

## NOVEL DETECTION OF LEPROSY IN ARCHAEOLOGICAL POPULATIONS BY ANALYSIS OF MYCOLIC ACID LIPID BIOMARKERS

Oona Lee, David Minnikin, Gurdyal Besra, Helen Donoghue, Mike Taylor, Charlotte Roberts

**Aims.** Evidence for tuberculosis (TB) infection can be found in the archaeological skeletal record, using analysis of DNA and lipid biomarkers, such as mycolic acids (Gernaey *et al.* 2001). Analysis of DNA has also been used to confirm the presence of leprosy in ancient skeletons. This communication will demonstrate that characteristic mycolic acid biomarkers can be detected in bones from lepers.

**Methods.** Standard cells of *Mycobacterium leprae* and nine ribs from UK leprosy and non-leprosy cemeteries were degraded by alkaline hydrolysis to release long-chain fatty acids, which were converted to pentafluorobenzyl (PFB) esters. The long-chain esters were fractionated on silica gel cartridges to give fractions rich in mycolic acid PFBs. After conversion of the mycolate PFB esters to pyrenebutyric acid (PBA) derivatives, profiles were obtained by normal and reverse phase high performance liquid chromatography (HPLC).

**Results and Discussion.** As expected from previous studies, standard *M. leprae* had a mycolic acid profile distinct from that of *Mycobacterium tuberculosis*. Mycolate profiles from the nine bone samples all produced HPLC profiles corresponding to mycolic acids. Three of the samples gave clear profiles, indicating leprosy, and two were clearly tuberculosis. Intriguingly, one sample indicated a possible co-infection and the other three samples gave unusual profiles. Examples with DNA evidence for co-infection with tuberculosis and leprosy (Donoghue *et al.* 2005) are also being analysed.

Donoghue HD, Marcsik A, Matheson C, Vernon K, Nuorala E, Molto JE, Greenblatt CL, Spigelman M. 2005. Co-infection of *Mycobacterium tuberculosis* and *Mycobacterium leprae* in human archaeological samples: a possible explanation for the historical decline of leprosy. *Proceedings of the Royal Society B* 272: 389-94.

Gernaey AM, Minnikin DE, Copley MS, Dixon RA, Middleton JC, Roberts CA. 2001. Mycolic acids and ancient DNA confirm an osteological diagnosis of tuberculosis. *Tuberculosis* 81: 259-65.