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Pattern of Antimicrobial Susceptibility Obtained from Blood Isolates of a Rare but Emerging Human Pathogen, *Gordonia polyisoprenivorans*

The genus *Gordonia*, originally described in 1971 by Tsukamura, consisted of both clinical and environmental isolates (9). However, a recent review of case reports suggests the genus *Gordonia* as an increasing source of opportunistic infection, with many of its species as the primary agents associated with clinical disease (7).

Gordonia polyisoprenivorans was first isolated from water inside an automobile tire (8). The first clinical case of *G. polyisoprenivorans* was reported by Kempf et al.; it presented in a 26-year-old woman following an allogeneic blood marrow transplant and was successfully treated with piperacillin-tazobactam (6). A case presenting with *G. polyisoprenivorans*-related endocarditis was later reported by Verma et al.; the patient died, despite three changes in antimicrobial therapy over a period of 6 weeks (10). Recently, Gupta et al. (4) described the first case of pneumonia indicating *G. polyisoprenivorans* as the infectious agent.

Due to the lack of reports on appropriate antimicrobial therapy, we present the antimicrobial susceptibilities of 13 *G. polyisoprenivorans* blood isolates and the type strain to 12 antimicrobial agents.

Since phenotypic tests previously described by Conville and Witebsky (3) were inconclusive, clinical isolates were identified as *G. polyisoprenivorans* by analysis of the near full-length 16S rRNA gene (~1,445 bp) and *gyrB* gene fragment (1,263 bp) sequences as described by Lasker et al. (7) (data not shown).

MICs for 12 antimicrobial agents were determined following Clinical and Laboratory Standards Institute (CLSI) guidelines for actinomycetes (2) (Table 1). Eight of the 14 isolates were resistant to trimethoprim-sulfamethoxazole (Tmp-Smx). Intermediate resistance to minocycline was observed for five isolates. Four isolates showed intermediate resistance to tigecycline, whereas one isolate (W8398) was resistant. Four isolates were resistant to clarithromycin. All isolates were susceptible to amikacin, ampicillin, ceftriaxone, imipenem, amoxicillin-clavulanate, ciprofloxacin, vancomycin, and linezolid.

Several factors may contribute to the emergence of bloodstream infections by *G. polyisoprenivorans*. Foremost, all patients were immunocompromised and had long-term indwelling catheters (4, 6, 10) (Table 2). Recent analysis of the genome suggests that *G. polyisoprenivorans* is capable of bloodstream infections primarily through its ability to colonize indwelling catheters (5) by producing biosurfactants to form biofilms, allowing for adhesion to the rubber material of catheters (1, 4, 5, 8). Following adhesion, this microorganism can utilize rubber as the sole source of carbon through a pathway of oxidative cleavage and is presently the most potent rubber (natural and xenobiotic) degrader of all organisms tested (5).

This is the first report of *in vitro* antimicrobial susceptibilities for human isolates of *G. polyisoprenivorans*. Our data show that *G. polyisoprenivorans* demonstrates decreased drug susceptibility and resistance to some classes of antimicrobial agents used in treatment for this opportunistic infection. Recognition of the presence of resistant isolates by the clinical community may influence cautious empirical administration of certain antimicrobials. With the extended survival of severely compromised patients, the increased use of long-term indwelling catheters, and the poor response without removing the foreign foci, an improved knowledge of the species-specific susceptibilities of these microorganisms may facilitate effective therapy until *in vitro* strain-specific susceptibility studies are reported.

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TABLE 1 Antimicrobial susceptibility results for the type strain and 13 clinical isolates of *Gordonia polyisoprenivorans*

