

Scientists discover why some prostate tumours are resistant to radiotherapy

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Scientists at the University of York believe they have identified how some tiny regulatory molecules in cells can make prostate cancers resistant to radiotherapy.

It is hoped that this new development could pave the way for more effective treatments - allowing a lower dose of [radiotherapy](#) to be used while prolonging the lives of thousands of men.

Prostate cancer is the most commonly diagnosed form of male cancer in the UK and kills more than 11,000 men every year.

In the latest studies, published in *European Urology* and the *British Journal of Cancer*, scientists in The YCR Cancer Research Unit in the Department of Biology at York have shown a direct link between these tiny molecules – known as micro-RNAs - and resistance to radiotherapy.

Every cell has hundreds of micro-RNAs, whose function is to control the expression of genes.

Once regarded as "junk" by scientists, they are now considered vital for the organisation of the various tissues in the body, instructing genes when and where to be active.

The York team have now shown that they are the switch which enables cells to react very rapidly to changes in their environment, such as that provided by cancer treatments.

Previous research has revealed that all prostate cancers contain at least four different cell types, including the [cancer stem cells](#) which resist most current treatments.

By looking at the micro-RNAs present in each of the cell types individually, the researchers found that some micro-RNAs acted in a positive manner, switching off genes which could make the stem cells susceptible to radiotherapy, whilst other micro-RNAs were not expressed in the resistant stem cells, permitting the expression of resistance genes.

By manipulating the levels of these critical micro-RNAs in the clinic, scientists say it should be possible to kill greater numbers of cancer stem cells than ever before, reducing the 30% of prostate cancer patients whose tumours recur after radiotherapy.

Professor Norman Maitland, of The YCR Cancer Research Unit, said prostate [cancer](#) is diagnosed in about 42,000 men every year in the UK. Of those men about a third will get radiotherapy, and of those, about a third will fail on radiotherapy.

"Doctors don't know which patients are going to relapse - and the reason they relapse is probably because the radiotherapy is not focussed on the stem cell, it is focused on the whole tumour.

"We think that by exploiting this new knowledge we can make radiotherapy more effective. What is the impact? We believe it could extend the lifetime of these men. It could also allow a lower dose of radiotherapy to be used and that's really what we are testing at the moment.

"Now we have a handle on why [stem cells](#) cause men to relapse after radiotherapy, this will be the bridge to transforming that into a treatment

and making radiotherapy better."

More information: "Construction of therapeutically relevant human prostate epithelial fate map by utilising miRNA and mRNA microarray expression data." *British Journal of Cancer* , (23 July 2015) | [DOI: 10.1038/bjc.2015.262](https://doi.org/10.1038/bjc.2015.262)

Provided by University of York

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