



Schweizerische Gesellschaft für Strahlenbiologie und Medizinische Physik

Société Suisse de Radiobiologie et de Physique Médicale

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Swiss Society of Radiobiology and Medical Physics

Member of the European Federation of Organisations for Medical Physics (EFOMP) and the International Organization for Medical Physics (IOMP)

DESCRIPTION OF MIP TASK GROUP

Task group name

Desired level of dosimetry in molecular radiotherapy (MRT) procedures

Chair person

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Aims and roadmap

Background and motivations

From the "Internal Dosimetry Task Force Report on: Treatment Planning For Molecular Radiotherapy: Potential And Prospects" [ref-1]:

- Cancer and benign diseases have been treated with radiopharmaceuticals since the 1940s. A forthcoming European council directive (council directive 2013/59 Euratom [ref-2]) mandates that treatments should be planned according to the radiation doses delivered to individual patients, as is the case for external beam radiotherapy. The directive also specifies that verification of the radiation doses delivered should be performed.
- In recent years the number and range of radiotherapeutics available has expanded significantly. Many new agents are in development or in early phase clinical trials. These will provide new treatment options for many cancers, particularly following unsuccessful treatments with conventional chemotherapeutics or relapse and will have a significant impact on the costs of healthcare.
- In almost all therapeutic procedures considered, the ability to perform image-based patient-specific dosimetry has been demonstrated. This allows verification of the absorbed doses delivered to tumours, target volumes and healthy organs. Patient-specific treatment planning is also feasible in all cases, either from tracer studies with the therapeutic radionuclide, with surrogate imaging radionuclides as 'companion diagnostics', or within an 'adaptive planning' strategy in the case of multiple administrations.
- Molecular radiotherapy (MRT) is a highly multidisciplinary area requiring a range of trained staff to provide a comprehensive service. All therapy procedures have demonstrated the potential to be highly effective. Dosimetry-based individualisation of treatment is likely to significantly improve this effectiveness, although must be adequately resourced.

Indeed personalized dosimetry play a key role in defining the optimal amount of activity delivered to patients occurring MRT procedures. Planned and delivered dose to target tissues and limiting organs can be assessed providing valuable information to define the optimal trade-off between treatment efficacy and patient safety (prevent and/or limit the toxicity) and to establish dose-response and dose-toxicity relationships.

This project has three aims:

1. Review and discuss present dosimetry procedures applied in therapeutic delivery of radio-pharmaceuticals in different Swiss centres. A group of medical physicists involved in MRT procedures (in nuclear medicine) across Switzerland promote the discussion.
2. Prepare a written document outlining the desired level of dosimetry according to each specific radio-therapeutic procedure.
3. Discuss the document within the SSRMP and the SGNM-SSMN societies to guide possible improvement of dosimetry protocols in MRT.

Project design:

1. According to specific MRT procedures, the discussion will focus on:
 - 1-a) Present implementation of dosimetry protocols supporting the administered dose assessment and the planning of dose to target tissues and non-target tissues across centres.
 - 1-b) Present implementation of dosimetry protocols aiming to the verification of delivered doses to target and non-target tissues.
2. A written document will span the following topics:
 - 2-1) desired dosimetry level for both dose planning and delivered dose verification according to specific MRT procedures
 - 2-2) Review of present standards (or guidelines) and logistic supporting the desired level of dosimetry mentioned in point 2-1.

Because a large number of MRT procedures applied at the national level, the working- group will focus on the MRT procedures that will be considered of more interest according to the number of treatment performed and/or the number of centres involved in this procedures. Other criteria will be specified if needed.

3. The resulting written document will be the base for discussion within the SSRMP and the SGNM-SSNM societies to guide possible improvement of MRT dosimetry protocols across Switzerland.

Proposed roadmap :

To start, we focus on a few MRT procedures well spread around Swiss nuclear medicine centres :

- Y-90 microspheres for the treatment of primary and metastatic liver cancer
- I-131-Nal for benign thyroid diseases
- I-131 for the treatment of differentiated thyroid cancer with ablative intent and in the case of recurrent disease
- I-131 mIBG for the treatment of neuroblastoma in children and young adults
- Lu-177 DOTATATE for the treatment of neuroendocrine tumours
- Ra-223 dichloride for the treatment of bone metastases from castration-resistant prostate cancer

Ref-1: 'Internal Dosimetry Task Force Report on: Treatment Planning For Molecular Radiotherapy: Potential And Prospects''

Ref-2: COUNCIL DIRECTIVE 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom. 2014, Official Journal of the European Union.

Ref-3: C. Stokke et al. Dosimetry-based treatment planning of molecular radiotherapy: a summary of the 2017 report from the Internal Dosimetry Task Force. EJNMMI Physics (2017) 4:27

Anticipated results

- Report
- Recommendation
- Other (ex: position statement, scientific statement, advice notice, practice guidelines, ...):
Position statement

Science relevance

Review present implementation of MRT dosimetry across Swiss centers. Outline present achievable standards in MRT dosimetry according to specific MRT procedures.

Professional relevance

Reference position document on practicable and wished MRT dosimetry according to specific MRT procedures.

Educational relevance

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Start date

June 2019

End date

December 2019