First report of *Actinomyces europaeus* bacteremia result from a breast abscess in a 53-year-old man

H. L. Nielsen1,2
1) Department of Clinical Microbiology, Viborg Hospital, Viborg and 2) Department of Clinical Microbiology, Aalborg University Hospital, Aalborg, Denmark

**Abstract**

This is the first report of *Actinomyces europaeus* bacteremia in a 53-year-old man. The bacteremia was the result of a breast abscess. Identification was established by matrix-assisted desorption ionization–time of flight mass spectrometry and confirmed by 16S rRNA gene sequencing. The patient was treated with surgical drainage and penicillin for 4 weeks; the patient did not experience any relapse during 6 months of follow-up.

**Keywords:** *Actinomyces europaeus*, actinomycosis, bacteremia, breast abscess, penicillin

**Original Submission:** 25 February 2015; **Revised Submission:** 19 April 2015; **Accepted:** 4 May 2015

Available online 14 May 2015

*Corresponding author:* H. L. Nielsen, Department of Clinical Microbiology, Aalborg University Hospital, Hobrovej 18-22, DK-9000 Aalborg, Denmark

E-mail: halin@rn.dk

*Actinomyces* species are part of the commensal flora of the mucous membranes of the oropharynx, gastrointestinal tract and female genital tract. Many *Actinomyces* species are opportunistic pathogens of humans that may lead to actinomycosis, a slowly processing indolent granulomatous infection, often located in the cervicofacial, thoracic, abdominal and in women also the pelvic areas [1]. Breast infection with *Actinomyces* species is an unusual condition. Nevertheless, *A. israelii*, *A. tenuis*, *A. radingae*, *A. viscous*, *A. meyeri*, *A. neuii* and *A. europaeus* have all been associated with breast infection in women [2–7]. Breast infection in men with *Actinomyces* species is rare. Only a single case of a 73-year-old man with a primary breast abscess from *A. neuii* mimicking an epidermoid cyst has been reported [8].

*Actinomyces europaeus* is a short, nonmotile, facultative anaerobic rod first described in 1997 [9]. Besides breast abscesses, *A. europaeus* has been described in urinary tract infections as well as skin and soft tissue infections [10]. To my knowledge, the present case is the first report of *A. europaeus* bacteremia resulting from a breast abscess.

A 53-year-old Danish man was hospitalized in July 2014 with a painful swelling in the right breast which had appeared a few days earlier. The patient was diabetic and smoking 20 to 30 cigarettes a day. He had a history of obesity, chronic obstructive pulmonary disease and schizophrenia. Previously he had been experienced recurrent cutaneous abscesses, primarily localized to the axillae and the groin, which were treated with surgical drainage.

At examination, the patient was febrile (39.5°C) and had tachycardia and tachypnea. His right breast was diffusely swollen, and there was a hyperaemic area of 10 × 30 cm. He was also severely obese, with a body mass index of 45.9 kg/m², and laboratory test showed a C-reactive protein level of 275 mg/L and white blood cell count of 14.3 × 10⁹/L. A chest X-ray revealed nothing abnormal. A blood culture was performed, and thereafter antimicrobial therapy was initiated with intravenous dicloxacillin 1 g three times a day. By ultrasound, a large abscess formation in the right breast was visualized, including a sinus tract located in the right inframammary region. Through the sinus, a pigtail catheter was inserted into the abscess, and there was a prompt discharge of thick pus. After drainage, the patient quickly improved; he was discharged on day 2 with oral piperacillin 1 g three times a day. Nevertheless, on day 5, the patient was rehospitalized as a result of increased purulent secretion from the sinus, and the antimicrobial therapy was changed to intravenous cefuroxime 1.5 g three times a day.

From the blood culture system (BacT/Alert 3D; BioMérieux, Marcy l’Etoile, France), the standard anaerobic bottle had a positive growth of short, nonmotile, Gram-positive coccoid rods after 5 days of incubation. The isolate were negative for catalase, urease and nitrate reduction but showed a positive fermentation of maltose. The coccoid rods was identified as *A. europaeus* by matrix-assisted laser desorption–ionization time of flight mass spectrometry (MALDI-TOF MS; Vitek MS; BioMérieux) with 99.9% probability as well as partial sequencing of the 16S rRNA gene (ABI Prism Big Dye Sequencing kit) (GenBank accession KP752177). BLAST analysis showed 99% identity with the 16S rRNA gene sequence of *A. europaeus* strain CCUG 32789A (GenBank accession NR_114971). The *A. europaeus* was susceptible to all antimicrobial agents tested according to the Clinical and Laboratory Standards Institute criteria by Etest (BioMérieux) with the following minimum inhibitory concentration results: penicillin G, 0.064 mg/L; piperacillin–tazobactam, 0.125 mg/L; ceftriaxone, 0.125 mg/L;
meropenem, 0.064 mg/L; clindamycin, 0.064 mg/L; erythromycin, 0.032 mg/L; and moxiflaxacin, 0.250 mg/L.

Gram staining of the pus revealed a high number of short Gram-positive coccoïd rods, but no sulphur granules were seen. Cultures grew A. europaeus and Porphyromonas species. The Porphyromonas species was susceptible to penicillin and metronidazole and was not further characterized. The A. europaeus from pus was also susceptible to all antimicrobial agents tested as above.

