

6th International Conference on

Bioinformatics & Systems Biology

August 22-23, 2016 Philadelphia, USA

Interactions of a novel class of beta-lactam antibiotics with their targets penicillin-binding proteins from different sources studied by covalent docking approach

Anna Marabotti, Anna Verdino, Margherita De Rosa and Annunziata Soriente
University of Salerno, Italy

A novel class of cephalosporin-derived antibiotics, carrying two beta lactam rings in their molecular structure, has been synthesized with the aim of overcoming problems due to the widespread antibiotic resistance. A computational approach to clarify the interactions between these antibiotics and their natural targets, penicillin binding proteins (PBPs) from either Gram + and Gram - bacteria has been carried out by means of covalent docking, a variant of the traditional docking approach, using a modified version of the popular program AutoDock. In this way, we were able to simulate the complex formed between the PBPs and these molecules, taking into account the presence of the covalent bond formed with the reactive Ser residue in the active site of the proteins. The results obtained confirmed the ability of these compounds to interact with several PBPs, and the different affinity of the two beta lactam rings for the active site. Moreover, our simulations allowed to identify the structural reasons for the different affinities showed by the two diastereoisomers of the antibiotics with respect to their target proteins. Finally, we also performed studies in order to predict the affinity of these compounds for beta lactamase, the enzyme responsible for the resistance of bacteria towards this class of therapeutic compounds. These studies will allow to improve the chemical and biological features of this class of drugs, suggesting modifications to introduce in the structure of the lead compound.

Biography

Anna Marabotti graduated in 1996 in Medicinal Chemistry, and obtained her PhD in Biochemistry in 2001. She is working as an Assistant Professor in the University of Salerno, teaching Advanced Biochemistry in Master's degree in Biology. Her main research interests are in the studies of structure-dynamics-function of proteins using a combination of bioinformatics and experimental techniques, applied to proteins of relevant biotechnological interest, or involved in genetic diseases. She is co-author of more than 70 full papers published in journals indexed by the main online resources and in journals with ISSN/ISBN code, and of about 100 communication to congresses.

amarabotti@unisa.it

Notes: