National and Kapodistrian University of Athens
School of Medicine
University General Hospital *Attikon*
2nd Department of Radiology

Auto field alignment treatment planning tool verification by using *in vivo* dosimetry in breast and supraclavicular matching region

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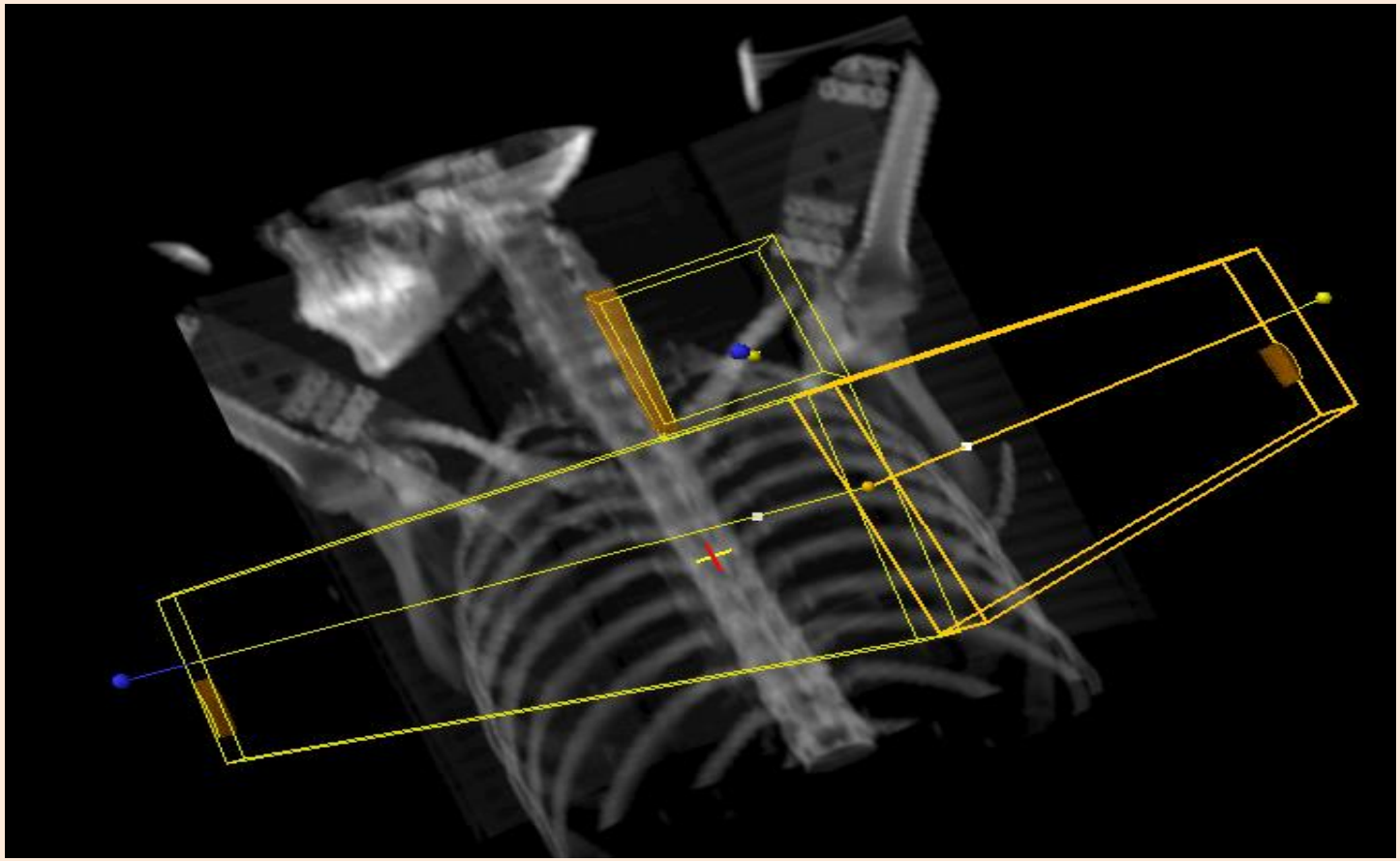
Introduction

Three-field matching need

-Two tangential fields for breast irradiation

- One anterior field for supraclavicular region irradiation



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Three-field matching complexity

