



ANNUAL REPORT 2025

Objective

The Nederlandse Commissie voor Stralingsdosimetrie (NCS, Netherlands Commission on Radiation Dosimetry) was established on the 3rd 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, 2025, the members of the board of the NCS were:

Dr. G. Pittomvils	chairman	(SBPH/BVZF)
P. Brands	vice chairman and representative NCS platform	
Dr. J.A. de Pooter	secretary	(VSL)
T. Perik	treasurer	(NVKFM)
E. Raaijmakers		(NVRO)
N. de Graaf		(NVvR)
P. van der Tol		(NVKF)
A. Vegter		(NVMBR)
M. van der Vlies		(NVNG)
Dr. F. Dekkers		(NVRB)
R. Kollaard		(NVS)

The board of the NCS met three times in 2025 on 13 March (online), 19 May (online) and 30 October (in person). The main subjects raised at the board meetings were:

- Monitoring the progress of activities by the subcommittees and the platform;
- Monitor the needs for new NCS subcommittees
- The NCS LinkedIn page <https://www.linkedin.com/company/105982333/>
- NCS potential contribution to the cluster MedTech of the FMS
- Preparation for the 9th NCS lustrum symposium in 2027

The new NCS articles of association have been accepted by the board in March. In 2025 no NCS reports have been published. Two new subcommittees have been installed in 2025: Small Field dosimetry and Recommendations for 3D superficial treatments.

Subcommittees

1. Subcommittee on Dosimetry for Scanned Pencil Beam Proton Therapy

International codes of practice for reference dosimetry and recommendations for measurement of beam characteristics in proton therapy exists (TRS-398, ICRU 78). However, they are mainly focused on passive scattering delivery technology and they do not address specific issues of pencil beam scanning. The aim of the subcommittee is to develop uniform guidelines for the absolute and relative dosimetry of the pencil beam scanning modality with continuous and pulsed proton beams, focusing on the new proton therapy facilities that are currently being developed in the Netherlands and Belgium. The guidelines will be based on current literature as well as clinical experience of the participating members of this subcommittee.

In the first half of 2025 the subcommittee met several times online. In this period the subcommittee has reviewed all chapters most of the chapters (except chapter 4) are in a final draft. The aim for 2026 is to finalize chapter 4 and thereby the report.

Members of the subcommittee are:

Marco Schippers (PSI/UMCG, advisor)

Marc-Jan van Goethem (UMCG)

Frank Verhaegen (MAASTRO)

Enrica Seravalli (UMCU)



Steven Habraken (HPTC/LUMC)

Jasper Kouwenberg (HPTC)

Gloria Vilches Freixas (MAASTRO, secretary)

Petra Trnkova (Czech Technical University)

Hugo Palmans (Medaustrom, Austria and National Physical Laboratory, UK)

Jacco de Pooter (VSL, representative NCS board)

2. Subcommittee on Quality control for linear accelerators

The goal of this subcommittee is to completely revise the philosophy of performing linac QA. More based on the actual performance of the linac using statistics process control (SPC) and risk analysis, rather than tight tolerances and fixed frequencies.

The subcommittee has joined forces with an NVKFM/NVKF collaboration on QA2030, aiming for similar goals. We have met on several occasions and are in the process of setting the foundation of the linac and on SPC. In the meantime, a new paradigm for measuring field profiles and the central position of unflattened beams has been published and communicated to the industry.

Jeroen van de Kamer has taken the role of chair; Jan van Santvoort (HMC) and Theo van Soest (UMCU) have discontinued their contribution due to retirement. Kay van Nielen,

Peter Van der Baan and Erik Roijen have taken place in the subcommittee to succeed them. Stan Heukelom acts as an advisor.

Members of the subcommittee are:

Jeroen van de Kamer (NKI-AVL, chairman)

Thijs Perik (NKI-AVL, secretary and representative from the NCS board)

Hendrik Piersma (RIF, secretary)

Jochem Wolthaus (UMC Utrecht)

Bas Gobets (LUMC)

Daan Hoffmans (Amsterdam UMC)

Richard Tiggelaar (Amsterdam UMC)

Kay van Nielen (Erasmus MC)

Peter Van der Baan (Erasmus MC)

Erik Roijen (Maastrou)

3. 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 the current procedures in use are discussed, and suggestions and guidelines are proposed with the aim to standardize the clinical implementation across the different techniques and centres. First version of the report was send in February to the NCS board. Then reviewers were appointed. First questions of the reviewers have been received in April. Answers to the reviewers were provided in September. Another review round took place in November. The final version of the report was submitted to the NCS board and is currently in the approval process. Only three meetings of the committee have been held remotely last year, mainly to answer the questions of the reviewers.

