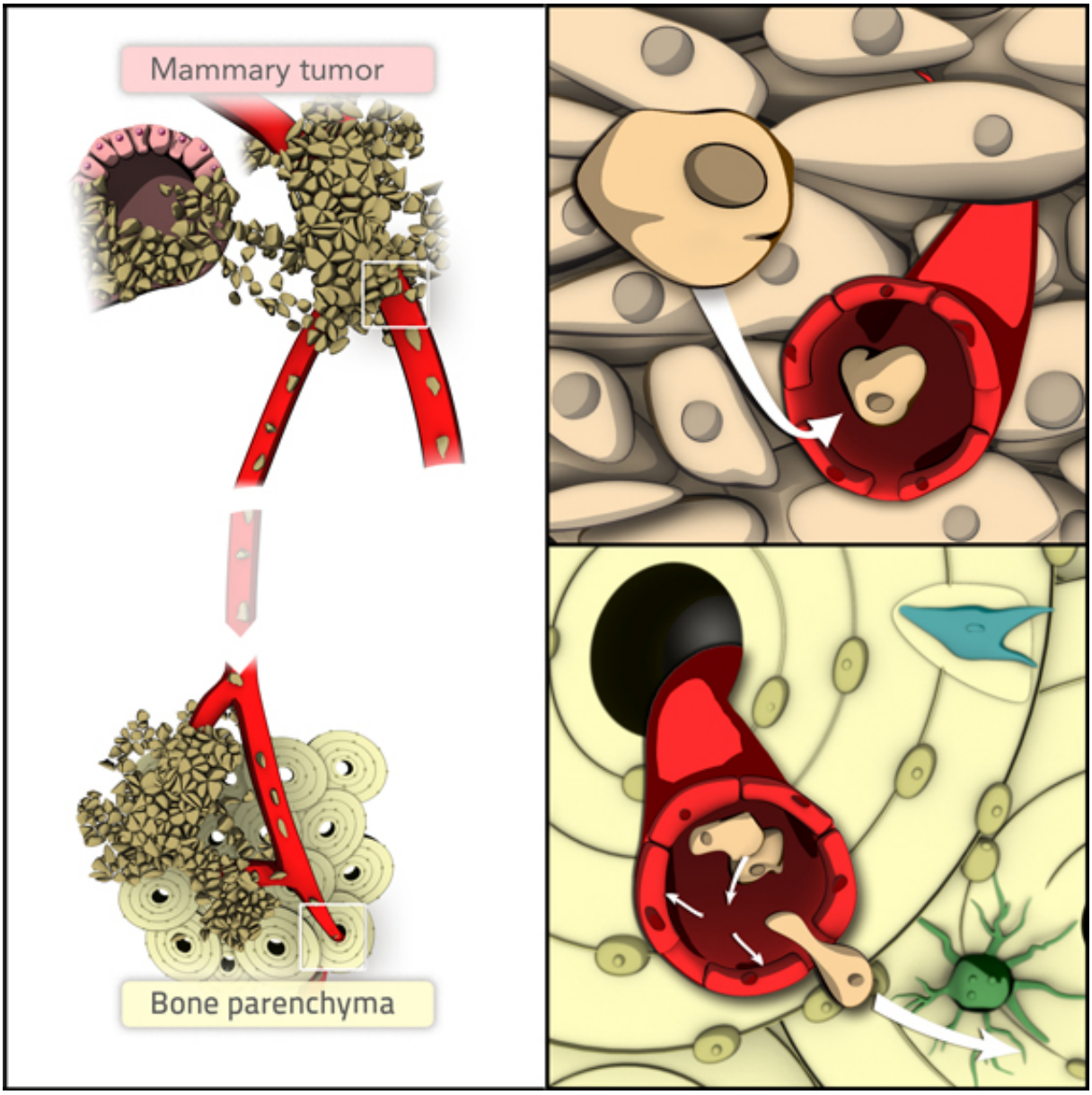
Researchers identify the gene responsible for metastasis of breast cancer to the bone

September 16 2015



Picture showing the metastasis of a primary breast tumour to bone. Credit: Formas Naturales by Inbiomotion

