Letters

Colonisation of point of use water filters by silver resistant non-tuberculous mycobacteria

Point of use water treatment devices are often employed to eliminate the disagreeable taste that results from the use of chlorine to disinfect drinking water. These devices generally rely on granular activated carbon to remove chlorine and they contain silver as a bactericidal agent. This improves the taste of the water, so the consumer may perceive an improved water quality. However, previous studies have shown that bacteria present in tap water, including both innocuous and disease causing species, are able to multiply in carbon filters impregnated with silver and are released into the water passing through the filter.[1 2] The simplest devices available for home use are the "pour through" units: tap water is poured into the top of the unit, passes through the filter by gravity, and is stored in the bottom of the unit for use.

To date no one has reported the ability of non-tuberculous mycobacteria (NTM), including *M avium*, to colonise carbon filters. *M avium* often infects AIDS patients and there is evidence of waterborne transmission of *M avium* in such patients.[3 4] Accordingly we conducted several experiments to determine if NTM are able to colonise a commercial pour through device. Three NTM species, *M avium*, *M fortuitum*, and *M mucogenicum*, were tested in separate experiments. Filters were prepared as recommended by the manufacturer and placed in the filter container/storage unit. Suspensions of each mycobacterial species were diluted in 2 litres of tap water to a final concentration of 9 colony forming units (CFU)/ ml for *M fortuitum*, 24 CFU/ ml for *M mucogenicum*, and 145 CFU/ ml for *M avium*. No attempt was made to remove indigenous mycobacteria from the tap water. The tap water/ mycobacteria suspension was passed through the filter and the entire filter/storage unit was stored at room temperature overnight. The filtered water was then removed and 2 litres of fresh uninoculated tap water were filtered and the unit stored at room temperature. After one week, and each week thereafter for eight consecutive weeks, the filtered water was removed, analysed for mycobacteria, 2 litres of fresh uninoculated tap water were filtered, and the unit again stored at room temperature.

No mycobacteria were recovered at weeks 1 and 2 (< 1 CFU/ ml). *M avium* were detected at week 3 at 22 000 CFU/ml, peaked at week 5 at 47 000 CFU/ ml, and then decreased to 3 CFU/ml at week 8. All *M avium* isolates recovered had identical 16S rRNA gene sequences. *M fortuitum* and *M mucogenicum* were never detected in the filtered water (< 1 CFU/ ml, fig 1).

The three mycobacterial species evaluated were found to differ in sensitivity to silver by a disk diffusion assay. *M avium* was able to grow in the presence of 1000 μg/ml silver, whereas *M fortuitum* and *M mucogenicum* were inhibited at 50 μg/ml. A survey of 45 NTM drinking water isolates, representing 11 different species, revealed 26 isolates (57%) that were resistant to 1000 μg/ml silver, including all 20 *M avium* isolates tested.

These results suggest that drinking water containing silver resistant NTM, treated by point of use filtration that relies on the bacteriocidal effect of silver, could pose a health risk for immunocompromised consumers. For such consumers, boiling the filtered water might be the prudent option.

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2 Geldreich EE, Taylor RH, Blannon JC, *et al.* Bacterial colonization of point-of-use water treatment devices. *J Am Water Works Assoc* 1985;77:72–80.
3 Nightingale SD, Byrd LT, Southern PM, *et al.* Incidence of Mycobacterium avium-intracellulare complex bacteria in human immunodeficiency virus-positive patients. *J Infect Dis* 1992;**165**:1082–5.
4 von Reyn CF, Maslow JN, Barber TW, *et al.* Persistent colonisation of potable water as a source of Mycobacterium avium infection in AIDS. *Lancet* 1994;**343**:1137–41.

Laboratory diagnosis of vaginal discharge (ACP Broadsheet No 153)

This ACP Broadsheet[1] (was known as Best Practice—ED) is a useful document, which is likely to become the gold standard for the laboratory investigation of patients presenting with vaginal discharge. However, the authors also attempt to deal with clinical situations in which vaginal discharge is unlikely to be the presenting complaint and here their advice is contentious. They recommend that vaginal swabs submitted from patients with pelvic inflammatory disease (PID) should undergo "full culture" with special media for the isolation of coliforms and anaerobes in addition to routine investigation for *N gonorrhoeae*, bacterial vaginosis, *Trichomonas vaginalis*, and *Candida* spp. Coliforms and anaerobes are indeed implicated in PID, possibly as secondary invaders from the vagina, but the temporal association and pathogenesis are unclear. Culture of a vaginal swab from a patient with PID is analogous to culture of a throat swab from a patient with pneumonia. Full culture of a vaginal specimen is not generally recommended in the investigation of PID[2] as it does not aid in diagnosis or determine the choice of therapeutic antimicrobial agents.

"Full culture" is also recommended when a vaginal swab is submitted in clinical situations such as "premature labour, prolonged rupture of membranes, spontaneous rupture of membranes, antepartum haemorrhage, and threatened abortion." In these circumstances, the diagnosis of infection (amnionitis) and the timing of antimicrobial therapy are based on pre-agreed clinical criteria and empiric antimicrobial therapy is directed at a range of organisms implicated in the condition. Gram stain and culture of amniotic fluid have been recommended but even these are of limited value in individual patients.[3]

In PID and the other clinical situations mentioned full culture of vaginal specimens for coliforms and anaerobes is unwarranted and therefore an unnecessary expense.

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3 Newton ER. Chorioamnionitis and intraamniotic infection. *Clin Obstet Gynecol* 1993; **36**:795–808.

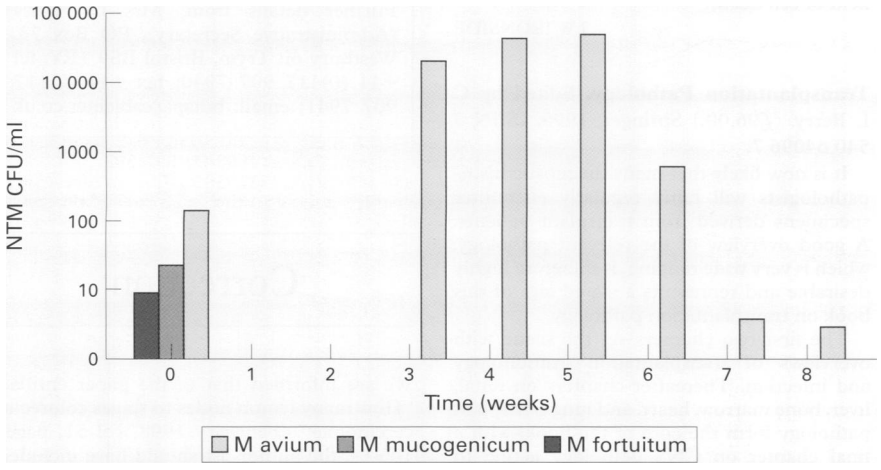

Figure 1 Non-tuberculous mycobacteria colonisation of point of use filter systems.

Book reviews

Color Atlas of Differential Diagnosis in Exfoliative and Aspiration Cytopathology. By S R Kini. ($150.00.) Lippincott Williams & Wilkins, 1998. ISBN 0683 30675 8.

The title of this book accurately reflects the objectives of the text. The concept is based around teaching methods used by the author for postgraduate training. However, this book is clearly not aimed solely at trainees in pathology, and much of the information would be of benefit to anyone who routinely reports cytopathological material. The format of the book consists of text, tables listing features that may be of use in differential diagnosis, and numerous illustrations.

The text is well written and it is gratifying to see that the gynaecological cytology section does not restrict itself solely to