Image-guided brachytherapy for cervical cancer: a questionnaire-based survey in Japan

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A questionnaire was sent to 171 facilities having HDR brachytherapy equipment.

- Total 144 (84%) facilities responded.
- 9 blank (no activity).
- Total 135 (78%) facilities filled in the questionnaire.
Overview of Japanese practice in 2012

- Imaging with applicator
  - X-rays (n=84)
  - X-rays and CT/MRI (n=43)
  - CT/MRI (n=8)
  (Total 135)

- Imaging used for treatment planning
  - X-rays (n=84)
  - X-rays (n=29)
  - CT/MRI (n=22)

- Possibility of introducing of 3D-treatment planning system within 3y
  - 2D at present 84%
  - No (n=46)
  - Yes (n=38)

3D in near future 66%
# Imaging used for treatment planning

<table>
<thead>
<tr>
<th>Group</th>
<th>Year</th>
<th>Number</th>
<th>Response rate</th>
<th>X-rays</th>
<th>CT</th>
<th>MRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS ¹)</td>
<td>2007</td>
<td>256 MDs</td>
<td>55%</td>
<td>43%</td>
<td>55%</td>
<td>2%</td>
</tr>
<tr>
<td>CANADA ²)</td>
<td>2009</td>
<td>58 MDs</td>
<td>62%</td>
<td>50%</td>
<td>45%</td>
<td>5%</td>
</tr>
<tr>
<td>UK ³)</td>
<td>2008-2011</td>
<td>45 Facilities</td>
<td>96%</td>
<td>73%</td>
<td>22%</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26%</td>
<td>53%</td>
<td>21%</td>
</tr>
<tr>
<td>The present study</td>
<td>2012</td>
<td>171 Facilities</td>
<td>84%</td>
<td>84%</td>
<td>15%</td>
<td>1%</td>
</tr>
</tbody>
</table>

1) Viswanathan A, et al. IJROBP 2010  
3) Tan LT, et al. Clinic Oncol 2011
Overview of Japanese practice in 2012

- Imaging with applicator
- Imaging for treatment planning
- Possibility of introducing 3D-treatment planning system within 3y

- X-rays (n=84) **Group 1**
- X-rays and CT/MRI (n=43) **Group 2**
- CT/MRI (n=8) **Group 3**

(Total 135)

2.5-D group

- No (n=46)
- Yes (n=38)
What is the reason for acquiring images other than X-rays?

- To confirm the perforation: 15
- To see the positional relationship with OARs/tumor: 28
- To set a reference point other than Point A: 7
- To calculate DVH parameters after treatment: 15
- Other: 1

(n = 29)
What is the reason for using X-rays for the actual treatment planning?

- Limited time for planning with CT/MRI: 21
- Inadequate manpower: 14
- Lack of knowledge for the planning: 7
- Applicators used were not CT/MRI-compatible: 6
- Inadequate planning software: 9
- Other: 5

\( n = 29 \)
Overview of Japanese practice in 2011

- Imaging with applicator
- Imaging for treatment planning
- Possibility of introducing of 3D-treatment planning system within 3y

X-rays (n=84)

X-rays and CT/MRI (n=43)

CT/MRI (n=8)

(Total 135)

Group 1: X-rays (n=84)
- No (n=46)
- Yes (n=38)

Group 2: X-rays (n=29)

Group 3: CT/MRI (n=22)

3-D group
What is the reason for using CT and not MRI for treatment planning?

- Difficulty in ensuring reservations for MRI: 13
- Limited access to MRI: 9
- Long examination times: 4
- Inadequate manpower: 4
- Applicators used were not MRI-compatible: 7
- CT examination is sufficient: 5
- Other: 1

n=22
How often is CT or MRI imaging performed with insertion of the applicator?

- Every session: 15
- Only the first session: 5
- Other: 2

n=22
Group 3

Which applicator do you use?

- CT/MRI-compatible applicator: 6
- Metal applicator: 16

n=22
Which normal tissues do you routinely contour?

- N/A: 4
- Bladder: 15
- Rectum: 16
- Sigmoid colon: 10
- Small intestine: 9
- Vagina: 1
- Other: 1

n=22

Which targets do you routinely contour?

- N/A: 6
- GTV-BT: 5
- HR-CTV: 10
- IR-CTV: 3
- Other: 1

n=22
Group 3

Which DVH parameter for target do you routinely use?

- D90: 8
- D100: 8
- D150: 0
- D200: 1
- V100: 2
- V150: 0
- V200: 0
- Other: 6

n=22

Which method do you use for dose specification to the target?

- Point A: 12
- HR-CTV: 0
- Point A and HR-CTV: 9

n=22
Is the treatment plan optimized whenever the CTV or GTV could not be fully covered by the prescribed dose?

- Yes: 17
- No: 3

What reference is used for optimization?

- Point A: 5
- HR-CTV D90: 10
- Other DVH parameter: 2
- Other: 3

Group 3

n=22
Which DVH parameters do you routinely use for the organs at risk?

- **D0.1cc**: 8
- **D1cc**: 7
- **D2cc**: 11
- **D5cc**: 2
- **Other**: 3

n=22
Group 3

Which method do you use for dose specification to the rectum?

- ICRU points: 6
- DVH parameters: 9
- Both: 6

Is optimization carried out using the rectal dose?

- Yes: 20
- No: 2

What reference was used for optimization to the rectum?

- ICRU points: 5
- D2cc: 7
- Other DVH parameter: 1
- Other: 7

n=22
Who was responsible for each working process?

<table>
<thead>
<tr>
<th>Task</th>
<th>Physician</th>
<th>Radiation therapist</th>
<th>Medical physicist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicator reconstruction</td>
<td>7</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Contouring</td>
<td>21</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Dose calculations</td>
<td>19</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>(radiation source position, prescription, etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirmation of treatment plan</td>
<td>21</td>
<td>9</td>
<td>5</td>
</tr>
</tbody>
</table>

(n=22)
Summary

1. In 2011, 2D treatment planning was performed for 84% of the facilities while 3D planning was limited for 16%.

2. The 3D planning with CT is potentially available for 66% in near future.

3. The limited time for planning, inadequate manpower, and shortage of applicator/software were major barriers to 3D planning.

4. Reservation and/or access for imaging were important factor for treatment planning. CT scan was preferred as a major tool for treatment planning.

5. In order to shift 3D planning era smoothly, working environments of brachytherapy section has to be improved.