Post Mastectomy Radiotherapy (PMRT)

Evidence & Planning

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Recurrence Risk

• Positive Axillary Nodes
  • ↑ with more LN involvement
  • 1-3 LN+: 5-15% at 10yrs
  • ≥4 LN+: 15-50%
  • Ratio of LN+ (>20%) = LRR >20%

• Tumour Size
  Increases with Size

Truong IJRBP. 68(1):59-65. 2007
Recurrence Risk

• High Risk Features
  - Grade III Tumors
  - LVSI
  - TNBC
  - ER/PR Negative Tumours
Where are the recurrences?

- >50% chest wall (mastectomy scar/skin)
- 20-40% supraclavav or infraclavicular
- <5% post ALND (I/II)
- Internal mammary LN
  - 1/3 path involvement in high risk
  - Few clinical recurrences
Indication of PMRT

• Definitive
  – Tm size >5cm
  – 4 or >4 axillary nodes metastasis
  – Positive Surgical Margins
  – Pectoralis muscle involvement

• Debatable
  – 1 to 3 axillary nodes metastasis
  – 2 to 5 cm primary tumor

Early Breast Cancer
Evidences

• Controlled Randomized Trials.

• Meta analysis
Danish 82b Trial

Pre menopausal Early Breast Cancer Majority T1 and T2 (85%) pN +ve
N=1708 (62% 1-3 nodes +)

Disease Free Survival
Overall Survival

Median Follow Up 10 Years

The New England Journal of Medicine Volume 337 Number 14 October 2, 1997
Danish 82c Trial
Post menopausal Early Breast Cancer Majority T1 and T2 (87%) pN +ve
N=1375 (58% 1-3 Nodes +)

Disease Free Survival

Overall Survival

Median Follow Up 10 Years
British Columbia Trial
Pre menopausal Early Breast Cancer Majority T1 & T2 with pN+ve
N=318 (60% 1-3 nodes +)

CMF + PMRT
CMF

Disease Free Survival
Overall Survival

Median Follow Up 15 Years

The New England Journal of Medicine  Volume 337  Number 14 October 2, 1997
Updated Result of British Columbia

Median Follow Up 20 Years

Breast ca Specific Survival

<table>
<thead>
<tr>
<th>Year</th>
<th>CT+RT N</th>
<th>S</th>
<th>95% CI</th>
<th>CT N</th>
<th>S</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>107</td>
<td>66</td>
<td>(59, 73)</td>
<td>81</td>
<td>53</td>
<td>(45, 61)</td>
</tr>
<tr>
<td>10</td>
<td>89</td>
<td>56</td>
<td>(49, 65)</td>
<td>62</td>
<td>42</td>
<td>(35, 51)</td>
</tr>
<tr>
<td>15</td>
<td>72</td>
<td>52</td>
<td>(45, 60)</td>
<td>44</td>
<td>35</td>
<td>(28, 43)</td>
</tr>
<tr>
<td>20</td>
<td>45</td>
<td>48</td>
<td>(41, 57)</td>
<td>29</td>
<td>30</td>
<td>(23, 38)</td>
</tr>
</tbody>
</table>

p-value = 0.001  RR: 0.63 (0.47, 0.83)

Overall Survival

<table>
<thead>
<tr>
<th>Year</th>
<th>CT+RT N</th>
<th>S</th>
<th>95% CI</th>
<th>CT N</th>
<th>S</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>124</td>
<td>76</td>
<td>(70, 83)</td>
<td>106</td>
<td>69</td>
<td>(62, 77)</td>
</tr>
<tr>
<td>10</td>
<td>102</td>
<td>64</td>
<td>(57, 72)</td>
<td>83</td>
<td>55</td>
<td>(47, 63)</td>
</tr>
<tr>
<td>15</td>
<td>76</td>
<td>52</td>
<td>(45, 60)</td>
<td>59</td>
<td>44</td>
<td>(37, 53)</td>
</tr>
<tr>
<td>20</td>
<td>51</td>
<td>47</td>
<td>(40, 56)</td>
<td>35</td>
<td>37</td>
<td>(30, 45)</td>
</tr>
</tbody>
</table>

p-value = 0.03  RR: 0.73 (0.55, 0.98)

