

# Antibiotics and Antibiotic Resistance

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## Riboswitch control of aminoglycoside antibiotic resistance

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Regulatory RNA molecules in bacteria are increasingly shown to play an important role in influencing gene expression, particularly during the response to the changes of intracellular and environmental signals or stress conditions (including exposure to antimicrobial agents). The majority of riboswitches are regulatory RNAs that regulate gene expression by binding small molecule metabolites. Here we report the discovery of an aminoglycoside-binding riboswitch that is widely distributed among antibiotic resistant bacterial pathogens. This riboswitch is present in the leader RNA of the resistance genes that encode the Aminoglycoside Acetyl Transferase (AAC) and Aminoglycoside Adenyl Transferase (AAD) enzymes that confer resistance to aminoglycoside antibiotics through modification of the drugs. We show that expression of the AAC and AAD resistance genes is regulated by aminoglycoside binding to a secondary structure in their 5' leader RNA. Reporter gene expression, direct measurements of drug RNA binding, chemical probing and UV cross-linking combined with mutational analysis demonstrate that the leader RNA functions as an aminoglycoside-sensing riboswitch in which drug binding to the leader RNA leads to the induction of aminoglycosides antibiotic resistance. Effects of other RNA structural change-related mechanisms such as ribosome stalling on antimicrobial resistance are also described.

### Biography

Xu Jia has completed his PhD from Fudan University, China. He is the Director of non-coding RNA and Drug Discovery Laboratory in Chengdu Medical College. His work continues towards defining the regulatory function of small non-coding RNA in antibiotic resistance as well as the mechanisms involved in RNA structure change. He has published more than 10 papers related to antibiotic resistance and epidemiology survey in reputed journals and has been serving as a Distinguished Professor in Chengdu Medical College.

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