



NCS 07-015

Delft, August 20

ANNUAL REPORT 2006

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, Netherlands 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, Netherlands Radiobiological Society);
- Nederlandse Vereniging voor Stralingshygiëne (NVS, Netherlands Society for Radiological Protection);
- Nederlandse Vereniging Medische Beeldvorming en Radiotherapie (NVMBR, Dutch Society 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).

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

- Participation in dosimetry standardization and promotion of dosimetry intercomparisons;
- 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 website: <http://www.ncs-dos.org/>

secretary:

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Department of Electricity, Radiation and Length
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Board

On December 31, 2006 the members of the board of the NCS were:

Prof. Dr. S. Vynckier, chairman	(SBPH/BVZF)
Prof. Dr. B.J.M. Heijmen, vice chairman	(NVRO)
Mr. E. van Dijk, secretary	(NMI)
Dr. J. Zoetelief, treasurer	(NVRB)
Dr. A.J.J. Bos	(NVS)
Prof. Dr. A.A. Lammertsma	(NVNG)
Drs. J.M. Schut	(NVvR)
Dr. Ir. F.W. Wittkämper	(NVKF)
Mr. D. Zweers	(NVMBR)

The board of the NCS met three times in 2006, on April 3, June 26 and October 2. 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 "Uniformity of Dosimetry Protocols"

The subcommittee 'Uniformiteit Dosimetrieprotocollen' has held three "full subcommittee" meetings in 2006, on January 19 at Universitaire Klinieken Saint-Luc (U.C.L.), Brussels, on April 24 at Nederlands Meetinstituut (NMI), Delft and on October 18 at Universitaire Klinieken Saint-Luc (U.C.L.), Brussels.

The goals of the subcommittee are:

- 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 in photon and electron beam qualities that are being used in Belgium and the Netherlands.
- To give recommendations to Belgian and Dutch medical physicists in the final NCS report.

During 2006, analysis of data on beam quality correction factors, k_Q and beam quality specifiers, $TPR_{20,10}$ and $\%dd(10)_x$, measured in selected clinical photon beams was completed to a large extent. A generic model for fitting k_Q data of photon beams was determined. The model was based on the experimental k_Q data, measured by the NCS subcommittee and selected data from the literature.

All 24 ionisation chambers used in the k_Q measurement campaign in Belgium and The Netherlands were recalibrated in the NMI Co-60 reference gamma ray beam and the recombination correction for the chambers was experimentally determined in the same beam. In addition, all Farmer-type chambers were calibrated in the horizontal Co-60 facility at Laboratory for standard dosimetry Gent. The results were included in the k_Q database.

Some topics related to dosimetry in high energy electron beams needed further discussion including literature study on, e.g. perturbation factors for cylindrical and plane parallel ionization chambers.

Test measurements with five Wellhöfer-Scanditronix PPC40 plane parallel ionisation chambers were conducted in the NMI Co-60 beam and in the high-energy electron beams at Nederlands Kanker Instituut - Antoni Van Leeuwenhoek Ziekenhuis. These chambers were kindly made available for these measurements by Stratec Services, Houten, NL. Based on the results of test measurements it was decided to recommend this chamber for absolute dosimetry in high energy electron beams.

It will be recommended to cross calibrate plane-parallel chambers against a Farmer-type chamber (any of the Nuclear Enterprise, Physikalische Technische Werkstätte or Wellhöfer) in a high-energy electron beam.

The final structure of the report was determined and a first draft of the first two chapters: Introduction and Code of Practice for high energy photon beams respectively and part of the appendices were drafted and discussed. A full draft of the report will be completed and discussed before March 2007 and a submission of the complete draft to the NCS board is foreseen in May 2007.

