

## LETTER TO THE EDITOR

## Comment on “The Clinical Features and Pathophysiology of Acute Radiation Dermatitis in Patients Receiving Tomotherapy”

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Dear Editor:

We read with interest the article by Lee et al.<sup>1</sup>, where a significantly more severe dermatitis was reported in patients receiving tomotherapy when compared to patients receiving conventional radiation. However, the authors do not provide any reasons for their findings. Unfortunately, there is no information on contouring of the planning target volume (PTV); therefore, we can only speculate that grade 2 dermatitis in breast cancer patients might occur due to inclusion of voxels with low computer tomography (CT) numbers (air) as the target. Low density materials are less attenuating and require higher intensity of radiation for delivery of the same dose as to more dense tissues. If this is the case, the actual dose delivered to the surface layer might be higher than the prescription. In our institution, tomotherapy has been used clinically since September 2004, and we have not observed serious dermatitis in our tomotherapy patients, compared to “conventional” techniques. In order to verify the correspondence of calculated and actually delivered doses, either MOSFET dosimeters OneDose<sup>TM</sup> (Sicel Technologies, Morrisville, NC)<sup>2</sup> or optically stimulated luminescence (OSL) dosimeters InLight<sup>®</sup> NanoDot<sup>TM</sup> (Landauer Inc., Glenwood, IL)<sup>3</sup> are used during the first fraction of the treatment for

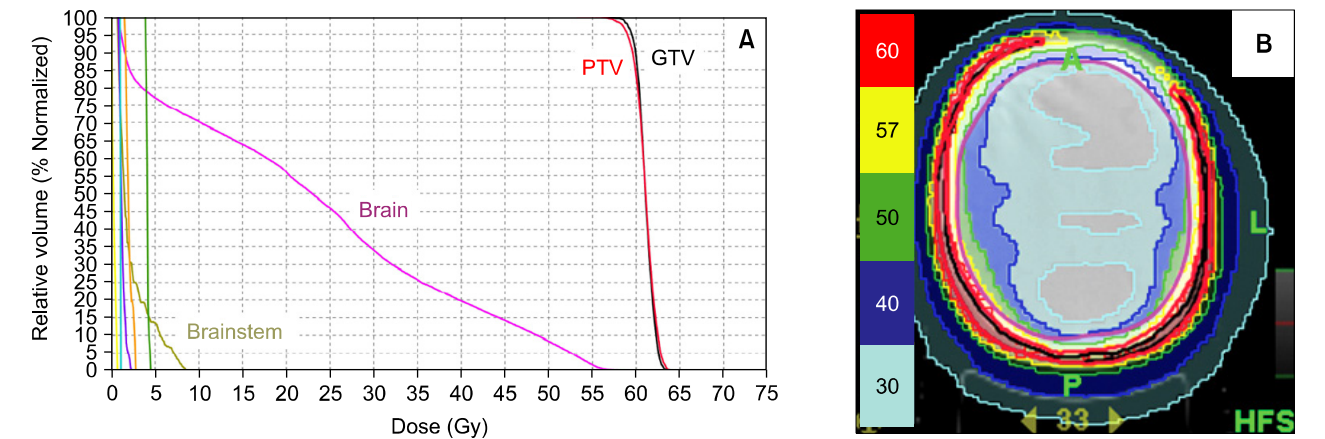
lesions close to the surface.

To stress the importance of careful contouring of the target and planning, we refer to one of our recent cases involving a 73-year-old male with a history of squamous cell carcinoma (SCC) on his scalp since 2004. He had undergone at least two surgical excisions with skin flaps in 2006 and 2008. He has had multiple recurrences of these lesions, mainly around flaps involving a large area of his scalp. The patient refused additional surgical procedures. He underwent photodynamic therapy (PDT) in 2007 for treatment of actinic keratosis of his scalp as an attempt at possible control of his SCC. However, due to skin irritation and pain from treatment, the patient did not tolerate PDT. Tomotherapy treatment was recommended in order to avoid critical organs, such as optic nerves, lens, and brain tissue. He underwent CT simulation and planning for tomotherapy treatment of his scalp lesion of 60 Gy in 1.8 Gy fractions over a period of 6 ½ weeks, resulting in the dose-volume histogram shown in Fig. 1A with good sparing of organs at risk. The PTV was contoured 2 mm below the surface in order to avoid air voxels in the target volume, as shown in Fig. 1B together with the planned dose distribution. During the course of tomotherapy, grade 1 radiation dermatitis developed after 4 weeks into treatment. The treating physician reviewed this patient during his course of treatment and recommended a skin moisturizing gel (hypo-allergenic Aloe Vera). Dry skin desquamation was observed in the irradiated area of the scalp during the last week of the therapy. He tolerated the course of the therapy without any treatment interruption. Two months after tomotherapy, the patient showed a clinically complete response, as shown in Fig. 2, and recovered from radiation dermatitis on follow-up assessment. To date, 5 months after completion of tomotherapy the patient has shown no disease recurrence. MRI of the

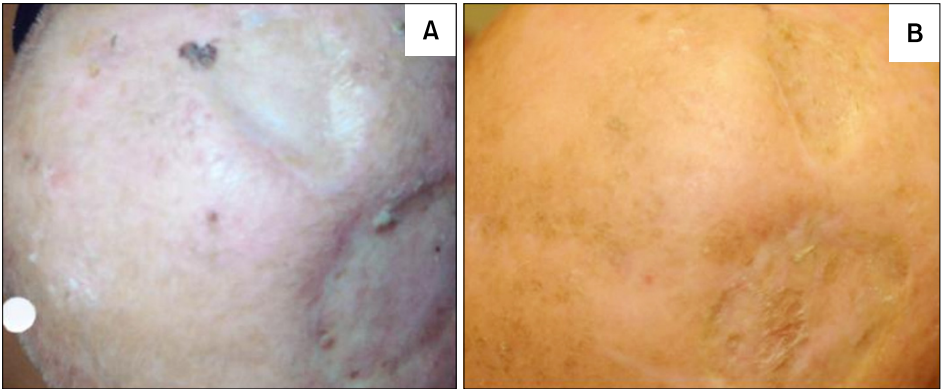
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**Fig. 1.** (A) Cumulative relative dose-volume histogram and (B) dose distribution for the patient with large superficial target volume. GTV: gross tumor volume, PTV: planning target volume, unlabeled dose-volume histograms correspond to the right eye (purple), right lens (blue), right optic nerve (orange), optic chiasm (green), spinal cord (yellow).



**Fig. 2.** Clinical photographs of the patient's scalp: (A) before and (B) 2 months after tomotherapy treatment.

brain showed no acute radiation effect on brain tissue. This example, with a very large superficial target, shows that careful contouring of targets close to the skin surface is necessary in order to avoid significant dermatitis.

REFERENCES

1. Lee JH, Kay CS, Maeng LS, Oh SJ, Lee AH, Lee JD, et al. The clinical features and pathophysiology of acute radiation dermatitis in patients receiving tomotherapy. *Ann Dermatol* 2009;21:358-363.

2. Hardcastle N, Soisson E, Metcalfe P, Rosenfeld AB, Tome WA. Dosimetric verification of helical tomotherapy for total scalp irradiation. *Med Phys* 2008;35:5061-5068.

3. Yukihiro EG, McKeever SW. Optically stimulated luminescence (OSL) dosimetry in medicine. *Phys Med Biol* 2008; 53:R351-R379.