Multi functional large pore mesoporous silica nanoparticles for cancer vaccine

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Cancer vaccine is targeted to induce anti-tumor immune activity by using re-education of tumor antigen to immune system. An important thing is how to choose the strategy of delivering antigen information to immune cell. Mesoporous silica nanoparticles (MSNs) have been applied to delivery carriers for various guest molecules based on their surface by volume ratio. Although conventional MSNs have these advantages, the small pore size (~3 nm) is limited to load relatively large sized molecules. It is still challenging to control pore structure of MSNs with large pores and to combine with functional materials, though there have been reports on the preparation of pore size controlled MSNs. In this study, we demonstrate the combination of large pore sized MSNs with magnetic nanoparticles, simultaneously. The surface-modified, large pore-sized MSNs resulted in higher loading of model antigen compared to conventional MSNs. The resulting MSNs were applied as an efficient antigen delivery to immune cells to invoke anti-tumor adaptive immune responses with a property of tracking those particles with molecular imaging technics.