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Acute Pyelonephritis Caused by *Staphylococcus xylosus*

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Staphylococcus xylosus was recovered from the urine of a patient with pyelonephritis. Antibodies against the teichoic acid of the microorganism were demonstrated in the patient's serum by the agar gel diffusion technique.

In contrast to *Staphylococcus saprophyticus*, generally accepted as a cause of urinary tract infections (1, 4, 7), *S. xylosus* has not been considered a human pathogen. This is a report on a patient in whom this microorganism apparently caused acute pyelonephritis.

The patient was a 26-year-old female without preexisting, known kidney disease. One month before the diagnosis of pyelonephritis, the patient experienced fever that lasted for nearly a week but cleared without therapy. No blood or urine cultures were done during this time. On admission, the patient displayed pyelonephritis, with the typical clinical manifestations (fever, pain in the kidney area, dysuria) and typical laboratory findings (persistent pyuria in three subsequent urine specimens 50 leukocytes per o.f.). Two blood cultures were negative. *S. xylosus* was obtained from the urine specimen in pure culture and at a significant level (10^4 colony-forming units per ml). The bacterium was identified by the criteria described by Kloos and Schleifer (2).

The organism was susceptible to penicillin and 10 other antibiotics and resistant to erythromycin (minimum inhibitory concentration, 150 μg/ml), in keeping with previous findings (6).

Enzymatic determinations (5) showed the presence of both ribitol and glycerol in the teichoic acid of the strain.

Teichoic acid-containing material was prepared by acid extraction with 0.1 M glycine HCl buffer (pH 1.5) at 60°C for 15 min (K. H. Schleifer, personal communication) and applied as antigen for the detection of antibodies in the serum about 5 days after the diagnosis of the disease. Four similar extracts of *S. saprophyticus* (CCM 883 and CCM 2204), *S. aureus* (ATCC 12600), and *S. epidermidis* (Q239), as well as normal human serum, were used as controls during the application of the Ouchterlony diffusion technique, for which commercially available plates from Meloy Laboratories (Springfield, Va.) were used. Serial twofold dilutions of serum in 0.9% saline, as well as the undiluted normal serum, were placed in the outer wells, and the undiluted extract was placed in the central well. Precipitin lines were read after 24 and 48 h of incubation in a humid chamber at room temperature.

The results of the antigen-antibody reactions, summarized in Table 1, revealed the presence of antibodies with a significant specificity for the *S. xylosus* strain isolated from the patient's serum. This finding, in combination with the positive urine culture, suggests strongly that the *S. xylosus* isolate was the causative agent of the patient's pyelonephritis.

The presence of antibodies so soon after the onset of the pyelonephritis led us to the conclusion that the earlier fever episode was the first attack of the disease, very probably associated with *S. xylosus* bacteremia.

We considered the possibility that the *S. xylosus* strain was a pentose-positive mutant of *S. saprophyticus*, a more common urinary tract pathogen. As shown in Table 2, the degradation of the pentoses D(+)-xylose and L(+)-arabinose is an important taxonomic parameter for separating these two *Staphylococcus* species. Experiments with mutants indicate that the fermentation of xylose or arabinose or both is a characteristic of *S. xylosus* (3). Although pen-

TABLE 1. Ouchterlony analysis of antibodies, present in the patient's serum, against five different extracts[a]

Extract	Antibody titer in serum
S. xylosus	1:16
S. saprophyticus CCM 883	1:4
S. saprophyticus CCM 2204	1:4
S. aureus ATCC 12600	1:2
S. epidermidis Q239	1:2

[a] Normal human serum was run as a control. The titer in normal serum was 0 for all extracts.

TABLE 2. Distinction between *S. saprophyticus* and *S. xylosus*[a]

Test	Reaction of:	
	S. saprophyticus	*S. xylosus*
Lysostaphin (50 μg/ml) resistance	(+)	−
Nitrate reduction	−	(+)
Phosphatase	(−)	(+)
D(+)-Galactose	−	+, ±
D(+)-Mannose	−	+
D(+)-Xylose and L(+)-Arabinose	−	+, ±
Xylitol	(+, ±)	(−)

[a] See reference 2. +, Positive; ±, weak; −, negative. A single symbol denotes a type character frequency of 90 to 100%; symbols in parentheses denote a frequency of 70 to 89%; two symbols listed together denote a frequency of 80 to 100%.

tose-negative mutants of *S. xylosus* which resemble *S. saprophyticus* have been isolated, the converse, i.e., the isolation of pentose-positive mutants of *S. saprophyticus*, has not been encountered.

LITERATURE CITED

1. **Jordan, P., A. Iravani, G. Richard, and H. Baer.** 1980. Urinary tract infection caused by *Staphylococcus saprophyticus*. J. Infect. Dis. **142**:510–515.
2. **Kloos, W. E., and K. H. Schleifer.** 1975. Simplified scheme for routine identification of human *Staphylococcus* species. J. Clin. Microbiol. **1**:82–88.
3. **Lehmer, A., and K. H. Schleifer.** 1980. Untersuchungen zum Pentose- und Pentitolstoffwechsel bei *Staphylococcus xylosus* und *Staphylococcus saprophyticus*. Zentralbl. Bakteriol. Parasitenkd. Infektionskr. Hyg. Abt. 1 Orig. Reihe C **1**:109–123.
4. **Meers, P. D., W. Whyte, and G. Sandus.** 1976. Coagulase-negative staphylococci and micrococci in urinary tract infections. J. Clin. Pathol. **28**:270–273.
5. **Schleifer, K. H., and J. Steber.** 1974. Chemische Untersuchungen am Phagenreceptor von *Staphylococcus epidermidis*. Arch. Mikrobiol. **98**:251–270.
6. **Tselenis-Kotsowilis, A., G. Dimitracopoulos, and J. Papavassiliou.** 1978. A comparative study of *Staphylococcus epidermidis* isolates from clinical material and healthy carriers. Zentralbl. Bakteriol. Parasitenkd. Infektionskr. Hyg. Abt. 1 Orig. Reihe A **241**:101–107.
7. **Wallmark, G., I. Arremark, and B. Telander.** 1978. *Staphylococcus saprophyticus*: a frequent cause of acute urinary tract infection among female outpatients. J. Infect. Dis. **138**:791–797.