



ANNUAL REPORT 2010

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 Technicians and other Specialists in the field of Medical Physics)

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.

Websites:

<http://www.stralingsdosimetrie.be>, <http://www.stralingsdosimetrie.com>,
<http://www.stralingsdosimetrie.nl>, <http://www.stralingsdosimetrie.org>

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Board

On December 31, 2010 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)
Prof. Dr. A.A. Lammertsma		(NVNG)
Dr. P. Sminia / Dr. K. Franken		(NVRB)
Dr. A. Spilt		(NVvR)
Dr. Ir. F.W. Wittkämper		(NVKF)
D. Zweers		(NVMBR)

The board of the NCS met four times in 2010, i.e., on January 14, April 1, June 22, and September 30.

The main subjects raised at the board meetings were:

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

Subcommittees

1. *Subcommittee on “Quality control of low -energy-photon emitting seeds in Brachytherapy”*

The goals of the subcommittee are:

- To draft a report with recommendations for QC on the use of low-energy-photon (LEP) emitting sources in brachytherapy
- To study the current clinical practice and use this as a basis for the report.
- To stimulate the development of a standard for such sources in Belgium and The Netherlands, and promote efforts to make calibration methods at each center traceable to (inter)national measurement standards.

The subcommittee has gathered seven times in 2010, on March 29th, April 27th, June 11th, July 9th, August 4th, August 20th and October 26th. The meetings were held in Utrecht (UMC) and Antwerp (Middelheim Hospital).

The subcommittee has performed earlier on-site visits to study the clinical practice in the institutions in Belgium and The Netherlands that were using I-125 seeds for prostate implants. During these visits the results of a previously mailed TPS test procedure were collected and source strength measurements on a number of sources were performed.

In 2010 the subcommittee continued the preparation of the report on recommendations for quality control of low energy photon emitting sources in brachytherapy. The results of the on-site visits are incorporated and discussed in this report. The manufacturing process and quality control performed by the manufacturer are described. Dosimetric reference data for the most commonly used LEP sources in our countries are given as an appendix, and safety issues with respect to the use of LEP sources for permanent prostate brachytherapy are addressed.

The subcommittee has now finalized the discussions on the recommendations for quality control of the I-125 seeds and the TPS. The report still needs some final reviewing and the subcommittee expects to have a draft of the report ready after 2 more meetings in 2011.

Work of this subcommittee was presented by Drs. A.H.L. Aalbers at the IAEA Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry (IDOS) held in Vienna, Austria, 9-12 November 2010. The title of his presentation was: “On the quality control of low-energy photon brachytherapy sources: current practice in Belgium and The Netherlands”

Members of the subcommittee:

A. Rijnders (chairman), M.Sc.

Drs. A.H.L. Aalbers

B. Schaeken, M.Sc.

M. Debrabandere, M.Sc.

Dr. K. Koedooder

Dr. R. Moerland

B. Thissen, M.Sc.

Dr. Ir. A. van't Riet

Prof. Dr. S. Vynckier

2. *Subcommittee on “Quality control of stereotactic radiotherapy: recommendations on dosimetry procedures and quality control”*

A rapidly growing number of radiotherapy centers in The Netherlands and Belgium are being equipped for stereotactic radiotherapy, i.e. stereotactic surgery (SRS) and stereo-

tactic radiotherapy (SRT) The development nowadays is focused on imaged guided “frameless” high-dose high precision techniques with standard and dedicated linacs (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”.

Because very high fraction doses are delivered in stereotactic treatments and high accuracy in (re)positioning of the tumor with respect to the isocentre is required, stereotactic treatment facilities require higher accuracy levels. This necessitates more attention to the QA of both treatment devices and treatment process than for other complex treatments. Therefore, the introduction of stereotactic radiotherapy in the clinic means the acceptance, commissioning and QA of a stereotactic system as an entity. 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 tumor at isocentre. QA of the treatment process itself is important but is 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 2010 the subcommittee had 3 meetings alternately held in Belgium and The Netherlands. After a first draft was compiled (2008), 2010 was used to going with reviewing and rewriting the draft required by the large number of information present in the draft.

In 2008 a prototype phantom is designed and constructed for end to end tests based on EBT radiochromic film dosimetry in the hospitals of the members of the subcommittee. This purpose of this prototype is to show the feasibility of such a phantom for the various SRS/SRT treatment techniques. Due to transition of EBT I to EBT II radiochromic film in 2010 it was still not possible to start with the end to end tests.

