Development of conjugated secondary antibodies for wildlife disease surveillance

Sunday Ochai[1], Jan Crafford[1], Pauline Kamath[2], Wendy Turner[3], and Henriette Heerden[1]

[1]University of Pretoria Faculty of Veterinary Science
[2]University of Maine
[3]University of Wisconsin-Madison

March 3, 2023

Abstract

Disease monitoring in free-ranging wildlife is a challenge and often relies on passive surveillance. Alternatively, proactive surveillance that relies on the detection of specific antibodies could give more reliable and timely insight into disease presence and prevalence in a population, especially if it occurs below detection thresholds for passive surveillance. An example is the Bacillus anthracis protective antigen (PA)-ELISA (Enzyme-Linked Immunosorbent Assay) that was used for surveillance of anthrax exposure. However, serological biosurveillance is hampered by a lack of species-specific conjugates that can be used in assays. In this study, we developed anti-kudu and anti-impala immunoglobulin specific conjugates in chickens and examined their binding, compared to the binding of commercially available protein-G and -AG conjugates, to different herbivore species using an ELISA-based avidity index. The conjugates were evaluated for cross-reaction with other wild herbivores to assess future use in diagnostic ELISAs for other species. The developed conjugates had a high relative avidity of $> 70\%$ against kudu and impala sera. The commercial conjugates (protein-G and -AG) had significantly low relative avidity ($< 20\%$) against these species. Eighteen other wildlife species demonstrated cross-reactivity with a mean relative avidity of $> 50\%$ with the impala and kudu conjugates and $< 40\%$ with the commercial conjugates. These results demonstrate the need for species-specific conjugates to improve the quality of immunoassays currently in use in wildlife, thus providing better tools for the surveillance of zoonotic agents along the livestock-wildlife-human interface.

Hosted file

`Conjugate manuscript_Ochai S.O. et al 2023.docx` available at https://authorea.com/users/592014/articles/627724-development-of-conjugated-secondary-antibodies-for-wildlife-disease-surveillance