A pH and reduction dual responsive drug delivery carrier based on poly(amino acid) derivatives for tumor treatment

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This study was conducted to develop a drug delivery carrier with a specific drug release profile towards tumor cells based on the fact that tumor cells have lower pH and higher concentration of a reducing agent than normal cells. Hydrazone bond was used as a pH sensitive linker that is stable at pH7.4 but unstable at pH5.0. Doxorubicin (DOX) and methoxy poly ethylene glycol (mPEG) were conjugated on poly(aspartyl hydrazide) backbone with hydrazone bond. N-succinimidyl 3-(2-pyridyldithio) propionate (SPDP) crosslinker grafted on the backbone formed a disulfide bond in a normal cell, but the disulfide bond was dissociated in a tumor cell. In a normal cell drugs were released with only disregarded amount, but in a tumor cell, drugs were rapidly released as a consequence of breaking of hydrazone bonds and disulfide bonds. Characterization of the dual sensitive particle was fully investigated and drug release profile was also evaluated.