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Layer-by-layer self-assembly nanoparticles designed for resveratrol delivery

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Resveratrol (RSV) is a non-flavonoid polyphenol which exhibits a wide array of beneficial multi-target biological effects in preclinical studies. Besides this evidence, the far-reaching application of RSV is strongly hampered due to a low favorable pharmacokinetics behavior attributed to its poor water solubility. This way, an unmet need to develop proper RSV delivery systems is posed, aiming for the enhancement of its bioavailability *in vivo*. An advanced formulation strategy able to surpass this limitation is nanotechnology, whereby Layer-By-Layer (LbL) self-assembly nanoparticles assume particular emphasis. LbL self-assembly is an encapsulation technique which is built on the sequential assembly of oppositely charged polyelectrolytes upon charged low soluble drug nanoparticles' surface. Tunned nanocapsule type constructions at nanoscale are obtained, fundamentally comprising a drug nano-core which is covered by a polyelectrolyte-based multilayered nanoshell. Herein, LbL self-assembly technique coupled with a washless polyelectrolyte approach was developed. Aqueous RSV nanoparticles composed of distinct bilayers of Polyallylamine Hydrochloride (PAH) as the poly-cation and Dextran Sulfate (DS) as the poly-anion, were performed (including, 2.5 (RSV-$(PAH/DS)_{2.5}$), 5.5 [RSV-$(PAH/DS)_{5.5}$] and 7.5 [RSV-$(PAH/DS)_{7.5}$] bilayers). Homogenous particle size distributions with 150-250 nm were obtained. The most complex formulation, composed 7.5-bilayers, evidenced 219±1 nm and 0.17 of polydispersity index; high electrical surface of +31±0.5 mV and a high drug content of 92±2%. The modulation of the composition of the coating shell allowed the control of the RSV release pattern. Owing to such, these LbL nanoparticles are considered as a promising vehicle for the delivery of RSV.

Biography

Antonio Ribeiro has completed his PhD from Rene Descartes University in France. He is a Board Member of UC-Tecnimede, an industrial-university consortium basef in Coimbra and focused on new delivery systems. He has published more than 60 papers in peer-reviewed reputed journals and several hundreds of communications around the world. He has also been serving as an Editorial Board Member of reputed journals.

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