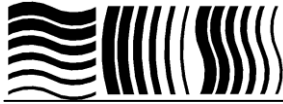


ANNUAL REPORT 2013

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:

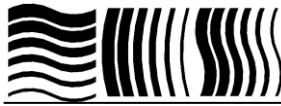
- Nederlandse Vereniging voor Radiotherapie en Oncologie (NVRO, Dutch Society for Radiotherapy and Oncology);
- Nederlandse Vereniging voor Nucleaire Geneeskunde (NVNG, Dutch Society for Nuclear Medicine);
- Nederlandse Vereniging voor Klinische Fysica (NVKF, Dutch Society for Medical Physics)
- Nederlandse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



To pursue its aims, the NCS has the following tasks:

- Participation in dosimetry standardization and promotion of dosimetry inter-comparisons;
- Drafting of dosimetry protocols;
- Collection and evaluation of physical data related to radiation dosimetry;
- Maintain or establish links with national and international organizations concerned with ionizing radiation;
- Promulgate information on new developments in the field of radiation dosimetry.

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



Board

On December 31, 2013 the members of the board of the NCS were:

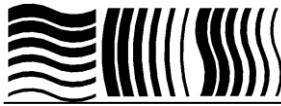
Dr. J.B. van de Kamer	chairman	(NVRO)
T.W.M. Grimbergen	vice chairman	(NVS)
Dr. J.A. de Pooter	secretary	(VSL)
Dr. A. Van Der Plaetsen		(SBPH/BVZF)
J.M.J. Hermans	treasurer	(NVKFM)
Dr. J. R. de Jong		(NVNG)
Dr. P. Sminia / Dr. K. Franken		(NVRB)
Dr. A. Spilt		(NVvR)
Dr. Ir. F.W. Wittkämper		(NVKF)
M.K. Zeeman		(NVMBR)

The board of the NCS met three times in 2013, on 14 March, 6 June, and 2 September.

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.

Prof. Dr. Adriaan Lammertsma has decided to end his membership of the NCS board by the 31st of August 2013. Adriaan has been a member of the NCS board for more than 13 years. The board wants to thank him for his valuable contribution and commitment in these years. The NVNG will be represented by Dr. Johan de Jong from the 1st of September 2013. In 2013 two NCS reports have been published, NCS-22 Code of Practice for the Quality Assurance and Control for Intensity Modulated Radiotherapy, and NCS-23 Audit of High-Energy Photon Beams in Belgian and Dutch Radiotherapy Departments.



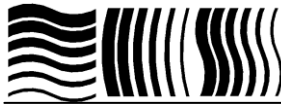
Subcommittees

1. *Subcommittee on Quality Control of Stereotactic Radiotherapy: Recommendations on dosimetry procedures and Quality Control*

A rapidly growing number of radiotherapy centres in The Netherlands and Belgium are being equipped for stereotactic radiotherapy, i.e. stereotactic surgery (SRS) and stereotactic radiotherapy (SRT). In radiotherapy centres the development is focused on imaged guided “frameless” high-dose high precision techniques with standard and dedicated linear accelerators, e.g. Novalis and CyberKnife. “Frameless” here means “without an invasive or relocatable localizer and treatment frame fixed on the skull of the patient with the aim to fix the patient on the treatment couch”. On the other hand, in a free-market concept in health care, non-image guides stereotactic treatment with a GammaKnife might become popular for non-radiotherapy centres due to its apparent simplicity relative to linac-based stereotactic treatment.

In stereotactic treatments very high fraction doses are delivered, while a high accuracy in (re)positioning of the tumour with respect to the isocenter is required, irrespective of devices used. Therefore, stereotactic treatments require higher accuracy levels in equipment and processes compared to standard radiotherapy treatments. This necessitates more attention to the quality assurance of both treatment devices and treatment process than for other complex treatments. Experiences from well-established stereotactic treatment centres learn that the introduction and maintenance of stereotactic radiotherapy in the clinic means the acceptance, commissioning and QA of a stereotactic treatment system as an entity, both in devices and in process. So, on one side this includes the acceptance, commissioning and QA of the hardware (e.g. linac, mMLC, cone, frames, couch), and software (TPS), as well as the imaging-system and systems for detection and (re)position tumour at isocenter. On the other side QA of the treatment process itself is important, but often overlooked; manpower trained at expert-level is required, working as a team and embedded in a well-structured organization.

