**The Fight Against Bacterial Drug-Resistance**

One of the most prominent problems in the medical field today is drug resistance. Bacteria have several mechanisms that promote their survival by being resistant to drugs. Some of these defense mechanisms include restricting access of the antibiotic, getting rid of the antibiotic, destroying the antibiotic, or changing the target of the antibiotic (CDC, 2018). These defense mechanisms have come to be prominent among bacteria due to evolution, or the survival of the fittest, of these organisms. The organisms with these advantageous drug-resistant strategies survive and reproduce, while the ones without these strategies will die. Since bacteria reproduce at such a quick pace, the bacteria with the antibiotic-resistant strategies quickly repopulate, dominate the population, and make the once useful anti-biotic drug now not useful at all.

Currently, medical researchers and professionals try to eliminate these organisms via drugs that can kill the bacteria in many ways. However, due to the fast evolutionary rate of bacteria, our drugs become useless eventually as the new population of bacteria are derived from a bacterium that had resistance to this drug already. It is a frustrating battle, as it appears to be a never ending cycle of new drug development that eventually will become useless against bacteria. Instead of developing new drugs constantly, researches are looking for other ways to combat bacteria and their drug-resistance.

One way we can prevent drug-resistance in bacteria is through studying these mechanisms which bacteria utilize to resist drugs. Dr. Patricia Canaan, a professor at Oklahoma State University, performs research in this area of study. Dr. Canaan’s most recent publication research was focused on examining, classifying, and comparing the known beta-lactamases of the microorganism *Elizabethkingia* (Canaan, 2019). Dr. Canaan’s current research is concerned with discovering novel beta-lactamases in human opportunistic pathogens and learning about the biochemistry of these beta-lactamases. Beta-lactamases are proteins that breakdown beta-lactam: an antibiotic molecule that is found in a whole class of antibiotics like penicillin (Midic, 2014). When a bacterium uses a beta-lactamase, they are destroying the antibiotic; which is a type of defense mechanism that leads to antibiotic resistance. Dr. Canaan’s research is fundamental to understanding and predicting drug resistance in bacteria.

By discovering the ways in which bacteria can destroy our antibiotics, we can synthesize different antibiotics that bacteria are not resistant to. Eventually, research efforts towards finding a way to completely eliminate a bacterial population may be achieved. This would eliminate the problem of antibiotic resistance by not leaving any bacterial survivors, that are resistant to our drugs, who repopulate and spread their defensive genes. Efforts towards fighting drug-resistance in bacteria, like those of Dr. Canaan’s, come from research focused on learning more about the defense mechanisms of bacteria. Without these research efforts, the battle against drug resistant bacteria would be hopeless.

References:

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