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Individualized dosimetry for patients with Graves' disease

Introduction

- Directive 2013/59 Euratom requires all therapeutic exposures individually planned and their delivery appropriately verified.

Purpose

- We have developed a home-made software for I-131 dosimetry in hyperthyroid patients using gammacamera and capture probe for prior and post treatment
- This study describes the dosimetry method, the differences between pre and post treatment purposes, and compare its results.

Materials and Methods

- Based on EANM Dosimetry Committee Guidelines

Pretreatment

INa Probe → Uptake measurements
at 2, 24 and 96h after administration of 25 μ Ci tracer
(also measured before its administration)

Gammacamera → Tc-99m planar images to estimate thyroid mass.

Posttreatment

INa Probe → Uptake measurements
at 96h and 168h after treatment activity administration

Materials and Methods (2)

Pretreatment

Two-compartmental model →
Calculate activity to achieve 160 Gy to the thyroid

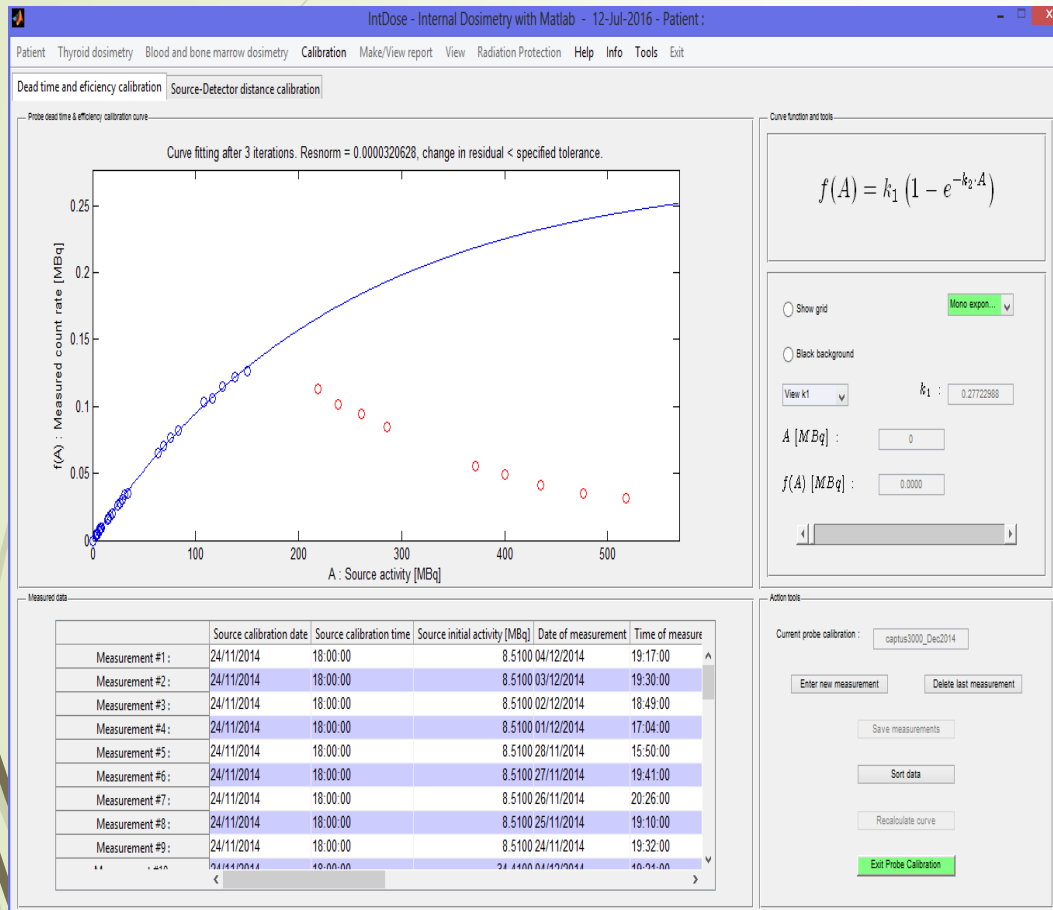
Posttreatment

monocompartmental model →
calculate real absorbed dose to the thyroid

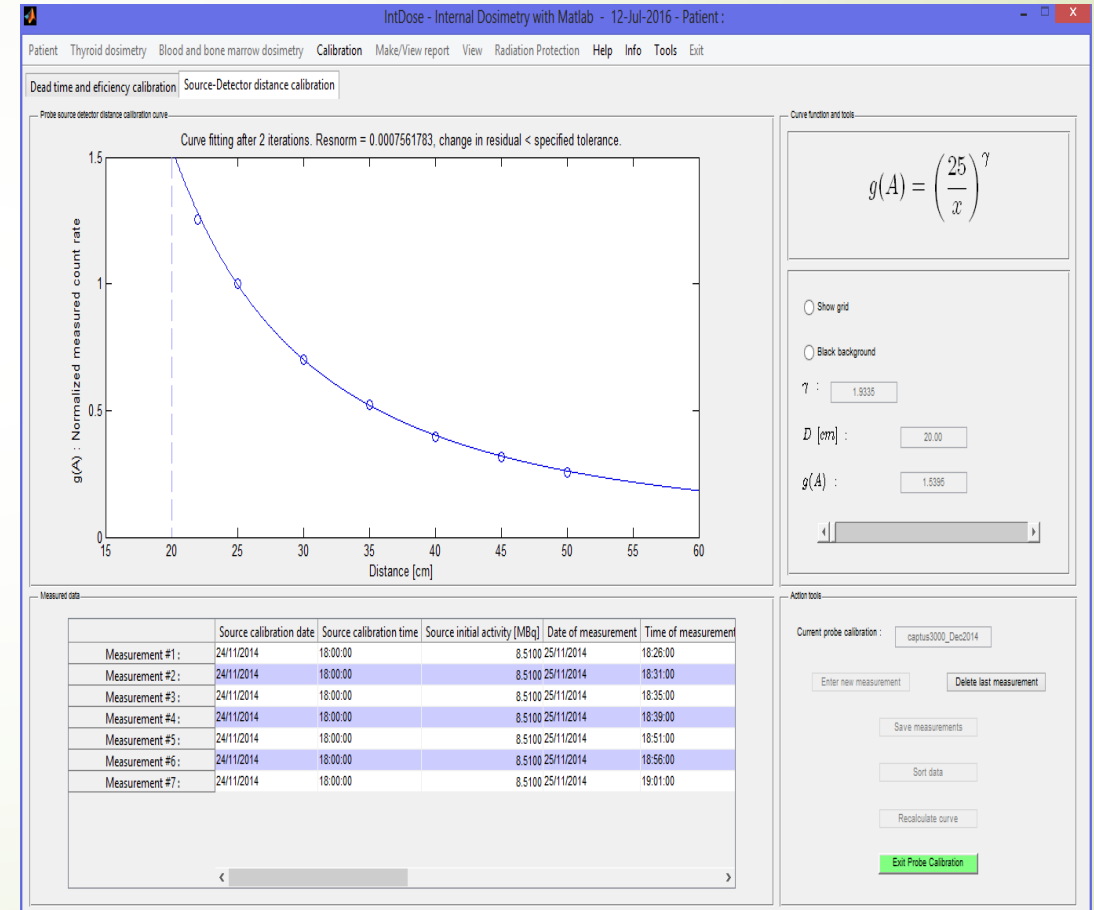
(dead time correction using previous probe calibration curve)

Materials and Methods (3)

