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Prevalence of *Corynebacterium urealyticum* in Urine Specimens Collected at a University-Affiliated Medical Center

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***Corynebacterium urealyticum* (formerly *Corynebacterium* group D2) has been implicated as a cause of alkaline-encrusted cystitis and urinary tract struvite calculi. Despite preselecting urine specimens with neutral and alkaline pHs and using prolonged incubation on a selective medium, isolation of this organism was rarely observed in a population of hospitalized patients. We do not recommend routine cultures for this organism unless the urine is alkaline and struvite crystals, leukocytes, and erythrocytes are present.**

Corynebacterium group D2 was first described by King (4) in 1972 and was more recently reclassified as *Corynebacterium urealyticum* by Pitcher et al. (6). Its role as a urinary tract pathogen is well established (2, 7–9, 13), particularly in patients who develop nosocomial infections following urologic manipulations and antibiotic therapy (8, 13). As implied by its name, *C. urealyticum* is strongly urease positive, splitting urea to form ammonia, with the resultant alkalinization of the urine. This can lead to alkaline-encrusted cystitis or the formation of struvite (2, 8–11). *C. urealyticum*, like *C. jeikeium*, is resistant to most antibiotics with the exception of vancomycin (2, 3, 12). Despite this observation, infected patients respond to appropriate antibiotic therapy and failure to institute therapy often leads to persisting infection (8).

Previous results from our laboratory (5) demonstrated that most uropathogens grow rapidly in culture and indicated that urine specimens should be routinely incubated for only 24 h. However, *C. urealyticum* is a slowly growing organism, requiring incubation for 48 h or longer before growth is detected. Furthermore, isolation of *C. urealyticum* is enhanced with use of specific, selective media (2). Thus, techniques for the optimum recovery of this organism would certainly increase the expense of processing urine specimens. Unfortunately, the frequency with which *C. urealyticum* is isolated in selective urine cultures is unresolved. Walkden and associates (14) in South Africa reported a 0.038% yield while De Briel et al. (2) isolated *C. urealyticum* from 8.1% of the urine specimens processed in their French hospital from highly selected patients. In an effort to determine the feasibility of instituting procedures for detecting *C. urealyticum*, we prospectively examined urine specimens received at the Barnes Hospital Clinical Microbiology Laboratory.

Because *C. urealyticum* is associated with the alkalinization of urine, the pHs of all specimens were initially measured by pH strips and only specimens with pHs of 7.0 and higher were cultured for *C. urealyticum*. All specimens received in buffered preservatives were excluded from this study. Neutral and alkaline urine specimens were inoculated with a 10-μl calibrated loop onto a Trypticase soy agar plate supplemented with 5% sheep blood (sheep blood agar), a MacConkey agar plate (Becton Dickinson Co., Cockeysville, Md.), and a selective sheep blood agar plate supplemented with 1% Tween 80, ticarcillin (100 μg/ml), fosfomycin (50 μg/ml), cefotaxime (32 μg/ml), and 5-fluorocytosine (200 μg/ml) (2). Satisfactory recovery of *C. urealyticum* and inhibition of common urethral flora were determined by inoculating the selective media with a stock strain of *C. urealyticum* (provided by Marie Coyle) mixed with a contaminated urine specimen. The three agar plates were incubated in 5% CO_2 for 72 h. The blood agar plates were examined for the presence of small, opaque, white, nonhemolytic colonies. Catalase-positive, gram-positive bacilli were further identified according to the protocol of Coyle and Lipsky (1). *C. urealyticum* is strongly urease positive, fails to reduce nitrate and produce acid from carbohydrates, and is typically resistant to all antibiotics except vancomycin and the fluoroquinolones (3, 6). The medical records for patients with *C. urealyticum* were reviewed to determine the significance of the isolates.

The pHs of 602 specimens were measured during the study period, and 194 specimens with pHs of ≥7.0 were processed as described above. No growth, mixed organisms in small numbers ($<10^4$ CFU/ml), or a single organism in small numbers was observed in 149 specimens, while organisms present in quantities of $\geq 10^4$ CFU/ml were observed in 45 specimens. *C. urealyticum* was recovered in only two specimens from separate patients. The first patient was a 71-year-old woman with a history of diabetic nephropathy who presented with a complaint of increasing frequency of urination. Urinalysis revealed a urine pH of 8.0, pyuria (25 leukocytes per high power field), and few organisms. The culture was positive for *Moraxella* spp. ($\geq 10^4$ CFU/ml) and mixed microbial flora. *C. urealyticum* ($<10^4$ CFU/ml) was isolated after 48 h of incubation on the selective blood agar plate but was not observed on the nonselective blood agar plate. Because the patient's symptoms resolved after empiric treatment with trimethoprim-sulfamethoxazole (the isolate was resistant) for 7 days, the significance of the isolate is doubtful.

The second patient was a 40-year-old woman admitted to the hospital with a history of recurrent pneumonia, secondary to aspiration. Urine cultures were collected as part of a febrile workup. Her history was remarkable only for stress incontinence. *C. urealyticum* ($<10^4$ CFU/ml) was isolated on the selective agar plate after 72 h of incubation and was subsequently recovered in the presence of mixed bacterial flora on the nonselective blood agar plate. The patient received a 10-day course of empiric clindamycin and ceftriaxone therapy directed at her pneumonia. She never developed symptoms

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indicative of a urinary tract infection and did not receive treatment directed at the isolate.

The results of this study suggest that the incidence of *C. urealyticum* in this population is low. Specimens were screened to select ones with pHs of ≥7.0, inoculated onto both selective and nonselective enriched media, and incubated for 72 h to enhance the recovery of slowly growing *C. urealyticum*. The use of selective media has been shown repeatedly to be effective for increasing the recovery of *C. urealyticum* (2, 14). Despite these efforts, only two isolates were recovered from 194 urine specimens, both of which appeared to be clinically insignificant. Thus, the routine of selective media and of extended incubation of all urine cultures for the recovery of *C. urealyticum* appears to be unwarranted. Since the diseases caused by these organisms are well recognized, i.e., alkaline-encrusted cystitis and formation of struvite calculi, particularly in patients who develop nosocomial infections following urologic procedures and antibiotic therapy, the decision to culture selectively should be guided by clinical evidence of disease and the presence of struvite crystals and inflammatory cells in alkaline urine.

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