

Reviewing Mechanism of Action of MF59-Adjuvanted Influenza Vaccine for Enhancing Innate and Adaptive Immune Responses

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Enhanced influenza vaccines, including MF59-adjuvanted formulations, help to overcome immunosenescence by improving immunogenicity compared to standard formulations. MF59 (an oil-in-water emulsion adjuvant) orchestrates both innate and adaptive immune functions, thereby amplifying, broadening, and prolonging immune responses. This work describes the pathways by which MF59-adjuvanted vaccines enhance immune responses. A framework of the mechanism of action of MF59 has been developed based on established immunology literature. Mechanisms were described using evidence from preclinical and clinical studies. MF59 promotes the recruitment of monocytes, macrophages, and granulocytes at the injection site, and stimulates the production of chemokines and inflammatory cytokines. This transient immune-competent microenvironment promotes antigen uptake, supports the differentiation of APC precursors toward DCs, enhances germinal center activity, and drives broader T- and B-cell activation, including increased memory B-cell generation, improved antibody quality and diversity for both HA and NA, and, in some settings, cross-reactivity to drifted strains. MF59-adjuvanted influenza vaccine targets various components of the immune system to enhance immune responses and overcome immunosenescence. MF59-adjuvanted vaccines provide multifaceted orchestration of innate and adaptive immunity and support improved and more durable protection against influenza in older adults.

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No, I am not a junior scientist.

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