Probe Calibration



Response Counts / Activity



Response Counts vs distance to probe

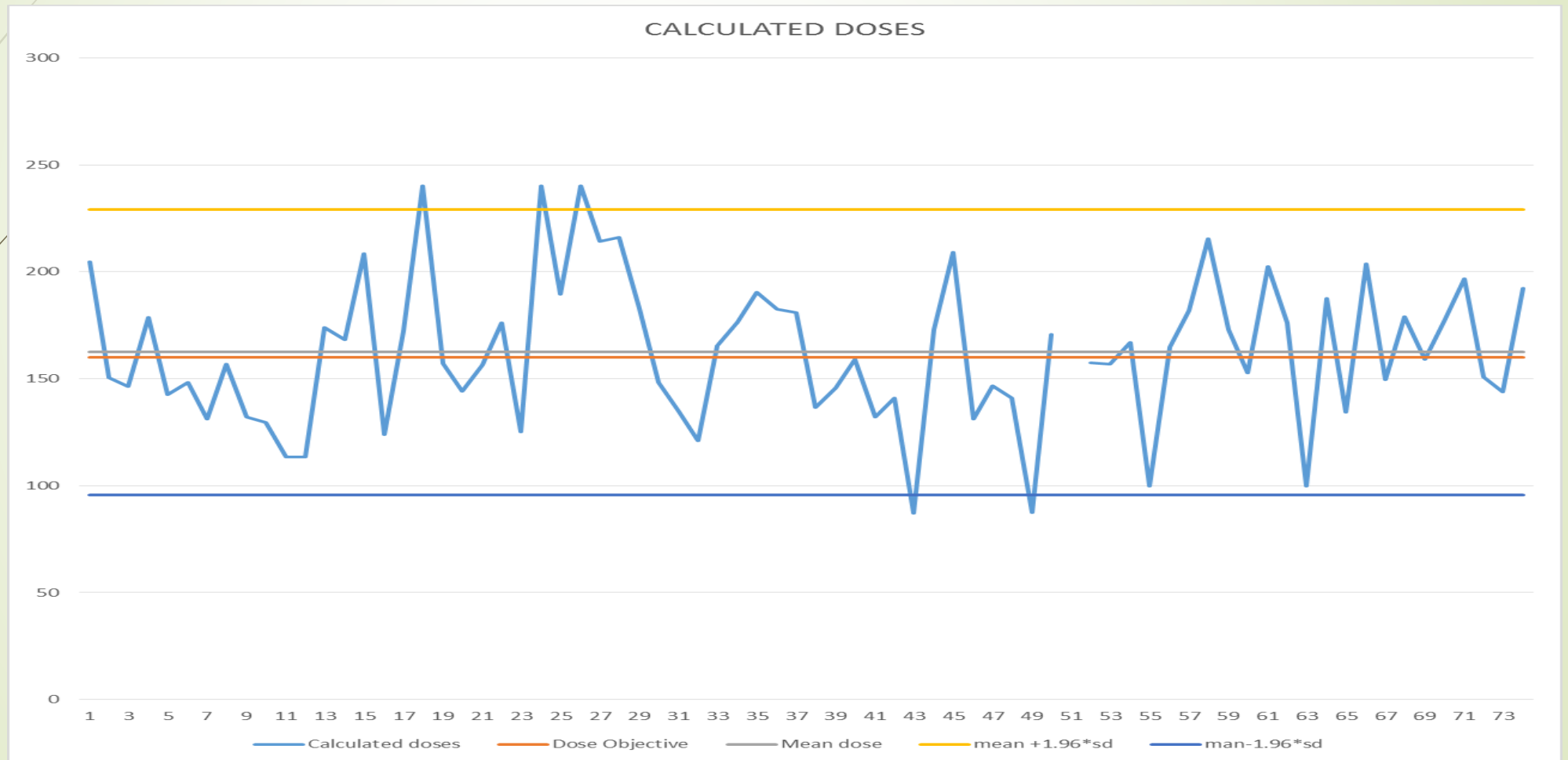
Results

78 patients during 2015

163,1 Gy and 37,7 Gy are the average and standard deviation of administered absorbed doses, ranging from 87,3 Gy to 240,1 Gy. The mean activity to be administered according the used model is 9,1 mCi which differs from previously used (Marinelli algorithm, 7,3 mCi) and administered (8,9 mCi). Differences of means between activities by Marinelli and by our method using t-Student are significant ($p < 0.05$)

