Nerve growth stimulates prostate cancer

Dense arrangement of nerves linked to aggressive disease.

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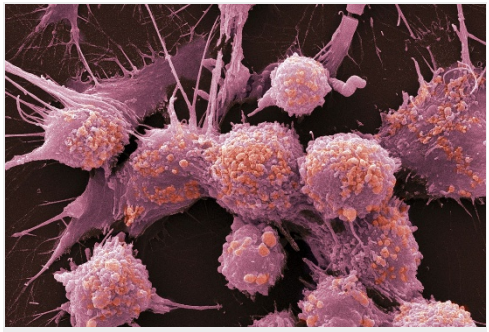
The growth of new nerves in and around prostate cancers spurs tumours to grow and invade other tissues, studies in mice have shown.

The results, published today in *Science*[1], could steer researchers towards novel approaches to treating cancer. Although it is not yet clear whether the mechanism occurs in humans — or in cancers affecting other organs — an analysis of samples from 43 patients with prostate cancer found that nerve density was high in patients who fared poorly in the clinic.

"It's a catalytic paper," says John Isaacs, a cancer researcher at the Johns Hopkins Medical Institutions in Baltimore, Maryland, who was not affiliated with the study. "People may now focus on trying to tackle these unanswered questions."



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Prostate cancer cells (seen in coloured scanning electron micrograph). Inhibiting the growth of nerve fibres has been shown to slow down the spread of this type of cancer, at least in mice.

Previous work had shown that cancer cells sometimes migrate along nerves, and that this process can be associated with poor responses to therapy[2]. To learn more, Claire Magnon and Paul Frenette of the Albert Einstein College of Medicine in New York and their colleagues studied tumour development in mice injected with human prostate cancer cells.

The resulting tumours, they saw, were infiltrated with certain types of nerve fibres. Chemically destroying those nerves prevented the development of tumours in the prostate. Furthermore, the team found that another class of nerves was associated with tumour spread, and that blocking certain receptors on those nerves prevented the cancer from invading nearby lymph nodes.

Tumour growth blockade

The results suggest that blocking these nerve receptors — including two types called the β2- and β3-adrenergic receptors — could be a way to treat cancer. Magnon notes that this idea is backed by epidemiological studies showing that people being treated for cancer tend to fare better if they are taking beta-blocker drugs, which are used to treat heart conditions and anxiety disorders and block β-adrenergic receptors[3].

Why would new nerves make cancers more aggressive? David Rowley, a cancer researcher at Baylor College of Medicine in Houston, Texas, also notes that new nerve growth is also a crucial step in repairing wounds. Some have proposed that the body perceives cancer and its associated tissue damage and inflammation as a wound that never heals. "Nerves play a role in wound repair," says Rowley, "so it stands to reason that nerves also play a role in a tumour's environment."

Designing drugs to target that process will not be trivial, says Isaacs, who notes that the same β-receptors are involved in other important processes, such as dilating the airways of the lungs. In addition, current beta-blockers may have a small effect on β_2 or β_3 receptors, but primarily target another receptor called β_1.

But if those challenges are overcome, the results could have implications beyond prostate cancer, says Rowley. "I would predict that this same process happens in all solid tumours," he says.

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References

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