of long-term fluconazole therapy. We suggest that clinicians should institute measures for detecting fluconazole resistance in otherwise healthy patients.

Jack D. Sobel and Jose A. Vazquez
Division of Infectious Diseases, Department of Internal Medicine, Wayne State University School of Medicine, Detroit Medical Center, Detroit, Michigan

References


Serum Levels of Penicillin in Basic Trainees in the U.S. Army Who Received Intramuscular Penicillin G Benzathine

The most important advent in the treatment of streptococcal pharyngitis and the prevention of primary and secondary rheumatic fever as well as the control of these diseases has been the development of intramuscular penicillin G benzathine (PGB), which became available in the United States in 1952. A single intramuscular injection of PGB (with the dosage adjusted according to weight) produces serum levels of penicillin G that are relatively low but that are inhibitory for essentially all strains of group A beta-hemolytic streptococci (GBHS) for up to 4 weeks [1]. Because of these advantages and since compliance was assured, intramuscular PGB evolved as the "gold standard" for the treatment of streptococcal pharyngitis and the agent of choice for controlling outbreaks of streptococcal infection and preventing primary rheumatic fever in basic trainees in the military [2].

It is surprising that there have been no reports of studies of serum penicillin levels in highly active basic trainees in the military who received the standard 1.2 million units of intramuscular PGB at the beginning of their training; PGB has been used to control streptococcal infection in these populations of young adults with great success since the mid-1950s [2]. This study was undertaken to provide this information.

Study subjects were newly arrived army recruits who reported to Fort Sill, Oklahoma, for 8 weeks of basic training. An integral part of basic training is strenuous exercises involving daily calisthenics (including sit-ups and push-ups) and a 2-mile run three times weekly. Ongoing monitoring of streptococcal infection in trainees prompted routine administration of 1.2 million units of intramuscular PGB to the entire cohort of several hundred soldiers in each training cycle shortly after they arrived at the training center. Members of the study training cycle were counseled as to the purpose of the study, and 125 volunteers signed informed consent forms. All participants received 1.2 million units of PGB (bicillin L-A, lot 2931727 [expiration date, January 1995]; Wyeth-Ayerst Laboratories, Philadelphia), in the outer upper gluteal region with use of a 3.2-cm, 20-gauge needle on the morning of 3 March 1994. The assay of this lot by Wyeth-Ayerst Laboratories revealed that each 2-ml injection contained 1,248,200 units of PGB.

Ten-ml samples of venous blood were drawn from each participant at 1, 7, 14, 21, and 28 days after the penicillin injection. Immediately after the samples were obtained, sera were separated and frozen at −80°C. All samples were submitted for assay for determination of penicillin concentration within 1 week after the final sample (day 28) was collected.

An assay for determination of serum penicillin concentration was performed with use of an agar diffusion method that was previously described [3]. Validation of the assay was performed in triplicate, and the minimum concentration of penicillin that could be detected was 0.006 μg/mL. Any sample below 0.006 μg/mL was considered to be 0.005 μg/mL for analysis. The upper limit of the sensitivity of the assay was considered to be anything that could be achieved by serum dilution.

Linear regression modeling (SuperANOVA software, Abacus Concepts, Berkeley, CA) was used to relate penicillin concentrations at varied intervals after the injection to the independent vari-

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Reprints or correspondence: Dr. James W. Bass, Department of Pediatrics, Tripler Army Medical Center, Honolulu, Hawaii 96859-5000.

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ables of age, height, weight, and body surface area. The independent variables were assessed in a univariate linear regression model. Data are presented as mean ± SD. The significance of the results was determined at P < .05.

Of the 125 trainees, 86 subjects (all male) completed the study; 53 were white, 19 were African American, 10 were Hispanic, and 4 were Asian. The mean age (± SD) was 21 ± 3 years, the mean (± SD) height was 177 ± 8.3 cm, the mean weight (± SD) was 76 ± 10.8 kg, and the mean (± SD) body surface area was 1.93 ± 0.07 m².

