

Healthy cells 'collaborate' with tumors to help build new blood vessels

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Healthy cells actively collaborate with tumours by creating a mesh of collagen that encourages cancer cells to build new blood vessels, a new study shows.

Researchers found that 'collaborator' [cells](#) build a beneficial environment around the [tumour](#) which helps it to build the new [blood vessels](#) it needs to grow.

Scientists at The Institute of Cancer Research, London, and the Cancer Research UK Beatson Institute in Glasgow, showed that a type of signal called transfer RNA plays a key role in driving collagen production to increase the blood supply to tumours.

Their study sheds light on the key role played by the surrounding environment in a tumour's growth and development - and could open up novel approaches to treatment.

It is published today (Thursday) in *Current Biology* and was funded by organisations including Cancer Research UK and Breast Cancer Now.

Cells called fibroblasts are the body's natural factories for collagen, the main structural protein of the body. In most healthy tissues, fibroblasts mainly generate type I collagen.

But researchers found that fibroblasts near tumours switch from producing type I collagen to type II collagen. They showed that this

change in collagen production helps the tumour to build new blood vessels - supporting its growth.

The researchers found that fibroblast cells that were activated by malignant breast tumours produced much more of a type of transfer RNA called the initiator methionine tRNA, than they would normally. The increase in this particular transfer RNA allowed fibroblasts to increase their production of type II collagen.

The initiator methionine tRNA is required for all protein production in the cell, so it might be expected that increased levels of it would raise levels of all cellular proteins. However, the researchers showed that increased levels of the transfer RNA resulted in increased levels of specific proteins only, including collagen II.

The work therefore reveals an unexpected role for the initiator methionine tRNA in controlling production of secreted collagens that promote [blood vessel growth](#) in tumours.

Study co-leader Dr Andrew Reynolds, Leader of the Tumour Biology Team at The Institute of Cancer Research, London, said:

"Cancers can't gather together the resources they need to grow and spread all by themselves - they need the support of surrounding healthy cells. Our study shows that a specific type of transfer RNA can ramp up production of collagen II protein in fibroblasts, stimulating the blood vessel growth in tumours that promotes cancer growth. Our results could open up new approaches to treatment, such as drugs that are designed to disrupt cancer's ability to manipulate its environment."

Study co-leader Professor Jim Norman, Leader of the Integrin Cell Biology Laboratory at the Cancer Research UK Beatson Institute, Glasgow, said:

"It is known that cancers have alterations to their repertoire of transfer RNAs - in particular they display elevated levels of the initiator methionine tRNA. Our study is important because it shows that this does not lead directly to increased synthesis of cellular protein to make more cells - as had previously been suggested - but very selectively alters production of certain secreted proteins, such as collagen II. This then indirectly drives tumour growth by helping the tumour solicit its own blood supply."

Dr Laura McCallum, Cancer Research UK's Senior Research Information Manager, said:

"This exciting study adds to the growing evidence that no cancer cell acts alone. Understanding how [cancer](#) cells manipulate healthy neighbouring cells to support them is vital if we are to find new ways to stop the disease in its tracks."

Dr Richard Berks, Senior Research Communications Officer at Breast Cancer Now, said:

"This early study highlights one way that normal cells could be helping tumours grow and spread, by promoting the growth of new blood vessels."

"We know tumours cannot exist in isolation; they must recruit non-[cancer cells](#) in their local environment to help them progress and researchers are now trying to understand whether this relationship could provide an effective target for treatments."

"Improving our understanding of the tumour micro-environment, and how it helps tumours to grow, will be critical to finding ways to stop breast and other cancers. We look forward to further discoveries in this area in the future."

More information: *Current Biology* (2016). [DOI: 10.1016/j.cub.2016.01.045](https://doi.org/10.1016/j.cub.2016.01.045)

Provided by Institute of Cancer Research

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