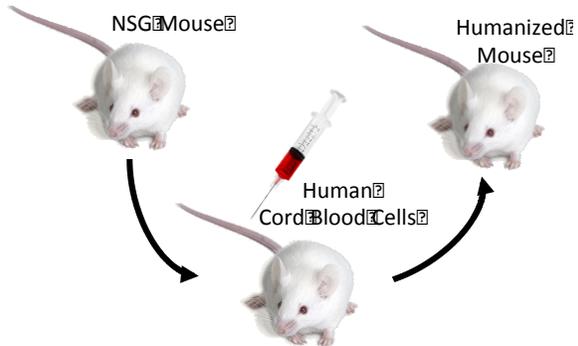


Using cord blood to humanize mice to study immune function in inborn errors of metabolism (IEM)

Humanized mice?

In the last decade, several mouse models have been constructed that allow researchers to transfer or *en*graft foreign tissues and cells. The NSG mouse, developed by The Jackson Laboratory in Bar Harbor, Maine, lacks an immune system and is able to accept human immune cells and tissues better than any other mouse strain. By transferring human immune cells or tissues, the mouse immune system becomes humanized.



Immune function in patients with IEM using humanized mice

Our laboratory focuses on studying immune system function in patients with IEM. Specifically, how good are immune cells from patients with IEM at fighting off infections? One of the tools that we use is humanized NSG mice. White blood cells from blood samples from patients with IEM may be transferred to NSG mice where immune function may be studied. There is limitation, however, eventually the white blood cells see the mouse organs as not human, and attack the mouse causing graft-versus-host-disease. The mice eventually die. With white blood cells from a blood sample from an IEM patient, we have a window of 5 weeks to study immune function before graft-versus-host-disease ensues.

Why cord blood?

While this way of studying immune function is useful, a more long-term solution involves using cord blood samples. Cord blood samples, collected at the time of a baby's birth from the umbilical cord, contain hematopoietic stem cells. Hematopoietic stem cells have the ability to become all the different cells of immune system: T-cells, B-cells, dendritic cells, macrophages, etc. Hematopoietic stem cells from human cord blood can be transferred into NSG mice where they "grow up" and learn how to be human immune cells that can function normally inside the mouse. The major benefit is that since the cells have "grown up" inside the mouse, there is no graft-versus-host-disease, allowing the mice to be studied for longer periods of time. In addition, as mouse gets too old, we can then transfer the bone marrow containing human immune cells to a new mouse, thus keeping the IEM patient sample going for future studies.

How to participate

We are looking for cord blood samples from patients with IEM to help us better understand the function of their immune cells and their ability to fight infection. Cord blood samples may be donated for our studies via our clinical protocol, the NIH

MINI Study: Metabolism Infection and Immunity in IEM. As part of our protocol, we have “samples only participation” where families may donate cord blood samples and other tissues. Cord blood samples may be obtained from already frozen stores or arrangements may be made at the time of a child’s birth. Cord blood samples donated to the study will be used to create humanized NSG mice. If you have any questions regarding cord blood donation, or participating in our clinical protocol at NIH, please contact us below.

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