State of the Art: Concise Review

Stereotactic Ablative Radiotherapy for Pulmonary Oligometastases and Oligometastatic Lung Cancer

David Benjamin Shultz, MD, PhD,* Andrea Riccardo Filippi, MD,† Juliette Thariat, MD,‡ Françoise Mornex, MD, PhD,† Billy W. Loo Jr, MD, PhD,* and Umberto Ricardi, MD†

Abstract: An increasing body of experience suggests that oligometastasis represents a minimal metastatic state with the potential for cure or prolonged survival in selected patients treated with radical local therapy to all identified sites of disease. The main clinical scenarios managed by thoracic oncology specialists are pulmonary oligometastases from primary malignancies of other anatomic sites and primary lung cancer with oligometastases to lung or other organs. Surgery has been a mainstay of treatment in these situations, with remarkably favorable outcomes following pulmonary metastasectomy in well-selected patient cohorts. As with early stage lung cancer in patients who are medically inoperable, stereotactic ablative radiotherapy is emerging as a prominent local treatment option for oligometastatic disease. We review the role and clinical experience of stereotactic ablative radiotherapy for pulmonary oligometastases and oligometastatic lung cancer.

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Metastatic disease in solid malignancies has historically been considered incurable, and the role of local therapies including radiation therapy has primarily been palliative. Though metastases are generally widely disseminated, a minimal metastatic state, dubbed oligometastasis,1,2 has been recognized, with a distinct natural history and a prognosis intermediate between that of localized and widely metastatic disease.1,6 Oligometastasis may be loosely defined clinically as a limited number of metastatic lesions in a limited number of organs, generally identified by imaging, suggesting the potential benefit of radical local therapies. This definition has evolved with advances in diagnostic tools and systemic and local treatments. Improved imaging, such as with whole body fluorodeoxyglucose positron emission tomography (PET), has increased the likelihood of detecting limited metastasis. Furthermore, it is thought that the improved effectiveness of systemic therapy for occult microscopic disease, such as with individualized targeted therapy, may increase the chance of cure following ablation of limited imaging-detected metastases.

Aggressive local treatment, with the goal of ablating all known sites of disease, is an emerging treatment strategy for oligometastatic disease. However, determining the advantages or superiority of this approach compared to palliative systemic therapy or best supportive care is challenging because of the predominantly retrospective nature of existing data, which has raised substantial concerns for selection bias (performance status, disease-free interval, small metastatic burden) despite the use of techniques such as propensity score analyses. The ability to predict rapidly versus slowly progressive disease7 would be of major importance for the design of customized therapeutic strategies and for prospective clinical trials.5,8

Perhaps the best evidence for a local ablative approach for oligometastatic disease comes from treatment, most commonly surgery, of lung or liver oligometastases from colorectal cancer, performed sequentially following systemic treatment.9 This approach has since been extended to other cancer types. The two clinical scenarios most commonly treated by thoracic oncology specialists are pulmonary oligometastases from non-lung primary malignancies and primary lung cancer with or without oligometastases to the lung.

Stereotactic ablative radiotherapy (SABR), also known as stereotactic body radiotherapy, is a rapidly emerging technique for the treatment of oligometastatic disease. SABR's role in the treatment of stage I lung cancer in patients is well established for inoperable patients,10 while for patients who can tolerate surgery, lobectomy is the standard of care. For a third category of patients, who are considered at high risk for complications from a lobectomy but who might tolerate sublobar resections or other invasive procedures such as SABR or radiofrequency ablation, there is a lack of consensus regarding appropriate treatment, and, as with the comparison between lobectomy and SABR, this issue has only been explored retrospectively.11 The attractiveness of SABR in oligometastatic disease is due to its feasibility in an ambulatory setting, low side-effect profile, and efficacy.12,13 SABR may be performed sequentially with systemic therapy and is delivered in a small number of fractions (usually ≤5), varying in size from 5 to more than 20 Gy.

*Department of Radiation Oncology, Stanford University School of Medicine, Stanford, CA; †Department of Oncology, University of Torino, Italy; and ‡Département de Radiothérapie, Centre Hospitalier Lyon Sud, Pierre Bénite, France.

David Benjamin Shultz and Andrea Riccardo Filippi contributed equally to this article.

