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Controlled drug release from magnetoliposomes

DIPLOMOVÁ PRÁCE - ABSTRACT IN ENGLISH

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The aim of this work was to study the controlled release of a model substance from magnetoliposomes. With this intention, phospholipid-stabilised superparamagnetic nanoparticles were firstly prepared and characterized in detail. Subsequently, they were used as a vital component of the desired magnetoliposomes. Among the prepared samples, carriers with membranes made of DPPC, DMPG and CHOL were found to be optimal, showing the best properties for future controlled release. Carboxyfluorescein, a model fluorescent substance, was successfully encapsulated in them, which enabled the investigation of the controlled release process itself. It was hypothesized that the crucial mechanism of release is an increase in the permeability of the membranes due to their heat-induced phase transition. However, it has been repeatedly shown that the substance can be released from the carrier by the application of an alternating magnetic field, without exceeding the phase transition temperature, indicating its probable mechanical release. This phenomenon has been studied in more detail in terms of the duration and number of magnetic pulses applied. In a final experiment in a continuous-flow system with a static magnetic field, the potential of magnetoliposomes as systems for targeted delivery of encapsulated substances was confirmed. In conjunction with controlled release, these are thus very promising carriers, capable of delivering a given substance to a narrowly specified location with its subsequent, absolutely non-invasive, release. We therefore believe that these results will initiate even more thorough research in this field in the near future.