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Viewing cancer cells in 'real' time

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A breakthrough technique that allows scientists to view individually-labeled tumor cells as they move about in real time in a live mouse may enable scientists to develop microenvironment-specific drugs against cancer, researchers report at the American Society for Cell Biology (ASCB) 48th Annual Meeting, Dec. 13-17, 2008 in San Francisco.

With this technique, researchers at the Albert Einstein College of Medicine's Gruss Lipper Biophotonics Center in New York City are targeting intravasation, the deadly process by which tumor cells invade the surrounding basal membrane and tap into blood vessels, from which they obtain nutrients that allow them to grow and spread in the body.

Viewing the cancer cells in real time through a special glass "window" inserted into a tumor in the animal's mammary gland, the scientists marked the cells in the tumor with a green fluorescent protein and then bathed two small groups of cells in a blue laser, permanently "photo-switching" the green fluorescence to red.

Through the glass "window," the researchers followed the two red photo-switched cancer cell populations as they grew and moved about in reaction to their microenvironments.

The scientists, Bojana Gligorijevic, Dmitriy Kedrin and Jacco van Rheenen, in the labs of Jeff Segall and John Condeelis at Albert Einstein, found that the microenvironment decides single cells' fate even in a very small tumor.

In the experiment, the two red-switched cell populations were only five cell diameters apart in the tumor.

One group was near a blood vessel, while the other was farther "inland" in the tumor. Twenty-four hours after the red markers were switched on, the cancer cells near the vessel could be seen moving towards the blood supply.

The number of these marked cells decreased as they were launched into the blood circulation. Meanwhile, the inland cancer population moved little but increased in number.

Gligorijevic says that she and her colleagues will zero in on the differences between the two microenvironments, to identify the critical interactions that drive intravasation in one part of the tumor and not in the other.

"Using this approach we can now link the behavior of individual tumor cells to the type of microenvironment within the tumor, a classification which will help us in developing and testing microenvironment-specific drugs," Gligorijevic explains.

Source: American Society for Cell Biology