➢ Causes

- irregular morphology of breast region
- divergence of tangential fields

➢ Consequences

- overdosage → healthy tissue damage
- underdosage → failure in tumor control

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Purpose

In vivo treatment plan verification in field matching region, using thermoluminence dosimeters (TLDs)

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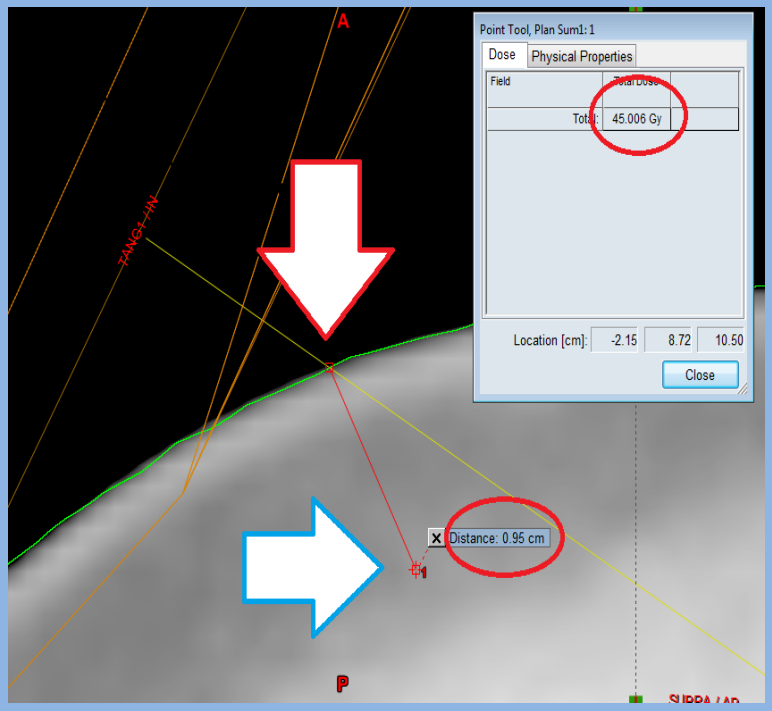
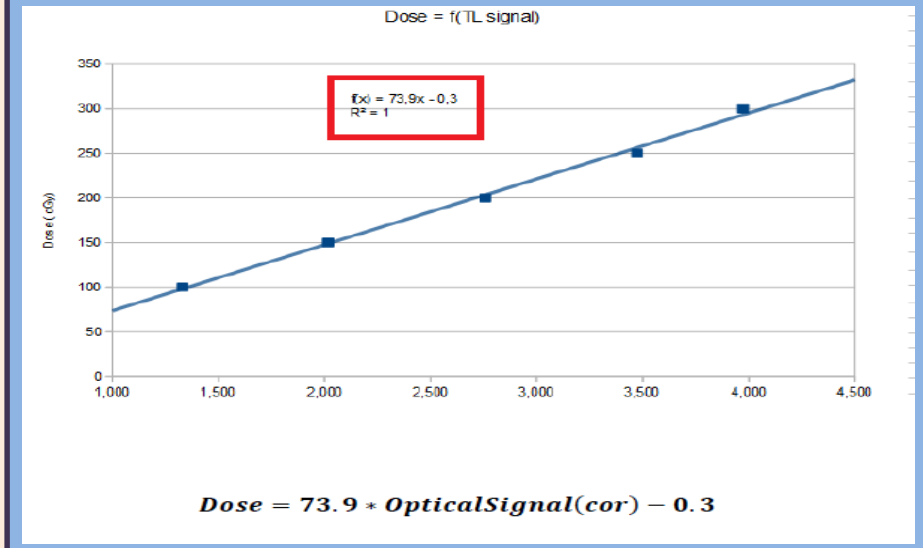
Methods

