Supporting Information

Chitosan-based core-shell structured particles for in vivo sustainable gene transfection

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1. Biodegradation of EG-HBC

The synthesized EG-HBC was dissolved in an acetic solution (2%) at a concentration of 1 mg/mL. Then the solution was poured into a petri dish, dried in an air oven at 45 ^{o}C to get a thin EG-HBC film. The obtained EG-HBC thin film was immersed into 50 mL of the aqueous solution of lysozyme (0.5 mg/mL). The status of EG-HBC film were recorded in digital photos at different time, as shown in Figure S1. It is clearly seen that a lot of bubbles appear on the film indicating the degradation of EG-HBC begins since the products of the degradation of CS include carbon dioxide. The EG-HBC film cannot be clearly observed after 24 h, and 72 h later, totally disappears.

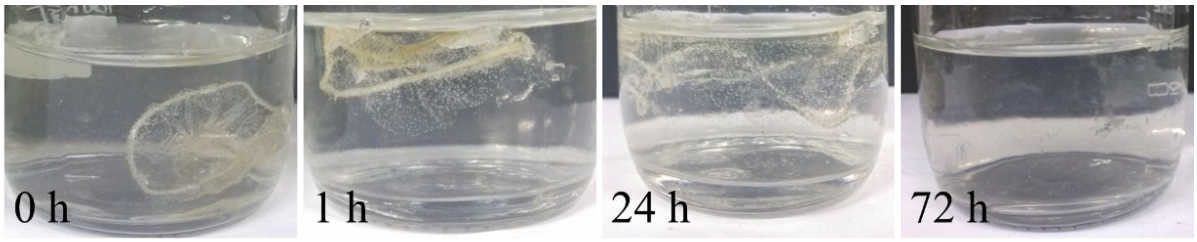

Figure S1. The biodegradation process of EG-HBC film in the aqueous solution of lysozyme at room temperature.

2. Zeta potentials of *p*EGFP-loaded CS-based particles.

Zeta potentials of different particles in the aqueous solution of acetic acid were measured by dynamic light scattering (Nano-ZS90, Malvern, UK).

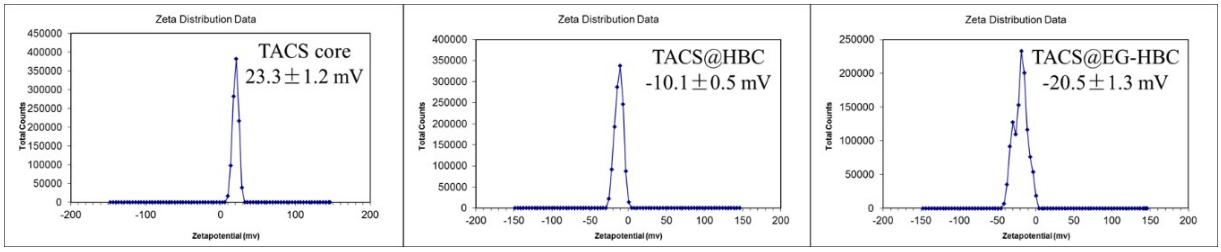

Figure S2. Zeta potential of *p*EGFP-loaded CS-based particles.

3. FACS graphs.

Fluorescence activated cell sorting (FACS) was used to characterize the gene transfection efficiency of *p*EGFP-loaded on different carriers.

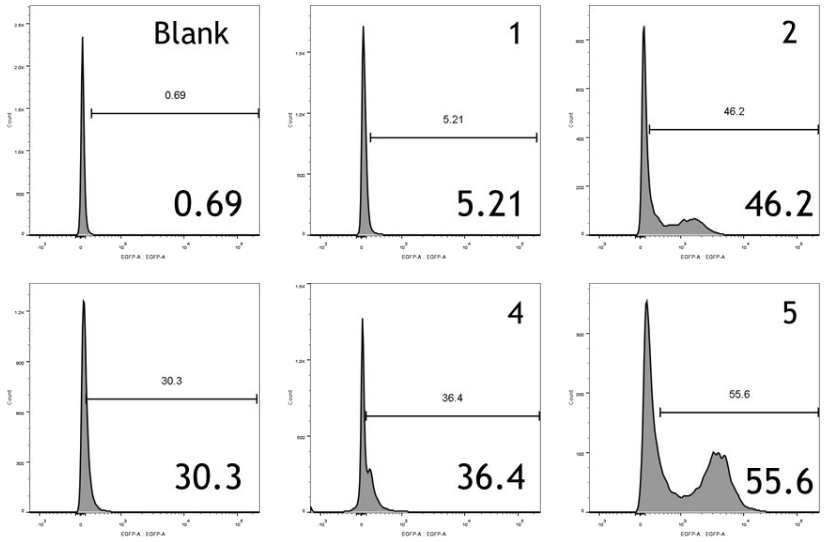

Figure S3. FACS graphs of in vitro gene transfection of *p*EGFP loaded on different carriers (1: CS; 2: TACS; 3: TACS@HBC; 4: TACS@EG-HBC; 5: Lip2000).

3. The luciferase assay.

Hela cell lines (derived from cervix carcinoma cells of human) were cultured in DMEM-high glucose (HyClone) containing heat-inactivated 10% fetal bovine serum (FBS, Gibco-BRL) and 1% penicillin-streptomycin. Then, Hela cells were seeded in 24-well plates at a density of 3×10^4 per well, and grew overnight at 37 °C in CO_2 incubator. The high glucose DMEM in each well was all removed. The wells were washed with 0.5 mL of serum-free DMEM. Then, 100 μL of serum-free DMEM medium containing luciferase reporter gene plasmid (*p*LRG) or *p*LRG-loaded particles (*p*LRG for each well was 4 μg) was injected into each well. For comparison, a group of *p*LRG-loaded Lip2000 was set as the positive control, another group of 100 μL fresh serum-free DMEM medium as the blank control. After 4 hours' incubation, the mediums in all wells were replaced by fresh DMEM medium with 10% FBS. After 48 h, mediums were all replaced with 100 μL of lysis buffer for each well, and after that another 50

μL of luciferase detection reagent was added, the result was measured by a microplate reader. As Figure S4 showed,

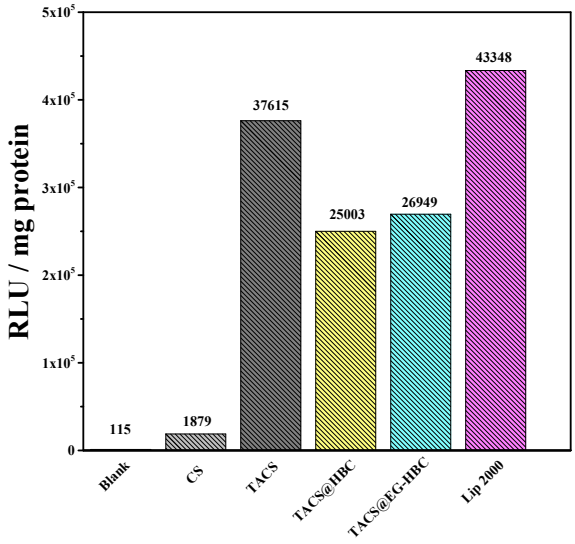

Figure S4. The luciferase assay of *p*LRG loaded on different carriers