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Antimicrobial Resistance: A Misuse or Overuse of Antibiotics?

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ABSTRACT: The effectiveness of antibiotics in treating infections in patients is declining as antibiotic-resistant bacteria become alarmingly powerful. We might be failing to understand the cliche that the emergence of antibiotic-resistant bacteria is caused by the overuse and abuse of antibiotics. The high cost of pharmaceuticals serves as an example of the failure of the current system. One medicine costs over $5 billion and takes 15 years to create. There is minimal input into the open-loop system that produces new medications. Because pharmaceuticals are not tailored, this ineffective method produces drugs that are dangerous to the majority of the target population and only work for a small portion of that population. This issue can only be resolved by a complete return to nature rather than by just increasing R&D spending.

KEYWORDS: antimicrobial resistance, combinatorial chemistry, directed synthesis, diverse molecular targets, R&D

1. INTRODUCTION

Even after supposedly effective treatment, an infection may persist due to a variety of factors, including incorrect diagnosis, medication errors, rational drug selection, postulated treatment outcomes, drug interactions, potential adverse drug reactions, low immunity, and etiologic agent resistance to antibiotics [1].

There is a need for the development of more potent drugs if the persistence of infections is a key factor in antimicrobial agent resistance, which is the inability of microorganisms, particularly bacteria, fungi, parasites, and viruses, to withstand the effects of medications that were previously used to treat them. Antibiotic resistance (ABR) is the term for this type of medication resistance [2].

Drug-resistant superbugs are one of the biggest threats to your health, regardless of your socioeconomic status, race, gender, etc. Even though the issue is widespread, we are not completely helpless in the face of these formidable obstacles.

Globally, about 700,000 people die each year from AMR, representing about 1% of global deaths. It has been posited that by the year 2050, one out of every four deaths in Nigeria will be due to AMR [3]. We are ostensibly on the cusp of a post-antibiotic era. If the current trajectory of these drug-resistant microorganisms is not reversed by 2050, some ten million people could succumb to drug-resistant diseases, costing the global economy 20 trillion USD. I think your best defense is a healthy immune system [4].

The true cause of AMR

It will be unsatisfactory if you are unable to pinpoint the root cause(s) of this problem. First and foremost, Alexander Fleming identified *Penicillium notatum*, a typical mold, as the source of the first antibiotic in 1928. About ten years later, the medication was available, and it completely changed how infectious diseases were thought of. The synthesis of the drugs proved useful as the need for them grew. Penicillin's effectiveness against *Staphylococcus aureus,* for which it was developed, significantly decreased because researchers used combinatorial chemistry and directed synthesis rather than the original materials upon which the drug was based. For instance, shortly after the massive production of the drug through combinatorial chemistry and directed synthesis in 1946, the efficacy of penicillin against *S. aureus* dropped to 88%. Four years later, the efficacy dropped to 66%. In 1982, it dropped to 10%, and now it is less than 5% sensitive to *S. aureus [5].* Can anyone hazard a guess that the total depletion in the efficacy of penicillin against *S. aureus is* a consequence of the overuse and misuse of antibiotics that have assumed a permanent cliché in our contemporary society today, when 128,000 people die each year in America because of taking medications as prescribed? Could it be the side effects of these chemically synthesized drugs? Would it have been different if the pharmaceutical industry had not totally embraced combinatorial chemistry and the direct synthesis of drugs?

Remember, Alexander Fleming and Selman Waksman admonished that bacteria are adaptive; if they don't die, they become stronger and more resilient when exposed to the magic bullets, and, eventually, they will need stronger and stronger drugs. The same way the immune system becomes stronger and more resilient when exposed to pathogens Could the active pharmaceutical

product (API), excipients, or both have contributed to the rapid spread of this adaptation among microbes? Since there is a total shift from the microprogram to combinatorial chemistry and directed synthesis, I can hazard a guess for the latter.

The most adaptable species is the one that endures, not the strongest or the most intelligent. Given that the nucleic acid, proteins, and cell wall that surround bacteria can all change, bacteria are genetically programmed to be adaptable. As long as the insults don't pile up or persist, some changes are temporary or reversible.

But if the insults are sustained or accumulate over time—and they can even be passed from one microbe to another—the change may also become permanent. Excipients, or API, are the main targets of the insults. This is because they are harmful to the body and can destroy the gut microbiome, which is where 80% of our immune system resides.

The panacea

The high cost of medications is an illustration of the current system's failure. Over $5 billion is spent on a single medicine, which takes approximately 15 years to create [6-7]. The process of developing new medications is an open-loop system with little input. Because pharmaceuticals are not tailored, this inefficient approach produces medications that are only helpful for a tiny subset of the target population while offering severe risks and adverse effects to the majority [7]. This issue cannot be remedied merely by increasing R&D spending..

The solution may lie in investing more in plant-based foods like medicinal plants since they contain molecules that produce pharmacological effects similar to any other medication but with the advantage of having diverse molecular targets that prevent and correct the tendency toward disease without any palpable adverse effects. Another solution may lie in the total avoidance of toxemia, whether from toxic food, drinks, products, or the mind.

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