On day 8, the antimicrobial therapy was changed to oral penicillin 1.2 million units four times a day for 4 weeks. Finally, the patient was discharged on day 11 with a clean abscess cavity of 4 × 5 cm with no purulent secretion, and the breast remained painless. After 6 months, the patient had not been rehospitalized with recurrent infection in the breast.

To my knowledge, this is the first report of A. europaeus bacteremia. The A. europaeus was isolated from both blood and the abscess cavity, and therefore it is fair to conclude that it was the main causal agent, whereas the Porphyromonas species was of minor importance. The patient had several comorbidities like diabetes, obesity, chronic obstructive pulmonary disease and schizophrenia. Previously he had experienced recurrent skin infections and cutaneous abscesses, and therefore it is plausible that A. europaeus reached the mammary tissue through skin lacerations with dissemination to the bloodstream. However, as a function of the increased usage of MALDI-TOF MS, the term “first report” may have a potential limitation because there may be an opportunity for previous cases of bacteremia with A. europaeus encountered and reported with the simple identification as Actinomyces species.

The traditional treatment for actinomycosis is high-dose penicillin for prolonged period of 6 to 12 months. However, shorter treatment regimens have been successful [11]. To my knowledge, all cases of breast infection with Actinomyces species have been successfully treated with a combination of surgical drainage and antibiotic therapy. Minimum inhibitory concentrations for all antibiotics tested against were all very low, but other strains of A. europaeus have shown reduced susceptibility to piperacillin–tazobactam, ciprofloxacin, clindamycin and erythromycin [12]. The patient was treated with intravenous β-lactam antibiotics for 1 and 4 days, separated by 3 days of oral fluocoxacillin. Finally, he was treated with 4 weeks of oral penicillin. Overall, this treatment seems short compared to the traditional recommendation for actinomycosis, but the patient did not have any relapse during the 6 months of follow-up.

This report confirms the pathogenic potential of A. europaeus, but future studies are needed to elucidate the clinical significance of this bacterium. Furthermore, future studies are needed to confirm that antibiotic treatment can be individualized and short-term regimens of only 4 weeks may be sufficient.

Conflict of interest
None declared.

Acknowledgements
The author would like to thank T. A. Knudsen, MD, and M. Christensen, MD, and their colleagues from the Department of Mamma Surgery, Viborg Hospital, Denmark, for treatment of the patients with great care. The author would also like to thank S. Lomborg, MD, and K. J. Handberg from the Department of Clinical Microbiology at Viborg Hospital and Aarhus University Hospital, Denmark, for technical assistance.

References
[1] Wade WG, Könnönen E. Propionibacte rium, Lactobacillus, Actinomyces, and other non-spore-forming anaerobic Gram-positive rods. In: Versalovic J, Carroll KC, Jorgensen JH, Funke G, Landry ML, Warnock DW, editors. Manual of clinical microbiology. 10th ed, vol. 1. Washington, DC: ASM Press; 2011. p. 817–33.
[2] Arzar KH, Wagborn D, Lyons M, Cunncik G. Rare species of Actinomycetes as causative pathogens in breast abscess. Breast J 2007;13: 501–5.
[3] Capobianco G, Dessole S, Becchere MP, Profil S, Cosmi E, Cherchi PL, et al. A rare case of primary actinomycosis of the breast caused by Actinomyces viscosus: diagnosis by fine-needle aspiration cytology under ultrasound guidance. Breast J 2005;11:57–9.
[4] Lacoste C, Escande MC, Jammet P, Nos C. Breast Actinomyces neui abscess simulating primary malignancy: a case diagnosed by fine-needle aspiration. Diagn Cytopathol 2009;37:311–2.
[5] Allen JN. Actinomyces meyeri breast abscess. Am J Med 1987;83:186–7.
[6] Thambi R, Devi L, Sheepa S, Poothiodi U. Primary breast actinomyces simulating malignancy: a case diagnosed by fine-needle aspiration cytology. J Cytol 2012;29:197–9.
[7] Silva WA, Pelheiro AM, Jahns B, Bogé-Stuber K, Droz S, Zimmerli S. Breast abscess due to Actinomyces europeus. Infection 2011;39:255–8.
[8] Olson JM, Vary Jr. JC. Primary cutaneuous Actinomyces neui infection of the breast successfully treated with doxycycline. Cutis 2013;92:E3–4.
[9] Funke G, Alvarez N, Pascual C, Falsen E, Akervall E, Sabbe L, et al. Actinomyces europaeus sp. nov., isolated from human clinical specimens. Int J Syst Bacteriol 1997;47:687–92.
[10] Sabbe Lj, Van De Merwe D, Schoufler L, Bergmans A, Vaneechoutte M, Vandamme P. Clinical spectrum of infections due to the newly described Actinomyces species A. tunicinis, A. rodigare, and A. europeus. J Clin Microbiol 1999;37:8–13.
[11] Sudhakar SS, Ross JJ. Short-term treatment of actinomycosis: two cases and a review. Clin Infect Dis 2004;38:444–7.
[12] Smith AJ, Hall V, Thakker B, Gemmell CG. Antimicrobial susceptibility testing of Actinomyces species with 12 antimicrobial agents. J Antimicrob Chemother 2005;56:407–9.