TARGETING SARS-COV-2 RBD TO HORSE DEC-205

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Introduction. DEC-205 is a C-type lectin endocytic receptor expressed at high levels on DCs present in the T cell areas of lymphoid organs; that provides an efficient receptor-based mechanism to process proteins for MHC class I and II presentation by DCs *in vivo* (Bonifaz, 2004). Monoclonal antibodies against DEC-205 have been developed for species such as mice, pigs, and chickens and used in DC-targeting vaccine prototypes (Badillo-Godinez, 2015; Flores-Mendoza, 2012). The use of DEC-205 monoclonal antibody conjugated with an avian influenza virus protein hemagglutinin has been reported to generate robust immune responses (Jáuregui-Zúñiga, 2017). In this work, we used an anti-chicken DEC-205 monoclonal antibody that displays cross-reactivity with horse, conjugated with the SARS-CoV-2 RBD, to immunize horses to obtain hyperimmune sera with COVID-19 neutralization capabilities.

Metodology. Two horses were immunized subcutaneously with 150 µg of the anti-DEC-205:RBD conjugate in complete Freund's adjuvant and boosted at two weekly intervals four times using Poly I:C (InvivoGen) as adjuvant. Blood was collected from the animals before each immunization.

Results. Figure 1 shows results where a humoral immune response against RBD was detected after the first immunization (15 days) on both horses. The RBD-ACE neutralizing capacity of the hyperimmune sera obtained from horses was assayed with a SARS-CoV-2 sVNT kit. It was found that the sera obtained from one horse displayed neutralizing levels of 80-90%, and the second horse presented neutralization levels of 90 to 40%.

Conclusion. Our study shows that the cross-reactive anti-DEC-205 4D2 antibody could be further developed as a platform for delivering protective antigens at relatively low doses while eliciting potent humoral responses with few vaccinations.
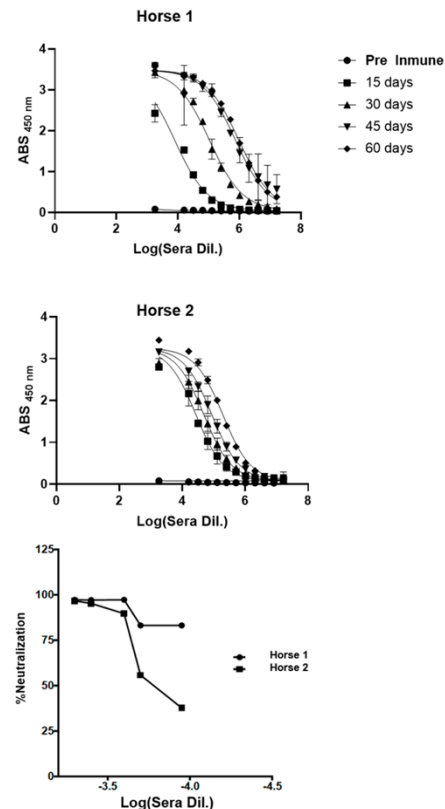
Figure 1. Immunization protocol and neutralizing assay. A. Horse immunization protocol; B-C. ELISA assay from both horses; D. Neutralizing antibody assay with SARS-CoV-2 (sVNT) Kit.

Bibliography.
Badillo-Godinez, O., Esquivel-Guadarrama, F., 2015. Targeting of rotavirus VP6 to DEC-205 induces protection against the infection in mice. Vaccine 33, 4228–4237.

Bonifaz, L.C., Steinman, R.M., 2004. In Vivo Targeting of Antigens to Maturing Dendritic Cells via the DEC-205 Receptor Improves T Cell Vaccination. J. Exp. Med. 199, 815–824.

Flores-Mendoza, L., Hernández, J., 2012. Development and characterization of a monoclonal antibody against porcine CD205. Vet. Immunol. Immunopathol. 146, 74–80.

Jáuregui-Zúñiga, D., Possani, L.D., 2017. Targeting antigens to Dec-205 on dendritic cells induces a higher immune response in chickens: Hemagglutinin of avian influenza virus example. Res. Vet. Sci. 111, 55–62.