

MF59® Adjuvant Fact Sheet

MF59® is Novartis' proprietary adjuvant that is added to influenza vaccines to help stimulate the human body's immune response through production of CD4 memory cells. MF59, is the first oil-in-water influenza vaccine adjuvant to be commercialized in combination with a seasonal influenza virus vaccine. Adjuvanted vaccines combined with MF59 augment the breadth of immune response compared with non-adjuvanted vaccines.

Novartis Vaccines
proprietary adjuvant

Studies have shown that MF59 helps elicit broad cross-reactive immune responses against a wide range of seasonal influenza strains, including those strains not contained in a seasonal influenza vaccine. This has also been shown with potential H5 pandemic virus strains. The adjuvant has also demonstrated the ability to provide strong immune memory and sustained antibody responses when used with both seasonal and pre-pandemic vaccines, which help the immune system produce a protective response that can be boosted several years after an initial vaccination.

MF59 helps elicit broad
cross-reactive immune
responses

Data published recently in the Proceedings of the National Academy of Sciences of the United States of America reinforced the potentially broad applicability of MF59 and the role it can play in pandemic preparedness around the world, potentially allowing for less antigen per vaccine dose while providing the same sustainable immune response. Also, MF59 could provide cross-protection across similar strains of a virus, which is an additional important element for a (pre-)pandemic vaccine given that mutations are a common feature of emerging influenza strains.

MF59 has been extensively tested in more than 60 clinical trials involving nearly 28,000 people. With more than 10 years of clinical experience and more than 40 million doses of adjuvanted vaccines distributed, MF59 has an established safety profile and has been shown to be well tolerated in children, adults and the elderly.

Clinical trials with MF59

Novartis Vaccines has also developed an investigational pre-pandemic influenza vaccine adjuvanted with MF59 which has demonstrated the ability to mount a satisfactory immune response against H5N1 avian influenza virus. The adjuvanted vaccine has demonstrated potential effectiveness against pandemic strains in all age groups, from young children to seniors.

MF59-adjuvanted vaccines

An established leader in innate immunity and the development of adjuvants, Novartis Vaccines is testing the use of MF59 with novel vaccines across its research and development portfolio. It has also launched a program in collaboration with other divisions of Novartis to discover and develop a new breed of adjuvants that are capable of enhancing and fine-tuning the immune response to vaccines.

History of Adjuvants

MF59 was developed in the 1990s by researchers at Ciba-Geigy, a Novartis heritage company, and Chiron, acquired by Novartis in 2006, who were searching for an adjuvant that was both capable of provoking a greater immune response than had been previously possible and well tolerated. The resulting compound – subsequently named MF59 – demonstrated a good safety profile in people and was able to jump start the innate immune response, a vital part of the immune system that determines the magnitude and precise nature of the body's immune response to an infection.

Adjuvants first developed in 1920

Historically, vaccine development has focused on refining the antigen, proteins in vaccines that stimulate the production of an antibody, used to produce the immune response. Increasingly, vaccines are made from purified antigens rather than inactivated – or killed – viruses. While this can produce better characterized antigens and help reduce potential reactions, purified antigens are less likely to spark an innate immune response, which necessitates the use of adjuvants.

History of MF59

Novartis Vaccines researchers have made significant progress in unraveling how adjuvants fuel the immune response cascade. Among the discoveries are that adjuvants help increase antibody production by activating one or more components of the immune system, including:

How adjuvants work

- Recruiting immune cells to the injection site, which increases the immune response to the influenza vaccine.
- Promoting the uptake of influenza vaccine antigens into immune cells, which boosts the immune response.

Because adjuvants bolster the body's immune response to a pathogen, fewer antigens are needed in each dose to develop protective immunity. Studies have shown that MF59 reduced the amount of antigen required to generate an immune response to less than half the amount used in seasonal influenza vaccines. This has the potential to extend antigen supplies in a crisis, which is an important consideration given that

production processes limit how much vaccine can be manufactured at any given time.

In the event of an influenza pandemic, being able to reduce the amount of antigen in each dose will allow government and regulatory officials to vaccinate more people. The ability to produce a protective immune response with lower doses also has the potential to extend the supply of seasonal influenza vaccine. The need for influenza vaccines is expected to continue growing for the next several years and additional capacity can assist in efforts to reach all regions with seasonal influenza vaccines.

Influenza pandemic

An influenza pandemic occurs when a new influenza strain to which humans have no immunity emerges, mutates and spreads globally. Three influenza pandemics have occurred during the 20th Century. The deadliest was in 1918 and resulted in as many as 50 million deaths worldwide. The most recent was in 1968 and caused about 700,000 deaths around the world. During the last four centuries, an influenza pandemic has emerged about once every 30-40 years.

Adjuvants in an influenza pandemic

Experts believe the next pandemic could spread around the world within three to six months and are concerned that reactive vaccination, which would start after a pandemic begins, may not be enough to protect the world's population. The purpose of pre-pandemic vaccination is to prime the immune system in advance to better defend against infections from an H5N1 influenza virus. It is intended for use before the World Health Organization (WHO) declares an influenza pandemic.

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