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Recent Medicinal Advances in Quinazolinone - based Antimicrobial Agents

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Abstract

Quinazolinones are a heterocyclic group that has been studied for a long time in medicinal chemistry because they have many biological functions, such as strong antibacterial and antifungal effects. In this chapter, quinazolinone-derived antimicrobials' synthesis methods, structure-activity relationships (SAR), molecular targets, recent developments in medicinal chemistry, *in vitro*/*in vivo* research, mechanism-of-action insights, and difficulties are reviewed. The focus is on target-directed design (DNA gyrase, topoisomerases, DHFR), contemporary hybridisation techniques, SAR trends that boost the potency of both Gram-positive and Gram-negative bacteria, and translational barriers including resistance and ADME/toxicity. Emerging evidence that rationally designed quinazolinones can produce promising lead compounds against resistant bacteria has been studied in recent perspectives.

Keywords: Quinazolinone scaffolds, medicinal advances, mechanism, antimicrobial activity.

1. Introduction

Quinazolinones (notably the 2- and 4-oxo variants) are bicyclic systems combining benzene and pyrimidinone units. Historically developed for diverse indications (antihypertensive, anticancer, antimalarial), quinazolinone derivatives are an important scaffold in antimicrobial drug discovery owing to their synthetic accessibility and ability to accommodate diverse substituents for target engagement and ADME tuning. Quinazolinones have garnered more interest as antibacterial and antifungal treatments in recent surveys, especially when used as hybrid scaffolds and as inhibitors of known pathogenic targets such as DNA gyrase B, topoisomerase IV, and dihydrofolate reductase (DHFR) [1].

Antimicrobial Resistance (AMR) is the main target of the major challenges to global health in the twenty-first century. Due to the fast-