

Pool Party Pseudomonas: *Pseudomonas putida* Makes a Splash

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Discussion- Bacteriology

- Gram negative, nonfermenting rod, lives in soil and water
- Ubiquitous in environment
- Uses:
 - Synthetic microbiology and medicine
 - Pharmaceutical application
 - Agricultural and ecological uses
 - Plant growth promotion
 - Conversion of renewable substrates into preferred compounds
 - Soil remediation
- Medical data:
 - Catheter-related infections
 - Low mortality rate
 - SSTI, bacteremia
 - Immunocompromised hosts
 - ICU and non-ICU
 - Contaminates water reservoirs
 - Transmitted via contaminated fluids

Discussion- Resistance Mechanisms

- Typical treatment includes carbapenems or cefepime, however severe resistance mechanisms exist.
- Highest resistance is usually against meropenem, ciprofloxacin, and cefepime in oncology populations.
- *Pseudomonas aeruginosa* and *Pseudomonas putida* have different integron structures, so there is no Bla-VIM transfer between them.
- At this point, there is no evidence for horizontal gene transfer of antibiotic resistance genes on transposons and plasmids from one species to another
- There may be transfer of carbapenem resistance between the *Pseudomonas spp.*
- In our patient, the water reservoir harboring bacteria was likely the swimming pool
- The use of ceftriaxone and ciprofloxacin for treatment represents an alternative to typically resistant antibiotics, and a unique intravenous and oral combination to deescalate from stronger antibiotic classes. .

Here we present a unique organism, *Pseudomonas putida* (*P. putida*), and its bacteriology.

Growth of *Pseudomonas putida*

Gram stain of blood culture:
Gram negative rods after less than one day of incubation
Nucleic acid testing:
Specific targets not detected.

Organism	P.putida	
	MIC	INTRP
Aztreonam		I
Cefepime		S
Ceftriaxone		S
Ciprofloxacin		S
Gentamicin		S
Levofloxacin		S
Piperacillin/tazobactam		S
Tobramycin		S
Trimethoprim/Sulfa		R

S = SUSCEPTIBLE I = INTERMEDIATE R = RESISTANT
S-DD = SUSCEPTIBLE, DOSE DEPENDENT N = NON-SUSCEPTIBLE

Figure 1:

- This case of bacteremia was positive for *Pseudomonas putida* that was resistant to Trimethoprim/Sulfa with intermediate sensitivity to Aztreonam, but otherwise was pansensitive to the remaining commonly used antibiotics at our institution.

Hospital Course

- **72 y/o man w/PMHx Parkinson's, history of DVT on Apixaban**
- **CC:** focal neuro symptoms- confusion, delayed responsiveness, decreased grip strength
- **Exposures:** pool time at a party over July 4th weekend
- **Vitals:** 39.9 C, 163/77 mmHg, O2 saturation, 94 bpm, 20 breaths/min at 89% on room air, requiring 2L NC
- **Physical Exam:** not interactive, erythema and swelling of RLE and streaking toward inner thigh, no purulence
- **Labs:** WBC 16.9, 88.7% neutrophils, platelets 108
- **CT head-** no acute intracranial abnormalities
- **MRI-** negative for stroke
- **EEG-** negative for seizure-like activity
- **Treatment:** Ceftriaxone 2g daily, IV Vancomycin = de-escalated due to non-purulent cellulitis
- **Blood cultures:** Gram negative rods after < 1 day incubation; eventually positive for *Pseudomonas putida*
- Discharged home on PO ciprofloxacin; recovered from the infection

References:

- Peter, Silke, et al. "Genomic Characterisation of Clinical and Environmental *Pseudomonas Putida* Group Strains and Determination of Their Role in the Transfer of Antimicrobial Resistance Genes to *Pseudomonas Aeruginosa*." *BMC Genomics*, vol. 18, no. 1, Nov. 2017, p. 859. *BioMed Central*. <https://doi.org/10.1186/s12864-017-4216-2>.
- Loeschcke, Anita, and Stephan Thies. "Pseudomonas Putida—a Versatile Host for the Production of Natural Products." *Applied Microbiology and Biotechnology*, vol. 99, no. 15, 2015, pp. 6197–214. *PubMed Central*. <https://doi.org/10.1007/s00253-015-6745-4>.