

Stress triggers tumor formation, researchers find

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Stress induces signals that cause cells to develop into tumors, Yale researchers have discovered. The research, published online Jan. 13 in the journal *Nature*, describes a novel way cancer takes hold in the body and suggests new ways to attack the deadly disease.

Until now, most researchers believed that more than one cancer-causing mutation needed to take place in a single cell in order for tumors to grow. The Yale team, led by Tian Xu, professor and vice chairman of genetics and a Howard Hughes Medical Institute Investigator, illustrated that cancer-causing mutations can cooperate to promote [tumor development](#) even when they are located in different cells within a tissue.

"The bad news is that it is much easier for a tissue to accumulate mutations in different cells than in the same cell," said Tian, who also is a researcher with the Yale [Cancer](#) Center and the Fudan-Yale Center for Biomedical Research at Fudan University in China.

The Yale team worked with fruit flies to study the activity of two genes known to be involved in development of human cancers: a gene called RAS that has been implicated in 30 percent of cancers, and a tumor-suppressing gene called scribble, which contributes to tumor development when mutated. Neither a mutated RAS nor the defective scribble alone can cause cancer. Researchers in the Xu lab previously showed that a combination of the two within the same cell could trigger malignant tumors.

However, the Yale team found that these mutations did not have to co-exist in the same cell to cause tumors. A cell with only mutant RAS can develop into a [malignant tumor](#) if helped by a nearby cell with defective scribble. They also found [stress](#) conditions such as a wound could trigger [cancer formation](#). For instance, RAS cells developed into tumors when a wound was induced in the tissue. The culprit underlying both phenomena turned out to be a signaling process called JNK, which is activated by environmental stress conditions.

"A lot of different conditions can trigger stress signaling: physical stress, emotional stress, infections, inflammation - all these things. Another bad news for cancer" Xu said.

While the paper shows it is easier than previously thought for cancer to take root in the body, it also identifies new targets to prevent and treat one of the deadliest diseases in the developed world. The Yale team found that the JNK stress signaling travels from one cell to the next, but that the propagation can be blocked.

"Better understanding of the underlying mechanism causing cancer always offers new tools to battle the disease," Xu said.

Provided by Yale University

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