EXPOSURE OF SURGICAL STAFF

Breast Cancer:
SLN biopsy & Excision of the Primary Tumor

Surgeon
Assistant Surgeon
Nurse
Anesthetist
Pathologist

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### Whole Body Dosimetry for Surgeons

<table>
<thead>
<tr>
<th>Study</th>
<th>Dose per procedure</th>
<th>No of procedures to reach annual dose limit for public (1 mSv)</th>
<th>No of procedures to reach annual dose limit for radiation workers (20 mSv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AY de Kanter et al EJSO 2003; 29:396-9</td>
<td>2.5 µSv</td>
<td>400</td>
<td>8000</td>
</tr>
<tr>
<td>WA Waddington et al EJNM 2000 27:377-91</td>
<td>0.34 µSv</td>
<td>2941</td>
<td>58824</td>
</tr>
<tr>
<td>Brenner W et al Nuklearmedizin 2000 39(5):142-5</td>
<td>3,6 µSv</td>
<td>278</td>
<td>5556</td>
</tr>
<tr>
<td>Motta C et al Tumori 2000 86(4):372-4</td>
<td>0.75 µSv</td>
<td>1333</td>
<td>26660</td>
</tr>
</tbody>
</table>

- **Injected dose**
- **The time between injection and operation**
- **Duration of surgery** *(Experience?)*
- **Distance from the injection site**

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A Y de Kanter et al: Radiation protection for the sentinel node procedure in breast cancer EJSO 2003 29: 396-9

Table 3  Measured results

<table>
<thead>
<tr>
<th></th>
<th>Surgeon (μSv)</th>
<th>Assistant-surgeon (μSv)</th>
<th>Theatre nurse (μSv)</th>
<th>Pathologist (μSv)</th>
<th>Assistant pathologist (μSv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracal wall</td>
<td>3.7 (0–9.8)</td>
<td>0.9 (0–7.5)</td>
<td>1.9 (0–6.3)</td>
<td>0.4 (0–8.5)</td>
<td>2.0 (0–8.0)</td>
</tr>
<tr>
<td>Abdominal wall</td>
<td>8.2 (0–32.7)</td>
<td>2.1 (0–8.7)</td>
<td></td>
<td>1.0 (0–6.8)</td>
<td></td>
</tr>
<tr>
<td>Left hand</td>
<td>61 (22.2–152.8)</td>
<td>21 (3.2–51.8)</td>
<td>3 (0–6.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>18 (1.8–42)</td>
<td>17 (0–30.4)</td>
<td></td>
<td>2 (0–12.2)</td>
<td></td>
</tr>
</tbody>
</table>

Finger Dose
(Limit: 50 mSv/year for the public)

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Surgeon</td>
<td>10.5 mSv/year</td>
</tr>
<tr>
<td>Pathologist</td>
<td>5.55 mSv/year</td>
</tr>
</tbody>
</table>

250 operations per year
Mean exposure time: 30 min for the surgeon, 10 min for the pathologist

Σ (Dose rate at a distance & side x Time spent within that distance & side) = Estimated WB dose
Estimation of whole body dose rate

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Averages

4 hours p.i. 30 MBq Tc 99m nanocolloid

Surgeon
3 - 56 min at 0.5 m
20-96 min at 1.0 m
25 min at 1.50 m
4 min beyond 2.0 m

0.4 - 0.7 µSv

2 - 4.4 µSv

Assistant Surgeon 1
3 - 98 min at 0.5 m
1 - 32 min at 1.0 m
2 - 6 min at 2.0 m
8 min beyond 2.0 m

0.5-2.2 µSv

Nurse
55 min at 0.5 m
48-100 min at 1.0 m

0.4-0.55 µSv

Assistant Surgeon 2
17- 93 min at 0.5 m
0-32 min at 1.0 m

0.2 - 4.2 µSv

48-98 min at 0.5 m

227 - 500 surgery/year for 1 mSv
4540 - 10000 surgery/year for 20 mSv

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RADIOACTIVE WASTE

Swabs

Contaminated during the excision of the injection site
(approx. 5 % of the injected dose)

Very Low Level Radioactive Waste
Collect and store?

! Contaminated swabs kept away from the probe: False count rate!
Surgical staff do not require a classification of "exposed workers"

Radioactivity administered by qualified persons in a dedicated area

No need to have special precautions in the operating room
(Swabs from the primary lesion excision may be collected separately and stored?)

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