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$CaCl_2 + H_2O_2 + 2NH_3 \cdot H_2O \longrightarrow CaO_2\downarrow + 2NH_4Cl + 2H_2O$	Eq. 1
$CaO_2 + 2H_2O \longrightarrow Ca(OH)_2 + H_2O_2$	Eq. 2
$2GSH + H_2O_2 \xrightarrow{OH^-} GSSG + 2H_2O$	Eq. 3
$2CaO_2 + 2H_2O \longrightarrow 2Ca(OH)_2 + O_2\uparrow$	Eq. 4
$2H_2O_2 \xrightarrow{OH^-} 2H_2O + O_2\uparrow$	Eq. 5

Scheme S1. Reaction mechanisms for CaO_2 synthesis (Eq. 1) and pH increase (Eq. 2, Eq. 4), GSH depletion (Eq. 3), O_2 production (Eq. 4, Eq. 5) by CaO_2.

Nanoparticles	Hydrodynamic Sizes	PDI	Zeta potential
LipoDDP	181.2 ± 4.5 nm	0.315	0.8 ± 0.3
LipoCaO_2	273.4 ± 7.8 nm	0.183	- 0.7 ± 0.4
LipoCaO_2/DDP	317.8 ± 6.4 nm	0.229	- 1.0 ± 0.6

Figure S1. DLS results of nanoparticles.

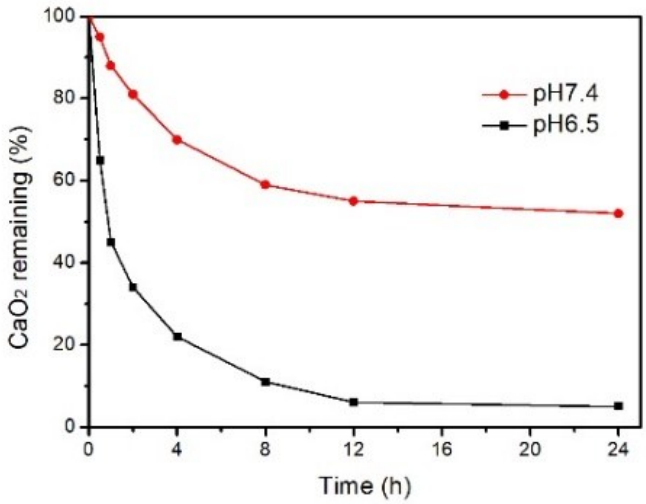

Figure S2. The CaO_2 remaining in LipoCaO_2/DDP after incubating in cell medium at 37 ℃ (pH7.4 and pH 6.5).

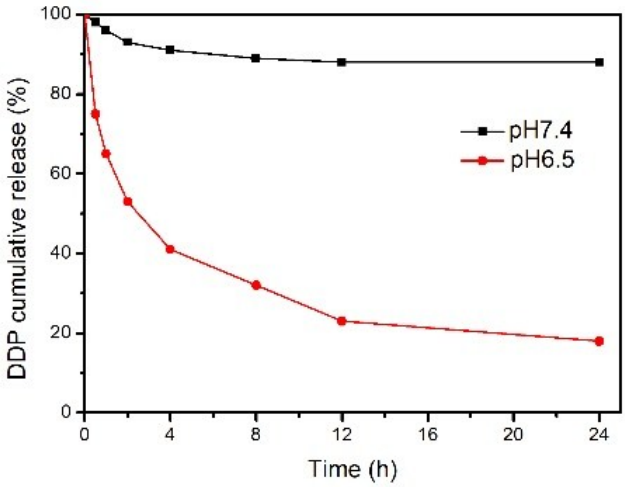

Figure S3. The cisplatin remaining in LipoCaO$_2$/DDP after incubating in cell medium at 37 ℃ (pH7.4 and pH 6.5).

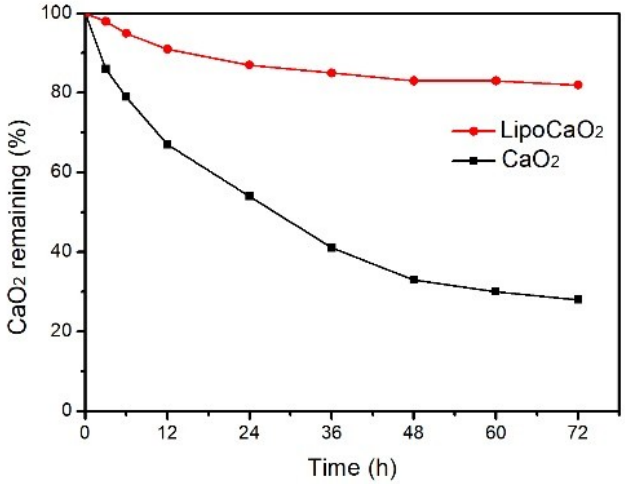

Figure S4. The CaO$_2$ remaining in LipoCaO$_2$/DDP and CaO$_2$/DDP (without lipid-coating) at 4 ℃.