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Address for correspondence: Billy W. Loo, Jr., MD, PhD, Department of Radiation Oncology and Stanford Cancer Institute, Stanford University School of Medicine, 875 Blake Wilbur Drive, Stanford, CA 94305. E-mail: BWLoo@stanford.edu; or Umberto Ricardi, MD, Department of Oncology, University of Torino, c.so Bramante 88, 10123 Torino, Italy. E-mail: umberto.ricardi@unito.edu

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each. Here, we review the use of SABR for the treatment of pulmonary oligometastases and oligometastatic lung cancer.

**PULMONARY OLIGOMETASTASES**

**Lessons from the Surgical Experience**

In 1997, the “International Registry on Lung Metastases,” a comprehensive research network among 18 major European and North American thoracic surgery departments, reported the results of 5206 lung metastasectomies, with 4572 (88%) complete resections. The primary tumor was epithelial in 2260, sarcoma in 2173, germ cell in 363, and melanoma in 328 patients. The actuarial survival after complete resection was 36% at 5 years, 26% at 10 years, and 22% at 15 years (median survival: 35 months); the corresponding values for incomplete resection were 13% at 5 years and 7% at 10 years (median survival: 15 months). Among complete resections, the 5-year survival was 33% for patients with a disease-free interval (DFI: time between initial diagnosis and onset of lung metastatic disease) below 11 months and 45% in patients with a DFI longer than 36 months; moreover, 5-year survival was superior for patients with single lesions (43% vs. 27%). These findings suggested a potentially curative role for surgery in a subset of metastatic patients, such as those with a completely resected single lesion (R0) and extended DFI. A recent large single-institution series confirmed these factors as prognostic, with a survival projection at 2 and 5 years after complete resection (achievable in 85% of patients) of 74% and 46%, respectively. As a result of these findings, internationally accepted selection criteria for lung metastasectomy are good performance status, absence of extra-pulmonary metastases, control of the primary tumor, possibility of complete resection, and adequate respiratory function. All comprehensive series reported thus far comprise multiple primary tumors (e.g., epithelial, mesenchymal, germ cell tumors, and melanoma), and, among different epithelial tumors, histology has not been shown to be a significant prognostic factor. That being said, there are several reports from smaller series describing the results of surgical metastasectomy for colorectal cancer metastases. In a recent systematic review, Schlijper et al. included 23 surgical reports, selected by a minimum follow-up of 24 months and a minimum of 50 patients, without regard to previous therapies, four of which were prospective studies. In this report, 2- and 5-year survival for metastasectomy ranged from 64% to 88% and 29% to 71.2%, respectively.

**Role for SABR**

SABR is an ideal modality for treating pulmonary metastases with the goal of achieving high rates of tumor control with minimal morbidity, noninvasively (Fig. 1). The use of SABR in treating metastatic pulmonary nodules was a natural extension of its established role in the treatment for early stage non–small-cell lung cancers (NSCLC) not amenable to surgical resection. In oligometastatic disease, pulmonary lesions treated with SABR have a 1-year local control rate of 70% to 95% according to various studies, reporting single-fraction schedules, showed similar local control rates, especially for smaller tumors. All published series included a broad spectrum of different primary tumors, with the most represented histological subtypes being colorectal and lung cancer. Table 1 summarizes the results of clinical trials published over the last 10 years. The predominant clinical presentation was a single lung metastasis, with more limited reports of patients with two to five pulmonary nodules. Siva et al. reviewed several studies on SABR for lung metastases, with a total of 488 patients treated with a wide range of technical approaches and different dose-fractionation schedules, and demonstrated a 2-year weighted overall survival of approximately 50%. Furthermore, in a prospective pilot study on oligometastatic patients (<5 lesions), survival at 3 years was around 30% and at 5 years did not exceed 25%.

