Design of protein nanocages for extending protein half-life with functional moiety

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Half-life extension with functional moiety is a fascinated approach to elevate the drug efficacy. Here, we suggest the Fc binding domain (FBD) fused-protein nanocages (FFPNs), which overcame the limitation of protein based materials half-life. In this study, a series of designed protein nanocages with expanded pharmacokinetic properties are developed, which named for FFPNs, by genetically conjugating neonatal Fc receptor (FcRn) binding domains to the surface of protein nanocages. From the investigation of in vitro analysis, surface plasmon resonance (SPR) and Caco-2 cell transcytosis assay, we detected the selective binding ability and transcytosis capacity between FFPNs and FcRn in a pH-dependent manner. Also, pharmacokinetic experiment of FFPNs shows the hyper extension of protein half-life, which could be widely used for applications in biomedical fields. Therefore, with genetically extended moiety of FBDs to nanocages, FFPNs could be an efficient modulation to improve the therapeutic drug ability.