Retrovirology

Poster presentation

P11-04. PEGylated poly [2-(N,N-dimethylamino) ethyl methacrylate] as mucosal DNA delivery vector improves HIV-1-specific immune responses

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Background

Development of safe and efficient vectors is crucial for gene therapy and vaccine delivery. As a promising transfection reagent, poly [2-(N,N-dimethylamino) ethyl methacrylate] (PDMAEMA) have potential applications in gene delivery systems. However, its high cytotoxicity limits its advances into clinical evaluation. Polyethylene glycol (PEG) is one of the most widely used to decrease polymers' cytotoxicity in drug delivery systems. But the vaccine delivery effects was still unclear by PEGylation for this polymer.

Methods

PEGylated PDMAEMA was synthesized with PEG segments by atom transfer radical polymerization, and its binding capability to DNA was determinded by gel electrophore retardation assaysis. Its effects on transfection efficiency and cytotoxicity in vitro were determined by Flow Cytometry using GFP as a reporter and MTT assay respectivly. Finally, ELISA and Elispot assay were used to evaluated its effects on immunogenicity as a mucosal DNA vaccine carrier *in vivo*. An plasmid DNA expressing HIV-1 gag was used as an model vaccine.

Results

PEGylated PDMAEMA retained its DNA bing capability and its cytotoxicity was dramatically decreased compared to unPEGylated PDMAEMA but with low transfection efficiency *in vitro*. However, our *in vivo* data proved that PEGylated PDMAEMA significantly improved the priming effect of an HIV DNA vaccine through intranasal administration compared to another cation vector polyethyleneimine (PEI) and had more immunositmulatory ability *in vitro*.

Conclusion

Our study suggested that PEGylated PDMAEMA could be used in vaccine research as a nonviral vector and importantly, transfection efficiency *in vitro* did not correlate to the immunogenicity *in vivo* for polymer vectors especially due to its potential adjuvant effects.