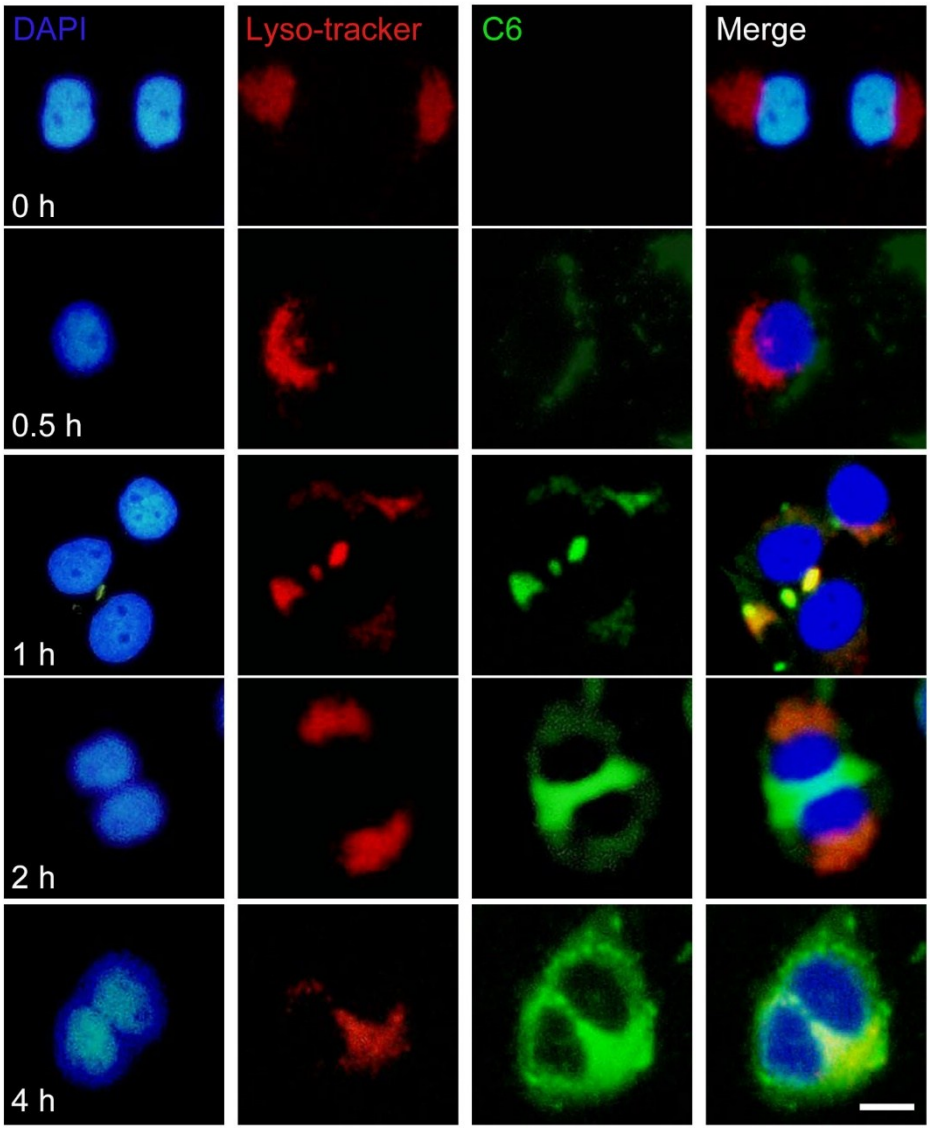

Figure S5. Intracellular fate of LipoCaO$_2$/DDP NPs. HepG2 cells labeled with DAPI (nucleus) and Lyso-Tracker Red (lysosome) were treated with 6-coumarin-loaded LipoCaO$_2$/DDP NPs at 37 °C for different periods of time and visualized under fluorescence microscope. The scale bar represents 20 μm.

