

# Human *Staphylococcus intermedius* Infection in a Patient With Postradiation Changes

Benjamin N. Ostendorf, MS,\* Richard L. Oehler, MD, FACP,†‡ and John N. Greene, MD, FACP§||

**Abstract:** *Staphylococcus intermedius* is known primarily for its role as a commensal and pathogen in dogs and a variety of other animals. It has also been reported as a cause of human infection in a limited number of cases. Here, we report a case of *S. intermedius* wound infection in a 47-year-old woman with postradiation skin changes. Transmission occurred most likely through direct skin contact with her pet dog. This case highlights the possibility of pet-transmitted infections in predisposed patients and should raise awareness of possibly drug-resistant pathogens in animal reservoirs.

**Key Words:** *Staphylococcus intermedius*, pet infection, coagulase-positive staphylococcus

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*Staphylococcus intermedius* is a gram-positive, coagulase-positive species that is a frequent commensal in the oral, nasal, and skin flora of dogs and other animals.<sup>1</sup> It is also a common cause of dog infections.<sup>2</sup> *Staphylococcus intermedius* is only rarely found as part of human flora, even in people in close contact with animals.<sup>3</sup> In a report on dog bite–induced wound infections, Talan and colleagues<sup>4</sup> were the first to demonstrate that *S. intermedius* can also lead to human infections. Subsequent studies have reported other human infections by *S. intermedius* including endocarditis,<sup>5</sup> bacteremia,<sup>6</sup> pneumonia,<sup>7</sup> otitis externa,<sup>8</sup> mastoiditis,<sup>9</sup> brain abscess,<sup>10</sup> empyema,<sup>11</sup> sinusitis,<sup>12</sup> and meningitis.<sup>13</sup>

Microbiological identification of *S. intermedius* is more difficult because rapid coagulase tests are often negative, potentially leading to their misidentification as coagulase-negative staphylococci.<sup>1</sup> In contrast, tube coagulase tests usually confirm coagulase presence but sometimes lead to a premature diagnosis of *Staphylococcus aureus*, which can be distinguished from *S. intermedius* by additional biochemical assays.<sup>14</sup>

Here, we report a case of *S. intermedius* wound infection in a patient with postradiation skin changes who had previously undergone several reconstructive procedures to the affected area.

## CASE REPORT

A 47-year-old white woman with a history of bilateral breast cancer and bilateral breast reconstruction presented in February 2010 with a 4-day history of fever up to 39°C, chills,

and skin breakdown and implant exposure of the left breast. The patient also noted extending erythema around the exposed area accompanied with serous drainage. She took 1 dose of levofloxacin at home after which she noted improvement of symptoms.

The patient was initially diagnosed with bilateral invasive ductal carcinoma of the breast in 2007. She underwent bilateral mastectomy in November 2007 and completed a course of chemotherapy and radiation to the left breast in June 2008. Subsequently, she received delayed reconstruction of her breast with a right tissue expander and left latissimus dorsi flap and tissue expander placement in April 2009. After exposure of the expander on the left side, both tissue expanders were exchanged for permanent implants in November 2009. Since then, she had multiple implant exposures on the left side. She was last seen 3 weeks prior when she received minor surgery for reclosure of recurrent skin breakdown.

The medical history revealed no other medication allergies, medical conditions, or surgeries. Her medications included oral letrozole for adjuvant breast cancer treatment. Her family history was positive for lung cancer in her father, and no other history of cancer in the family. She reported sharing the bed with her healthy dog, which shed a lot of hair. She had a 20-pack-year history of smoking, which she quit in June 2008. She also admitted to drinking 1 to 2 glasses of wine daily but denied any illicit drug use. She had not travelled recently and denied any sick contacts. Review of systems was unremarkable.

