Lack of Oxygen Influenced Tumor Behavior and Patient Outcome in Intermediate-risk Prostate Cancer

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- Low oxygen (hypoxia) predicts prostate cancer recurrence after radiotherapy.
- Measuring prostate cancer hypoxia could help identify the best treatment for patients.
- New treatments that target prostate cancer hypoxia could improve patient outcome.

CHICAGO — Hypoxia, or a lack of oxygen, in prostate cancer tumors was associated with early biochemical relapse and local recurrence after radiotherapy in men with intermediate-risk disease, according to a study published online today in *Clinical Cancer Research*, a journal of the American Association for Cancer Research, and presented at an AACR Annual Meeting 2012 press conference.

This new insight into the behavior of prostate cancer tumors could lead to the development of new treatment strategies that target hypoxia or the manifestations of hypoxia and ultimately improve outcomes, according to Michael F. Milosevic, M.D., radiation oncologist in the Princess Margaret Hospital Cancer Program, University Health Network and professor of radiation oncology at the University of Toronto, in Toronto, Ontario, Canada.

Localized prostate cancer commonly is treated with surgery or radiotherapy, and about 25 percent of men develop either progressive local disease or metastases — when cancer spreads to bones or other areas of the body. Doctors now rely on a range of clinical factors to predict how patients will respond to these treatments. The ability to identify biologic factors that influence prostate cancer behavior will enable physicians to better select the most appropriate and effective treatments for individual patients, according to Milosevic.

“Our particular focus was to look at aspects of prostate tumors related to hypoxia,” he said. “Many kinds of tumors are hypoxic, but it has never conclusively been demonstrated before in prostate cancer.”

Milosevic and colleagues measured hypoxia in 247 men with localized prostate cancer prior to radiotherapy and followed them for a median of 6.6 years. The five-year biochemical relapse-free rate was 78 percent, determined by measuring blood prostate-specific antigen (PSA) levels over time. Researchers found that a

percentage-of-oxygen reading of <10 mm Hg in the tumors independently predicted early biochemical relapse after radiotherapy.

When the researchers specifically evaluated 142 patients with bulk tumors at the site of the oxygen measurement, they found that hypoxia was even more strongly associated with early biochemical relapse. In addition, hypoxia was the only factor identified that predicted local recurrence in 70 patients who had biopsies performed during follow-up.

“People do worse if they have low oxygen levels in their prostate cancer,” Milosevic said. “In addition, the length of time over which they do poorly seems to be shortened. These patients tend to develop evidence of cancer recurrence at earlier time points, within a few years of completing treatment, compared with other patients.”

Simpler ways to measure prostate cancer hypoxia need to be explored, according to Milosevic.

“The way we measured hypoxia in our study was a rigorous method that is not applicable to widespread clinical practice,” he said. Although other methods exist, such as evaluating biopsy tissue or using imaging, they still need to be validated.

Milosevic and colleagues hope that their research will lead to new treatment approaches for those men identified as having hypoxia.

“We want to actually be able to intervene in their treatment and improve their outcomes,” he said. “We hope to explore this concept of new drugs that might target hypoxia or manifestations of hypoxia so treatments are more effective.”

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organizations. As the Scientific Partner of Stand Up To Cancer, the AACR provides expert peer review, grants administration and scientific oversight of individual and team science grants in cancer research that have the potential for patient benefit. The AACR actively communicates with legislators and policymakers about the value of cancer research and related biomedical science in saving lives from cancer.

For more information about the AACR, visit www.AACR.org [6].

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