

Scientists at the University of Manchester in the UK think that a key biological mechanism may explain for the first time why women with dense breast tissue have an increased risk of developing breast cancer.

The University of Manchester team has been working with IBM Research in the US and Cyprus on this project, which is funded by one of the UK's leading [breast cancer](#) charities and research organizations, Breakthrough Breast Cancer.

Prof. Michael Lisanti, from the University of Manchester, says:

"We know that high breast density can greatly increase a woman's breast cancer risk as well as other factors such as aging, family history and presence of mutations in genes such as BRCA 1 and BRCA 2."

"What no one has fully appreciated before are the underpinning mechanisms at play," Lisanti adds. "Using a bioinformatics approach, we have identified the relevant signaling pathways that make dense breast tissue more favorable for [tumor](#) formation."

'Molecular signature' from fibroblasts holds the key

Using structural cells called fibroblasts from high-density breast tissue to generate a "molecular signature," the scientists found that a cell communication network called JNK1 exhibited more activity in fibroblasts from high-density breast tissue than in lower-density breast tissue.

Cells are instructed by this network to release chemicals that cause [inflammation](#), which can encourage the formation of tumors.

Dr. Federica Sotgia, joint-senior author on the paper, says that their "research expands on the early work by the London surgeon Stephen Paget, who proposed the 'seed and the soil' hypothesis, now over 125 years ago. In this paradigm, the 'seeds' are the [cancers](#) cells and the 'soil' is the tissue in which they grow."

Dr. Sotgia adds:

"Our research has identified the right soil for seeds to flourish by looking at the micro-environment in the breast and examining the mechanisms at play. This can help us with designing new preventative trials, to develop and test new therapies, which might prevent progression on to cancer.

Current cancer treatment often focuses on targeting cancer cells, but is not focused on targeting the fibrotic connective tissue, that may develop first, before you have cancer."

So the team thinks that using drugs to target this network and block it from communicating with cells could provide a potential treatment for women with breast cancer. This theory is supported by the researchers' discovery that the molecular signature of the fibroblasts from high-density breast tissue matches the signature of fibroblasts from breast tumors.

For the next step in their work, the researchers will partner with other "world-leading" experts in cancer signaling, including Prof. Nic Jones, director of the Manchester Cancer Research Centre (MCRC) and Cancer Research UK chief scientist, who heads the Cell Regulation Laboratory, and breast density specialist Prof. Tony Howell.

Prof. Howell says that "at least 50% [of] cancer risk is genetic, but activated cell stress signaling could potentially be reduced by dietary or lifestyle intervention. This research should help with a cancer prevention strategy, rather than waiting to treat the cancer once it arrives."

"This analysis of breast density provides a new framework for additional experimental exploration in breast cancer research," adds Prof. Jones. "This has important clinical and translational implications for stratified medicine and breast cancer prevention."

In 2012, *Medical News Today* reported on a study finding that ~~having dense breast tissue increases risk of cancer returning~~ in women who have previously had breast cancer.

Written by ~~David McNamee~~