The physical examination on admission was remarkable for normal vital signs with no fever and no abnormalities except for a 3 × 2-cm exposed implant with surrounding redness and minimal serous drainage of her left breast. The involved area was tender to palpation. The white blood cell count was 5090 cells/μL; kidney and liver function tests were normal. A Gram stain of a deep wound smear of the left breast demonstrated gram-positive cocci in pairs. A deep culture of the breast wound obtained in the operating room after implant removal and before placement of the new implant grew staphylococcus, which was first reported as coagulase-negative but later identified as coagulase-positive *S. intermedius*. An antibiogram including all usual antibiotics tested for *Staphylococcus* species revealed resistance of the strain to only penicillin. On the day of admission, she was administered intravenous daptomycin and cefepime. Two days later, the left breast implant was removed, and she underwent reconstruction with a transverse rectus abdominis myocutaneous flap. After 6 days of hospitalization with no further episodes of fever or postsurgical complications, she was discharged on oral levofloxacin for 1 week. Several weeks later, her surgical site was well healed with no further evidence of infection.

## DISCUSSION

*Staphylococcus intermedius* has only rarely been reported as a cause of human infection. It was first recognized as a human pathogen in dog bite–induced wound infections.<sup>4</sup> Most of the few cases dealing with invasive infections affected patients who either were immunocompromised or had undergone invasive procedures.<sup>5–7,9,12</sup> However, noninvasive transmission to

From the \*University Hospital Freiburg, Freiburg, Germany; †Division of Infectious Diseases and Tropical Medicine, Department of Internal Medicine, University of South Florida College of Medicine; ‡Division of Infectious Diseases, James A. Haley Veterans Medical Center, Tampa, FL; §Infectious Diseases and Hospital Epidemiologist Moffitt Cancer Center and Research Institute, Tampa, FL; and ||Internal Medicine and Oncological Sciences, University of South Florida, College of Medicine, Tampa, FL.

Correspondence to: John N. Greene, MD, FACP, Infectious Diseases and Hospital Epidemiologist Moffitt Cancer Center and Research Institute, Internal Medicine and Oncological Sciences, University of South Florida, College of Medicine, 12902 Magnolia Drive, FOB-3, Tampa, FL 33612-9497. E-mail: john.greene@moffitt.org.

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immunocompetent patients has also been reported.<sup>8</sup> Our patient had a history of multiple skin breakdowns of her reconstructed breast secondary to radiation therapy. As she shared her bed with her pet dog, direct contact transmission of *S. intermedius* from her dog and/or its shed hair appears, by far, the most likely route of infection, as she did not report contact with any other animals, and *S. intermedius* is only rarely found in humans. This report highlights the possibility of pet-transmitted skin infections to predisposed patients. Physicians should be aware of this possibility and encourage preventive behavior when open wounds or central lines may allow for direct inoculation and subsequent infection.

Pet-transmitted infections also pose a risk to public health because of the possible spread of drug-resistant pathogens. In light of increased use of antimicrobials in pet animals, various studies have documented increasing microbial resistance in different bacteria.<sup>15–17</sup> This has 2 potentially serious implications for human health. First, pets may serve as a reservoir for antimicrobial-resistant bacteria.<sup>18–20</sup> Second, gene transfer of plasmids conferring drug resistance might lead to its spread in human pathogens. Recently, the first multidrug-resistant strain of *S. intermedius* was reported.<sup>21</sup> It remains a likely possibility that zoonotic strains such as *S. intermedius* are able to pass on such plasmids to human pathogens. Fortunately, the strain responsible for infection in our patient was resistant only to penicillin.

As our case illustrates, *S. intermedius* is often initially misidentified as coagulase-negative species when identification is based on a rapid coagulase test only.<sup>18</sup> It is therefore easily confused with either a skin contaminant or *Staphylococcus epidermidis* infection. On the other hand, a positive tube coagulase test should not lead to a definitive diagnosis of *S. aureus* infection, as performed by some laboratories. Instead, acetoin and  $\beta$ -galactosidase reactions can further distinguish between the 2 species.<sup>4</sup> These factors may have led to the underestimation of the prevalence of *S. intermedius* infection in humans.

In conclusion, we report the first case of *S. intermedius* wound infection in a patient with postradiation skin changes in an open wound. This illustrates that physicians should be aware of the possibility of pet-transmitted infections, especially in cancer patients with close animal contact. It also hints at the concern regarding rising antimicrobial resistance in zoonotic pathogens and the related implications for human health.

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