Members of the subcommittee:

Dr. S. Heukelom (chairman)

Dr. H. Marijnissen,

A. Nulens M.Sc.,

Dr. G. Pittomvils,

Dr. E. Raaijmakers,

Dr. D. Verellen,

Dr. S. Vieira (secretary),

Ing. J. Hermans (representative from the NCS-board).

3. Subcommittee on “Film dosimetry”

This sub-committee focuses on radiochromic as well as radiographic film dosimetry. The subcommittee has composed a list of topics for the report. For the part on radiochromic film dosimetry, the sub-committee is dealing with a number of unresolved problems related to the sudden replacement of the film type EBT by its successor EBT2 in 2009. The subcommittee will evaluate the progress on these issues related to radiochromic film dosimetry in 2010. In 2011 it will be decided whether radiochromic film dosimetry will be included in the final report.

Members of the subcommittee:
Prof. Dr.C. De Wagter (chairman)
Ing. L. Van Battum
Ir. P. van der Hulst
Dr. S. Kwa
Dr. L. Paelinck
Dr. M. Piessens
Dr. J. de Pooter
Mr. K. Tournel

4. Subcommittee on “Dosimetry audits”

The goal of the committee is to design and administer an audit on absolute dosimetry in radiotherapy institutes in the Netherlands and Belgium to ensure the agreement in absolute dose and minimize systematic errors in the participating institutes. The audit is based on NCS protocol 18 and serves as an independent external quality check for the implementation of the new NCS Code of Practice. In first instance, the audit will be limited to high-energy photon beams. In the future an extension to high energy electron beams can be expected.

Besides the audit measurements the committee only met once in April to discuss the progress of the work.

The Subcommittee finished all audit measurements in the participating institutes in the summer of 2010. The second half of 2010 was used to check all measurements and to write a synopsis for the IAEA IDOS symposium in November 2010. This synopsis was accepted as a poster presentation. In December an abstract was send in to the BHPA symposium in February 2011. This abstract was accepted as an oral presentation.

Members of the subcommittee:
ing. T. Perik (chairman)
ing. J. Martens (treasurer)
M. Dwarswaard (secretary)
ing. E. Loeff
ing. E. Peeters-Cleven
ing. S. van het Schip
ing. J. Hermans
N. Planteydt
Drs. A. Aalbers (advisor)
ing. L. de Prez
Dr. Ir. F. Wittkämper (advisor)
Dr. F. Sergent
Dr. K. Feyen

5. Subcommittee on “Guidelines for quality assurance of Cyberknife and helical tomotherapy”

Cyberknife and Helical Tomotherapy are relatively new modalities for radiation therapy treatments with integrated systems for treatment planning, imaging, image registration, and dose delivery. Both modalities have several differences compared to conventional linear accelerators, which imply that general Quality Assurance guidelines are not always applicable or sufficient. For example, current dosimetric protocols, based on the absorbed dose (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 Cyberknife and Helical Tomotherapy systems.

In 2010 the subcommittee gathered on March 03, June 26 and September 22. An inventory is made of the current QA practices of its members for Tomotherapy and (partly) Cyberknife. An overview of what should be the content of the report was made. In 2011 the focus will be on producing drafts. Documents produced by the committee are managed centrally by means of a Google docs account and edited via a 'peer review' method by the committee members.

Members of the subcommittee:

V. Althof (chairman)
B. De Ost (secretary)
H. Marijnissen
N. Reynaert
K. Tournel
S. Vynckier (representative from the NCS-board)

In 2011 two new members (both Cyberknife users) will be welcomed in the subcommittee: Magali Devillers and Veronique Baart, both from Liege, Belgium.

6. Subcommittee on "Dosimetry for clinical particle beams"

Since a final decision on the realization of proton facilities in the Netherlands is delayed, the urgency and the need of an NCS report on dosimetry for clinical particle beams has decreased. Therefore it was proposed to put the subcommittee temporarily in an inactive state. When the realization of new facilities will start the subcommittee will restart its work. In the meanwhile several research projects are running on this topic in which several of the subcommittee members are involved. The knowledge and experience gathered in these projects can be used for the report later on. There were no meetings in 2010.

