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P19-29. Determining the optimal protocol for plasmid DNA vaccine delivery by intradermal *in vivo* electroporation

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Background

In vivo electroporation (EP) has proven to significantly increase transfection efficiency and augment immune responses to plasmid DNA encoded vaccine antigens. In mice, we have attempted to establish the optimal EP immunization protocol for delivering HIV-1 antigens.

Methods

Mice were immunized with a plasmid encoding HIV-1 gag p37, either intradermally (id) with the DermaVax EP device, or intramuscularly (im) without EP. The different parameters explored were; the number of immunizations, the interval between immunizations, and the choice of priming (im or id). A novel Fluorospot assay was used to evaluate the vaccine specific cellular immune responses. This assay allows for detection of vaccine-specific cells that secrete IFN-γ, IL-2 and cells that simultaneously secrete both cytokines. In order to verify the Fluorospot results, conventional ELISpot assay was used. The humoral vaccine-specific response was evaluated by ELISA.

Results

The main findings were: 1) two and three id+EP immunizations induced similar and high cellular (up to 8000 IFN-γ SFC/million splenocytes) responses while antibody responses were increased after three as compared to two immunizations, 2) one month interval between immunizations was superior to two months in terms of cellular responses, and 3) repeated id+EP immunizations induced higher immune responses than im priming followed by id+EP boost.

Conclusion

The Fluorospot and the ELIspot assays gave similar results, confirming the sensitivity of the Fluorospot assay. Moreover, the Fluorospot assay enabled identification of high quality vaccine-specific cells simultaneously secreting both IFN-γ and IL-2. Three id+EP immunizations induced the highest levels of antibodies, while two immunizations were sufficient to induce a strong cellular response. In an upcoming longitudinal study we will further investigate the capacity of id EP to induce long lasting immune responses and also investigate the qualitative differences in responses induced by single vs. multiple immunizations.