

Biopolymers

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Biopolymers – Key actors in the medicine of the future

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The main achievements of science and technology in the last century has brought substantial improvements in the quality of life of the human species (i.e., in food production, health, energy, transport and communications). However, new approaches and a change in paradigms are urgently needed to address remaining gaps in health worldwide. Some of these include: 1) Strategies to fight microbial drug resistance; 2) novel and more effective therapies against cancer; 3) effective therapies against neurological disorders related to aging. The modern understanding of health is based on the concept of regulation of metabolism by a complex network of communication mechanisms based on signaling molecules that regulate basic cellular activities and coordinates cell responses so they can act in concert. These respond to, are controlled by, and can be interrupted by processes occurring at the molecular and supramolecular/macromolecular scales. The latter are the domain of bioinspired nanomaterials. These biomaterials are believed to be key in the development of new approaches to tackle the disease. A fundamental reason in this respect, is that these materials not only share similar building blocks, but also the hierarchical organization in the length scale of living systems, for example, bones, shells, hair, fibers, etc. This conference will address recent advances in our laboratory with the aim of contributing to some of the health challenges. To do this, we have to use platforms based on nanomaterials based on biopolymers. These include nanoparticles and nanocapsules capable of disrupting quorum sensing in Gram negative bacteria; nanocapsules capable of preventing the adhesion of *Helicobacter pylori* to stomach cells; electrostatically self-assembled nanocomplexes of chitosan and polynucleotides (pDNA, siRNA and microRNA) able to transfect cells of breast cancer and cystic fibrosis cells; and nanocapsules loaded with capsaicin that can reversibly disrupt the tight junctions and therefore permeabilize drugs across epithelial cell monolayers. *In vitro* proof-of-concept of the effectiveness of these systems will be discussed. The current obstacles and future perspectives will also be discussed in the context of the translation of these nanomedicine to the clinic.

Biography

Francisco M Goycoolea has twenty years of experience researching on biomass-sourced polymers as building blocks of novel bioinspired materials such as soft hydrogels and nanoparticles for biomedical and biotechnological applications. In 2016, he has been appointed as Chair in Biopolymers at University of Leeds. He has published more than 110 papers in reputed journals and has been serving as an Editorial Board Member of repute.

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