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New finding in cell migration may be key to preventing clots, cancer spread

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Researchers at the University of Illinois at Chicago College of Medicine have discovered how cells in the body flatten out as they adhere to internal bodily surfaces, the first step in a wide range of important processes including clot formation, immune defense, wound healing, and the spread of cancer cells.

Their study is published in the January 15 issue of *Science*.

Xiaoping Du, UIC professor of pharmacology, and his colleagues were trying to better understand how platelets in the blood form clots. Clots that form in blood vessels can lead to heart attack and stroke.

To form clots, platelets flatten out to seal the wound and to bind to each other, a process called "spreading." Spreading is the first step in a number of cell processes, Du says.

In order for cells to move, they must adhere and spread onto the extracellular matrix, a scaffolding of fibers that supports cells. Only then is the cell able to crawl along -- whether it be an immune cell moving toward a wound, or a cancer cell invading neighboring tissue.

Adhesion to the extracellular matrix is mediated by cell receptors called integrins. Du's team "found the mechanism for the transmission of the signal to spread" by the integrins, he said.

The integrin molecule spans the cell membrane, with a portion of the

integrin inside the cell and another part outside.

When the outside part of the integrin molecule binds to the matrix, a signal is sent inside the cell via a G protein, a type of protein involved in cell signaling but that was not previously known to interact with integrins.

Du and his colleagues found that the G protein G-alpha-13 binds to the inner side of the integrin molecule when the outside portion binds to the matrix. G-alpha-13 then inhibits a molecule called RhoA, which normally allows the cell to maintain a spherical shape. When RhoA is inhibited by G-alpha-13, the cell is able to flatten out and spread onto the matrix.

Because the factors involved in this first step in spreading are common to virtually all cells, Du believes that the mechanism is likely universal.

"Understanding these fundamental processes has the potential to allow us to develop drugs to treat thrombosis, stroke and heart attack," he said, and may lead to drugs that could stop cancer cells from migrating.

Provided by University of Illinois at Chicago