Researchers identify promising biomarkers and new therapeutic targets for kidney cancer

May 31 2012

Using blood, urine and tissue analysis of a unique mouse model, a team led by UC Davis researchers has identified several proteins as diagnostic biomarkers and potential therapeutic targets for kidney cancer. Subject to follow-up validation testing, inhibition of these proteins and several related pathways holds promise as a form of therapy to slow the growth of kidney tumors.

In a paper just published online in the journal *Cancer Research*, the researchers found high concentrations of specific proteins that point to alterations in three sequences of chemical reactions known as biochemical pathways of mice implanted with human kidney cancer cells. The findings suggest that cancerous tumors modulate the pathways, which in turn makes these pathways potential therapeutic targets.

Nicotinamide and cinnamoylglycine, which were altered as a signature of one of the pathways, are just two of approximately 2,000 chemicals, or metabolites, that the human body produces. Metabolites, referring to any substance produced by metabolism, are a reflection of the body's processes in real time. The field of study, known as metabolomics, enables researchers to discover biomarkers and to identify novel therapeutic targets.

The study used metabolomics techniques and instrumentation to simultaneously examine chemicals in two biofluids (urine and serum, or

blood) as well as tissue from kidney cancer mice models. Seeking to describe the utility of these fluids as tumor indicators, they found that serum metabolomics analysis is the most accurate proxy of chemical changes that are related to kidney cancer.

"It's exciting to report that our identification of several important metabolic processes may well result in the discovery of diagnostic markers and new therapeutic targets for kidney cancers," said lead author Robert H. Weiss, a professor in the UC Davis Division of Nephrology, Department of Internal Medicine. Currently, there are no tests to easily identify kidney cancer and current treatments are not always successful, so these markers will be important tools for detection and new treatments of the disease.

For the study, researchers transplanted human kidney cancer cells into a mouse model capable of growing human tumors. Researchers compared the metabolites identified in the implanted mice against those in a control group of mice that had surgery, but no cancer cells implanted.

If further research with mouse models demonstrates that inhibition of the newly identified targets works in therapy, then preparation for human trials will be a next step.

"This research represents collaboration among many kinds of experts, all of whom are concerned that kidney cancer patients have too few treatment options, which often have debilitating side effects," said Weiss, who serves as chief of nephrology at the Sacramento Veterans' Administration Medical Center in addition to his work at UC Davis.

Provided by Queen's University Belfast

Citation: Researchers identify promising biomarkers and new therapeutic targets for kidney