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In vivo Veritas: Influenza vaccination triggers rapid dendritic cell differentiation from blood monocytes *in vivo* in humans

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Innate immune responses initiate and modulate the ensuing adaptive immune responses, and dendritic cells (DCs) are the central regulator for both innate and adaptive immunity. The aim of this study is to understand the innate immune responses elicited by influenza vaccines and the possible linkage to subsequent antibody and T cell responses. Because blood monocytes are the precursors of DCs, we studied the phenotypic and functional changes of these cells isolated before and at different days post-influenza vaccine immunizations in human subjects. We found that a large proportion of blood monocytes become DC-like cells *in vivo* shortly after the flu shot (<1 day). These influenza vaccine-induced monocytes display multiple DC phenotypes, produce TNF-α, capture antigens via macropinocytosis and stimulate proliferation of allogenic naïve CD4+ and CD8+ T cells. These DC-like monocytes can efficiently process and present various microbial antigens and cross-prime naïve CD8+ T cells for differentiation into cytotoxic T cells that kill target cells in the absence of CD4+ T cell help. The DC-like functions of influenza vaccine–induced monocytes can be further modulated by costimulation with cytokines or TLR ligands. The CD16- and CD16+ subsets of monocytes contribute differentially to the inflammatory DC pool in response to influenza vaccination and induce the generation of phenotypically distinct CCR6+ and IL-7Rα(hi) memory T cell subtypes, respectively. The rapid induction of monocyte-to-DC transformation is mediated by influenza vaccine-induced serum factors and can also be observed in patients administered with IFN-α. These results may shed light on how the immune responses are initially triggered by influenza vaccine and how induction of DC differentiation could be harnessed in the context of human vaccination.

Biography

Yun-Chi Chen and his research group at Morgan State University have been studying host cell and immune responses to various infections/immunizations, including dengue, West Nile, and vaccinia viruses and influenza and malaria vaccines, regarding the functions and differentiation of monocytes/macrophages, dendritic cells and T lymphocytes, in humans and animal models. His group has currently established a large cohort of HIV-infected patients to study hepatitis C virus-coinfections. Dr. Chen obtained his PhD from Sir William Dunn School of Pathology, University of Oxford, where he was the Burton Senior Scholar at Oriel College. He did his post-doctoral training at Johns Hopkins Bloomberg School of Public Health.

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