



# ANNUAL REPORT 2021

## Objective

The Nederlandse Commissie voor Stralingsdosimetrie (NCS, Netherlands Commission on Radiation Dosimetry) was established on the 3<sup>rd</sup> of September 1982 with the main objective of promoting the appropriate use of radiation dosimetry, both for radiation research and for practical applications. The NCS is chaired by a board of scientists, installed in consultation with the supporting societies:

- Nederlandse Vereniging voor Radiotherapie en Oncologie (Dutch Society for Radiotherapy and Oncology);
- Nederlandse Vereniging voor Nucleaire Geneeskunde (Dutch Society of Nuclear Medicine);
- Nederlandse Vereniging voor Klinische Fysica (Society for Medical Physics of the Netherlands);
- Nederlandse Vereniging voor Radiobiologie (Netherlands Radiobiological Society);
- Nederlandse Vereniging voor Stralingshygiëne (Netherlands Society for Radiological Protection);
- Nederlandse Vereniging voor Medische Beeldvorming en Radiotherapie (Dutch Society for Medical Imaging and Radiotherapy);
- Nederlandse Vereniging van Klinisch Fysisch Medewerkers (Dutch Society for Medical Physics Engineers);
- Nederlandse Vereniging voor Radiologie (Radiological Society of the Netherlands)
- Belgische Vereniging voor Ziekenhuisfysici/Société Belge des Physiciens des Hôpitaux (Belgian Hospital Physicists Association);

expanded with a representative from the National Metrology Institute VSL.

To achieve its aims, the NCS carries out the following tasks: participation in dosimetry standardisation, promotion of mutual comparisons of dosimetry, drafting of dosimetry protocols and the collection and evaluation of physical data related to dosimetry. Furthermore, the commission shall establish or maintain links with national and international organisations concerned with ionising radiation and promulgate information on new developments in the field of radiation dosimetry.

Website: <https://www.radiationdosimetry.org>



## **Board**

On December 31, 2021, the members of the board of the NCS were:

Dr. J.B. van de Kamer	chairman	(NVRO)
T.W.M. Grimbergen	vice chairman	(NVS)
Dr. J.A. de Pooter	secretary	(VSL)
Dr. G. Pittomvils		(SBPH/BVZF)
J.M.J. Hermans	treasurer	(NVKFM)
M. van der Vlies		(NVNG)
N. de Graaf		(NVvR)
Dr. F. Dekkers		(NVRB)
Dr. Ir. F.W. Wittkämper		(NVKF)
M.K. Zeeman		(NVMBR)

The board of the NCS met three times in 2021 on 19 January (online), 1 June (online) and 28 October (physical). The main subjects raised at the board meetings were:

- Monitoring the progress of activities by the subcommittees and the platform;
- Initiate the publication of NCS-reports;
- Development of new activities;

In 2021 one NCS reports has been published.

- NCS-34: Code of Practice and recommendations for Total Body Irradiation and Total Skin Irradiation (<https://doi.org/10.25030/ncs-034>)

No new subcommittees have been installed:

The board welcomed two new board members. Manfred van der Vlies and Geert Pittomvils who will be the representatives for the NVNG and the SBPH/BVZF respectively. The board has drafted a procedure for establishing a subcommittee in which the different roles of supporting societies, representatives, NCS board are defined as well as the formal steps taken during the lifetime of a subcommittee including, initialization of the committee, and review of the report.

### 1. Subcommittee on Implementation of paediatric diagnostic reference levels in the Netherlands

In October the NCS board has decided to conclude this subcommittee under the umbrella of the NCS and to transfer the work to the Federatie Medische Specialisten.



## Subcommittees

### 1. *Subcommittee on Dosimetry for Scanned Pencil Beam Proton Therapy*

No report available.

### 2. *Subcommittee on Quality Assurance of Treatment Planning Systems*

No report available

### 3. *Subcommittee on MRI QA for radiotherapy*

Magnetic Resonance Imaging (MRI) is increasingly used in the process of radiation therapy (RT).

