Supporting Information

Upconversion Nanoparticles Loaded with eIF4E siRNA and Platinum (IV) Prodrug to Sensitize Platinum Based Chemotherapy for Laryngeal Cancer and Bioimaging

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Figure S1. Particle size distribution of different nanoparticles in water. (a) UCNP@PEI with the average hydrodynamic diameter of 98 nm, (b) NP-1 with the average hydrodynamic diameter of 254 nm, (c) NP-2 with the average hydrodynamic diameter of 240 nm, determined by dynamic light scattering (DLS).
Figure S2. Thermo-gravimetric (TG) analysis of UCNPs, and PEI encapsulated UCNPs (UCNP@PEI) nanoparticles.
Figure S3. 980 nm laser excited upconversion emission spectra and digital photographs of UCNPs, NP-1 and NP-2.
Figure S4. (A) Gel retardation assay. 0.5 μg of plasmid DNA (pEGFP-N1, pDNA) was incubated with varying NP-1 nanoparticles:pDNA weight ratios (N/P ratio) of 1:1, 2:1, 5:1, 10:1, and 20:1 and the mixture was briefly vortexed. After 30 min incubation at room temperature, the mixture with addition of loading buffer was loaded on a 1% agarose gel. The electrophoresis was carried out at 100 V for 40 min in TAE buffer. (C) Zeta potential of the UCNP@PEI:pDNA.
Figure S5. The Hep-2 cells viabilities after incubation with UCNP@PEI nanoparticles (NP) and UCNP@PEI@eIF4E siRNA (NP@ eIF4E siRNA) for 48 h measured by MTT assay.
Figure S6. The L929 fibroblast cells viabilities after incubation with UCNP@PEI nanoparticles (without platinum) and PEI for 48 h measured by MTT assay.
Figure S7. *In vivo* biodistribution of UCNP@PEI (a) and NP-2 (b). The biodistribution is measured by testing the Gd$^{3+}$ concentration in collected tissues and organs by ICP-MS.
**Figure S8.** H&E immune-staining of organs collected after treatment of UNCP@PEI (a) and NP-2 (b) for 7 days, 15 days and 30 days.
Figure S9. Blood analysis of the mice after treatment of UCNP@PEI (A) and NP-2 (B) for 7 days, 15 days and 30 days.
Figure S10. The cumulative release of siRNA (a) and Pt (b) at pH 7.5 and pH 4.5.