Journal of the National Cancer Institute, Vol. 97, No. 2, January 19, 2005
Limitation of these Results

**ECOG: 10 Year Cumulative Incidence of Loco-Regional Failure without XRT**

<table>
<thead>
<tr>
<th>Tumor Size, No. of Nodes</th>
<th>No. of Patients</th>
<th>Isolated LRF %</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1, 1-3</td>
<td>407</td>
<td>9.1</td>
<td>1.5</td>
</tr>
<tr>
<td>T2, 1-3</td>
<td>576</td>
<td>7.0</td>
<td>1.1</td>
</tr>
<tr>
<td>T3, 1-3</td>
<td>35</td>
<td>22.9</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Danish trial 82b[^6]
Danish trial 82c[^7]
Canadian[^5]

[^6]: Recht et al, JCO, 1999
Limitation of these Results

### NSABP

<table>
<thead>
<tr>
<th></th>
<th>1-3 LN+</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 2</td>
<td>2.1-5</td>
<td>&gt; 5</td>
</tr>
<tr>
<td>No. of patients</td>
<td>1,045</td>
<td>1,489</td>
<td>229</td>
</tr>
<tr>
<td>Isolated LF, %</td>
<td>4.3</td>
<td>7.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Isolated RF, %</td>
<td>2.4</td>
<td>3.5</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Isolated LRF, %</strong></td>
<td>6.0</td>
<td>9.7</td>
<td>7.5</td>
</tr>
<tr>
<td>LRF with or without DF, %</td>
<td>10.6</td>
<td>15.3</td>
<td>11.4</td>
</tr>
<tr>
<td>DF, %</td>
<td>24.6</td>
<td>35.7</td>
<td>40.5</td>
</tr>
</tbody>
</table>

**NOTE.** Subcolumn headings indicate tumor size (in centimeters).
Abbreviations: LN+, positive lymph nodes; LF, local failure; RF, regional failure.

Taghian et al, JCO, 2004
Limitation of these Results

### Multi-Institutional Studies with no XRT

<table>
<thead>
<tr>
<th>Study Description</th>
<th>1-3 LN+ (%)</th>
<th>≥ 4 LN+ (%)</th>
<th>Median No. of LN Dissected</th>
<th>Chemotherapy Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danish trial 82b</td>
<td>30</td>
<td>42</td>
<td>7</td>
<td>CMF</td>
</tr>
<tr>
<td>Danish trial 82c</td>
<td>31</td>
<td>46</td>
<td>7</td>
<td>CMF</td>
</tr>
<tr>
<td>Canadian</td>
<td>33</td>
<td>46</td>
<td>11</td>
<td>CMF</td>
</tr>
<tr>
<td>ECOG</td>
<td>13</td>
<td>29</td>
<td>15</td>
<td>CMF</td>
</tr>
<tr>
<td>MDA</td>
<td>14</td>
<td>25-34</td>
<td>17</td>
<td>Doxorubicin based</td>
</tr>
<tr>
<td>IBCSG, premenopausal</td>
<td>19.7</td>
<td>30-38</td>
<td>~15</td>
<td>CMF**</td>
</tr>
<tr>
<td>IBCSG, postmenopausal</td>
<td>18½</td>
<td>29-35</td>
<td>~15</td>
<td>CMF or tamoxifen††</td>
</tr>
<tr>
<td>NSABP</td>
<td>13</td>
<td>24-32</td>
<td>16</td>
<td>Doxorubicin/CMF##</td>
</tr>
</tbody>
</table>

Taghian et al. JCO. 2004
Limitation of these Results

• Surgery was not adequate specially the axillary dissection as compare to other trials.