Few consistent prognostic factors have emerged from various studies to guide appropriate patient selection for the treatment of oligometastatic pulmonary tumors. In two sequential reports by Milano et al. that included oligometastatic patients with less than five lesions in various organs including lung, the subgroup of breast cancer patients experienced superior rates of survival, while among non-breast epithelial subtypes, no significant differences were recorded. DFI (here defined as the interval between the initial diagnosis and the start of a local therapy for lung lesions) appears to have an impact for SABR, but results are unclear. Norihisa et al. found that DFI longer than 3 years was associated with better overall survival, and Filippi et al. reported that patients with a DFI longer than 2 years had better cancer-specific survival, on both univariate and multivariate analyses. Conversely, other studies failed to show a survival difference according to DFI. Tumor volume appears to be prognostic, with better outcomes in smaller tumors (<3.3 cc for gross tumor volume). Many patients included in these retrospective series, especially those with more than two pulmonary nodules, also received systemic therapy, either prior to or immediately after SABR, or at the time of a second progression. Few have been treated with further local therapies (including a second SABR) for oligometastatic recurrence or progression and it is difficult to estimate the contribution of these factors on survival. Reported 1- or 2-year progression-free survival (PFS) rates following SABR are highly variable, ranging from 25% to 70% and reflect the intrinsic heterogeneity of this patient.
Ongoing Trials

Current clinical trials evaluating the role for surgery or SABR for oligometastatic cancer include patients with a heterogeneous group of primary tumors. PulMiCC\textsuperscript{38} is a randomized trial comparing surgery to active surveillance for pulmonary oligometastases in colorectal cancer. The COMET\textsuperscript{39} phase II trial randomizes patients to standard of care versus standard of care plus SABR for all known sites of metastatic and primary disease (bone, adrenal, lung, brain, and liver). The primary endpoint is overall survival, and secondary endpoints include quality of life, toxicity, PFS, local control, and number of cycles of further systemic therapy. The SAFRON\textsuperscript{40} trial is a phase II randomized study comparing stereotactic radiotherapy and radiosurgery in oligometastatic pulmonary metastases. The primary endpoints are safety and toxicity. Finally, NCT01185639\textsuperscript{41} is a single-arm Phase II clinical trial, evaluating the role for SABR in NSCLC patients with a maximum of 5 metastatic sites, following primary chemotherapy. These innovative studies will better clarify the efficacy of local ablative strategies for the treatment of oligometastatic disease.

**OLIGOMETASTATIC NSCLC AND SABR**

**Definition of Oligometastatic NSCLC**

Definitive therapy for early stage NSCLC, through surgery or SABR, achieves 5-year survival rates in excess of 70%.\textsuperscript{42,43}

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**TABLE 1. Clinical Trials of Stereotactic Ablative Radiotherapy for Pulmonary Oligometastatic Disease**

