Target volumes for Post mastectomy Radiotherapy in breast cancers

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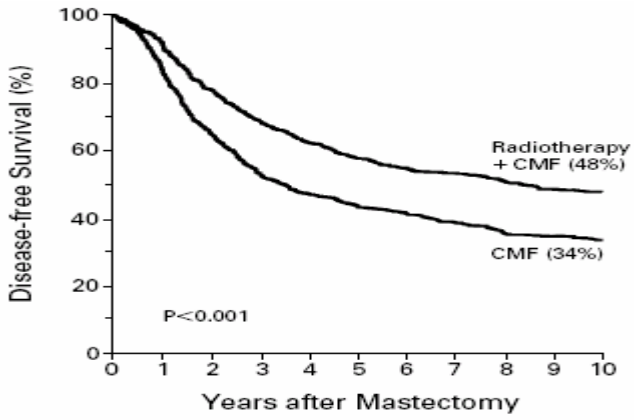
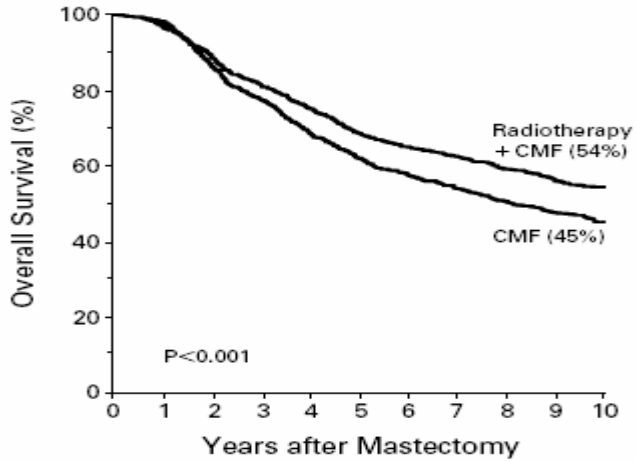
Road map

- Indications and Recommendations
- Post operative Anatomy
- Delineation of CTV chest wall & LN

Chest wall Radiotherapy in LN +ve or >T3 disease





1789 patients, 1982 – 1989, premenopausal, node + or Tumor > 5cm, M0
Total mastectomy, level I + II (partly) + CMF +/- 50Gy/25fx (electrons + photons)
Sx in 79 departments, RT in mainly 6 centers

Local rec. 32% vs. 9%
OS 40% vs. 54%

Overgaard et al. NEJM 1997 337:949

Ragaz et al. NEJM 1997 337:956

Overgaard et al. 1999, 353:1641

ASCO 2001 guidelines–PMRT

Site	Indication
Chest wall	T3, ≥4 LN
Axilla	Incomplete dissection, ECE
IMC	??
SCF	+ve Axilla

Recommendations

- ≥ 4 LN
- ≥T3
- Chest wall mandatory in PMRT
- SCF in ≥ 4 Axillary LN
- No axillary RT in complete dissection

Insufficient evidence

- T1/T2
- Dose Schedule
- SCF RT in 1-3 Ax LN
- IMC RT
- Sequencing of PMRT, Reconstruction & Systemic therapy

