**A Severe Threat: Antibiotic Resistance and its Toll on the Modern Existence**

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**Abstract**

**Antibiotic resistance is a problem facing the modern world today. Antibiotics, which are one of the many treatments used when dealing with bacterial infections are growing rapidly ineffective. While a majority of the problem does stem from the abuse of the prescription drugs given by medical professionals it also comes from prescription cocktails and the threating superbugs. As time goes forward there is a call to advance in ways to fight bacterial infections, when people grow and adapt there is to say that there will be no antibiotics in the future to save us. Infections as simple as swimmer ear and pinkeye will become more serious with the threat of antibiotics no longer being the saving grace to the problem. Life will become even more terrifying for cancer patients with the risk of infections that they can easily catch and no antibiotics to help fight it off. It is important to research new ways to combat this problem, one way that researchers are starting to combat this problem is with bacteriophage therapy. With bacteriophage therapy stopping the bacteria from coding into their genes the sequence of the antibiotics might be the new way that antibiotic resistance will make a turn around. Though bacteriophage therapy has been around for centuries now with the assistance of CRISPR- Cas 9 the hope for reversing antibiotic resistance could be the step toward the problem of abuse of prescription drugs, prescription cocktails, and the superbug.**

**Introduction**

One reason why antibiotic resistance is constantly plaguing society is because of the multidrug-resistant bacteria called a superbug. Superbugs have developed a resistance to almost every antibiotic out there. When one of these superbugs likes to show itself it’s almost impossible to fight it off. One of these superbugs Methicillin-resistant staphylococcus aureus which commonly known as MRSA is one of the most recognizable superbugs that exist, it shows up most frequently in hospitals after patients have had surgery. Superbugs have been researched with antibiotics available in the hope to find one that would fight it and they've been resistant to every one of them. One common antibiotic, penicillin which found in 1945 and has been used the most when dealing with infections. When it was found there was a group of bacteria that was said to be resistant or unaffected by the penicillin. The researcher who found penicillin “warned people of this in his noble prize speech”(Ventola). This was an omen to what was to come in the future. There are times a medical physician will use antibiotics that aren't strong enough to combat the infection which in turn causes that antibiotic to become resistant in the body, but to leave enough of the bacteria behind to code the antibiotic into its genes.

A way that a physician will try and fight this from happening is to prescribe what is known as a prescription cocktail. When doing this the goal is to be positive that there isn’t more than one type of bacteria left in the body. The problem with this type of technique is that this gives the bacteria that is not killed off by the antibiotic a chance to code this into their genes, then in the future when that type of bacteria becomes present again it is resistant in the body which makes it difficult for medical professionals to help their patients get better. In instances where the patient starts to recover, they tend to stop taking the antibiotic they were prescribed. This helps aid the antibiotic resistant crisis.

Another problem that comes with antibiotic resistance is the misuse and inappropriate prescribing of antibiotics. The misdiagnosis of certain bacterial infections can contribute to the problem of antibiotic resistance: “studies that show that misdiagnosis and choice of antibiotic used are incorrect 30% to 50% of cases”(Ventola). There has also been no new antibiotics as of late, “of the 18 largest pharmaceutical companies 15 have abandoned the antibiotic field in lieu of a more stable field than antibiotics”(Ventola) with no new antibiotics being produced then this increases the chance for people to become resistant to the antibiotics that that are already on the market.

**Recent Progress**

Bacteriophage therapy, which is using a virus to infect and replicate using lytic that will cause the destruction of the bacteria, has been around for centuries now. This type of treatment tends to be useful with the multi-drug resistant bacteria such as “Staphylococcus, Streptococcus, Pseudomonas, Klebsiella, and E.coli”(Lin, Koskella, Lin) While antibiotics “travel throughout the body, bacteriophage therapy will target the specific infection”(Golkar, Bagasra, Pace) antibiotics are known more commonly to cause secondary infections because antibiotics travel throughout the body of the host and with these phages that are specific to the host it lessens the chance for secondary infections. With this type of therapy, it will be a step toward antibiotic resistance becoming a thing of the past.

CRISPR-Cas9 which is a technology that allows geneticists to modify the genome is “programed to disrupt the antibiotic resistance gene”(Lin, Koskella, Lin). The help of CRISPR- Cas 9 and the bacteriophage therapy these techniques will be applied to hospitals in the hope to reduce the spread of the antibiotic resistance in not only surgery patients but for cancer patients as well who are at high risk for infection as well as antibiotic resistance from the amount of antibiotics that are consumed in their bodies. Antibiotics are also known to cause reactions in patients such as “anaphylaxis, nephrotoxicity, cardiotoxicity, and hepatotoxicity”(Lin, Koskella, Lin) those are only a few of the complication that can come from antibiotic use, though the study of phage therapy has only recently caught the attention of western medicine there have been no studies as of late that show that phage therapy is dangerous and is relatively safe. With immunocompromised patients the advantages to phage therapy are greater than the disadvantages. Bacteriophage therapy is becoming more prominent in the age of new advancement technology in the future the goal is to make therapy more widely used than the antibiotic counterpart. With this type of therapy will also give researchers time to think of new antibiotics or different ways to combat this threat.

**Discussion**

Consumers of antibiotics need to be aware of how the misuse of these antibiotics can affect their bodies. One simple way of combating antibiotic resistance would be to educate people about what can happen with antibiotic resistance in their bodies.

As well as less frequent use of antibiotics with minor infections, only using them in hospital settings. In the future there will have to be new and updated antibiotics, but because the antibiotic research industry is quickly dwindling this may cause a problem. There is a call to find innovative ways to fight off infections. Researchers are starting to think of new ways to minimize the development of certain resistances in bacteria. As well as think of new ways to fight off the superbug that has become popular in the media in the last twenty years.

The misuse of antibiotics has led researchers to look for new ways to fight infections, and with bacteriophage therapy hopefully there will be a chance to not only lessen antibiotic resistance, but also give new way to fight the superbugs such as MRSA. The time has come to discover and unlock new ways to make infections easier to deal with. Giving hope that bacteriophage therapy works so that way minor infections aren’t difficult to deal with and reversing the silent treat of antibiotic resistance.

**References**

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