A mechanised batch screening method for the detection of bacteriuria

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In the modern hospital microbiology department, it is not feasible to investigate fully all routine urine specimens for the detection of bacterial infection of the urinary tract. Although increased numbers of leucocytes in the urine may enable selection of urines for comprehensive culture techniques, including direct antibiotic sensitivity testing, it is totally unacceptable to reject any specimen with a normal leucocyte count without performing a screening culture.

An advance in efficient screening, using blotting paper strips, was described by Leigh and Williams¹ and is now successfully used in many hospital laboratories.

The method now described however, involves the mechanical inoculation of 25 urine specimens simultaneously onto an agar surface in a way which reduces both time and materials to a minimum.

Materials and methods

The urine specimens studied were preserved immediately using boric acid² in a 5 ml screw cap container, designed initially for paediatric use and now produced commercially (Sterilin Ltd, Middlesex, England).

Twenty-five uncapped urine specimens were placed in a 100 mm square dish divided into compartments. The plate acts as a holder which fits on the carriage of a modified multipoint inoculator (Denley, Sussex, England). The inoculator modification was firstly to increase upward lift of the rods and secondly to give a suitable spacing to the 5 × 5 configuration. The 25 precision ground steel rods inoculate 1 µl of each specimen onto the agar surface of a 100 mm square dish containing 30 ml CLED agar (Oxoid).

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Quantitative surface viable counts were performed on urines by spreading 10 µl of a 1/10 dilution in Ringer's solution over the surface of a CLED agar plate.

Results

The Figure shows the resulting graph comparing the number of colony-forming units (CFU) determined by both methods on urines showing discrete countable colonies on the multipoint inoculum.

The calculated line of regression is virtually identical for both Gram-positive and Gram-negative organisms with 10 CFU on the multipoint inoculum being equivalent to a count in the region of 10⁷ CFU/l of urine.

Discussion

The blotting paper strip method works well for screening urines containing 10⁸ organisms/l but is less reliable below this level.³ It is now recognised that counts of 10⁷ organisms/l of a pure growth are often of significance in both antenatal and other patients.^{4,5} The mechanical method allows assessment of purity of growth between 10⁷ and 5 × 10⁸ organisms/l and often above this level. The urines not rejected on the basis of the screening test should be fully cultured from the original stored urine as, in common with the paper strip method, confusion and delay may occur by working from the colonies of the screening culture.⁶

The handling of urines in batches of 25 is compatible with the convenient and efficient batch method for performing urine microscopy, which utilises microtitre plates with flat bottomed wells viewed through an inverted microscope.⁷

Comparison of surface viable count and multipoint inoculator on urines.

During the course of one year, the use of the small containers has been accepted by the nursing staff without any problems being encountered. Improved handling of urine specimens has been achieved; the mechanical method demonstrating itself as an efficient labour saving and highly cost effective procedure in the laboratory.

References

- ¹ Leigh DA, Williams JD. Method for the detection of significant bacteriuria in large groups of patients. *J Clin Pathol* 1964;17:489-503.
- ² Porter IA, Brodie J. Boric acid preservation of urine samples. *Br Med J* 1969;iii:353-5.
- ³ Line SJ, Brookes G. The control and use of bacteruritest strips. *Mast Matters* 1975;9:11-4.

- ⁴ Little PJ, Peddie BA, Sincok AR. Significance of bacterial and white cell counts in midstream urines. *J Clin Pathol* 1980;33:58-60.
- ⁵ Maskell R. Current Topics in Infection Series. 3 *Urinary tract infection* London: Edward Arnold, 1982.
- ⁶ Stokes EJ, Ridgway GL. *Clinical bacteriology* 5th ed 1980. London: Edward Arnold.
- ⁷ Maskell R. Microbiology of urinary tract infection. In: Asscher AW, ed. *The management of urinary tract infection*. Oxford: Medicine Publishing Foundation, 1980:41-50.

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Letters to the Editor

Bone histomorphometric analysis in familial hypocalciuric hypercalcaemia

According to recent publications,¹ familial hypocalciuric hypercalcaemia is a relatively common disease but with as yet unknown physiopathology. We report here histomorphometric analysis of the bone of a mother and son showing clinical and biological symptoms of the condition: hypercalcaemia without other features of familial multiple endocrine neoplasia type 1, hypermagnesaemia, hypocalciuria, normal concentration of parathormone (PTH), and abnormal serum calcium concentrations after parathyroidectomy.

Transiliac bone biopsies were performed after double labelling with tetracycline. The following histomorphometric parameters were measured: trabecular bone volume, relative trabecular resorption surfaces, relative trabecular osteoid volume and surfaces, thickness index of osteoid seams, and mineralisation rate. Histomorphometric results were compared to Meunier's normal values. They are shown in the following Table.

Bone histomorphometric analysis shows the presence of a high remodelling state in both patients: relative trabecular resorption surface values are slightly but constantly raised indicating a stimulation in the osteoclastic resorption activity. Simultaneously, relative trabecular osteoid volume

and surface values are high: this means that the number of active osteoblasts is increased although the osteoblastic activity is normal at the cellular level as shown by normal thickness index of osteoid seams and mineralisation rate. This histomorphometric profile is similar to hyper-

Table Bone histomorphometry in a mother and son with familial hypocalciuric hypercalcaemia

Parameters	Mother	Son
Trabecular bone volume (%)	11.0 N = 15.3 ± 4.6	20.7 N = 19.3 ± 3.1
Relative trabecular resorption surfaces (%)	5.2 N = 3.6 ± 1.1	5.1 N = 3.6 ± 1.1
Relative trabecular osteoid volume (%)	4.3 N = 1.6 ± 0.7	13.1 N = 2.7 ± 1.3
Relative trabecular osteoid surface (%)	19.5 N = 8.6 ± 3.9	63.1 N = 14.4 ± 5.9
Thickness index of osteoid seams (%)	22.0 N = 18.5 ± 2.5	20.7 N = 18.9 ± 4.5
Mineralisation rate (µm/day)	0.74 N = 0.72 ± 0.12	0.54 N = 0.72 ± 0.12