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Using layered double hydroxides nanoparticle conjugated with CpG to polarise immune responses from Th2 to Th1 bias

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Vaccine is one of the promising treatments in cancer therapy. Modulation of immune response is very important in the induction of humoral or cellular immunity, which will affect vaccine efficiency. Here we have tailored an anionic clay nanomaterial to specifically load the model antigen ovalbumin (OVA) and the toll-like receptor ligand CpG in combination to modulate the immune response from Th2 bias towards the preferred polarity Th1 for anti-cancer purpose. Alum is a vaccine adjuvant approved for human use by FDA, while it has a severe inflammatory response and cannot modulate the immune response. The anionic clay, MgAl-layered double hydroxide (LDH) nanomaterial, has a similar chemical composition to Alum, but distinct properties. For example, MgAl-LDH nanoparticles can strongly interact with and carry proteins and gene materials for cellular delivery. In this research, using MgAl-LDH to carry OVA induced a comparable antibody response to Alum. In sharp contrast, combination of CpG to LDH-OVA resulted in much higher IgG2a:IgG1 ratio than that in the case of Alum, demonstrating polarisation of the immune response from Th2 towards Th1. Moreover, CpG-OVA-loaded LDH retarded tumour growth in vivo, further confirming LDH-CpG adjuvant activity. Therefore, MgAl-LDH nanomaterial has the great potency to be a vaccine adjuvant for switching Th2 to Th1 dominant immune responses.

Biography

Zhi Ping (Gordon) Xu is an Australian Research Council (ARC) Future Fellow (2013-2016). Since 2004, He has received a number of fellowships and awards, including an ARC Australian Postdoctoral Fellowship (2005-2007), ARC Australian Research Fellowship (2008-2012), and UQ Foundation's Research Excellence Award (2009). Associate Professor Xu and his colleagues have received funding from the ARC and National Health and Medical Research Council (NHMRC) totalling more than \$5 million. Associate Professor Xu is an ARC and NHMRC referee.

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