



"Frontiers in Immunology, an international, peer-reviewed journal publishes article of an influenza vaccine produced in ciliates"

Leading journal presents a proof of principle study for Cilian's expression technology CIPEX-System to produce influenza vaccine candidates.

Münster, Germany, 9 December 2019, Cilian AG, a biopharmaceutical company focused on the development of subunit vaccines, enzymes and monoclonal antibodies, announces that Frontiers Immunology, the international, peer-reviewed, open-access, online publication journal, has published an article entitled:

Recombinant haemagglutinin derived from the ciliated protozoan *Tetrahymena thermophila* is protective against Influenza infection.

Frontiers in Immunology, as the official Journal of the International Union of Immunological Societies (IUIS), is a leading journal in its field, publishing rigorously peer-reviewed research across basic, translational and clinical immunology.

The authors of the article

([https://www.frontiersin.org/articles/10.3389/fimmu.2019.02661/full?utm_source=Email_to_authors&utm_medium=Email&utm_content=T1_11.5e1_author&utm_campaign=Email_publication&field=&journalName=Frontiers in Immunology&id=496102](https://www.frontiersin.org/articles/10.3389/fimmu.2019.02661/full?utm_source=Email_to_authors&utm_medium=Email&utm_content=T1_11.5e1_author&utm_campaign=Email_publication&field=&journalName=Frontiers%20in%20Immunology&id=496102)) are from Cilian AG, Münster, Germany; the Imperial College London, United Kingdom; the University of Siena, Siena, Italy; VisMederi s.r.l., Siena, Italy; the CEA-Université Paris Sud, France; the Université Lyon, Lyon, France and from Adjuvatis, Lyon, France. All companies and institutions are scientific partners and/or affiliated members within the European ADITEC consortium, a multinational collaborative research programme. The authors demonstrated successfully in a study the use of *Tetrahymena thermophila* as a recombinant protein expression platform for the production of various recombinant viral surface proteins (haemagglutinin) as antigenic vaccine proteins and the testing of these proteins in different animal models.

They concluded that: "This study has successfully demonstrated the expression and purification of haemagglutinin from both seasonal influenza A and B strains. This ciliate derived material was immunogenic, inducing an antibody response in both mice and non-human primates. Furthermore, mice immunized with ciliate derived haemagglutinin were protected against infection with homologous influenza virus strains."

The authors also noted that: "The hemagglutinin could also be combined with submicron PLA particles containing a Nod2 ligand, significantly boosting the immune response and reducing the dose of antigen required. Thus, we show that *Tetrahymena* can be used as a manufacturing platform for viral vaccine antigens."

Commenting on the paper, Dr. Marcus Hartmann, CSO of Cilian AG, "It is gratifying and encouraging that in collaboration with the independent research groups of Dr. John Tregoning and Dr. Bernard Verrier we could demonstrate that our expression technology CIPEX represents the alternative for the production of influenza vaccine candidates. These results support our ongoing efforts in developing our vaccine product pipeline."

Dr. Bernard Verrier, head of the group from Laboratoire de Biologie Tissulaire et d'Ingénierie Thérapeutique, Université Lyon, France added: "The combination of haemagglutinin vaccine, produced in Cilian's expression system, with PLA particles allow us to lower levels of antigen which may be advantageous in a pandemic situation"

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