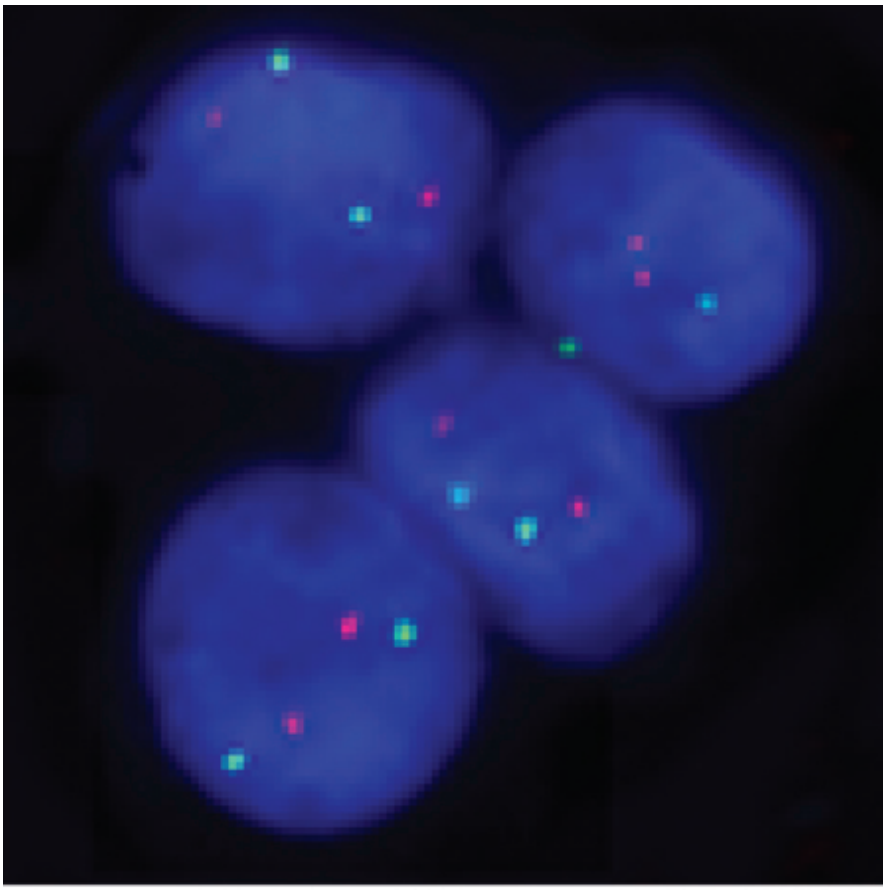
Physicians currently have no tools to help them detect which breast cancer patients will suffer metastasis to the bone, a process that occurs in 15-20% of cases. A study led by ICREA researcher Roger Gomis at the Institute for Research in Biomedicine (IRB Barcelona) and published today in JNCI has uncovered a gene that allows breast cancer cells to invade bones and create new tumours, or to metastasize. This discovery has been patented and transferred to Inbiomotion, a spin off from the IRB Barcelona and ICREA, founded at the end of 2010. Inbiomotion, led by the venture investor Ysios Capital, has developed the technology necessary to validate the marker in clinical trials, which are already underway.