Members of the subcommittee:

Prof. Dr. Ir. M. Schippers (chairman)
Prof. Dr. Ir. F. Verhaegen (secretary)
Prof. Dr. S. Brandenburg
Dr. H. Palmans
Dr. J. de Pooter
Dr. A. van't Veld
Prof. Dr. S. Vynckier
Dr. F. Wittkämper

7. 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 tumor sites with varying degrees of complexity. Further, an increasing number of institutes is introducing intensity modulated rotational techniques. This NCS subcommittee focuses on the quality assurance required to introduce and maintain IMRT and rotational techniques in clinical practice including the following topics:

- Machine acceptance
- Beam modelling and small field dosimetry
- TPS issues
- Machine QA/QC frequency and tolerance
- Patient specific pre-treatment / in vivo dosimetry and pass criteria

- Delivery
- Risks

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, and an overview of the current status of QA for rotational techniques. These recommendations can be used to benchmark in-house QA protocols.

In 2010, several meetings have been held to define the scope of the committee, to make a structure breakdown for the report, to do some literature research and to discuss some issues in-depth. Members of the committee have been assigned to the different subtopics. As of 2011, the actual drafting of the report will start. It is the aim of this committee to finish the report at the end of 2011 or early 2012.

Members of the subcommittee:

Edwin van der Wal (chairman)

Jan Wiersma

Alle Henk Ausma

Luc Bos

Johan Cuijpers

Lars Murrer

Geert Pittomvils

Milan Tomsej

Jeroen van de Kamer (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 “radiology and nuclear medicine”

Members: J.G. van Unnik (chairman, NVvR), J. Geleijns (secretary, NVKF), J.A.K. Blokland (NVNG), S. van Dullemen (NVS), P.J. Kicken (NVS), A.H.J. Renders (NVKF), L.J. Schultze Kool (NVvR), M. Wienia (NVMBR), D. Zweers (NVMBR)

In 2010 the responsibilities and activities of the NCS Platform for Radiology and Nuclear Medicine were transferred to new the NCS Platform for Radiation Protection in Hospitals.

Diagnostic reference levels

Main achievement in 2010 was the start of the third phase of the implementation of diagnostic reference levels in The Netherlands, in cooperation with the Dutch Ministry of Health. In addition to the NCS website, a website dedicated to diagnostic reference levels in the Netherlands provides further detailed information on this topic (<http://www.referentieniveau.nl/>).

Meetings

There were no meetings of the NCS working group in 2010.

2. Advisory platform on “Radiation Protection in Hospitals”

This platform was installed march 2010. 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 platform met in 2010 three times in full strength

- March 24th at the NKI-AVL in Amsterdam; kick-off meeting
- April 29th at the AMC in Amsterdam; regular meeting
- August 26th at the LUMC in Leiden; regular meeting

Representatives of the platform attended the following meetings:

- February 4th The Hague; consultation of radiation safety community on the “Besluit Stralingsbescherming 2010” (Visscher, chairman)
- June 2nd, Utrecht; government expert group meeting “Preventing theft of RA sources”, (Visscher, chairman)
- December 10th, Workshop Diagnostic Reference Levels, (Kramer, chairman NCS)
- The platform met once with a government representative to be informed about the requested advice to how to introduce the C-category of exposed worker.

- Part of the platform discussed with governmental officials from, VWS (public health), SZW (labor inspection) and VROM (environmental issues) and representatives of the waste industry how to cope and how to prevent the occurrence of RA materials in hospital waste. October 13th 2009, June 24th and September 25th 2010

Achievements/progress

- Introduction C-class worker:
 - o *Concept of guideline finished*
- Risk analysis RA substances in de nuclear medicine
 - o *Guideline finished and ratified by NVKF en NVNG, ratification by NCS not yet*
- Risk analysis radiological practices in hospitals.
 - o *Guideline in preparation, consultation with radiological community planned*
- Risk analysis radiotherapeutic practices.
 - o *Guideline in preparation*
- RA substances in (hospital)waste
 - o *Guideline hospital community/government/waste industry in concept*
- Advice on composite material "lead" aprons
 - o *NCS sub committee started*
- Advice on introduction and extension of Diagnostic Reference Levels
 - o *Negotiation in progress*

Platform members

Chairman: K.J. Visscher PhD,

Secretary: P. Jonkergouw, MSc

NVRO (Dutch Society of Radiation Oncology)

