Medical Xpress

UCLA researchers identify leukemia stem cells

May 27 2008

Stem cell researchers at UCLA have identified a type of leukemia stem cell and uncovered the molecular and genetic mechanisms that cause a normal blood stem cells to become cancerous.

The discovery may lead to new therapies that target these leukemia stem cells, attacking the disease at its very root and killing the early cells that give rise to the mature cancer cells. The study appears in the May 22, 2008 issue of the journal *Nature*.

Scientists now believe stem cells are responsible for the origin of many cancers and their ability to become drug resistant and spread throughout the body. Current cancer therapies don't target cancer stem cells, only the cancer cells that are generated by them. Scientists theorize that the cancer stem cells – a very small population when compared with mature cancer cells - lay dormant while the cancer cells are killed. Later, sometimes years later, the cancer stem cells begin to self-renew and differentiate into malignant cells, causing a recurrence of the disease.

If scientists could understand the biology of cancer stem cells and find a way to kill them, it might provide what the oncology research community never talks about – a potential cure for certain cancers. If the cancer stem cells could be sought out and eliminated from the body, the cancer could not re-grow.

Led by Dr. Hong Wu, a professor of medical and molecular pharmacology and a scientist with the Eli and Edythe Broad Center of

Regenerative Medicine and Stem Cell Research, the UCLA team has for the first time identified and isolated the stem cells responsible for a type of leukemia known as T-cell or acute T-lymphoblastic leukemia, an aggressive and deadly cancer that , can occur in both children and adults. The team also discovered the mechanisms by which blood stem cells – the cells that become the various cells in the blood supply – are converted to malignant leukemia stem cells, providing potential targets for therapies to home in on and attack those stem cells.

“One of the main challenges in cancer biology is to identify cancer stem cells and define the molecular and genetic events required for transforming normal cells into cancer stem cells,” said Wu, who also is a researcher at UCLA’s Jonsson Comprehensive Cancer Center and senior author of the Nature study. “With this study, we’ve been able to do that in one type of leukemia.”

In mouse models that developed T-cell leukemia, the team studied the cancerous cells and, using a sorting method that sought out certain cell surface markers, was able to identify the leukemia stem cells. Those cells were isolated and then transplanted into other mouse models to see if they developed T-cell leukemia, a sign that the team had been successful in finding the leukemia stem cells.

The team also wanted to know how blood stem cells become cancerous and studied the cells at the molecular and genetic level to uncover those mechanisms.

“We thought that multiple genetic or molecular alterations would have to occur for cancer to develop,” said Wei Guo, a postdoctoral student in Wu’s lab and the first author of the study. “In this case, we were able to find those alterations.”

The alterations found that collaboratively contribute to leukemia stem

cell formation were the deletion of the PTEN tumor suppressor gene, a chromosomal translocation involving c-myc, a gene known to result in cancer that is usually regulated and kept in line, and the activation of a cell signaling pathway called beta catenin.

Wu and her team currently are testing therapies that target the alterations they discovered, hoping to interrupt the process that causes the blood stem cells to become leukemia stem cells, thereby preventing the cancer. They're also looking for other alterations that might be at play in transforming the normal stem cells into cancerous stem cells.

Source: University of California - Los Angeles

Citation: UCLA researchers identify leukemia stem cells (2008, May 27) retrieved 2 May 2024 from https://medicalxpress.com/news/2008-05-ucla-leukemia-stem-cells.html