

Stefanie Reichelt

When viewed using a microscope, all parts of the human body - from chromosomes to sperm - can be visually arresting. My work is inspired by scientific images of cells from organisms as diverse as algae and fruit flies, and I find the detail of the scientific images a rich source of ideas for abstract etchings.

art cell

As an undergraduate, I learned the craft of scientific illustration, producing accurate but beautiful drawings and paintings of beetles and butterflies. I regard myself as both an artist and a scientist and during my student years, I became fascinated with the delicate elegance of cell division. Although digital cameras have removed most of the need for high standards of graphic art in bioscience, the preparation of both fixed and living material is a new and equally demanding art: I realised this when 'painting' cells with fluorescently-labelled antibodies. If the treatment is carried out with sufficient skill and care, delicate net-like structures composed of microtubules and other subcellular components can be imaged, but the result is so dependent on the treatment that it needs careful study to relate it to what must be present in life.

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Before joining Cancer Research UK, Cambridge Research Institute (CRI), I worked with one of the UK-based inventors of the confocal microscope, Brad Amos, at the MRC-LMB in Cambridge. As a biologist, I had not been trained to take microscopes apart and put them back together, but soon became caught up in optical design and testing work. I was one of the first to use a 405 nm (violet) laser in a confocal microscope and also worked on a high-resolution spectral confocal development, as well as a compact point-scanning confocal microscope which was brought to market as the CellMap system.

Now, my group at the CRI uses confocal point-scanning, spinning disc systems and non-linear imaging techniques to study live cell divisions and cell development, tumour development and biopsy material. As head of the microscopy laboratory, I am in charge of a team of imaging specialists who work in

collaboration with researchers, obtaining results that are crucial to developing new treatments for cancer patients. Cell division is one of the most intensively studied processes that spiral out of control in cancer, leading to the formation of tumours.

My work is on display at the institute, at the gallery space called ArtCell, which I founded and organise. Last year, my work was featured in a 2-page weekend supplement by Kate Weighton in The Times and a collection of my scientific images are part of the science photo library collection.

The etchings are based on images produced in the course of research. I especially like the random effects which happen during the etching process. If you look closely at printing plates and the detail in the prints, the chemical reaction marks the plate in an intrinsic pattern, which often resembles what we see inside a cell. The microtubules in a live cell are not static but grow and shrink constantly. If such dynamic processes get out of control, the result can be cell death or cancer. The same random vs order balance has to be maintained when chromosomes are duplicated. If an error occurs the cell has to be eliminated, but the randomness of gene distribution also ensures the power of evolution and is the base of our individuality.

When cells grow in a Petri dish, they like to space out in an even monolayer, each cell maintaining a certain distance to its neighbours. Cancer cells start to overgrow other cells and form tumours when signalling between cells is not maintained. We grow cells in special Petri dishes and they divide and we can visualise cytoskeletal elements within these cells. I am fascinated by the way we can visualise the genetic composition of our cells. A method of great value

