



NCS 010-001

Delft, April 12, 2010

ANNUAL REPORT 2009

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.

The Commission's websites: <http://www.ncs-dos.org> <http://www.stralingsdosimetrie.be>,
<http://www.stralingsdosimetrie.com>, <http://www.stralingsdosimetrie.nl>,
<http://www.stralingsdosimetrie.org>

secretary:

E. van Dijk, VSL, Dutch Metrology Institute
Project manager Research&Development
P.O. box 654, 2600 AR DELFT
Tel. 015 2691681, Fax. 015 26912971
e-mail: evandijk@VSL.nl

Board

On December 31, 2008 the members of the board of the NCS were:

Prof. Dr. S. Vynckier	chairman	(SBPH/BVZF)
T.W.M.. Grimbergen	vice chairman	(NVS)
E. van Dijk	secretary	(VSL)
Dr. J. Zoetelief	treasurer	(NVRB)
J.M.J. Hermans		(NVKFM)
Dr. J.B. van de Kamer		(NVRO)
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 three times in 2009, i.e., on March 12, June 11, October 1.

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 "Uniformity of dosimetry protocols"

The goals of the subcommittee achieved by the publication of NCS report 18 were:

- To achieve uniformity of photon and electron dosimetry protocols based on absorbed dose-to-water standards.
- To draft a Code of Practice (CoP) that is concise, clear, and easy to use in practice.
- To draft a CoP that applies to ionisation chambers and photon and electron beam qualities that are being used in Belgium and the Netherlands.
- To give recommendations for Belgian and Dutch clinical physicists in the final NCS report.

In 2009, members of this subcommittee (Tony Aalbers, Leon de Prez and Hugo Palmans) investigated the 'sleeve effect' on the determination of the quantity absorbed dose to water under reference conditions in clinical photon and electron beams. The study was restricted to the Farmer types of ionization chambers recommended in the Code of practice described in NCS Report 18. Using the expression developed by Almond and Svensson for ρ_{wall} and modified independently by Gillin and by Hanson and Dominguez-Tinoco the influence of various sleeve thicknesses on k_Q beam quality correction factors was calculated. Furthermore measurements were carried out in a water phantom with a waterproof IBA Farmer type cylindrical ionisation chamber (FC-65 G) using polymethyl methacrylate (PMMA) sleeves with thicknesses ranging from 0.5 cm – 2.5 cm. The measurements were performed for Co-60 gamma rays at the Van Swinden Laboratory (VSL, Delft), for 6, 10 and 18 MV photon beams at the Dutch Cancer Institute (NKI, Amsterdam) and for a 25 MV photon beam at the Cliniques univ. St. Luc (UCL, Brussels). The results of the study will be reported to the Belgian and Dutch Radiotherapy Physics community. The contributions of Stefaan Vynckier and Frits Wittkämper to the experimental work are gratefully acknowledged.

Members of the subcommittee are:

Drs. Tony Aalbers, (chairman)

Marie-Thérèse Hoornaert M.Sc.

Dr. André Minken

Dr. Hugo Palmans

Dr. Marc Pieksma

Ing. Leon de Prez

Prof. Dr. Stefaan Vynckier

Dr. Frits Wittkämper

Dr. Nick Reynaert

2. Subcommittee on "Quality control of low -energy-photon emitting seeds in Brachytherapy"

The subcommittee met on February 11, April 3, May 19, August 27^{and} October 8, 2009. The meetings were held either in Utrecht (UMC) or in Antwerp (Middelheim Hospital).

The goals of the subcommittee are:

- To draft a report with recommendations for QC on the use of low-energy-photon 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 used in Belgium and The Netherlands, and promote efforts to make calibration methods at each center traceable to (inter)national measurement standards.

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

In 2009 the subcommittee continued the preparation of the report on recommendations for quality control of low energy photon emitting sources used in brachytherapy. The results of the on-site visits are incorporated and discussed in the report. The general chapters describing the manufacturing process and quality control by the manufacturer are finalized, as well as recommendations on certain aspects of the procedure and on safety issues. The subcommittee needs still to finalize the discussions on the quality control procedure of the I-125 seeds and after a last revision expects to be able to present a draft of the report in the coming months.

