original article

Performance of ESAT-6 and CFP-10 in diagnosis of tubercular infection

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ABSTRACT

Background

Diagnosis of latent tuberculosis infection (LTBI) is currently based on the tuberculin skin test. The Enzyme-linked immunospot assay (ELISPOT) is a new blood test to diagnose LTBI. Genomic analyses have enabled the identification of specific *M. tuberculosis* proteins (ESAT-6 and CFP-10). The use of such proteins in vitro makes it possible to detect the presence of T lymphocytes circulating as a result of a specific stimulus. The aim of this study is to compare the ELISPOT and the tuberculin skin test for detecting LTBI in patients with tuberculosis.

Patients and Methods

452 blood samples were taken: 150 subjects as control groups and 302 subjects with TB-like symptoms and analysed. The T effector lymphocyte assay was performed by T-SPOT TB (Oxford Immunotec).

Results

Among 150 healthy subjects (control groups) the Mantoux test and the *in vitro* test identified 0 subjects, 23 (15,3%) were still positive in the Mantoux test, but were negative in the *in vitro* assay. While, 127 (84,7%) were negative in both immunological tests. Of the group of 302 patients with unidentified fever, 126 (41.7%) were positive in both immunological tests. Lastly 126 (41.7%) were negative for both tests. 25 cases were positive in the Mantoux test alone (8.3%).

Conclusions

Compared with the tuberculin skin test, the ELISPOT appears to be at least as sensitive for diagnosis of LTBI in patients with tuberculosis.

Keywords: tuberculosis infection, diagnostic test, immunity, hematologic test, sensitivity.

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INTRODUCTION

Tuberculosis continues to be a major scourge of mankind. Each year, approximately 8 million people develop active tuberculosis and 2 million people die of this disease.[1] Most of these people represent vaccine failures in that they have developed tuberculosis despite having been vaccinated previously with *Mycobacterium bovis* BCG or bacillus Calmette-Guérin. While not highly effective, BCG is the only vaccine against tuberculosis currently available, and it has been used widely. More than 4 billion doses of BCG have been administered worldwide.[2]

Although BCG has a limited preventive value and is not contributing to the elimination of the disease, its use in protecting at least children from TB is recommended by the WHO in countries where the disease is endemic[3] and where public health budgets cannot cover the high costs of antibiotic treatment. In Italy, a country with low prevalence in which the annual rate of tubercular disease is below 10 cases in 100,000, the laws currently in force make anti-tubercular vaccination compulsory for infants and children of below 5 years of age who test negative for tuberculin; persons living or having close contact with persons infected with TB in the contagious phase where the risk of contagion persists; health workers, including students of medicine and trainee nurses; and anybody who works in health environments at high risk of exposure to strains of Multidrug-Resistant *M. tuberculosis* or in environments at high risk of TB but cannot be given preventive therapy because they are clinically advised to avoid taking certain drugs.[4] The possibility of accurately and rapidly detecting M. tuberculosis infection is crucial for the global control of the disease. Diagnosis and treatment where indicated of latent tubercular infection are considered absolute priorities for controlling and eliminating tuberculosis. Specifically, early identification of infected subjects at high risk of clinical progression and of those with active pulmonary tuberculosis makes it possible to reduce the sources of contagion in the population. The diagnosis of the active disease is based essentially on the assessment of the risk of infection, the clinical-radiological picture, and the direct examination of samples, although the reference for diagnosis remains the identification of M. tuberculosis in culture. In contrast, in latent tubercular infection, in which the mycobacteria are in a state of quiescence, microbiological isolation is not possible, and diagnosis is therefore based entirely on the demonstration of an immunological response to