Friday, 5 August 2005, 23:54 GMT 00:54 UK

Clue to stopping prostate cancer

US scientists have defined a biological process which appears to stop early prostate tumour growth.
The process, which is part of aging and is controlled by certain genes, results in cells - and tumours - failing to respond to normal growth signals.
Men with prostate cancer lack the genes that appear to mediate this process - "senescence", journal Nature reports.
A New York-based team's study in mice suggests correcting this could be a way to prevent prostate tumour growth.

Senescence genes

Senescence is the state or process of aging derived from the Latin word senex, meaning "old man" or "old age" and is controlled by genes.

Cells remain alive but fail to respond to normal growth signals. If this occurs in a tumour, it means it will not grow.

For their research, Dr Pier Paolo Pandolfi and colleagues at the Memorial Sloan-Kettering Cancer Center looked at mice bred to lack certain genes that play a role in senescence and appear to be altered in prostate cancer - PTEN and p53.

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>
> Researcher Dr Pier Paolo Pandolfi

Up to 70% of men with prostate cancer have lost one copy of the PTEN gene at the time when they are diagnosed with cancer and p53 is absent in a high proportion of men with advanced prostate cancer.

In the study, some of the mice had the mouse equivalent of both PTEN and p53, some had neither gene and others had either PTEN or p53.

While the normal mice and the mice without p53 had no

prostate tumours at six months, the mice without PTEN had small prostate tumours.

Mice without both PTEN and p53 had very large and advanced prostate tumours and died by seven months.

Therefore, inactivation of p53 was necessary as well as loss of PTEN for aggressive prostate cancer growth.

New therapies

Dr Pandolfi explained: "Acute loss of PTEN results in increased, not decreased p53 function. This works to suppress the further development of cancer."

He said boosting p53 function might be a good way to contain early prostate cancer.

"If we can maintain a higher level of p53 in prostate cancer and induce cellular senescence, the disease should remain stable," he said.

The team are already testing specific drugs to restore PTEN function.

Two other pieces of research in the same journal support the Memorial Sloan-Kettering work.

Another US team, led by Daniel Peeper, found senescence kept human moles in a non-cancerous state for year, and without it they could develop into a dangerous form of skin cancer called malignant melanomas in the lab.

Similarly, a team from Germany showed that cellular senescence is capable of blocking a cancer called lymphoma in mice.

Commenting on all of the work, Dr Norman Sharpless, from the University of North Carolina School of Medicine, and Dr Ronald DePinho, from Harvard Medical School, said questions remained.

"Does senescence really mean life imprisonment for a precancerous cell, or is parole possible - that is, can senescence be reversed under some conditions?" they asked.

They said the results so far were mixed and suggested different cell types undergo senescence in different ways - some permanently and some reversibly.

They recommended more work to check whether anti-cancer therapies based on cell senescence would be safe and effective.