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## Improved adjuvants for vaccine development: Surface and adjuvant modified PLGA microspheres

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**P**LGA (poly lactic-co-glycolic acid) is a biodegradable and biocompatible polymer widely used in vaccine development. Although it is approved for human use by the FDA (Food and Drug Administration) and the EMA (European Medicines Agency), there is not any licensed vaccine that uses this polymer. This can be explained due to the difficulty to develop strong and long lasting immune responses. For this purpose, antigens need to be administered in combination with adjuvants, which can act by several mechanisms, including (i) a depot effect from where the antigen is released, (ii) a delivery system that transports the antigen to the antigenpresenting cells (APCs), and (iii) immune-stimulatory adjuvants, which activate the immune system interacting with the pathogen recognition receptors. The use of PLGA based micro or nanoparticles for vaccine development has the advantage of allowing the transport of the encapsulated antigens to the APCs, as well as the co-encapsulation of adjuvants that may stimulate the immune system, combining more than one adjuvant mechanism. In this study, we have prepared PLGA microparticles including several adjuvants: MPLA (monophosphoryl lipid A; TLR4 agonist), poly(I:C) (polyinosinic-polycytidilic acid; TLR3 agonist) and α-GalCer (α-galactosyl ceramide; natural killer T cell stimulator). In addition, we have modified the microparticle's surface charge (making it cationic), thus improving their uptake by human APCs. *In vivo* results obtained in Balb/C mice showed that higher IgG levels where obtained by cationic microparticles. Moreover, these microsparticles induced higher IFN-γ levels, indicative of Th1 activation, while unmodified ones mainly triggered IL4 and IL17A release, showing Th2 activation.

## **Biography**

Aiala Salvador Martinez completed her PhD in 2012 in the University of the Basque Country, in the Pharmaceutical Technology area. Her work was based on the development of adjuvant and delivery systems for vaccines. During her PhD, she did a research stay at the Vaccine Research Center (National Institutes of Health, USA). Currently, she is continuing her research as an Associate Professor in the University of the Basque Country. She has published 9 papers in reputed journals and has taken part in 10 research projects.

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