Significant serum levels of penicillin (mean ± SD, 0.072 ± 0.108 µg/mL) were detected 1 day after all 86 serum samples were obtained. Penicillin was detectable in only 34 (39.5%) of 86 samples after 7 days (mean ± SD level, 0.010 ± 0.010 µg/mL) and in only 3 (3.4%) of 86 samples obtained after 14 days (mean level, 0.016 µg/mL). Penicillin was not detected in any of the 86 samples obtained 21 and 28 days after the injection. Age, height, weight, and body surface area were not significantly related to penicillin concentration determined at 1 and 7 days after injection.

Serum penicillin levels in the study subjects at 1 day after injection are similar to those in a previous report [4]. This accord suggests that the integrity of the serum specimens was maintained throughout collection, storage, transport, and testing, and it supports the validity of the penicillin assay. The cause of the decrease in serum penicillin levels after the first week after our study subjects were injected is unknown.

We conclude that serum levels of penicillin that inhibit GABHS in basic trainees in the army persist for only 1–2 weeks after administration of 1.2 million units of PGB. Despite these observations, there has been no evidence that GABHS infection is not controlled when this agent in this dosage is given to basic trainees in the military early in the training cycle [2]. Our findings, if confirmed, may be important in devising strategies to allow continued control of these infections in basic trainees in the military.

James W. Bass, Jenice N. Longfield, Ronald G. Jones, and Rae M. Hartmann
Department of Pediatrics, Tripler Army Medical Center, Honolulu, Hawaii; the Clinical Operations Directorate, U. S. Army Medical Command, Fort Sam Houston, Texas; and the Preventive Medicine Service, U. S. Army Medical Department Activity, Fort Sill, Oklahoma

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References


Escherichia vulneris as a Cause of Intravenous Catheter–Related Bacteremia

In 1982, Brenner et al. [1] applied the designation of Escherichia vulneris to organisms in the Enterobacteriaceae family that were formerly known as Alpha group 1, Enteric group 1, or API group 2. The DNA of these organisms was shown to be highly related, thus indicating they were a distinct species. Biochemical reactions that differentiated E. vulneris from other Escherichia species included lack of indole production and ornithine decarboxylase production. Unlike other Enterobacteriaceae, E. vulneris was methyl red positive and did not utilize citrate [2].

Most isolates of E. vulneris have been recovered from wounds (vulneris [Latin]: of a wound). Pien et al. [3] described a series of 12 patients who had E. vulneris isolated from soft tissues. The isolates did not produce infection in mice, and the authors questioned whether the organism was a pathogen that merited treatment in humans. The following case report demonstrates that E. vulneris can cause iv catheter–related bacteremia.

A 62-year-old woman with poor nutritional status because of Crohn's disease presented with rigors and a fever (temperature, to 102.3°F); she was receiving total parenteral nutrition via a peripherally inserted central venous catheter (PICC). On physical examination, the PICC insertion site was free of erythema, discharge, and tenderness. The remainder of the examination was unremarkable. Blood cultures yielded enteric gram-negative bacilli, and she was admitted to the hospital. Treatment with intravenous cephalazidime (1 g t.i.d.) and nafcillin (1 g every four hours) was started. The PICC was removed, and semiquantitative culture of the catheter tip also yielded 30 colonies of the same organism [4].

The organism was presumptively identified as E. vulneris by the Vitek GNI automated system (bioMérieux Vitek, Hazelwood, MO). Conventional biochemical tests resulted in definitive identification of the organism as E. vulneris. It did not produce indole, citrate hydrolysis, or ornithine decarboxylase, and it did not ferment sorbitol; it produced lysine decarboxylase and orthonitrophenyl-β-D-galactopyranoside, and it fermented arabinose. The organism was motile [5]. Antibiotic testing based on breakpoint susceptibilities with use of the Vitek system revealed that the organism was susceptible to first-generation cephalosporins.

The patient was afebrile during her entire hospitalization. Her oral intake of food improved; she did not require placement of a new central venous catheter for total parenteral nutrition. Treatment was switched

Reprints or correspondence: Dr. Anne C. Spaulding, Division of Infectious Diseases and Immunology, Department of Medicine, University of Massachusetts Medical Center, 55 Lake Avenue North, Worcester, Massachusetts 01655.

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