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Address for correspondence: Yvonne Pfeifer, Robert Koch Institute, Burgstr. 37, 38855 Wernigerode, Germany; email: pfeifery@rki.de

Gordonia sputi Bacteremia

To the Editor: In November 2007, a 69-year-old man with fever was hospitalized at the Northern Hospital in Marseilles, France. He also had diabetes, high blood pressure, and alcohol and tobacco addictions. In September 2007, he had received a diagnosis of laryngeal cancer, which required 2 chemotherapy treatments through a central venous catheter (CVC), the second of which he had received 6 days before his November visit. Prostatic cancer, diagnosed 1.5 years earlier, had been treated by radiotherapy. At the time of the November admission, he had leukopenia (1.77×10^9 leukocytes/L with 0.49×10^9 polymorphonuclear cells/L) and an elevated C-reactive protein level (151 mg/L). The patient was admitted with a preliminary diagnosis of drug-induced febrile granulocytosis; the origin of his fever remained unclear. Blood for culture was first collected from a peripheral vein and on the next day was collected from a peripheral vein and from the CVC. Gram-positive rods grew in the aerobic bottle from the CVC sample. The microorganism was identified by biochemical tests using API Coryne strip (bioMérieux, Marcy-l'Etoile, France) as *Rhodococcus* spp. (94% similarity). The day after hospital admission, the patient was empirically treated with intravenous ticarcillin-clavulanate, 5 g 3×/day; ciprofloxacin, 200 mg 2×/day; and granulocyte colony–stimulating factor. One day later, fever resolved and the polymorphonuclear cell count was within normal limits. Oral antimi-

crobial drug therapy was continued for 1 week.

Bacterial identification of the strain was performed by 16S rRNA sequencing. We obtained a 1,464-bp sequence, which was found to differ at only 2 nt positions from that of *Gordonia sputi* (GenBank accession no. X80634). We concluded that our patient had catheter-related bacteremia caused by *G. sputi* because he was immunocompromised and had a CVC. We ruled out a contaminant because the organism did not belong to the normal flora of human skin and because fever resolved after treatment with antimicrobial drugs.

The genus *Gordona* was first described in 1971, for coryneform bacteria isolated from sputum of patients with pulmonary disease or from soil (*1*). It is a member of the mycolic acid–containing group consisting of genera *Corynebacterium*, *Dietzia*, *Gordonia*, *Mycobacterium*, *Nocardia*, *Rhodococcus*, and *Tsukamurella*. The genus has been revised several times by rearrangements with the genera *Rhodococcus* and *Nocardia*, and the name *Gordona* was changed to *Gordonia* in 1997. The genus belongs to suborder *Corynebacterineae* within the order *Actinomycetales* and currently contains 27 recognized species; only 7 have been described in human disease. Species are identified by molecular analysis.

Gordonia spp. cause a wide spectrum of disease in humans (*2–10;* Table). Neurologic and vascular infections in immunocompromised and immunocompetent patients have been reported. Cutaneous and respiratory infections, otitis externa, osteitis, and arthritis have reportedly occurred only in immunocompetent patients. Bacteria have most often been isolated from blood samples. Bacteremia has started from underlying disease such as a sequestrated lung (*4*) or acute cholecystis (*5*) or has been related to coronary artery surgery (*2*) and frequently to CVCs (*2,3,6*). Catheter removal has been recommended for treatment of

Table. Summary of clinical reports involving *Gordonia* spp.*

Gordonia sp.	Clinical findings, by system					
	Vascular	Cutaneous	ENT	Nervous	Osteoarticular	Respiratory
G. rubripertincta	Bacteremia (CVC) (*2*)					Lung infection (*2*)
G. terrae	Bacteremia (cholecystitis) (*5*); bacteremia (CVC) (*2*); bacteremia (CVC) (*6*)†	Granulomatous skin lesion (*2*); palpebral abscess (*9*); granulomatous mastitis (*7*); mycetoma of the hand (*9*)		Meningitis, brain abscess (*2*); brain abscess (*2*)†		
G. bronchialis	Bacteremia (sequestrated lung) (*4*)	Recurrent breast abscess (*7*)		Ventriculitis (intraventricular shunt) (*6*)	Sternal wound infections (*2*)	
G. polyisoprenivorans	Endocarditis (CVC) (*3*);† bacteremia (CVC) (*3*)†					
G. otitidis	Bacteremia (CVC) (*6*)		Otitis externa (*6*)			Bronchitis (*8*)
G. sputi	Bacteremia (CVC) (*2*)†; endocarditis (CVC) (*2*); mediastinitis (surgery) (*2*)					
G. araii					Arthritis (bioabsorbable tapered screw) (*10*)	

*ENT, ear, nose, throat; CVC, central venous catheter. Patients were immunocompetent unless otherwise noted. When infection was associated with a medical device, the device is listed in parentheses.
†Immunocompromised patient.

Gordonia spp. infections in children (*6*), but the recommendation varied for adults. Six cases of infection in children have been described (*6*), appearing as bacteremia, ventriculitis, and brain abscess.

Microbiologic diagnosis of *Gordonia* spp. remains difficult. Biochemical profiles can lead to incorrect identification of isolates as *Rhodococcus* spp. (*2,4–6,9*) and sometimes *Corynebacterium* spp. (*3*) or *Nocardia* spp. (*6*). Identification at the genus and species levels is presently obtained by 16S rRNA sequence comparisons.

