No. 31 June 24, 2014 (Ter/Sel)

Protein test instead of cystoscopy

A recent study from the Heidelberg-based company Sciomics, a spin-off from scientists from the German Cancer Research Center (DKFZ), has presented an advanced method to predict the recurrence of bladder cancer after surgery. The method, which can help avoid frequent cystoscopy examinations in a majority of patients, is based on an analysis of the protein composition of cancer tissue obtained during surgery. The test detects proteins relevant to cancer that are suspected to promote recurrence, thus facilitating a prognosis for the disease.

Approximately 60 percent of patients suffering from bladder cancer that has not yet spread to layers of muscle tissue in the bladder have a recurrence of the disease within five years after surgery. “These patients must have a cystoscopy every three months,” says Dr. Christoph Schröder, proteome researcher at the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) and CEO of Sciomics GmbH. “For many people this is an unpleasant examination, and it is also costly. We wanted to find a way to make things easier for the patients and save costs at the same time.” In a recent study, the scientists compared cancer tissue obtained from patients who had remained cancer-free within five years after their surgery with tissue from patients who had suffered a relapse. Of the 725 proteins that were analyzed, over a third exhibited significant differences between the two patient groups. “We identified 255 proteins that appeared at either much higher or much lower levels when comparing the samples,” said Schröder. This enabled the researchers to classify the cases into distinct groups. They selected 20 of the proteins whose behavior could be used to predict the chances of a recurrence very precisely.

“The results are promising. We will now extend the study to several hundred patients in hopes of confirming our results,” says Dr. Jörg Hoheisel, head of division at the DKFZ. However, Hoheisel says, the development of a clinical application will require quite some time; the cases must be monitored for at least five more years.

To carry out the study the scientists used antibody microarrays, which can also be simple and effective diagnostic tools. One type of microarray attaches thousands of antibodies, each of which is capable of binding to a specific protein, into rows on a solid surface. When the scientists pour a solution of proteins on the array, any of the molecules bearing a binding site that is complementary to one of the antibodies will attach itself, leaving it caught in the researchers trap. A single array can hold a vast number of spots, permitting the detection of thousands of antibody-protein combinations in a single experiment. Subsequently, the array is scanned by a laser to make the proteins visible through a color (fluorescence) reaction. This allows scientists to determine which proteins are present in a sample and the quantities at which they are produced.

Scientists use microarrays to screen for differences in protein expression – between different types of patients, or to compare healthy and diseased tissue. This permits the development of distinction criteria, or biomarkers, that can be used to make an initial diagnosis, predict how a disease will progress, or choose the most promising treatment. Microarrays also deliver important results for the pharmaceutical industry in the development of compounds for new drugs.

Thus the use of antibody microarrays extends beyond cancer-related research to making diagnoses and prognoses for individual patients. “The method can also be used to detect other pathogenic alterations, sometimes at very early stages,” says Schröder. “A previous study has shown that it can be used to diagnose different types of pancreatic cancer. And an ongoing project suggests that it can be used to predict whether a patient will experience acute kidney failure in the aftermath of cardiac surgery or a lung transplant, before surgery is ever performed. It’s crucial information to have because this risk may be up to 50 percent,” Hoheisel adds.

Harish Srinivasan, Yves Allory, Martin Sill, Dimitri Vordos, Mohamed Saiel Saeed Alhamdani, Francois Radvanyi, Jörg D. Hoheisel, Christoph Schröder: Prediction of recurrence of non muscle-invasive bladder cancer by means of a protein signature identified by antibody microarray analyses. Proteomics, 2014, 2014, 14(11):1333-42, DOI: 10.1002/pmic.201300320.

Sciomics GmbH is a start-up biotech company based in Heidelberg. Founded as a spin-off from the German Cancer Research Center (DKFZ), it specializes in the development and distribution of protein and antibody microarrays. Sciomics offers services comprising the whole process from the design of the arrays, over their production and analysis, to detailed result reports. Together with fellow DKFZ spin-off PEPperPRINT GmbH and Cambridge Protein Arrays in the United Kingdom, Sciomics collaborates closely in a network that jointly offers a range of microarrays. Company founders Dr. Christoph Schröder and Dr. Jörg Hoheisel have been instrumental in the development of the microarrays for the past ten years and are internationally well-known for key publications in the field.

The German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) with its more than 2,500 employees is the largest biomedical research institute in Germany. At DKFZ, more than 1,000 scientists investigate how cancer develops, identify cancer risk factors and endeavor to find new strategies to prevent people from getting cancer. They develop novel approaches to make tumor diagnosis more precise and treatment of cancer patients more successful. The staff of the Cancer Information Service (KID) offers information about the widespread disease of cancer for patients, their families, and the general public. Jointly with Heidelberg University Hospital, DKFZ has established the National Center for Tumor Diseases (NCT) Heidelberg, where promising approaches from cancer research are translated into the clinic. In the German Consortium for Translational Cancer Research (DKTK), one of six German Centers for Health Research, DKFZ maintains translational centers at seven university partnering sites. Combining excellent university hospitals with high-profile research at a Helmholtz Center is an important contribution to improving the chances of cancer patients. DKFZ is a member of the Helmholtz Association of National Research Centers, with ninety percent of its funding coming from the German Federal Ministry of Education and Research and the remaining ten percent from the State of Baden-Württemberg.

Contact:

Dr. Stefanie Seltmann
Head of Press and Public Relations
German Cancer Research Center
Im Neuenheimer Feld 280
D-69120 Heidelberg
T: +49 6221 42 2854
F: +49 6221 42 2968
presse@dkfz.de

Dr. Sibylle Kohlstädt
Press and Public Relations
German Cancer Research Center
Im Neuenheimer Feld 280
D-69120 Heidelberg
T: +49 6221 42 2843
F: +49 6221 42 2968
Email: presse@dkfz.de