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Autor(en) des Beitrags: Trueck, C; Zimmermann, K; Mykhaylyk, O; Anton, M; Vosen, S; Wenzel, D; Fleischmann, BK; Pfeifer, A

Titel des Beitrags: Optimization of magnetic nanoparticle-assisted lentiviral gene transfer.

Abstract: Targeting of specific cells and tissues is of great interest for clinical relevant gene- and cell-based therapies. We use magnetic nanoparticles (MNPs) with a ferrimagnetic core (Fe(3)O(4)) with different coatings to optimize MNP-assisted lentiviral gene transfer with focus on different endothelial cell lines. Lentiviral vector (LV)/MNP binding was characterized for various MNPs by different methods (e.g. magnetic responsiveness measurement). Transduced cells were analyzed by flow cytometry, fluorescence microscopy and iron recovery. Cell transduction and cell positioning under physiological flow conditions were performed using different in vitro and ex vivo systems. Analysis of diverse MNPs with different coatings resulted in identification of nanoparticles with improved LV association and enhanced transduction properties of complexes in several endothelial cell lines. The magnetic moments of LV/MNP complexes are high enough to achieve local gene targeting of perfused endothelial cells. Perfusion of a mouse aorta with LV/MNP transduced cells under clinically relevant flow conditions led to local cell attachment at the intima of the vessel. MNP-guided lentiviral transduction of endothelial cells can be significantly enhanced and localized by using optimized MNPs.

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