

Bioreducible solid solution for enhancing therapeutic efficacy of adult stem cells

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In this presentation, we will introduce two different types of bioreducible inorganic nanoparticles releasing metal ions without cytotoxicity. Mn or Fe ion release from AuNPs was designed to be pH-responsive so that low pH condition of the cell endosomes can trigger in situ release of Mn and Fe ion from AuNPs after cellular uptake of Mn- or Fe-incorporated AuNPs (MnAuNPs or FeAuNPs). Due to the differences in reduction potentials of Mn and Fe with Au, only Mn or Fe can be ionized and released while Au remained intact when MnAuNPs or FeAuNPs were uptaken by cells. Compared to PC12 cells treated with a high concentration of free Mn ion, PC12 cells treated with an equal concentration of MnAuNPs resulted in significantly enhanced cellular neurodevelopment with decreased apoptosis and necrosis. Enhanced therapeutic effect on skin wound healing based on improved angiogenic paracrine factor secretion was observed when FeAuNPs treated hMSCs were injected to the wound site compared to conventional hMSCs injection.