

Development of nanocarriers to improve the transport of drugs across the blood brain barrier

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The crucial problem in treating diseases of the central nervous system is the transport and delivery of therapeutic molecules that are unable to cross the blood-brain barrier (BBB). Therefore, efforts have focused on the development of nanocarriers suitable for drug transport across the BBB, and in this context, nanosystems such as liposomes may be ideal candidates. We designed cationic liposomes composed of phospholipids (DPPC or DOPC) and cholesterol in mixture with diastereomeric gemini and/or glycosylated amphiphiles and studied their interaction with cell culture models of the BBB, i.e. a monolayer of brain microvascular endothelial cells derived from human induced pluripotent stem cells (iBMECs). To study the permeability of liposomes via the BBB model, two low-permeability molecules, kynurenic acid (a neuroactive molecule) and resveratrol (a phenolic molecule with several interesting biological properties) were encapsulated in liposomes and used as tracers. The presence of gemini and/or glycosylated amphiphiles should favour interaction with iBMECs and promote BBB crossing via absorptive- or carrier-mediated transcytosis, respectively.