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A.I.R vaccines – A synthetic self-amplifying RNA-based vaccine against Influenza

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Vaccines are the most effective method of controlling infectious diseases. However, todays vaccine production is facing difficult challenges, as the concepts are often not fast and flexible enough to allow quick responses for the efficient control and prevention of global outbreaks of newly emerging and re-emerging viruses and the adaption to new antigenic drifts. To address this challenge, BioNTech RNA Pharmaceuticals GmbH is developing an innovative synthetic Amplified Immune Response (A.I.R) vaccine platform against Infectious Diseases that is characterized by short manufacturing times, high flexibility and the feasible production of at least 100,000 RNA-based human vaccination doses per week based on the low concentration needed. The administration of *in vitro* transcribed self-amplifying RNA (saRNA) results in higher antigen expression than delivery of comparable amounts of mRNA, correlating rather to the final subgenomic transcript copy number than to initially transferred RNA amounts. However, antigen expression is still transient as innate immunity effectively prevents persistent replication. Against influenza virus, both B and T cell-responses are induced. We were able to show high antibody titres in mice for over a one year period and protection against live viral challenge after prime-boost as well as after single vaccination by using submicrogram quantities of saRNA. In summary, A.I.R vaccines give equivalent protection against Influenza to mRNA vaccines but at much lower doses.

Recent Publications

1. Vogel, Annette & Lambert, Laura & Kinnear, Ekaterina & Busse, David & Erbar, Stephanie & C. Reuter, Kerstin & Wicke, Lena & Perkovic, Mario & Beissert, Tim & Haas, Heinrich & T. Reece, Stephen & Sahin, Ugur & S. Tregoning, John. (2017). Self-Amplifying RNA Vaccines Give Equivalent Protection against Influenza to mRNA Vaccines but at Much Lower Doses. Molecular Therapy. 26. 10.1016/j.ymthe.2017.11.017.
2. Annette B. Vogel. (2016). An mRNA Vaccine Encoding Rabies Virus Glycoprotein Induces Protection against Lethal Infection in Mice and Correlates of Protection in Adult and Newborn Pigs. https://doi.org/10.1371/journal.pntd.0004746.
3. Kägebein D1, Gutjahr M, Große C, Vogel AB, Rödel J, Knittler MR. (2014). Chlamydia trachomatis-infected epithelial cells and fibroblasts retain the ability to express surface-presented major histocompatibility complex class I molecules. Infect Immun. 2014 Mar;82(3):993-1006. doi: 10.1128/IAI.01473-13.
4. Khoufache, K., Berri, F., Nacken, W., Vogel, A. B., Delenne, M., Camerer, E., Riteau, B. (2013). PAR1 contributes to *influenza A virus* pathogenicity in mice. The Journal of Clinical Investigation, 123(1), 206–214.
5. Benjamin Petsch, Margit Schnee, Annette B. Vogel, Elke Lange, Bernd Hoffmann, Daniel Voss, Thomas Schlake, Andreas Thess, Karl-Josef Kallen, Lothar Stitz, et al. Nat Biotechnol. 2012 Dec; 30(12): 1210–1216. Published online 2012 Nov 25. doi: 10.1038/nbt.2436.

Biography

Annette B. Vogel is presently the Head of Infectious Disease Vaccines, BioNTech AG, Germany. She has been associated with Friedrich-Loeffler-Institut, Federal Reserch Institute for Animal Health as scientist. She has done her education from Georg-August-University Goettingen and completed her DSc from Eberhard-Karls-University Tubingen. She has many publications to her name like "PAR1 contributes to *influenza A virus* pathogenicity in mice", "Influenza virus infection aggravates stroke outcome" to name a few. Her Research interest spans around cell culture, animal models, infectious disease, flow cytometry, virology, vaccination, serology and genomics.

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