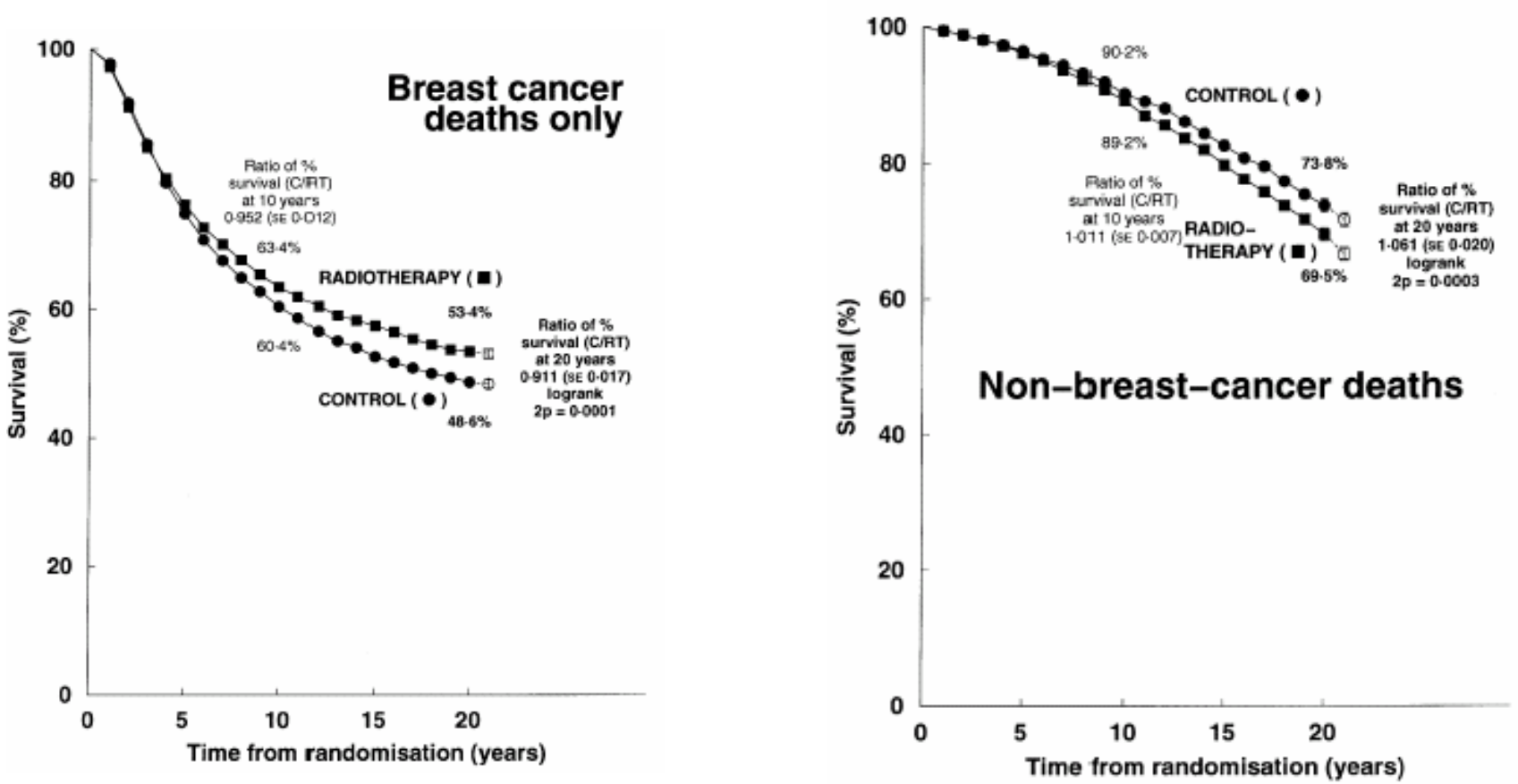
Increased cardiac mortality in left PMRT

- Innocent bystanders like Heart, Lung, LAD, Brachial plexus, ribs get irradiated
- Cardiac volume irradiated correlates with cardiac mortality (3.2 times).
- Lung volume irradiated correlates with functional lung damage (3%).

Gagliardi G, etal, IJROBP, 2000;46:373-381
Gagliardi G, etal, BJR 1996, 69:839-846

