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36th Euro Global Summit and Expo on **Vaccines & Vaccination**

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6th World Congress and Exhibition on Antibiotics and Antibiotic Resistance

June 03-04, 2019 London, UK

Novel nanoparticle based vaccine against respiratory viruses

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C ubunit or DNA vaccines are generally less immunogenic than whole organism vaccines. One approach to reduce Othis deficiency is the development of repetitive antigen displays. One of the most successful repetitive antigen displays is our Self-Assembling Protein Nanoparticle (SAPN) technology. Based of coiled-coil oligomerization domains our SAPNs can self-assemble into spherical particles that mimic the size and shape of small viruses, decorated on their surface with antigens. We have used SAPNs to develop avian influenza (AI) and infectious bronchitis virus (IBV) vaccines by displaying the two conserved and antigens of these viruses. In case of AI, these M2e and Helix C in their native tetrameric and trimeric oligomerization states, respectively, while B cell epitopes derived from the second heptad repeat (HR2) region of the IBV spike protein are repetitively presented in their native trimeric conformation. In addition, flagellin been co-assembled into the SAPN to achieve a self-adjuvanting effect. Specific Pathogen-Free Chickens vaccinated with such self-adjuvanted SAPNs induce significantly higher levels of antibodies than unadjuvanted SAPNs. Antibodies from chickens vaccinated with the self-adjuvanted SAPNs are cross neutralizing towards group 1 influenza strains in *in vitro* experiments. Immunization with self-adjuvanted SAPNs provides full protection against lethal human influenza challenge in mice, while, chickens were partially protected against a lethal pathogenic avian influenza. The IBV-SAPN vaccine fully protected chickens against pathogenic IBV. Thus, we have generated self-adjuvanted SAPNs with a great potential as universal human and avian influenza as well as IBV vaccines. Future studies are in progress to improve those SAPN-vaccines and test for crossprotection against various sub or serotypes of influenza and IBV.

Recent Publications

- Babapoor, S., D. O. Almeida, J. J. Fabis, Z. H. Helal, X. Wang, T. Girshick and M. I. Khan. Protective Effect of In ovo Vaccination with IBV-Spike-Recombinant DNA and Chicken Interferon as an Adjuvant. Int. J. Poult. Sci 8 (11): 1034-1041, 2009.
- Karch, C., P., J. Li, C. Kulangara, S.M. Paulillo, S.K. Raman, S. Emadi, A. Tan, Z.H. Helal, Q. Fan, M. I. Khan, P. Burkhard, Vaccination with self-adjuvanted protein nanoparticles provides protection against lethal influenza challenge. Nanomedicine: Nanotechnology, Biology and medicine.13: (1), 241-251. 2017.
- Ebrahimi-Nik H., M. R. Bassmi, M. Mohri, M Rad and M. I. Khan. Bacterial ghost of avian pathogenic E. coil (APEC) serotype o78:K80 as a homologous vaccine against avian colibacillosis. PLOS One, doi.org/10.1371/ journal.pone.0194888. March 22, 2018.
- Li, Jianping. Z. Helal, B. Ladman, C. Karch, J. Gelb, Jr, P. Burkhard and M. I. Khan. Nanoparticle vaccine for avian influenza virus: a challenge study against highly pathogenic H5N2 subtype. Virology and antiviral research. Vol. 7: 1-5. 2018.2018.
- Li, Jianping, Z. Helal, C. Karch, T. Girshick, A. Garmendia, N. Mishra, P. Burkhard and M. I. Khan. A selfadjuvanted nanoparticle based vaccine against infectious bronchitis virus. PLOS One, in press, September 6, 2018.

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Biography

Mazhar I. Khan's research involved molecular epidemiology and pathogenesis of influenza virus infection. Currently, in his laboratory in developing and testing nanoparticle based avian influenza (bird flu) and infectious bronchitis virus vaccines. He has long-term experience in development and application of DNA probe, PCR, multiplex PCR, real-time PCR and loop-mediated isothermal amplification (LAMP) methods for rapid detection of viral pathogens in clinical samples. Have made significant contributions in the diagnostic field using DNA techniques in identification of several pathogens of avian, animal and human diseases since 1985. Have mentor visiting international scientists form Asia, Europe and South America. He has an extensive knowledge on pathogenicity studies in embryos infected with infectious bronchitis virus, a coronavirus, which causes stunting and embryo deformity before hatching. As a virologist, have extensive knowledge and research involved in the development of diagnostic tests and vaccines for the control of avian viral diseases.

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