



Conference Proceeding

Ferritin/Nanozyme: Novel Properties and Their Application in Tumor Theranostics

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Abstract

Since the first finding that Fe₃O₄ nanoparticles with intrinsic peroxidase-like activity, nanozyme is becoming a rapidly emerging field between biology and nanotechnology. Recently, we paid our attention to study the mechanisms and improvements of iron oxide nanozyme (IONzyme) and develop applications in tumor theranostics. Employing human H-ferritin (HF_n) as a template, we biomimetically synthesized a magnetoferritin (M-HF_n) nanoparticle, which endow the IONzyme with intrinsic tumor targeting property. Based on M-HF_n, we developed a novel tumor diagnosis method. We further used HF_n as a nanocarrier, which specifically delivers high doses of Dox to kill tumor cells, while exhibiting excellent safety profiles. Importantly, we show that a HF_n nanocarrier both successfully crosses the BBB and kills glioma tumor cells. Its principle point of entry is the HF_n receptor (transferrin receptor 1), which is overexpressed in both BBB endothelial cells (ECs) and glioma cells. We found that HF_n enters and exits the BBB via the endosome compartment. In contrast, upon specifically targeting and entering glioma cells, nearly all of the HF_n accumulated in the lysosomal compartment, resulting in the killing of glioma tumor cells, with no HF_n accumulation in the surrounding healthy brain tissue. Thus, HF_n is an ideal nanocarrier for glioma therapy and possesses the potential to serve as a therapeutic approach against a broad range of central nervous system diseases. Recently, we report a novel strategy to coordinate nanozymes to target tumor cells and selectively perform their activity to destruct *in vivo* tumors. We introduced HF_n to guide nanozymes to efficiently transfer into lysosomes and boost ROS generation in a tumor-specific manner, resulting in significant tumor regression in human tumor xenograft mice model. Thus, ferritinylation is a novel strategy to render nanozymes to target tumor *in vivo*. This work provides a new strategy to coordinate nanozymes for *in vivo* tumor catalytic therapy.

Keywords: Nanozymes; Ferritin nanocarrier; Tumor diagnosis; Tumor catalytic therapy; BBB and glioma

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