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Opinion

Antibiotic Prudency: Time to Promote the Strategy

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Received: August 30, 2021; **Published:** September 24, 2021

During the currently active COVID-19 pandemic times, enhanced irrational antibiotic use, nay "abuse", has further worsened the perplexing problem of antibiotic resistance (ABR). The problem is most pronounced in resource-limited communities in particular. The currently available antibiotics for multidrug resistant (MDR) infections are under increasing threat to become ineffective before long, resulting in an extremely vulnerable and precarious situation where serious infections, especially with Gram-negative pathogens, will flourish causing huge morbidity and mortality. The development of new antibiotics from new classes - a tough, cumbersome, time-consuming and expensive issue - is likely to take several years [1]. Meanwhile, there is an urgent need to discover and promote alternative strategies [2].

In this behalf, "antibiotic prudency" needs assuming a central role. What's it? Precisely speaking, the term, antibiotic prudency, denotes the use of antibiotics exclusively as and when they are absolutely needed and at the standard dose for an appropriate duration only. There is no point in jumping at their use hypothetically. The success of this strategy depends on the availability of alternative therapies to antibiotics. "Drug repurposing" [3] is the semantic employed for use of non-antibiotic agents for overcoming MDR resistance The potential alternative therapeutics include antibodies, bacteriophage, immunotherapy, probiotics, antimicrobial peptides, faecal microbiota transplant and oligonucleotides.

The administration of pathogen-specific antibodies (passive immunisation) prior to or after exposure to the disease-causing bugs is a good alternative strategy known since the preantibiotic era. It had been almost entirely abandoned with the introduction of chemical/ conventional antibiotics. However, now that the available antibiotics are becoming ineffective, it is beginning to gain attention as an alternative to antibiotics.

Bacteriophage (also termed "phage") therapy ranks among the most actively researched alternatives to antibiotics.

Immunotherapy involves molecules that boost the host immune system to generally prevent disease in the course of infection-prone times Probiotics (also prebiotics and synbiotics) are good bacteria that are supposed to modulate the gut microbial community toward health. However, some reports indicate lack of consistent efficacy. Clearly, more work is required to demonstrate their role as an alternative to antibiotics.

Antimicrobial peptides/ proteins (AMPs) have broad activity to directly kill pathogens. These are diverse class of naturally occurring molecules produced as a first line of defense by all multicellular organisms.

Faecal microbiota transplant therapy is an effective option for therapy of recurrent infection with Clostridium difficile. Presently, its use in other indications needs to be a part of clinical trials.

Oligonucleotide therapy is in the process of research trials as a new approach for the treatment of MDR pathogens. Recently, work of researchers, Klauss., *et al*. [4] has demonstrated the powerful antimicrobial activity of this lipid oligonucleotide (LON) on the ß-lactamase activity in clinical and laboratory studies. Understandably, the self-delivery of oligonucleotide sequences via lipid conjugation may be extended to several antibiotics. This may open up novel ways to tackle the nasty problem of antibiotic resistance.

All in all, it is high time we cut down the use of conventional antibiotics. The use of alternative products, some established whereas others still under investigations, need serious consideration. Immunotherapeutics, antimicrobial peptides and gut microbiota modulation appear to be quite promising approaches. At the same time, Oligonucleotide therapy seemingly has the potential to turn out as a strong alternative as well as a facilitator for optimal efficacy of the antibiotics.

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Volume 10 Issue 10 October 2021