Accepted Manuscript

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PII: S0223-5234(18)30781-5

DOI: 10.1016/j.ejmech.2018.09.009

Reference: EJMECH 10720

To appear in: *European Journal of Medicinal Chemistry*

Received Date: 28 May 2018

Revised Date: 3 September 2018

Accepted Date: 4 September 2018

Please cite this article as: G. Martelli, D. Giacomini, Antibacterial and antioxidant activities for natural and synthetic dual-active compounds, *European Journal of Medicinal Chemistry* (2018), doi: 10.1016/j.ejmech.2018.09.009.

Antibacterial and antioxidant activities for natural and synthetic dual-active compounds.

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Keywords: antimicrobial resistance; antibacterial; antioxidant; natural products; polyphenols; lactams; dual target compounds; multigenic diseases

Abstract

Antimicrobial resistance is widely recognized as a grave threat to global health in the 21st century, since the past decades have seen a dramatic increase in human-pathogenic bacteria that are resistant to one or multiple antibiotics. New antimicrobial agents are urgently required, particularly in the treatment of chronic infections such as cystic fibrosis, often associated with persistent colonization by drug-resistant pathogens and epithelial damage by pulmonary oxidative stress. In such events, it would be favourable to find agents that could have antioxidant and antibacterial activities combined in one molecule. The discovery of compounds that can show a dual-target activity considerably increased in the last years, reflecting the growing confidence that this new approach could lead to better therapeutic solutions for complex multigenic diseases. The aim of this review is to report those natural and synthetic compounds displaying significant antioxidant and antibacterial activities. In recent years there has been a growing attention on plant-derived antimicrobials as an alternative to antibiotics, for their efficacy and low tendency in developing bacterial resistance. Moreover, it was found that some natural products could enhance the activity of common antibiotics displaying a synergistic effect. We then report some selected synthetic compounds with an in-built capacity to act on two targets or with the combination in a single structure of two pharmacophores with antioxidant and antibacterial activities. Recent literature instances were screened and the most promising examples of dual-active antibacterial-antioxidant molecules were highlighted.