<table>
<thead>
<tr>
<th>Reference</th>
<th>No. of Patients</th>
<th>No. of Targets</th>
<th>Radiation Dose</th>
<th>Median Follow-Up (Months)</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fractionated/Single Fraction SABR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onimaru et al.\textsuperscript{27}</td>
<td>20</td>
<td>32</td>
<td>48 Gy/8 fx, 60 Gy/8 fx</td>
<td>18</td>
<td>48% 2-yr OS, 69.6% 3-yr LC for 48 Gy, 100% 3-yr LC for 60 Gy</td>
</tr>
<tr>
<td>Yoon et al.\textsuperscript{26}</td>
<td>53</td>
<td>80</td>
<td>30 Gy/3 fx, 40 Gy/4 fx, 48 Gy/4 fx</td>
<td>14</td>
<td>70% LC for 30 Gy, 77% for 40 Gy, 100% LC for 48 Gy, 51% all 2-yr OS</td>
</tr>
<tr>
<td>Okunieff et al.\textsuperscript{28}</td>
<td>50</td>
<td>125</td>
<td>50 Gy/10 fx, 48 Gy/6 fx, 57 Gy/3 fx</td>
<td>18.7</td>
<td>91% 3-yr LC, 50% 2-yr OS</td>
</tr>
<tr>
<td>Norihisa et al.\textsuperscript{10}</td>
<td>34</td>
<td>43</td>
<td>48 Gy/4 fx, 60 Gy/5 fx, at isocenter</td>
<td>27</td>
<td>90% 2-yr LC, 84% 2-yr OS</td>
</tr>
<tr>
<td>Brown et al.\textsuperscript{25}</td>
<td>35</td>
<td>69</td>
<td>5 Gy/1 fx to 60 Gy/4 fx</td>
<td>18</td>
<td>77% crude LC, 72.5% 2-yr OS</td>
</tr>
<tr>
<td>Rusthoven et al.\textsuperscript{12}</td>
<td>38</td>
<td>63</td>
<td>60 Gy/3 fx at 80%</td>
<td>15.4</td>
<td>96% 2-yr LC, 39% 2-yr OS</td>
</tr>
<tr>
<td>Wulf et al.\textsuperscript{14}</td>
<td>41</td>
<td>51</td>
<td>30 Gy/3 fx, 36 Gy/3 fx, 26 Gy/1 fx at 100%</td>
<td>13</td>
<td>80% 1-yr LC, 33% 2-yr OS</td>
</tr>
<tr>
<td>Ricardi et al.\textsuperscript{23}</td>
<td>61</td>
<td>77</td>
<td>45 Gy/3 fx, 26 Gy/1 fx at 80%</td>
<td>20.4</td>
<td>89% 2-yr LC, 66.5% 2-yr OS</td>
</tr>
<tr>
<td><strong>Single Fraction SABR Only</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hof et al.\textsuperscript{30}</td>
<td>61</td>
<td>71</td>
<td>12 to 30 Gy at isocenter</td>
<td>14</td>
<td>65.1% 2-yr OS</td>
</tr>
<tr>
<td>Filippi et al.\textsuperscript{29}</td>
<td>67</td>
<td>90</td>
<td>26 Gy at 80%</td>
<td>24</td>
<td>88.1% 2-yr LC, 70.5% 2-yr OS</td>
</tr>
</tbody>
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Population\textsuperscript{23–26} A recent retrospective study, to the best of our knowledge the first designed to compare surgery with SABR for pulmonary oligometastases, suggested comparable rates of local control and PFS.\textsuperscript{39} In this single institutional experience of consecutive patients, SABR was offered as a second choice to patients not eligible for surgery. Most surgical patients (n = 68) had colorectal cancer (57%) or sarcoma (27%), while most SABR patients (n = 42) had colorectal (74%) or NSCLC (14%). With a median follow-up of 43 months, overall survival at 5 years was 41% for metastasectomy and 49% for SABR. These results are promising, but the absence of prospective trials, large retrospective studies with adequate follow-up, meta-analyses, or collaborative network observational studies hampers our ability to evaluate the role of SABR in this setting. Metastasectomy should still be regarded as the standard therapeutic option for pulmonary oligometastases, as SABR has not yet been evaluated in a large prospective study.
Conversely, disease that has spread to regional lymph nodes, treated with chemotherapy in combination with either surgery, radiotherapy, or both, is difficult to eradicate and Stage IV disease treated exclusively with chemotherapy is considered incurable, with median survival rates of 13–14 months.\textsuperscript{46,45} Recently, oligometastatic NSCLC (OLC), presenting with one to five synchronous or metachronous metastatic lesions, has emerged as a putatively distinct disease state.\textsuperscript{46} Locally ablative therapies are often used to treat OLC; however, the subset of patients within the spectrum of OLC who benefit from these interventions to metastatic sites or the primary lesion has not been conclusively identified. These issues are reflected by the heterogeneous survival outcomes reported in several retrospective and a limited number or prospective studies. One example of the latter, a single-arm phase II study, enrolled 39 patients presenting with stage IV disease with four or less synchronous sites of distant metastasis.\textsuperscript{47} The primary lesion was treated with radiotherapy alone or in combination with chemotherapy, and all sites of distant metastasis were treated with surgery or ablative radiotherapy. Median survival was 13.5 months, though six patients were progression free after 2 years. Within the larger body of retrospective literature, median survival among OLC patients with controlled primary tumors in a recent systematic review was 19 months and aggressive treatment to the primary tumor improved OS, supporting the hypothesis that OLC represents a clinically distinct and potentially curable disease.\textsuperscript{48} Currently, the NCCN recommends surgical resection or SABR as an option for NSCLC presenting or progressing with solitary sites of metastasis to the brain or adrenals, though in the latter case only when the lung cancer is considered curable based on T and N staging.\textsuperscript{49}

**The Role for SABR**

The role for SABR, as an alternative to surgery, in the definitive management of early stage lung cancers, has been well established. Although lobectomy remains the standard of care for patients who are surgical candidates, in patients who are medically inoperable, SABR provides primary tumor control rates that are comparable to lobectomy.\textsuperscript{50} SABR for primary early stage lung cancer is definitive and differs from radiotherapy for advanced stage but potentially curable disease (T3, node positive), in that a smaller number of fractions (1–8) are used to deliver larger per fraction doses to the primary tumor only, without chemotherapy. Identical techniques can be used to ablate metastatic tumors within or outside of the lungs in OLC.

