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Editorial

New Proposals for Treatment against Bacterial Resistance

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An increasing number of researchers around the world are devoting efforts to solve a serious problem that it threatens the public health. A post-antibiotic era – in which common infections and minor injuries can kill – far from being an apocalyptic fantasy, is instead a very real possibility for the 21st Century [1,2]. After the development and mass commercialization of antibiotics, pathogenic and environmental bacteria have developed resistance to antibiotics since the last century, so that the infection caused by Antibiotic-Resistant Organisms (AROs) could be considered an emerging infection and its control should be prioritized in all nations, regardless of territory and economic situation [3]. The negative effects of antimicrobial resistance (AMR) are already manifesting around the world, with thousands of losses in various regions of the world. For instance, in 15 European countries more than 10% of bloodstream *Staphylococcus aureus* infections are caused by Methicillin-Resistant Strains (MRSA), with several of these countries seeing resistance rates closer to 50% [4]. Tuberculosis killed fewer people during the period between 2000 and 2015, but is still among the top 10 causes with a death toll of 1.4 million. According to World Health Organization the bacteria *Neisseria gonorrhoeae* is becoming harder and impossible to treat with antibiotics, spreading a Sexually Transmitted Disease (STD) around the world [5]. What are the alternatives or new proposals against increasing microbial resistance? The answer could be in the human body. The human microbiota should be considered as a source for new antibiotics. The *S. lugdunensis* was associated with a significantly reduced *S. aureus* carriage rate. The reason is that lugdunin or lugdunin-producing commensal bacteria could be valuable for preventing staphylococcal infections. The lugdunin is a novel thiazolidine-containing cyclic peptide antibiotic and not showed development of resistance in *S. aureus* [6]. Using new or uncultured microorganisms against bacterial resistance appears to be promising. A research demonstrated several methods to grow by cultivation *in situ* or by using specific growth factors and discover a new antibiotic called teixobactin that inhibits cell wall synthesis by binding to a highly conserved motif of lipid II (precursor of peptidoglycan) and lipid III (precursor of cell wall teichoic acid). Any mutants of *Staphylococcus aureus* or *Mycobacterium tuberculosis* resistant to teixobactin was observed and this new antibiotic could prevent the development of bacterial resistance [7]. The *Streptomyces formicae* was isolated from the African fungus-growing plant-ant *Tetraponera penzigi* and was demonstrated that it produces novel pentacyclic polyketides that are active against Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Vancomycin-Resistant *Enterococcus* (VRE). This study identified the first antibiotic from the *Tetraponera* system and highlights the benefits of exploring unusual ecological niches for new actinomycete strains and novel natural products [8]. Komodo dragons are the largest living lizards and they endure numerous strains of pathogenic bacteria in their saliva and recover from wounds inflicted by other dragons, reflecting the inherent robustness of their innate immune defense. A bioprospecting study combining partial de novo peptide sequencing with transcriptome identified 48 cationic antimicrobial peptides from Komodo dragon plasma. All but one of the identified peptides were derived from histone proteins and the antimicrobial effectiveness of 8 peptides was evaluated against *Pseudomonas aeruginosa* and *Staphylococcus aureus* with 7 peptides exhibiting antimicrobial activity against both microbes and 1 showing significant potency against *P. aeruginosa*. This study demonstrated the path of bioprospecting for the discovery of cationic antimicrobial peptides, with a myriad of new antimicrobial peptides derived from histones in reptile plasma. This study clarified the role of intact histones and histone-derived peptides against infection [9]. These alternative findings indicate that the response to resolving bacterial resistance could be present in the nature.

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