

New tumor proteins may identify a range of cancers early

October 20 2010

A new study led by Ohio State University cancer researchers describes a novel cancer-specific protein that is present in a broad range of cancer types and at all stages of tumor development, from premalignant cells to metastatic tumor cells.

If verified, the antigen could serve as a marker for the early detection and treatment of primary and metastatic tumors, and provide a target for the development of anticancer therapies, the researchers say.

In addition, a vaccine designed to target these cancer-cell proteins, called Piwil2-like (PL2L) proteins, might prevent still-benign tumors from progressing to cancer and prevent recurrence of malignant tumors following surgery.

The study is published online in the Oct. 20 issue of the Public Library of Science journal [PLoS ONE](#).

"This finding is important because we may have identified a common tumor-specific antigen that may also play a role in [tumor development](#) generally," says principal investigator Dr. Jian-Xin Gao, a researcher in the department of pathology and at The Ohio State University Comprehensive Cancer Center – Arthur G. James Cancer Hospital and Richard J. Solove Research Institute.

"This protein might be a biomarker for cancer diagnosis, prevention and therapy, and it could offer a new target for development of new

anticancer agents and a new tumor vaccine."

In 2007, Gao and his colleagues discovered a new type of cell that appears to play a role in cancer development and can either remain benign or become malignant, depending upon environmental cues. They called these cells precancerous stem cells and showed that they stably express the Piwil2 gene, something that normally occurs only in the testis and embryonic tissues.

In this study, they have confirmed that the expressed molecules represent PL2L proteins, which are the products of incomplete, truncated versions of the PIWIL2 gene in humans and mice.

The researchers analyzed mouse tumors and human cancer cell lines using gene-exon-mapping reverse transcription polymerase chain reaction (GEM-RT-PCR), bioinformatics analyses and novel monoclonal antibodies to show that these cells produce abundant PL2L proteins but little complete Piwil2.

Specifically, the alternatively activated PIWIL2 gene can produce at least four versions of these proteins, including PL2L40, PL2L50, PL2L60 and PL2L80. Of these, PL2L60 is the most abundant in tumor cell lines.

Using novel antibodies, Gao and his colleagues identified PL2L60 in a variety of human cancer cell lines including those derived from the blood, skin, soft tissues, kidney, brain, breast, liver, pancreas, cervix, colon, ovaries, liver and lung of humans and mice.

Generally, PL2L proteins are co-expressed with a cell survival and growth promoting protein called NF- κ B in proliferating [tumor cells](#) of primary and metastatic cancers, such as breast and cervical cancers. In contrast, whole Piwil2 was detected almost exclusively in dead or dying

tumor cells, suggesting that PL2L proteins and Piwil2 proteins play opposite roles in tumor development.

"Because PL2L60 is consistently expressed in many types and all stages of cancer, we believe it might play a role in tumor initiation and progression, but might be distinct from the known oncogenes and tumor suppressor genes with regard to its tumorigenic mechanism," Gao says.

"We believe we may have identified a common tumor antigen that may play a role in tumor development generally and serve as a bridge linking cancer diagnostics and anticancer drug development," Gao says.

Provided by The Ohio State University

Citation: New tumor proteins may identify a range of cancers early (2010, October 20) retrieved 18 April 2024 from

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