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Microbial biotransformations: New approaches to obtain new molecules

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Microbial low-molar-mass secondary metabolites often have potent pharmacological activities and have been employed as antibiotics, antivirals, antimycotics, antiprotozoans, cytotoxics and immunosuppressives, which make them extremely important for pharmaceutical industry. In addition, microbes may produce a larger spectrum of molecules by microbial biotransformation (also, microbial biocatalysis) in which, parental molecules are converted into new chemically stable compounds with desired pharmacological activity by minor structural alterations. Among several practical advantages of microbial biotransformation, we point out the relatively mild incubation conditions used in the processes and the possibility of obtaining compounds where regio- and stereo-specificity are involved, molecular handling become more easy than by synthetic chemistry. In order to establish better protocols, academic and industrial researchers face many challenges. Prior to biotransformation reactions, they must find potential biotransforming microorganisms and non-toxic or inhibitory parental chemicals. For the upstream stage, diverse strategies must be considered taking in account the type of bioreactor to be used (solid-state or submerged), the microbial growth phenotype (planktonic or biofilm), aeration and nutritional requirements, scaling-up projections, etc. Subsequent downstream steps must recover and preserve the brand new molecules. Despite all such challenges, novel approaches have been proposed for microbial biotransformation studies. Innovations in high throughput screening of wild biotransforming organisms, the use of high-biotransforming mutants, immobilized-cell technologies, improved bioreactors and more efficient downstream processes have lead to the production of new high added value biomolecules.

Biography

Edvaldo Antonio Ribeiro Rosa is a full Professor of Microbiology at the Pontifical Catholic University of Parana (PUCPR). He is the Leader of the Xenobiotics Research Unit, at PUCPR. His research interests are "on microbial biotransformation of xenobiotics to obtain new bioactive molecules and in the modulation of microbial virulence factors by drugs".

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