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Editorial

Improving the therapeutic index of medicines is a perpetual goal of both medicinal chemists and drug delivery scientists. Nanomedicine, the application nanotechnology to medicine, works at the molecular level using “bottom up” or with advent of novel fabrication methods “top down” constructed multifunctional, spatially ordered architecturally varied nanostructures to ultimately improve bioavailability and targeting achieving medical benefit. This field possesses an interdisciplinary conceptual breadth bringing together scientists and clinicians towards the engineering of useful architectures made up of individual building blocks driven by discrete molecular forces (chemical bonding, electrostatics, steric interactions and physical adsorption) aimed to be clinically translated as multifunctional, often biomimetic and bioresponsive systems. This issue presents a series of contributions on current advances in understanding the engineering and fabrication of organic or inorganic nanomedicines for a variety of applications in drug delivery across challenging barriers such as the blood-brain barrier (BBB) and to intracellular targets, regenerative medicines and cancer.

In this respect, in this CTMC thematic issue, Dr Jones evaluated novel and exciting developments in triblock, graft and hyperbranched polymer chemistries that are changing the way polymeric micelles drug formulations are engineered. The issue continues with Prof Antimisiaris evaluating the characteristics of nanoliposomes functionalized with three different ligands that are critical for reversal of A β -induced cytotoxicity and their ability to inhibit A β peptide aggregation for their potential to target one of the main pathologies of Alzheimer’s disease, the amyloid plaques. As there is an increased interest in non-spherical nanomedicines, the issue discusses peptide amphiphile (polypeptide block copolymers) architecture fundamentals that govern the self-assembly of peptide amphiphiles into spherical but mostly high axial nanostructures for range of application ranging from permeation across the BBB and cancer to regenerative medicine. On this note, Ruso’s et al discuss inorganic hierarchically materials and their application in the field of orthopaedic regenerative medicine, while Dr Baeza and Prof Vallet-Regi discuss the current state of mesoporous silica nanocarriers as anti-tumour therapies. The issue finishes presenting current advances in “bottom-up” and “top-down” fabrication techniques for the preparation of nanomedicines such as electrohydrodynamic preparation and nanonisation technologies respectively.

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