New test developed to detect men at high risk of prostate cancer recurrence

April 5 2014

Vienna, Austria: A new genetic "signature" to identify prostate cancer patients who are at high risk of their cancer recurring after surgery or radiotherapy has been developed by researchers in Canada, the 33rd conference of the European Society for Radiotherapy and Oncology (ESTRO33) in Vienna will hear today (Saturday).

Professor Robert Bristow will tell the conference that although surgery and precision radiotherapy are the mainstays of treatment for cancer that is confined to the prostate, the cancer will return in between 30-50% of patients due to spread of the disease outside the prostate gland that was undetected during the initial treatment.

"Men who fail treatment within two years may be at the highest risk of dying from their prostate cancer," he will say. "Existing methods for identifying high risk patients are imperfect, so new tests are required that are better at predicting which patients will have their cancer recur. These men can then be offered additional treatments, such as chemo- and hormone therapy, that will combat the prostate cancer throughout their entire body, rather than therapies solely focused on the prostate, in order to improve their chances of survival."

Prof Bristow (MD, PhD, FRCPC), a clinician-scientist at the Princess Margaret Cancer Centre and a Professor at the University of Toronto, Canada, and Dr Paul Boutros from the Ontario Institute of Cancer Research, together with their Canadian team, have developed a "signature" based on the DNA of the patient's prostate cancer that can

accurately predict treatment failure in patients undergoing radiotherapy or surgery. The tumour's genetic characteristics and its microenvironment were analysed from biopsy tissue taken before the start of treatment.

"This is the first report of a test using this information derived from biopsy samples that can predict with close to 80% accuracy which men are at high or low risk of their prostate cancer recurring," he will say.

The researchers need to validate the test over the next two to three years in different and larger groups of patients to ensure that it will work successfully in hospitals worldwide. "If all goes well, then this will lead to a new test for cancer patients that can be turned around in three days and will tell doctors which patients will do well with local treatment alone – surgery or radiotherapy – and which will need extra treatment," Prof Bristow will say.

The researchers analysed DNA from biopsied tissue taken from 126 men who were predicted to be at intermediate risk of their cancer returning. The men were treated with image-guided radiotherapy (IGRT), which focuses the radiation more precisely on the tumour, and they were followed up for an average of 7.8 years. The researchers used a process for analysing the tumour DNA called array comparative genomic hybridization (aCGH), which looks at the patient's whole genome and identifies areas where there are missing, extra or irregular sections of DNA. From this information they were able to develop the genetic signature that identified men at high and low risk of their cancer recurring.

Then the researchers tested the genetic signature on a second group of 150 patients who were also at intermediate risk of cancer recurrence and who went on to have their tumours removed by surgery (radical prostatectomy). The signature test produced results similar to those in

the first group.

In a secondary study, the researchers tested the oxygen content of the tumours from men treated with IGRT and found that this also predicted outcome, independently of the genetic signature test. Tumours with high levels of hypoxia (oxygen deprivation) were associated with worse survival.

"Importantly, we found that when we combined the signature with the additional information about the tumour's oxygen content, this made the genetic test even more accurate," Prof Bristow will say.

Men with low levels of genetic changes and low hypoxia had the best outcome, with 93% surviving for five years without their cancer recurring. Men with high levels of genetic alterations and high hypoxia had worse outcomes, with 49% surviving for five years without recurrence.

"These results will enable us to develop a new way of personalising medicine, so that we can improve cure rates and reduce the chances of the cancer spreading to other parts of the body," concludes Prof Bristow.

Professor Vincenzo Valentini, president of ESTRO and a radiation oncologist at the Policlinico Universitario A. Gemelli, Rome, Italy, commented: "This is exciting research because an accurate and quick test that can predict which men are most likely to need extra treatment to reduce the risk of a recurrence of their cancer is urgently needed. If the utility of this genetic signature is confirmed in further research over the next few years, it could become an important tool for helping us to better target appropriate treatment according to the genetic make-up of each man's tumour."

More information: Abstract no: O-0139, "Interdisciplinary 2:

Prediction and modelling" session, 16.15-17.15 hrs (CEST) on Saturday, 5 April, Strauss 1.

Provided by European Society for Radiotherapy and Oncology