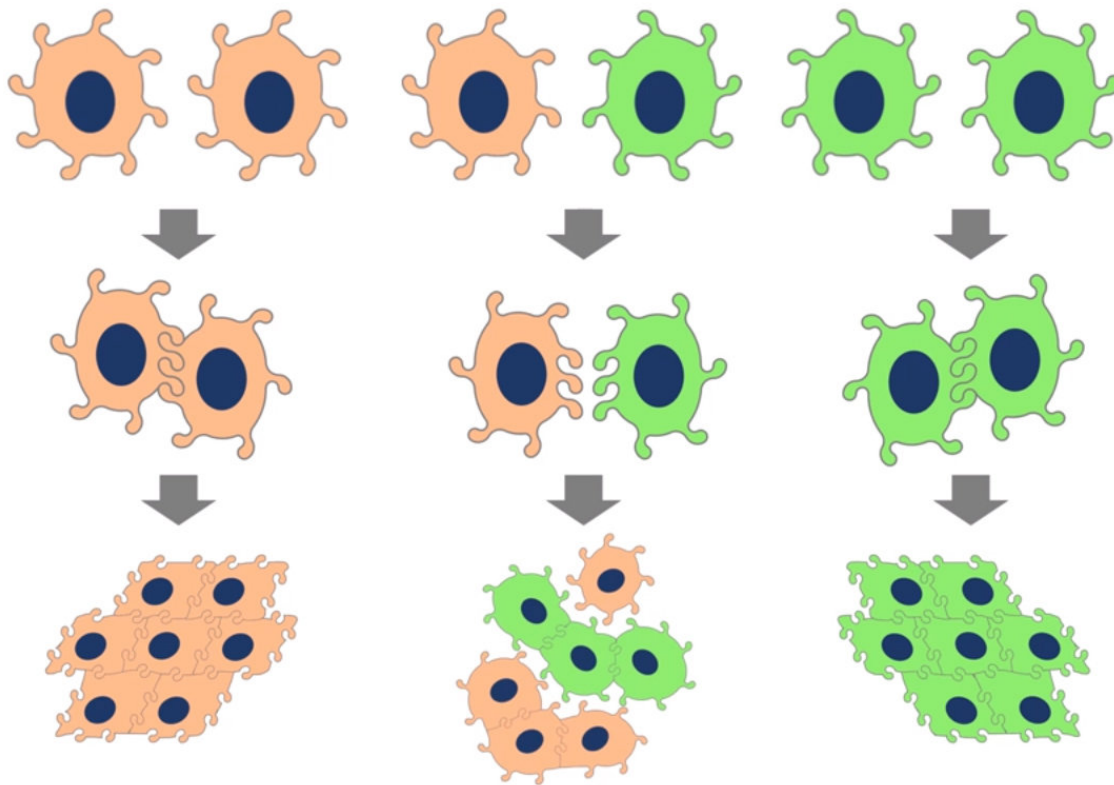


Flipped cells cause blood vessels to leak in diabetes and other diseases

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An enzyme activated in diabetics causes previously aligned cells in a blood vessel to reverse their orientation, creating misalignments that allow veins and arteries to leak three times more blood proteins than normally constructed blood vessels. Credit: Rensselaer

An enzyme activated in diabetics has been found to cause previously

aligned cells in a blood vessel to reverse their orientation, creating misalignments that allow veins and arteries to leak three times more blood proteins than normally constructed blood vessels. Controlling the enzyme could ease symptoms of swelling, nerve pain, localized low blood pressure, and risk of infection in diabetes, other diseases that cause blood vessels to leak, and smoking.

The finding, which is published today in *Science Advances*, stems from a closer examination of the [chirality](#), or "handedness," of [cells](#). Chirality is a property of asymmetry found at all scales of life, from the level of molecules to organisms. Like left and right hands, cells that display chirality are mirror images of one another. This is the first study to move beyond the effects of cell chirality on embryonic development, and examine its effects on physiological processes.

"This research tells us that chirality can change in your lifetime after birth, which is surprising," said Leo Wan, lead author of the research, and associate professor of biomedical engineering and member of the Center for Biotechnology and Interdisciplinary Studies at Rensselaer Polytechnic Institute. "But if here we see that disease can reverse chirality, we can also envision targeted therapies to block that process."

The endothelial cells that line the interior of a blood vessel commonly share a right-hand orientation, fitting neatly together to form a semi-permeable barrier that tightly controls the passage of proteins and cells from the bloodstream into the surrounding tissue. But the new research shows that even low levels of the protein kinase C (PKC) - activated in diseases like diabetes—in [blood vessels](#) can cause some cells to reverse chirality, flipping to left-hand orientation and creating gaps between right- and left-hand cells that increase permeability threefold.

Wan said understanding this process could lead to the development of a therapy that would block alterations of cell chirality inside blood vessels,

a targeted approach that he anticipates as fairly easy to achieve.

More information: "Cell chirality regulates intercellular junctions and endothelial permeability" *Science Advances* (2018).

advances.sciencemag.org/content/4/10/eaat2111

Provided by Rensselaer Polytechnic Institute

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