Research Center for Medical Sciences
Core Research Facilities for Basic Science
(Division of Molecular Genetics)

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General Summary

Recent advances in technologies and study designs have unveiled the genetic components of human diseases. The aim of our project is to explore genetic factors of allergic and immunological diseases. Interdisciplinary research to elucidate the relationships between genetic variants and phenotypes is necessary to identify the molecular targets and improve our understanding of diseases.
Gene therapy has become an attractive procedure to cure diseases. We contribute to gene therapy through the development of regulation of gene-expression and genome editing.
We maintain the following experimental devices, which are commonly utilized: next-generation sequencing systems, 3130XL sequencer, MoFlo XDP cell sorter, flow cytometer, X-ray irradiation research system and qPCR. We also support experiments using these devices.

Research Activities

Genetics of inflammatory diseases
Psoriasis is an inflammatory skin disease histologically characterized by epidermal hyperplasia, inflammatory cell infiltration and vascular changes. A dysregulated cutaneous immune response occurs in genetically susceptible individuals. We have collaborated with Osaka University and Nippon Medical University for researching inflammatory skin diseases since 2017. We have recruited patients with psoriasis and conducted an association study of psoriasis with GWAS-discovered loci for psoriasis. We are going to perform genome-wide association study, next-generation sequencing analysis, transcriptome and metabolome analysis of psoriasis.

An effective strategy for the research of allergic and immunological diseases
Starting in August 2017, Prof. Tamari has served as the principal investigator of a group established to make research plans for the next ten years of allergy and clinical immunology research. This work is supported by Health Science Research Grants from the Ministry of Health, Welfare and Labor of Japan and we are going to compile a report on an effective strategy for the research of allergic and immunological diseases.

Development of the adenovirus vector systems
Because the adenovirus vector (AdV) is an attractive tool for gene expression and for the regulation of gene expression, it is applied to many areas of research. It is well known

that the AdV is useful tool to transduce the purpose gene in hepatocytes. We develop a protocol for cure of hepatitis B virus (HBV) using AdV. In culture cells, the efficiency of HBV genome replication is poor. We established the efficient detection system of HBV genome replication applying AdVs (HBV103-AdV system). We performed high-throughput screening of anti-HBV drugs using this system. As a result, we identified several promising compounds and analyzed the mechanism. Furthermore, we succeeded in efficient cleavage of HBV genome using CRISPR/Cas9 and now we develop a hepatocyte specific genome editing system. And also we have constructed the AdVs for repairing Gusb gene of Sly's disease by genome editing.

Publications

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