Institute of DNA Medicine
Department of Oncology

Mikio Zeniya, *Professor*
Junko Yamada, *Associate Professor*
Sadamu Homma, *Associate Professor*
Shigeo Koido, *Associate Professor*

General Summary

Basic and clinical studies of cancer immunotherapy have been performed in our laboratory.

Research Activities

Phase I clinical study of immunotherapy against advanced pancreatic and biliary tract cancers by vaccination with dendritic cells pulsed with Wilms' tumor 1 peptide combined with gemcitabine
In this clinical study, dendritic cells (DCs) will be generated in the cell-processing center of the Shimbashi campus from peripheral blood mononuclear cells (PBMCs) obtained from patients of Kashiwa Hospital. The DCs will then be returned to Kashiwa Hospital and used as a therapeutic agent. We performed a dry run trial for the cell transfer 3 times using PBMCs and DCs obtained from a healthy volunteer and found that the cells could be transferred under the strictly controlled conditions to prevent microbial contamination and cell degradation.

Generation of cancer vaccine targeting tumor vessels from induced pluripotent stem cells
Induced pluripotent stem (iPS) cells differentiated to progenitors of vascular cells showed a gene expression profile similar to that of tumor endothelial cells. Vaccination of mice with DCs pulsed with the lysate of vascular progenitor cells demonstrated potent antitumor activity against the challenge of CMS-4 tumor cells and lengthened survival. Small tumors formed subcutaneously in the immunized mice elicited significant suppression of tumor vessel development. Cancer vaccines targeting tumor vessels could be generated from iPS cells.

Immunotherapy with a DC and glioblastoma fusion cell vaccine
A clinical study of immunotherapy using a fusion cell vaccine of autologous DCs and malignant glioblastoma cells combined with temozoramide treatment has been performed for several years. Its safety and significant preventative effects against the postoperative recurrence of glioblastomas were demonstrated.

Exploitation of a novel cancer vaccine based on evolutionary molecular engineering
Several artificial proteins composed of antigenic peptides of MHC class I and II and protein-stabilizing alpha-helix structure from ovalbumin were synthesized with an evolutionary molecular engineering technique. Because an immune response to the synthesized

protein could be successfully induced in mice without adjuvant, this protein engineering technique might be used to generate new cancer vaccines that could elicit immune responses to human cancer antigens.

Generation of cancer vaccine from novel tumor markers for prostate cancer
Several proteins identified as novel candidate markers for prostate cancer by proteomics analysis have been evaluated for clinical application. Antigenic peptides on MHC class I molecules from human prostate cancer cells were examined for generation of peptide vaccines against prostate cancer by mass spectrometric analysis.

Publications

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Reviews and Books

Koido S, Homma S, Hara E, Namiki Y, Okusa T, Gong J, Tajiri H. Antigen-specific polyclonal cytotoxic T lymphocytes induced by fusions of dendritic cells and tumor cells. *J Biomed Biotech* 2010; **2010:** 752381.

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