TPS dose calculation



TLDs calibration



In vivo dose measurements

- 10 patients
- 7 measurement points

Expected – measured doses comparison

- Wilcoxon non parametric test
- H0 : Doses do not differ significantly

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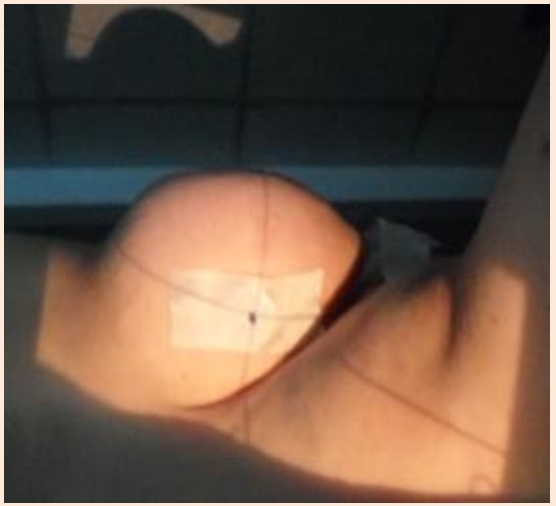
Measurement points

Tangential in field

Anterior field



Tangential out field

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Results

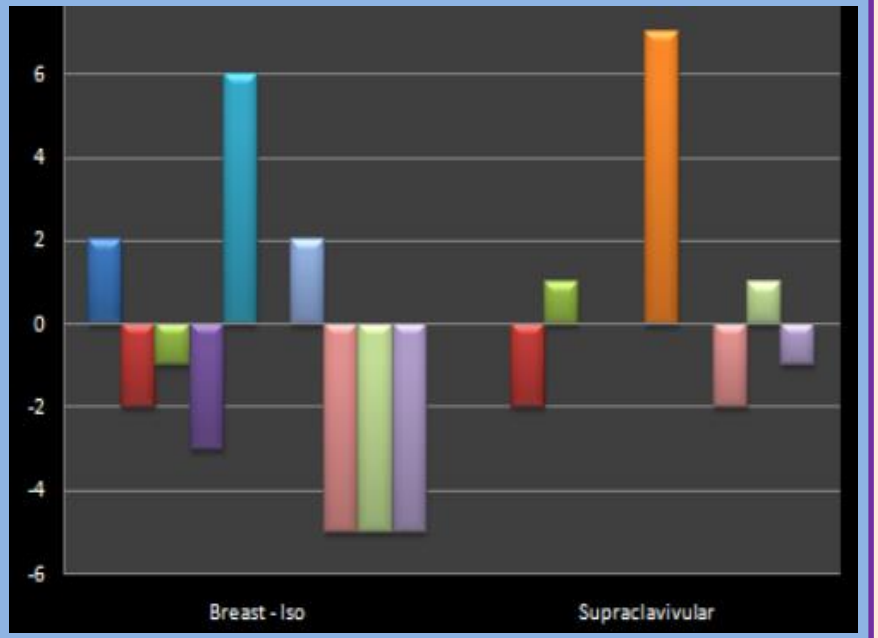
Measured and excpected dose deviations (%):

Breast iso / Supraclavicular

→ do not reject H_0

(p = 0.4414, p = 1)

→ lie between ICRU limits

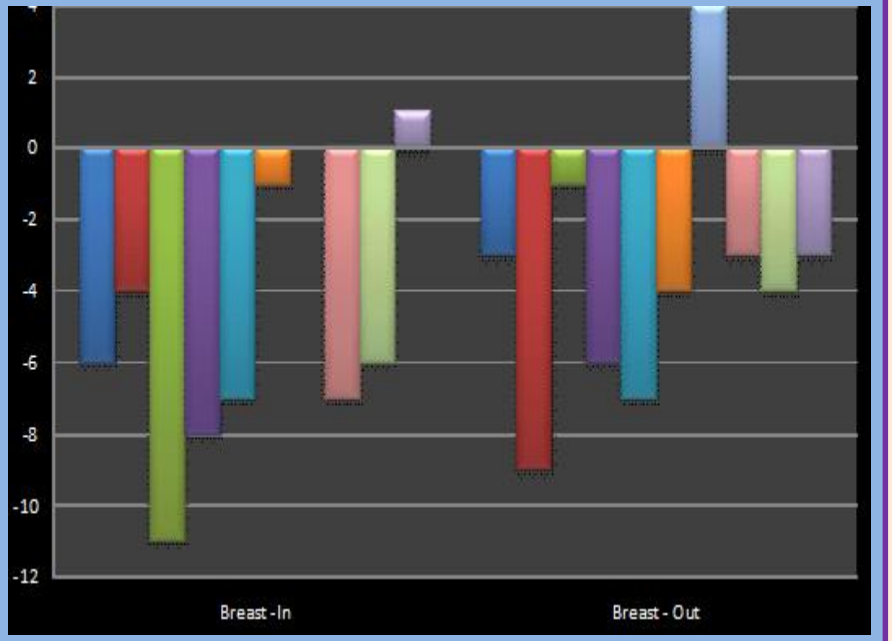


Tangential fields entrance

→ do differ significantly

(p = 0.0039, p = 0.0020)