Antimicrobial agent	MIC (μg/ml)[a]													
	G. polyisoprenivorans ATCC BAA-14^T	Isolate W8130	IsolateW8137	Isolate W8277	Isolate W8350	Isolate W8398	Isolate W8446	Isolate W8488	Isolate W8560	Isolate W8859	Isolate W8876	Isolate W9085	Isolate X0357	Isolate X0406
Amikacin	£0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	0.5 (S)	≤0.25 (S)	≤0.25 (S)	1 (S)	≤0.25 (S)	≤0.25 (S)	<0.25 (S)	<0.25 (S)
Amoxicillin-clavulanate	≤0.5/0.25 (S)	≤0.5/0.25 (S)	≤0.5/0.25 (S)	≤0.5/0.25 (S)	≤0.5/0.25 (S)	1/0.5 (S)	8/4 (S)	1/0.5 (S)	≤0.5/0.25 (S)	1/0.5 (S)	≤0.5/0.25 (S)	≤0.5/0.25 (S)	<0.5/0.25 (S)	<0.25/0.5 (S)
Ampicillin	≤0.5 (S)	1 (S)	≤0.5 (S)	≤0.5 (S)	1 (S)	1 (S)	4 (S)	≤0.5 (S)	≤0.5 (S)	4 (S)	≤0.5 (S)	≤0.5 (S)	<0.5 (S)	<0.05 (S)
Ceftriaxone	≤1 (S)	≤1 (S)	≤1 (S)	≤1 (S)	2 (S)	4 (S)	8 (S)	≤1 (S)	≤1 (S)	8 (S)	≤1 (S)	≤1 (S)	<1 (S)	<1 (S)
Ciprofloxacin	≤0.06 (S)	0.13 (S)	≤0.06 (S)	≤0.06 (S)	0.13 (S)	0.13 (S)	2 (I)	0.13 (S)	0.13 (S)	0.5 (S)	0.5 (S)	≤0.06 (S)	<0.06 (S)	<0.06 (S)
Clarithromycin	≤0.25 (S)	>32 (R)	8 (R)	>32 (R)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	8 (R)	4 (I)
Imipenem	1 (S)	0.5 (S)	0.5 (S)	0.5 (S)	1 (S)	2 (S)	2 (S)	0.5 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	≤0.25 (S)	<0.25 (S)
Linezolid	2 (S)	1 (S)	1 (S)	2 (S)	2 (S)	2 (S)	4 (S)	2 (S)	1 (S)	4 (S)	2 (S)	2 (S)	1 (S)	2 (S)
Minocycline	1 (S)	2 (I)	1 (S)	0.25 (S)	2 (I)	4 (I)	2 (I)	2 (I)	0.5 (S)	1 (S)	1 (S)	1 (S)	0.25 (S)	1 (S)
Tigecycline[b]	≤0.13 (S)	4 (I)	2 (S)	0.25 (S)	4 (I)	8 (R)	2 (S)	4 (I)	2 (S)	4 (I)	1 (S)	2 (S)	<0.13 (S)	2 (S)
Trimethoprim-sulfamethoxazole	4/76 (R)	0.5/9.5 (S)	0.25/4.8 (S)	8/152 (R)	4/76 (R)	1/19 (S)	>8/152 (R)	>8/152 (R)	1/19 (S)	>8/152 (R)	>8/152 (R)	4/76 (R)	0.5/9.5 (S)	0.5/9.5 (S)
Vancomycin	2 (S)	1 (S)	1 (S)	1 (S)	1 (S)	2(S)	1 (S)	≤0.5 (S)	1 (S)	1 (S)	1 (S)	1 (S)	1 (S)	1 (S)

[a] Abbreviations: S, susceptible; I, intermediate; R, resistant. The MIC interpretive breakpoints were those of the CLSI 2003 M24-A standard (2).

[b] Tigecycline breakpoints have not been determined for nocardiae and other aerobic actinomycetes; those proposed by FDA for *Enterobacteriaceae* were used.

TABLE 2 Characteristics of catheter-related human blood isolates of *Gordonia polyisoprenivorans*[a]

Isolate	Sex	Date of birth	Type of infection	Underlying condition(s)	Yr of isolation
W8130	M	10/20/1925	Acute endocarditis	HHT, MDS, pancytopenia	2003
W8137	F	03/29/1949	Bacteremia	FMF, amyloidosis, hypothyroidism	2003
W8277	M	01/06/1970	Bacteremia	ALL	2004
W8350	F	05/13/1952	Bacteremia	Collagen vascular disease	2004
W8398	F	07/24/1949	Bacteremia	Metastatic breast cancer to brain	2005
W8446	F	02/11/1958	Bacteremia	Unknown	2005
W8488	M	01/20/1966	Bacteremia	Unknown	2005
W8560	M	04/07/1946	Induration (right forearm)	Colorectal cancer	2005
W8859	F	12/16/1989	Bacteremia	AML	2007
W8876	M	10/09/1943	Bacteremia	CHF, cardiomyopathy, hyperproteinemia	2007
W9085	F	03/08/1980	Bacteremia	Preterm labor, preeclampsia, hydronephrosis	2007
X0357	M	02/03/1955	NA	NA	2010
X0406	F	1965	NA	NA	2010

[a] Abbreviations: M, male; F, female; HHT, hereditary hemorrhagic telangiectasia; MDS, myelodysplastic syndrome; FMF, familial Mediterranean fever; ALL, acute lymphoblastic leukemia; AML, acute myelogenous leukemia; CHF, congestive heart failure; NA, not available.

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