A concern of integrating MRI into RT-planning is the spatial accuracy of these images, as they are affected by magnetic field inhomogeneities, magnetic susceptibility artefacts, chemical shifts and non-linearities in the gradient fields. Since these effects are system and patient dependent, dedicated procedures for quality assurance (QA) and quality control (QC) of MRI for RT are mandatory.

The subcommittee has been established in 2017. The goal of this subcommittee is to develop a code of practice for MRI QA/QC which is dedicated to RT purposes.

In 2021, the subcommittee had multiple online meetings. The code of practice has been formulated and all the chapters are written. The subcommittee is in the process of internal review of the chapters. Pieterneel van der Tol has left the subcommittee. She has not been replaced.

Members of the subcommittee are:

Zdenko van Kesteren (AUMC/AMC, Amsterdam, chairman)

Ellen Brunenberg (Radboud UMC, Nijmegen)

Joost Kuijter (VUmc, Amsterdam)

Steven Petit (Erasmus MC, Rotterdam)

Mariska de Smet (BVI, Tilburg)

Rob Tijssen (Catharina Ziekenhuis, Eindhoven)

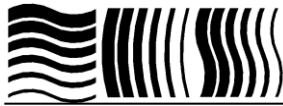
Mariëlle Philippens (UMCU, Utrecht)

Jeroen van der Kamer (NKI-AVL, Amsterdam, representative of the NCS board)

### 4. *Subcommittee on Code of Practice and Recommendations for Stereotactic Body Radiotherapy*

The purpose of the committee is to provide the basic requirements and guidelines for providing safe and high-quality SBRT treatments according to state-of-the-art international standards. The aim is to make a practical report that can readily be used with clear requirements and recommendations.

In 2021 the committee has organized 5 meetings, all via videoconference. In general, it was well received to work with videoconference. The finalization of the last chapters to be completed has been taken at hand. The first concept of the report will be drafted in 2022.



Members of the subcommittee are:

Johan Cuijpers (AUMC/VUmc, Amsterdam, chairman)  
Anke van Mourik (NKI-AvL, Amsterdam)  
Marloes Steneker (NK-AvL, Amsterdam)  
Anna Pethoukova (HMC, Den Haag)  
Richard Canters (MAASTRO, Maastricht)  
Marcus Wendling (Radboud UMC, Nijmegen)  
Siete Koch (MST, Enschede)  
Rens Vingerhoets (NWZ, Alkmaar)  
Chrysi Papalazarou (Erasmus MC, Rotterdam)  
Petra Kroon (UMCU, Utrecht)  
Jeroen van de Kamer (NKI-AvL, representative of the NCS board)

##### *5. Subcommittee on Quality control for linear accelerators*

The goal of the subcommittee is to produce a report to supersede the NCS reports 8 and 9 on linac QA. Rather than simply providing an updated list of tolerances and tests the subcommittee aims to produce a report in which

- tests and tolerances are put in the context of operation of the entire linac
- a transition from uniform tolerances to a system of Statistical Process Control is promoted
- a new framework of beam parameters is provided that is equally applicable to both flattened and non-flattened beams

Due to the Covid-19 crisis there have been no live plenary meetings of the subcommittee in 2021. Instead, there have been a few smaller, on line meetings, however, limited progress was made.

In 2021 Jan van Santvoort retired and withdrew from the subcommittee

Members of the subcommittee are:

Bas Gobets (LUMC/RdG, Leiden/Delft, chairman)  
Thijs Perik (NKI-AVL, Amsterdam, secretary)  
Hendrik Piersma (MST, Enschede, secretary)  
Daan Hoffmans (AUMC, Amsterdam)  
Erik Roijen (MAASTRO, Maastricht)  
Jan van Santvoort (HMC, the Hague)  
Theo van Soest (UMCU, Utrecht)  
Richard Tiggelaar (AUMC, Amsterdam)  
Jochem Wolthaus (UMCU, Utrecht)  
Jeroen van de Kamer (NKI-AVL, Amsterdam)  
Frits Wittkämper (NKI-AVL, Amsterdam, representative NCS board)

