Operating parameters optimization for the production of liposomes loaded with antibodies using a supercritical fluids assisted process

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Abstract

Monoclonal antibodies based therapy received an increasing interest in the last years due to the recognized activity against various diseases. However, their applications have been hampered by several factors, including poor intracellular uptake and rapid lysosomal degradation. Nanoencapsulation of monoclonal antibodies represents a significant advance to protect and deliver these molecules, in a controlled manner, increasing the time between administrations and formulation shel-life. Furthermore, with their encapsulation both extracellular, cell surface and intracellular targets can be reached.

This work examines the feasibility of encapsulating mouse IgG isotype control within phosphatidylcholine based liposomes using a supercritical based process called SuperLip (Supercritical assisted Liposome formation). This process allows a continuous production of both micrometric and nanometric liposomes with high encapsulation efficiency working under mild operative conditions, able to protect the termo-sensitive cargo.

The effect of some operative parameters have been studied on liposomes mean diameter, particles size distribution and IgG entrapment efficiency. In particular the effect of water flow rate and IgG loading was studied. Liposomes with mean diameters in the range between 220 and 590 nm have been obtained. High entrapment efficiencies up to 93% were observed. The general trend observed was that the encapsulation efficiency increased in correspondence of higher water flow rate tested and lower IgG loading.