Members of the subcommittee are:

A. Rijnders, M.Sc. (chairman),

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

3. 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 stereotactic radiotherapy (SRT). The development nowadays is focused on imaged guided "frameless" high-dose high precision techniques with 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 a high accuracy in (re)positioning of the tumor with respect to the isocentre is required. This necessitates more attention to the QA of both treatment devices and treatment process than is the case for other complex treatments. Therefore, the introduction of stereotactic radiotherapy in the clinic means the acceptance, commissioning and quality assurance (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)positioning tumor at isocentre. QA of the treatment process itself is important but is often disregarded. Manpower is required, trained at expert-level, 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 started in January 2006. In 2009 the subcommittee had 4 meetings alternately held in Belgium and The Netherlands. After a first draft was compiled in 2008, 2009 was used to review and rewrite the draft required by the extent of information present in the draft.

In 2008 a prototype phantom was designed and constructed for end to end tests based on EBT type of radiochromic film used for 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 from EBT I to EBT II type of radiochromic film in 2009 it was not possible to start with the end to end tests.

Members of this NCS subcommittee are:
Dr. S. Heukelom (chairman)
Dr. H. Marijnissen
A Nulens M.Sc.
Dr. G. Pittomvils
Dr. E. Raaijmakers
Prof. Dr. D. Verellen
Dr. S Vieira
Prof. Dr. B. Heijmen.

4. Subcommittee on "Film dosimetry"

This sub-committee focuses on radiochromic as well as radiographic film dosimetry. The subcommittee has started with writing the part on radiographic film dosimetry. Concerning 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. Two main issues have attracted attention. The first is the hypothesis that the variation in sensitive layer thickness leads to variations in response of the film. The second issue is the question whether it is possible to correct for these variations by using the blue color channel in addition to the red color channel. The subcommittee will evaluate the progress on these issues related to radiochromic film dosimetry in august 2010. It will then be decided if radiochromic film dosimetry will be included in the final report

Members of this NCS subcommittee are:
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

5. Subcommittee on "Dosimetry audits"

The goal of the subcommittee is to design and execute an audit on absolute dosimetry in radiotherapy institutes in the Netherlands and Belgium. The audit will be based on the protocol presented in NCS Report 18. In first instance, this audit will be limited to high energy photon beams. In the future an extension to high energy electron beams can be made. It is the intention to visit every institute in the Netherlands and Belgium.

In 2009 the subcommittee met several times. All members participated in training sessions before the audits were started with the aim to foster a consistent performance during the measurements. Improvements in the measurement protocol were introduced following tests in hospitals during training sessions.

Participating radiotherapy institutes are subdivided into audit regions. For 2009, audits in the regions Holland and South were planned.

The first audit was made on November 10 at the MCA, Alkmaar. Four additional hospitals

were audited in 2009. In total 27 institutes will be audited in the measurement programme. An abstract for the BHPA annual meeting in February 2010 was written and accepted for presentation.

Members of the subcommittee are:
Ing. T. Perik (Chairman)
Ing. J. Martens (Treasurer)
Ing. M. Dwarswaard (Secretary)
Mr. 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)
F. Sergent MSc
A. Monseux MSc
PhD. K. Feyen

6. *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 differ from conventional linear accelerators, which implies that general quality assurance (QA) guidelines are not always applicable or sufficient. For example, current dosimetry protocols (NCS 18, AAPM TG-51) require calibration measurements under reference conditions. These reference conditions can not be met for the new modalities. New methods are proposed in literature and are subject of debate. Additional 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 goals of the subcommittee are to provide guidelines for QA and dosimetric calibration of the Cyberknife and helical tomotherapy systems.

Members of the subcommittee are:
Dr. V. Althof (chairman)
Dr. B. De Ost (secretary)
Dr. H. Marijnissen
Dr. N Reynaert
Dr. K. Tournel
Prof. Dr. S. Vynckier

7. *Subcommittee on "Dosimetry for clinical particle beams"*

The first meeting of the subcommittee was held on June 22, 2009.

The goal of the subcommittee is to draft an NCS report, including a Code of Practice (CoP) for dosimetry of clinical particle beams.

Aspects to be considered for the report are:

- availability of primary standards for particle beam dosimetry
- how to deal with intercomparisons
- quality assurance (QA) protocols for accelerators and facilities, beam contamination and patient specific quality control (QC)
- Contaminated beams and scanned versus static beams

- CoP for proton beams, including CT aspects for protons
- Specifications of C-beams (uncertainties due to contamination and fragmentation)
- Stopping powers for protons, cross sections, accuracy and benchmarks
- Specific dosimetry problems such as quenching of the Bragg peak

In 2009 the subcommittee has started to study the available literature.

