Priming Strategy for Natural Killer Cell Activation via Coacervate-mediated Interleukin-15 Delivery

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A successful delivery of Interleukin (IL)-15 to natural killer (NK) cells and a subsequent activation of NK cells' anticancer efficacy could be a promising immuno-cancer therapy. For the protection of IL-15 with maintaining its bioactivity, coacervate (Coa) (a complex of (1) mPEGylated poly(ethylene arginylaspartate diglyceride) (mPEG-PEAD), a cationic polymer, (2) heparin, anionic counterpart, and (3) cargo IL-15)) were developed. A release kinetics of cargo IL-15 could be controlled by stabilization of Coa structure via PEG conjugation on the PEAD backbone. After 8 days of culture with IL-15 loaded Coa, proliferation rate of NK cells was enhanced as compared with bolus IL-15 treatment. In addition, mRNA expression related to anticancer efficacy of IL-15 primed NK cells were upregulated. Furthermore, during 4 hr of co-culture with NK and multiple cancer cells (MCF-7, MIA PaCa-2, HepG2), IL-15 loaded Coa group exhibited facilitated cancer killing efficacy than bolus IL-15 group. In summary, coacervate-mediated exogenous IL-15 delivery could be an effective NK cell priming technique for immuno-cancer therapeutic approaches.