**Brain Metastases**

The majority of published studies of OLC have described the outcomes of patients with resected solitary brain metastases.\textsuperscript{51} Compared with stereotactic radiosurgery (SRS), conventional surgery has the advantage of providing pathologic confirmation of metastatic disease and imparts superior rates of local control for larger tumors compared with SRS.\textsuperscript{50} However, adjuvant radiation to the resection cavity using SRS or whole brain radiotherapy (WBRT) is required following resection to ensure acceptable rates of local control.\textsuperscript{51,52} SRS has the advantage of being able to treat unresectable tumors, easily treating multiple tumors in different regions of the central nervous system (CNS) in a single course, of imparting acceptable rates of local control for small- to medium-sized tumors using a single modality, for being noninvasive, and, finally, is less toxic than whole brain irradiation (Fig. 2).\textsuperscript{53} The survival benefit of radiosurgery has been confirmed for a single brain metastasis in a randomized Phase III clinical trial, and in that same study, improved functional autonomy was observed in patients with one to three brain metastases.\textsuperscript{54} In this regard, Flannery et al.\textsuperscript{55} described 42 patients with OLC treated for a solitary, synchronous brain metastasis. Patients had stage I–III thoracic disease and slightly more than half were treated definitively in the chest with chemoradiotherapy with or without surgery. Fourteen patients had node negative T1 or T2 disease; however, a subset analysis describing their outcomes was not reported. For 26 patients whose thoracic disease was treated definitively, median OS was approximately 26 months, twice that of patients whose thoracic disease was treated with chemotherapy alone. For their CNS tumors, all patients were treated definitively with SRS. In all but five cases, patients died due to progression of disease outside of the CNS, suggesting that an aggressive local approach to brain metastasis in patients who can tolerate definitive treatment for their primary disease may be appropriate.

The question of whether adjuvant WBRT should be added to local ablative therapies to target subclinical lesions is unresolved. WBRT improves intracranial tumor control but carries an increased risk of neurotoxicity and may limit available salvage options. A recently completed EORTC study 22952–26001 showed that, as with previous phase III randomized trials, adjuvant WBRT (after surgery or radiosurgery in patients with one to three brain metastases) reduces intracranial events and neurologic death, but fails to improve the duration of functional independence or overall survival.\textsuperscript{56}

**Lung Metastases**

As described in preceding sections, SABR is an effective means of treating pulmonary metastases.\textsuperscript{12} In the case of OLC, it is often not possible to determine whether one or both lung lesions represent primary lesions. If one or more lesions are presumed to be metastatic, according to the AJCC 2009, lesions in the ipsilateral or contralateral lung designate T4 or M1a classifications, respectively, in both cases indicating a better prognosis than extrapolmonary metastatic disease.\textsuperscript{57} Voltolini et al. described 43 patients treated for NSCLC with synchronous multiple pulmonary tumors that were completely resected, 60% of which were of identical histology, most often by wedge resection. As high as 86% of patients had a total of two lesions and 60% underwent staging PET scans. Median survival was 32 months. On multivariate analysis, only node-positive disease or surgery prior to 2000, when PET was incorporated into routine staging, was associated with decreased survival.\textsuperscript{58} Assuming comparable rates of local control from SABR versus surgery,\textsuperscript{59} and adequate regional lymph node staging from PET-CT,\textsuperscript{60} treatment of patients with OLC restricted to lung metastasis with SABR appears to be a reasonable option.

