

## Metallacarborane Derivatives Effective Against *Pseudomonas Aeruginosa* and *Yersinia Enterocolitica*

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### Abstract

*Pseudomonas aeruginosa* is an opportunistic human pathogen that has become a nosocomial health problem worldwide. The pathogen has multiple drug removal and virulence secretion systems, is resistant to many antibiotics, and there is no commercial vaccine against it. *Yersinia pestis* is a zoonotic pathogen that is on the Select Agents list. The bacterium is the deadliest pathogen known to humans and antibiotic-resistant strains are appearing naturally. There is no commercial vaccine against the pathogen, either. In the current work, novel compounds based on metallacarborane cage were studied on strains of *Pseudomonas aeruginosa* and a *Yersinia pestis* substitute, *Yersinia enterocolitica*. The representative compounds had IC50 values below 10  $\mu$ M against *Y. enterocolitica* and values of 20–50 mM against *P. aeruginosa*. Artificial generation of compound-resistant *Y. enterocolitica* suggested a common mechanism for drug resistance, the first reported in the literature, and suggested N-linked metallacarboranes as impervious to cellular mechanisms of resistance generation. SEM analysis of the compound-resistant strains showed that the compounds had a predominantly bacteriostatic effect and blocked bacterial cell division in *Y. enterocolitica*. The compounds could be a starting point towards novel anti-*Yersinia* drugs and the strategy presented here proposes a mechanism to bypass any future drug resistance in bacteria.

### Biography

Swietnicki is a scientist working on antibacterial strategies. The work is focused on novel vaccines and therapeutics targeting bacterial virulence systems. Swietnicki obtained his Ph.D. in Biochemistry and Molecular Biology from the University of Florida, Gainesville, FL, USA, in 1995 for his work on Hepatitis A Virus 3C protease. Later he worked on human prion proteins at

CWRU, Cleveland, OH, USA before starting work on Select Agents at USAMRIID, Ft. Detrick, MD, USA, and ECBC, APG, MD, USA. In 2011 he moved to Poland to work on virulence blockers of enteropathogenic *E. coli* at EIT+ and later on novel vaccines against periodontitis at the Institute of Immunology and Experimental Therapy of PAS in Wrocław, PL.