No recommendation for antimicrobial drug susceptibility testing has been unanimously approved, but these microorganisms seem to be susceptible to many antimicrobial drugs (*6*). Previous studies suggest a combination of penicillins and aminoglycosides as a suitable therapy for *Gordonia*-related bacteremia (*3*). Carbapenem or fluoroquinolone in combination with an aminoglycoside can also be used (*6*).

Antimicrobial drug susceptibility is similar to that of *Rhodococcus* spp., for which *Gordonia* spp. are usually incorrectly identified. However, although vancomycin is often used to treat *Rhodococcus* spp. infections, in a previous study 11% of *Gordonia* spp. isolates were resistant (*6*). Treatment must therefore be evaluated specifically for each patient.

Gordonia spp. are environmental bacteria whose implication in human disease seems to be increasing. Phenotypic identification of bacteria included in this genus is difficult, and they are often poorly identified as *Rhodococcus* spp. or *Corynebacterium* spp. Molecular identification of *Gordonia* spp. by using 16S rRNA gene sequence comparison enables their characterization in human disease because the method is more accurate. The fact that these bacteria are often associated with medical devices highlights their role as nosocomial agents. Gram-positive bacilli must, therefore, not be systematically considered as contaminants, especially if associated with medical devices, and should be thoroughly identified by molecular methods in addition to biochemical tests.

**Aurélie Renvoise,
Jean-Robert Harle, Didier Raoult,
and Véronique Roux**

Author affiliations: Hôpital de la Timone, Marseille, France (A. Renvoise, D. Raoult, V. Roux); and Hôpital de La Conception, Marseille (J.-R. Harle)

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Address for correspondence: Véronique Roux, Laboratoire de Bactériologie–Virologie, Hôpital de la Timone, CNRS UMR 6020, IFR48, 264 rue Saint-Pierre, 13385 Marseille, CEDEX 05, France; email: vroux91@hotmail.com

Cross-reactive Antibodies against Avian Influenza Virus A (H5N1)

To the Editor: Intravenous immunoglobulin (IVIg) is used to treat bacterial and viral infections in patients with primary immunodeficiency disease and those with autoimmune and inflammatory disorders (*1*). IVIg contains pooled IgG from >1,000 blood donors and antibodies against various common human pathogens, including influenza virus A.

We tested the efficacy of commercial preparations of IVIg (50 mg/mL of highly purified immunoglobulin) against homosubtypic influenza viruses A (H1N1 and H3N2) and their cross-reactivity against avian influenza virus A (H5N1). IVIg preparations (Octagam; Octapharma, Vienna, Austria and Flebogamma; Instituto Grifols, Barcelona, Spain) had hemagglutination inhibition (HI) titers against subtypes H1N1 and H3N2 ranging from 20 to 40. Human Immunoglobulin, pH 4.0, (Harbin Sequel Bio-Engineering Pharmaceutical, Harbin, People's Republic of China) had lower HI titers against avian influenza viruses (10 for subtype H3N2 and <10 for subtype H1N1). As expected, we did not detect antibodies against hemagglutinin (HA) of subtype H5N1 (A/open-billed/stork/Nah-konsawan/BBD0104F/2004) in any of the IVIg preparations (HI titer <10).

Human influenza subtype H1N1 shares the same neuraminidase (NA) subtype (human N1) as subtype H5N1 (avian N1). We therefore tested whether IVIg preparations would react and inhibit NA activity of human and avian influenza viruses by using a neuraminidase inhibition (NI) assay (*2*). NI titer was defined as the reciprocal of the highest dilution that gave 50% reduction compared with that of the virus control.

All 3 IVIg preparations inhibited NA activity of human N1 (NI titer against subtype H1N1 range 258–986) and human N2 (NI titer against subtype H3N2 range 1,309–3,274). Enzyme activity of avian N1 (7:1 reassortant; PR8 + NA [A/Vietnam/DT-0361/2005 H5N1]) was inhibited by all IVIg preparations (NI titer range 143–231). These findings support the recent observation of neutralizing antibodies against human N1 in human serum, which could inhibit enzyme activity of avian N1 from subtype H5N1 (*3,4*). We also tested IVIg preparations against reverse genetics subtype H5N3 virus in which the N3 NA was derived from H2N3 virus (6:1:1 reassortant; 6 internal genes from PR8 + HA (A/Vietnam/DT-0361/05 H5N1) + NA (A/duck/Germany 1207 H2N3) and observed no effect (NI titer <10). The N3 subtype belongs to avian influenza NA. Thus, antibodies against NA in IVIg appear to be specific for those circulating human influenza viruses (human N1 and human N2).

Unlike HA and NA, virus matrix 2 ectodomain (M2e) is highly conserved. Its presence on the surface of the viral particle makes it a potential target of antibody response similar to that for HA and NA (*5,6*). We assessed reactivity of IVIg preparations against a consensus M2e peptide derived from human influenza viruses of H1, H2, and H3 subtypes (MSLLTEVET-PIRNEWGCRCNDSSD) and those derived from A/Hong Kong/156/97 H5N1 (MSLLTEVETLTRNGWGCR CSDSSD and A/Thailand/ SP-83/2004 H5N1 (MSLLTEVETPTRNEWECR CSDSSD) by using ELISA (*7*). Antibody titer was defined as the reciprocal of the highest dilution that had an optical density of 0.5 at 414 nm in our assay.

Results showed considerable variation among IVIg preparations, caused by M2e peptides derived from different influenza viruses (titer range 88–23,614). Among the 3 preparations, Human Immunoglobulin, pH 4.0, IVIg showed the highest titers against