SESSION 1 – P7

Solid Lipid Nanoparticles: a strategy to overcome the blood-brain barrier

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Diagnosis and therapy of brain diseases are often compromised by the difficulty to cross the blood brain barrier (BBB). Recently, the emerging field of nanotechnology has generated new promises to solve this problem. Nanoparticles (NPs) have several advantages in terms of biocompatibility, non-immunogenicity, non-toxicity and they can be functionalized to carry imaging agents and/or drugs, and to enhance theblood circulation residence time. Finally, the NPs surface can be modified with specific ligands in order to achieve site-specific delivery and successful penetration of the BBB. The objective of present investigation was to study the effect of surface characteristics of solid lipid nanoparticles (SLN) covalently coupled with the monomer of ApoE-residues (141-150) on cellular uptake in brain capillary endothelial cells. Radiolabelled and fluorescent (fluoroprobe strictly associated to SLN) have been used to evaluate the transcellular transport in in vitro BBB model based on human cerebral microvascular endothelial cells (hCMEC/D3). SLN made of tripalmitin, loaded with different fluorescent dyes (Bodipy, Tritc and Texas Red) and functionalized with phosphatidic acid (Aβ ligands) and DSPE-PEG(2000)-Maleimide have been investigated. SLN uptake was monitored byconfocal-laser-scanning microscopy and quantified by radiochemical techniques. The peptide mediated an efficient cellular uptake of SLN. SLN without surface-located peptide displayed less membrane accumulation and cellular uptake. In order to assess the ability of ApoE-SLN to enhance their transcellular transport, we studied the permeability through an in vitro BBB model. With respect to the un-functionalized SLN, the ApoE-SLN significantly enhanced their cellular uptake and permeability through the cell monolayer (PE = 0.6 • 10-5 cm/min vs PE = 6.95 • 10-5 cm/min, respectively; Student's t-test, p value

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