The goal of the subcommittee is to compose a report that provides recommendations for Belgian and Dutch medical physicists on dosimetry procedures and quality assurance for add-on stereotactic equipment, dedicated fully integrated systems and the treatment process. The subcommittee “Quality Control of stereotactic radiotherapy” was started in January 2006. In 2013 the subcommittee had 2 meetings alternately held in Belgium and The Netherlands and 1 phone call meeting. In 2012 the final structure of the report was setup and filled-in. Due to this structure, the concept title is changed a little: Quality Assurance in Process management & Treatment technique: “Intracranial Stereotactic Treatment”. The expectation that the report would be finished in 2013 is not achieved; it will be in 2014.



Members of this NCS subcommittee:

Stan Heukelom (VUMC, Amsterdam, chairman)
Hans Marijnissen (Erasmus MC, Rotterdam),
An Nulens (UZ Gasthuisberg, Leuven)
Geert Pittomvils (UZ, Gent)
Esther Raaijmakers (Instituut Verbeeten, Tilburg)
Dirk Verellen (AZ-VUB, Brussel)
Thierry Gevaert (AZVUB, Brussel)
Sandra Vieira (Champalimaud Centre for the Unknown, Lisboa, Portugal),
Nienke Holtzer (NKI-AVL, Amsterdam)
Joep Hermans (MAASTRO Clinic, Maastricht) representative from the NCS-board).

2. *Subcommittee on Dosimetry Audits*

The goal of the subcommittee was to design and administer an audit on absolute dosimetry in radiotherapy institutes in the Netherlands and Belgium. The audit is based on the new NCS dosimetry protocol, NCS -18. In first instance, this audit will be limited to high-energy photon beams. In the future the subcommittee expects to include high-energy electron beams.

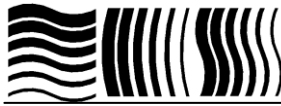
The subcommittee has worked in 2013 on reporting the audit. The report was submitted to the NCS board in December 2013 and published on the NCS website.

Members of this NCS subcommittee:

Thijs Perik (NKI-AVL, Amsterdam, chairman)
Jonathan Martens (MAASTRO Clinic, Maastricht, treasurer)
Marian Dwarswaard (MCA, Alkmaar, secretary)
Erik Loeff (Erasmus MC, Rotterdam)
Ester Peeters-Cleven (MST, Enschede)
Sander v/h Schip (CZE, Eindhoven)
Joep Hermans (Maastricht, Maastricht)
Nicolette Planteydt (ZRTI, Vlissingen)
Tony Aalbers (Utrecht, advisor)
Leon de Prez (VSL, Delft)
Frits Wittkamper (NKI-AVL, Amsterdam, advisor)
Francois Sergent (CHU, Charleroi)
Karen Feyen (AZ St. Maarten, Duffel)

3. *Subcommittee on Guidelines for Quality Assurance of Helical Tomotherapy*

Helical Tomotherapy is a modality for radiation therapy treatment with integrated systems for treatment planning, imaging, image registration and dose delivery. It has several differences compared to conventional linear accelerators, which imply that general Quality Assurance guidelines are not always applicable or sufficient. For example, current dosimetry protocols, based on the absorbed dose to water (NCS 18, AAPM TG-51), require calibration measurements under reference conditions. These reference conditions cannot be met. New methodologies are proposed in literature and are currently under discussion. Other specific QA issues concern the acceptance testing and commissioning of the complex integrated systems, verification of dose planning and delivery, mechanical QA and patient safety. The goal of this report is to provide guidelines for QA and dosimetric calibration of the Helical Tomotherapy system.



