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Researchers show that a promising drug can help prevent head and neck cancers

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Head and neck cancers typically begin in squamous cells that line moist surfaces inside the mouth, nose and throat. Squamous cell carcinoma of the head and neck (HNSCC) is the sixth most common type of cancer in the United States, and it is sometimes preceded by the appearance of changes inside the oral cavity called precancerous lesions. The most common type of change is a white patch known as a leukoplakia. Because it often takes decades for leukoplakias to develop into HNSCC, there is a window of opportunity to recognize and revert precancerous changes, thus preventing this type of cancer.

Researchers at Fox Chase Cancer Center have brought the field one step closer to the goal of prevention by demonstrating the efficacy of a promising naturally occurring agent that targets a gene that is important for the growth of leukoplakia cells in the mouth. They will present the findings at the AACR Annual Meeting 2013 on Tuesday, April 9.

They found that pharmacological inhibition of this gene, called cytochrome P450 1B1 (CYP1B1), led to a decrease in the movement and proliferation of leukoplakia cells. This research, was carried out by Ekaterina G. Shatalova, PhD, Research Associate at Fox Chase, and Margie L. Clapper, PhD, Co-leader of the Cancer Prevention and Control Program at Fox Chase.

"The difficulty in treating head and neck cancer is that the majority of the patients are diagnosed at advanced stages. This is one of the reasons why the five-year survival rate for head and neck cancer is only 40 to 50

percent," says Dr. Shatalova. "So the earlier we can treat these patients, the better."

The CYP1B1 protein metabolizes tobacco smoke and ethanol, known risk factors for head and neck cancer, generating potentially carcinogenic compounds. Shatalova, Clapper and their colleagues previously found that genetic deletion of CYP1B1 dramatically reduced the migration and proliferation of leukoplakia cells taken from the mouths of patients. "In the present study, we wanted to see if treating the same cells with a pharmacologic CYP1B1 inhibitor, which could possibly be used in humans, would have the same effect on cell motility and proliferation as genetic manipulation," Shatalova says.

In the new study, the researchers used homoeriodictyol (HED), a common dietary flavonoid that selectively inhibits CYP1B1. Consistent with their previous findings, exposure of leukoplakia cells to HED for several days resulted in an approximate seven-fold decrease in the rate of cell movement, as well as a 33 percent decrease in proliferation, when compared with untreated cells.

"Because the compound we used is abundant in citrus fruits and it is considered by the Food and Drug Administration to be a safe food additive, it is likely to be non-toxic to humans and thus could represent a promising agent for routine use," Shatalova says.

Moving forward, the researchers will test whether HED treatment reduces tumor growth and metastasis in animal models. "These novel effects of CYP1B1 inhibition could guide efforts to establish new strategies for the prevention and treatment of head and neck cancers," Shatalova says.

Provided by Fox Chase Cancer Center