

Immune system plays dual role in breast cancer

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The immune system plays a paradoxical role in the spread of breast cancer. Some immune cells contribute to metastasis, while other cells can be activated to strengthen the effect of chemotherapy. Kelly Kersten made this discovery in her PhD research. PhD defence 7 February.

Although cancer treatments and therapies are improving all the time, [breast cancer](#) remains one of the main causes of death in women, with the majority of these deaths being attributed to the spread of the tumour. 'We know that the cells of the immune system play a role here, but exactly how that works is still largely unknown,' Kersten explains. Her research, conducted at the Netherlands Cancer Institute in Amsterdam, aims to clarify this process.

Facilitating metastasis

Kersten carried out her research on mice with an invasive form of breast cancer, comparable with the situation in a human being with metastasising breast cancer. 'We saw that the primary tumour caused an infectious response in the whole body, which makes it easier for metastases to occur.' Kersten then discovered that a specific type of immune cell, the neutrophil, plays an active role here. The infectious response caused by the tumour causes neutrophils to be produced, which then accumulate,' Kersten explains.

Domino effect

'We've known for some time that some [immune system cells](#), T-cells, work against the cancer, slowing down tumour growth. It's these favourable cells that are switched off by the neutrophils, which then makes it easier for the tumour to spread.' The research group discovered that the neutrophils are directed by the domino effect of different immune reactions. Kersten and her colleagues made a detailed analysis of this [domino effect](#), resulting in a publication by Kersten in the journal *Nature*.

Enhancing the anti-tumour immune response

Kersten then wondered what this could mean for the treatment of breast cancer. 'A lot of successful results have been achieved in patients using immunotherapy, where the person's own [immune system](#) is activated to remove the tumour. 'This is already part of the treatment for lung and skin cancer, but not yet for breast cancer. So we tested a particular kind of immunotherapy in the same kind of mice. We didn't see very much effect from the immunotherapy alone, but we did see a change in combination with specific types of chemotherapy.' The combined chemo-immunotherapy set off an anti-tumour immune reaction that slowed down tumours in mice.

Link in patients

The research findings offer starting points for [breast cancer treatment](#). 'This immune reaction is in fact a whole cascade of responses. We have now looked at the first steps in the cascade in patients.' Kersten found a positive correlation between different signal substances from this cascade in the tissue of [breast cancer patients](#). 'There is a particular link, also in humans, which could indicate that the causal relationship that we found in mice between this [immune reaction](#) and the metastases also applies in humans.' A lot more research is needed on this, Kersten

stresses.

Clinical tests

Trials are currently being carried out in the Netherlands Cancer Institute treating breast cancer patients with immunotherapy. 'This treatment also tests the combination of chemo-immunotherapy,' Kersten explains. 'I am very curious about the outcome of this study.' However, she remains very cautious in her predictions. 'What I have found in my PhD research is very promising, but it is still a mouse and not a human being. More research is needed to determine whether our results can be translated to the clinical environment.'

Provided by Leiden University

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