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Detection of Cancer Stem Cells Increases Risk for Poor Outcome

Laboratory studies using two filters refine method of finding the cells

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[Johns Hopkins Kimmel Cancer Center](#) scientists have refined methods used in a previous study to reveal rare pancreatic tumor stem cells thought to fuel cancer growth and predict shortened survival. Pancreatic cancer remains one of the deadliest cancers and most difficult to treat.

To sift away mature cancer cells from the rarer stem cell versions, the Johns Hopkins scientists applied two filters to human pancreatic tumors transplanted into mice. One filter was first used by University of Michigan researchers to catch cells marked with protein flags called CD44 and CD24. The next filter screened for cells containing high levels of an enzyme called aldehyde dehydrogenase, also found in normal bone marrow stem cells. The Johns Hopkins scientists previously used the enzyme filter to identify stem cells in multiple myeloma, a cancer of the bone marrow.

The investigators say that using both filters resulted in a stem cell population that was two to 10 times more concentrated than using either filter alone. Only about one in 500 pancreatic cancer cells has stem cell features.

"Purifying this stem cell population even further is key to identifying the ultimate pancreatic cancer stem cell and eventually identifying the processes that control it," said William Matsui, assistant professor of oncology in the School of Medicine. Investigators could use the information to create drugs that attack stem cell-specific gene products and track stem cell populations as the drugs take effect.

Further analysis revealed that pancreatic cancer stem cells marked with aldehyde dehydrogenase were found in patients who survived on average four months less than patients whose cells lacked the enzyme.

Cancer that spreads is the main culprit in cancer deaths, and the Johns Hopkins researchers believe stem cells have a role in this.

"These stem cells have physical properties similar to the types of cells that are invasive and likely to spread to distant sites," said Zeshaan Rasheed, clinical fellow at the Johns Hopkins Kimmel Cancer Center.

In addition to looking for new drug targets, the investigators are planning studies to tease out stem cells' role in cancer metastasis and disease outcome.

The scientists presented their findings at the American Association for Cancer Research Annual Meeting, held April 12 to 16 in San Diego.

The study was funded by the National Institutes of Health. Additional participants include Jie Yang, Qiuju Wang, Irwin Freed, Daniel Laheru, Xiaobing He, David Berman, Manuel Hidalgo, Antonio Jimeno, Hansbart Koorstra, Seung-Mo Hong and Anirban Maitra, all of Johns Hopkins.