Study: Sugars on Cells Can Control Cancer

By Robert Cooke
STAFF WRITER

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Strange and complex sugar molecules that cover cancer cells can be exploited to control a tumor's growth, scientists announced yesterday.

The discovery, reported by a research team at the Massachusetts Institute of Technology, may offer a way to slow or stop the deadly expansion of tumors, and even block the spread of metastases, the tumors' deadly "seeds," they said.

"We've essentially shown that the sugars on tumor cells seem to be very important players in the tumor's progress," said bio-engineer Ram Sasi- sekharan. "Therefore, it's a very important therapeutic target for new anti- cancer strategies. We showed that we can inhibit a primary tumor's growth, and metastasis, in mice."

Whether these findings can be translated into cancer therapies for people is not yet known. But early experiments show that the complex sugars "are pretty potent agents that show a lot of promise." There were no signs of toxic side effects caused by the treatments in mice, Sasisekharan added.

Two different sets of sugar molecules, called glycosaminoglycans, were isolated and studied. One set of sugars, when injected, spurred rapid tumor growth. The other set did the opposite, dramatically inhibiting tumor growth. The same treatments also pushed, or stopped, the growth of new blood vessels needed to feed a tumor.

The sugar molecules being studied occur naturally as parts of an odd structure called the extra-cellular matrix, called ECM, a tenuous zone of proteins and sugars that coats the surface of each cell like the icing on a cake. The ECM seems to be a filter-like structure that governs what chemical signals actually reach the cell and drive its behavior.

For years, Sasisekharan said, researchers have considered the ECM as inert stuff, a sort of filling that surrounds the trillions of cells that make up the body. Increasingly, it is seen as a fundamentally important player, a sensing mechanism that the cell uses to tell where it is, who its neighbors are and what it should be doing.

According to the MIT team's report, these recent experiments with

special sugars, and the enzymes that cut them loose from cell surfaces, have opened a new avenue for cancer research. The work may provide new insight into the mysteries of the ECM itself.

The experiments were first done in laboratory dishes, and then advanced into mice. By using the different sugars themselves, or employing the enzymes that "process" them, Sasisekharan and his four co-workers could dramatically boost, or slow, tumor growth and metastasis in mice. The report was carried in The Proceedings of the National Academy of Sciences.

"We were fascinated that the tumor cell's coat contains sugar sequences that can both promote and inhibit growth," Sasisekharan said. The term "sequence" refers to the molecular arrangement, the chemical "spelling" of the sugar molecule.