succinyl-tetralysine [DPPE-succ-(Lys)4]) was synthesized, which efficiently reduced cytotoxic effects and further augmented the internalization efficiency of the MLs [5]. In conclusion, the results indicate that the use of cationic lipids for transfection purposes should be carefully considered as they can induce severe cytotoxic effects. By carefully controlling the physicochemical properties of the liposomal systems used, many of the cytotoxic effects can immediately be reduced. These data highlight the need for careful optimization of cationic liposome formulations and that great advances can still be made with respect to diminished toxicity and enhanced internalization.

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A6
Intracellular iron oxide nanoparticle coating stability determines nanoparticle usability and cell functionality

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Iron oxide nanoparticles are routinely exploited as T2/T2* contrast agents [1]. One of the most active topics in this biomedical research area is the non-invasive imaging of pre-labelled stem or therapeutic cells upon transplantation *in vivo* in [2]. To this end, commercial particles such as Endorem® are frequently employed, however, the particles display several characteristics which makes them less suitable for *in vivo* labelling [3]. In the present work, the effects on cell physiology of in-house produced cationic magnetoliposomes (MLs), that is, 14-nm diameter iron oxide cores each individually enwrapped by a lipid bilayer containing 3.33% of distearoyltrimethyl ammoniumpropane (DSTAP)[4] – a cationic lipid – are compared with the effects of Resovist (carboxydextran), Endorem (dextran) and VSOP (citrate) iron oxide particles. When the particles are incubated at high dosages, reaching high intracellular iron levels, this results in a transient decrease in cell cycle progression, actin cytoskeleton remodelling and focal adhesion formation and maturation [5]. The extent of these effects is in line with the intracellular iron concentration and appears to be common for all particles. When reaching similar intracellular iron concentrations and when verifying that the different particles are routed along the same way and are therefore exposed to similar intracellular microenvironment at fixed time points, it is shown that intracellular stability of the coating molecules is of high importance. The results *in vitro* show that citrate-coated particles are rapidly degraded, whereas those coated with dextran are more stable, but still less than the MLs. The degradation of the particles can be shown by the increase in free ferric ions, and the distorted *r*1/*r*2 ratio of the particles, hampering their use for long-term imaging. Labelled cells further show increases in reactive oxygen species and transferrin receptor expression in C17.2 neural progenitor cells and impeded functionality of PC12 rat pheochromocytoma cells. The extent of these effects is in line with the degradability of the particles *in vitro*. The MLs appear to be the most stable particles and further show a high persistence of the label in continuously proliferating C17.2 cells. In conclusion, the results indicate that the type of coating material used is highly important with regard to maintaining cell functionality and stability of the label. Further characterization of cell-nanoparticle interactions is both warranted and needed [1].

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A7
Nuclear inclusion of inert and chromatin-targeted polystyrene beads and plasmid DNA containing nanoparticles

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Introduction and aim: The nuclear membrane is currently one of the major cellular barriers to the effective delivery of plasmid DNA (pDNA). Cell division has a positive influence on the transfection efficiency from naked pDNA and nanoparticles containing pDNA. At the end of mitosis, the pDNA near the chromatin is probably randomly included in the nuclei of daughter cells during reassemby of the nuclear envelope around chromatin. However, very little is known on the nuclear inclusion of nanoparticles during cell division. We were interested if inert nanospheres get randomly enclosed in artificial Xenopus nuclei and in nuclei of dividing cells. We investigated nanospheres with a different size and charge, and whether the enclosure could be enhanced by the use of chromatin binding peptides such as AT-hooks. *Material and methods*: Non-targeted positively charged, poly-ethyleneglycol (PEG)-ylated and negatively charged green fluorescent polystyrene nanospheres (Molecular Probes) of 100, 200 or 500 nm were used. The 100 nm nanospheres were also modified with Mel-28 (GPSKPRGRPPKHKAKT), mutated Mel-28 (GPSKPGGGPPGHKAKT) or HMGA2 (SPKRPRGRPKGSKNKS), containing an AT-hook or a mutated AT-hook (targeted nanospheres). Artificial nuclei were obtained with the 'Xenopus egg extract (XEE) nuclear assembly reaction'. The enclosure of the nanospheres in the artificial nuclei and upon microinjection was visualised by confocal fluorescence microscopy. *Results and conclusions*: Periodically the non-targeted nanospheres were able to get enclosed in the artificial nuclei but enclosure was rather limited. The enclosure of the positively charged spheres is higher than that of the negatively charged and the PEG-ylated variants, likely as a result of aspecific interactions with the nett negatively charged chromatin. Size is also important: spheres with a diameter of