Tumour study could help improve radiotherapy

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Cancer patients could benefit from new insight into how tumours respond to radiotherapy, an Edinburgh study suggests.

Tiny sensors that monitor conditions inside tumours grown in the lab could help doctors improve treatments for patients, researchers say.

The technique could be used to design treatment plans that maximise the impact of radiotherapy and minimise side effects, the team says.

Radiotherapy is used to help treat almost half of all UK cancer cases, and is often given in a series of small doses.

Mimicking cancer

A team of chemists and cancer specialists created model tumours made of human cancer cells that mimic conditions inside real tumours.

Tiny laser-activated sensors were built into the models, which allowed the team to monitor how tumours respond to different dosages of radiotherapy.

Treatment schedule

Sensor readings showed that changing the treatment schedule for a course of radiotherapy affected its impact.

Two doses of six units of radiation – or six Gy – was more effective at killing tumour cells than a single dose of 12 Gy or three doses of four Gy, the team says. Delivering treatment in two fractions of six Gy decreased the level of acidity inside tumours – a key indicator of cell death. Studying the models under a microscope showed that it also caused tumours to break apart.

Other dosages had little effect on the structure of tumours or their pH, the team says.

Their findings could help inform future radiotherapy treatments for a range of cancers.

The study, published in the journal *The Royal Society of Chemistry*, was funded by EaStCHEM, NHS Lothian and the Jamie King Cancer Research Fund.

"This exciting research could give us a greater understanding of how radiotherapy affects tumours. By working so closely with our colleagues at the Edinburgh Cancer Centre, we have an opportunity to translate our findings into clinical practice," says Dr Colin Campbell of the School of Chemistry.

Provided by University of Edinburgh