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Your vaccine is served; BON APPETIT: An oral DNA carrying nanovaccine targets APC and eradicates melanoma in mice

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Abstract

Currently, one the most promising vaccine strategy that shows promise in treating cancers consists of personalized dendritic cells (DCs) loaded with antigens. The universal benefits of such cell based vaccines are limited as they are costly and require specialized techniques. Here, we present the use of a nanocarrier that carries antigens and targets predominantly DCs, *in vivo,* has intrinsic immunopotentiating effects, and works orally. The platform, peptide-derivatized-dendrimer (PDD) where the coupled peptide is an MHC class II ligand to home onto professional antigen presenting cells (APC). PDD has a positive net charge and therefore forms a complex with antigens (protein or DNA plasmids). Furthermore, since a universal T helper epitope is tailored as APC recognition peptide, PDD significantly enhances immune responses. The built-in universal T epitope has two roles in PDD, i) targets the flank of MHC class II of and ii) activate the immune system of >95% of the human population, negating MHC restriction. Analysis of peritoneal cells and of the draining lymph nodes upon injection of PDD/GFP-DNA complex in mice resulted in GFP expression in >80 of APC. Injection of PDD/ TRP2 DNA (plasmids harboring TRP2 complexed with PDD) resulted in the rejection of established B16 melanoma tumors. Next, the oral enteric coated PDD formulation was optimized and one administration of oral formulation of PDD/OVA-DNA could reject OVA/B16 melanoma tumors in 100% of vaccinated mice. Interestingly, oral PDD elicited strong T cell and humoral responses upon a single oral gavage.

Biography