The results of the TLD audit were presented at the ISORT (International Society for IntraOperative RadioTherapy) meeting in November held in Brussels.

Members of the subcommittee

Anna Petoukhova (Medisch Centrum Haaglanden)

Jacobus Van der Wingerden (Medisch Centrum Haaglanden)

Nicolas Hertsens (AZ Groeninge)

Geert Pittomvils (UZ Gent, representative of the NCS board)

Wim Dries (Retired, previously Catharina ziekenhuis)

Piet Stevens (Iridium kankernetwerk)

Verdi Van Reusel (University Health Network Toronto, previously Iridium kankernetwerk)

Stéphane Simon (Institut Bordet, Brussels, Chair)

4. 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 interventions. 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 2025. A large part of the report is now in draft or advanced draft. The committee gave several presentations in professional meetings on a pilot in veterinary practices, proposals for calculation and monitoring in nuclear medicine. An external review on chapter 5 for calculation of the skin dose for radionuclides was conducted.

Publications and presentations:

- de Wit, S.A.W., Willemsen, S.M., Broekhuis-Stuivenberg, V.H., Kollaard, R.P., Blootstelling van de handen bij het maken van opnamen in de veterinaire diagnostiek, *Nederlands Tijdschrift voor Stralingsbescherming* 16(1), p4-10, 2025.
- Westland, R., Aanpak risicoberekening van equivalente huiddosis, NVS-GV nascholing, 30-1-2025.
- Kollaard, R.P., Monitoring van de huiddosis bij handelingen met radioactieve



stoffen, NVS-GV nascholing, 30-1-2025.

- Kollaard, R., de Wit, S., Willemsen, S., Stuivenberg, V., Handdosis bij beeldvorming - Blootstelling in de veterinaire praktijk, NVS Lustrum, 19-6-2025

Members of the subcommittee are:

Robert Kollaard (NRG PALLAS, chair, representative from the NCS board)

Patricia Bekhuis (RIVM, secretary)

Theo Adriaensen (Amphia Hospital)

Ruud Brans (Amsterdam)

Tom Grimbergen (Mirion Dosimetry Services)

Johan de Jong (Arbo Unie)

Alexander Maass (UMCG)

Hans Boelens (UMCG)

Ellis Winters (NRG PALLAS)

Pieter van der Tol (Radboudumc)

Filip Vanhavere (SCK.CEN)

Alie Vegter (Treant Hospital)

Bart Vermolen (Gelderse Vallei Hospital)

Robert Westland (Amsterdam UMC)

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

The committee did not meet in 2025. Early 2026 a poll was distributed among the committee members to see whether the members want to continue.

6. Quality Assurance of fan-beam CT for Radiotherapy

The committee met in person once at the end of 2024 to establish a framework for the report to be produced. It has been discussed whether, following the publication of articles <https://doi.org/10.1016/j.phro.2023.100522> and <https://doi.org/10.1016/j.phro.2023.100523> there is still a need for a fan-beam CT simulation report.

7. Subcommittee on "Revision NCS report 26 (Human Exposure to Ionising Radiation for Clinical and Research Purposes)"

NCS Report 26 ("Human Exposure to Ionizing Radiation for Clinical and Research Purposes") is intended to provide researchers, METCs, (Medisch Ethische Commissies, 'Medical Research Ethics Committees') and the CCMO (Centrale Commissie Mensgebonden Onderzoek, 'Central Committee on Research Involving Human Subjects') with practical guidance in justifying medical research involving the exposure of volunteers to ionizing radiation. NCS Report 26 thus implements ICRP Publication 62 ("Radiological Protection in Biomedical Research"). This ICRP publication is an international standard incorporated into the licenses granted under the Kernenergiewet ('Nuclear Energy Act') to institutions conducting such research. NCS Report 26 is being revised because several areas for improvement are possible:



- NCS Report 26 seems to suggest a clear quantitative relationship between the risk of stochastic effects resulting from exposure to a dose of ionizing radiation at a specific age of the exposed individual. METCs therefore attach great importance to the dose in their assessments, while the relationship between risk and dose due to exposure at different ages is very uncertain at low exposure levels. The relationship will therefore be nuanced and clarified.
- The formal relationship between NCS Report 26 and ICRP Publication 62 is insufficiently clear. The NCS board wishes to make NCS Report 26 the national standard for medical research and to convince stakeholders and involved authorities (Ministerie van VWS, 'Ministry of Health, Welfare and Sport' and the ANVS, 'Authority for Nuclear Safety and Radiation Protection') of this. This requires full support within the field and these authorities.
- The role of the medical physics expert (MPE) and radiation protection expert (RPE) has been underemphasized. It will be explored how these roles can be given more attention, preferably by referring to existing guidelines.

Providing clear and concrete guidelines for justifying medical research will be retained in the revision.

There were no changes in the composition of the subcommittee in 2025. There were no activities in 2025 and no progress has been made.

Members of the subcommittee:

Fieke Dekkers (RIVM, chair)

Manfred van der Vlies (GHZ, secretary, representative from the NCS board)

Relinde Damveld (MST)

Collarette Eggels (MUMC)

Adriaan Lammertsma (UMCG)

Frank de Lange (Radboudumc)

Alie Vegter (Treant)

Ruud Verdaasdonk (UT)

Rozemarijn Vliegenthart (UMCG)

Wouter Vogel (AVL)

8. *Small field dosimetry*

The NCS small field dosimetry subcommittee was set up with the main goal of providing a concise and practical summary of small field dosimetry, tailored to clinical practice in the Netherlands and Belgium. In 2017, the IAEA published the Code of Practice (CoP) on Dosimetry of Small Photon Fields in Radiotherapy (TRS-483). This document introduced a harmonized approach for small field dosimetry, based on the evidence and methodologies available at the time. Since its release, TRS-483 has served as an important reference in several NCS reports addressing small field dosimetry. However, TRS-483 is a comprehensive and technical document. It is also extensive and at times complex to implement in clinical practice. Moreover, new data sets have emerged since its publication, and further insights into key concepts, such as the equivalent square field, have been described in recent scientific literature. The main deliverable of NCS Small Field Dosimetry Subcommittee is a report that will serve as a user-friendly reference for medical physicists, assistants,



research physicists and researchers, while remaining aligned with the core principles of TRS-483. Efforts will be made to ensure that the scope of this subcommittee does not overlap with that of the NCS subcommittee on Quality Control for Linear Accelerators.

On 15 May 2025, the NCS small-field dosimetry subcommittee held its kick-off meeting, with 18 members that participated. A core committee was formed, which met regularly thereafter (approximately once every six weeks from May 2025) to define the organizational structure, meeting format, topics of interest, reporting requirements, and planned activities of the entire subcommittee.

The committee organized its first physical meeting on 28 October 2025 at Erasmus MC, Rotterdam, with around 15 participants. During this meeting, members were introduced, key topics in small-field dosimetry were identified through brainstorming and active discussions, and responsibilities were delegated among members. With this meeting, our main committee also discussed on the structure and format of subsequent meetings. We will be holding 3 online meetings and 1 physical meeting at Erasmus MC in 2026, to discuss about updates and progress in the field of small field dosimetry.

Progress made in 2025:

- Defined the structure and organization of the report
- Discussed definitions and recent developments in small-field dosimetry
- Identified gaps in the field and the subcommittee's contributions to the report
- Assigned 3–5 participants per topic and appointed coordinators, grouped into thematic sections
- Agreed on the schedule and format of regular meetings for 2026

Members of the subcommittee are:

Kelvin Ng Wei Siang (Erasmus Medical Center & HollandPTC, chair)

Simon Woodings (UMC Utrecht, secretary)

Jacco de Pooter (VSL, representative from the NCS board)

Geert Pittomvils (UZ Gent, representative from the NCS board)

Jeroen van de Kamer (NKI-AVL)

Thomas Foppen (UMCU)

Marian Dwarswaard (LUMC)

Anne Monseux (CHU)