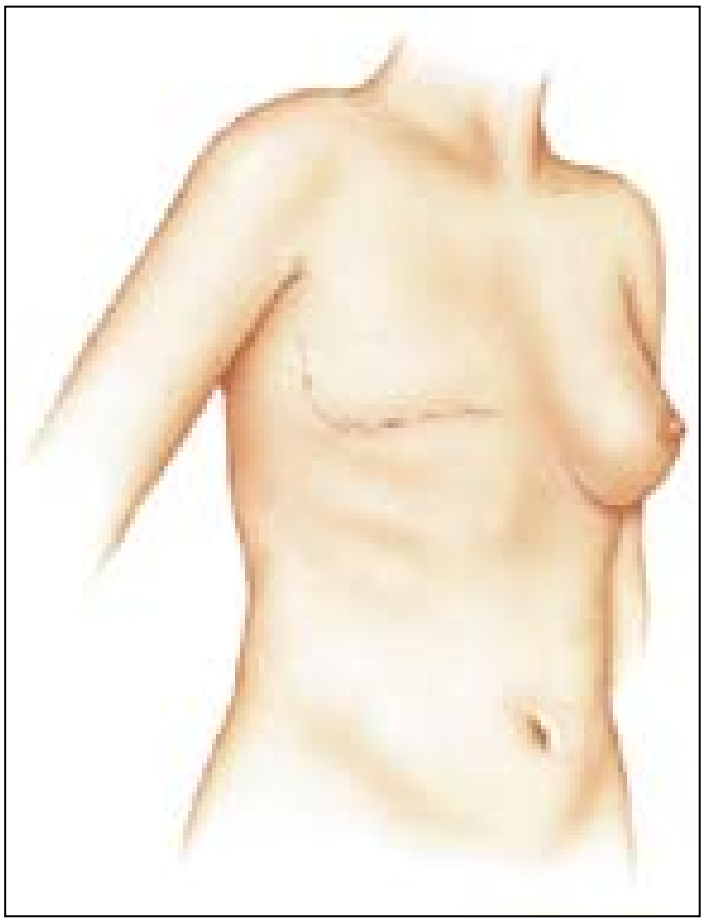
Favourable and unfavourable effects on long-term survival of radiotherapy for early breast cancer: an overview of the randomised trials

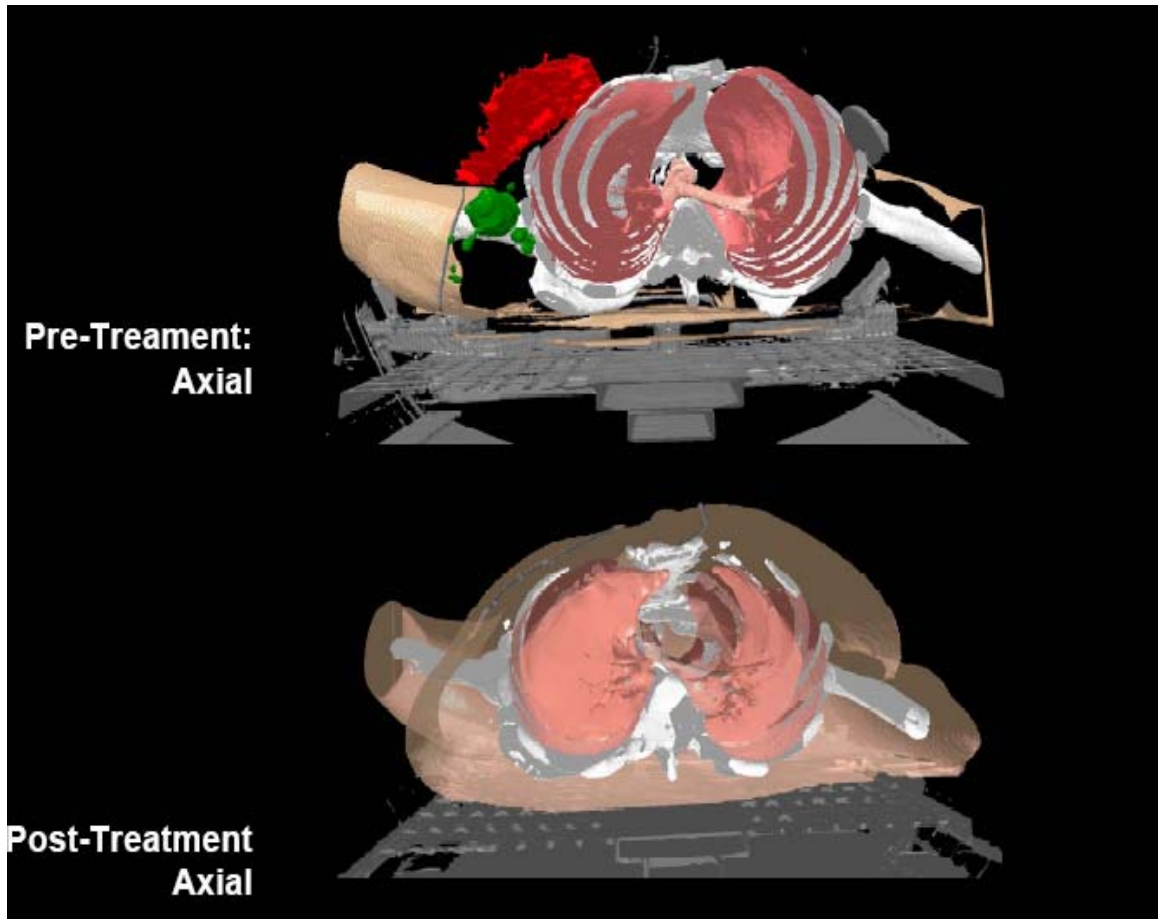
*Early Breast Cancer Trialists' Collaborative Group**



