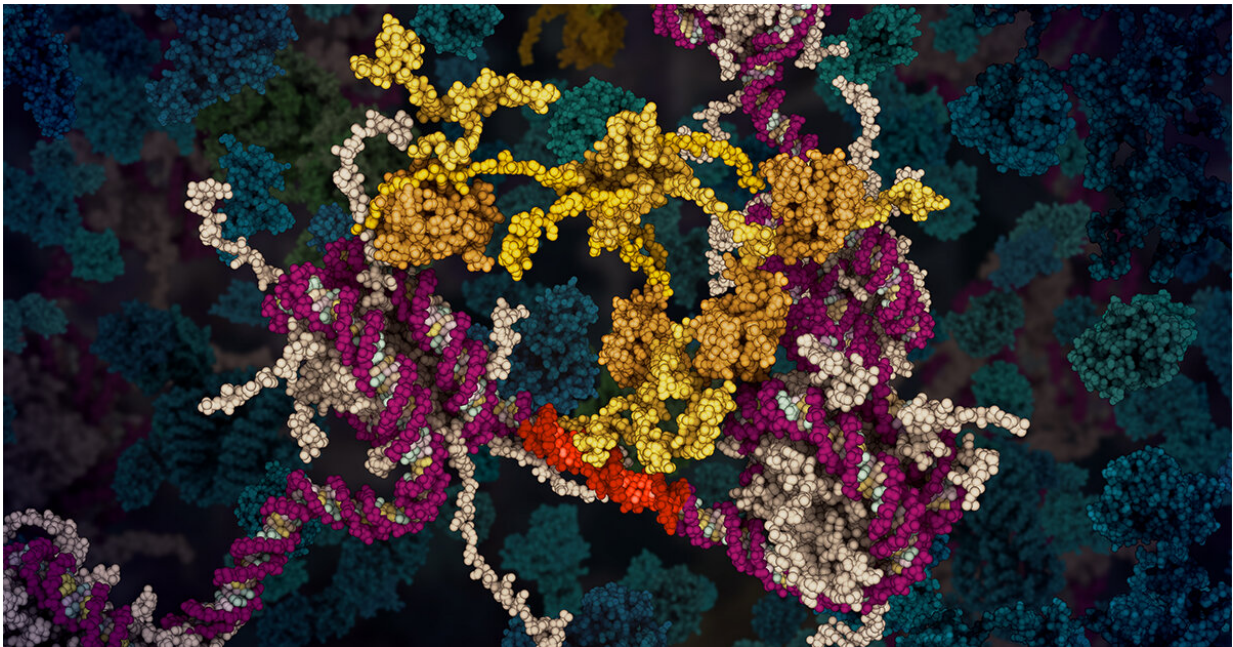


Animation reveals secrets of critical tumour protein

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Animation still showing the p53 tumour suppressor (yellow) protein binding to DNA (magenta/beige). p53 is a critical protein that determines how cells respond to DNA damage. Credit: WEHI, Australia

The latest animation technology has revealed the molecular detail of how our bodies are protected from cancer by a key 'tumour suppressor' protein called p53.

The new WEHI-TV animation visualises discoveries from more than 40

years of research to explain how the [tumour suppressor](#) protein p53 normally prevents [cancer](#)-causing changes in cells. More than half of human cancer cases involve faulty p53.

The animation was produced by WEHI.TV biomedical animator Ms Etsuko Uno, who worked closely with WEHI cancer researchers Professor Andreas Strasser and Dr. Gemma Kelly to ensure the animation's scientific accuracy.

Controlling cell life and death

In our bodies, p53 is an essential controller of cell division, [cell death](#) and DNA repair, ensuring that [healthy cells](#) can divide as needed, but forcing cells with damaged DNA to stop dividing and undergo repair—or die, if the damage is too severe. These processes are critical for maintaining good health; cancer is caused by damaged cells being allowed to persist and grow uncontrollably.

Cancer researcher Dr. Gemma Kelly, who also narrated the animation, said more than half of human cancers carry defects in p53.

"The most frequently mutated gene in human cancer is p53—and it is, I think, the most important 'tumour suppressor' protein. Mutations of the p53 gene are particularly common in several prevalent cancer types with poor prognosis, including lung cancer, ovarian cancer and pancreatic cancer," she said.

"Despite 40 years of intense research into p53, there is still a lot to learn about how this tumour suppressor works, in order to develop better therapies for cancers that have defective p53."

Using animation to understand science

The new WEHI.TV animation was created to clearly explain the latest knowledge about p53, said its creator Ms Etsuko Uno.

"Working closely with our researchers, I was able to produce very complex pictures of p53 functioning within cells, which reflect the most up-to-date data about this tumour suppressor," she said.

"This has been one of the most challenging proteins I have illustrated, because—unlike most other proteins I have tackled—this [protein](#) is largely unstructured. WEHI's structural biology researchers provided valuable guidance on how to accurately depict it."

"To create the detailed molecular shapes and movements, we turned to technologies used to make computer games, using a production software called Unity," Ms Uno said.

Explaining p53's function

The new animation demonstrates how p53 responds to DNA damage in cells, 'turning on' the production of proteins that can repair the damage. It also stops the cells dividing, to allow time for this repair and prevent errors in genes being transmitted to new cells. However, if the damage is too severe, p53 delivers its final blow, directing the production of 'cell death' proteins that trigger the cell's demise, by a programmed cell death process called apoptosis.

The animation also explains how malfunctions in p53 can lead to cancer development, by not adequately repairing DNA damage within cells.

Cancer researcher Professor Andreas Strasser said the animation provided a vivid and accessible explanation of how tumour suppressors within our [cells](#) work to prevent cancer developing. "It's a wonderful educational resource, which clearly explains how p53 protects us from

cancer," he said.

"I am thrilled to see how it incorporates the latest discoveries about how p53 functions—including discoveries made by my own research group—incorporated in a dynamic and scientifically accurate way."

Provided by Walter and Eliza Hall Institute

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