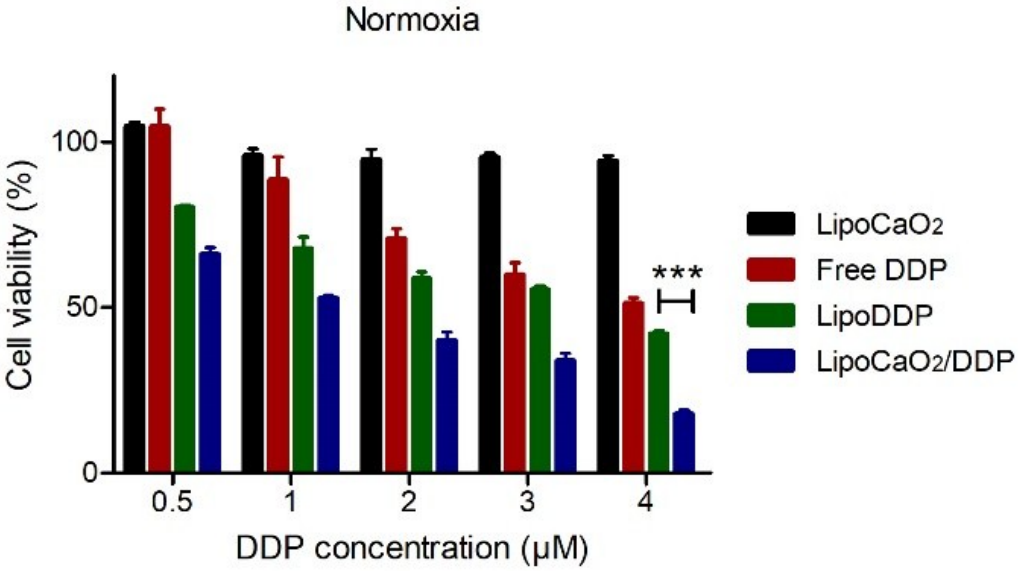

Figure S6. HepG2 cell viability after incubation with different groups in normoxic condition for 24 h.

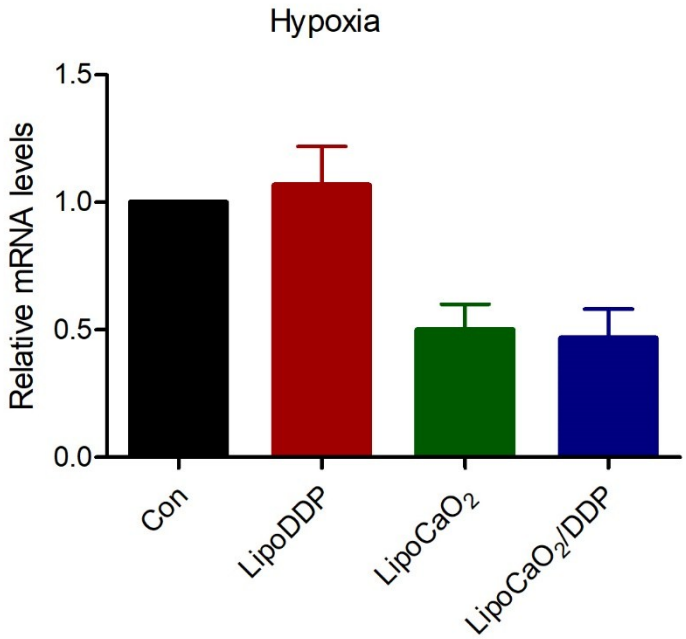

Figure S7. MRP2 mRNA expression of HepG2 cells under hypoxic condition.

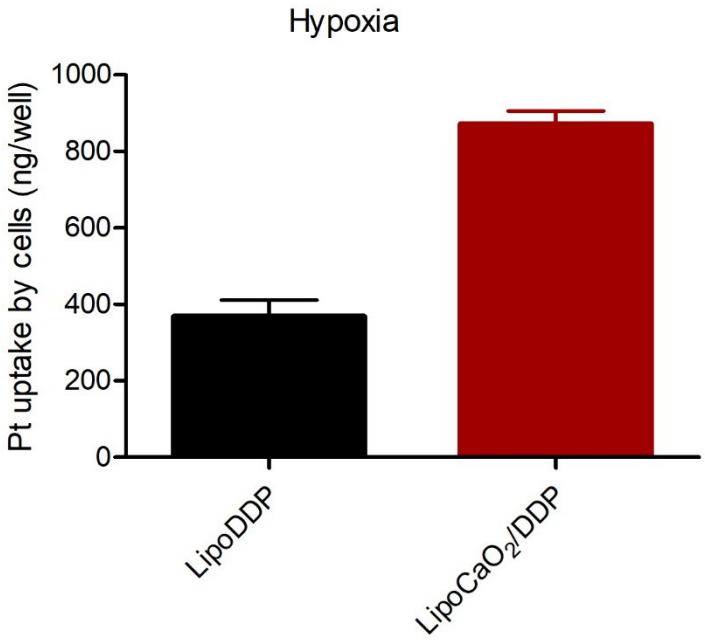

Figure S8. The amount of cisplatin in cells incubated with LipoDDP or $LipoCaO_2$/DDP in 24 well plates for 4 h.

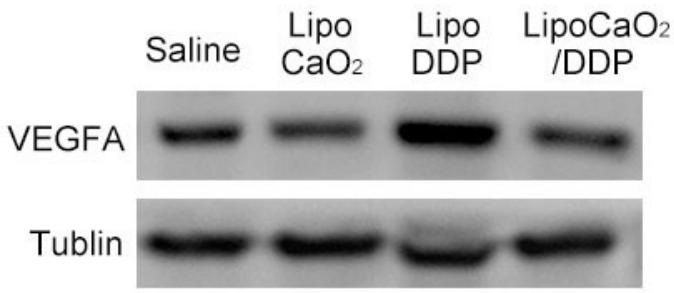

Figure S9. VEGFA expression of cells collected from HepG2 xenograft tumors.