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Stem Cells May Hold Key to Stopping Spread of Leukemia

Toronto, July 14, 2009––Researchers have discovered that by enriching a class of blood stem cells they can inhibit the growth of a rare but aggressive form of leukemia.

Dr. Yaacov Ben-David, a senior scientist at Sunnybrook Research Institute, and colleagues found that the presence of leukemic inhibitory stem cells in the spleens of a mouse model slows the advance of erythroleukemia, a cancer in which a large number of abnormal red blood cells grow in the blood and bone marrow. Prognosis for patients with this type of leukemia is poor.

With this discovery, scientists have a new model for the development of a more efficient drug therapy for this and other forms of leukemia. It also suggests a route for a novel combination therapy, one that targets both genes and cells.

“Many scientists are using targeted therapy for genes that activate or control the growth of cancer cells,” says Ben-David, who is also a professor at the University of Toronto. “But the cellular environment around the tumour, its microenvironment, is the body’s first defence. If we can first strengthen it by the enrichment of inhibitory stem cells, then we may have a better treatment for patients than with targeted therapy alone.”

The research was pre-published online July 7 in the journal *Blood*.

For their study, the researchers turned to a mouse model of a noncancerous blood disorder, in which the bone marrow makes too many red blood cells. With this condition, despite having an abnormally high number of blood cells, these mice rarely develop erythroleukemia. The researchers thus hypothesized that the inhibitory stem cells have a protective effect.

To test their hypothesis, the scientists induced erythroleukemia in mouse models with this noncancerous blood disorder. Upon analysis, they found that the ability of the leukemic inhibitory stem cells to secrete nitric oxide was primarily responsible for the cells’ anti-tumour properties. They also discovered that specific cytokines, signalling molecules that tell cells how to communicate with each other, enriched the stem cells, strengthening the anti-tumour effect.

“I’m very excited about this work,” says Ben-David, whose lab was the first to show, in 2004, that two proteins in the microenvironment of the spleen hasten the growth of leukemic cells, and that removal of the spleen might therefore be a way to halt the spread of leukemia, an approach now being clinically tested at Sunnybrook.

“Now that we’ve identified a molecular mechanism preclinically, we can look at performing a clinical trial in the near future,” he says.

Erythroleukemia typically affects people aged over 50 years old, though it affects all age groups, including children, and more men than women get it. Risk factors include prior exposure to chemicals, including chemotherapy to treat cancer.

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Media Contact
Stephanie Roberts, 416-482-3812