Stanford Scientists First To Identify New Cellular Correlates of Protection Against Influenza for an Oral Flu Vaccine Developed by Vaxart

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A new Stanford study published in Cell Host and Microbe finds that protection against influenza infection may be achieved through mechanisms other than the development of serum antibodies

STANFORD, Calif., Nov. 18, 2021 (GLOBE NEWSWIRE) -- A new Stanford study published in Cell Host and Microbe has demonstrated that VXA-A1.1, an investigational oral tablet flu vaccine under development by Vaxart, Inc. (NASDAQ: VXRT), had cellular correlates of protection against influenza infection.[1]

These cellular correlates were found using mass cytometry analysis of vaccine-elicited cellular immune responses in the peripheral blood of participants in a previously reported Phase II H1N1 challenge study of VXA-A1.1.[2]

The U.S. Centers for Disease Control and Prevention (CDC) estimates that, on average, 36,000 people in the U.S. died from the flu in each of the past ten years. It is estimated that 61,000 people in the U.S. died from the flu in the 2017-2018 season – the highest toll in recent years. The 2019-2020 season, which was shorter than normal, resulted in approximately 22,000 U.S. deaths.[3] Globally, the number of annual flu deaths has been estimated to range from nearly 300,000 to more than 600,000.[4]

“The data show that cellular responses are potentially more relevant for protection for an oral vaccine than circulating antibody responses,” said David McIlwain, Ph.D., senior research scientist in the Department of Microbiology and Immunology at the Stanford School of Medicine and lead author of the study.

“These results support using early immune response data to predict protection against respiratory pathogens several months later, potentially speeding vaccine development,” said Sean Tucker, Ph.D., Vaxart’s founder and chief scientific officer and a co-author of the publication.

About the Study

Results of a Phase II human influenza challenge study following vaccination with VXA-A1.1, which was funded by the U.S. government’s Biomedical Advanced Research and Development Authority (BARDA), have previously been reported.[2] Participants in the Phase II study received either VXA-A1.1, an injected quadrivalent, inactivated influenza vaccine (IIV) or a placebo. Participants were challenged with H1N1 influenza virus 90-120 days after vaccination and were monitored for signs and symptoms of infection and viral shedding.

Results of the Phase II study were the first to show that VXA-A1.1 offered greater protection against viral shedding than the injected IIV. The results suggested that cellular responses rather than neutralizing antibodies may be especially important in the VXA-A1.1 mechanism of protection.[2]

The study announced today is the first to use mass cytometry to evaluate more than 40 different immune cell parameters in peripheral blood samples collected from 141 participants in the Phase II study. Mass cytometry immune cell profiling was performed on samples collected immediately prior to (day 1) and seven days following (day 8) vaccine administration.

Immune profiling tracked levels of multiple cell subsets with similar patterns of markers. The relationship between each subset and virus shedding was determined. Random forest-based machine learning models were used to define high-dimensional cellular correlates between the immune profiling and viral shedding data.

Key Findings

Key findings from the study include:

- Specific B cell and T cell responses contribute to protection from viral shedding with VXA-A1.1 but not with IIV.
- At day 8, vaccine-elicited subsets of plasmablasts (including α4β7+, CD62L-, pSTAT5+ cells) and hemagglutinin (HA+)-specific cells significantly correlated with protection from viral shedding after day 90 in participants vaccinated with VXA-A1.1, but not in participants treated with IIV or placebo.
- At day 8, VXA-A1.1, but not IIV or placebo, elicited subsets of T cells expressing markers (β7 integrin and CCR9) that are indicative of enhanced homing to mucosal tissue.
- Random forest models of the VXA-A1.1-treated group could distinguish those individuals who were later protected versus those who remained susceptible to the virus using datasets from both unsupervised clustering approaches and manual gating (p= 0.00001).

References

[1] McIlwain D, Chen H, Rahil Z, et al. Human influenza virus challenge identifies cellular correlates of protection for oral vaccination. Cell Host Microbe

(2021). doi:10.1016/j.chom.2021.10.009

[2] Liebowitz D, Gottlieb K, Kolhatkar NS et al. Efficacy, immunogenicity, and safety of an oral influenza vaccine: a placebo-controlled and active-controlled phase 2 human challenge study. Lancet Infect Dis. 2020;20:435-444.

