Cornelia G Palivan, Chem Sci J 2016, 7:3(Suppl)
http://dx.doi.org/10.4172/2150-3494.C1.005

2nd World Chemistry Conference

Artificial organelles: How nanoscience provides therapeutic solutions

Cornelia G Palivan
University of Basel, Switzerland

Because organelles are key components in cells and comprise compartments loaded with molecules essential to life, their inadequate functioning can contribute to numerous pathological conditions. Creating artificial organelles that aid their natural counterparts in cells will have a dramatic impact on medicine in the treatment of disorders and in the design of artificial cells. To design artificial organelles, nanoscience provides a necessary tool, the self-assembly of amphiphilic copolymers into supramolecular structures such as micelles, tubes, and vesicles. They represent ideal candidates to form organelle-like compartments that can contain combinations of biomolecules. Here, we show the necessary steps for the development of an artificial organelle able to act *in situ* inside cells. The artificial organelle is based on two enzymes in tandem encapsulated in polymer vesicles with membrane rendered permeable by inserted channel proteins. Polymer vesicles play a dual role: they protect the enzymes from proteolytic attack and allow them to act inside their cavity. An example of the first artificial peroxisome is presented as model for nanosciance based strategy to design artificial organelles. Uptake, absence of toxicity, and *in situ* activity in cells exposed to oxidative stress demonstrated that the artificial peroxisomes detoxify superoxide radicals and H_2O_2 after endosomal escape. Our artificial peroxisome combats oxidative stress in cells, a factor in various pathologies (e.g. arthritis, Parkinson's, cancer, AIDS), and offers a versatile strategy to develop other "cell implants" for cell dysfunction.

Biography

Cornelia G Palivan is Professor in Physical Chemistry at the University of Basel, Switzerland. She received several awards for her research, and published more than 100 publications. Her interest is on development of hybrid materials (nanoreactors, active surfaces, artificial organelles, nanodevices, functional membranes) by combining biomolecules or mimics with synthetic supramolecular assemblies for medical, environmental, technological, and food science oriented applications.

cornelia.palivan@unibas.ch

Notes: