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The scope of artificial antigen presenting cells in cancer therapy

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Artificial antigen-presenting cells (aAPCs) are synthetic antigen-presenting cells (APCs) made by attaching all the necessary signals required to activate and stimulate T cells against particular antigens. Since therapy with natural APCs is expensive, time-consuming and unable to regulate exact signals, there has been a newfound interest in the use of aAPCs as it gives greater control over T-cell signalling. aAPCs are constructed using various materials like microparticles, nanoparticles, etc. Poly lactic-co-glycolic acid (PLGA) nanoparticles are mostly used in the construction of aAPCs as biomaterial platforms. Various signals are fitted onto these biomaterial platforms. Furthermore, aAPCs have three surface molecules that are fitted on a biomaterial platform. First of which is the MHC molecule (HLA in humans); it is loaded with specific antigens. The second is a co-stimulatory molecule like a cluster of differentiation-80 (B7.1) or cluster of differentiation-86 (B7.2). The last surface molecule is an immune-modulating molecule like interleukin-2 (IL2) which amplifies T cell stimulation. In cancer therapy, cancer-specific antigens can be loaded on aAPCs to strongly promote and expand tumour-specific cytotoxic T cells. Now, these T cells can adoptively be transferred to the patient for efficient cancer therapy. The development of aAPCs and their use in cancer therapy can be a revolutionary approach in the future and the initial results of many clinical studies are encouraging as well. This highlights the need for research in the construction of aAPCs for more potent and effective cancer treatment.

Keywords: Artificial antigen presenting cells, Cancer, Immunotherapy, T cells, Immunology, Antigen

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