Presentations were delivered at the annual "Doorwerth" Conference for Clinical Physics in April and at the refresher course of the Nederlandse Vereniging voor Klinisch Fysisch Medewerkers in November 2006

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 "Dosimetry in Radiology"

In December 2005 ICRU Report 74 entitled "Patient Dosimetry for X-Rays Used for Medical Imaging" was published. As decided previously this ICRU report had to be finalised before the NCS report could be completed.

The drafts of the chapters of the report on "Dosimetry in Radiology" were dating back to 2000. They were brought into the format of the NCS reports. By the end of 2005 the authors of the various chapters were asked if they were still interested in the completion of the NCS report and be willing to update their chapters. Some authors were no longer active in the field but most responded positively. By October 2006 a complete draft was agreed upon by the subcommittee. On November 6, 2006 the completed draft was distributed among the members of the board of the NCS for discussion at the next board meeting.

Membership of the subcommittee:
Dr. J. Zoetelief (chairman)
Prof. Dr. J.J. Broerse
Dr. P.J.H. Kicken
Mr. W. Teeuwisse
Ir. W. de Vries
Mr. D. Zweers

3. Subcommittee “Monte Carlo Treatment Planning”

The first report containing a literature overview and guidelines on Monte Carlo Treatment Planning (MCTP) was finalized early 2006 and is officially available since September 2006. The report was available at the “First European Workshop on MCTP”, organized in October 2006 in Gent. A condensed version of the report is published by the American journal “Rad. Phys. Chem.” as a Topical Review paper early 2007.

In the mean time the group has started a research project focusing on benchmarking treatment planning results using the MCTP dose engine of the Gent University (MCDE) for different radiotherapy institutes. Several sub-projects (GUH and UCL) were finished in 2006 and led to some publications in Med. Phys. and Phys. Med. Biol. Currently a similar sub-project between Daniel den Hoed Rotterdam and the Belgian Lab for standard dosimetry (Gent University) is on-going. Additional radiotherapy institutes will be included. This should lead to a second report, summarizing obtained results. The purpose is to access on the added value of commercial MCTP software in the clinic.

Members of the subcommittee are:

Ir. M. Coghe,
Prof. Dr. Ir. C. De Wagter,
Prof. Dr. B. Heijmen,
Ir. J. Jansen
Dr. N. Reynaert (chairman)
Dr. Ir. D. Schaart,
M. Tomsej (secretary), M.Sc.,
Dr. S. Van der Marck,
Drs. Ing. W. Van der Zee
Dr. Ir. C. Van Vliet Vroegindeweyj

In 2006, the composition of the group was somewhat changed to:

Ir. M. Coghe,
Dr. B. De Smedt,
Prof. Dr. Ir. C. De Wagter,
Prof. Dr. B. Heijmen,
Ir. J. Jansen
Dr. N. Reynaert (chairman)
Dr. Ir. D. Schaart,
Dr. Ir. Y. Seppenwoolde,
M. Tomsej (secretary), M.Sc.,
Dr. Ir. C. Van Vliet Vroegindeweyj

5. Subcommittee “Loodschorten (Lead Aprons): Protocols for personal dosimetry of workers wearing protective clothing”

In the first quarter of 2006 the composition of the subcommittee was finalised. The members represent the five approved dosimetric services of The Netherlands and the most important professional societies in the field of ionising radiation in combination with protective clothing. During a first meeting at TU Delft in April 2006 the ten members discussed the goal and set a plan for the subcommittee. Ultimately, the subcommittee should deliver an NCS report containing the code of practice for dosimetry of exposed professionals wearing protective clothing. A literature study on current legislation and methods of individual monitoring was started. Based on these results, a draft of the first three chapters of the NCS report was written. It includes exposure conditions in The Netherlands and correction methods for personal dosimetry using single or multiple dosimeters. The fourth chapter on possible alternatives with respect to the application of protective clothing and

other personal protective devices, single or double dosimeters and their wearing positions and correction factors was prepared and discussed. To discuss these latter issues the subcommittee convened in Delft for the second time in November 2006. In March 2006 it had been agreed to consult the Advisory Platform Radiology and Nuclear Medicine about making choices from the alternatives. This body represents the majority of professional groups to be affected by the code of practice. Its approval is highly desirable for smooth implementation of the code of practice, foreseen as the fifth and last chapter of the NCS report. As the process of consultation required more time than anticipated, postponement of the end date of the project (December 2006) was asked and granted. The work is in progress in 2007.