##### *6. Subcommittee on Intra operative radiotherapy*

IORT refers to the delivery of a high dose at the time of surgery to a specific target while healthy structures are displaced or shielded. This treatment technique involves a multidisciplinary approach and a close interaction between surgery and radiotherapy. In clinical practice different dedicated devices are used: mobile electron linear accelerators, a low-energy X-ray machines and brachytherapy. This leads to a diverse combination of equipment with specific dosimetric characteristics, quality assurance protocols, sterilization procedures, dose calculation, safety and risk assessment, specific care paths and a special



work environment. Therefore, the NCS initiated a subcommittee that focuses on the current practice on IORT.

In this report of this committee the current procedures in use will be discussed, and suggestions and guidelines will be proposed with the aim to standardize the clinical implementation across the different techniques and centres.

Seven meetings of the committee have been held last year out of which only one could be partially face-to-face organized in Kortrijk in between pandemic waves.

Chapters are in the writing process, introduction, commissioning, QA and radioprotection are still in draft mode but almost finished.

One abstract has been finalized and will be submitted to the next ISORT meeting that hopefully will happen this year (last year ISORT meeting was also cancelled). A second abstract, based on the second TLD audit is still in draft mode.

#### Members of the subcommittee

Anna Petoukhova (Medisch Centrum Haaglanden, Den Haag)  
Jacobus Van der Wingerden (Medisch Centrum Haaglanden, Den Haag)  
Inger-Karine Kolkman-Deurloo (Erasmus MC, Rotterdam)  
Nicolas Hertsens (AZ Groeninge, Kortrijk)  
Stephane Simon (Bordet, Brussel), Chair  
Verdi Van Reusel (Iridium kankernetwerk, Antwerpen)  
Dianne Weug (Catharina ziekenhuis, Eindhoven), advisor  
Jeltsje Cnossen (Catharina ziekenhuis, Eindhoven), advisor  
Jeroen van de Kamer (NKI-AvL, Amsterdam), representative of the NCS board  
Wim Dries (Catharina ziekenhuis, Eindhoven), Secretary  
Piet Stevens (Iridium kankernetwerk, Antwerpen)

#### *7. Subcommittee on Clinical application of deformable image registration and auto-segmentation in radiotherapy*

Sophisticated auto-segmentation and deformable image registration (DIR) toolboxes have become commercially available for clinical use in radiation oncology. A variety of clinical applications make use of both techniques. Still, their validity is not guaranteed in all circumstances and therefore one needs to be cautious when applying them in clinical use. These applications include auto-segmentation, contour propagation, re-irradiation and dose accumulation; also DIR typically plays a role in off-line and on-line plan adaptation.

This NCS subcommittee aims to give an overview of literature, possibilities and pitfalls of different techniques and provide guidance to commissioning and acceptance for various clinical applications.

The subcommittee officially started in May 2019 and had meetings at regular intervals on a physical basis and holds telephone conferences to monitor progress. At the onset of 2020 the committee work continued until the COVID pandemic started when it was put on hold. The work was restarted at the end of 2020 with the formation of small working groups handling the various chapters of the report. The relevant literature is identified, and the outline of the report is approaching its final structure. In 2021, new committee members were added for specific expertise needed in the committee; Vicki Trier Taasti (MAASTRO, Maastricht), Irene Hernandez Giron (LUMC, Leiden), Eliana Vasquez Osorio (Manchester, UK), Rob Louwe (HollandPTC, Delft), Cassia Oraboni Ribeiro (UMCG, Groningen). In 2021, various chapters were finished in draft and progress was made towards finalizing all chapters at the end of 2021. Early 2022 is aimed to have a full draft with the intent to finish the report second half of 2022.



