

Nanomedicine and Nanotechnology in Health Care

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**Rafael Vazquez-Duhalt***National Autonomous University of Mexico, Mexico***Design of a VLP-nanovehicle for CYP450 enzymatic activity deliveries**

The intracellular delivery of enzymes for therapeutic use has a promising future for the treatment of several diseases such as genetic disorders and cancer. Virus-like particles offer an interesting platform for enzymatic delivery to targeted cells because of their great cargo capacity and the enhancement of the biocatalyst stability towards several factors important in the practical application of these nanoparticles. We have designed a nano-bioreactor based on the encapsulation of a cytochrome P450 (CYP) inside the capsid derived from the bacteriophage P22. An enhanced peroxigenase, CYPBM3, was selected as a model enzyme because of its potential in enzyme prodrug therapy. A total of 109 enzymes per capsid were encapsulated with a 70% retention of activity for cytochromes with the correct incorporation of the heme cofactor. Upon encapsulation, the stability of the enzyme towards protease degradation and acidic pH was increased. Cytochrome P450 activity was delivered into human cervix carcinoma cells via transfecting P22-CYP nanoparticles with lipofectamine. This work provides a clear demonstration of the potential of biocatalytic virus-like particles as medical relevant enzymatic delivery vehicles for clinical applications.

Biography

Rafael Vazquez-Duhalt is working as a full Professor at the Center for Nanosciences and Nanotechnology of the National University of Mexico. He earned his PhD degree in Biological Sciences from the University of Geneva, Switzerland. In addition, he carried out a three-years Post-doctoral work in the University of Alberta, Canada. He has been a visiting Professor at the University of Maryland and at the University of California, San Diego. He earned the Scopus Prize from Elsevier Publisher as Mexican researcher with higher H factor in Biotechnology and Agronomy fields in 2011, the Research Merit State Prize from the Morelos State Government in 2009, and "Thomson-Reuters" Prize to the most cited Mexican research article in Microbiology in the decade 1999-2009 in 2009. He is the author of 3 patents, published 2 books and more than 145 scientific articles.

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