[3] USA Facts. How many people die from the flu? Available at: https://usafacts.org/articles/how-many-people-die-flu/

[4] Paget J, Spreeuwenberg P, Charu V et al. Global mortality associated with seasonal influenza epidemics: New burden estimates and predictors from the GLaMOR Project. J Glob Health. 2019;9(2):020421.

About Vaxart

Vaxart is a clinical-stage biotechnology company developing a range of oral recombinant vaccines based on its proprietary delivery platform. Vaxart vaccines are designed to be administered using tablets that can be stored and shipped without refrigeration and eliminate the risk of needle-stick injury. Vaxart believes that its proprietary tablet vaccine delivery platform is suitable to deliver recombinant vaccines, positioning the company to develop oral versions of currently marketed vaccines and to design recombinant vaccines for new indications. Vaxart's development programs currently include tablet vaccines designed to protect against coronavirus, norovirus, seasonal influenza, and respiratory syncytial virus (RSV), as well as a therapeutic vaccine for human papillomavirus (HPV), Vaxart's first immune-oncology indication. Vaxart has filed broad domestic and international patent applications covering its proprietary technology and creations for oral vaccination using adenovirus and TLR3 agonists.

Note Regarding Forward-Looking Statements

This press release contains forward-looking statements that involve substantial risks and uncertainties. All statements, other than statements of historical facts, included in this press release regarding Vaxart's strategy, prospects, plans and objectives, results from pre-clinical and clinical trials, commercialization agreements and licenses, and beliefs and expectations of management are forward-looking statements. These forward-looking statements may be accompanied by such words as "should," "believe," "could," "potential," "will," "expected," "plan," and other words and terms of similar meaning. Examples of such statements include, but are not limited to, statements relating to Vaxart's ability to develop and commercialize its product candidates, including its vaccine booster products; Vaxart's expectations regarding clinical results and trial data; and Vaxart's expectations with respect to the effectiveness of its product candidates. Vaxart may not actually achieve the plans, carry out the intentions, or meet the expectations or projections disclosed in the forward-looking statements, and you should not place undue reliance on these forward-looking statements. Actual results or events could differ materially from the plans, intentions, expectations, and projections disclosed in the forward-looking statements. Various important factors could cause actual results or events to differ materially from the forward-looking statements that Vaxart makes, including uncertainties inherent in research and development, including the ability to meet anticipated clinical endpoints, commencement, and/or completion dates for clinical trials, regulatory submission dates, regulatory approval dates, and/or launch dates, as well as the possibility of unfavorable new clinical data and further analyses of existing clinical data; the risk that clinical trial data are subject to differing interpretations and assessments by regulatory authorities; whether regulatory authorities will be satisfied with the design of and results from the clinical studies; decisions by regulatory authorities impacting labeling, manufacturing processes, and safety that could affect the availability or commercial potential of any product candidate, including the possibility that Vaxart's product candidates may not be approved by the FDA or non-U.S. regulatory authorities; that, even if approved by the FDA or non-U.S. regulatory authorities, Vaxart's product candidates may not achieve broad market acceptance; that a Vaxart collaborator may not attain development and commercial milestones; that Vaxart or its partners may experience manufacturing issues and delays due to events within, or outside of, Vaxart's or its partners' control; difficulties in production, particularly in scaling up initial production, including difficulties with production costs and yields, quality control, including stability of the product candidate and quality assurance testing, shortages of qualified personnel or key raw materials, and compliance with strictly enforced federal, state, and foreign regulations; that Vaxart may not be able to obtain, maintain, and enforce necessary patent and other intellectual property protection; that Vaxart's capital resources may be inadequate; Vaxart's ability to resolve pending legal matters; Vaxart's ability to obtain sufficient capital to fund its operations on terms acceptable to Vaxart, if at all; the impact of government healthcare proposals and policies; competitive factors; and other risks described in the "Risk Factors" sections of Vaxart's Quarterly and Annual Reports filed with the SEC. Vaxart does not assume any obligation to update any forward-looking statements, except as required by law.

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