• Median no of lymph nodes removed
  – Danish Trials 7
  – British Columbia 11
Danish Trial 83b & 83c
Sub-group Analysis

• Only select patients with no of nodes removed 8 or more.
• Further grouped based on 1-3 nodes or $\geq 4$ nodes
• N=1152
Danish Trial 83b & 83c
Sub-group Analysis

Loco regional Recurrence

Median Follow Up 15 Years

M. Overgaard et al. / Radiotherapy and Oncology 82 (2007) 247–253
Danish Trial 83b & 83c  
Sub-group Analysis

Loco regional Recurrence  
Median Follow Up  15 Years

M. Overgaard et al. / Radiotherapy and Oncology 82 (2007) 247–253
Danish Trial 83b & 83c
Sub-group Analysis

Loco regional Recurrence

Median Follow Up 15 Years

M. Overgaard et al. / Radiotherapy and Oncology 82 (2007) 247–253
Danish Trial 83b & 83c
Sub-group Analysis (Hypothesis)
Larger Proportion of patients will have survival benefit

23% improvement in local control translate into 9% OS improvement
PMRT → Local Control → OS gain

1-3 positive nodes

Systemic Treatment

Local RT

Danish Trial 83b & 83c: Sub-group Analysis (Hypothesis)
Larger Proportion of patients will have survival benefit.

23% improvement in local control translate into 9% OS improvement.

PMRT → Local Control → OS gain.

1-3 positive nodes.

Systemic Treatment.

Danish Trial 83b & 83c
Sub-group Analysis

Limited Proportion of patients will have survival benefit

41% improvement in local control translate into 9% OS improvement

PMRT → High Local Control → No OS gain
4 or >4 positive nodes

Local RT

Systemic Treatment

M. Overgaard et al. / Radiotherapy and Oncology 82 (2007) 247–253
Hypothetical benefit of Local Tumor Control on Survival with increasing Metastatic Risk of Primary.

- Pts with 1-3 positive nodes
- Pts with 4 and more than 4 positive nodes

Adapted from NEJM 2007;356: 2399-2405.
Postmastectomy irradiation

High local recurrence risk is not associated with large survival reduction after postmastectomy radiotherapy in high-risk breast cancer: A subgroup analysis of DBCG 82 b&c

Marianne Kyndi a,b,*, Marie Overgaard c, Hanne M. Nielsen a, Flemming B. Sørensen b, Helle Knudsen d, Jens Overgaard a

a Department of Experimental Clinical Oncology, Aarhus University Hospital, Denmark
b Department of Pathology, Aarhus University Hospital, Denmark
c Department of Oncology, Aarhus University Hospital, Denmark
d Department of Pathology, Herlev Hospital, Denmark
Danish Trial 83b & 83c Sub-group Analysis

• Among patients in 82b and 82c randomized to no radiation, 3 risk groups were identified

• Good: 4 of 5 favorable features
  – ≤3 nodes
  – Size <2 cm
  – Grade 1
  – ER or PR positive, her2 negative

• Poor: 2 of 3
  – Grade 3, >3 nodes, size >5 cm

Radiother Oncol 2009 Jan;90(1):74-9
Danish Trial 83b & 83c
Sub-group Analysis

LRR by Risk Group

No Radiotherapy

\[ p < 0.001 \]

- **Poor**: 50%
- **Intermediate**: 26%
- **Good**: 11%

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>101</td>
<td>74</td>
<td>57</td>
<td>46</td>
</tr>
<tr>
<td>Intermediate</td>
<td>303</td>
<td>132</td>
<td>93</td>
<td>69</td>
</tr>
<tr>
<td>Poor</td>
<td>107</td>
<td>19</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>

Radiother Oncol 2009 Jan;90(1):74-9
Danish Trial 83b & 83c
Sub-group Analysis

5 year LRR & 15 year Breast Cancer Mortality by Risk Group

- Moderate
  - no RT Local rec. (5-year) 11%
  - + RT
  - no RT Breast cancer mortality 22%
  - + RT (15-year) 61%

Improvement in local control translate excellently into improvement in cancer specific survival

Radiother Oncol 2009 Jan;90(1):74-9
Danish Trial 83b & 83c
Sub-group Analysis

5 year LRR & 15 year Breast Cancer Mortality by Risk Group

- no RT Local rec. (5-year)
- + RT
- no RT Breast cancer mortality
- + RT (15-year) 61%

Improvement in local control translate reasonable into improvement in cancer specific survival

Radiother Oncol 2009 Jan;90(1):74-9
Danish Trial 83b & 83c
Sub-group Analysis

5 year LRR & 15 year Breast Cancer Mortality by Risk Group

Improvement in local control does not translate into improvement in cancer specific survival

Radiother Oncol 2009 Jan;90(1):74-9
Hypothetical benefit of Local Tumor Control on Survival with increasing Metastatic Risk of Primary.

