A subunit vaccine for bovine viral diarrhea: lipid-based formulation containing bovine viral diarrheas virus E2 protein in combination with adjuvants to improve immunogenicity

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Bovine viral diarrhea virus (BVDV) contributes to a respiratory disease complex in cattle and is an important pathogen in the cattle industry. The objective of the research is to fabricate a cationic lipid-based delivery system for intranasal administration of the E2 protein as a BVDV vaccine and to determine its in vivo efficacy. We hypothesize that attraction between lipidic carrier and nasal epithelia improves its retention time and will enhance the immunogenicity of vaccine.

TriAdj [Poly (I:C), Innate defense regulator protein (IDR -1002) and Polyphosphazene] forms an electrostatic complex with DDAB:DOPE (1:1 mol:mol) cationic liposomes creating lipidic particle (L-TriAdj; <150+/−13.5 nm). L-TriAdj particles lyophilized with 5% w/v dextrose then reconstituted showed consistent mean diameters (373.6+/−11.1 nm) L-TriAdj was mixed with E2 protein to prepare whole vaccine particles. Vaccines made with lyophilized L-TriAdj had a greater mean diameter than those prepared fresh (378.8+/−25.20 nm vs. 232.7+/−38.86 nm). As an alternative formulation, the E2 protein antigen was incorporated during TriAdj preparation then combined with the cationic liposomes to prepare Lipid-Antigen-TriAdjuvant (LAT; mean diameter 452.7+/−317.6 nm, zeta potential: +41.5+/−0.9 mV). An in vivo efficacy study comparing the lipidic vaccine formulations is planned.
