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Cancer test can tell patients instantly if their treatment works

Chemotherapy could be cut short by nanoparticle that glows green when tumour cells die

By Sarah Knapton SCIENCE EDITOR

CANCER patients could soon be able to find if their chemotherapy is working as it happens and follow the disease as it is cleared from their body.

A new technique can assess the effectiveness of cancer treatment just eight hours after the first drugs have been taken.

It would spare cancer patients of an anxious wait to see whether drugs have worked because scans cannot detect if tumours are shrinking until several rounds of treatment have taken place.

Experts from the Brigham and Women's Hospital in Boston, US, have developed an approach that can alert them to the death of cancer cells the moment the drugs begin to work. Using a nanoparticle that delivers therapy and glows green when cancer cells die, researchers were able to see whether a tumour was resistant or susceptible to chemotherapy or immunotherapy.

The finding, published in *The Proceedings of the National Academy of Sciences*, could one day mean that patients are not given unnecessary chemotherapy. "Using this approach, the cells light up the moment a cancer drug starts working. We can determine if a cancer therapy is effective within hours of treatment," said Dr Shiladitya Sen-

gupta, a principal investigator from the Boston hospital. "Our long-term goal is to find a way to monitor outcomes very early so that we don't give a chemotherapy drug to patients who are not responding to it."

The technique takes advantage of the fact that when cancer cells die, an enzyme known as caspase is activated.

The researchers added a chemical to the drugs which glows green in the presence of the enzyme so that the treatment not only fights cancer but reports on its progress. When they tested it on prostate and skin cancer tumours they saw a huge increase in fluorescence when the tumours were sensitive to the drug.

When the treatment was not working there was virtually no glow, suggesting chemotherapy could be stopped if it was ineffective, and patients switched to a different treatment. The team also saw an increase in the fluorescent signal in tumours treated with the immunotherapy after five days.

The researchers plan to see whether the findings can be tested in humans.

In a separate study, scientists at Case Western Reserve University in the US developed a sensor that can pick up a single molecule of enzyme produced by cancer cells, which could lead to the disease being spotted far sooner.

Prof Giuseppe Strangi, the research leader, said: "Very early, most circulating tumour cells express proteins of a very low molecular weight. These proteins are usually too small and in too low a concentration to detect with current test methods."