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New insights into potent cancer tumour suppressor gene

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New insight into the function of a gene important in the suppression of cancer is published today. Researchers at the National University of Ireland Galway have shown that the TP53 gene has even greater anti-cancer activity than previously thought.

Professor Noel Lowndes is head of the Centre for Chromosome Biology at NUI Galway and an SFI Principal Investigator. Leadauthor on the paper and an expert in DNA damage, he explains: "TP53 is one of the most potent genes in the human genome at preventing cancer and hence is termed a tumour suppressor gene. The importance of TP53 as a tumour suppressor is best illustrated by its mutation in at least half of all human cancers."

Previously, TP53 has been known to function in processes that prevent cancer cells from multiplying in the body by either triggering their own destruction, or preventing cell division. Together, these processes are recognised as potent anti-cancer mechanisms.

Professor Lowndes continued: "In our recent work we add a new role to the expanding list of anti-cancer mechanisms controlled by TP53. We show that TP53 directly regulates the repair of broken DNA. Broken DNA is the most dangerous type of DNA damage as it can result in cell death or loss of genetic information in those cells that survive the break.

There are two major competing biochemical pathways for repairing broken DNA. One simply re-joins the two ends of the broken

chromosome. The other uses a nearby intact DNA molecule of the same sequence as a template to repair the broken chromosome. Our work demonstrates that TP53 directly influences the regulation of these two pathways. Thus, loss of TP53 during cancer development will drive the evolution of cancer cells towards ever more aggressive cancer types."

More information: A role for the p53 tumour suppressor in regulating the balance between homologous recombination and non-homologous end joining. DOI: 10.1098/rsob.160225

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