Extracellular forces help epithelial cells stick together

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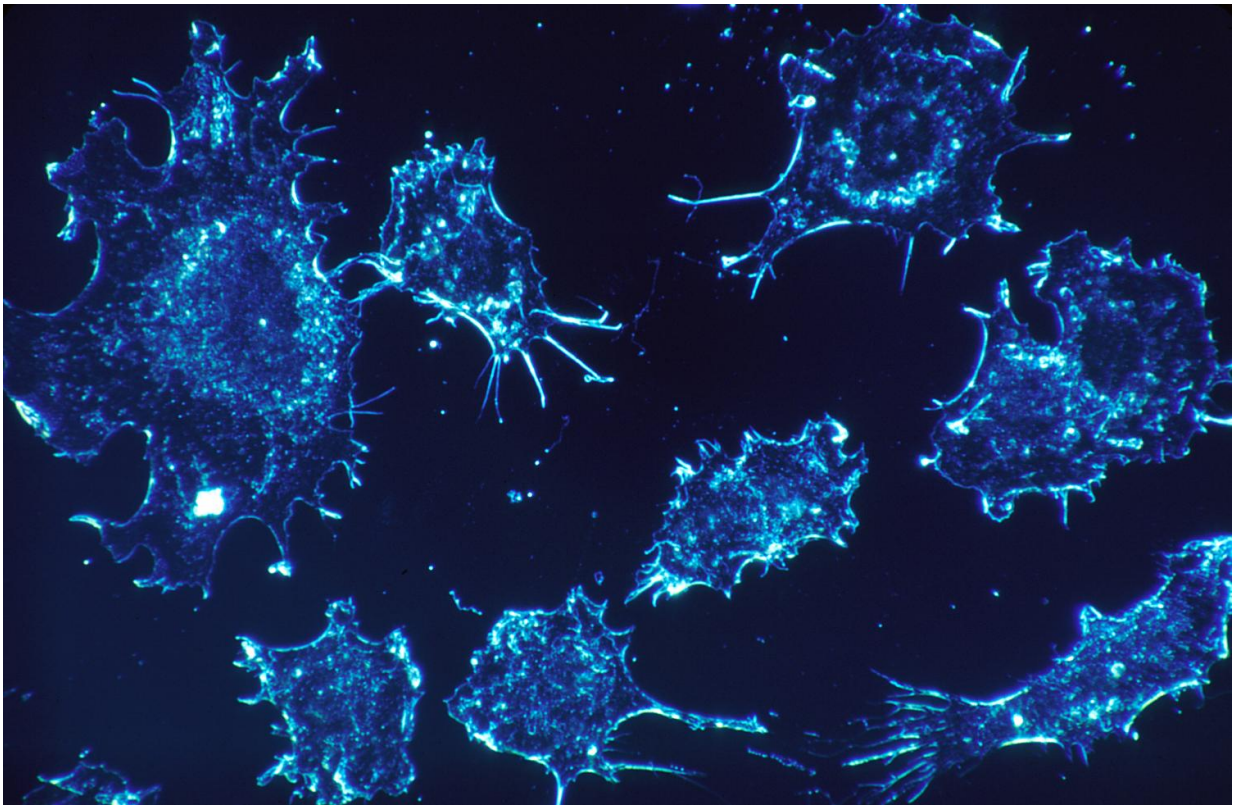

Cancer cells. Credit: Dr. Cecil Fox, National Cancer Institute

Different surfaces and organs of the body are covered by epithelial tissue, which is composed of cells tightly connected to each other. The cells can be attached through junctions that are in direct contact with the cytoskeletal network inside the cells.

This network, composed of actin and myosin proteins that together form contractile actomyosin bundles, maintain the epithelial cells close to each other.

Recent studies have shown that physical alterations in the growth environment of cells have a significant impact on tissue function. Therefore, such changes are also connected to the onset of a number of diseases, including cancer.

Now, a research group working at the University of Helsinki's Faculty of Veterinary Medicine under the direction of Sari Tojkander has found that extracellular forces regulate the formation of epithelia-integrating actomyosin bundles.

"Contacts between neighbouring epithelial cells generate mechanical tension, which activates a certain intracellular signalling pathway. This, in turn, drives the assembly of epithelial actomyosin structures. If components involved in the signalling pathway are disturbed, epithelial cells are detached from each other and become mobile," says Sari Tojkander.

The study utilised breast and kidney epithelial cell lines, but the researchers assume that the same mechanisms also apply to other types of epithelial cells.

"Another important factor is that, in the case of cancer, the proteins associated with this signalling pathway that is sensitive to mechanical tension are regulated erroneously. In other words, our findings have a direct association with means that cancer cells may use to break away from the area of the original tumour, enabling them to scatter to healthy tissues," says postdoctoral researcher Kaisa Rajakylä, who is the principal author of the article.

More information: Eeva Kaisa Rajakylä et al, Assembly of Peripheral Actomyosin Bundles in Epithelial Cells Is Dependent on the CaMKK2/AMPK Pathway, *Cell Reports* (2020). DOI: 10.1016/j.celrep.2020.02.096