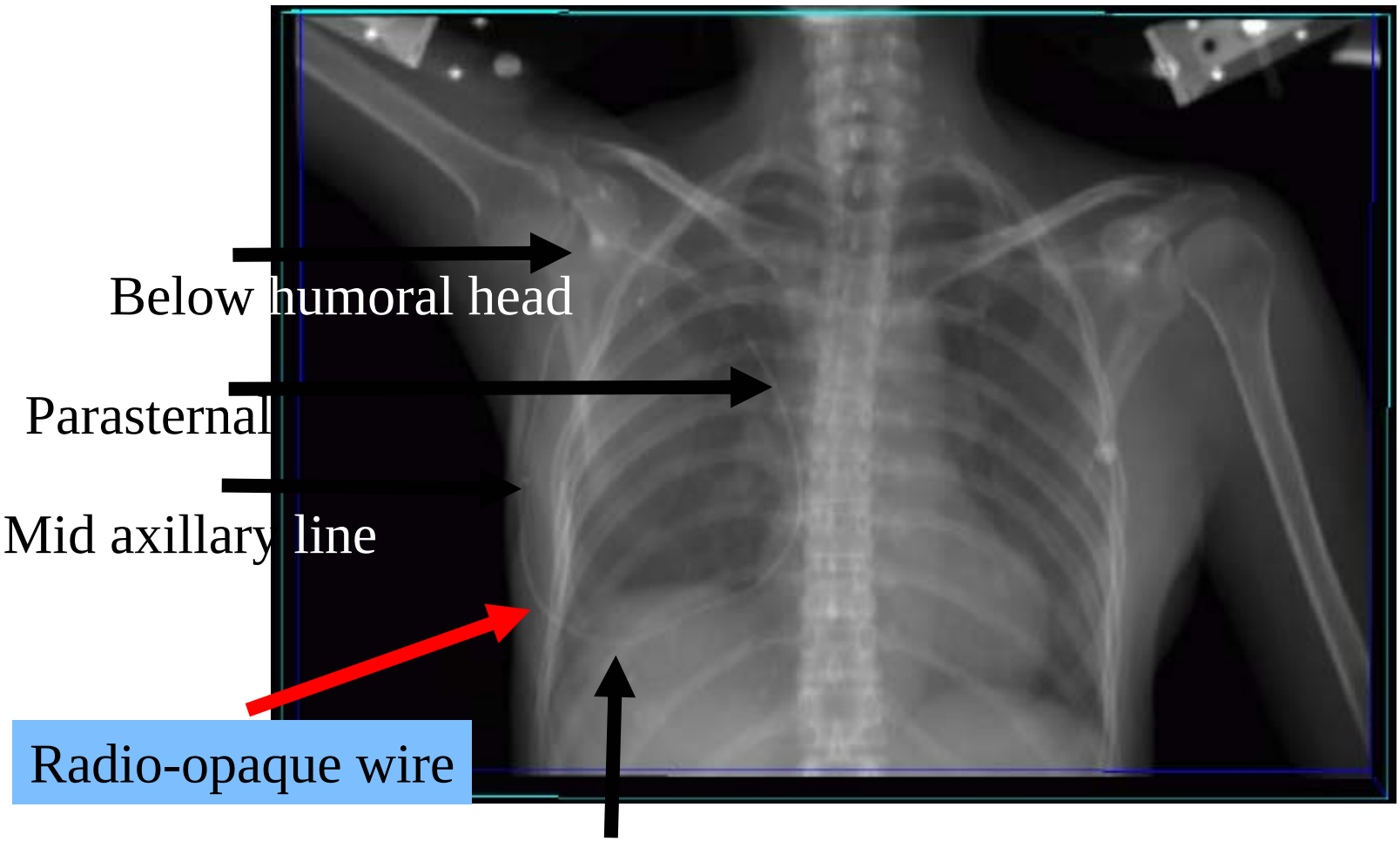
Vascular deaths: Proportional excess ratio=1.3, absolute rates 3 fold greater

