Biomarker panel identifies prostate cancer with 90 percent accuracy

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Researchers in England say they have discovered a set of biomarkers that can distinguish prostate cancer from benign prostate disease and healthy tissue with 90 percent accuracy. This preliminary data, if validated in larger ongoing studies, could be developed into a serum protein test that reduces the number of unnecessary biopsies and identifies men who need treatment before symptoms begin.

The researchers, from Oxford Gene Technology (OGT) and its subsidiary, Sense Proteomic, Ltd., presented their findings at the Fourth AACR International Conference on Molecular Diagnostics in Cancer Therapeutic Development.

"This pilot study shows the potential for a new diagnostic test for prostate cancer. The measure of clinical specificity — the measure of false positives — is much improved in this study compared to that seen with the current prostate specific antigen and digital rectal examination test procedures used in diagnosis of prostate cancer," said John Anson, Ph.D., vice president of biomarker discovery at OGT.

Prostate cancer caused an estimated 258,000 deaths worldwide in 2008, and is the second most common cause of cancer deaths in males in the United States with approximately 32,000 deaths estimated for 2010. The most effective screening tests now available are based on a single biomarker, prostate specific antigen (PSA). PSA, however, is known to have a specificity of less than 50 percent, which generates high false positive rates, resulting in many unnecessary surgical and radiotherapy procedures, Anson said.

The researchers developed a "functional protein" microarray to detect autoantibodies in prostate cancer serum samples. By identifying the antigens to which these autoantibodies are raised, these autoantibodies can be used as biomarkers of disease.

Although more commonly linked to autoimmune diseases, the immune system also produces autoantibodies in response to other diseases, including cancer, due to pathological changes that occur during the course of the disease.

"The appearance of autoantibodies may precede disease symptoms by many years," Anson said. "This means that autoantibody-based diagnostic tests can enable presymptomatic and early diagnosis of disease. Early diagnosis of cancer, especially aggressive forms, could significantly increase cure rates."

The researchers developed a microarray of 925 proteins, and then used blood samples to test arrays. They compared the results from 73 samples from patients diagnosed with prostate cancer to 60 samples from a control group of cancer-free individuals to find proteins on the arrays that were bound by autoantibodies present in the blood samples.

Panels of up to 15 biomarkers were identified that distinguished prostate cancer from both benign prostate disease and healthy tissue. The researchers are now testing the biomarker panel in 1,700 samples drawn from prostate cancer patients, cancer-free controls, and patients with other cancers or with other prostate diseases. Identifying prostate cancer from other prostate disease will be the real test of the biomarker panel, according to Anson.

"The latter can present similar symptoms to prostate cancer and can, in many cases, raise PSA levels and trigger a biopsy. OGT expects its biomarker panel to discriminate between prostate cancer and these 'interfering' diseases," said Anson.

In addition to prostate cancer, OGT's "functional protein" microarray can be applied to discover biomarker panels and ultimately develop better

diagnostic tests for other cancers and autoimmune diseases. Early results in systemic lupus erythematosus and non-small cell lung cancer are encouraging.

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