

Inbuilt body clocks link breast stiffness to cancer risks

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Credit: University of Manchester

University of Manchester biologists have discovered that breast tissues have 24-hour body clocks, and that several hundred genes are regulated in a daily cycle.

The discovery by Dr Qing-Jun Meng and Professor Charles Streuli, may offer the first evidence of a link between breast biology—including [breast cancer](#) risks—and the body clock.

They found that ageing of breast tissue has a central role in controlling these clocks.

Breast tissues get stiffer as they get older which, the authors find, causes the clocks to get weaker.

Higher mammographic density - or breast tissue stiffness - is a known risk factor for breast cancer, but the way that stiffness contributes to cancer is not known.

"We have discovered that tissue stiffness contributes to the age-dependent dysregulation of both clocks and stem cell function in the breast tissue. We identified some of the clock target genes within breast tissue, which are known to be involved with tumour formation. There is now a widening interest in the importance of stem cells for the formation of breast cancers – so our findings in relation to that are of much interest," says Dr Qing-jun Meng.

Funded by the Medical Research Council and Wellcome, The Manchester biologists have now discovered that the amplitude (strength) of clocks within [breast cells](#) is dependent on the biological stiffness of the tissue.

They also found that body clocks are needed for the production breast stem cells.

The weakening of clocks in ageing may therefore reduce normal stem cells, and it may help cause the tissue to become cancerous.

The study is published in *Nature Communications* today.

Dr Meng said: "We have discovered that tissue stiffness contributes to the age-dependent dysregulation of both clocks and stem cell function in

the breast tissue.

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"There is now a widening interest in the importance of [stem cells](#) for the formation of breast cancers —so our findings in relation to that are of much interest".

Prof Streuli said: "A lot of epidemiological work links both [breast tissue density](#) and body clock disruption to the risk of getting breast cancer.

"And now for the first time we've identified a biological link."

All tissues have 24-hour clocks, causing the amounts or activities of proteins in their cells to go up and down every day.

We know the clocks are important for normal breast function, because genetically deleting one of the clock genes contributes to nursing defects.

They also found that stiffening of [breast tissue](#) with age causes their inbuilt clocks to get weaker. And the study shows how this works at the molecular level.

Provided by University of Manchester

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