Finding cancer 'cold spots' can help minimize radiotherapy side-effects

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Fine-tuning radiotherapy to take into account which parts of a patient's tumor are growing fastest could improve control of cancer while subjecting patients to lower doses of radiation, Dutch researchers reported today at the 2nd European Lung Cancer Conference.

"The only problem in radiotherapy is minimizing the side-effects," says lead researcher Dr Christian Siedschlag from the Dutch Cancer Institute. "If one could hit the tumor with arbitrarily high doses without having to worry about complications, all tumor cells could be killed with 100 percent certainty. Unfortunately this is not the case, therefore one must take every chance to administer no more dose than is absolutely necessary."

With this in mind, the Dutch researchers investigated whether some areas in a tumor might not need to be irradiated, thereby decreasing the overall dose and minimizing damage while achieving the same therapeutic effect.

The tool they used to do this is a form of positron emission tomography scanning called FDG PET. PET scans measure the glucose metabolism of a tumor by injecting 'radioactive sugar' and measuring where the radioactivity (and hence the sugar) is absorbed in the body.

Tumors have an increased metabolism compared to normal tissue, which makes them show up well on PET scans. In most cases, lung tumors are visible on PET scans as a bright sphere, with the highest intensity in the

middle.

"Sometimes, though, the shape of the tumor on a PET scan is more irregular, for instance donut-shaped with a 'cold spot' in the middle or boomerang-shaped with a 'cold spot' (or 'cold area') on one side," Dr Siedschlag explains. "The underlying question that motivated this study was: can we give less radiation dose to these cold spots? If it turned out that these cold areas show less signal on a PET scan because there are less active tumor cells, then the answer would be yes. However, it could also have been that the radioactive sugar doesn't reach the cold spots for other reasons."

At the ELCC meeting, the group reports preliminary results showing that indeed in most cases the cold spots consist of dead tumor cells. In 7 out of 61 patients they saw cold spots on PET scans. Surgical examination showed that in five cases, these spots were in fact dead cells.

"By decreasing the doses given to the cold spots, one might be able to increase the dose given to the rest of the tumor, while keeping the normal tissue dose constant. Or one could keep the dose given to the rest of the tumor constant, which would lead to less side-effects with an identical therapeutic result."

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