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COX-SAVE: Development of a *Coxiella burnetii* Secure Advanced Vaccine based on E-beam technology

Tuesday, October 14, 2025 5:31 PM (1 minute)

Q fever is caused by *Coxiella burnetii* (Cb), a zoonotic pathogen mainly shed by ruminants during abortion or parturition. Human infection can occur through inhalation of contaminated aerosols. Although a commercial vaccine exists for ruminants, it can induce adverse reactions and does not fully prevent bacterial shedding, highlighting the need for a more effective and safer vaccine. The COX-SAVE consortium is developing a Nine Mile phase II (NMII) Cb vaccine candidate based on a novel inactivation method, - low-energy electron irradiation (LEEI) - which inactivates pathogens by damaging nucleic acids while preserving structural antigens like proteins and lipopolysaccharide, which are essential for eliciting protective immunity. LEEI enables precise control of irradiation dose, ensuring complete inactivation while maintaining antigenic integrity. Compared to conventional chemical inactivation, LEEI offers enhanced reproducibility and rapid processing, without the need to remove chemicals post-inactivation. Based on qPCR, vacuole formation and immunofluorescence staining, application of 25 kilogray (kGy) was determined as inactivation dose. The in vitro characterization of the pathogenicity and immunogenicity of the vaccine candidate is carried out via cell culture-based assays in L929 cells and in primary macrophage cultures. Initial immunization studies will be conducted in sheep, followed by trials in cattle to assess the protective efficacy of the Cb-LEEI vaccine.

Keywords

Vaccine, LEEI, *Coxiella*, Zoonoses, One Health, Animal Health, Human Health

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48

Professional Status of the Speaker

Senior Scientist

Junior Scientist Status

No, I am not a Junior Scientist.

Author: Dr MAKERT, Gustavo R. (Fraunhofer-Institut for Cell Therapy and Immunology)

Co-authors: Dr BAUER, Benjamin U. (Clinic for Swine and Small Ruminants, University of Veterinary Medicine Hannover and Institute of Immunology, Friedrich-Loeffler-Institut); Dr MERTENS-SCHOLZ, Katja (Institute of Bacterial Infections and Zoonoses, Friedrich-Loeffler-Institut); HOLLWEDEL, Femke (Serum plant Memsen, Part of the WDT-Group (The veterinary company)); Prof. GANTER, Martin (Clinic for Swine and Small Ruminants, University of Veterinary Medicine Hannover); Dr KNITTLER, Michael R. (Institute of Immunology, Friedrich-Loeffler-Institut); Dr FERTEY, Jasmin (Fraunhofer-Institut for Cell Therapy and Immunology)

Presenter: Dr MAKERT, Gustavo R. (Fraunhofer-Institut for Cell Therapy and Immunology)

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