Medical Xpress

Crucial role of breast cancer tumour suppressor revealed

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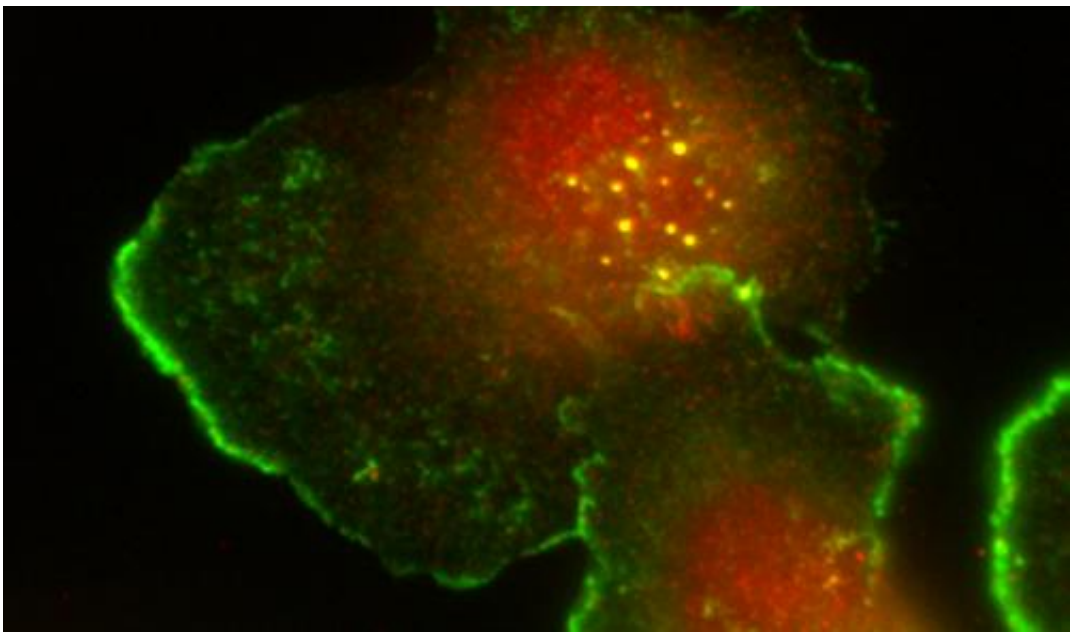

Credit: Valenzuela-Iglesias et al

A new study led by José Javier Bravo-Cordero, Spanish researcher at the Albert Einstein College of Medicine in New York, details how cells with low levels of the profilin 1 protein in breast tumours increase their capacity to metastasise and invade other tissues.

In recent years, medical professionals have been greatly interested in the development of new treatments to combat the spread of cancer, which is the largest cause of death in patients with this illness.

However, effective treatments have still not been developed to stop or prevent tumour cells spreading from their primary tumour, a critical step in the cancer reaching different organs during metastasis.

Now, a new study published in the *European Journal of Cell Biology* and led by José Javier Bravo-Cordero, a Spanish researcher working in the Albert Einstein College of Medicine in New York (USA), reveals how the profilin 1 protein intervenes in the formation of determining structures for the tumour invasion.

"To obtain this level of effectiveness the tumour cells form a subcellular structure called invadopodia (from the Latin invado, invade, and podio, feet; invasive feet) and they use it to spread towards other parts of the organism," explains Bravo-Cordero to SINC.

Using high resolution microscope techniques, the authors have been able to study the dynamics of the invadopodia in tumour cells which lack profilin 1, and describe their role and the route they regulate.

Therefore patients with breast cancer tumours show reduced levels of the protein profilin 1, which is related to an increase in the capacity of the human breast tumours to metastasise other organs.

"Surprisingly, the cells which lack profilin 1 show extremely invasive activity mediated by the invadopodia, compared to control cells. It is as if we had taken the brake off and lost control of the vehicle," describes the Spanish scientist.

What is more, adds Bravo-Cordero, "in the absence of profilin 1 the invadopodia are more aggressive when it comes to degrading the extracellular matrix and are highly invasive structures, which explains the high metastatic potential of these cells".

A crucial structure

The work, carried out with the collaboration of researchers from the University of Pittsburgh (Pennsylvania, USA), shows the importance of the internal structure of the invadopodia and the actin cytoskeleton (basically the scaffolding of eukaryotic cells) in their function, and how profilin 1 plays a vital role in its regulation.

"If we destroy the scaffolding, the structures do not form; in the same way if we are very efficient with the assembly of this scaffolding we can form structures that have more invasive capacity. These are the variables that we have to play with to stop invasive tumours, and profilin 1 regulates this balance," the expert points out.

The authors have described the molecular route which allows the invadopodia to be more aggressive in the cells that lack profilin 1. This route plays a role in their maturation for these to be efficient.

"It is a maturation issue. In the absence of this protein the invadopodia mature more quickly, become more efficient in their function, degrade the matrix more quickly by having taken off the profilin 1 brake, and therefore, these cells have greater capacity for invasion," declares Alejandra Valenzuela-Iglesias, scientist at the University of Sonora (Mexico) and lead author of the study.

The researchers highlight that currently "how all the invasive machinery is being revealed at a subcellular level and we are identifying the 'nuts and bolts' we must adjust to prevent tumour cells from spreading. This will greatly assist in developing new treatments which may help to halt the process of metastasis," they conclude.

More information: A. Valenzuela-Iglesias, V.P. Sharma, B.T. Beaty, Z. Ding, L.E. Gutierrez-Millan,P. Roy, J.S. Condeelis, J.J. Bravo-

Cordero. 'Profilin1 regulates invadopodium maturation in human breast cancer cells'. European *Journal of Cell Biology*. On line 31 de diciembre de 2014.

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