Ten Best Readings Relating to Personalized Treatment Approaches in Radiation Oncology

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Eleanor E. R. Harris, MD

From the Radiation Oncology Program at the H. Lee Moffitt Cancer Center & Research Institute, Tampa, Florida.

Harris EE, Correa C, Hwang WT, et al. Late cardiac mortality and morbidity in early-stage breast cancer patients after breast-conservation treatment. *J Clin Oncol.* 2006;24(25):4100-4106. Epub 2006 Aug 14.

Irradiation to the left breast is not associated with a higher risk of cardiac death up to 20 years after treatment, but it is associated with an increased rate of diagnoses of coronary artery disease and myocardial infarction compared with right breast treatment.

Prosnitz RG, Hubbs JL, Evans ES, et al. Prospective assessment of radiotherapy-associated cardiac toxicity in breast cancer patients: analysis of data 3 to 6 years after treatment. *Cancer.* 2007; 110(8):1840-1850.

Radiation therapy-induced perfusion defects may persist or initially may appear 3 to 6 years following radiation therapy in a high percentage of patients. However, these defects were not associated with changes in regional wall motion or ejection fraction. Additional study is needed to determine the clinical relevance of these defects. Effort should be made to minimize incidental irradiation of the heart while maintaining adequate coverage of target volumes.

Yaremko BP, Guerrero TM, Noyola-Martinez J, et al. Reduction of normal lung irradiation in locally advanced non–small-cell lung cancer patients, using ventilation images for functional avoidance. *Int J Radiat Oncol Biol Phys.* 2007;68(2): 562-571. Epub 2007 Mar 29.

Four-dimensional computed tomography-derived ventilation regions were successfully used as avoidance structures to reduce the dose-volume and dose-function histograms at 5 Gy in all cases. In a subset, there was also a reduction in the F10 and V10 without a change in the V20, suggesting that this technique can be safely used.

Nelson C, Starkschall G, Balter P, et al. Assessment of lung tumor motion and setup uncertainties using implanted fiducials. *Int J Radiat Oncol Biol Phys.* 2007;67(3):915-923.

Respiratory gating may reduce average motion during the course of treatment, but large motion is still possible when delivering gated treatment. Setup uncertainties were on the order of, if not larger than, residual gated motion. The authors recommend careful consideration of all sources of error before reducing margins on the basis of respiratory motion management alone without a strategy for accurate patient setup on a daily basis.

Torres-Roca JF, Eschrich S, Zhao H, et al. Prediction of radiation sensitivity using a gene expression classifier. *Cancer Res.* 2005;65(16):7169-7176.

Radiation sensitivity can be predicted based on gene expression profiles, and a genomic approach is introduced to the identification of novel molecular markers of radiation sensitivity.

Svensson JP, Stalpers LJ, Esveldt-van Lange RE, et al. Analysis of gene expression using gene sets discriminates cancer patients with and without late radiation toxicity. *PLoS Med.* 2006;3(10): e422.

Gene expression profiling succeeded to some extent in discriminating groups of patients with and without severe late radiotherapy toxicity. The discriminative power was enhanced by assessment of functionally or structurally related gene sets. While prediction of individual response requires improvement, this study is a step forward in predicting susceptibility to late radiation toxicity.

Fleckenstein K, Gauter-Fleckenstein B, Jackson IL, et al. Using biological markers to predict risk of radiation injury. *Semin Radiat Oncol.* 2007; 17(2):89-98.

This review introduces the mechanisms of radiation-induced lung injury and summarizes clinical research focused on evaluating changes in biological markers before, during, and after radiation therapy of the thorax.

Hart JP, Broadwater G, Rabbani Z, et al. Cytokine profiling for prediction of symptomatic radiation-induced lung injury. *Int J Radiat Oncol Biol Phys.* 2005;63(5):1448-1454. Epub 2005 Aug 22.

Patients with lower levels of plasma IL-8 before radiation therapy might be at increased risk for developing symptomatic radiation-induced lung injury (SRILI). Further studies are necessary to determine whether IL-8 levels are predictive of SRILI in a prospec-

tive trial and whether this marker might be used to determine patient eligibility for dose escalation.

McGarry RC, Papiez L, Williams M, et al. Stereotactic body radiotherapy of early-stage non–small-cell lung carcinoma: phase I study. *Int J Radiat Oncol Biol Phys*. 2005;63(4):1010-1015. Epub 2005 Aug 22.

Stereotactic body radiation therapy seems to be a safe, effective means of treating early-stage lung cancer in medically inoperable patients. Excellent local control was achieved at higher dose cohorts with apparent dose-limiting toxicities in patients with larger tumors.

Kavanaugh BD, Schefter TE, Wersäll PJ. Liver, renal and retroperitoneal tumors: stereotactic radiotherapy. In: Meyer JL, ed. *IMRT, IGRT, SBRT - Advances in the Treatment Planning and Delivery of Radiotherapy (Frontiers of Radiation Therapy and Oncology)*. Vol 40. Basel, Switzerland: Karger; 2007:415-426.

Stereotactic body radiation therapy has a potential role in the management of renal cell carcinoma, either as an alternative to surgery to the primary site or as cytoreductive therapy directed toward metastatic sites, and in the management of selected retroperitoneal tumors.