Anatomy

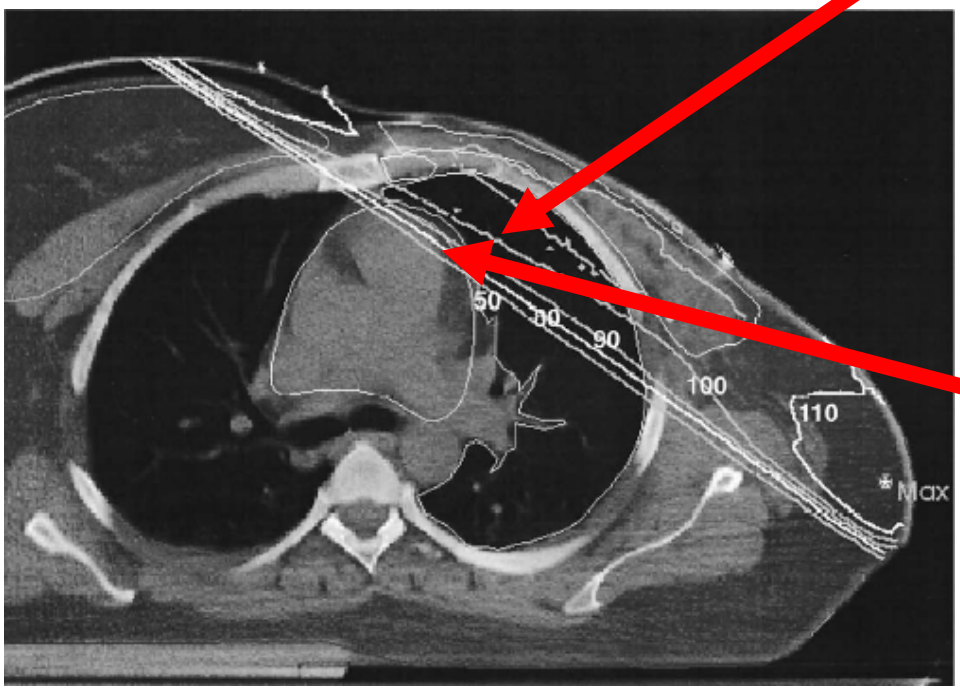




Simulator Film based planning

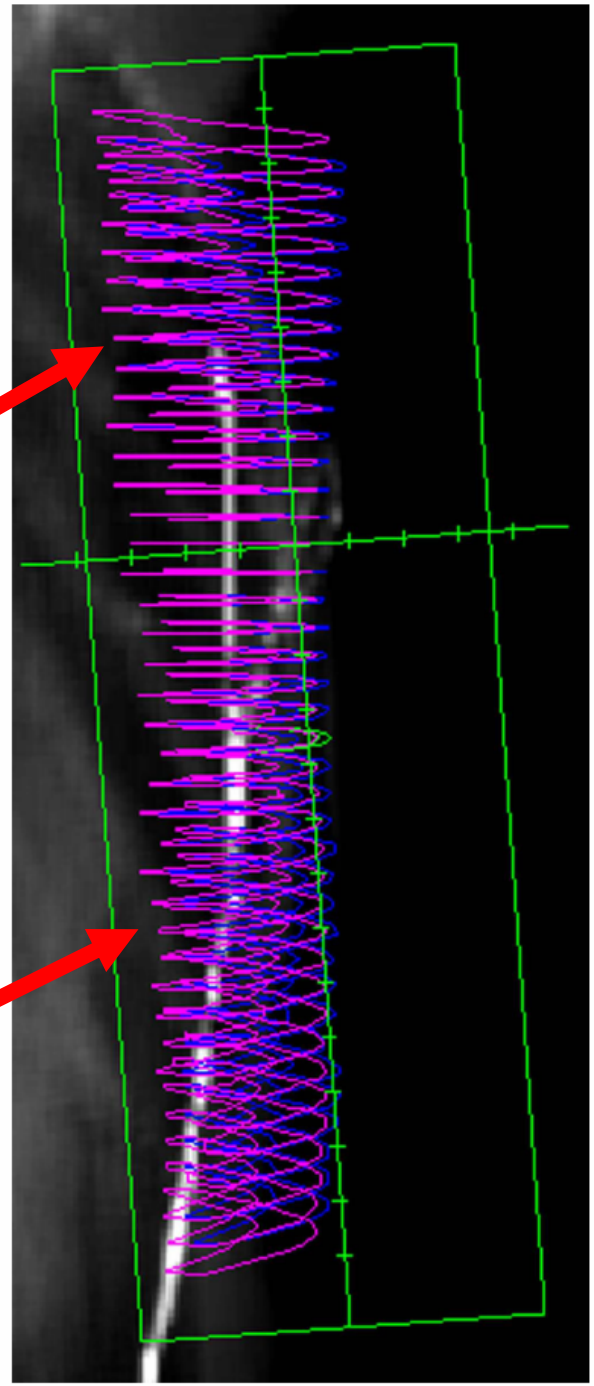


Simulator based tangential photon beam planning



Lung

Heart

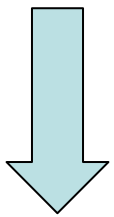


Need for delineation

- To spare the ipsilateral lung
- heart
- Left anterior descending artery
- Brachial plexus injury with axillary RT

How to Simulate?