The subcommittee is in the process of writing draft chapters and reviewing the results. Recently, Accuray has released the TomoEdge feature on the TomoTherapy system. This modality consists in allowing the jaws to move asymmetrically at the beginning and the end of target volumes to enable sharper penumbras at the longitudinal edges of the target volumes. At the present time, no comprehensive QA recommendations exist on this modality in literature. Ideally, the report includes recommendations on this feature at the time of publication.

The report will cover the following topics:

- Treatment delivery - mechanics
- Dosimetry
- Treatment planning
- Imaging and set up verification
- Miscellaneous (adaptive, patient transfer and DQA)

Members of this NCS subcommittee:

Vincent Althof (RISO, Deventer, chairman)
Bie De Ost (UZA/ZNA, Antwerp, secretary)
Nick Reynaert (Centre Oscar Lambret, Lille)
Koen Tournel (UZ, Brussels)
Ann Van der Plaetsen (AZ St.Lucas, Gent - representative from the NCS-board)
Edmond Sterpin (UCL, Brussels)

4. Subcommittee on IMRT Quality Assurance

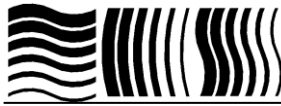
The last decade, IMRT has evolved into a standard treatment modality within the Dutch and Belgian radiotherapy communities. So far, most institutes have implemented IMRT, static or dynamic, for one or more tumour sites with varying degrees of complexity. This NCS subcommittee focuses on the quality assurance required to introduce and maintain IMRT in clinical practice including the following topics:

- Linac commissioning, acceptance and QA
- Treatment planning
- Patient specific QA
- Risk analysis

The committee aims at a comprehensive set of tests, including frequency and tolerances, and practical guidelines or references to relevant literature. These guidelines should serve as a guide to good-practice, not as an exhaustive overview of all adequate procedures. They should provide a practical strategy to setup a QA framework for IMRT. Further, these recommendations can be used to benchmark in-house QA protocols.

The subcommittee has finished its work in 2013 by an intensive collaborative effort in the first half of 2013. The work was presented at several national meetings. All activities were concluded by the end of 2013.

In 2013 the final version of the report was drafted. The report was extensively reviewed by three external reviewers. June 2013 the report was published on the NCS website as report 22 "Code of Practice for the Quality Assurance and Control for Intensity Modulated Radiotherapy". The Dutch and Belgian professional societies have been informed on the publication of the NCS report.



Members of this NCS subcommittee:

Edwin van der Wal (RCWest, the Hague, chairman)
Jan Wiersma (AMC, Amsterdam, secretary)
Alle Henk Ausma (RIF, Leeuwarden)
Luc Bos (MCA, Alkmaar)
Johan Cuijpers (VUMC, Amsterdam)
Lars Murrer (MAASTRO Clinic, Maastricht)
Geert Pittomvils (UZ, Gent)
Milan Tomsej (CHU, Charleroi)
Jeroen van de Kamer (NKI-AVL, Amsterdam, representative from the NCS board)

5. Subcommittee on QA for Rotational IMRT

The aim of our subcommittee is to produce a report with guidelines for introduction and maintenance of safe and high quality rotational IMRT (or VMAT) techniques in clinical practice. The report will be based on the experience present in Belgian and Dutch institutes as well as on available literature.

In 2013, we have organized five subcommittee meetings. The core of our report will consist of three chapters: “VMAT machine QA”, “VMAT plan QA” and “VMAT treatment planning”. Each of these chapters was assigned to two or three members. Besides the meetings, the authors of a certain chapter have come together to work on their chapter. Currently, all chapters are reaching maturity. Our aim is to finish the report in 2014.

The subcommittee was strengthened in 2013 with a new member: Michel Öllers, to contribute to the subcommittee through his knowledge on the Varian equipment.

On June 28 2013, a presentation was given by D. Schuring at the ‘Kringdag’ of the ‘Kring Radiotherapeutische klinische fysica’ in Maastricht. The title of the presentation was: “Patient specifieke QA in het komende NCS rapport over VMAT-QA”.

