Basic study to establish a "humanized animal model" by improvement and modification of severely immunodeficient NOG mice

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Outline of survey

Various laboratory animals including mice and primates are used in basic and applied researches in biological, medical, and pharmacological fields. The differences between these animals and humans are great although there is a certain level of similarity. The results obtained from experiments using such laboratory animals are not often applicable to humans.

To solve this problem, attempts have been made to produce "humanized animal models" with human cells, tissues, organs, and a human immune system and metabolic systems. Recently, we succeeded in producing a severely immunodeficient NOD/SCID/gc-(NOG) mouse in which various human cells are differentiated and proliferated by transplantation of human stem cells.

This study is intended to establish severely immunodeficient mice that are more appropriate to generate "humanized animal models" with a complete human immune system or certain human cells, tissues and organs by adding improvements such as expression of the human major histocompatibility complex (MHC), or secretion of various human growth factors and cytokines in NOG mice.

Expected results

This study is intended to establish severely immunodeficient mice essential for generation of "humanized animal models". If the human immune systems is reconstituted or a wide variety of human cells, tissues or organs is grown in these mice by transplantation of human cells, tissues or organs, it becomes possible to study directly by using theses animals a wide variety of human diseases that could be studied only in vitro or in humans to date. Such a "humanized animal model" is extremely useful not only for basic studies on various human diseases but also for the application in developing drugs to treat them.

References by the principal researcher

Ito M, Hiramatsu H, Kobayashi K, Suzue K, Kawahata M, Hioki K, Ueyama Y, Koyanagi Y, Sugamura K, Tsuji K, Heike T, Nakahata T. NOD/SCID/gamma(c)(null) mouse: an excellent recipient mouse model for engraftment of human cells. Blood. 2002;100:3175-3182.

Hiramatsu H, Nishikomori R, Heike T, Ito M, Kobayashi K, Katamura K, Nakahata T. Complete reconstitution of human lymphocytes from cord blood CD34+ cells using the NOD/SCID/gammac null mice model. Blood. 2003;102:873-880.

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