



Trends in
Medical Research

ISSN 1819-3587



Academic
Journals Inc.

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Tumor Cells in Blood May Signal Worse Prognosis in Head and Neck Cancer Patients

A new study suggests that the presence of tumor cells in the circulating blood of patients with squamous cell cancer of the head and neck may predict disease recurrence and reduced survival. An increased number of Circulating Tumor Cells (CTCs) also correlates with a worse outcome.

Those are the early findings from an ongoing, prospective study of the prognostic importance of CTCs by a team of researchers at The Ohio State University Comprehensive Cancer Center-Arthur G. James Cancer Hospital and Richard J. Solove Research Institute.

The study is published in the Dec. issue of the Archives of Otolaryngology, Head and Neck Surgery.

"These findings are extremely exciting, and they suggest that the presence of circulating tumor cells in the blood is correlated with reduced disease-free survival," says Co-first Author Dr. Kris Jatana, Assistant Professor of Otolaryngology-head and neck surgery at The Ohio State University and Nationwide Children's Hospital. "If these results are supported with continued prospective follow-up, CTCs would be used as a prognostic marker to help further individualize therapy."

Squamous cell carcinomas make up 95 percent of the 36,500 new cases of head and neck cancer expected to occur in the United States in 2010, and the estimated 7,900 deaths from the disease. Currently, no prognostic blood test exists for this malignancy.

With 5 billion red blood cells and 7 million white blood cells in just 20 drops of blood (that is, in one milliliter), counting the much-smaller number of CTCs that might be in a patient blood sample specimen is a challenge.

This team of researchers identified CTCs after first removing normal cells so that abnormal cells -- cancer cells -- remained, a method called negative depletion. They eliminated all the red blood cells by rupturing them, then removed healthy white blood cells by labeling them with magnetic nanoparticles and used a strong magnetic field to pull them out of each sample. Finally, the remaining abnormal cells were stained and manually counted.

"We believe our technique is superior to others because it removes normal cells from the blood, allowing for the detection of CTCs in their native state," Jatana says. "Other reported techniques identify only those cells with a specific surface marker, which has the potential to miss abnormal cells."

This study involves 48 patients who underwent surgical intervention for squamous cell cancer of the head and neck, 35 of which had smoked the equivalent of a pack of cigarettes a day for 15 years, and half of them were moderate to heavy alcohol consumers.

"Although smoking and alcohol consumption are a contributing risk factor for developing head and neck cancers, patients who do not use either also can develop the disease," Jatana says. Patients in the study were followed for an average of 19 months after surgery.

To date, no instances of cancer recurrence or disease-related mortality occurred in patients with no CTCs. The study found a correlation between an increasing number of CTCs and a worse prognosis.

"In the future, along with continued follow-up of these patients, we want to further characterize these cells and determine if this technology can be used for early detection of cancer recurrence," Jatana says. "This could help us individualize treatment and optimize outcomes for head and neck cancer patients."

Funding from the National Science Foundation, the National Cancer Institute and the State of Ohio Third Frontiers Program supported this research. Jeffrey Chalmers, professor of chemical and biomolecular engineering at Ohio State, is the principal investigator for these grants.

Other Ohio State researchers involved in this study were Jas C. Lang, PhD, Elisabeth White, Amit Agrawal, MD; Enver Ozer, MD; David E. Schuller, MD; and Ted N. Teknos, MD, of the Department of Otolaryngology -- Head and Neck Surgery; Priya Balasubramanian PhD; Liying Yang, PhD; and Jeffrey J. Chalmers, PhD, of the William G. Lowrie Department of Chemical and Biomolecular Engineering; and Courtney A. Jatana, DDS, of the Department of Oral and Maxillofacial Surgery.

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