Members of the subcommittee are:
Dr. J. Zoetelief (Chairman)
Dr. J.W.E. van Dijk
Mr. L. Ebben
Ir. Y. Franken
Drs. T. Grimbergen
Mrs. Ir. W. Hummel
Dr. Ir. P.J.H. Kicken
Dr. Ir. F.W. Schultz (secretary)
Dr. G. Voorhout

6. *NCS Subcommittee: Quality control of low-photon-energy emitting seeds in brachytherapy*

This subcommittee was formed in 2003 and has gathered three times in 2006, namely on May 11th, June 30th and October 20th. Alternatively, these meetings were held in Antwerp (Middelheim Hospital) and Utrecht (UMC).

The goals of the subcommittee are:

- Description of current practice : clinical, Quality Control
- Comparison of different methods for QC
- Report on recommendations for QC
- Dosimetric recommendations, relevant principles and parameters
- Reference to the task of standard labs, traceability of calibration methods used at each centre
- Possibility to develop a visiting QA team: dosimetric intercomparisons

In 2006 the subcommittee started site visits at institutions in Belgium and The Netherlands using I-125 seeds for prostate implants. In the period February to July 19 (out of 22) institutions in Belgium and all 12 institutions in The Netherlands were visited. During these visits the results of the previously mailed Treatment Planning System test procedure were collected and source strength measurements were performed.

The TPS test procedure focused on 5 aspects: absolute dose calculation at a number of points on the central axis of the source (1D anisotropy approximation), dose summation, isodose line representation, dose-volume histogram (DVH) calculation, and absolute dose calculation using the 2D anisotropy correction. As all systems used in both countries apply the American Association of Physicists in Medicine Task Group-43 calculation method it was expected that possible deviations would likely be linked to differences in TG-43 source reference data, used as input for the TPS. Therefore also recorded the reference data used in each institution were recorded. Whenever possible we used the AAPM TG-43 (U1) consensus source data we used as reference.

In-air kerma measurements were performed in all participating institutions by a visiting team, using two commercially available measurement systems. These two instruments, the PTW SourceCheck and the Standard Imaging IVB1000 well type chamber, were

chosen as they can be equipped with dedicated adaptors allowing measurements to be performed in a precise and reproducible way for single seeds as well as for seeds in specific clinical packaging (strands-cartridges). The results were compared to local measurements obtained with the centre's measuring equipment (if available), and to the source strength specified on the manufacturer's certificate.

A National Institute of Standards and Technology traceable calibration factor for each seed model/brand used in both countries had to be determined for this equipment. This was carried out at the Dutch Standards Laboratory (NMI), with the support of the seed manufacturers and the German Standards Laboratory (PTB). Some difficulties were encountered during the calibration for one seed type and this calibration had to be repeated in 2007.

Preparations for a report on recommendations for quality control of low-photon-energy emitting seeds in brachytherapy is continuing.

Presentations:

Rien Moerland: "Kwaliteitscontrole en dosisberekeningen bij het gebruik van I-125 zaadjes bij prostaat implantaties", NMI-NVKF meeting, Delft.

Tony Aalbers: "Quality control of low-photon-energy emitting seeds", Bard Brachy users meeting, Eindhoven.

Members of the subcommittee are:

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

Advisory platforms

The Netherlands Commission on Radiation Dosimetry covers a wide field of expertise through the participating scientific societies. In 1999 NCS platforms were established on dosimetry for radiology and nuclear medicine (chairman J.G. van Unnik) and dosimetry for radiotherapy (chairman J.J. Broerse). The tasks of these platforms were to give advice on specific research projects initiated by the Government. In some instances the platforms have been of benefit, however, during the past three years further requests were not received and the platforms became dormant. 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.

