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Polyelectrolyte nano-complexes-safe and efficient tools for the delivery of drugs or vaccine

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The complexation of polyelectrolytes is very attractive to process polysaccharides into biomaterials, because it is energy efficient, requires no toxic chemical, has a low environmental impact and can be applied to biocompatible polymers such as polysaccharides. We used chitosan, a copolymer of N-acetyl glucosamine and glucosamine obtained from the partial deacetylation of chitin as polycation and a variety of polyanions such as dextran sulphate, hyaluronan, heparin, and chondroitin sulphate. These polysaccharides are generally regarded as safe and some of them can be found in the extracellular matrix of mammals. In this contribution we will present our latest achievement in the control of the elaboration, structure and performances of polyelectrolyte nanocomplexes as drug and vaccine carriers of high potential. In particular, we will address the issues of colloidal stability in physiological media, a major limiting factor in the development of this technology; the nanocomplex loading with drugs or vaccine; the targeting of these nanodelivery systems. The formation of polyelectrolyte complexes is spontaneous at room temperature, i.e. under kinetics control. We will present an alternative approach close to the thermodynamic equilibrium and discuss the potentiality of this particularly innovative synthesis route. Finally, we will present our latest results on the delivery of anti-retroviral drug and the inhibition of the infection by the HIV-1 virus of hPBMCs *in vitro*.

Biography

Thierry Delair received his PhD in Organic Chemistry in 1986 and Post-doctorate at the Stanford Research Institute (California). He has been Professor at University Lyon 1, since November 2008. Previously, he spent 20 years in R&D Department at BioMérieux, a medical diagnostics company. He developed polymeric materials for *in vitro* diagnostic applications and for vaccine delivery. He has published 135 articles in international peer-reviewed journals (h-index 33), filed 18 patents, and has given 60 oral presentations. His research results encouraged him to establish three companies: Ademtech (magnetic particles), CYTOSIAL BIOmedic (cosmetics SME) and Anabior (vaccines adjuvants).

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