Enhanced efficacy of tumor targeting driven by multivalent recognition of peptide-decorated nanoparticles

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Cells can be recognized by the receptors expressed on their surface, and specific targeting of cells and tissues is a key challenge in broad range of biomedical research. For better targeted drug delivery and therapeutic treatment, strong binding to cells with a desired receptor profiles while barely binding to other cells is essential. Herein, we formulate optimal design rules for multivalent peptide decorated nanoparticles that allow them to efficiently distinguish target cells based on their receptor profiles. The results show that properly designed multivalent targeting of receptor leads specificity toward a chosen receptor, thus demonstrating a general route toward targeting cells without particularly dominant markers. We speculate that this will enable to achieve targeted delivery of therapeutic nanoparticles with greatly reduced incidence of side effects.