Thierry Gevaert (UZ Brussel)

Antoine Delor (UCL)

Luca Pellegrini (CHU)

Geert Pittomvils (UZ Gent)

Sven Meijer (Radboud UMC)

Ans Swinnen (Maastricht)

Femke van der Sloot (Erasmus MC)

Sander Kamerbeek (ISALA)

Marlies Boussaer (UZ Brussel)



9. Subcommittee on 3D superficial treatments

Superficial lesions are defined as lesions close to the skin surface, with a maximum depth of approximately 5 cm. In general, radiation oncology uses either electron beam therapy or intensity modulated photon beam therapy to treat these types of lesions, but, orthovolt and brachytherapy are used as well. Currently, institutes are switching from hand calculation to Monte Carlo based treatment planning systems for electron beam therapy.

Due to density variations, skin sparing and steep depth dose gradients, electron beam planning results in inhomogeneous dose volume histograms, which become visible in 3D planning. In addition the 95% and 100% isodose volumes for electron beam therapy are small resulting in modality specific normalization levels. Moreover, we are dealing with dose schemes that are based on a treatment history of hand calculations.

Some centers are quitting electron beam treatment while relying on photon based IMRT or VMAT solutions for the same lesions, and volume based dose prescription rules are applied. Those isodose volumes are large less inhomogeneous compared to the electron beam treatments.

The goal of this subcommittee is to provide guidelines on how to treat superficial lesions, with respect to beam modalities, 3D treatment planning, imaging, use of different kinds of bolus and shielding, and minimum requirements for QA. This should lead to a more uniform approach across centers.

Regarding 3D electron beam planning, measurement guidelines and validation of the beam model will be handled as well as recommendations on how to prescribe the dose. Agreements and differences with 3D photon beam, orthovolt and brachytherapy planning will be explained.

The subcommittee met three times online meetings in 2025 (05/06/2025, 18/09/2025, 26/11/2025). A survey was done with the centers involved in this subcommittee. This survey is the starting point for brainstorming about the content of the report.

Currently, each participating center provides a flowchart/decision tree on how the treatment technique is implemented in their center. In the following meetings, it will become a more generalized flowchart, that can be implemented directly into the report.

Members of the subcommittee are:

Ans Swinnen (Maastricht, chair)

Wim Jansen (RTG, secretary)

Geert Pittomvils (UZ Gent)

An Nulens (UZ Leuven)

Rik Westendorp (Isala)

Anna Petoukhova (Haaglanden MC)

Thijs Perik (NKI-AVL, representative of the NCS board)

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*

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 2025. Activities in 2025 include:

- The position of the platform in relation to committees within other associations;
- Revision of the platform's job descriptions;
- Updating RIAS spreadsheets;
- In collaboration with NLA, revision of the Format RIAS including room classification.

In 2025 one new member joined the Platform: Arnout van der Borden from NVRO.

Members of the platform are:

Peter Brands (NVKF, chairman and representative from the NCS board)

Mariska Sonneborn (NVS, secretary)

Gitta Bleeker (NVvR)

Niels Veltman (NVNG)

Jan Habraken (NVNG)

Bradley Pieters (NVRO)

Marja Harbers (NVKFM)

Louise Andrews (NVZA)

Daniëlle Vialle (NVMBR)

Arnout van der Borden (NVRO)

NCS FINANCIAL OVERVIEW 2025

	Income (€)	Costs (€)
Savings-account on January 1, 2025	38 954.47	
Current-account on January 1, 2025	14 956.24	
Contribution Supporting societies	3000.00	
Interest savings-account	543.38	
Banking costs current account		227.62



Costs web site	986.15
Costs meetings NCS board	837.92
Costs NCS subcommittees	1397.83
Notary Fees	1535.60
Savings-account on December 31, 2024	39 497.85
Current-account on December 31, 2024	12 971.12
Total	<hr/> 57454.09
Result	<hr/> 57454.09
	-1441.74

NCS BUDGET 2026

	Income (€)	Costs (€)
Contributions scientific societies	3100.00	
Interest savings-account	500.00	
Banking costs		200.00
Costs NCS board		1500.00
Costs subcommittees		1500.00
Website maintenance		1000.00
Notary Fees		
Draw on reserves (savings account)	600	
Total	4200.00	4200.00