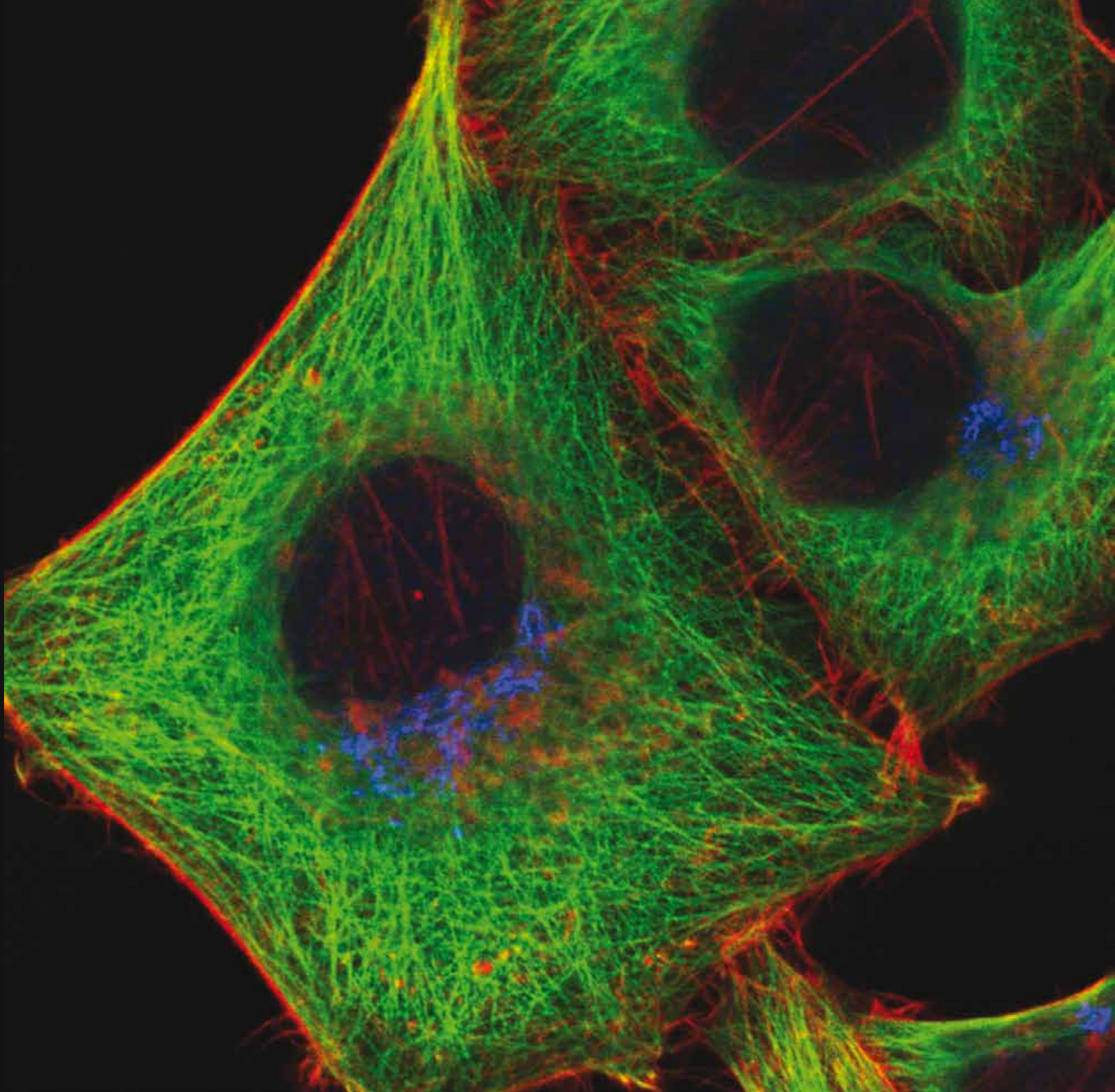
LIFE RACE

Fertilisation is the moment when a sperm and egg join together, and the genes from the mother and father combine to form a new life. This etching is based on what scientists see when observing the process through a microscope. The observations can provide clues as to why a couple has difficulty conceiving.



SPIN CYCLE

This picture shows tissue culture cells imaged using a confocal laser scanning microscope. Within each cell thin filaments called microtubuli have been labelled green. These are part of the cytoskeleton. The cell edges contain shorter actin filaments (red). The un-stained cell nucleus appears as a dark round area in the centre of the cell. There is a blue network-like structure near the nucleus, which is called the Golgi apparatus.





ONE BECOMES TWO

In this etching, which I based on real scientific images, one cell is dividing to make two. Scientists are interested in this process because errors can result in cancer. The V-shaped structures are chromosomes, which hold a cell's genetic material. Special strings pull them to opposite ends, ready to make two new cells.

THE BIG SPLIT (Right)

This is an etching of what I believe is the most dramatic process that our cells perform – division - when one cell becomes two. It keeps us alive and healthy, but can be deadly if it goes wrong. When cells divide, genetic material is duplicated before splitting into two identical portions. Here, the chromosomes have duplicated, making a butterfly shape. The “wings” are then pulled apart, with one side going to each new cell. In cancer, the mechanisms that keep the genetic material intact often malfunction.



X-TREME CLOSE UP

This is a close-up of an etching of a chromosome, based on what I observe through the microscope. Chromosomes are organised structures of DNA, grouped into genes. The bands, painted with fluorescent dyes, represent the positions of certain genes. In disease diagnosis and research, "painting chromosomes" can help scientists to detect abnormal genes which may indicate cancer. The etchings are produced by scoring the image on to a metal plate, covering it with ink and printing on to paper.



for research is the use of specific reagents known as 'chromosome paints'. By coupling fluorescent stains with DNA-recognition molecules, it is possible to stain even individual genes which appear as fluorescent bands on the chromosomes. This can help to diagnose a genetic defect, a disease or a mutation, which might have led to cancer.

The exhibitions at ArtCell are free. Opening times are 10.00-17.00 seven days a week. ArtCell, at Cancer Research UK's Cambridge Research Institute; Tel: +44 (0)1223 404180.

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Stefanie Reichelt, a microscopist and cell biologist based at the Cancer Research UK, Cambridge Research Institute, is also a photographer and print-maker. Her artwork is based on the scientific images taken by means of state-of-the-art microscopes at the cancer research institute in Cambridge.

She is the founder and organiser of the CRUK based ArtCell Gallery:

www.stefaniereichelt-photographyandprints.com/artcell.html.

Her prints are available as small edition prints (email for further details).