Members of the subcommittee are:

- Wouter van Elmpt (MAASTRO, Maastricht, chairman)
- Erik van Dieren (MST, Enschede, secretary)
- Sasha Ivashchenko (LUMC, Leiden)
- Alexis Kotte (UMCU, Utrecht)
- Charlotte Brouwer (UMCG, Groningen)
- Andras Zolnay (Erasmus MC, Rotterdam)
- Peter Remeijer (NKI-AVL, Amsterdam)
- Miguel Palacios (AUMC/VUMC, Amsterdam)
- Vicki Trier Taasti (MAASTRO, Maastricht)
- Irene Hernandez Giron (LUMC, Leiden)
- Eliana Vasquez Osorio (Manchester, UK)
- Rob Louwe (HollandPTC, Delft)
- Cassia Oraboni Ribeiro (UMCG, Groningen)
- Jeroen van de Kamer (NKI-AVL, Amsterdam, representative from the NCS board)

#### 8. Subcommittee on Radiation Protection and Dosimetry of the Extremities

The extremities and in particular the skin may be exposed to significant amounts of radiation, especially in workplaces where open radioactive sources are being produced or applied and in fluoroscopy guided procedures. Although several international recommendations have covered this topic (such as the ORAMED study, ISO 15382 and Annex E of ICRP-106), up to now there is little harmonization in the dosimetry and protection of the extremities in practice.

The aim of this NCS subcommittee is to develop guidelines with respect to the dosimetry and protection of the extremities, with special attention to applications of open radioactive sources and exposures in fluoroscopy guided procedures. The guidelines will be based on current literature as well as the experience of the participating members of this subcommittee.

There were 4 meetings in 2021. In addition to drafting the first texts, during these meetings the following items were discussed:

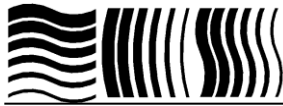
- Discussion on adequate system(s) for monitoring of the skin (including factors from ring to fingertip dose)
- Adequate methods for calculation of the skin dose
- Ring dosimeter pilot for fluoroscopy guided procedures

Composition of the committee:

- Ischa de Waard (RIVM, Bilthoven) was replaced by Patricia Bekhuis (RIVM, Bilthoven)
- Jeroen Schlieff (NRG, Arnhem) was added to the committee

Dissemination:

- Kollaard, R., Extremitendosis in de nucleaire geneeskunde, NVKF nascholing kring Radiologie en Nucleaire Geneeskunde, 9 December 2021



Members of the subcommittee are:

Robert Kollaard (NRG, Arnhem, chairman)  
Patricia Bekhuis (RIVM, Bilthoven)  
Theo Adriaensen (Amphia Hospital, Breda)  
Tom Grimbergen (Mirion Dosimetry Services, Arnhem, representative from the NCS board)  
Alexander Maass (UMCG, Groningen)  
Nanko de Graaf (radiologist Erasmus MC, Rotterdam)  
Pieternel van der Tol (Radboud UMC, Nijmegen)  
Emmie Meijne (UMCG, Groningen)  
Mark van Mierlo (GE Healthcare, Eindhoven)  
Jeroen Schlieff (NRG, Arnhem)  
Filip Vanhavere (SCK.CEN, Mol, Belgium)  
Alie Vegter (Treant Hospital, Stadskanaal)  
Bart Vermolen (Gelderse Vallei Hospital, Ede)  
Robert Westland (AUMC, Amsterdam)

9. *Subcommittee on Quality control and dosimetry for MRI-guided-radiotherapy*

No activities

Members:

Jochem Wolthaus (UMCU, Utrecht, chairman)  
Guy Warmerdam (Radboud UMC, Nijmegen, secretary)  
Bram van Asselen (UMCU Utrecht)  
Daan Hoffmans (AUMC, Amsterdam)  
Tomas Janssen (NKI-AvL, Amsterdam)  
Jochem Kaas (RadboudUMC, Nijmegen)  
Jeroen van de Kamer (NKI-AvL, Amsterdam)  
Martijn Kusters (Radboud UMC, Nijmegen)  
Miguel Palacios (AUMC, Amsterdam)  
Jacco de Pooter (VSL, Delft, representative NCS board)  
Leon de Prez (VSL, Delft)  
Kathrin Surmann (Radiotherapiegroep, Deventer)  
Rob Tijssen (Catharina ziekenhuis, Eindhoven)



