

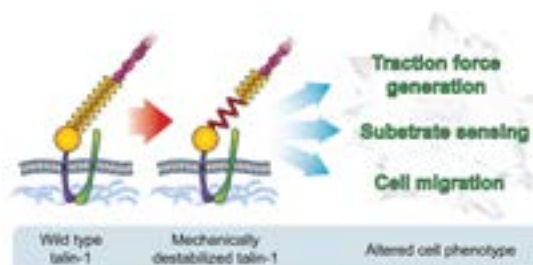
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Mechanical stability of talin rod controls traction force generation and cell migration

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Talin is a central adhesion protein linking β -integrin cytosolic domains to actin fibers. It participates in the transmission of mechanical signals between extracellular matrix and cell cytoskeleton. Talin rod domain consists of a series of mechanically vulnerable α -helical subdomains containing binding sites for other adhesion proteins such as vinculin, actin and RIAM. Force induced unfolding of these rod subdomains has been proposed to act as a cellular mechanosensor, but so far evidence linking their mechanical stability and cellular response has been lacking. We show that stepwise mechanical destabilization of talin rod subdomain increases talin and vinculin accumulation into cell-matrix adhesions and decreases cell migration rate. In addition, mechanical destabilization of talin subdomain was found to decrease cellular traction force generation and to promote the formation of adhesions on fibronectin over vitronectin. Experiments with truncated talin forms confirmed the mechanosensory role of the talin subdomain and excluded the possibility that the observed effects are caused solely by the release of talin autoinhibition. We demonstrate that by modulating the mechanical stability of an individual talin rod subdomain, it is possible to affect traction force generation, ECM sensing and consequently highly coordinated processes such as cell migration. Our results suggest that talin acts as a mechanosensor and is responsible for controlling the cellular processes dependent on mechanical signals and cellular mechanosensing.



Biography

Vesa P Hytonen is a Head of the Protein Dynamics research group in BioMediTech at the University of Tampere, Finland. After graduating as a PhD scholar from the University of Jyväskylä, Finland in 2005, he has conducted Post-doctoral training at ETH Zurich, Switzerland from 2005-2007. He then continued as a Post-Doctoral researcher at the University of Tampere and established independent research group in 2010. He is currently working as Associate Professor at the University of Tampere. His research interests are Mechanobiology, Protein Engineering and Vaccine research and authored more than 100 scientific articles.

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