

pH-triggered release of iron from AuFe nanoparticles that enables cellular neuronal differentiation without cellular toxicity

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We report that Fe ion at high concentrations can be delivered to affected part using gold nanoparticles (Au NPs) to enhance cellular neurodevelopment without toxicity. Fe²⁺ release from Au NPs was designed to be pH-responsive so that low pH condition of the cell endosomes can trigger in situ release of Fe²⁺ from Au NPs after cellular uptake of Fe-incorporated Au NPs (AuFe NPs). Due to the differences in reduction potentials of Fe and Au, only Fe ionized and released while Au remained intact when AuFe NPs were uptaken by cells. Compared to free Fe²⁺, equal concentration of AuFe NPs is more effective. This is the second report on the use of AuNPs as a vehicle for pH-responsive, intracellular delivery of metal ion, which may open a new window for drug delivery and clinical therapy.