## Advisory platform

The Netherlands Commission on Radiation Dosimetry covers a wide range of expertise through the participating scientific societies. In 1999 NCS platforms were established. Currently only the advisory platform on Radiation Protection in Hospitals is active. The task of the platform is to give advice on specific research projects initiated by the Government. In case of future needs the NCS can be approached for consultation through its secretary under the condition of modest coverage of NCS experts in terms of attendance fee and travel costs for meetings

### 1. *Advisory platform on Radiation Protection in Hospitals*

In 2010 the NCS platforms was reinitiated with the aim to provide practical advice regarding legal aspects concerning the use of radiation in the clinical environment. For this, the platform is represented by the participating societies, expanded with the Dutch Society on Pharmacy in Hospitals. To achieve this goal, the platform has frequent contact with the Dutch Government.

The Platform advises on radiation safety laws and regulations. It establishes practical guidelines for existing and new laws and regulations. The Platform maintains close contacts with the Dutch ministries of VWS (Ministry of Health, Welfare and Sport) and SZW (Ministry of Social Affairs and Employment) and the ANVS (Authority for Nuclear Safety and Radiation Protection). The Platform plays a key role in effective and efficient implementation of European directives into national law.

The Platform had three meetings in 2021 (live and online) and consultation by mail. Activities in 2021 include:

- Clearance level for artificial isotopes
- Guideline for organizing radiation protection in hospitals (committee of VWS and ANVS)

The position of the NVZA representative is still vacant.

Members of the NCS platform are:

- Peter Brands (NVKF, chair)
- Kitty Hoornstra (NVS, secretary)
- Herman Pieterman (NVvR)
- Niels Veltman (NVNG)
- Alie Vegter (NVMBR)
- Jan Habraken (NVNG)
- Bradley Pieters (NVRO)
- Marja Harbers (NVKFM)
- <vacant> (NVZA)
- Jeroen van de Kamer (NVRO, representative from the NCS board)





**NCS FINANCIAL OVERVIEW 2021**

	<b>Income (€)</b>	<b>Costs (€)</b>
Savings-account on January 1, 2021	38160.59	
Current-account on January 1, 2021	29144.89	
Contribution Netherlands Society for Radiology (NVvR)	600.00	
Contribution Netherlands Society for Medical Physics (NVKF)	400.00	
Contribution Netherlands Society for Radiotherapy and Oncology (NVRO)	800.00	
Contribution Netherlands Society for Nuclear Medicine (NVNG)	200.00	
Contribution Netherlands Society for Radiological Protection (NVS)	400.00	
Contribution Netherlands Radiobiological Society (NVRB)	100.00	
Contribution Dutch society of Medical Physics Engineers (NVKFM)	100.00	
Contribution Netherlands Society for Medical Imaging (NVMBR)	300.00	
Contribution Belgian Hospital Physicists Association (BHPA)	200.00	
Interest savings-account	0.00	
Banking costs current account		127.45
Costs web site		544.50
Costs meetings NCS board		554.06
Costs NCS subcommittees		792.26
Savings-account on December 31, 2020		38160.59
Current-account on December 31, 2020		30226.62
Total	70405.48	70405.48



**NCS BUDGET 2022**

	<b><i>Income (€)</i></b>	<b><i>Costs (€)</i></b>
Contributions scientific societies	3100.00	
Interest savings-account	0.00	
Banking costs		200.00
Costs of board and subcommittees meetings		12500.00
Website maintenance etc		600.00
NCS 40 years		5000.00
<b>Total</b>	<b>3100.00</b>	<b>7000.00</b>