Controllable and localized TRAIL delivery system using Coacervate embedded composite hydrogel for improved anticancer therapy

좌예림, 최서현, 김교범†
동국대학교
(kyobum.kim@dongguk.edu†)

TNF-related apoptosis-inducing ligand (TRAIL) is one of the most well-known anti-cancer biotherapeutics that selectively induce apoptosis of cancer cells. However, clinical translation of TRAIL is still limited by its short half-life and poor in vivo stability. Therefore, we designed a TRAIL-loaded coacervate (Coa) embedded hydrogel platform, which can effectively localize and improve stability of TRAIL. Herein, we used (1) Coa consisting of mPEGylated poly(ethylene argininylaspartate diglyceride) and heparin for exogenous TRAIL delivery along with a high loading efficiency of TRAIL into Coa and (2) thiolated gelatin/poly(ethylene glycol) diacrylate composite hydrogels for an injectable reservoir. The release profile of TRAIL could be regulated by a two-step diffusional mechanism. Coa-mediated TRAIL delivery exhibited a higher cytotoxicity and apoptosis of pancreatic cancer cells (MIA PaCa-2) as compared with bolus TRAIL treatment. Consequently, these results demonstrated that TRAIL delivery system using Coa-embedded hydrogel could effectively maintain bioactivity of cargo proteins and control therapeutic dose in the tumor microenvironment.