

International Conference and Exhibition on Biosensors & Bioelectronics

May 14-16, 2012 Embassy Suites Las Vegas, USA

Nanoparticles for tolerogenesis in the Vasculature of the Chicken Chorioallantoic Membrane

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Infants do not produce the same immune response to foreign ABO blood group antigens as older individuals who have a fully developed immune system. ABO-incompatible infant heart transplantation has been shown to result in development of immune tolerance to donor ABO antigens, which is associated with persistence of donor antigens. Therefore, we hypothesized that intentional introduction of synthesized ABO antigens to infants would also induce tolerance. Inducing tolerance to foreign ABO antigens in this manner would extend the window of time during which safe transplantation from ABO-incompatible donors could be performed, thus expanding the potential donor pool for infants and children who have passed the age at which their immune system matures. A proposed method to induce tolerance is by conjugating antigens to synthesized silica nanoparticles for introduction to immature individuals, which will allow maximum exposure of circulating lymphocytes to the antigens. Here, characterization of the newly synthesized nanoparticles in the chicken chorioallantoic membrane (CAM) vasculature is shown. Nanoparticles are injected into the CAM to determine detection efficiency, aggregation, and uptake kinetics in angiogenic blood vessels using FCS. Analyzing these uptake kinetics provides information on the biophysical interactions of the nanoparticles with angiogenic vasculature. PEG-coated silica nanoparticles were easily detected with few aggregation tendencies in the 100-200 nm range. Uptake into blood vessel walls has not been observed for these nanoparticles over 100nm, indicating that the particles can circulate for a prolonged period of time in the blood stream, thus enhancing the likelihood of successful tolerance induction.

Biography

Amy Tekrony completed a B.Sc. in Chemistry in 2008 and a M.Sc. in Biophysical Chemistry in July 2011 from the University of Calgary. She is currently working as a research assistant and Sessional Instructor at the University of Calgary.

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