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Final comments from a medical perspective

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“How long do I have, doctor?”

Patients ask for their life expectancy

After regular treatment
(i.e. surgery, medical therapy)
prognosis varies with
10-year overall survival rates
between < 10% > 90%

Appearance of relapse and
repeated hospital visits impact
on quality of life

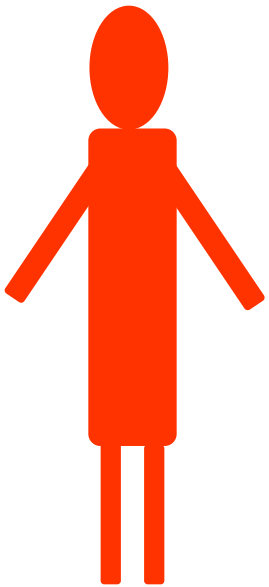
“Excuse me doctor, would you mind spelling that medical term? I want to update my Facebook friends on her condition.”

Patient relevant outcomes
(Rx success, safety, undesired side effects, risk for the offspring, duration of hospitalization, risk for family members)

Why dosimetry?

Fixed activity:

Every patient is given the same activity, regardless of biological variation



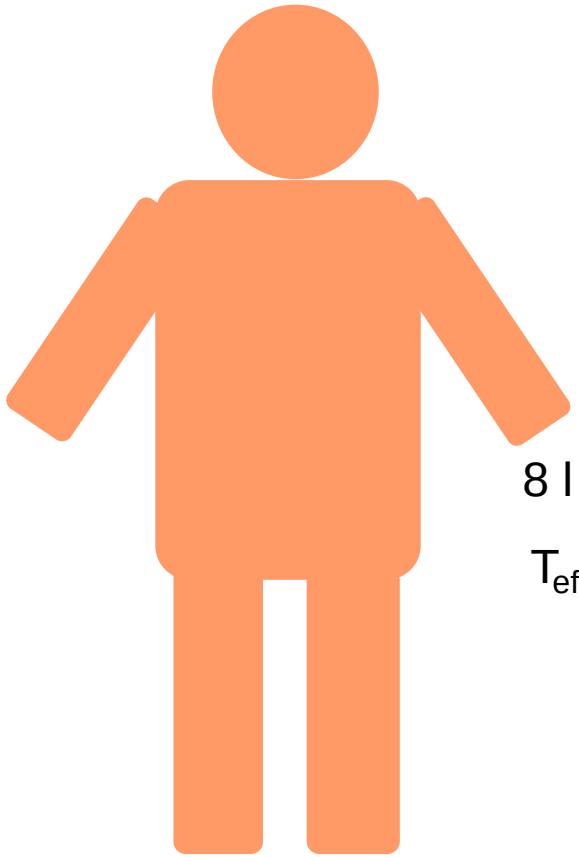
Old lady

155 cm

49 kg

3,5 l Bloodvolume

T_{eff} in Blood: 36 h



Young man

210 cm

200 kg

8 l Blood volume

T_{eff} in blood: 8 h

Ultimate goal

Conclusion

The ultimate aim of the project is to encourage and assist European MRT clinics, and those worldwide, to adopt dosimetry as a routine part of patient treatment and to bring MRT into line with other radiotherapy modalities.

The project will also support compliance with the EC Directive 2013/59/EURATOM, which states that individual dose planning for radiotherapy patients (including MRT) must be enforced in legislation by EU member states by 6 February 2018.

Therefore, the end result should be more effective, better targeted treatment, for the benefit of patients and the healthcare system.

For more details go to http://mrtdosimetry-empir.eu/

If you would like to become a collaborator with MRTDosimetry, please contact Vere Smyth (vere.smyth@npl.co.uk)

This project has received funding from the EMPIR programme co-financed by the Participating States and from the European Union's Horizon 2020 research and innovation programme

References

Strigari, L., et al. The evidence base for the use of internal dosimetry in the clinical practice of molecular radiotherapy Eur J Nucl Med Mol Imaging DOI 10.1007/s00259-014-2824-5 (2014)

IAEA TRS 398, Absorbed Dose Determination in External Beam Radiotherapy: An International Code of Practice for Dosimetry Based on Standards of Absorbed Dose to Water, Technical Reports Series No. 398, Vienna (2000).