Adapted from

*NEJM 2007;356: 2399-2405.*
All reports related with Danish trial 83b & c make strong case of PMRT in patients with 1-3 positive axillary nodes
Evidences

• Controlled Randomized Trials.

• Meta analysis
Total No of Patients 8500

Local Recurrence
- local control
  at 5 years

Absolute gain 17%

Overall Survival
- survival
  at 15 years

Absolute gain 4.4%

Every 4 LR avoided, 1 death is avoided over the following 15 years.
Total No of Patients: 8500

Breast ca Mortality
- Absolute gain 5.4%
- Absolute gain 5.4%

Overall Survival
- Absolute gain 4.4%
- Absolute gain 3.5%

Non Cancerous Deaths are taking place

EBCTCG, Lancet, 2005
Oxford 2014 Meta-analysis

PMRT in 1-3 Positive Nodes

Total No of Patients 1133

10 years Local Recurrence

Absolute gain 16.7%

20 years Breast ca Mortality

Absolute gain 7.9%

EBCTCG, Lancet, 2014
Effect of PMRT Based on No of Nodes

A. Any first recurrence (years 0-9)

<table>
<thead>
<tr>
<th>Category</th>
<th>Events/women</th>
<th>RT events</th>
<th>Ratio of annual event rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Allocated RT</td>
<td>Allocated no RT</td>
<td>Log-rank O-E</td>
</tr>
<tr>
<td>1 positive node</td>
<td>35/145</td>
<td>63/173</td>
<td>-10.6</td>
</tr>
<tr>
<td></td>
<td>(24-1%)</td>
<td>(36-4%)</td>
<td></td>
</tr>
<tr>
<td>2-3 positive nodes</td>
<td>69/178</td>
<td>92/187</td>
<td>-8.5</td>
</tr>
<tr>
<td></td>
<td>(38-8%)</td>
<td>(49-2%)</td>
<td></td>
</tr>
<tr>
<td>Unknown but pN1-3</td>
<td>73/216</td>
<td>107/234</td>
<td>-18.3</td>
</tr>
<tr>
<td></td>
<td>(33-8%)</td>
<td>(45-7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>177/539</strong></td>
<td><strong>262/594</strong></td>
<td><strong>-37.5</strong></td>
</tr>
<tr>
<td></td>
<td>(32-8%)</td>
<td>(44-1%)</td>
<td></td>
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Difference between treatment effects in two categories: $\chi^2=0.8; 2p>0.1$, NS

B. Breast cancer mortality

<table>
<thead>
<tr>
<th>Category</th>
<th>Deaths/women</th>
<th>RT deaths</th>
<th>Ratio of annual death rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Allocated RT</td>
<td>Allocated no RT</td>
<td>Log-rank O-E</td>
</tr>
<tr>
<td>1 positive node</td>
<td>46/145</td>
<td>66/173</td>
<td>-5.7</td>
</tr>
<tr>
<td></td>
<td>(31-7%)</td>
<td>(38-2%)</td>
<td></td>
</tr>
<tr>
<td>2-3 positive nodes</td>
<td>76/178</td>
<td>96/187</td>
<td>-7.0</td>
</tr>
<tr>
<td></td>
<td>(42-7%)</td>
<td>(51-3%)</td>
<td></td>
</tr>
<tr>
<td>Unknown but pN1-3</td>
<td>80/216</td>
<td>111/234</td>
<td>-11.4</td>
</tr>
<tr>
<td></td>
<td>(37-0%)</td>
<td>(47-4%)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>202/539</strong></td>
<td><strong>273/594</strong></td>
<td><strong>-24.1</strong></td>
</tr>
<tr>
<td></td>
<td>(37-5%)</td>
<td>(46-0%)</td>
<td></td>
</tr>
</tbody>
</table>

Difference between treatment effects in two categories: $\chi^2=0.0; 2p>0.1$, NS

EBCTCG, Lancet ,2014
Oxford Meta-analysis

• This also support the use of PMRT in patients with early breast ca with 1-3 positive nodes
Postmastectomy Radiotherapy: An American Society of Clinical Oncology, American Society for Radiation Oncology, and Society of Surgical Oncology Focused Guideline Update


Clinical Question 1
Is PMRT indicated in patients with T1-2 tumors with one to three positive axillary lymph nodes who undergo ALND?

