Researchers uncover signaling pathway that regulates movement of blood-forming stem cells

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Researchers at the Keck School of Medicine of the University of Southern California (USC) have identified a signaling pathway that helps regulate the movement of blood-forming stem cells in the body—a finding that provides important new insight into how stem cells move around the body and which may lead to improvements in the efficiency of bone marrow transplants.

The study will appear in the journal *Nature*, and is available online March 25th.

"By identifying the key mechanism by which these stem cells home and engraft to the bone marrow, it may be possible to pharmacologically treat the cells to activate this pathway and thus increase the effectiveness of bone marrow transplants," says lead author Gregor Adams, Ph.D., assistant professor of cell and neurobiology at the Keck School and a researcher at the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC.

Hematopoietic stem cells are blood-forming cells that circulate through the body shifting back and forth between the bloodstream and bone marrow, Adams explains. When patients receive a bone marrow transplant, healthy blood stem cells are injected into their veins. Unless those stem cells can find their way into a specific site known as the stem cell niche, they cannot develop properly to replenish the white cells, red

cells and platelets in the patient's blood.

The mechanisms that guide the cells during this migration have not been well understood. However, in this study the researchers found that blood-forming stem cells that lacked a specific signaling molecule, called GalphaS, did not home to or engraft in the bone marrow of adult mice, Adams says.

"Here we show that the GalphaS pathway is a critical intracellular pathway involved in this process," he says. "Currently, large numbers of blood-forming stem cells are required in bone marrow transplantation due to the limited efficiency of the homing process. This study opens up the possibility of treating bone marrow cells with GalphaS pathway activators as a means to increase the effectiveness of bone marrow transplants."

Improving the efficiency with which stem cells colonize the bone marrow following transplantation could have far-reaching implications for disease treatment, says Martin Pera, Ph.D., director of the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC.

"For example, such a discovery might enhance the utility of umbilical cord blood, which contains only limited numbers of stem cells, for the treatment of cancer and blood disorders in children and adults," Pera says.

Source: University of Southern California (news : web)

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