

Deciphering the immune mechanisms of influenza vaccines on the innate immune response

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Rising public skepticism toward vaccination highlights the need for evidence of influenza vaccine effectiveness. Individuals with rheumatoid arthritis (RA) receiving immunomodulatory therapy represent a population for whom vaccine-mediated protection is especially relevant. This project investigates the mechanistic effects of three licensed influenza vaccines on innate immune function in healthy controls and RA. To characterize vaccine-driven innate immune reprogramming, primary human monocytes, HoxB8 monocytes and HEK Blue reporter cell lines were used. Vaccine-associated activation was interrogated using Toll-like receptor (TLR)-specific ligands followed by cytokine profiling. This approach aims to identify the TLRs engaged by each vaccine and their downstream signaling pathways. Pre-treatment with Eflueda, Influsplit, and Influvac reprogrammed monocytes, resulting in enhanced cytokine responses upon restimulation with the TLR7/8 agonist R848 and the TLR2 agonist LTA compared to monocytes not pre-treated with influenza vaccines. These effects were stimulus-specific, as vaccine pre-treatment did not alter responses to other TLR agonists. This framework will be applied to compare monocyte responses in RA patients with and without immunotherapy before and after influenza vaccination. These data will clarify how immunotherapy alters vaccine-induced innate immune signaling and support improved vaccination strategies for immune-mediated inflammatory diseases.

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Yes, I am a junior scientist.

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