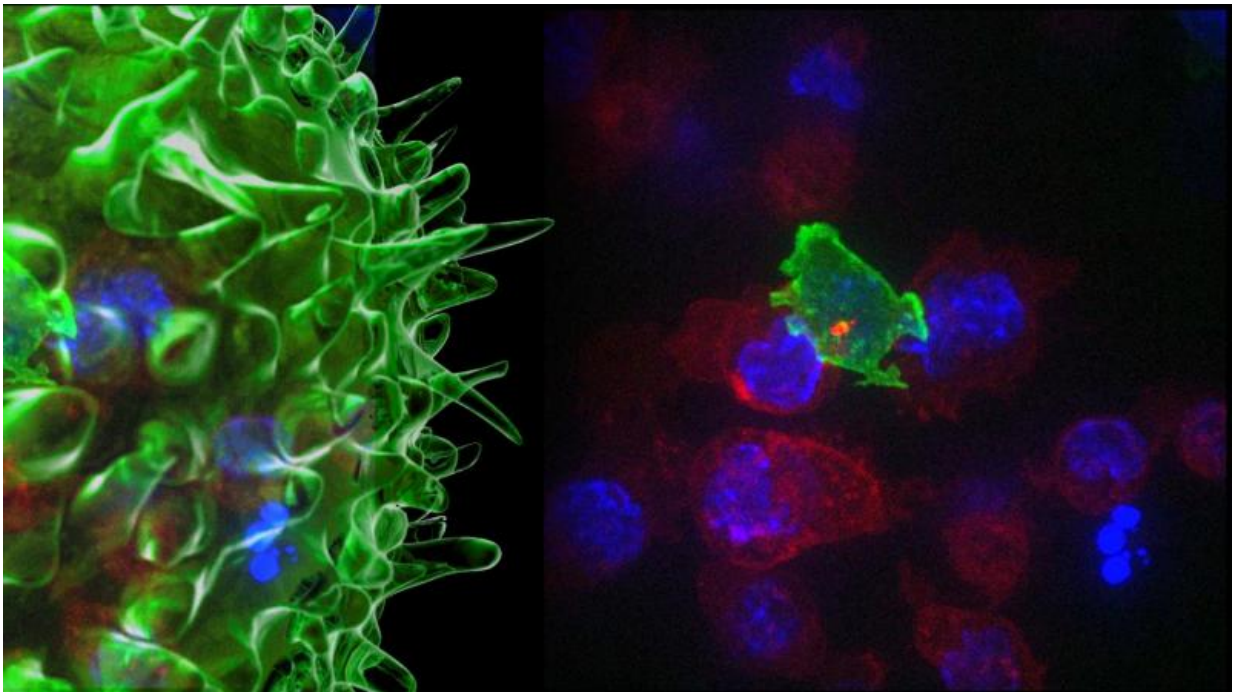


# Body's 'serial killers' captured on film destroying cancer cells

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A cytotoxic T cell -- the body's 'serial killers' -- as it hunts down and eliminates cancer cells. Credit: Gillian Griffiths/Jonny Settle

A dramatic video has captured the behaviour of cytotoxic T cells - the body's 'serial killers' - as they hunt down and eliminate cancer cells before moving on to their next target.

In a study published today in the journal *Immunity*, a collaboration of

researchers from the UK and the USA, led by Professor Gillian Griffiths at the University of Cambridge, describe how specialised members of our [white blood cells](#) known as cytotoxic T cells destroy [tumour cells](#) and virally-infected cells. Using state-of-the-art imaging techniques, the research team, with funding from the Wellcome Trust, has captured the process on film.

"Inside all of us lurks an army of serial killers whose primary function is to kill again and again," explains Professor Griffiths, Director of the Cambridge Institute for Medical Research. "These cells patrol our bodies, identifying and destroying virally infected and [cancer cells](#) and they do so with remarkable precision and efficiency."

There are billions of T cells within our blood - one teaspoon full of blood alone is believed to have around 5 million T cells, each measuring around 10 micrometres in length, about a tenth the width of a human hair. Each cell is engaged in the ferocious and unrelenting battle to keep us healthy. The cells, seen in the video as orange or green amorphous 'blobs' move around rapidly, investigating their environment as they travel.

When a cytotoxic T cell finds an infected cell or, in the case of the film, a cancer cell (blue), membrane protrusions rapidly explore the surface of the cell, checking for tell-tale signs that this is an uninvited guest. The T cell binds to the cancer cell and injects poisonous proteins known as cytotoxins (red) down special pathways called microtubules to the interface between the T cell and the cancer cell, before puncturing the surface of the cancer cell and delivering its deadly cargo.

"In our bodies, where cells are packed together, it's essential that the T cell focuses the lethal hit on its target, otherwise it will cause collateral damage to neighbouring, [healthy cells](#)," says Professor Griffiths. "Once the cytotoxins are injected into the cancer [cells](#), its fate is sealed and we

can watch as it withers and dies. The T cell then moves on, hungry to find another victim."

The researchers captured the footage through high-resolution 3D time-lapse multi-colour imaging, making use of both spinning disk confocal microscopy and lattice light sheet microscopy. These techniques involves capturing slices through an object and 'stitching' them together to provide the final 3D images across the whole cell. Using these approaches the researchers have managed to elucidate the order the events leading to delivery of the lethal hit from these serial killers.

**More information:** Ritter, AT et al. Actin depletion initiates events leading to granule secretion at the immunological synapse. *Immunity*; 19 May 2015.

Provided by University of Cambridge

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