Published in final edited form as:

Int J Radiat Oncol Biol Phys. 2007 August 1; 68(5): 1582. doi:10.1016/j.ijrobp.2007.03.027.

Ototoxicity after radiotherapy of head and neck cancer: The perils of retrospective dose-response estimations

Charlie Pan, MD and Avraham Eisbruch, MD
University of Michigan

To the Editor

Bhandare et al have recently reported a retrospective series of ototoxicity after radiotherapy for head and neck cancer (1). They performed a very meticulous examination of multiple factors, based on chart reviews and available reports of otological examinations in patients treated between 1965–2000 who complained of hearing loss. The authors concluded that doses in the range of 60–66 Gy and above were associated with hearing loss. Specifically, sensorineural hearing loss (SNHL) incidence was 37% for cochlear doses above and 3% for doses below 60.5 Gy, respectively. These data may be adopted as treatment directives by practitioners, however, our experience suggests that these dose levels are too high. We have conducted a prospective study of SNHL in 35 patients with head and neck cancer, in which the function in the cochlea ipsilateral to tumor, which had received a high dose, was compared to the contralateral cochlea which had received a low dose, and both were compared to pre-therapy baseline (2). We have found that SNHL risk started at 45 Gy. Our results are consistent with other small prospective studies which reported increased hearing loss risks associated with doses in the range of 32–50 Gy (3–6).

The retrospective nature of the study by Bhandare et al is the likely cause of their underestimation of the risks of hearing loss following lower doses, reported by the prospective studies. Such an underestimation has likely occurred in other attempts at retrospective fitting of doses vs. complication risks. Prospective studies involving large number of patients followed over sufficiently long time interval are the best source of relevant data and should be encouraged. Until such data is available for ototoxicity, we recommend a dose limit of 45–50 Gy, or less, to the inner ear, for patients in whom these doses can be achieved without under-dosing the targets.

References

1. Bhandare N, Antonelli PJ, Morris CG, et al. Ototoxicity after radiotherapy for head and neck tumors. *Int J Rad Oncol Biol Phys* 2007;67:469–79.
2. Pan CC, Eisbruch A, Lee SJ, et al. Prospective study of inner ear radiation dose and hearing loss in head and neck cancer patients. *Int J Rad Oncol Biol Phys* 2005;61:1393–1402.
3. Grau C, Moller K, Overgaard M, et al. Sensorineural hearing loss in patients treated with irradiation for nasopharyngeal cancer. *Int J Rad Oncol Biol Phys* 1991;21:723–728.
4. Honore HB, Bentzen SM, Moller K, et al. Sensorineural hearing loss after radiotherapy for nasopharyngeal carcinoma: individualized risk estimation. *Radiother Oncol* 2002;65:9–16. [PubMed: 12413669]

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

5. Merchant TE, Gould CJ, Xiong X, et al. Early neuro-otologic effects of three-dimensional irradiation in children with primary brain tumors. *Int J Rad Oncol Biol Phys* 2004;58:1194–1207.