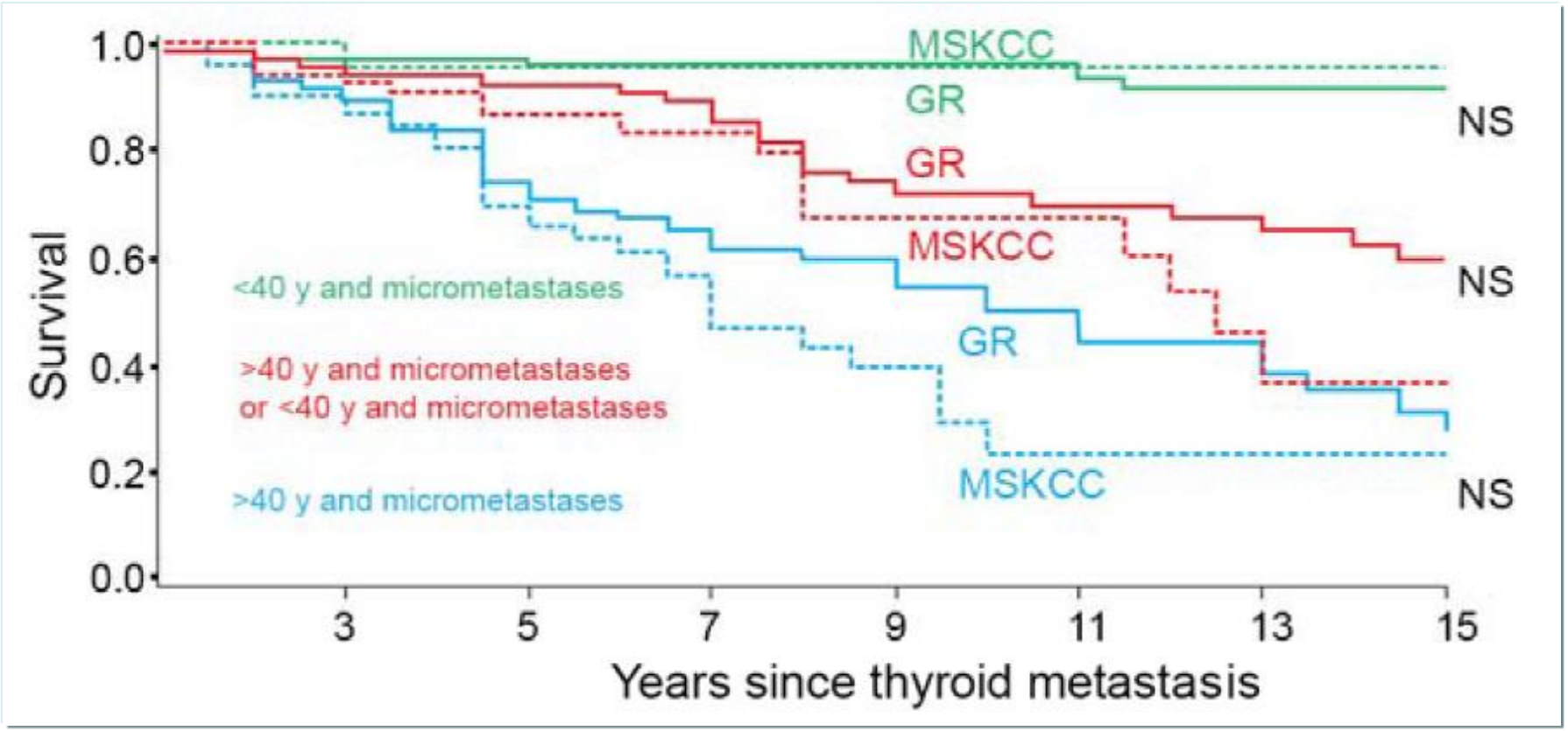
Wishful thinking?

