NOTES

New *Staphylococcus aureus* Phage Type 94/96(292) Associated with a Fatal Septicemia

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A fulminating septicemia due to *Staphylococcus aureus* phage type 94/96(292) resulted in the death of a patient with no previous history of illness. This newly characterized strain is identified by an additional typing reaction with experimental phage 292. The prevalence of this strain is discussed.

In 1972 Blouse et al. (1) reported the isolation of two *Staphylococcus aureus* typing phages from spontaneously induced staphylococcal strains. One of the phages, 94 (WH-1), proved valuable in typing otherwise untypable strains; however, the other phage, 292, did not show promise until recently, when added to the basic typing series. The following report documents the first fatal case involving a new staphylococcal strain, 94/96(292), a strain characterized by an additional typing reaction with experimental phage 292. Comments concerning the strain's prevalence are also presented.

The patient, a 32-year-old white male, was in good health until 6 weeks prior to admission. At this time, he was treated with phenylbutazone and ampicillin for superficial thrombophlebitis and cellulitis of the left leg. He was seen again 1 week later for bleeding superficial varicosities of the lower extremities. On the evening before admission he became lethargic. He was comatose and incontinent on hospital admission the next morning. Examination at the hospital revealed he was febrile (oral temperature of 104°F, 40°C), obtunded, and responsive only to pain. Chest X rays and serum electrolytes were normal, and his leukocyte count was 13,000 per mm³ with 19% band neutrophils, 64% segmented neutrophils, and 17% lymphocytes. Urinalysis revealed a specific gravity of 1.034, 3+ protein, moderate acetone, and a large amount of occult blood. Microscopic examination of the urine showed 0 to 3 leukocytes and 2 to 5 erythrocytes per high-power field. The blood urea nitrogen was 28 mg/dl. The patient was then transferred to the U.S. Air Force Medical Center, Keesler Air Force Base, Miss., where he was admitted to the In-

tensive Care Unit. The cerebrospinal fluid (CSF) had 261 leukocytes per mm³ with 60% polymorphonuclear leukocytes. The CSF protein was 93 mg/dl, and the CSF glucose was 94 mg/dl, with a concomitant serum glucose of 190 mg/dl. After examination and laboratory studies, the patient was placed on penicillin (60 × 10⁶ U/day) and chloramphenicol (8/day). The patient's condition continued to deteriorate despite vigorous antibiotic/supportive therapy, and later that day he developed complications which eventually led to intractable ventricular tachycardia and shock syndrome. He died the following afternoon.

Necropsy findings of the heart revealed minimal atherosclerosis of the aortic valve and left anterior descending coronary artery. The lungs were markedly congested and edematous with no pulmonary emboli present. The abdomen and genitourinary system were unremarkable. Focal areas of cloudy fluid and small white nodules were noted beneath the subarachnoid membrane overlying the cerebral hemispheres. Histological examination revealed focal microabscesses in the heart, kidneys, brain, and liver. Sections of the bone marrow showed generally hypoplastic marrow with plasmacytosis. All pathological evidence suggested the patient had a fulminating septicemia (later confirmed as *S. aureus* by laboratory studies), which resulted in microabscess formation throughout the brain and other organs.

Serological tests on a serum specimen collected on admission were negative (<1:8 threshold titer) by complement fixation test for adenovirus; influenza A and B; coronavirus OC43 and 229E; *Mycoplasma pneumoniae*; meningococcus; parainfluenza 1, 2, and 3;

mumps; lymphocytic choriomeningitis; vaccinia; herpes; varicella; echovirus; coxsackieviruses (B1, B3, B4, B5, and B6); encephalitis (St. Louis encephalitis, Western equine encephalitis, Eastern equine encephalitis, and Central European tick-borne encephalitis); poliomyelitis; rickettsial pox; Rocky Mountain spotted fever; chlamydia group; murine typhus; *Histoplasma capsulatum*; *Coccidioides immitis*; and *Blastomyces dermatitidis*. A similar battery of tests performed on CSF was also negative (<1:2 titer).

Three blood cultures collected at various intervals during the patient's brief course of hospitalization were positive for *S. aureus*, as well as isolates from CSF collected on separate occasions. Staphylococcal isolates were also obtained from the oropharynx, nasopharynx, and lesions on the leg. All isolates were resistant to penicillin and sensitive to methicillin, oxacillin, erythromycin, Keflin, Cleocin, tetracycline, kanamycin, and gentamicin, thus implying that all strains were related. Phage typing of isolates obtained from blood and CSF cultures, using the accepted set of typing phages (3A, 3C, 6, 29, 42E, 47, 52, 52A, 53, 54, 55, 71, 75, 77, 79, 80, 81, 83A, 84, 85, 94, 95, and 96) and

phage 292, indicated that the strains were related and had identical typing patterns of 94/96(292).

Approximately 15% of the *S. aureus* strains received at the Epidemiology Division Laboratories, Brooks Air Force Base, Tex., are characterized by the 94/96 phage pattern. The strains are representative of those found in Air Force hospitals throughout the United States. During the past year an increasing prevalence of strain 94/96 among hospitalized patients has been observed. When phage 292 was added to the typing set, it was found to aid significantly in the further differentiation of 94/96 strains. Thus far, 29% of the type 94/96 strains studied have been further characterized by the 94/96(292) pattern. Since the 94/96 strains appear to be gaining a significant place among hospital strains, the introduction of typing phage 292 for the epidemiological surveillance of these strains is both timely and warranted.

LITERATURE CITED

1. Blouse, L. E., C. U. Mauney, R. V. Marraro, and H. J. Dupuy. 1972. Apparent spontaneous induction of *Staphylococcus aureus* isolated from clinical sources. *Appl. Microbiol.* 23:1023-1024.