Molecular fingerprint discovered that may improve outcomes for head and neck cancer patients

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Researchers at Albert Einstein College of Medicine of Yeshiva University and Montefiore Medical Center, the University Hospital for Einstein, have found a biomarker in head and neck cancers that can predict whether a patient's tumor will be life threatening. The biomarker is considered particularly promising because it can detect the level of risk immediately following diagnosis. This discovery could become a component of a new test to guide how aggressively those with head and neck tumors should be treated. The findings were published online January 9 in the *American Journal of Pathology*.

"Previous efforts to identify biomarkers for guiding treatment of head and neck cancer have not developed anything clinically useful for patients," said Geoffrey Childs, Ph.D., professor of pathology at Einstein and co-senior author of the paper.

Head and neck cancers, the sixth most common malignancy among men worldwide, most often affect the mouth, back of the throat and larynx (voice box). Smoking and alcohol use are major risk factors. Only half of patients are still alive more than five years after diagnosis—a survival rate that hasn't changed in 40 years.

In their study, researchers took tissue samples from tumors and nearby healthy tissue of 123 head and neck cancer patients at Montefiore and measured levels of 736 members of a class of RNA molecules known as

microRNAs. Certain members of this family of RNAs, which regulate protein abundance in cells, are abnormally expressed in head and neck cancers as well as every other malignant cell type yet examined. Of all the microRNAs measured, one in particular – miR-375 – stood out for being the most down-regulated (i.e., expressed at low levels) in head and neck tumors compared with its levels in adjacent normal tissue.

The researchers ranked these 123 patients according to how extreme the difference was between the miR-375 in their tumor and in adjacent normal tissue, with that difference expressed as the ratio "miR-375 level in patient's tumor tissue divided by miR-375 level in patient's normal tissue." All patients were then followed throughout the course of their illness.

MiR-375 proved to be a highly useful biomarker for predicting disease outcome. The patients for whom the difference between their tumor and normal-tissue miR-375 levels was most extreme (i.e., the one-fourth of patients with the lowest ratios) were nearly 13 times more likely to die or 9 times more likely to experience distant spread (metastasis) of their cancer compared to patients with higher miR-375 ratios.

"As as a result of our study," Dr. Childs noted, "we hope that miR-375 will become part of a laboratory test to determine which patients have potentially lethal tumors and therefore should be treated aggressively following initial diagnosis. Our entire head and neck cancer group is working to identify and refine additional biomarkers to create a useful clinical test or 'personalized genetic signature' to help individual patients get the best possible treatment."

Provided by Albert Einstein College of Medicine

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