Guideline 7-21

A Quality Initiative of the Program in Evidence-Based Care (PEBC), Cancer Care Ontario (CCO)

Radiotherapy with Curative Intent in Patients with Early Stage, Medically Inoperable, Non-Small Cell Lung Cancer


Report Date: May 4, 2016

Section 1: Recommendations

The complete guideline is available on the CCO website: https://www.cancercare.on.ca/toolbox/qualityguidelines/diseasesite/lung-ebs/, and includes a summary of the key evidence associated with each recommendation, the guideline development methods, the evidence review and a summary of the review process.

For information about this document, please contact Dr. C. Falkson, the lead author, through the PEBC via:
Phone: 905-527-4322 ext. 42822 Fax: 905 526-6775 E-mail: ccopgi@mcmaster.ca

For information about the PEBC and the most current version of all reports, please visit the CCO website at http://www.cancercare.on.ca/ or contact the PEBC office at:
Phone: 905-527-4322 ext. 42822 Fax: 905 526-6775 E-mail: ccopgi@mcmaster.ca
Radiotherapy with Curative Intent in Patients with Early Stage, Medically Inoperable, Non-Small Cell Lung Cancer

Section 1: Recommendations

GUIDELINE OBJECTIVES
To investigate the effectiveness of radiotherapy with curative intent in patients with early stage non-small cell lung cancer (NSCLC) who are medically inoperable.

TARGET POPULATION
Adult patients with potentially curable, early stage (Stage I or II) NSCLC (without nodal involvement or metastases), and who are deemed medically inoperable or refuse surgery.

INTENDED USERS
Radiation planning and treatment providers, oncologists, thoracic surgeons, respirologists, diagnostic assessment groups, and other healthcare providers involved with lung cancer.

NOTE: Stereotactic body radiation therapy (SBRT) and stereotactic ablative radiation therapy are considered synonymous for the purposes of this guideline and will be referred to as SBRT from this point on.

RECOMMENDATIONS

Recommendation 1
SBRT with curative intent is an option that should be considered for patients with early stage, node-negative, medically inoperable NSCLC.

Qualifying Statements for Recommendation 1
- The planning process and treatment delivery for SBRT require the use of advanced technology to maintain an appropriate level of safety due to the high dose per fraction. Consistent patient positioning and four-dimensional analysis of tumour and critical structure motion during simulation and treatment delivery are essential.
- Preliminary results for proton beam therapy have been promising but require further clinical studies. More randomized controlled trials are required.

Recommendation 2
Recommended fractionation schemes for SBRT should have a BED$_{10(LQ)}$ of ≥100.$^1$

Qualifying Statements for Recommendation 2
- Tumour size and proximity to critical central$^2$ structures [1] requires consideration when determining the dose fractionation due to increased risk of treatment-related adverse events associated with centrally located tumours.

---

$^1$ BED = biological effective dose; LQ = linear quadratic
$^2$ Central tumours refer to tumours within a 2 cm radius of the distal trachea and proximal bronchial tree.
- **Examples** of dose/fractionation schemes used in the studies included (see Table 4-2):

<table>
<thead>
<tr>
<th>Location</th>
<th>Total dose (Gy)/# of fractions</th>
<th>BED&lt;sub&gt;10&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral</td>
<td>60/3</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>54/3</td>
<td>151.2</td>
</tr>
<tr>
<td></td>
<td>55/5</td>
<td>115.5</td>
</tr>
<tr>
<td></td>
<td>48/4</td>
<td>105.6</td>
</tr>
<tr>
<td></td>
<td>66/3</td>
<td>211.2</td>
</tr>
<tr>
<td></td>
<td>60/5</td>
<td>132</td>
</tr>
<tr>
<td>Central</td>
<td>50/5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>48/4</td>
<td>105.6</td>
</tr>
<tr>
<td></td>
<td>60/8</td>
<td>105</td>
</tr>
</tbody>
</table>

- Evidence showed consistent tumour control and survival outcomes using the above schedules. Ongoing trials may yield new evidence regarding optimal stereotactic dosing schedules and recommended doses different than those listed above.
- Based on the current evidence and the opinion of the authors, radiation doses of BED<sub>10(LQ)</sub> >146 may significantly increase toxicity and should be avoided.
- Although the use of radiation dosages expressed as a biological effective dose has been advocated, it is important to understand the limitations of determining radiation BED using the linear quadratic model for the extreme-hypofractionated schemes used in SBRT.
Reference