Superparamagnetic Liposomes for MRI Monitoring and External Magnetic Field-Induced Selective Targeting of Malignant Brain Tumors

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Résumé en anglais	Magnetic-fluid-loadedliposomes (MFLs) of optimized magnetic responsiveness are newly worked out from the entrapment of superparamagnetic maghemite nanocrystals in submicronic PEG-ylated rhodamine-labelled phospholipid vesicles. This nanoplatform provides an efficient tool for the selective magnetic targeting of malignant tumors localized in brain and non-invasive traceability by MRI through intravascular administration. As assessed by in vivo 7-T MRI and ex vivo electron spin resonance, 4-h exposure to 190-T m–1magnetic field gradient efficiently concentrates MFLs into human U87 glioblastoma implanted in the striatum of mice. The magnetoliposomes are then longer retained therein as checked by MRI monitoring over a 24-h period. Histological analysis by confocal fluorescence microscopy confirms the significantly boosted accumulation of MFLs in the malignant tissue up to the intracellular level. Electron transmission microscopy reveals effective internalization by endothelial and glioblastoma cells of the magnetically conveyed MFLs as preserved vesicle structures. The magnetic field gradient emphasizes MFL distribution solely in the tumors according to the enhanced permeability and retention (EPR) effect while comparatively very low amounts are recovered in the other cerebral areas. Such a selective targeting precisely traceable by MRI is promising for therapeutic applications since the healthy brain tissue can be expected to be spared during treatments by deleterious anticancer drugs carried by magnetically guided MFLs.

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