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Resistance to Aminoglycosides

Glycomics and the Link to the Human Gut Microbiome

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1.1 Aminoglycosides as Antimicrobial Drugs

The exponential appearance of antibiotic-resistant infections, in particular those caused by Gram-negative pathogens, is a major public health concern. The observed decrease in the emergence of new effective antimicrobial drugs is an inevitable consequence of the use of antibiotics, and new approaches to fight infection are a matter in need of attention from the scientific community (Magiorakos et al. 2012). In response to this challenge, the optimization of existing drugs with known mechanisms of action and resistance, such as aminoglycosides, is an attractive approach for the development of new antimicrobials.

Aminoglycosides or aminoglycoside antibiotics (AGAs) are secondary metabolites of bacteria used in the warfare against other microorganisms, which were repurposed in medicine as broad-spectrum antibiotics in both humans and animals. This class of antibiotics has activity against Gram-negative and Gram-positive bacteria by targeting ribosomal RNA (rRNA), leading to protein misfolding. AGAs have predictable pharmacokinetics and often act in synergy with other antibiotics, such as beta-lactams, making them powerful anti-infective drugs (Hanberger et al. 2013). Despite their potential renal toxicity and ototoxicity and known bacterial resistance, diverse molecules of this family of antibiotics have been used in clinical practice for several decades (Thamban Chandrika and Garneau-Tsodikova 2018).

AGAs are constituted by a carbohydrate residue moiety and possess several amino and hydroxyl group functionalities, determinants for the interaction

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