

# Trojan Horse Strategy May or May Not Defeat Drug-Resistant Pathogens

Akamu Jude Ewunkem<sup>1</sup>, Bailey Ariyon<sup>1</sup>

<sup>1</sup>Department of Biological Sciences, Winston Salem State University

Pathogens are increasingly resistant to antibiotics, and existing drugs work poorly against chronic infections. For these reasons, a great deal of research is focused on finding new antibiotic compounds. Metallic compounds have shown to be promising as a viable alternative to contain pathogens resistant to conventional antimicrobials. Gallium is highlighted as an antimicrobial agent capable of disrupting the essential activities of pathogens, such as metabolism, cellular respiration, and DNA synthesis. This occurs due to the similar properties between gallium and iron, which is a fundamental ion for the correct functioning of pathogens activities. Therefore, gallium acts as a Trojan horse to iron seeking bacteria. Here we utilized experimental evolution to investigate how rapidly pathogens can evolve resistance to the iron analog, gallium and evaluated the nature of the genomic changes responsible for that resistance. In addition, we determined changes in cell morphology associated with gallium resistance and how gallium resistance conferred correlated resistances to iron metals and antibiotics. Thus, this study is of paramount importance because it showed how the various applications of gallium could result in unanticipated resistance.

**Keywords:** Gallium, Pathogens, Experimental evolution, Resistance, Genomics, Trojan Horse