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“Cell Membrane-Coated Nanoparticles for Immune Modulation”

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Abstract: Nanotechnology is an exciting scientific area that is changing the way we design and administer medicines. One avenue in which nanomedicine can have a large impact is through immune modulation and “nano-immunoengineering. Nanoparticle size, design freedoms, and unique cell-particle interactions can be taken advantage of to influence the immune system in new and efficacious ways. Additionally, cell membrane coating has recently emerged as a new technique to endow nanoparticles with the surface properties of the source cell. This dissertation will demonstrate how cell membrane coating can be merged with nanoparticle design to facilitate immune modulation for the improvement of a variety of pathological conditions. The first example will focus on the design of cancer cell membrane-coated nanoparticles for anticancer vaccination. The second example will discuss cell membrane-coated nanoparticles for the treatment of infectious diseases, specifically the development of erythrocyte membrane-coated nanoparticles for antivirulence vaccination.