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Smart polymer-coated hybrid calcium phosphate nanoparticles for oral vaccine delivery

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Vaccine has been limited in oral administration due to its low immune response compared to parenteral administration. The antigen degradation in acidic Gastrointestinal Environment (GI), mucus barriers and inefficient cellular uptake by immune cells are the major challenges for oral vaccine delivery. In this study, smart polymer-coated calcium phosphate nanoparticles (poly-CaP NPs) were prepared and investigated for oral vaccine delivery to protect the antigens against acidic degradation in GI, controllably release the antigens at various pH, improve the mucosal penetration and enhance the cellular uptake of antigens to stimulate immune response. Compared to the polymeric particles, Calcium Phosphate (CaP) is the major inorganic phase of human hard tissues, which has excellent biocompatibility and biodegradability with simple preparation method. The Poly-CaP nanocomposites are eligible to encapsulate an appreciable amount of antigen and protect the loaded cargo at gastric pH and burst antigen release at intestinal pH. Remarkably, Mucosal Penetrating Polymer (MPP) decorated at the surface of CaP resulted in increased mucosal penetration, internalization by Antigen Presenting Cells (APCs) as well as enhanced antigen cross-presentation. These consequences demonstrated that the smart core-shell poly-CaP nanocomposites have a great potential for oral vaccine delivery.

Biography

Pei Cao is currently pursuing her PhD from the University of Queensland. She has completed her Master's from the China University of Petroleum and Bachelor of Science from China University of Petroleum.

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