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# Targeting cancer stem cells in the lab



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Understanding of the particular cancer cells within a tumour that drive its growth could now advance more rapidly, thanks to Oxford University scientists.

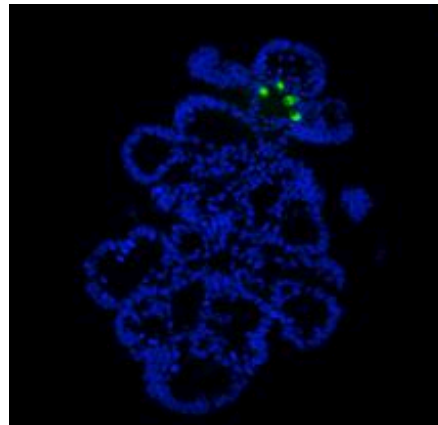
They show in the journal PNAS how a crucial class of cancer cell, called cancer stem cells, can be investigated in the lab in ways that should greatly speed their study, and allow the development of drugs targeted against them.

'Cancer stem cells drive the growth of a tumour,' says Dr Trevor Yeung of the Weatherall Institute of Molecular Medicine at Oxford University. 'If we could target treatments against these cells specifically, we should be able to eradicate the cancer completely.'

He adds: 'Radiotherapy and chemotherapy work against all rapidly dividing cells. But there is increasing evidence that cancer stem cells are more resistant than other cells to this treatment. Cancer stem cells that have not been eradicated can lead to later recurrence of cancer.'

'It's like trying to weed the garden. It's no good just chopping off the leaves, we need to target the roots to stop the weeds coming back.'

Cancer cells in tumours are not all exactly the same. Tumours are now understood to contain different types of cells, and it is the cancer stem cells that retain the ability to drive the tumour's



A colony of various cell types found in the gut grown in the lab from a single bowel cancer stem cell.

## Further information

- ▶ PNAS
- ▶ Weatherall Institute of Molecular Medicine
- ▶ Cancer Research UK



growth.

They are called cancer stem cells because, like stem cells present in normal tissues of the body, they can produce further cells like themselves and also differentiate to provide various different cell types.

' But a better, more descriptive name would be cancer-driving cells or tumour-initiating cells,' says Dr Yeung, a Cancer Research UK scientist and first author on the paper.

**“ If we could target treatments against these cells specifically, we should be able to eradicate the cancer completely. ”**

Dr Trevor Yeung

Study of these cancer-driving cells within

tumours has been slow because it has been hard to identify them unequivocally, separate them out and study them in the lab.

Previously, identifying cancer stem cells has relied on working with cancer biopsies from human patients. Scientists have tried to enrich the number of cancer stem cells present in samples and then see if those cells are sufficient to initiate tumours in mice. This is a long process, and the samples can't then be used in further experiments.

The Cancer Research UK-funded scientists in Oxford have developed a new way of obtaining samples rich in cancer stem cells from bowel cancer cell lines and maintaining them in simple cell cultures in the lab.

The work involved the use of established cell lines, known biological markers to isolate the cancer stem cells, and largely standard cell culture conditions. These are the tools necessary to change the way research on cancer stem cells can be carried out. It should allow repeatable, high-throughput screens of drugs, as well as basic studies to characterise cancer stem cells and their roles in advancing tumours.

' Working with cell lines is a much more convenient way to study these cells than using samples taken from human patients or using animal models,' says Professor Sir Walter Bodmer, who led the work. 'We can now evaluate anti-cancer drugs better to see whether they attack cancer stem cells. If you don't attack these cells, the cancer can grow out again.'

' In the long term, it should allow the development of more useful, safe and specific drugs targeting cancer stem cells,' adds Dr Yeung.

The work also reveals that cancer stem cells are not necessarily just a small subset of cells within a tumour, as has been widely assumed. The researchers found that the proportion of cancer stem cells within different bowel cancers can vary widely, with higher proportions of cancer stem cells correlating with more aggressive tumours.

' People have assumed that cancer stem cells made up a small

proportion of the cells in a tumour, but it is becoming increasingly clear that this is not correct. The most aggressive tumours can have a majority of cells that are cancer stem cells,' says Dr Yeung

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