Department of Genetic Disease Research (Lysosomal Storage Disease)

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Research Activities

This Department was established on April 1, 2007 as a donated department. The members of this department are 1 principal investigator, 5 co-investigators, 1 visiting fellow, and 3 assistants collaborating with the Department of Gene Therapy, Institute for DNA Medicine.

The major topics for investigation are follows.

1. Development of screening methods for lysosomal storage diseases by means of dry blood spots.

The lysosomal storage diseases (LSDs) screened for were Pompe disease, Fabry disease, and mucopolysaccharidosis (MPS) I, II, and VI.

a) We screened at high risk patients with muscular dystrophy by means of dry blood spots (DBSs). About 120 patients from a muscular dystrophy hospital were analyzed for Pompe disease. Two patients showed markedly decreased activities, and gene analysis demonstrated that these patients had a pseudodeficiency of alpha-glucosidase.

b) Screening for Fabry disease in a dialysis center by means of DBSs. We screened more than 1,000 patients with end-stage renal disease.

c) Screening of patients for MPS I, II, and VI in a rehabilitation hospital by means of DBSs. We established a method of screening for MPS using DBSs. Our procedure used 4-methylumbelliferone as a substrate and 3-mm-diameter punched discs.

1) Gene therapy for Pompe disease, Fabry disease, and Twitcher disease using a lentivirus vector. Pompe knockout mice were successfully treated with a lentivirus vector, as shown by the markedly reduced levels of accumulated glycogen in various muscle tissues.

2) Isolation of induced pluripotent stem cells: We successfully produced induced pluripotent stem cells from tail-skin fibroblasts of Fabry, Pompe, and Twitcher mice. Induced pluripotent stem cells from Fabry mice were differentiated into cardiac muscle cells.

Publications

Fujiwara Y, Ohashi T, Kobayashi M, Ida H, Eto Y. Efficacy of Enzyme replacement therapy in Fabry disease; efficacy to cardiac function (in Japanese). *Tokyo Jikeikai Ikadaigaku Zasshi* (*Tokyo Jikeikai* Med J) 2007; **122:** 295-304.

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Reviews

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