Updates in Breast Cancer Radiotherapy Research

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What is Radiotherapy (RT) ?

• The use of ionising radiation, (gamma rays, x-rays or electrons) under therapeutic conditions, to damage DNA of malignant cells

• Causes lethal damage to the tumour cell population

• Is a localised form of treatment

• Main advantage is preservation of structure and function of the organ
How is radiotherapy delivered?
When is radiotherapy used to treat breast cancer?

- After breast conserving surgery to reduce risk of local recurrence
- Sometimes after mastectomy to reduce risk of local recurrence and increase survival
- As the primary treatment (very rare)
- In advanced disease to palliate symptoms
UK Breast RT trials – available in Belfast

- **START-P** N=1340
- **START** N=4450
- **FAST** N=915
- **FAST-Forward** N=4000
- **PRIMETIME**
- **PRIME** N=240
- **IMPORT LOW** N=2015
- **IMPORT HIGH** N=2940
- **SUPREMO** N=915
- **STaBRad**
- **BIG 3-07** N=2940
START Trial - 3 weeks is better than 5

% of patients with no LR relapse

50 Gy (53/1105; 10yr rate 5.5%, CI 4.2-7.2)

40 Gy (42/1110; 10yr rate 4.3%, CI 3.2-5.9)

Cumulative hazard rate

Hazard Ratio (95%CI)  
40Gy vs. 50Gy  0.77 (0.51 – 1.16)

Absolute difference at 10 years (95%CI)  
-1.2% (-2.6 to 1.0%)
## FAST Forward Trial (N=4000)

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>TD (Gy)</th>
<th># (Gy)</th>
<th>T (wk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>15</td>
<td>40.0</td>
<td>2.67</td>
<td>3</td>
</tr>
<tr>
<td>Test 1</td>
<td>5</td>
<td>27.0</td>
<td>5.4</td>
<td>1</td>
</tr>
<tr>
<td>Test 2</td>
<td>5</td>
<td>26.0</td>
<td>5.2</td>
<td>1</td>
</tr>
</tbody>
</table>
More accurate delivery of dose reduces damage to normal breast tissue

Table 5
Proportion of patients with any clinician-assessed breast induration (a little, quite a bit or very much) within number of assessments performed according to randomisation arm, standard 2D dosimetry or 3D intensity modulated radiotherapy (IMRT)

<table>
<thead>
<tr>
<th></th>
<th>Year 2 assessment</th>
<th>Year 5 assessment</th>
<th>P-value (from GEE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard 2D</td>
<td>IMRT 3D</td>
<td>Standard 2D</td>
</tr>
<tr>
<td>Centre of the breast</td>
<td>33/122 (27%)</td>
<td>19/117 (16%)</td>
<td>37/117 (32%)</td>
</tr>
<tr>
<td>Pectoral fold</td>
<td>32/119 (27%)</td>
<td>13/113 (12%)</td>
<td>34/118 (29%)</td>
</tr>
<tr>
<td>Infra-mammary fold</td>
<td>35/121 (29%)</td>
<td>18/113 (16%)</td>
<td>28/116 (24%)</td>
</tr>
<tr>
<td>Boost site</td>
<td>65/120 (54%)</td>
<td>44/118 (37%)</td>
<td>70/114 (61%)</td>
</tr>
</tbody>
</table>

Donovan et al. Radiother Oncol 2007;82:254-264
UK IMPORT HIGH Trial

Sequential boost (Control)

15+8 Fractions

2.67Gy

2.67 → 2.0Gy

Simultaneous boost

Test 1

15 Fractions

2.4Gy

3.2Gy

Test 2

15 Fractions

2.4Gy

3.5Gy
Personalised Medicine - DDRD Assay
Future Breast RT Research

- 895 patients with node-negative, ER-positive breast cancer.
- Local Recurrence risk correlates with Oncotype DX score.

Using molecular and genetic information to inform treatment strategy

Stereotactic Ablative Radiotherapy (SABR)
CORE Study

A randomised trial of Conventional care versus Radioablation (stereotactic body radiotherapy) for Extracranial metastases

NSCLC, breast or prostate cancer patients
• Completed radical treatment
• ≤3 extra cranial metachronous oligometastases
• Suitable for SBRT

Randomise
(1:1)

Standard of Care

SBRT + Standard of Care
Summary

- RT is a highly effective adjunct to breast conserving surgery.

- Work continues to optimise breast RT delivery to fine tune control rates and to reduce side-effects.

- Forth-coming adjuvant breast RT studies will seek to avoid RT for patients with low risk disease.

- SABR may be a potential treatment option for patients with limited metastatic disease.