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Development and evaluation of *Pasteurella multocida* B:2 marker vaccine for bovine hemorrhagic septicemia

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Objectives: To prove in a mouse model that the formalin-inactivated *Pasteurella multocida* B:2 bacterin when mixed with aluminium oxide nanoparticles (Al_2O_3 NPs) and keyhole limpet hemocyanin (KLH), made a potent and efficacious hemorrhagic septicemia (HS) marker vaccine and allowed serological differentiation of infected from vaccinated animals (DIVA) with a companion anti-KLH ELISA.

Methods: The experimental vaccine was constructed by mixing Al_2O_3 NPs and KLH with formalin-inactivated *Pasteurella multocida* B:2 P52 strain. Various groups of Swiss albino mice (n=8/group) were inoculated twice at three-week interval. Two weeks later, the mice were challenged with 50x lethal dose 50 of virulent *Pasteurella multocida* B:2 P52 strain and protection levels were determined for each group. Serum samples were collected weekly from each mouse. Antibody levels against bacterial antigens and KLH were determined by indirect ELISA.

Results: The mice in Al_2O_3NPs+KLH+bacterin [HSVac-I] group showed 100% protection. While Al_2O_3NPs+bacterin [HSVac-II], KLH+bacterin [HSVac-III], plain bacterin [HSVac-IV] and alum-precipitated bacterin [HSVac-V] groups had 87.5%, 62.5%, 62.5% and 12.5% protection respectively. Anti-bacterial antibody levels in the HSVac-I, II & III groups were significantly higher than those in HSVac-IV ($P<0.05$) and HSVac-V ($P<0.001$) groups on14, 21, 28 and 35 days post-immunization. Anti-KLH antibodies had high titres in all the KLH-positive groups and persisted as long as anti-bacterial antibodies. Anti-KLH antibodies were not detectable in field sera samples from KLH-unexposed domestic ruminants.

Conclusion: KLH was suitable as an exogenous marker for HS DIVA vaccine and with Al_2O_3 NPs improved the HS vaccine potency and efficacy in the mouse model.

Biography

Susim Mukul Ray has completed his Masters in the discipline of Veterinary Microbiology (MVSc) in 2013 from Department of Veterinary Microbiology, ICAR Center of Advanced Faculty Training; LLRUVAS in India. He has worked on marker vaccine against a deadly bacterial disease of ruminants. He has presented part of his work in International Congress of Immunology 2013 held in Milan, Italy and awaits publication in a reputed journal. He is currently working as Branch Manager-Integration division-cum-In charge, Vaccine & Disease Diagnosis Laboratory, Hi-Tech Hatch Fresh Pvt. Ltd., India.

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