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Listeria based nanovaccines as therapeutic vaccines

Dendritic cell-based (DC-based) vaccines are promising immunotherapies for cancer. However, several factors, such as the lack of efficient targeted delivery and the sources and types of DCs, have limited the efficacy of DCs and their clinical potential. We propose an alternative nanotechnology-based vaccine platform with antibacterial prophylactic abilities that uses gold glyconanoparticles coupled to listeriolysin O 91–99 peptide (GNP-LLO91–99), which acts as a novel adjuvant for cancer therapy as well as therapeutic vaccine for cutaneous melanoma acting as a novel immunotherapy. GNP-LLO91–99 exhibited dual anti-tumour activities, namely, the inhibition of tumour migration and growth and adjuvant activity for recruiting and activating DCs, including those from melanoma patients. GNP-LLO91–99 nanoparticles caused tumour apoptosis and induced antigen and melanoma-specific cytotoxic Th1 responses ($P \leq 0.5$). They also cause tumour complete remission and survival improvement. GNP-LLO91–99 nanovaccines presented superior tumour rejection and survival benefits, when combined with anti-PD-1 or anti-CTLA-4 checkpoint inhibitors, predicting an improvement of these immunotherapies action. Studies with monocyte-derived DCs of patients with stage IIIB melanoma confirmed the ability of GNP-LLO91–99 nanovaccines to complement the action of check point inhibitors, not only reducing cell-death markers expression on DCs, but also potentiating DC antigen-presentation and production of Th1-Th12 cytokines. We propose that GNP-LLO91–99 nanovaccines function as immune stimulators and immune effectors and serve as safe cancer therapies, alone or in combination with other immunotherapies.

Biography

Carmen Alvarez-Dominguez has completed her PhD in Immunology, 1993 has her expertise in listeriosis and Listeria based vaccines and nano-vaccines for biomedical purposes. Her group has prepared different vaccines for listeriosis, either systemic listeriosis or neonatal listeriosis, using different vectors such as dendritic cells or nanoparticles. Moreover, they have also prepared Listeria-based nano-vaccines as therapeutic tools for solid tumours. She has built this vaccine expertise after more than 27 years of experience in research, evaluation and teaching in hospital, basic research and academic institutions in Spain and USA. She is also moving recently to consultancy companies to put new vaccines into the market.

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