

【Grant-in-Aid for Scientific Research(S)】

Integrated Science and Innovative Science (Comprehensive fields)



Title of Project : Development of experimentation systems related to personalized medicine using humanized NOG mice

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Research Area : Comprehensive fields, Laboratory animal science

Keyword : laboratory animals, immunodeficient mice, NOG mice, humanized mice, personalized medicine

【Purpose and Background of the Research】

Severe immunodeficient NOG (NOD/Shi-scid, IL-2Rg KO) mice reported by us in 2002 are well known to support engraftment and differentiation of transplanted human cells and tissues without rejection. Therefore, these mice are considered extremely useful for generating “humanized mice”, and humanized mice using NOG mice are actually widely used in various research fields of medicine and biology, especially as human disease models.

We have developed 30 or more improved NOG mice in the period from 2006 to 2009 under a previous Grant-in-Aid for Scientific Research (S) to improve NOG mice more appropriate for generating humanized mice.

The purpose of this project is to generate more useful humanized mice with human immunity corresponding to various human diseases using the improved NOG mice. In addition, new technologies using human iPS cells for personalized medicine will be investigated for application of humanized mouse models.

【Research Methods】

Based on the results of the previous Grant-in-Aid for Scientific Research (S) from 2006 to 2009 under, the following research will be undertaken.

1. Investigation of the characteristics and usefulness of various improved NOG mice as humanized mice

2. Establishment of the technologies to generate humanized mice with human immunity
3. Investigation of generation of human artificial organs and various stem or progenitor cells from human induced pluripotent stem (iPS) cells
4. Establishment of experimentation systems for various human diseases by combining 1 to 3 above

【Expected Research Achievements and Scientific Significance】

Humanized mice are considered to be very useful to study the mechanisms of human diseases and to develop therapeutic agents. The generation of humanized mice with human immunity attempted in this project may contribute to vaccine development for human infectious diseases, such as malaria and HIV-1. Human artificial organs or various stem and progenitor cells generated from human iPS cells may help overcome the limitation of human resources, and may be applied on the personalized medicine.

【Publications Relevant to the Project】

- Ito, M., K. Kobayashi, and T. Nakahata. 2008. NOD/Shi-scid IL2rgamma(null) (NOG) mice more appropriate for humanized mouse models. *Curr Top Microbiol Immunol* 324:53-76.
- Ito, M., H. Hiramatsu, K. Kobayashi, et al. 2002. NOD/SCID/gamma(c)(null) mouse: an excellent recipient mouse model for engraftment of human cells. *Blood* 100:3175-3182.

【Term of Project】 FY2010-2014

【Budget Allocation】 124, 300 Thousand Yen

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