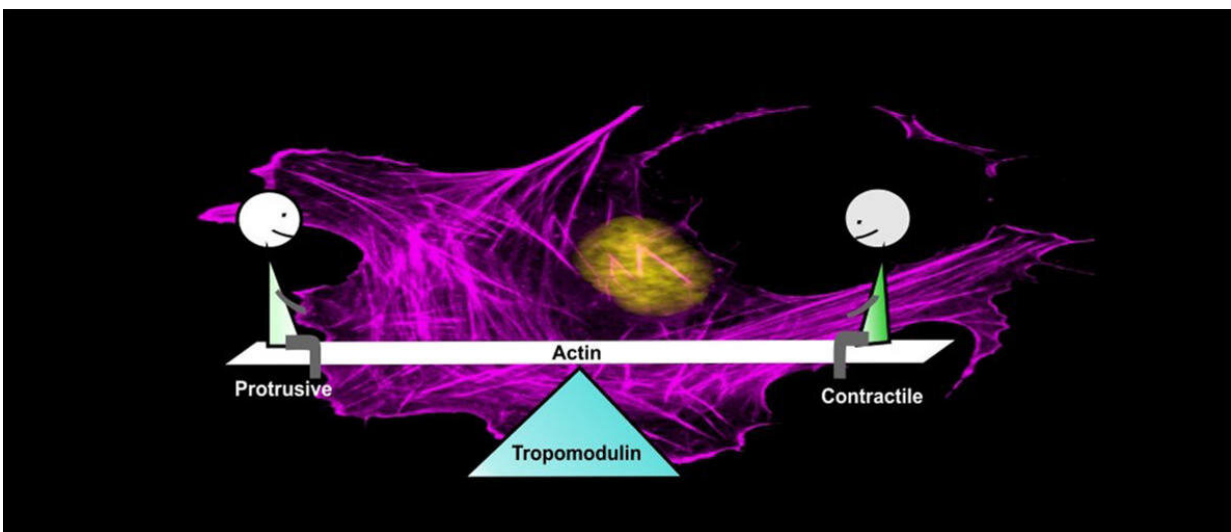


Protein function maintains the balance between protrusive and contractile cell machineries

February 17 2020



Tropomodulin is a key player that maintains the balance between the protrusive and contractile actin-filament machineries within a cell. Credit: Reena Kumari

Tropomodulin maintains the fine balance between the protein machineries responsible for cell movement and morphogenesis. Disturbances in this balance are common in many diseases, for example, invasive cancers.

In a healthy cell, there is a [fine balance](#) between the protrusive structures

that make the cell more migratory, and the contractile structures that maintain the cell's shape and its association with the environment. A disturbance in this balance leads to several diseases, such as invasive cancers.

The most important component of both protrusive and contractile machineries is a protein called actin. This means that the proper distribution of actin between these structures is essential for the normal function of the cell. Nevertheless, the mechanisms that ensure that actin is distributed correctly between the protrusive and contractile machineries have remained elusive.

Researchers at the University of Helsinki, Finland, and the University of Pennsylvania, Philadelphia, U.S., have now identified a protein called tropomodulin as a key player that maintains the balance between the protrusive and contractile actin-filament machineries within a cell.

The function of tropomodulin has previously been studied mainly in the context of muscles, where it maintains the architecture of actin filaments within the contractile fibers of muscle cells.

"We have now revealed that tropomodulins stabilise the actin filaments of the contractile structures in non-muscle [cells](#) through interacting with specific proteins within these actin filament bundles. The depletion of tropomodulins led to a loss of contractile structures, accompanied by an excess of protrusive structures, and thus to severe problems in a cell's shape and force production," says Academy Professor Pekka Lappalainen from the HiLiFE—Institute of Biotechnology, University of Helsinki.

Researchers were surprised to see that the depletion of one protein can have such drastic effects on the [balance](#) of the [actin](#) machinery.

"Another exciting and unexpected finding of this study was the notion that the same [protein](#) can have a different function depending on the tissue or cell type. Our study also sheds light on why abnormal levels of tropomodulin are linked to the progression of various cancers," says Ph.D. student Reena Kumari.

More information: Reena Kumari et al. Tropomodulins Control the Balance between Protrusive and Contractile Structures by Stabilizing Actin-Tropomyosin Filaments, *Current Biology* (2020). [DOI: 10.1016/j.cub.2019.12.049](#)

Provided by University of Helsinki

Citation: Protein function maintains the balance between protrusive and contractile cell machineries (2020, February 17) retrieved 20 March 2024 from <https://phys.org/news/2020-02-protein-function-protrusive-contractile-cell.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--