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The World Vaccine Congress in Europe is in its 16th year and is a major destination for vaccine leaders to share developments in the field.

"As the world's leader in the production of influenza vaccines, Sanofi Pasteur's ambition is to drive innovation and to shape the future by exploring several of the leading influenza vaccine strategies," according to Mr Olivier Charmeil, President and CEO of Sanofi Pasteur, the company that supplied over 220 million doses of seasonal influenza vaccines in 2014.

At the World Vaccine Congress, Dr Harry Kleanthous, Associate VP for Research discussed the paradigm shifting potential of broader-spectrum influenza vaccine approaches that stimulate protection against many influenza strains, unlike the current licensed vaccines that are designed to protect against 3-to-4 strains that are determined before the influenza vaccine production process begins each year.

"We are actively exploring the development of a more-broadly protective influenza vaccine that will be designed to prevent the seasonal mismatches that can occur and that are not addressed using the current technology," explained Dr Kleanthous. "They are complementary but can be considered 'tailored' antigens in that they are designed to re-focus the immune response to key protective epitopes on the hemagglutinin, which is the active component of our currently licensed influenza vaccines," he continued. "These antigens are still a key player in any flu vaccine, since antibodies directed against them are responsible for preventing the Flu virus from binding to and infecting the cell. Creating new antigens is a central theme in our strategy."

Sanofi Pasteur has an existing R&D collaboration agreement with the University of Georgia on a method that - according to Dr Kleanthous - could yield a novel, synthetic vaccine based on the hemagglutinin protein, designed to protect against seasonal influenza strains spanning several years, including drifted strains not yet in existence.

Traditional influenza vaccine manufacturers are directed by, and provided with candidate vaccine viruses from public-health authorities determined through active surveillance of influenza viruses circulating each year.

Sanofi Pasteur's experimental vaccine is a novel synthetic vaccine generated from key genetic sequences of many flu

viruses, and is termed 'computationally optimized broadly reactive antigen' or COBRA, and is designed to protect against many strains over several years, due to the common sequences many flu viruses share.

The key advantage is broader coverage against several seasonal flu strains, which is important when there is a mismatch to the vaccine strain.

An additional advantage of this approach is not relying upon annual strain selection, allowing year-round manufacturing.

"We are working with one of the leading infectious disease researchers from the University of Georgia, Dr Ted Ross, who is currently engineering COBRA vaccines based on past sequences to cover as many strains as possible and to maximize the immune response to an influenza vaccine," said Dr Kleanthous. "We need to find common elements that don't change every year; study how influenza vaccines have performed in the past, testing what's immunologically relevant for a broader-spectrum influenza vaccine. Improved influenza vaccines such as COBRA--designed to protect against drifting and co-circulating viruses, as well as other antigens that induce complimentary mechanisms of protection--are anticipated to have a significant impact on strain coverage and vaccine effectiveness," the researcher concluded.

According to Sanofi Pasteur's Senior Vice President for R&D, Dr John Shiver, a universal flu vaccine will need to be compared against the standard-of-care (seasonal vaccines), showing safety, comparable immunogenicity, and efficacy in human clinical trials over several years against a range of influenza virus strains.

"A truly universal vaccine is the ultimate goal; however, we believe that a broader-spectrum vaccine will be available first to replace the current seasonal flu vaccine given annually," he explained. "Science, including vaccine R&D, tends to be an iterative process. It's an evolution."