**Adrenal Metastases**

Numerous small retrospective series have described outcomes following resection of solitary adrenal metastases in OLC and a recent systematic review reported the results of those studies, separately describing the cohort of patients who were treated...
for solitary adrenal metastases that presented synchronously with the primary lung tumor.61 Interestingly, a comparison of median survival favored metachronous over synchronous metastases (12 months vs. 31 months); however, 5-year survival rates were comparable, at approximately 25%. A recent report described the use of SABR for treating 13 OLC patients with a solitary adrenal metastasis using doses that ranged from 20 to 40 Gy delivered in five fractions. Median PFS was 12 months, median OS was 23 months, and the crude rate of local control was 77%.62

Tyrosine Kinase Inhibitors and Oligoprogressive Disease

Patients with metastatic lung cancer driven by epidermal growth factor receptor (EGFR) mutations or anaplastic lymphoma kinase gene rearrangements that are treated with the tyrosine kinase inhibitors (TKI), erlotinib, gefitinib, afatinib, or crizotinib, have superior rates of survival compared to patients with cancers without these mutations treated with cytotoxic chemotherapies.63–66 Weickhardt et al.67 reported a single institution retrospective study of 25 patients who developed oligoprogressive disease while being treated with either erlotinib or crizotinib monotherapy in the CNS alone or with four or fewer extracranial metastases. Patients were treated with SABR, SRS, WBRT, or surgery and maintained on that same drug. This strategy was associated with a median of six additional months before a second progression. In a similar study, 18 patients with EGFR-mutant, non-CNS, oligoprogressive disease received ablative treatment while

**FIGURE 2.** Stereotactic radiosurgery (SRS) for oligometastatic non–small-cell lung cancer (NSCLC). A 63-year-old man with initial stage III NSCLC treated 9 months previously with chemoradiation developed sudden onset seizures with left facial twitching and distortion, followed by jerking of the left arm and leg and loss of consciousness. Magnetic resonance imaging (MRI) revealed a single lesion in the left tempoparietal region measuring $16 \times 12 \times 13$ mm. This lesion was subsequently targeted using a noncoplanar technique with 20 Gy delivered to the 80% isodose line in a single fraction.
TABLE 2. Ongoing Clinical Trials Examining the Role for Surgery or SABR for Oligometastatic Cancer

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Eligibility</th>
<th>Intervention</th>
<th>Primary Endpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>PulMICC</td>
<td>Randomized</td>
<td>Pulmonary metastases from colorectal cancer</td>
<td>Active monitoring vs. pulmonary metastasectomy</td>
<td>Feasibility/survival</td>
</tr>
<tr>
<td>SABR-COMET</td>
<td>Randomized</td>
<td>All treatable metastatic sites; maximum of three tumors to any single organ system; controlled primary tumor</td>
<td>Palliative-scheme radiation as clinically indicated vs. stereotactic ablative radiation to multiple sites</td>
<td>Overall survival</td>
</tr>
<tr>
<td>SAFRON II</td>
<td>Randomized</td>
<td>A maximum of three metastases to the lung from any nonhematological malignancy</td>
<td>Stereotactic multifraction SABR vs. radiosurgery</td>
<td>Toxicity</td>
</tr>
<tr>
<td>NCT01185639</td>
<td>Phase II</td>
<td>NSCLC with ≤5 metastatic sites, involving lung, liver, adrenal, or spinal lesions; if primary untreated, must have three mets</td>
<td>SBRT to affected sites, delivered in three or five fractions</td>
<td>Progression-free survival</td>
</tr>
<tr>
<td>NCT01725165</td>
<td>Randomized</td>
<td>Three or less metastases from NSCLC</td>
<td>Consolidative radiotherapy and/or surgery vs. systemic therapy or observation</td>
<td>Progression-free survival</td>
</tr>
</tbody>
</table>

Future Trials and Conclusions

Despite promising results from several retrospective studies and limited prospective data, randomized evidence that could eliminate the specter of selection bias or support standardized treatment strategies for oligometastatic cancer with SABR or other local ablative therapies is lacking (Table 2). A randomized Phase II trial, initiated at the University of Chicago,71 was recently closed due to slow accrual. At least one ongoing Phase II multiinstitutional trial is randomizing patients with OLC to chemotherapy followed by local ablative therapy to sites of metastasis (radiation or surgery) versus further systemic therapy or surveillance.72 Another similar trial using radiation alone recently completed accrual.73 We await the results from these and other ongoing randomized control trials to assess the value of SABR in the treatment of pulmonary oligometastases and OLC.

REFERENCES


69. Pemetrexed disodium and carboplatin or cisplatin with or without erlotinib hydrochloride in treating patient with stage IV non-small cell lung cancer resistant to first-line therapy with erlotinib hydrochloride or gefitinib. Available at: http://clinicaltrials.gov/show/NCT01928160. Accessed April 2014.


