Radiotherapy doses to be more accurate

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Credit: AI-generated image (disclaimer)

Cancer patients undergoing radiotherapy treatments in future will be safer thanks to a collaborative piece of research by NPL, the University of Montreal, and McGill University which will result in improved measurement consistency.

Radiotherapy treats cancer by focusing beams of ionising radiation on a tumor, which kills cells by damaging their DNA. For treatment to be

effective, the delivery of radiation needs to be very tightly controlled – too much dose could damage surrounding healthy tissue, too little may cause the tumour to grow again.

As measurement experts, NPL is very active in the field of radiotherapy dosimetry, and has published the results of a collaborative project (On charged particle equilibrium violation in external photon fields) in the journal *Medical Physics*, which was selected to be highlighted by the journal's editor.

In this paper, NPL and collaborators at Canada's McGill University and the University of Montreal report a misconception on how charged particles (ionising electrons) are distributed locally whilst delivering a uniform dose to a tumour using a special form of radiotherapy called 'intensity modulated radiotherapy' (IMRT).

Identifying this misconception allows for much improved correction factor calculations for ionisation chambers and other detectors used in IMRT, and therefore will safeguard cancer patients who receive this form of treatment in future.

Dr Hugo Palmans, a principal research scientist in NPL's Acoustics & Ionising Radiation Division, said:

"This work will impact a range of radiotherapy treatment options, such as TomoTherapy, CyberKnife, and volumetric arc therapy – as we now have a better understanding of how the complex fields of charged particles produced by these therapies are distributed. Medical physicists can now calculate improved values of correction factors for their IMRT detectors which will greatly improve their safety and effectiveness."

NPL's involvement in this research was funded by the National Measurement System, and is part of a much larger multi-disciplinary

effort to make radiotherapy safer than ever.

More information: Read the full paper: On charged particle equilibrium violation in external photon fields, Med. Phys. 39, 1473 (2012)

Provided by NPL