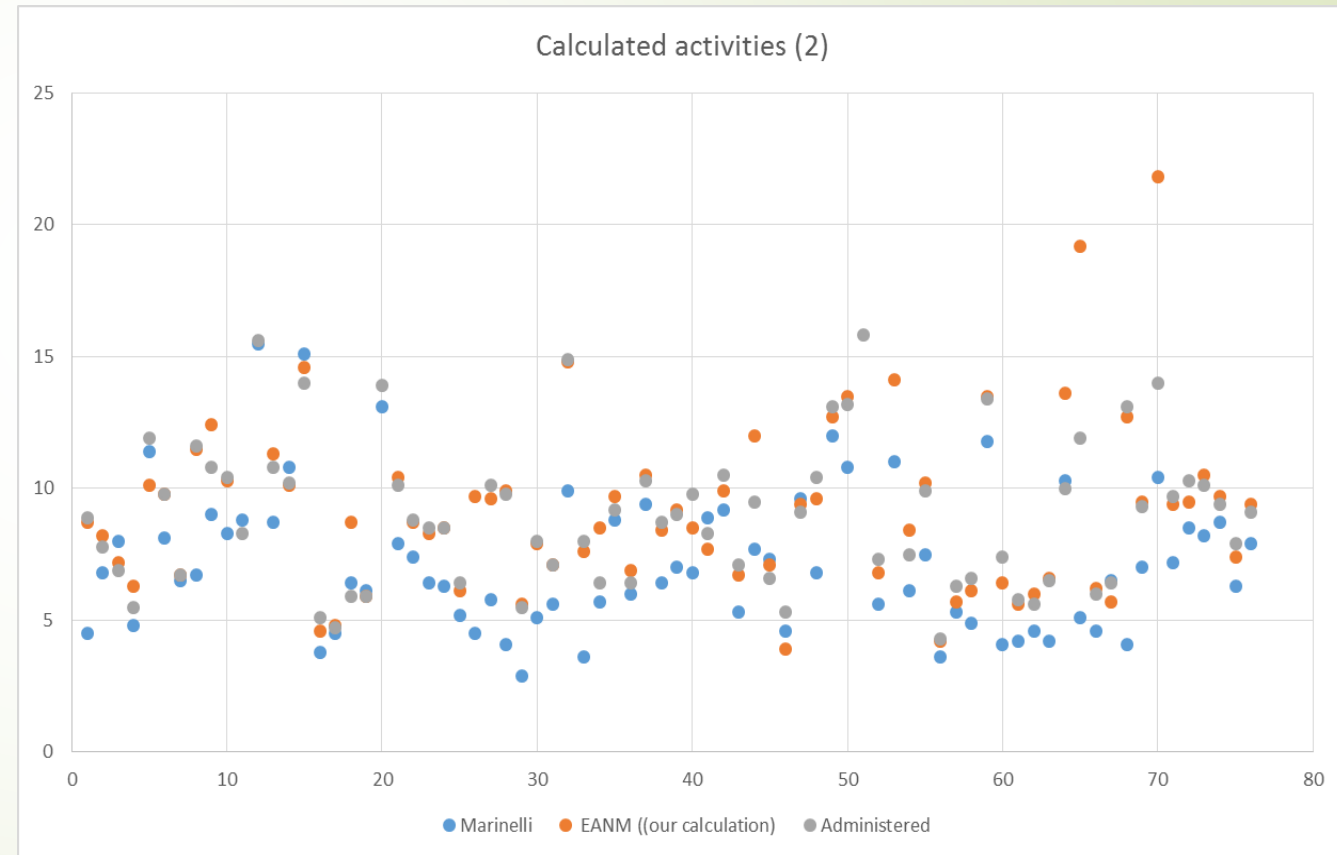
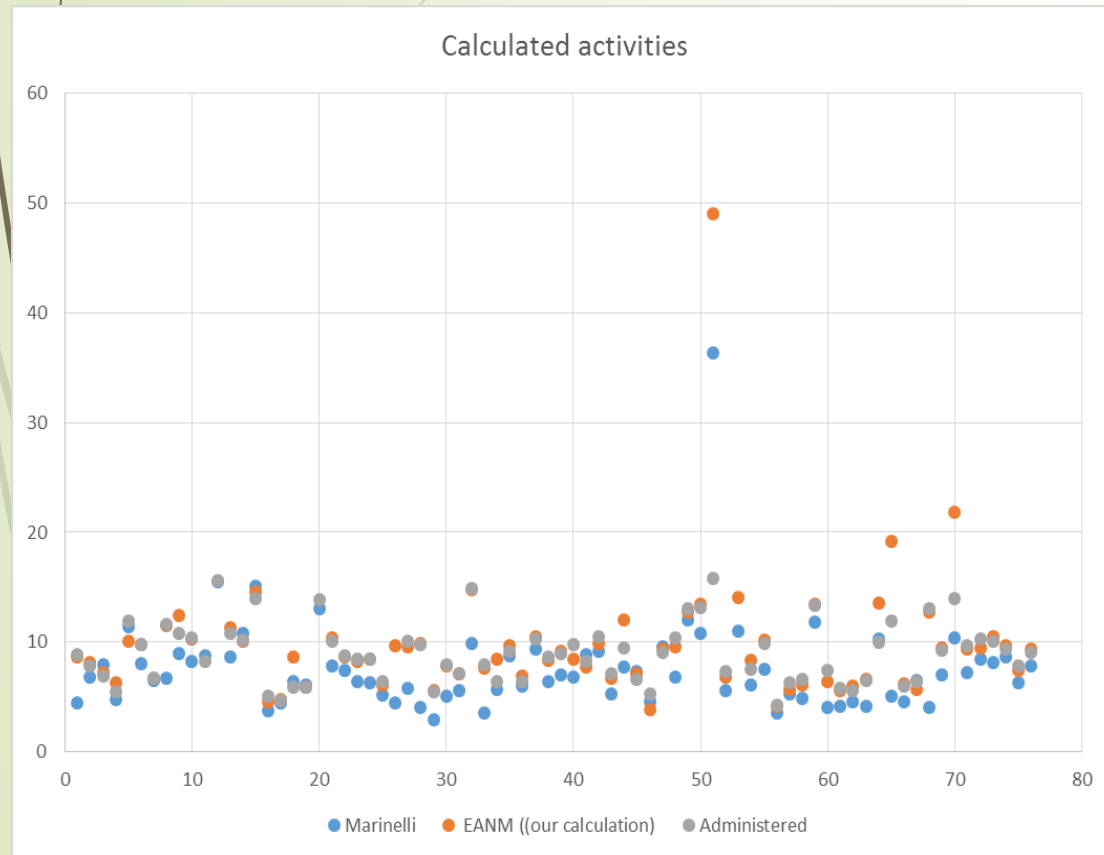
Results

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Conclusion

- Individualized pre and post treatment dosimetry for hyperthyroidism I-131 therapy is mandatory.