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HTLV-1 Tax peptide-carrying polyion complex nanoparticles induce potent cellular immunity in mice

Tomofumi Uto[1,2,3*], Takami Akagi[1,3], Mitsuru Akashi[1,3], Masanori Baba[2,3]

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Development of safe and effective vaccines is important for controlling a variety of infectious diseases, including retroviral infections. The induction of cytotoxic T lymphocytes (CTLs) is a promising strategy for elimination of infected cells. Polyion complex (PIC) nanoparticles have been created using anionic biodegradable poly(γ-glutamic acid) (γ-PGA) and cationic protamine. Amphiphilic graft copolymers, consisting of γ-PGA and l-phenylalanine (l-Phe) hydrophobic side chain, were synthesized by grafting l-Phe to γ-PGA. The PIC nanoparticles were prepared by mixing the graft copolymers with protamine in phosphate buffered saline. In this study, antigen peptide-carrying PIC nanoparticles were examined for their effect on the induction of antigen-specific cellular immunity in mice. The antigen-specific CTL response was evaluated by intracellular cytokine staining and IFN-γ ELISPOT assay. The immunization with PIC nanoparticles carrying HTLV-1 Tax peptide could induce the expansion of Tax-specific $CD8^+$ T cells. In contrast, no such induction of the antigen-specific $CD8^+$ T cells was observed, when mice were immunized with the peptide alone or peptide plus an aluminum adjuvant. These results suggest that the Tax peptide-carrying PIC nanoparticles are capable of inducing cellular immune responses and may have potential as an effective vaccine adjuvant for anti-HTLV-1 vaccines.

Authors' details
[1]Graduate School of Engineering, Osaka University, Suita, Osaka, Japan. [2]Center for Chronic Viral Diseases, Graduate School of Medical and Dental Sciences, Kagoshima University, Sakuragaoka, Kagoshima, Japan. [3]JST-CREST, Shibuya-ku, Tokyo, Japan.

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* Correspondence: tomo-uto@chem.eng.osaka-u.ac.jp
[1]Graduate School of Engineering, Osaka University, Suita, Osaka, Japan
Full list of author information is available at the end of the article

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