SENTINEL LYMPH NODE CONCEPT IN OESOPHAGEAL CANCER
Sentinel Lymph Node (SLN)
Sentinel Lymph Node (SLN)

- Not always on a direct drainage pathway
- Not always the nearest node
- Not always hot or blue
- May be more than one
SLN Concept

- Well-established in:
  - Melanoma; Breast cancer

- Less well-established in:
  - Colorectal cancer; gastric cancer

- Controversial in oesophageal cancer:
  anatomy + lymphatic flow
2 Reasons

1. Minimally invasive surgery
2. Focused analysis of specific lymph nodes
Aims

1. To determine the feasibility of SLN biopsy in oesophagectomy with conservative lymphadenectomy

2. To evaluate the accuracy of SLN biopsy in predicting the status of non-SLNs

3. To identify potential technical problems in performing SLN biopsy
Study Design

1. 26 consecutive patients
Oesophageal Cancer

<\(pT2\)
- Surgery
  - 9
  - 35%

\(\geq pT2\)
- Neoadj Tx + Surgery
  - 17
  - 65%
Study Design

1. 26 consecutive patients
2. Radioactive tracer injection
Injection of Radioactive Tracer

- **Endoscopic injection**
  - $^{99m}$Tc-antimony sulfide
  - 4 mls = 40MBq
  - Submucosal injection
  - Proximal/Distal margins
Study Design

1. 26 consecutive patients
2. Radioactive tracer injection
3. Oesophagectomy with conservative lymphadenectomy
Radical Lymphadenectomy

**Mediastinal Nodes**
1. Paratracheal
2. Carinal
3. Left bronchial
4. Right bronchial
5. Para-aortic
6. Middle para-oesophageal
7. Lower para-oesophageal

**Abdominal Nodes**
8. Right paracardial
9. Left paracardial
10. Left gastric
11. Lesser curve
12. Common hepatic
13. Splenic artery
14. Coeliac axis
Conservative Lymphadenectomy

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Study Design

1. 26 consecutive patients
2. Radioactive tracer injection
3. Oesophagectomy with conservative lymphadenectomy
4. *In vivo* lymphatic mapping
Lymphatic Mapping

Sentinel Lymph Node Activity ≥2:1 to adjacent tissue with Navigator™ Gamma Probe
Study Design

1. 26 consecutive patients
2. Radioactive tracer injection
3. Oesophagectomy with conservative lymphadenectomy
4. *In vivo* lymphatic mapping
5. *Ex vivo* lymphatic mapping
**Ex vivo lymphatic mapping**

**Sentinel Lymph Node**

- Background ratio of 10:1
- Any node with ≥ 10% activity of hottest node
Study Design

1. 26 consecutive patients
2. Radioactive tracer injection
3. Oesophagectomy with conservative lymphadenectomy
4. In vivo lymphatic mapping
5. Ex vivo lymphatic mapping
6. Analysis of SLN
Analysis of SLN

**Isolated tumor cell:** \( \leq 0.2\text{mm} \)

**Micrometastasis:** \( >0.2\text{mm and} \leq 2\text{mm} \)
Results

- Age: 64 yrs (range = 46-76 yrs)
- Sex: 92% male
- Tumour type: 81% adenocarcinoma
- Resection rate: 96%
 Sentinel Nodes

- Total number of SLNs: 66
- Median # of SLNs: 3 (range 0-5)
- Median # of LNs: 12 (range 4-30)
Sentinel Node Identification