Outline and summary of the current project

- It is now **widely accepted** that nuclear medicine therapy (molecular radiotherapy – MRT) would be **more effective** if treatments were routinely planned on the basis of individual normal tissue and target tissue dosimetry (Strigari et al, 2014). **Physicist!**

- Focus of this (follow-on) project is "**clinical implementation**"

Outcome: dosimetry vs. non-dosimetry in thyroid cancer



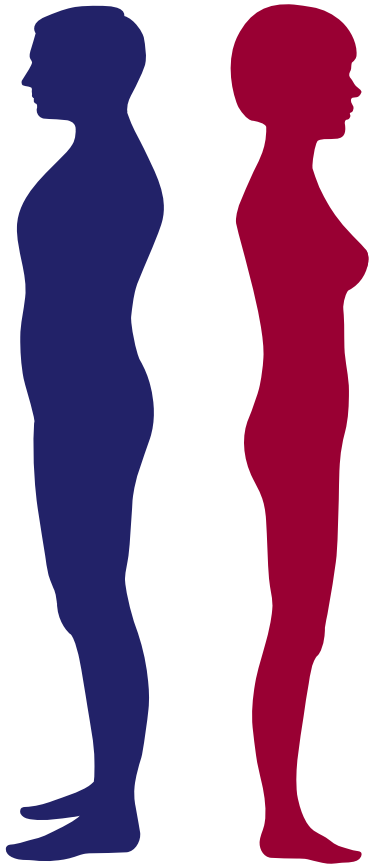
Deandreis J Nucl Med 2016

General ideas

- Frequency (relevance) of entities
- Affected age groups (MIBG versus PSMA)
- Radiation oncology versus chemotherapy approach ("dose escalation")
- Clinical implementation of dosimetry and simplification of handling
- Prove of superiority
- Patient safety versus treatment efficacy
  → i.e. thyroid cancer versus prostate cancer
  (neuroendocrine tumors, liver tumors, hematological malignancies)

Thyroid cancer in the US

Males		
Prostate	220,800	26%
Lung & Bronchus	115,610	14%
Colon & Rectum	69,090	8%
Urinary Bladder	56,320	7%
Melanoma of the Skin	42,670	5%
Non-Hodgkin Lymphoma	39,850	5%
Kidney & Renal Pelvis	38,270	5%
Oral Cavity & Pharynx	32,670	4%
Leukemia	30,900	4%
Liver & Intrahepatic Bile Duct	25,510	3%
All Sites	**848,200**	**100%**



Females		
Breast	231,840	29%
Lung & Bronchus	105,590	13%
Colon & Rectum	63,610	8%
Uterine Corpus	54,870	7%
Thyroid	47,230	6%
Non-Hodgkin Lymphoma	32,000	4%
Melanoma of the Skin	31,200	4%
Pancreas	24,120	3%
Leukemia	23,370	3%
Kidney & Renal Pelvis	23,290	3%
All Sites	**810,170**	**100%**

Siegel Cancer J Clin 2015

Expected results of (our) project

NPL with support from all partners will create an exploitation plan at the beginning of the project and review and update it at least at each project meeting. The main project outputs to be exploited are:

-Transfer instrument (Task 1.3)

-3D printed phantom with radioactive test sources (Tasks 1.2 and 2.3)

-Protocol for commissioning, QC of QI using SPECT and PET-CT (Task 2.2)

-Open-access database containing reference images (Task 3.7)

-Protocol for commissioning and QC of MRT dosimetry platforms (Task 4.4)

Outlook

Encourage reviews

Initiate clinical studies

Regulations less important (EURATOM)

Consider economics

Networking? Lobbying?

Medical/clinical societies (non-biased) might be more open than hardcore nucmeds

Involve industrial partners in radiopharmaceutical business

What next?

This could be a suitable topic for a SIP (Support for Impact calls in 2019 and 2020 under EMPIR)?

Thank you