BRIEFING NOTES

Issue No 000001 October 2001

DFID TB KNOWLEDGE PROGRAMME

Diagnosis: the role of molecular technology in sub-Saharan Africa

BACKGROUND

The HIV pandemic in sub-Saharan Africa has resulted in a dramatic rise in the incidence of tuberculosis. Co-infection with HIV is associated with decreased sensitivity of both sputum microscopy and chest radiography for the detection of pulmonary tuberculosis. Culture, although offering improved sensitivity, is slow and results are not available until several weeks after submission of specimens. The lack of sensitive diagnostic tools may result in either 'under' or 'over-treatment' of suspects, impacting both on patient care and the efficient utilisation of resources. In addition, delays in diagnosis and access to treatment may augment transmission. Nucleic acid amplification methods have been shown to offer rapid diagnosis. However, their utility for routine diagnosis in such areas of high HIV infection has not been evaluated.

INVESTIGATION

A study was undertaken to evaluate the role of nucleic acid amplification (NAA) technology for the diagnosis of tuberculosis in the routine diagnostic setting of a developing country with a high incidence of HIV (Zambia). The technology was assessed at two different levels of the health care system, a specialist referral laboratory and a rural district hospital. A commercial kit and a low-cost 'in-house' polymerase chain reaction (*PCR*) were evaluated for the diagnosis of pulmonary tuberculosis from sputum specimens.

RECOMMENDATIONS

- Zambia should not invest in nucleic amplification technology for routine diagnosis of tuberculosis at the present time.
- Where further diagnostic investigations are to be undertaken, consideration should be given to reducing the sputum samples examined during the initial screening to two.

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SUMMARY OF MAJOR FINDINGS

- The sensitivity of microscopy for the diagnosis of pulmonary tuberculosis (PTB) was low. In Lusaka less than 30% of patients were identified by microscopy and the majority of patients were diagnosed on 'clinical suspicion'.
- The 'in-house' PCR tested was not an appropriate technique for the routine diagnosis of PTB in Zambia. The PCR failed to identify all smear positive cases. The PCR was not sustainable for routine use at the rural district site.
- The commercial kit (Gen-Probe Amplified Mycobacterium Tuberculosis Direct Test) identified over 80% of PTB patients with results available within 3 days. It was the most sensitive of the laboratory techniques examined. However, the current high purchase cost of this test would prohibit its use for routine diagnosis in the public sector of such a poor country.
- In Lusaka significant proportion (~20%) of patients placed on treatment for tuberculosis had no laboratory evidence of infection with *Mycobacterium tuberculosis*, their sputum being found smear, culture and AMTD negative. Further research is required to determine degree of misdiagnosis in this setting.
- The use of three smears for the diagnosis of PTB in the rural setting could not be justified on economic grounds.

COLLABORATING PARTNERS

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This work was funded by the Department for International Development, UK

KEY PUBLICATIONS

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