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Immunomodulating nano-adaptors potentiate antibody-based cancer immunotherapy

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Modulating effector immune cells via monoclonal antibodies (mAbs) and facilitating the co-engagement of T cells and tumor cells via chimeric antigen receptor- T cells or bispecific T cell-engaging antibodies are two typical cancer immunotherapy approaches. We speculated that immobilizing two types of mAbs against effector cells and tumor cells on a single nanoparticle could integrate the functions of these two approaches, as the engineered formulation (immunomodulating nano-adaptor, imNA) could potentially associate with both cells and bridge them together like an 'adaptor' while maintaining the immunomodulatory properties of the parental mAbs. However, existing mAbs-immobilization strategies mainly rely on a chemical reaction, a process that is rough and difficult to control. Here, we build up a versatile antibody immobilization platform by conjugating anti-IgG (Fc specific) antibody (αFc) onto the nanoparticle surface (αFc-NP), and confirm that αFc-NP could conveniently and efficiently immobilize two types of mAbs through Fc-specific noncovalent interactions to form imNAs. Finally, we validate the superiority of imNAs over the mixture of parental mAbs in T cell-, natural killer cell- and macrophage-mediated antitumor immune responses in multiple murine tumor models.

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