New research on inflammation and cancer: A prehistoric code regulates cell motility

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Recent research demonstrates that an evolutionarily conserved molecular code, present on cell surface adhesion molecules, is a critical regulator of cell motility. The prehistorical code identified by the researchers finally explains on the molecular level how cells can fine-tune their migration in response to different tissue determinants. This code which predates dinosaurs and life moving to dry land remains functional in our bodies even today.

Scientists from the research group led by Academy professor Johanna Ivaska from the University of Turku have identified a previously undescribed protein sequence in adhesion receptors called integrins which regulates cell motility in response to different connective tissue components.

"Cell motility is essential for all life. In humans it plays a vital role from embryonic development to inflammation, immune responses and wound healing in adults. Furthermore, in cancer cell migration facilitates the metastatic dissemination", Academy Professor Johanna Ivaska explains.

For decades scientists have known that human cells must recycle their adhesion receptors to enable cell motility. However, the basis for specifically regulating this in different environmental conditions in the body has not been known. The identified code sequence explains the specificity of receptor turnover.

"Our observation that this code has remained virtually unaltered since

prehistoric times emphasises the biological importance of the finding. Only vital biological processes remain unchanged during the course of evolution", says Professor Ivaska.

This research has been a collaboration with Structural Biologists from University or Cambridge, UK and Cell Biologists from Gustave Rossy—Institute in Paris.

The projects stems from bioinformatics analyses performed by Graduate Student Nicola De Franceschi. He observed that integrins contain a previously unappreciated molecular code which governs cell motility.

"Our new observation demonstrate for the first time the mechanism which enables cells to specifically turnover their adhesions to migrate in a specific tissue. The ancient mechanisms remains today vital for human health and plays a role in pathological situations like chronic inflammation, some autoimmune diseases and cancer", describes Professor Ivaska.

These research findings have been published in online in *Nature Structural and Molecular Biology* journal on Jan. 18, 2016.

More information: Nicola De Franceschi et al. Selective integrin endocytosis is driven by interactions between the integrin α-chain and AP2, *Nature Structural & Molecular Biology* (2016). DOI: 10.1038/nsmb.3161

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