Calcium carbonate coated nanoparticles for pH responsive drug co-delivery to prostate cancer cells

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Introduction

- Mesoporous silica nanoparticles (MSNs) have been studied due to their potential application in cancer therapy.
- MSNs are comprised by a honeycomb-like porous structure with a large number of tubular channels (mesopores) with large volume (>0.6cm³/g), which provide a perfect reservoir for the loading of bioactive pharmaceuticals [1].
- Furthermore, they have high stability, rigidity and confer protection to their cargo [2], making them good drug delivery systems.

Materials and Methods

Results

Fig 1. - Evaluation of MSNs physicochemical and biological properties. (A) Scanning Electron Microscopy (SEM) analysis. (B) Doxorubicin release from MSNs-CaCO₃. (C) MSNs biocompatibility analysis in PC-3 cancer cells. (D) Flow Cytometry analysis of MSNs cellular uptake (I - free Dox; II - Dox-MSNs; III - Dox-MSNs-CaCO₃; and IV - Dox-Ibu-MSNs-CaCO₃). (E) Confocal image of nanocarrier uptake, white arrows indicate MSNs. Blue channel: nucleus; Red channel: cytoplasm and Green channel: Dox-Ibu-MSNs-CaCO₃.

Conclusion

- The carbonate coating of MSNs was revealed to be a promising approach to create a pH-sensitive template for a delivery system with application in cancer therapy.