- Patient supine (± breast board); Flat (CT) couch; Arms overhead.
- Place radio-opaque wire on patients chest wall
- Medially – midline
- Laterally –midaxillary line
- Superior- Inferior aspect of clavicular head
- Inferior- 1cm below the c/l Inframammary fold



[CT scan data (± Contrast) transferred to 3D TPS]

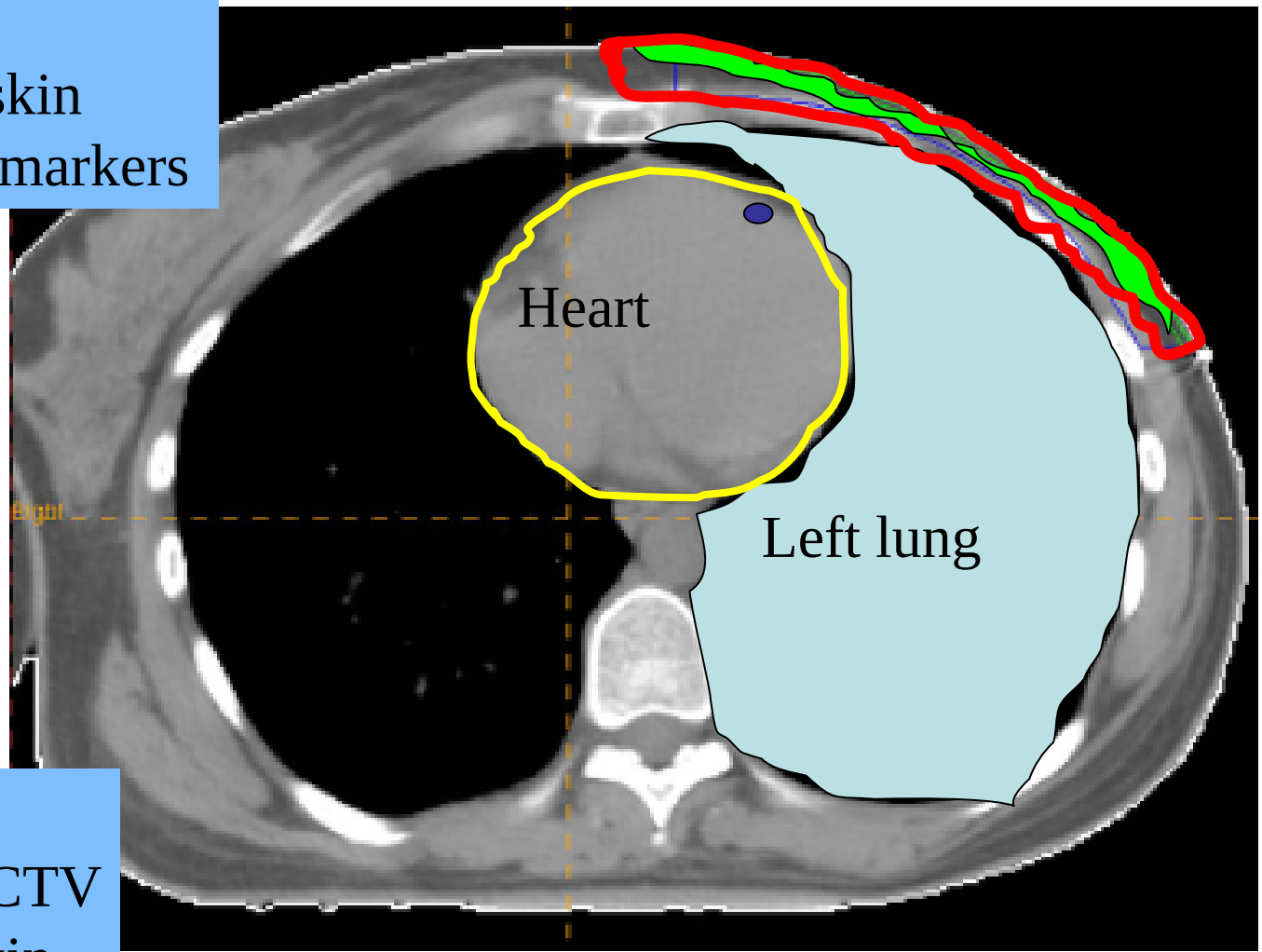
How to delineate?

