# Artificial antigen presenting cells

Artificial antigen presenting cells (aAPCs) are a new technology and approach to cancer immunotherapy.

Antigen presenting cells are the sentinels of the immune system and patrol the body for pathogens. When they encounter foreign pathogens, the antigen presenting cells alert the T cells—“the soldiers of the immune system”—that there is something foreign in the body with specific cell surface molecules. aAPCs are synthetic versions of these sentinel cells and are made by attaching the specific T-cell stimulating signals to various macro and micro biocompatible surfaces. This can potentially reduce the cost while allowing control over generating large numbers of functional pathogen-specific T cells for therapy. Activated and stimulated T cells can be studied in this biomimetic contex and used for adoptive transfer as an immunotherapy.

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Artificial antigen presenting cells (aAPC) are a promising platform for immune modulation due to their potent ability to stimulate T cells. Acellular substrates offer key advantages over cell-based aAPC, including precise control of signal presentation parameters and physical properties of the aAPC surface to modulate its interactions with T cells. aAPC constructed from anisotropic particles, particularly ellipsoidal particles, have been shown to be more effective than their spherical counterparts at stimulating T cells due to increased binding and larger surface area available for T cell contact, as well as reduced nonspecific uptake and enhanced pharmacokinetic properties. Despite increased interest in anisotropic particles, even widely accepted methods of generating anisotropic particles such as thin-film stretching can be challenging to implement and use reproducibly. To this end, we describe a protocol for the rapid, standardized fabrication of biodegradable anisotropic particle-based aAPC with tunable size, shape, and signal presentation for T cell expansion ex vivo or in vivo, along with methods to characterize their size, morphology, and surface protein content, and to assess their functionality. This approach to fabricating anisotropic aAPC is scalable and reproducible, making it ideal for generating aAPC for “off-the-shelf” immunotherapies [1].

1)
Ben-Akiva E, Rhodes KR, Meyer RA, Green JJ. Fabrication of Anisotropic Polymeric Artificial Antigen Presenting Cells for CD8+ T Cell Activation. J Vis Exp. 2018 Oct 12;(140). doi: 10.3791/58332. PubMed PMID: 30371668.