

Lysine biosynthesis in microbes: relevance as drug target and prospects for β -lactam antibiotics production.

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Abstract

Plants as well as pro- and eukaryotic microorganisms are able to synthesise lysine via de novo synthesis. While plants and bacteria, with some exceptions, rely on variations of the meso-diaminopimelate pathway for lysine biosynthesis, fungi exclusively use the α -aminoadipate pathway. Although bacteria and fungi are, in principle, both suitable as lysine producers, current industrial fermentations rely on the use of bacteria. In contrast, fungi are important producers of β -lactam antibiotics such as penicillins or cephalosporins. The synthesis of these antibiotics strictly depends on α -aminoadipate deriving from lysine biosynthesis. Interestingly, despite the resulting industrial importance of the fungal α -aminoadipate pathway, biochemical reactions leading to α -aminoadipate formation have only been studied on a limited number of fungal species. In this respect, just recently an essential isomerisation reaction required for the formation of α -aminoadipate has been elucidated in detail. This review summarises biochemical pathways leading to lysine production, discusses the suitability of interrupting lysine biosynthesis as target for new antibacterial and antifungal compounds and emphasises on biochemical reactions involved in the formation of α -aminoadipate in fungi as an essential intermediate for both, lysine

and β -lactam antibiotics production.

Involved units

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