

# APPLIED MEDIA PLANNER 2017

## RADIATION ONCOLOGY™

### 2017 Editorial Calendar

Month	Topics	Events
<b>March</b> Space   Feb 7 Materials   Feb 14	<b>Focus: Brain Metastases</b> Radiation for the postoperative surgical cavity Stereotactic radiosurgery for cerebellar metastases Technology Trends: Stereotactic radiosurgery for brain metastases	ESTRO   May 5-9
<b>June</b> Space   May 10 Materials   May 16	<b>Focus: Skin Cancer/Melanoma</b> Targeting melanoma Mycosis fungoides involving head and neck mucosal sites Technology Trends: EBRT/IMRT/TomoTherapy for skin cancer	ASCO   June 2-6 AAPM   July 30-Aug 3
<b>September</b> Space   Aug 9 Materials   Aug 15	<b>Focus: Prostate cancer</b> Single-fraction radiation therapy Brachytherapy applications Technology Trends: Proton therapy for prostate cancer	ASTRO   Sept 24-27
<b>December</b> Space   Nov 8 Materials   Nov 14	<b>Focus: Leadership/Patient Experience</b> Virtual/augmented reality applications in radiation oncology iPad, gaming, and wearable technology for patients Technology Trends: Reducing anxiety/improving the patient experience	RSNA   Nov 26-Dec 1

APPLIED RADIATION ONCOLOGY

### Stereotactic body radiation therapy (SBRT) for lung cancer

Kevin L. Stephans, MD

**S**tereotactic body radiation therapy (SBRT) has evolved over the past 15 years and revolutionized the management of early stage non-small cell lung cancer (NSCLC). Compared to conventional radiation therapy, SBRT offers superior outcomes, lower costs and greater patient convenience. SBRT delivers precise local control and cancer outcomes approaching surgical resection\* with lower risk of non-metastatic mortality, making SBRT the treatment of choice for medically inoperable and very high-risk surgical candidates. Encouraging results in this population have led to the investigation of SBRT's role in operable stage I NSCLC, lung adenocarcinoma, stage I small cell lung cancer, and potentially as a boost to conventional radiation therapy for locally advanced NSCLC. The lessons learned in the SBRT experience also serve as a model for developing SBRT for other mobile solid-tumor sites, including the liver, pancreas, adrenal gland and prostate.

**Technique**  
SBRT treatment planning begins with careful immobilization of the target with motion limited to <5-10 mm. This may be accomplished by abdominal compression (Figure 1), respiratory gating using either external breath-held or external respiratory or fiducial tracking/respiratory monitoring. Immobilization should be assessed by either fluoroscopy or dCBCT imaging or simulation, and verified by cone beam CT (CBCT) or other imaging during treatment.

Historically, the planning target volume (PTV) was created from a fixed expansion (1 cm superior-inferior, 1 cm

anteriorly) to be derived from the cone of multi-phase CT (CTV), often breathing, which, when added to the PTV, results in an internal target volume (ITV), which is then expanded uniformly by 5 mm to yield the PTV. Expanding the dCBCT ITV typically results in a smaller PTV, and likely more consistently represents the actual tumor motion, as well as cone of mass.

Beam arrangement may consist of 6 or more non-coplanar open beams, intensity modulated radiation therapy (IMRT) beams, non-coplanar volumetric arcs typically at least 1 mm, each offset by 30-40 degrees, intensity modulated arc therapy, or alternatively,



FIGURE 1. Abdominal compression positioning for SBRT treatment.

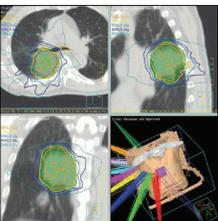


FIGURE 2. Representative dose distribution for a mobile tumor. Internal target volume (ITV) is more variable than the PTV (PTV) in a mobile tumor, and the patient sees that treated to 50% of the PTV when used in a single-beam approach.

particle-based therapy.<sup>1,2,3</sup> The use of IMRT in treating small moving lung targets is controversial due to concerns of potential underdosing, although IMRT is allowed by recent protocols such as RTOG 0813<sup>4</sup> and repeated outcomes with IMRT have been seen in other techniques.<sup>5</sup> Planning should utilize optimized cone convolution or Monte Carlo algorithms, as there is a suggestion that pencil-beam algorithms may overestimate tumor control due to more variable table drop.<sup>6</sup> One institution uses the 4D-derived average CT as the planning target for the best estimate of density and tumor center of mass. Planning should focus on maintaining conformity and rapid dose fall-off. Heterogeneity is acceptable, and may be desirable for purposes of faster fall-off, provided critical serial structures are not overexposed (Figures 2 and 3). Constraints should be based on appropriate protocols for the target being treated, such as RTOG 0813, NCI, NCI, or large institutional experience.

Image guidance during treatment initially consisted of beryllium gaspans followed by port films, although modern approaches typically rely on CBCT due to respiratory motion, and a PTV can be created by stacking free-breathing CTs in a CBCT frame at the time of treatment, generally introducing a systematic error that occasionally exceeds the PTV expansion.<sup>7</sup> One should either be very cautious of using a free-breathing image while verifying that the CBCT error is within the PTV.

Patients should be routinely re-imagined with CT after treatment for response assessment making that significant (tumor motion may occur) (Figure 3).<sup>8</sup> Concerning failures on CT include an enlarging mass that density

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