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Phage Display-Derived Vaccine Candidates for Control of Bovine Anaplasmosis

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Abstract : Bovine anaplasmosis is an infectious, tick-borne disease caused mainly by Anaplasma marginale; typical signs include anemia, fever, abortion, weight loss, decreased milk production, jaundice, and potentially death. Sick bovine can recover when antibiotics are administered; however, it usually remains as carrier for life, being a risk of infection for susceptible cattle. Anaplasma marginale is an obligate intracellular Gram-negative bacterium with genetic composition highly diverse among geographical isolates. There are currently no vaccines fully effective against bovine anaplasmosis; therefore, the economic losses due to disease are present. Vaccine formulation became a hard task for several pathogens as Anaplasma marginale, but peptide-based vaccines are an interesting proposal way to induce specific responses. Phage-displayed peptide libraries have been proved one of the most powerful technologies for identifying specific ligands. Screening of these peptides libraries is also a tool for studying interactions between proteins or peptides. Thus, it has allowed the identification of ligands recognized by polyclonal antiserums, and it has been successful for the identification of relevant epitopes in chronic diseases and toxicological conditions. Protective immune response to bovine anaplasmosis includes high levels of immunoglobulins subclass G2 (IgG2) but not subclass IgG1. Therefore, IgG2 from the serum of protected bovine can be useful to identify ligands, which can be part of an immunogen for cattle. In this work, phage display random peptide library Ph.D. ™ -12 was incubating with IgG2 or blood sera of immunized bovines against A. marginale as targets. After three rounds of biopanning, several candidates were selected for additional analysis. Subsequently, their reactivity with sera immunized against A. marginale, as well as with positive and negative sera to A. marginale was evaluated by immunoassays. A collection of recognized peptides tested by ELISA was generated. More than three hundred phage-peptides were separately evaluated against molecules which were used during panning. At least ten different peptides sequences were determined from their nucleotide composition. In this approach, three phage-peptides were selected by their binding and affinity properties. In the case of the development of vaccines or diagnostic reagents, it is important to evaluate the immunogenic and antigenic properties of the peptides. Immunogenic in vitro and in vivo behavior of peptides will be assayed as synthetic and as phage-peptide for to determinate their vaccine potential. Acknowledgment: This work was supported by grant SEP-CONACYT 252577 given to I. Amaro-Estrada.

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