- Contour both lungs
- Contour the heart (exclude great vessels)
- CTV delineation- Anteriorly – Skin surface
- Posteriorly- rib –soft tissue interface
- Medially- 1 cm lateral to the midline wire
- Laterally- 1cm medial to the lateral wire

Post mastectomy Radiotherapy of the chest wall: dosimetric comparison of common techniques. Pierce et al IJROBP: 2002;52(5),1220-1230

How and what to delineate?

CTV-
5mm from skin
5 mm from markers



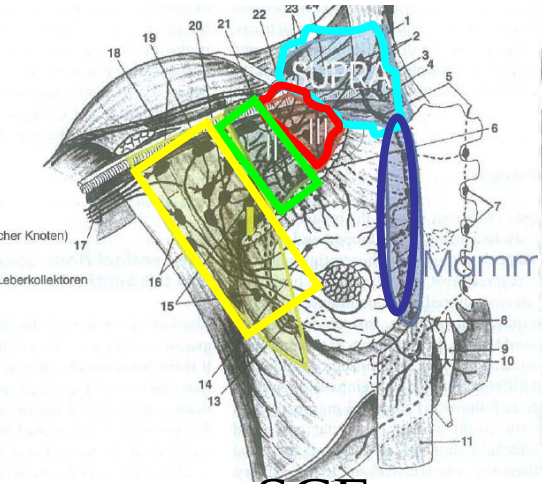
PTV-
7mm from CTV
Except at skin

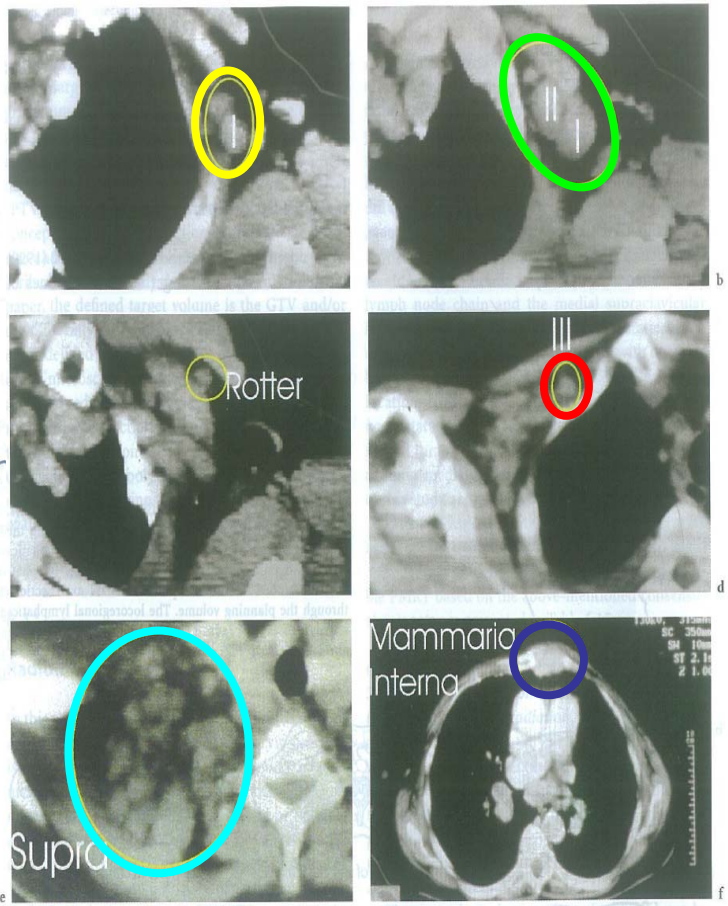
The issue of scar and bolus…

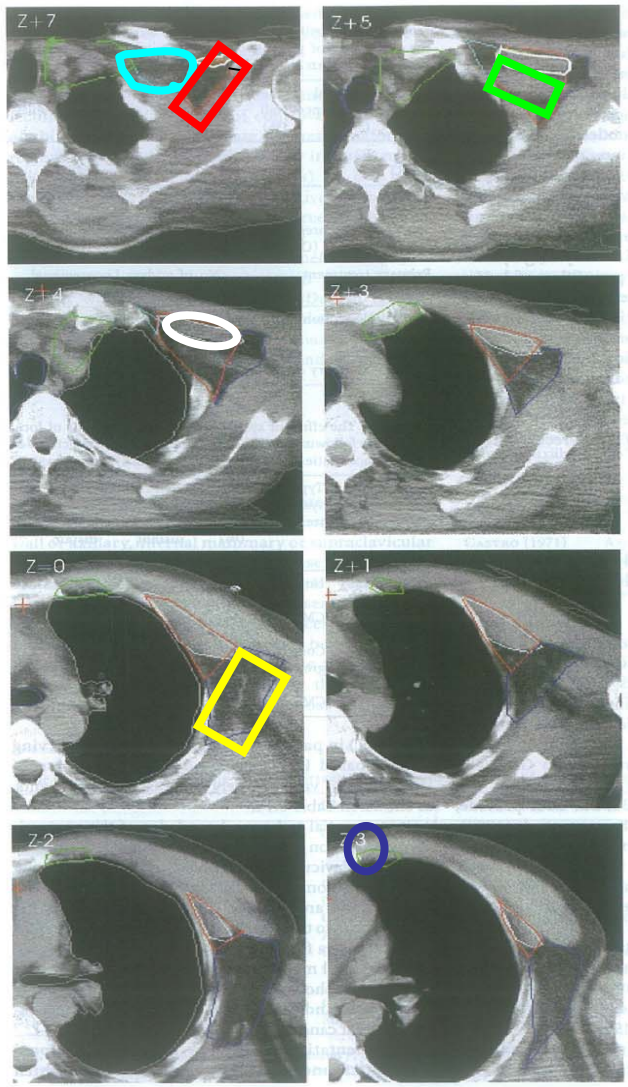
- Scar should be included
- Drain sites should be included
- Reasons – tumor cell entrapped in scar -hypoxic fibrotic region

- Bolus to the scar –Yes (unless lying in tangential beam)
- Bolus to entire chest wall-reason – heavy infestation of skin lymphatics
- Issue of junctions and self bolus effect exist
- Greater need in 4-6 MV beams than Telecobalt unit due to greater depth of Dmax

CTV delineation of SCF, IMC, Axillary Levels







SCF
Level III
Level II
Level I
IMC
Pectoralis minor

Conclusions

Delineation based planning in PMRT is to save the lung, heart, LAD especially in left sided lesions and brachial plexus injury in axillary irradiation.