The Rise in Antibiotic Resistance: A Cause for Concern

 Since the first discovery of penicillin in 1928, antibiotic resistance has plagued itself on the fight against infection. After the release of antibiotics to the public in 1943, the inappropriate use and disposal of antibiotics has led to a crisis in the world of medicine. Scientist are running out of effective antibiotics against life-threatening bacterial infections. In recent years, multi-drug resistant bacteria have become a threat that we have little in the way of controlling. Infections caused by bacteria that could once be treated with antibiotics have evolved to the point of life-threatening infections. Some strains of gonorrhea for example, which were previously able to be treated with antibiotics, have developed resistances that now cause untreatable infections leading to death. There are currently 18 bacterium classified as current antibiotic resistant threats in the United States, 3 of which are at a threat level of concerning, and 12 of which are at a threat level of serious. A minimum estimated 37,000 people die from infections by antibiotic resistance bacteria annually (1).

In an interview conducted with Dr. Erika Lutter, a pathogenic microbiology professor and researcher at Oklahoma State University’s Microbiology and Molecular Genetics department, we discussed the causes and possible solutions to this ever growing issue. Dr. Lutter describes antibiotics as a “natural component in the biological warfare between microbes,” as penicillin for example is a naturally occurring antibiotic found in mold. This means that antibiotic resistance isn’t inherently a man-made problem, it’s something that has likely been occurring for thousands of years as bacteria naturally came in contact with antibiotics, and formed a resistance through evolution. However, Dr. Lutter believes that multi-drug resistant bacteria is man-made, as in nature it is unlikely that one bacterium be introduced to multiple antibiotics over a course of time like we have seen in a clinical setting. Not only can bacterium evolve, but they can undergo gene transfer or transformation with DNA from other bacteria which allows them to form resistance to drugs they have never been in contact with. EHEC (Enterohemorrhagic Escherichia coli) is a great example of a strain of E. coli that was given genes from Shigella to produce a whole new pathogen with pathogenic components of each bacterium.

In the way of efforts every-day people can make to lessen the spread of antibiotic resistance, there are a few simple things we can do. The first and most simple is when you are prescribed an antibiotic, finish the full course prescribed, even if you feel better. When antibiotic are not taken how they are prescribed, it allows the antibiotics that are forming resistances to survive and reproduce. This can subsequently lead to re-infection and spread of an antibiotic resistant bacteria. The second thing that can be done is to always dispose of any unused antibiotics properly. Antibiotics should not be flushed or thrown away, as this can lead to the dispersal of the antibiotic into the environment in non-lethal doses. When bacterium are exposed to low levels of antibiotics, this allows them to easily form resistance and reproduce to form fully resistant offspring. At the physician level, doctors should be trained to prescribe antibiotics more appropriately. For example, those who come in with symptoms of a virus should not be given an antibiotic, as viruses cannot be treated with antibiotics. Dr. Lutter suggests that on top of the retraining of physicians to use antibiotics more appropriately, and developing new antibiotics, we can also focus on strategies to fight these microbes with drugs we have already developed. With the idea that evolution only happens in small jumps, it is unlikely a bacterium will gain resistance to two antibiotics at once. Therefore, using aggressive combination treatments will potentially prevent antibiotic resistance from occurring, by killing any bacteria that survive or evolve to either specific antibiotic before they have the chance to reproduce.

References:

1. “About Antimicrobial Resistance | Antibiotic/Antimicrobial Resistance | CDC.” *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, www.cdc.gov/drugresistance/about.html.