Recommendations
Recommendation 1a. The panel unanimously agreed that the available evidence shows that PMRT reduces the risks of locoregional failure (LRF), any recurrence, and breast cancer mortality for patients with T1-2 breast cancer and one to three positive lymph nodes. 1
Radiotherapy Planning
Position of the Patient

Supine Position
Position of the Patient
Symmetrical

- Both arms elevated above head
- More comfortable
Position of the Patient
Asymmetrical

Arm on involved side elevated above the head and face turned away from involved side
Special Precautions & Difficulties

The patient's slightly misaligned on the treatment couch will have the same effect as if the couch were angled.

**Tilt**

Tattoos are put over anterior surface so that patient remains straight throughout the treatment.
Rotation

Two Lateral Tattoos
REGIONS TO BE TREATED AFTER MRM

- Supraclavicular
- Axilla: Direct field
- Internal Mammary: Direct field or with tangential
- Chest wall: Tangential
Difficulties in RT Delivery
1. Matching of the adjacent Radiation Fields
Divergent Nature of the Radiation Beam

200 cGy

400 cGy
Hot spot

200 cGy
Divergent Nature of the Radiation Beam

200 cGy

Cold Spot

200 cGy
2. Sloping Chest Wall
3. Underlying Heart and Lung
Matching of the Adjacent radiation fields
• Matching of S/C and Tangent fields

Two Divergence

1. Divergence from Supra clavicular field

2. Divergence from Tangential field
Divergence from Supra Clavicular Field

Breast Field

Hot Spot

Supraclavicular Field
Divergence from Tangential

Supraclavicular Field

Hot Spot
1. **Half Beam Block**
   - Set the central axis of beam at matching line i.e. at junction
   - Open the length double i.e. if length is 6cm open 12 cm
   - Block the lower half of the length.
2. Asymmetrical Jaws

- Set the central axis of the beam at junction.
- Only open the upper jaw.

Solution Divergence from S/C
3. Gantry Rotation:

- First calculate the angle of divergence from s/c field

\[
\tan \theta = \frac{\text{Half field length}}{\text{SSD}}
\]

- Move couch 90°
- Rotate gantry 6° towards patient feet
Couch & Gantry Rotation

Rotate towards patient’s feet
Solution Divergence from Tangent

Asymmetrical Jaws

- Set the center of the beam at junction
- Open only lower jaw
Couch Rotation

(a) Calculate the angle of divergence

(b) Set the tangential field as usual
(b) Give couch twist 6° away from gantry in both MT and LT
Couch Rotation: Away from the Gantry
Couch Rotation: Away from the Gantry
Matching between Internal Mammary and Tangential fields

- Supraclavicular Direct field
- Axilla Direct field
- Chest wall Tangential
- Internal Mammary Direct field or with tangential
Both fields are matched at surface.

Because both fields are angled in different direction.
Angled the IM field to make it parallel to the tangential field.

**Problem**

More lung will be irradiated by IM field.

**Solution**

Treat IM field with electron beam.
Solution

Treat IM field with electron beam
Sloping Chest Wall
Problems

More lung comes in Tang field caudally

If field is set to reduce the lung caudally, then chest wall cranially will be missed
Solution 1

Sloping Chest wall

Chest wall and anterior border of the lung is parallel to the couch.
Solution 2 → If Breast Board not available

Problem→ Tangential field will encroach the s/c field resulting into hot spot

Solution→ shield the corner of Tangential field by making individualized blocks

Give collimator angle to make field parallel to the lung
Solution 3 → If Breast Board not available

Shaped Blocks to be made individually parallel to the chest wall to shield the lung
Underlying Heart and Lung
Divergence in Lung from Tangential field

Medial tangential

Lateral Tangential

More Lung Tissue is Irradiated
Solution 1

Breast Cone

- Set the center at the entry point
- Open the field
- Use breast cone to shield the inner half
Solution 2
Asymmetrical Jaws

