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Para Adjuvant Allogeneic Breast Cancer Vaccine: Maximizing Cancer Treatment by Modulating the Host Immunity

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Editorial Note

The aim of this study was to monitor cell-based immune response developed by micro particulate ovarian cancer vaccine when administered *via* dissolving micro needles for transdermal routes in murine models and correlate it with tumor retardation observed in tumor challenge study. Immunotherapeutic strategies may serve as an alternative method to control the recurrence or progression of ovarian cancer. Therefore, we propose here micro particulate vaccine to treat as well as to prevent ovarian cancer. This vaccine resulted in tumor retardation when challenged with live tumor cells. Recently, we conducted a study to understand the mechanism by which the vaccine worked, where we compared humoral and cellular immune response with tumor suppression observed. We also checked the efficacy of the adjuvants to improve the efficacy of the vaccine. The micro particles were made up of cellulose polymers such as HPMC, CPD and EC. Alum and MF59 were used as adjuvants to enhance the immune response. The micro needles were formulated using polymers such as HPMCAS and PVA along with sugars such as maltose and trehalose for their dissolving properties. We have demonstrated the efficacy of vaccine micro particles containing whole cell lysate of ID8 ovarian cancer cells in retarding tumor growth in murine models. Spray drying process and the formulation used for this purpose could retain the immunogenicity of vaccine resulting in T-cell response. Thus, the micro particulate vaccine provides a promising approach in terms of cost-effectiveness, ease of production and patient compatibility. Measles is a highly contagious infection that is caused by the measles virus. It mainly affects children and can be fatal as well. The disease causes about 100,000 deaths every year worldwide, although it is completely preventable by vaccines. It affects people primarily in the developing areas of Africa and Asia causing the most vaccine-preventable deaths of any disease. Since the primary targets of this disease are children, we aimed at formulating an oral vaccine that would prevent the use of needles, making the vaccine more patient-compliant.

The oral cavity of the mouth is covered by a lining that is rich in immune cells. These immune cells help the body to distinguish between harmful and harmless foreign material entering the body through the mouth. Oral Disintegrating Films (ODF) is films that dissolve when placed in the mouth. These films can be an inexpensive and an effective means to deliver drugs/vaccines orally without the use of needles. On dissolution, the microencapsulated vaccine antigen will be recognized by the immune cells in the mouth and further processed to produce protective antibodies against measles virus. Later, whenever the body is exposed to the virus, the protective antibodies present will be capable of combating the measles infection. The goal of this study was to explore the potential of Oral Disintegrating Films (ODF) loaded with measles vaccine nanoparticles as a viable immunization strategy. In this preliminary study, two pigs were used in the *in-vivo* model in order to evaluate the immunogenicity of the measles vaccine formulation when administered *via* the buccal route using ODFs. It is used to formulate and test the immune genecity and efficacy of orally delivered micro particle based therapeutic adjuvanted breast cancer vaccines. CpG and cyclophosphamide were used as adjuvant and T-reg inhibitor respectively in order to maximize the immune response against Tumor Associated Antigens (TAA's). Allogeneic breast cancer vaccine was obtained by preparing a whole tumor lysate consisting of all the TAA's of 4TO7 murine breast cancer cell line. Cellulose based vaccine micro particles containing TAA's and CpG were prepared by spray drying. Antigenicity of the vaccine mp's was evaluated by a dendritic cell culture based assay. As part of the therapy, four-eight week old female Balb/c mice received oral vaccine microparticles as well as the adjuvant CpG and T-reg inhibitor cyclophosphamide (50 mg/kg; i.p). To assess the *in vivo* efficacy of vaccine mp's, all the animals were challenged with 106 breast cancer cells subcutaneously.