Members of the subcommittee are:
Prof. Dr. Ir. M. Schippers (chairman)
Prof. Dr. Ir. F. Verhaegen (secretary)
Prof. Dr. S. Brandenburg
Dr. J. de Pooter
Dr. A. van 't Veld
Prof. Dr. S. Vynckier
Dr. F. Wittkämper

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.

Advisory platform on “radiology and nuclear medicine”

Diagnostic reference levels

Main achievement in 2009 was the finalization of the second phase of the implementation of diagnostic reference levels in The Netherlands, in cooperation with the Dutch Ministry of Health. To achieve this a NCS working group was established, members were Ad den Boer (Erasmus MC), Koos Geleijns (LUMC), Herma Holscher (HagaZiekenhuis), Willy Hummel (MCL/KCL), Rutger-Jan Nievelstein (UMCU), Arnold Schilham (UMCU), Paul Stoop (RIVM), Enno van der Velde (LUMC), Wouter Veldkamp (LUMC, voorzitter), Dirk Zweers (LUMC). Projectmanager was W.C. Krispijn (LUMC). Diagnostic reference levels were established for pediatric radiology (micturating cystourethrogram (MCUG), radiography (chest and abdomen) and adult cardiovascular imaging (coronary angiography by cardiac catheterization and computed tomography)). 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 various written consultations of the NCS Platform for Radiology and Nuclear Medicine in 2009, and there were three meetings of the NCS working group.

Membership advisory platform ‘Radiology and Nuclear Medicine’:

Drs. J.G. van Unnik (chairman)
Dr. J. Geleijns (secretary)
Dr. J.A.K. Blokland
Drs. S. van Dullemen
Mrs. I. van Helvoort
Dr. Ir. P.J.H. Kicken
Prof. Dr. L.J. Schultze Kool
Ir. A.H.J. Renders
Mr. W. Termorshuizen
Ms. M. Wienia
Mr. D. Zweers

Advisory platform “radiotherapy”

The activities of this subcommittee were discontinued in 2007.

NCS FINANCIAL OVERVIEW 2009

	Income (€)	Costs (€)
Savings-account on December 31, 2008	11209,75	
Current-account on December 31, 2008	-397,07	
Belgian current-account on December 31, 2008	893,89	
Checks and cash on December 31, 2006		
Contribution Netherlands Society for Radiology 2008		
Contribution Netherlands Society for Medical Physics 2008		
Contribution Netherlands Society for Radiotherapy and Oncology 2008		
Contribution Netherlands Society for Nuclear Medicine 2008		
Contribution Netherlands Society for Radiological Protection 2008		
Contribution Netherlands Radiobiological Society 2008		
Contribution Dutch society of Techn. And other spec. in MP NVKFM 2008		
Contribution Netherlands Society for Medical Imaging 2008		
Belgian Hospital Physicists Association 2008		
Interest savings-account	147,80	
Interest current account	9,63	
Sales of NCS Reports		
Travel costs		18,80
Costs Chamber of Commerce		26,14
Banking costs		100,08
Banking costs Belgian account		9,97
Costs of subcommittees meetings/final dinner		
Costs web site		380,21
Costs meetings NCS board		
Printing costs		
Non-cashable cheques		
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
Total	11864,00	11864,00

NCS BUDGET 2010

	Income (€)	Costs (€)
Contributions scientific societies	3000,00	
Interest savings-account	150,00	
Sales of NCS Reports	125,00	
Contributions from others to printing costs of NCS Reports		
Costs Chamber of Commerce		25,00
Banking costs		100,00
Costs of board and subcommittees meetings		300,00
Costs web site		2500,00
Costs of printing NCS Reports		350,00
Total	3275,00	3275,00

NCS Balance sheet 31-12-2009

	debet		credit
Savings account	10303,62		
Current account	141,26		
Belgian current account	883,92	Equity capital	€ 11.328,80

	-		-----
	€ 11.328,80		€ 11.328,80

NCS Income and expenses 2009

Contributions:

NVvR			
NVKF			
NVRO			
NVNG			
NVS			
NVRB			
NVKFM			
NVMBR			
SBPH/BVZF		Printing costs NCS reports	
		Banking costs Dutch acc.	€ 100,08
Interest savings acc.	€ 147,80	Banking costs Belgian acc.	€ 9,97
		Maintenance web site	€ 380,21
Interest current acc.	€ 9,63	Chamber of commerce	€ 26,14
Sales of NCS reports		Subcommittees	
		NCS board meetings	
		Travel costs	€ 18,80
		Credit balance	
		(deficit)	-€ 377,77
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	€ 157,43		€ 157,43