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Breast cancer replicates brain development process

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New research led by a scientist at the University of York reveals that a process that forms a key element in the development of the nervous system may also play a pivotal role in the spread of breast cancer.

A research team, led by Dr Will Brackenbury, a Medical Research Council Fellow in the Department of Biology at York, has studied how voltage-gated sodium channels assist in the metastasis of cancerous tumours. These channels are found in the membranes of excitable cells, such as neurons, where they are involved in transmission of electrical impulses. However, the channels have also been found in metastatic cancer cells.

Using clinical breast cancer specimens from the Breast Cancer Campaign Tissue Bank and preclinical laboratory modelling, the researchers, including Dr Rebecca Millican-Slater, a consultant pathologist at St James University Hospital, Leeds, discovered that a sodium channel protein called Beta-one is present at high levels in breast cancer samples compared with normal tissue.

In research published in the *International Journal of Cancer*, they show for the first time that the increase in beta-one protein levels make tumours grow faster. They also discovered that Beta-one proteins play a significant role in enabling the cells to change shape and move, and consequently metastasise.

Understanding these processes is important in understanding cancer

metastasis. Although the number of deaths from breast cancer is decreasing, it is still the leading cause of cancer-related death in women because of metastasis.

Dr Brackenbury said: "While there is no cure for metastasis, blocking the sodium channels inhibits migration and invasiveness and it may therefore be a viable therapeutic target. What is most exciting is that the mechanism by which Beta One regulates migration appears to replicate what it does in the central nervous system.

"As well as regulating electrical activity in neurons, Beta-one also regulates the migration of neurons during brain development and the breast cancer signalling mechanism seems to be the same. A process that is important in the development of the nervous system is being co-opted to play an insidious role in tumour development."

This research was funded by the Medical Research Council.

Baroness Delyth Morgan, Chief Executive at Breast Cancer Campaign, said: "The Breast Cancer Campaign Tissue Bank is vital for enabling researchers to use good quality tissue samples in their research. Dr Brackenbury's findings demonstrate how the Tissue Bank is helping drive forward research and new discoveries into what could be causing breast cancer to spread."

Provided by University of York