Prof. Dr. J.J. Broerse, emeritus chairman

Advisory platform "radiology and nuclear medicine"

There were no requests for advice in this area.

Membership advisory platform 'Radiology and Nuclear Medicine':

Drs. J.G. van Unnik (chairman)
Dr. J. Geleijns (secretary)
Prof. Dr. J.J. Broerse
Dr. J.A.K. Blokland
Mrs. I. van Helvoort
Dr. Ir. P.J.H. Kicken
Ir. A.H.J. Renders
Mr. W. Termorshuizen

Advisory platform "radiotherapy"

There were no requests for advice in this area.

Membership advisory platform 'Radiotherapy':

Prof. Dr. J.J. Broerse (chairman)
Ir. W. de Vries (secretary)
Drs. E.N.J. van Lin
Mrs. F. Cavelaars
Dr. R.W. de Boer
Ir. C.F. Westermann

NCS FINANCIAL OVERVIEW 2006
(all amounts in Euro)

	Income	Costs
	€	€
Savings-account on December 31, 2005	10749,19	
Current-account on December 31, 2005	6148,27	
Belgian current-account on December 31, 2005	970,35	
Checks and cash on December 31, 2005		
Contribution Netherlands Society for Radiology 2007	455,00	
Contribution Netherlands Society for Clinical Physics		
Contribution Netherlands Society for Radiotherapy and Oncology		
Contribution Netherlands Society for Nuclear Medicine 2007	95,00	
Contribution Netherlands Society for Radiological Protection 2007	105,00	
Contribution Netherlands Society for Radiobiology		
Contribution Netherlands Society for Medical Imaging 2007	115,00	
Belgian Hospital Physicists Association		
Interest savings-account	151,24	
Interest current account	34,74	
Capitalisation Belgian current-account		
Sales of NCS Reports***	881,11	
Costs Chamber of Commerce		22,20
Banking costs		54,21
Banking costs Belgian account		12,67
Costs of board and subcommittees meetings		141,60
Costs web site		357,03
Costs Pb apron		153,60
Costs meetings NCS board		99,30
Printing costs**		8639,27
Non-cashable cheques		
Cheques and cash on December 31, 2006		
Savings-account on December 31, 2006		10900,43
Current-account on December 31, 2005*		-1606,49
Belgian current-account on December 31, 2005		931,08
Total	19704,90	19704,90

* Not including project SZW

** Double payment 576,85

***A check from BNP Paribas was wrongly treated by ABN-AMRO but not reimbursed

NCS Balance sheet 31-12-2006

all amounts in Euro

	debet		credit
Savings account	10900,43		
Current account	-1606,49		
Belgian current account	<u>931,08</u>	Equity capital	€ 10.225,02
	-----		-----
	€ 10.225,02		€ 10.225,02

NCS Income and expenses 2006

Contributions:			
NVvR	€ 455,00		
NVKF			
NVRO			
NVNG	€ 95,00		
NVS	€ 105,00		
NVRB			
NVMBR	€ 115,00	Printing costs NCS reports	€ 8.639,27
SBPH/BVZF		Banking costs Dutch acc.	€ 54,21
		Banking costs Belgian acc.	€ 12,67
Interest savings acc.	€ 151,24	Maintenance web site	€ 357,03
Interest current acc.	€ 34,74	Chamber of commerce	€ 22,20
Sales of NCS reports	€ 881,11	Board and subcommittees	€ 141,60
		NCS board meetings	€ 99,30
		Costs Pb apron	€ 153,60
Credit deficit	€ 7.642,79	Credit balance	
	-----		-----
	€ 9.479,88		€ 9.479,88