

Quorum Sensing Inhibitor: A New Therapeutic Strategy

Rajesh K Das*

Department of Pharmaceutical Sciences, India

***Corresponding Author:** Rajesh K Das, Department of Pharmaceutical Sciences, India.

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Abstract

The increasing resistance of antibiotics from the last few decades, it is crucial to find new techniques against pathogenic bacteria. Quorum sensing (QS) is the alternative target to introduce a new strategy. Synthetic and natural QSIs play a crucial role to inhibit these QS signals. In this article, I highlight some examples of QS inhibitors like natural and synthetic based QS inhibitors. This article focuses on the inhibition of QS mechanisms with some of its applications.

Keywords: Quorum Sensing; Antibiotics; Autoinducing Peptides

Introduction

The insecure and excessive use of antibiotics causes several problems like the emergence of multi-drug resistance of pathogenic bacteria and thus becomes a serious problem to the health system of human and domestic animals. A large number of infectious diseases are linked to the enormous growth of bacterial biofilm formation. Quorum sensing (QS) controls this bacterial behavior by the secretion of signal molecules in a cell density-dependent manner. So, QS is gaining now as an important therapeutic target because QS inhibitory drugs have more specific effects than traditional antibiotics.

Quorum sensing signals

Acyl-homoserinelactones (AHLs), autoinducing peptides (AIPs) and autoinducer-2 (AI-2) are mainly found in forming bacterial QS signals by the formation of biofilm, conjugation of plasmid and finally affect the antibiotic resistance due to survival capacity of bacteria from difficulty in the environment. The process of QS signaling cell to cell communications is fully different for both Gram-positive and Gram-negative bacteria. Gram-negative bacteria mainly produce AHL signaling molecules, whereas, Gram-positive bacteria produce AIP signaling molecules but AI-2 signals are produced from both of these two bacteria.

Quorum sensing inhibition mechanism

The working principles of most of the QSIs are based on the mainly four pathways namely degrading QS signals, biosynthesis of inhibited QS signal, detected QS signal inhibition, antibiotics as QS inhibitors

- **Example of QSIs:** Natural quorum sensing inhibitors: Plant-based QSI, Fungus based QSIs, Marine organism-based QSIs, Synthetic quorum sensing inhibitors.
- **Application of QSIs:** QSI has a wide range of applications in various fields like the human health system, food industry. Hentzer, *et al.* suggested that QSI can effectively reduce biofouling of surgical implants (caused by *P. aeruginosa*) on the surface device. QS signal of *Vibrio cholera* is targeted by some QSI for developing cholera therapy. The combined form of antibiotics with anti QS strategies can also develop some QSIs for medicinal treatment.

Conclusion

In conclusion, QSI gives a new approach with promising activity in the battle against antibiotic-resistant pathogenic bacteria. Hence, combine the effect of QSI with antibiotics may be useful in clinical treatment. Though QSI has a wide range of applications in

the enormous field, its production at a large scale is still a matter of great concern. In the future, we hope that more types of QSI will come as safe and suitable antimicrobial drugs.

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