

▶ Inter-Observer Variation in Delineation of Tumours

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Target delineation is a major source of uncertainty in modern radiotherapy as it contributes to systematic errors and can lead to geographical misses of the target. The true gross tumour volume (GTV) in the individual patient is not known, and, hence, the delineation uncertainty can only be estimated. A common approach is to examine the delineation variation in a group of observers delineating the same target. (1)

At Rigshospitalet, University of Copenhagen, Denmark, we have routinely used FDG-PET/CT for planning radiotherapy since 2002 for various cancer types, and it has had a major impact on delineating variation. The addition of metabolic information alters the radiotherapy planning by detection of tumour extensions, additional lymph nodes, or distant metastases, and by helping to distinguish between tumour and surrounding normal tissues.

We have made two studies on this issue. One study examined the interobserver delineation variation in lung tumours. As the clinical routine, the FDG-PET/CT scans were analysed by a nuclear medicine physician and a radiologist. The PET positive lesions were delineated by the nuclear medicine physician, and the CT scans with these contours were imported into Eclipse. Three clinical oncologists and three radiologists delineated the lung tumours. The interobserver delineation variation was small, and the implementation of FDG-PET/CT further reduced the variation. (2)

Another study was made in cooperation with the EORTC (European Organization for Research and Treatment of Cancer) Lymphoma Group. The same set up was used on two cases of Hodgkin lymphoma. The FDG-PET/CT scans were analysed by a nuclear medicine physician and a radiologist together, the PET positive lesions were delineated by the nuclear medicine physician, and the CT-scans with the PET contours were imported into Eclipse. Seven experienced lymphoma radiation oncologists then delineated the GTV. Again, the interobserver delineation variation was small. Notably, the variation did not have a major impact on the dose plans when using 3D conformal techniques. However, it did influence dose plans significantly when highly conformal techniques such as intensity modulated radiotherapy (IMRT) were applied.

References

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2. Persson GF, Nygaard DE, Hollensen C, Munck af Rosenschöld P, Mouritsen LS, Due AK, Berthelsen AK, Nyman J, Markova E, Roed AP, Roed H, Korreman S, Specht L., Interobserver delineation variation in lung tumour stereotactic body radiotherapy. *Br J Radiol.* 2012 Sep;85(1017):e654-60.