Discovery casts doubt on cell surface organization models

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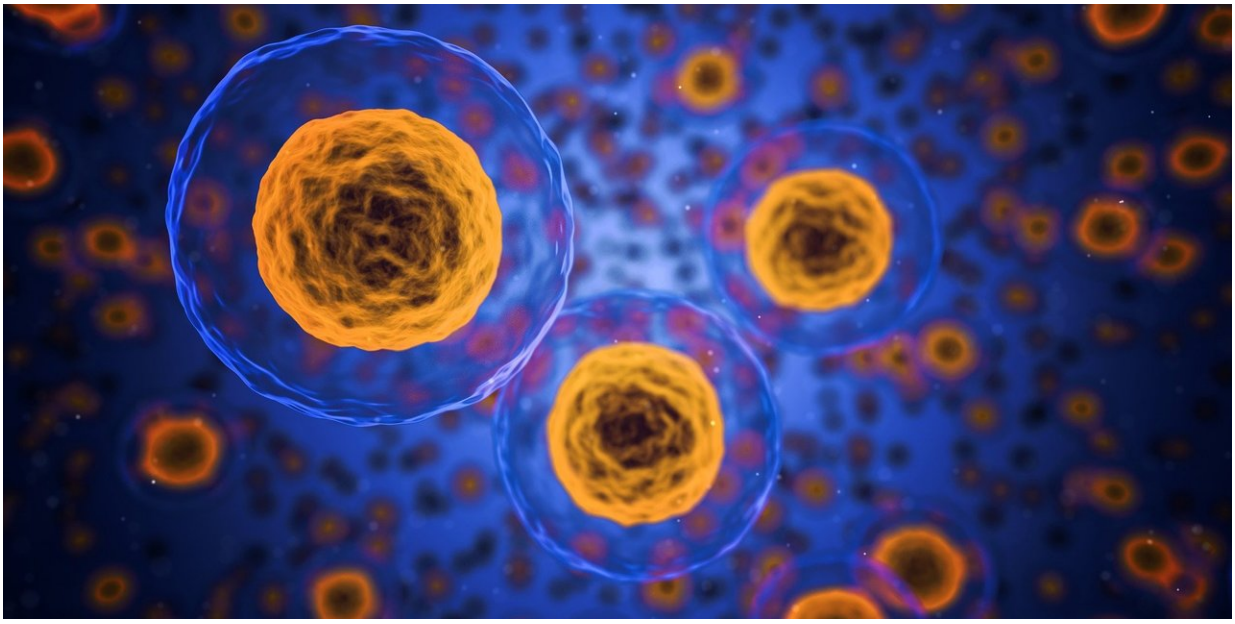

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Like planets, the body's cell surfaces look smooth from a distance, but contoured closer up. An article published in *Communications Biology* describes previously unknown implications of the way data from cell surfaces are normally interpreted; i.e. as if they lacked topographic features.

Researchers from the Universities of Gothenburg and Uppsala, Sweden,

studied how this variation in cell topography affects "diffusion"—how molecules move in the cell membrane. Diffusion is studied to develop models for the membrane's organization and to increase our understanding on the interaction between cell components.

One dimension missing

The basis for the researchers' study was their previous discoveries. These showed that not a single one of 70 cell types studied has a smooth surface.

"Today's dominant models of how the plasma membrane that surrounds the cell is organized are based on two-dimensional interpretation of measurement data. Our study shows that this leads to completely incorrect conclusions, since the cell surface is three-dimensional," says Ingela Parmryd, senior lecturer in Cell Biology at Sahlgrenska Academy, University of Gothenburg, the lead author of the article.

In studies of molecular movements, cell topography can cause both marked underestimation of movement in the membrane and deviant movement patterns. This is shown in the present study, which is groundbreaking in its field.

"The goal of our research is to take the great leap forward from current two-dimensional to three-dimensional membrane models. This is going to change the way we perceive fundamental biological processes like cell signaling, cell-to-cell contacts and cell migration—processes that change in pathological states such as cancer," Ingela Parmryd says.

More information: University of Gothenburg Jeremy Adler et al. Conventional analysis of movement on non-flat surfaces like the plasma membrane makes Brownian motion appear anomalous, *Communications Biology* (2018). DOI: 10.1038/s42003-018-0240-2