

## 'Live' imaging reveals breast cancer cells' transition to metastasis

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The spread, or metastasis, of individual breast cancer cells from the main tumor into the blood circulation to the lungs and other body tissues and organs is under the control of a growth factor abbreviated TGFb, according to a study with laboratory mice that will be presented at the American Society for Cell Biology 49th Annual Meeting, Dec. 5-9, 2009 in San Diego.

These messenger genes may be a promising target for drugs to block the [metastatic breast cancer](#) route, said Erik Sahai, Ph.D., of Cancer Research UK in London.

"The results helped us to find the set of genes that are behind the spread of breast cancer -- and that the genes need to be first turned on and then off in order for single [cancer cells](#) to be able to 'relocate,'" Sahai said.

Sahai's presentation at the ASCB conference follows the Oct. 2009 publication of the study in Nature Cell Biology.

In their studies with [laboratory mice](#) with breast cancer, Sahai and his colleagues determined that the control switch is the TGFb (transforming growth factor beta) that previous research had shown to regulate normal cell growth and movement.

Using an advanced microscopy and analysis technique, the Cancer UK scientists documented the movement of the cancer cells from the mouse's primary tumor site.

Because the cancer cells were tagged with a "reporter" protein that glowed blue when the TGFb cell messenger system was active, the researchers were able to determine that single breast cancer cells broke away from the main tumor and entered the [blood system](#) when TGFb first turned on the messenger genes in the cancer cells and then turned them off.

But, when TGFb was inactive, clumps, not individual, [breast cancer](#) cells broke away from the main tumor. Because these clumps can spread only through the lymphatic system, the [metastasis](#) was local, not through the blood.

The spread of individual cancer cells is more life-threatening than is the metastasis of a group of cells.

While single cells can travel through the [blood circulation](#) to sites throughout the body, groups of cancer cells are limited the lymphatic system, which keeps them local.

Advanced microscopy and analysis, said Sahai, allows researchers to investigate cell signaling "live" while observing individual cancer cells make the crucial transition to metastasis. It gives science a closer look at a process that has been largely hidden.

"Surprisingly little is known about the way cancer cells spread through the body because it is so incredibly difficult to study," said Sahai.

"In a medium-sized tumor there could be a billion cells -- and only a small proportion might break away and spread. So it is like trying to find -- and understand -- a moving needle in a very big haystack."

Source: American Society for Cell Biology

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