>1
6-15
1-5
0
Sentinel Node Distribution

Lower oesophagus

GOJ

60%

18%

40%

82%
# Sentinel Node Characteristics

## Success rate = 92%

<table>
<thead>
<tr>
<th>Patient</th>
<th>BMI</th>
<th>pT</th>
<th>No. SLN</th>
<th>Location of the SLN</th>
<th>SLN status</th>
<th>Non-SLN status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>1b</td>
<td>3</td>
<td>middle paraesophageal; perigastric</td>
<td>–</td>
<td>–</td>
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<tr>
<td>2</td>
<td>25</td>
<td>1a</td>
<td>2</td>
<td>lower paraesophageal</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>1b</td>
<td>2</td>
<td>lower paraesophageal</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>4</td>
<td>26</td>
<td>3</td>
<td>2</td>
<td>lower paraesophageal</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>5</td>
<td>33</td>
<td>0</td>
<td>2</td>
<td>lower paraesophageal</td>
<td>–</td>
<td>–</td>
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<tr>
<td>6</td>
<td>34</td>
<td>0</td>
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<td>–</td>
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<tr>
<td>7</td>
<td>32</td>
<td></td>
<td></td>
<td>M/MIC</td>
<td>+</td>
<td></td>
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<tr>
<td>8</td>
<td>25</td>
<td>1a</td>
<td>2</td>
<td>lower paraesophageal; celiac artery</td>
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<td>–</td>
</tr>
<tr>
<td>9</td>
<td>26</td>
<td>1a</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>–</td>
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<tr>
<td>10</td>
<td>42</td>
<td>1b</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>11</td>
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<td>1b</td>
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<td>–</td>
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<tr>
<td>12</td>
<td>22</td>
<td>0</td>
<td>3</td>
<td>lower paraesophageal</td>
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<td>–</td>
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<tr>
<td>13</td>
<td>23</td>
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<td>2</td>
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<td>M</td>
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<tr>
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<td>16</td>
<td>2</td>
<td>2</td>
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<td>–</td>
<td>–</td>
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## Accuracy of the Sentinel Lymph Node

<table>
<thead>
<tr>
<th>Sentinel Node</th>
<th>Overall Nodal Status</th>
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<tbody>
<tr>
<td></td>
<td>H&amp;E +ve</td>
</tr>
<tr>
<td>H&amp;E +ve</td>
<td></td>
</tr>
<tr>
<td>Immuno +ve</td>
<td></td>
</tr>
<tr>
<td>Negative</td>
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</tr>
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</table>

False negative rate = 11% (1/9)
Overall accuracy = 96% (22/23)
## Discussion

<table>
<thead>
<tr>
<th></th>
<th>No. pts</th>
<th>Detection</th>
<th>Sensitivity</th>
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</thead>
<tbody>
<tr>
<td>Kitigawa, 2000</td>
<td>27</td>
<td>25/27 (93%)</td>
<td>14/16 (88%)</td>
</tr>
<tr>
<td>Kato, 2003</td>
<td>25</td>
<td>23/25 (92%)</td>
<td>13/15 (87%)</td>
</tr>
<tr>
<td>Lamb, 2005</td>
<td>57</td>
<td>57/57 (100%)</td>
<td>35/37 (96%)</td>
</tr>
<tr>
<td>Current study</td>
<td>25</td>
<td>22/23 (92%)</td>
<td>8/9 (89%)</td>
</tr>
</tbody>
</table>
Choice of Radioactive Tracer

North America: $^{99m}$Tc-sulphur colloid

Europe: $^{99m}$Tc-albumin nanocolloid

Japan: $^{99m}$Tc-tin fluoride colloid

Australia: $^{99m}$Tc-antimony trisulfide colloid
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## Technical Problems

| Problem                                   | Solution                                                      |
|-------------------------------------------|                                                               |
| Insertion of endoscope                    | Jaw thrust                                                    |
| Narrow stricture                          | Injection @ proximal margin only                              |
| No tumor visible                          | Follow pre-treatment endoscopy report                         |
| Radiocolloid spillage                     | Inject at least 5-10 mm away from tumor                      |
|                                           | Avoid injection in the retroflexed position                   |
| Shine-through phenomenon                  | Angle gamma probe away from tumor                             |
| Obesity                                   | Consider low-calorie diet                                     |
| *Ex vivo* identification of sentinel nodes | Designate any node(s) with >20% the activity of the hottest node as a SLN |
Summary

1. SLN concept in oesophageal cancer does work

2. It seems accurate

3. Technical problems exist and the technique needs to be refined
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