-off (0.35IU/mL), QFT-GIT conversion from negative to positive in serial blood tests at three months was 8.85% (10/113) for exposed group and 4.54% (4/88) for non-exposed group. RR: 1.30 (95% CI: 0.91 – 1.85). There was no difference in conversion or reversion at study end between two groups. When a grey zone of between (0.2 IU/mL to 0.7 IU/mL) was implemented, QFT-GIT conversion at 3 months was 2.97% (3/101) for exposed group and 1.03% (1/79) for non-exposed group. RR 2.347 (95% CI 0.249, 22.129) Only one participant from non-exposed group who had persistent high positive reading of >1.0IU/mL developed active TB during the study period. This is in line with published experience that quantitative measurement may have implication of active disease. In conclusion, this is the largest scale TB contact investigation study using IGRA for healthcare workers in Hong Kong. The local prevalence of LTBI is now found to be 20.7% in our cohort. QFT-GIT conversion after clear TB exposure history was most implicated as new acquisition of TB infection. 3 months was regarded as the time required for TST conversion. Our findings suggest a tendency of QFT-GIT conversion after TB exposure within three months, albeit not statistically significant. Our study failed to obtain significant result as we have a few QFT-GIT converters. This can be explained by our relatively loose inclusion criteria. Only 52.7% of our index patients have AFB smear 3+, and the mean duration of exposure was only 27.08 hours. On the other hand, the association of QFT-GIT conversion with active TB disease was not found, due to the short follow-up duration. Further studies with longer term serial monitoring are warranted. (RFCID Project reference number: 09081002)