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Chapter - 7
**Antimicrobial Resistance: An Unknown Threat
to Humankind**

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Chapter - 7

Antimicrobial Resistance: An Unknown Threat to Humankind

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Abstract

With resistance found to every antibiotic now in clinical use and only a handful of innovative treatments in the development, antibiotic resistance is a worldwide health disaster. Understanding the molecular mechanisms that bacteria use to withstand the effects of antimicrobials is essential for identifying global patterns of resistance, optimising the use of existing medications, designing new medications that are less likely to develop resistance, and developing cutting-edge methods to combat resistance. In this review, we look at recent developments in our knowledge of how resistance genes affect the biology of the host, as well as new structural information on important molecular processes that underlie resistance, various mechanism of resistance and method of destruction of antibiotic through variety of different enzymatic action and other methods involved such as efflux and conformational changes that are adopted by the bacteria and other microorganism to combat antibiotics. Finally, we go over how we can apply this knowledge to create the newest antimicrobial treatments.

Keywords: Antimicrobial resistance, beta-lactamases, teixobactin, efflux pumps, enzymes

1. Introduction

Antimicrobial resistance (AMR) is spreading among a variety of infections and endangering contemporary medicine by increasing morbidity and mortality globally. The long-term effects of AMR on human society are still unknown, but it is now urgently important to preserve the efficacy of antibiotics. Coordinating efforts across nations and industries, such as trade, the environment, human and animal health and development, are necessary to address this pervasive issue. Prior attempts to coordinate such a response have been ineffective, but growing concern about AMR resulted in the

World Health Organization (WHO) of a Global Action Plan (GAP) in 2015 and a political declaration at the UN General Assembly in 2016 (Wernli *et al.*, 2017)

Both texts acknowledge AMR as a connected biological and societal issue that is aggravated by globalisation, the rising global population, the abuse of antibiotics for human and animal health, and the dearth of new medicine research. The conditions for the issue to get harsher in many developing nations include a high burden of infectious diseases, increased consumption in human and animal health, limited access to high-quality medications, and inadequate public health infrastructure. (Wernli *et al.*, 2017)

Governments, who are ultimately in charge of solving the issue, have recently begun implementing national plans based on the GAP. We see an urgent need to increase monitoring of nations pledges using an integrated methodology to measure AMR in order to assist GAP implementation. (Wernli *et al.*, 2017)

Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations was the title of a review written by Lord Jim O'Neill and his team in 2014 and commissioned by the UK government (the AMR Review). Antimicrobial resistance (AMR) may result in 10 million deaths annually by 2050, according to the analysis. This estimate has become a common statement; specialists, lay media and public health organisations have all used it. Frequently, the report merely reproduces this one particular, terrifying result without any qualifications or confidence intervals. We acknowledge that AMR imposes a significant clinical and public health burden, that this burden will probably grow over time, and that immediate action is needed. (De Kraker *et al.*, 2016)

However, we argue that the fight against a post-antibiotic age may be undermined rather than strengthened by incorrect global estimations such as those made in the AMR Review. To provide more accurate, comprehensive, and useful findings, these uncertainties must be addressed. The 2009 paper "The bacterial challenge: Time to react" by the European Center for Disease Prevention and Control (ECDC) contains the first estimates of the global burden of AMR. We will analyse both publications, which evaluated the burden of AMR in Europe and the world, respectively, because the model estimates provided in the AMR Review are based in part on the ECDC approach. (de Kraker *et al.*, 2016)