- Klinisch Fysicus Radiotherapie: Kees Visscher, PhD
- Radiation Oncologist: Bradley Pieters, MD, PhD
- o NVNG (Dutch Society of Nuclear Medicine)
 - Klinisch Fysicus Nucleaire Geneeskunde: Lieke Poot, Ir, PhD
 - Nucleair geneeskundige: Roel Claessens, MD, PhD
- o NVvR (Dutch Society of Radiology)
 - Klinisch Fysicus Radiologie: Koos Geleijns, PhD
 - Radiologist: to be determined.
- o NVKF (Dutch Society of Clinical Physics)
 - Christiaan van Swol, PhD, Ir
- o NZVA (Dutch Society of Hospital Pharmacist)
 - Kirsten Schimmel, PhD
- o NVS (Dutch Society of Radiation Protection)
 - Paul Jonkergouw, MSc
- o NVMBR (Dutch Society of Medical Imaging and Radiology)
 - Dirk Zweers,
- o NVKFM (Dutch Society of Dosimetrist)
 - Marja Harbers
- o Representative from NCS Board
 - Jeroen van de Kamer, PhD

Financial overview**NCS FINANCIAL OVERVIEW 2010**

	Income (€)	Costs (€)
Savings-account on December 31, 2009	10303.62	
Current-account on December 31, 2009	141.26	
Belgian current-account on December 31, 2009	883.92	
Contribution Netherlands Society for Radiology (NVvR) 2009	600.00	
Contribution Netherlands Society for Radiology (NVvR) 2010	600.00	
Contribution Netherlands Society for Medical Physics (NVKF) 2008	400.00	
Contribution Netherlands Society for Medical Physics (NVKF) 2009		
Contribution Netherlands Society for Medical Physics (NVKF) 2010	400.00	
Contribution Netherlands Society for Radiotherapy and Oncology (NVRO) 2007	685.00	
Contribution Netherlands Society for Radiotherapy and Oncology (NVRO) 2009	800.00	
Contribution Netherlands Society for Radiotherapy and Oncology (NVRO) 2010	800.00	
Contribution Netherlands Society for Nuclear Medicine (NVNG) 2009	200.00	
Contribution Netherlands Society for Nuclear Medicine (NVNG) 2010	200.00	
Contribution Netherlands Society for Radiological Protection (NVS) 2008	150.00	
Contribution Netherlands Society for Radiological Protection (NVS) 2009	400.00	
Contribution Netherlands Society for Radiological Protection (NVS) 2010	400.00	
Contribution Netherlands Radiobiological Society (NVRB) 2008	100.00	
Contribution Netherlands Radiobiological Society (NVRB) 2010	100.00	
Contribution Dutch society of Medical Physics Engineers (NVKFM) 2009	65.00	
Contribution Dutch society of Medical Physics Engineers (NVKFM) 2010	65.00	
Contribution Netherlands Society for Medical Imaging (NVMBR) 2009	300.00	
Contribution Netherlands Society for Medical Imaging (NVMBR) 2010	300.00	
Contribution Belgian Hospital Physicists Association (BHPA) 2010		
Interest savings-account	229.63	
Interest current account	0.00	
Contribution NCS/NVKFM audits based on NCS18 in NL	20000.00	
Contribution NCS/NVKFM audits based on NCS18 in BE	6000.00	
Cost NCS/NVKFM audits based on NCS18		2699.62
Travel costs boardmembers		202.95
Costs Chamber of Commerce		37.14
Banking costs		152.34
Banking costs Belgian account		8.40
Costs of farewell dinners / flowers/ wine board members		990.35
Costs web site		1950.40
Costs meetings NCS board		162.67
Savings-account on December 31, 2010		34833.25
Current-account on December 31, 2010		3086.31
Belgian current-account on December 31, 2010		0.00
Project account on December 31, 2010		0.00
Total	44123.43	44123.43

NCS BUDGET 2011

	<i>Income</i> <i>(€)</i>	<i>Costs (€)</i>
Contributions scientific societies	3000.00	
Interest savings-account	300.00	
Costs Chamber of Commerce		40.00
Banking costs		150.00
Costs of board and subcommittees meetings		1000.00
Costs web site		70.00
Purchase audit equipment NCS18 electrons		20000.00
Total	3300.00	21260.00