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Photoantimicrobials-are we afraid of the light?

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Abstract

Although conventional antimicrobial drugs have been viewed as miraculous cure-alls for the past 80 years, increasing antimicrobial drug resistance requires a major and rapid intervention. However, the development of novel but still conventional systemic antimicrobial agents, having only a single mode or site of action, will not alleviate the situation because it is probably only a matter of time until any such agents will also become ineffective. To continue to produce new agents based on this notion is unacceptable, and there is an increasing need for alternative approaches to the problem. By contrast, light-activated molecules called photoantimicrobials act locally via the in-situ production of highly reactive oxygen species, which simultaneously attack various biomolecular sites in the pathogenic target and therefore offer both multiple and variable sites of action. This non-specificity at the target circumvents conventional mechanisms of resistance and inhibits the development of resistance to the agents themselves. Photoantimicrobial therapy is safe and easy to implement and, unlike conventional agents, the activity spectrum of photoantimicrobials covers bacteria, fungi, viruses, and protozoa. However, clinical trials of these new, truly broad-spectrum, and minimally

toxic agents have been few, and the funding for research and development is almost non-existent. Photoantimicrobials constitute one of the few ways forward through the morass of drug-resistant infectious disease and should be fully explored. In this Personal View, we raise awareness of the novel photoantimicrobial technologies that offer a viable alternative to conventional drugs in many relevant application fields, and could thus slow the pace of resistance development.

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