- Set the center at the entry point
- Open only one jaw
- Central axis will pass through lung as straight line
Solution 3
By Rotating gantry head upward

Calculate the angle of divergence by
Half field width

\[ \tan \theta = \frac{\text{Half field width}}{\text{SSD}} \]
Posterior edge of the beam becomes co-planer after gantry rotation on transverse section
Number of fields

• If treating chest wall and all regional nodes then there are two techniques
  – Two fields Techniques
  – Three fields Techniques
Two Field Technique

1. S/C and Axilla by single direct field
2. Internal mammary and chest wall together by tang field
Drawbacks

Two Field Techniques

- More lung will be irradiated
- Opposite breast receive higher dose of radiation
- Portion of the heart will also be irradiated
Deep Tangential or Extended Partial Tangential field

- Only LN of upper 3 intercostal space are involved

- The upper part of chest tangential field is extended medially to cover the internal mammary nodes of upper three intercostal space.
Three Fields Technique

1. S/C + Axilla by direct field
2. IM by direct field
3. Chest wall by Tangential field
Field Boundaries
Supraclavicular RT

• Indication:-
  – 4 or > 4 axillary nodes positive
  – T3 or T4 tumors
  – Inadequate axillary dissection
  – No axillary dissection
Thyrocricoid groove

Upper border of Tangential field

Lateral border of the cricoid process

Upper border of Tangential field

Along medial border of sternocleidomastoid muscle

Portal
Prescription Depth 3cm from skin

Beam
Photon 4 to 6 Mev
OR cobalt 60
RT to Axilla

• Indication
  – Inadequate Axillary Dissection ( < 10 )
  – No axillary dissection in presence of positive sentinel node.
  – Extensive extra capsular extension
  – More than 75% nodes are positive ( eg 15/20)
Lateral border is extended more laterally to include the axilla.

humeral head is shielded
Supraclavicular and Axilla

Beams eye view and projected field over skin
Posterior Axillary field

SC

3 cm

50 Gy

Mid Plain
<50 Gy

Post Axillary Field
Upper Border along the spine of the scapula

Lateral border should match with lat border of ant axillary field with shielding of humeral head

Medial border along the convex lateral wall of the bony thorax cage with 1 to 1.5 cm of lung

Inferior border should match the lower border of Ant axillary field
Dose from Posterior field

• Calculate the contribution at mid plane by ant axillary + S/C fields
• Rest of the dose to be given from post field to make total dose 50Gy
• For example if the contribution from ant field is 35 Gy, give 15 Gy from post field.
• Indications:
  – Extensive axillary disease
  – Central or medial tumor > 5 cm size
Internal Mammary Nodes

Internal mammary nodes are in close proximity to the internal mammary vessels which are located approximately 3-4 cm lateral to mid line and 3-4 cm deep to the surface.
Field Boundaries

- At inferior border of S/C field
- The width of the field is usually 5 cm
- At 4th costal cartilage
- Base of xiphoid

Prescription Depth
- 4 Cm

Radiation
- Photon OR Electron
Chest wall Irradiation

• By two tangential fields
  – Medial Tangential
  – Lateral Tangential
Sternal Head of the Clavicle
2cm below inframammary fold
Mid axillary line
Mid line
lateral border of internal mammary
2 cm contra lateral side if IM node to be included in tang field

Energy
Cobalt 60
4 to 6 mv photon

2cm below inframammary fold
Parameter for Tangent Fields

- Length
- Width
- Gantry Angle

Length of the field
Upper border should be 1 cm in Air

Lung not more than 2 cm

Width
Tangent Portals
Dose distribution with two tangential fields

Note the higher doses at surface and medial and lateral deep breast tissue

Prescription

50 Gy/25 F/5W
Reasons for Hot spots
Solution:-
Use Wedge with thick end upward which act as compensator for missing tissues

It removes hot spots anteriorly.

The medial and lateral hot spots will still remain
Radiographic Parameter on Virtual simulation

Central Lung Distance (CLD): - width of the lung at central axis

Lung Length: - Vertical lung distance included in the radiation portal.

Maximum Heart Distance (MHD): - maximum width of the heart in the tangent field.

Maximum Heart Length (MHL): - Maximum length of the heart in the tangent field.
Thanks

Greetings From Shimla