Aptamer modified cell membrane capsules as anti-cancer drug carriers

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Introduction

Variety efforts are being made to develop colloidal based drug delivery systems, which encapsulate cytotoxic drug in a vehicle and release them in a controlled manner. However, the synthetic carriers developed thus far are hampered by rapidly clearance in the body, for example by phagocytes, possibly due to the non-natural surface characteristics in terms of chemistry, morphology, and mechanics [1,2] . In this study, we demonstrate that cell membrane capsules (CMCs) [3] act as unique delivery vehicles, in which modified by aptamer AS141 and then encapsulated doxorubicin by hydrophobic interaction. This extensible innovative drug delivery system opens new vistas for successful drug delivery systems.

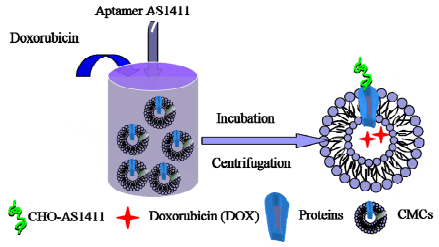

Fig. 1. Schematic presentation of the preparation of aptamer modified CMCs drug carriers.

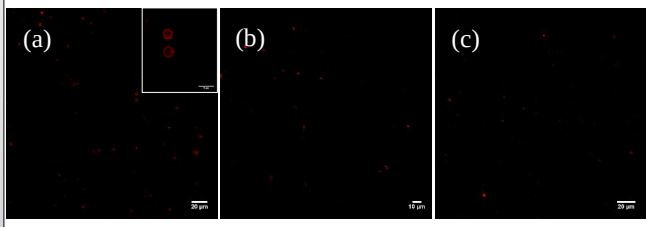

Fig. 2. CLSM images of the CMCs particles (a), AS1411 modified CMCs (b) and modified CMCs loaded with DOX. Inset is the corresponding magnified image of CMCs particles. Scale bar, 10μ m.

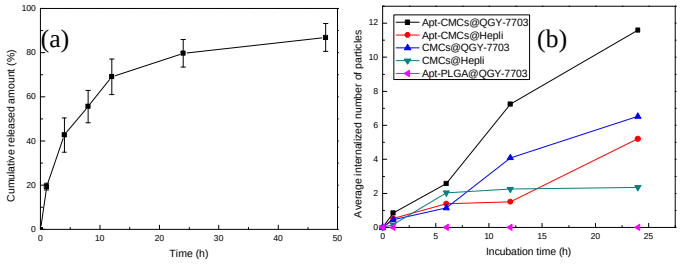

Fig. 3. Cumulative released amount of DOX from CMCs as a function of incubation time (a). The internalized number of Apt-CMCs, CMCs and Nile red labeled Apt-PLGA by QGY-7703 and Hepli cells as a function of time with a particle to cell ratio of 20:1. Data were averaged to every 50 cells (b).

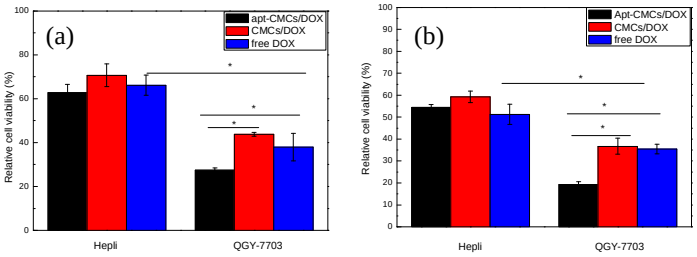

Fig. 4. Cell viability of Hepli and QGY-7703 cells after treated with 1.25μg/mL (a), 2.5 μg/mL (b) free DOX and Apt-CMCs and CMCs containing the same amount of DOX, respectively. * indicates $p<0.05$.

Conclusions

Novel cytocompatible particles as drug carriers were designed. The aptamer-modified CMCs (Apt-CMCs) were preferably ingested by liver cancer cells, leading to larger cytotoxicity when doxorubicin was loaded. Theoretically, many kinds of mammalian cells are suitable for CMCs preparation, which provided the possible personalized treatment. In addition, particulate drug platforms can get inspirations from biomimetic design derived from Mother Nature to achieve ideal function.

Acknowledgements

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Reference

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