REVIEW ARTICLE

Progress in Radiotherapy for Regional and Oligometastatic Disease in 2017

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ABSTRACT

This review highlights key publications and abstracts in the field of radiation oncology for lung cancer in 2017 and attempts to place these in the context of developments for the broader thoracic oncology community.

Keywords: Non–small cell lung cancer; Radiotherapy; Stereotactic radiotherapy; Chemoradiotherapy; Immunotherapy; Oligometastatic disease

Introduction

The year 2017 was a very exciting one in radiation oncology, with publications and abstracts across a range of disease presentations varying from early-stage NSCLC to oligometastatic disease, new insights into immune oncology and radiation in both the preclinical and clinical domains, and new trials in SCLC. The authors of this review have attempted to highlight some of the high-impact important developments for the broader thoracic oncology community. A number of key aspects of selected randomized trials are summarized in Table 1.[1–10]

Early-Stage NSCLC

Stereotactic ablative radiation therapy (SABR) is the guideline-recommended treatment for patients presenting with medically inoperable NSCLC.[11–13] SABR replaced conventional radiotherapy in guidelines on the basis of high local control rates and low toxicity observed in single-arm studies and as population studies showed increased survival after its clinical introduction.[14] Despite this, only the randomized Scandinavian SPACE trial had until recently directly compared SABR with conventional radiotherapy.[15] Although conventional radiotherapy resulted in a poorer quality of life with significantly worse dyspnea, chest pain, and cough, the SPACE study failed to demonstrate differences in overall survival (OS) or progression-free survival (PFS). However, the failure to show other differences in outcomes in SPACE may be due to important imbalances between study arms, with more smaller tumors and female patients included in the conventional radiotherapy arm. The early findings of the TransTasman Radiation Oncology Group CHISEL trial comparing both radiation approaches were presented at the recent World Conference on Lung Cancer.[1] CHISEL enrolled patients with a confirmed diagnosis of peripherally located inoperable T1 or T2a N0 NSCLC who, after a staging positron emission tomography (PET) scan, were randomized to SABR to either 54 Gy (in three fractions) or 48 Gy (in four fractions) or to conventional radiotherapy delivered in either 6.5 weeks (66 Gy) or 4 weeks

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Table 1. Key Aspects of Selected Randomized Trials

Topic and Author	Design	Study Name and Trial No.	No. of Patients Enrolled	Completed Accrual, Y or N	Results: Primary End Point	Comments
Stage I NSCLC (Ball et al.[1])	Ph II RCT comparing SABR with conventional radiotherapy. Primary end point: time to local failure	CHISEL NCT01014130	101	Y	Improved 2-y local control with SABR: 10% failure rate vs. 40%	Secondary end point of OS was superior with SABR (HR = 0.51, $p = 0.020$)
Stage III NSCLC (Liang et al.[2])	Ph III RCT comparing concurrent CT-RT with either cisplatin-etoposide or carboplatin-paclitaxel. Primary end point: OS	NCT01494558	200	Y	3-y OS significantly higher in the cisplatin-etoposide arm	Higher-grade ($\geq$2) pneumonitis rate in carboplatin-paclitaxel arm (33% vs. 19%); More grade $\geq$3 esophagitis in cisplatin-etoposide arm
Stage III NSCLC (Antonia et al.[3])	Ph. III blinded RCT comparing adjuvant durvalumab with placebo after CT-RT. Superiority study, coprimary for PFS (standard arm = placebo)	PACIFIC NCT02125461	713	Y	1-y PFS: 55.9% (experimental) 35.3% (control)	Planned interim analysis, OS data still pending
SCLC, limited stage (Faivre-Finn et al.[4])	Ph III RCT comparing OD of 66 Gy with TD of 45 Gy. Superiority study for OS (standard arm = TD)	CONVERT NCT00433563	547	Y	2-y OS: 51% (OD) vs. 56% (TD)	No significant Differences in toxicity. OS better than expected
SCLC, extensive stage (Takahashi et al.[5])	Ph III RCT comparing PCI plus MRI surveillance with MRI surveillance alone. Superiority, 1 sided, testing if PCI was superior to MR surveillance	UMIN 000001755	224	Y	OS: 13.7 mo (MRI surveillance) vs. 11.7 mo (PCI) ($p = 0.094$)	Trial closed early when planned interim analysis showed no OS benefit with PCI
SCLC, extensive stage (Gore et al.[6])	Ph. II RCT comparing PCI with PCI + cRT. Superiority design. Primary end point: OS (standard arm = PCI)	NRG Oncology RTOG 0937	97	Y	1-y OS: 60% (PCI) vs. 51% (PCI + cRT)	Trial closed early; OS better than expected; cRT delayed progression
Stage IV NSCLC (Iyengar et al.[7])	RCT of maintenance chemotherapy vs. SABR + chemotherapy. Superiority design. Primary end point: PFS (standard arm = maintenance chemotherapy)	NCT02045446	29	N	Median PFS 9.7 mo (experimental) vs. 3.5 mo (control)	Trial closed early by IDMC because of futility of rejecting null hypothesis
Stage IV cancer with a resected brain metastasis (Mahajan et al.[8])	Ph 3 RCT of postoperative SRS to surgical cavity vs. observation. Superiority design. Primary end point: local control in resection cavity	NCT00950001	132	Y	12-mo freedom from local recurrence 72% (SRS) vs. 41% (observation)	20% NSCLC. SRS was single-fraction, volume-based dosing median 16 Gy (range 12–18)

(continued)