→ systematic negative deviation



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Results

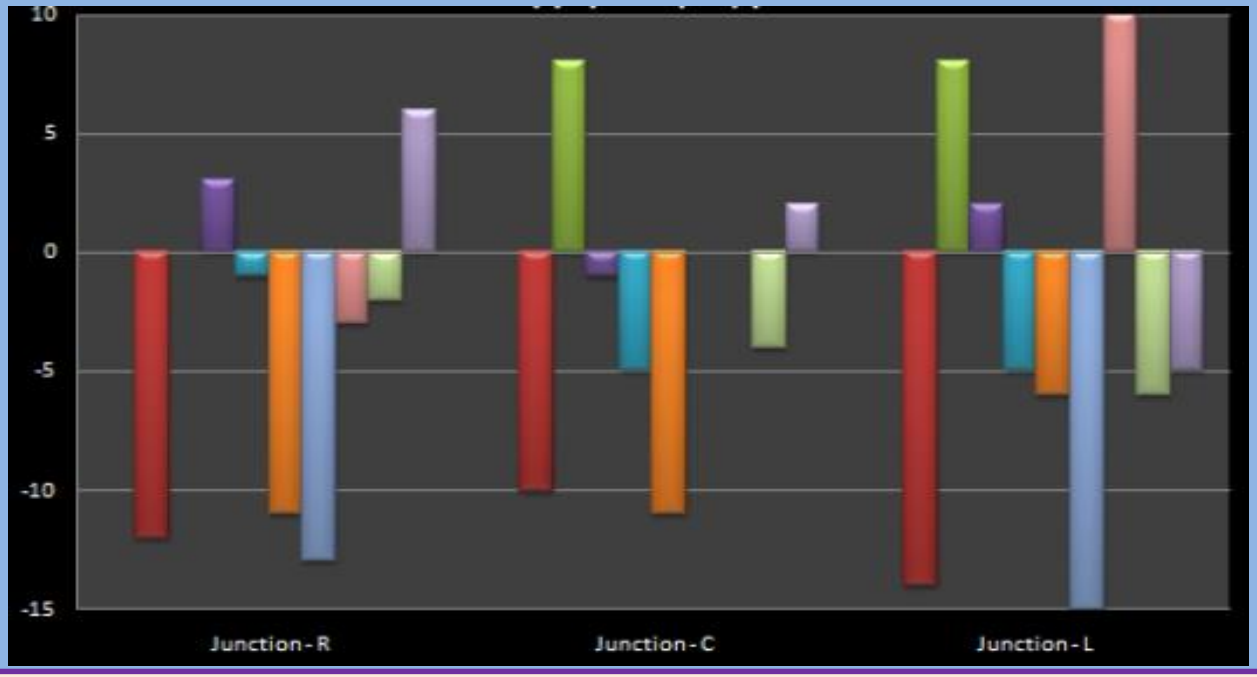
Measured and excpected dose deviations (%)

Matching region

→ do differ significantly (p = 0.0214)

→ non systematic deviation (-15% - +10%)

→ large day to day deviations



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Conclusion

Results indicate:

Breast iso /Supraclavicular

→ correct calibration

→ no serious mistakes in the procedure

Tangential fields entrance

→ systematic positioning error

– breast shape

– breast motion

Matching region

→ random errors

– respiratory motion

– immobilisation difficulties

– reproducibility difficulties

– TLDs positioning inaccuracies

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Conclusion

- Results in matching region (dev : -15% - +10%) agree with relevant published studies (dev : -20% - +15%)
- Eclipse *auto field alignment tool* is verified
- Extra caution is required from radiographers and medical physicists when three fields need to be matched

<u>Recommendation</u>

Monoisocentric technique should be used in three field matching (when possible)

- Better dosimetric results
- Random errors are minimised