EFFICIENCY IMPROVEMENT OF DRUG CARRIER DELIVERY NAVIGATED BY ENDOVASCULAR ADDRESSING

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Introduction

Currently, in clinical practice, drugs that have a large number of side effects are often used. Such as cytostatic or immunomodulatory drugs lead to significant damage to vital organs and intoxication of the whole body. In order to reduce the drug side effects, various approaches have been proposed for the elaborate new types of drug delivery systems. It is necessary to develop a method for targeted drug delivery that can increase the therapeutic effect due to the prolonged release of the drugs without systemic side effects in the vital organs.

We have proposed a combination of modern endovascular surgery methods and targeted delivery of micron-sized polyelectrolyte microcapsules that sensitive to an external magnetic field in vivo. A region of interest was selected in which the drugs are delivered in a low concentration compared to the dose systemically administered. The magnetic-inducted microcapsules` targeting by using injection into the hindpaw femoral artery is significantly more effective than the tail vein injection. As also the use of micro-sized polyelectrolyte capsules that were delivered intra-arterially to the kidney, allows to increase the released drug concentration in the interest region in comparison with the intravenous administration way.

Results and Discussion

We described to using composite microcapsules for research a distant control in vivo by magnetic field gradient. The visualization of microcapsules in vivo was on stage by Near-Infrared Fluorescence Imaging for Real-Time. The microcapsules contain magnetite nanoparticles and fluorescent dye – Cyanine 7 NSH-ester conjugating with bovine serum albumin and polyarginine. The average size of the microcapsule was about 5±1μm. The microcapsule suspension injections into the tail vein (systemic administration) and into the femoral artery (local administration) was proposed out respectively. The magnetic targeting of microcapsules injected through the femoral artery was more efficient compared with tail vein injection. A small dose of micron-sized polyelectrolyte micron capsules was delivered to the kidney by introducing a capsule suspension through a catheter into the renal artery. Capsules have been shown to successfully linger in the kidney.

Conclusions

This method of capsule administration allows to deliver a small drug amount to the interest region without significant exposure on other vital organs, thereby reducing the drug side effects.

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