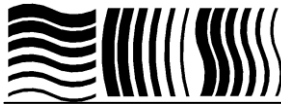
Members of this NCS subcommittee:

Anton Mans (NKI-AVL, Amsterdam, chairman)
Mark Arends (RIF, Leeuwarden, secretary)
Jochem Wolthaus (UMC-U, Utrecht)
Marjan Admiraal (VUmc, Amsterdam)
Michel Öllers (MAASTRO Clinic, Maastricht)
Danny Schuring (CZE, Eindhoven)
Rob Louwe (UMCN, Nijmegen)
Heidi Lotz (UMCG, Groningen)
Lia Vugts (Instituut Verbeeten, Tilburg)
Jeroen van de Kamer (NKI-AVL, Amsterdam, representative from the NCS board)

6. Subcommittee on Quality Assurance of Cone-beam CT

Cone-beam CT scanners integrated with linear accelerators have become increasingly important tools for image guidance of radiotherapy treatments. The application of cone-beam CT based image guidance is very diverse, ranging from bony anatomy based offline correction protocols to online stereotactic tumor based correction strategies. Although most institutions have presently implemented QA procedures for CBCT, the frequency and methods vary widely.

The aim of the subcommittee is to develop uniform guidelines for the commissioning and quality



assurance of cone beam x-ray based image guidance systems on conventional linacs, i.e. cone-beam CT (XVI, OBI), and portal imagers. The guidelines will be based on current literature as well as clinical experience from the participating members of this subcommittee.

Two meetings of the committee have been held in 2013. During these meetings the layout and contents of the six chapters in the NCS report have been defined. For all topics the goal is to be in line with existing international protocols wherever applicable.

For CBCT dosimetry, several international protocols exist, and work is undergoing to determine a practical method that does not require specialized dosimetry equipment or phantoms to implement (part of) these. A draft version of the geometry QA chapter has been written. It is based on both literature (e.g. AAPM TG 104, 142, 148, 179) and clinical experience from the contributing institutes.

For the coming year the goal will be to finalize the dosimetry, geometry, and image quality parts of the report, and have final drafts for the remaining topics.

Members of this NCS subcommittee:

- Peter Remeijer (NKI-AVL, Amsterdam, chairman)
- Martijn Eenink (RCWEST/LUMC, Leiden, secretary)
- Willy de Kruijf (Instituut Verbeeten, Tilburg)
- Kirsten Deurloo (MCA, Alkmaar)
- Niek van Wieringen (AMC, Amsterdam)
- Heleen van Herpt (UMCG, Groningen)
- Marianna Sijtsema (UMCG, Groningen)
- Martijn Hol (Erasmus MC, Rotterdam)
- Martijn Kusters (UMCN, Nijmegen)
- Koos Geleijns (LUMC, Leiden, advisor CT dosimetry)
- Joep Hermans (MAASTRO Clinic, Maastricht, representative from the NCS board)



Advisory platforms

The Netherlands Commission on Radiation Dosimetry covers a wide range of expertise through the participating scientific societies. In 1999 NCS platforms were established on dosimetry for radiology and nuclear medicine and dosimetry for radiotherapy. The tasks of these platforms are 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 goals of the platform are:

- Giving advice to both government and the hospital community regarding the radiation legislation and regulation within the sphere of competence of the NCS.
- Coaching and initiating the making and implementation of practical guidelines for the compliance and implication of existing and new Radiation Safety regulations in the spheres of interest of the NCS. The platform operates from within the hospital community for the hospital community for the irradiating professions, working in university hospital, large community hospitals and/or independent institutes.

Activities:

The Advisory platform on Radiation Protection in Hospitals has gathered once in Utrecht at the office of the NVMBR (meeting room kindly provided by the NVMBR), on September 18th 2013. Arno van der Wiel, representing the Dutch Ministry of VWS, was invited for this meeting and a valuable discussion about radiation protection in hospitals between the advisory platform and the representative of the Ministry of VWS was achieved.

Additional consultation of the Advisory platform on Radiation Protection in Hospitals was achieved by e-mail.

