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Non-inflammatory adjuvant for cutaneous vaccination

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Skin is rich in specialized antigen presenting cells and has been recognized as an attractive site for vaccine delivery, since skin scarification of the first smallpox vaccine 200 years ago. Despite its potential, cutaneous immunization is not commonly used in the clinic today because of technical difficulties and a lack of inflammation-free adjuvant. All current vaccine adjuvants cause inflammation that can jeopardize the integrity of the skin and thus the first line of our body's defense. With the development of intradermal injection devices and a variety of disposable microneedles for cutaneous vaccination in the past decade, there is an urgent need for the development of a potent vaccine adjuvant that introduces little inflammation and accommodates a limited injection volume in the skin. We develop a laser-based vaccine adjuvant capable of boosting immune responses, without incurring inflammation. This laser vaccine adjuvant (LVA) was induced by brief illumination of a small area of the skin with a nondestructive, 532 or 1064 nm laser prior to intradermal administration of vaccines at the site of laser illumination. The pre-illumination stimulated the motility of dendritic cells (DCs) and significantly augmented immune responses against various protein-based vaccines as a result of sufficient antigen (Ag)-uptake at the site of vaccine injection and transportation of the Ag-captured DCs to the draining lymph nodes. In comparison with all current vaccine adjuvants that are either chemical compounds or biological agents, LVA is a risk- and additive-free adjuvant and has distinct advantages over traditional vaccine adjuvants for cutaneous vaccination.

Biography

Dr. Mei X. Wu is an associate professor in the Department of Dermatology at Harvard Medical School (HMS) and an affiliated faculty of the Harvard-MIT Division of Health Sciences and Technology. She received her Ph.D. from Utah State University in 1992 and was further trained at MIT and HMS. She has more than 30 publications in peer-reviewed journals and her research has been continuously supported by various competitive funds from National Institutes of Health (NIH), Department of Defense, the American Cancer Society, the Crohn's & Colitis Foundation of America, the American Heart Association, and Bill Gates Foundation.