

## Scientists from CDI and China uncover mechanism behind dangerous antibiotic resistance

Since the discovery of penicillin in the early '40's, antibiotics have had a remarkable impact on treating bacterial infections and improving clinical practice. However, the antibiotic era is in jeopardy, as bacteria have continued to evolve resistance. This is because of antibiotic overuse in both the community and in hospital settings, as well as in promoting growth in food animal production. Confounding this problem is the increase in high risk immunosuppressed patients who are susceptible to bacterial infections. The ability to treat multidrug resistant bacteria is becoming a challenge, as effective antibiotics are limited. Carbapenem resistant Enterobacteriaceae are the current global public health problem, as their multidrug resistance status are recalcitrant to first line antibiotics. "Last resort" agents are commonly tried to treat these infections. Tigecycline is one of the last-resort antibiotics to treat complicated infections caused by both multidrug-resistant Gram-negative and Gram-positive bacteria, but now resistance is emerging to these, too.

CDI faculty members, Drs. Chen and Kreiswirth, collaborating with scientists from South China Agricultural University, explored the underlying mechanism and the prevalence of this resistance. During the course of their study, they were able to identify the cause of resistance: *tet(X4)*, a plasmid-encoded gene that confers high level resistance to tigecycline and other antibiotic members of this class, including the newly FDA-approved eravacycline. What is noteworthy in this case is that the gene is harbored on a plasmid, extrachromosomal DNA molecule that is mobile and able to transfer within and between Gram-negative pathogens. The authors found that the gene was spreading in pigs, chickens, and their surrounding environments in China, and have demonstrated the potential to further disseminate into highly drug resistant strains leading to untreatable infections.

Dr. Chen's and Dr. Kreiswirth's study was published in the June 24<sup>th</sup> issue of [Nature Microbiology](#). Their research focuses on molecular epidemiology of antimicrobial resistance and infectious diseases, including multidrug-resistant Gram-negative bacteria, methicillin-resistant *Staphylococcus aureus* (MRSA) and drug-resistant *Mycobacterium tuberculosis*.