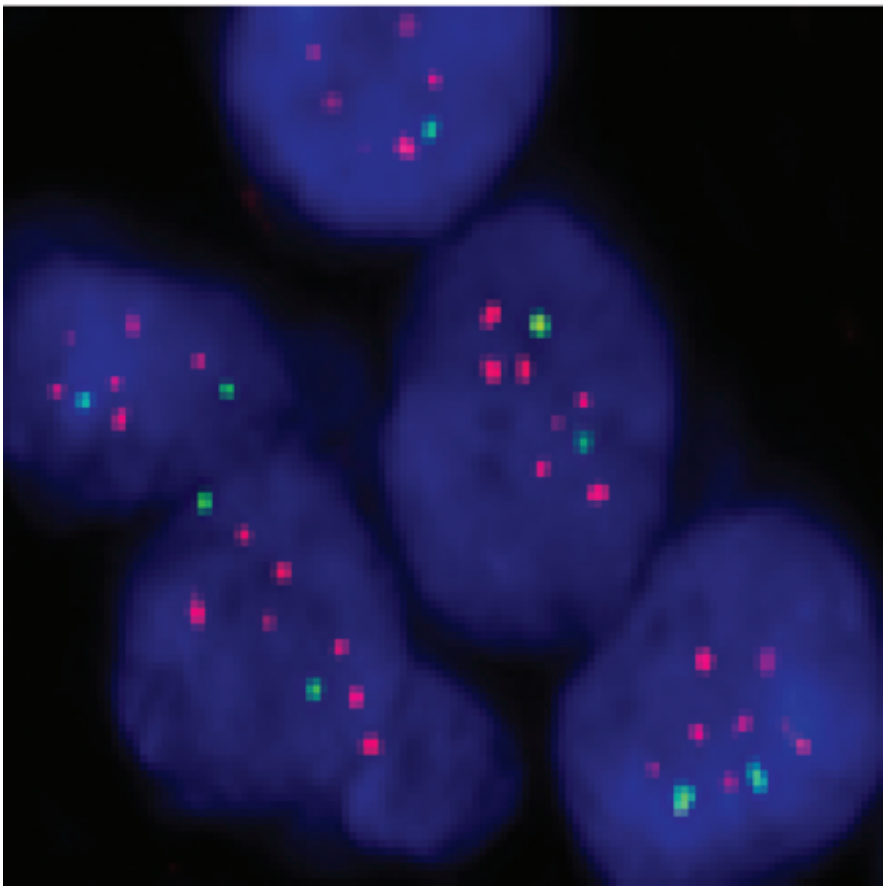
Bone metastasis is the only type of metastasis that can be controlled, but not cured, by drugs. Treatment is only given once the metastasis has been identified, which is normally too late. Preliminary studies indicate that the same drugs used to treat metastasis could also be used to prevent it, and identifying those patients at risk of developing bone metastasis is therefore very important. "This is where the discovery made at IRB Barcelona could be of great use to clinicians and would avoid unnecessary treatment of patients who are not at risk," suggests Gomis.

About one million new cases of breast cancer are diagnosed each year. Preventive treatment for bone metastasis can have unwanted side effects and comes at a high cost, making a broad administration of the drugs an unviable option, even less so considering only 15-20% of patients are likely to develop metastasis over time. "In order to implement a well-designed clinical trial, we first need to know which patients may benefit and which ones will not. Our discovery offers a way to distinguish that

wasn't possible before," confirms Gomis.

Conducting metastasis to the bone





Top, breast cancer tumour cells negative for the bone metastasis marker. Bottom, breast cancer tumour cells positive for the marker. Credit: Gomis Lab, IRB Barcelona

Experiments in the Growth Control and Cancer Metastasis Laboratory at the Institute for Research in Biomedicine (IRB Barcelona) have focussed on the analysis of estrogen-receptor-positive breast tumours since they specifically tend to metastasize to the bone, and represent 80% of all breast cancers. The results indicate that the gene MAF triggers a set of functions in the cell that allow metastasis to take place.

The researchers analyzed more than 900 clinical samples of primary breast tumours. In tumours in which the MAF gene is altered, the risk of metastasis to the bone is 14 times higher than in those in which it is unaltered. "This gene reliably predicts metastasis to the bone. Studying whether it is highly expressed in breast cancer patients to determine whether this also happens in a clinical setting is an important next step. It could improve the quality of life of these patients and the way clinicians manage their cancer. And this is exactly what we are doing", explains the researcher.

Clinical trials underway

The study, published today in the open access *Journal of National Cancer Institute* (JNCI), one of the most-read specialized oncology journals, is an ongoing technology transfer project at IRB Barcelona. The discovery has led to the creation of the company Inbiomotion, founded by Gomis and in which ICREA also participates. The spin off received funding in 2012 from the venture capital company Ysios

Capital and the Vila Casas Foundation to develop the tools necessary for the clinical trials. Inbiomotion has now delivered the technology and has begun to validate the marker in clinical trials in 3,300 patients.

More information: "Enhanced MAF Oncogene Expression and Breast Cancer Bone Metastasis" *JNCI* (2015) 107(12): djv256 DOI: 10.1093/jnci/djv256

Provided by Institute for Research in Biomedicine (IRB Barcelona)