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DNA Vaccine Study against Vaccinia Virus Using In vivo Electroporation

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Abstract : The adverse reactions of current live smallpox vaccines and potential use of smallpox as a bioterror weapon have heightened the development of new effective vaccine for this infectious disease. In the present study, DNA vaccine vector was produced which was optimized for expression of the vaccinia virus L1 antigen in the mouse model. A plasmid IgM-tL1R, which contains codon-optimized L1R gene, was constructed and fused with an IgM signal sequence under the regulation of a SV40 enhancer. The expression and secretion of recombinant L1 protein was confirmed in vitro 293 T cell. Mice were administered the DNA vaccine by electroporation and challenged with vaccinia virus. We observed that immunization with IgM-tL1R induced potent neutralizing antibody responses and provided complete protection against lethal vaccinia virus challenge. Isotyping studies reveal that immunoglobulin G2 (IgG2) antibody predominated after the immunization, indicative of a T helper type 1 response. Our results suggest that an optimized DNA vaccine, IgM-tL1R, can be effective in stimulating anti-vaccinia virus immune response and provide protection against lethal orthopoxvirus challenge.

Keywords : DNA vaccine, electroporation, L1R, vaccinia virus
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