Medical Xpress

Long-term study shows low oxygen levels in prostate tumors can predict recurrence

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Fox Chase Cancer Center researchers have discovered that low-oxygen regions in prostate tumors can be used to predict a rise in prostate-specific antigen (PSA) levels, a marker of tumor recurrence in prostate cancer. The long-term study results will be presented at the 2009 American Society of Clinical Oncology annual meeting in Orlando, FL.

Aruna Turaka, M.D., radiation oncology fellow at Fox Chase and lead author on the study, explained that low oxygen, or hypoxia, in tumors is a well-known risk factor for radiation resistance in solid tumors. Between 2000 and 2002, Fox Chase research colleagues published six research papers detailing the link between tumor hypoxia, radioresistance, and the risk of increased PSA levels. But mean follow-up at the time of those studies was 19 months, she said. The current study reinforces those preliminary findings with more "mature" data and a median follow-up of 8 years.

In the current study, Turaka and her colleagues used a custom-built probe to monitor the amount of oxygen that prostate tumors and non-cancerous muscle tissue were receiving. They used this probe on 57 patients with low or intermediate risk of cancer just before the patients received a form of localized radiation therapy. The researchers then tracked the patients over time, looking for a correlation between the amount of oxygen levels in the prostate tumor relative to the muscle tissue at the time of therapy and later looked at the increase in PSA levels.

Eight of the 57 patients experienced an increase in PSA levels following prostate cancer treatment, defined as an increase of 2 ng/mL above the lowest PSA reading following brachytherapy. Overall, average muscle oxygenation was 12.5-times higher than that of the tumor (30 mm Hg vs 2.4 mm Hg). Using a statistical model that accounted for such risk factors as tumor grade, PSA level, and tumor size, the team determined that hypoxia was a significant independent predictor of an increase in PSA levels.

In other words, even after accounting for PSA value, Gleason score, tumor size, age, and other prostate cancer risk factors, tumor hypoxia alone could predict the likelihood of increased PSA levels, and potentially tumor recurrence.

"Now", Turaka said, "the goal is to apply the results to the clinic". That, she said, requires a two-pronged approach: developing noninvasive screening methods to identify hypoxic tumors, and more potent anticancer weapons to target them.

"We already knew that there are hypoxic regions within cancers," she said. "The future goal is to interpolate that to relate to the expression of molecular markers [such as hypoxia-inducible factor-1-alpha] and attack those tumors with dose escalation radiation oncology strategies and targeted agents."

Source: Fox Chase Cancer Center (news : web)