

BIO_22 - Nanoparticle-Based Vaccine Formulation and Immunization Strategy Exploiting Cows as Biofactories for Colostrum-Derived Neutralizing Antibodies against SARSCoV2

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Introduction: Covid19 is a disease caused by SARSCoV2, which has the Spike protein responsible for cell invasion by binding to the ACE2 receptor. Neutralizing antibodies block the binding of Spike's RBD domain to ACE2, preventing entry into the cells. Bovine colostrum is a substance rich in antibodies, mainly IgG presenting high homology to human molecules. Hyperimmune colostrum is obtained from the immunization of cows before calving to intensify the production of immunoglobulins.

Objectives: Prospecting a vaccine adjuvant formulation to obtain serum and hyperimmune bovine colostrum with neutralizing activity against SARSCOV2.

Methodology: Holstein cows in the final third of pregnancy were divided into 5 homogeneous groups (n=5/group) and immunized with 150µg of recombinant Spike protein (RBD domain) diluted in commercial adjuvants (QuilA® or Alum Inject®) or encapsulated in an immunomodulatory nanosystem (NIBDAF), in addition to saline as control. Immunizations were performed intramuscularly with 2ml in 45, 30 and 15 days before delivery. Serum and colostrum were collected. Viral neutralization was performed by competition ELISA, using the cPass Neutralization Antibody Detection kit. The mean viral inhibition rate (TIV) was calculated for each group. Mann-Whitney test was used to verify the significance of the data. This study was approved by the Ethics Committee on the Use of Animals (protocol 1915290721).

Results: Groups immunized with RBD showed TIV above 20% in both serum and colostrum. Colostrum had a higher TIV than serum in all groups. RBD+QuilA® and RBD+NIBDAF+ Alumen® both presented higher TIV in colostrum (96%) when compared to RBD+Alumen® (91%), RBD+NIBDAF (66%).

Conclusion: The encapsulation of RBD in NIBDAF induces production of neutralizing antibodies against SARSCOV2. Indeed, its usage with Alumen® result in synergic additive effect on production of neutralizing antibodies, enabling the use of cows as biofactories.

Keywords: Bovine colostrum; Neutralizing antibodies; SARSCoV2; Adjuvant nanoparticle; Biofactory