Achievements/progress

Risk analysis:

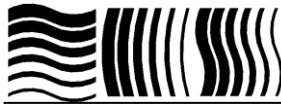
- Guideline on risk analysis in radiology has been published.
- Guideline on risk analysis in radiotherapy is under development.
- Lead aprons: an extension to the guideline on lead aprons is in preparation to extend the guideline to lead free aprons.

Other topics:

A new guideline (Eindtermen Stralingshygiëne voor Medisch Specialisten) on the training in radiation protection of medical doctors (radiology and nuclear medicine) is being developed by the NVVR and NVNG. The platform has provided advice and feedback a draft version of the guideline. The platform provided advice on the Ministeriële Regeling deskundigheidseisen stralingsbescherming

Patients treated with radionuclides need a proof of this treatment at the customs inspection in case the detection system for radioactivity gives a warning. For different therapies, different versions of such a letter were in circulation. These letters have been replaced by a single standard letter which can be used for all patients that have undergone a therapy with radionuclides.

Other projects and topics that are in preparation or under discussion:



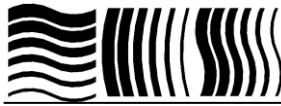
- Guidelines on protection of the gonads of the patient in radiological procedures;
- Equivalent lens dose of the worker in interventional radiological procedures (cardiology, radiology, neuro-interventions), the platform follows the developments of this project that is carried out by NRG (van Tuinen);

Publications:

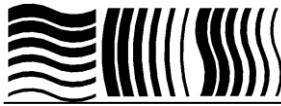
Guideline “Aanbevelingen risicoanalyse en evaluatie voor Nucleair Geneeskundige verrichtingen in ziekenhuizen RIAS-NG”,

Platform members:

- Dr. J. Geleijns (Chair, NVvR)
- Dr. P. Jonkergouw (Secretary, NVS)
- Dr. B. Pieters, (NVRO)
- H. Harbers, (NVKFM)
- A. Vegter, (NVMBR)
- Dr. K. Schimmel, (NVZA)
- Dr. C. van Swol, (NVKF)
- A. Vegter, (NVMBR)
- Dr. J. Habraken, (NVNG)
- A.J. van der Molen, (NVvR)
- Dr. R. Claessens, (NVNG)
- Dr. J.B. van de Kamer, (representative from the NCS board, NVRO)

**Financial overview****NCS FINANCIAL OVERVIEW 2013**

	Income (€)	Costs (€)
Savings-account on Januari 1, 2013	36339.96	
Current-account on Januari 1, 2013	10617.58	
Project-account on Januari 1, 2013	-17.75	
<hr/>		
Contribution Netherlands Society for Radiology (NVvR) 2013	600.00	
Contribution Netherlands Society for Medical Physics (NVKF) 2013	400.00	
Contribution Netherlands Society for Radiotherapy and Oncology (NVRO) 2013	800.00	
Contribution Netherlands Society for Nuclear Medicine (NVNG) 2013	200.00	
Contribution Netherlands Society for Radiological Protection (NVS) 2013	400.00	
Contribution Netherlands Radiobiological Society (NVRB) 2013	100.00	
Contribution Dutch society of Medical Physics Engineers (NVKFM) 2013	100.00	
Contribution Netherlands Society for Medical Imaging (NVMBR) 2013	300.00	
Contribution Belgian Hospital Physicists Association (BHPA) 2013	200.00	
Interest savings-account	593.17	
Interest current account	0.00	
Refund 5th lustre (2 persons)		180.00
Costs Chamber of Commerce		0.00
Banking costs current account		86.32
Banking costs project account		89.9
Costs new web site		5154.24
Costs meetings NCS board		1161.34
Costs NCS subcommittees		407.72
Savings-account on December 31, 2013		36933.13
Current-account on December 31, 2013		6528.26
Project account on December 31, 2013		92.05
Total	50632.96	50632.96



NCS BUDGET 2014

	Income (€)	Costs (€)
Contributions scientific societies	3100.00	
Interest savings-account	600.00	
Banking costs		150.00
Costs of board and subcommittees meetings		1500.00
Website maintenance etc		500.00
Total	3700.00	2150.00