New discovery points to a new treatment avenue for acute myeloid leukemia

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Dr. John Dick, Senior Scientist at the Ontario Cancer Institute, the research arm of Princess Margaret Hospital, co-led a multinational team that has developed the first leukemia therapy that targets a protein, CD123, on the surface of cancer stem cells that drive acute myeloid leukemia (AML), which is an aggressive disease with a poor outcome.

Dr. Richard Lock is leading the clinical trial in Australia that expands on research suggesting that antibodies targeting cancer stem cells significantly reduced the growth of human AML cells that had been transplanted into immune-deficient mice, a laboratory model that mimics the human disease, establishing the therapeutic potential of this type of therapy.

Dr. Tom Hudson, President and Scientific Director of the Ontario Institute for Cancer Research (OICR) congratulated Dr. Dick, who is the Program Leader of OICR's Cancer Stem Cell Program. Dr. Hudson said, "John Dick has made remarkable progress in the understanding of what initiates and sustains cancer. Together with his collaborators Dr. Dick has developed the first anti-cancer monoclonal antibody therapy that specifically targets cancer stem cells. This discovery offers hope for the development of treatments that target the cancer stem cells of other types of tumours as well."

"This is precisely the role we envisioned for the Ontario Institute for Cancer Research when the McGuinty government created it back in 2005," said Minister of Research and Innovation John Milloy. "Bringing

together this province's considerable strengths around cancer prevention, detection, diagnosis and treatment is helping Ontario lead the fight against this terrible disease."

The research on AML builds on the discovery by Dr. Dick that there is a population of cells within cancer, termed cancer stem cells, which are responsible for sustaining cancer growth. Their earlier research had shown that cancer stem cells are often resistant to standard chemotherapy and since they survive such therapy, they can eventually cause a recurrence of the disease.

The antibody targets the CD123 protein (IL-3 receptor α chain) on the cancer stem cells that drive cancer growth. The antibody does not appear to affect normal blood cells. On the basis of this experimental work, a Phase I clinical trial has been initiated to test safety and effectiveness in patients.

"The cancer stem cell hypothesis is one of the most exciting ideas in cancer biology, with the potential to truly transform cancer therapy. A major question has been whether agents could be developed that specifically target these cells without affecting normal stem cells," said Dr. Benjamin Neel, Director of the Ontario Cancer Institute. "The work of Drs. Dick and Lock provides the first evidence that such therapies may be possible."

More information: The research paper Monoclonal Antibody-Mediated Targeting of CD123, IL-3 Receptor α Chain, Eliminates Human Acute Myeloid Leukemic Stem Cells was published in *Cell Stem Cell* July 2, 2009.

Source: University Health Network