



## ANNUAL REPORT 2004

### 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, Netherlands Society for Nuclear Medicine);
- Nederlandse Vereniging voor Klinische Fysica (NVKF, Netherlands Society for Clinical Physics);
- Nederlandse Vereniging voor Radiobiologie (NVRB, Netherlands Society for Radiobiology);
- 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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## Board

On December 31, 2004 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)
Ir. W. de Vries, 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 four times in 2004, on January 12, May 19, October 13 and December 7. 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 one meeting in 2004, namely on April 29 at the Maastricht Clinics (Maastricht).

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 ionization chambers and photon and electron beam qualities being used in Belgium and the Netherlands.
- To make recommendations for Belgian and Dutch medical physicists in the final NCS report.

In 2004 activities concentrated on the execution of the measurement program in high-energy photon beams of nine selected Belgian and Dutch radiotherapy institutes. The experimental determination of  $k_Q$  beam quality correction factors. Beam quality specifiers  $TPR_{20,10}$  and  $\%dd(10)_x$  in all selected institutes were completed. The  $k_Q$  measurements involved four selected types of ionization chambers and the NMI water calorimeter. Six versions of each ionization chamber type (manufactured by NE, PTW and Wellhöfer), in total 24 ionization chambers, were measured in all 9 clinical beams. These measurements were completed by June 2004.

A first analysis of the results showed a need for remeasuring the data in two radiotherapy institutes. Furthermore all ionization chambers were recalibrated in the Co-60 reference beam at NMI. Progress was strongly dependent on the behaviour of the NMI water calorimeter, which suffered from severe problems related to the water quality used in the high purity water (HPW) glass cell of the calorimeter. The cell contains the measurement thermistors to detect the temperature change due to irradiation.

tion of the cell in an ionizing radiation beam. The problems with the water quality were also related to the malfunction of a commercial device used for purifying water. Furthermore the experiments were delayed because, in September 2004, preparations started for moving of the ionizing radiation standards from Utrecht to Delft.

Despite these difficulties, NMI staff succeeded in repeating the  $k_Q$  measurements in the two radiotherapy institutes (Jolimont and Leyenburg) in October and November 2004, respectively. Additional experiments were carried out in the Co-60 reference beam of NMI to examine the problems with the NMI water calorimeter. In December these experiments were interrupted because the irradiation facilities had to be dismantled in preparation of the move to a new building in Delft. So far the problems with the NMI water calorimeter have not been fully resolved yet. However, progress is made and the malfunction of a device used for geometrical measurements was identified. The possible effect of this malfunction on the repeated  $k_Q$  measurements in Leyenburg has still to be evaluated. It is expected that absolute dose determinations in the Co-60 reference beam of NMI with the water calorimeter will be resumed in May 2005.

Preliminary results of the  $k_Q$  measurements in clinical photon beams were presented at the 19<sup>th</sup> Annual BHPA Symposium at the Free University Brussels (VUB), 30-31 January 2004.

Without having formal meetings a subgroup (consisting of Tony Aalbers, Hugo Palmans and Stefaan Vynckier) continued discussions on instrumentation and methods for dosimetry in clinical electron beams, based on an absorbed dose-to-water standard. Limited progress was achieved with respect to these topics in 2004.

The subcommittee plans to complete and evaluate the measurement program in 2005. It is still possible that measurements in one clinical photon beam and recalibration of all ionization chambers in the Co-60 reference beam at NMI have to be repeated.

It is the intention to produce a final draft CoP for the dosimetry of high-energy photon beams and high-energy electron beams before the end of 2005.

Members of the subcommittee are:  
Drs. A.H.L. Aalbers (chairman)  
Mrs. M-T. Hoornaert  
Dr. A. Minken  
Dr. M.W.H. Pieksma (secretary)  
Dr. H. Palmans  
Prof.dr. S. Vynckier  
Dr. F.W. Wittkämper

## 2. Subcommittee "Dose Calculations in Megavoltage Photon Beams"

The tasks of this subcommittee were ended in 2004.

Members of the subcommittee are:  
Dr. J.J.M. van Gasteren (chairman)  
Dr. S. Heukelom  
Ir. H.N. Jager  
Dr. R. van der Laarse

Dr. B.J. Mijnheer  
Ir. J.P.C. van Santvoort  
M. Tomsej  
Dr.ir. J.L.M. Venselaar  
Drs. J. Welleweerd  
Ir. C.F. Westermann

### 3. *Subcommittee "Dosimetry in Radiology"*

As indicated in previous NCS annual reports, a complication occurred due to a draft ICRU Report entitled "Patient Dosimetry for X-Rays Used for Medical Imaging". As agreed in 2001 between NCS and ICRU chairmen, the NCS and ICRU reports will be published approximately simultaneously. In March 2004 the chairman of the ICRU Main Committee was optimistic about finishing the Report in 2004. The ICRU draft Report, however, was not accepted in 2004. It is now very likely that it will be at the end of 2005. This implies that the NCS report will also have to be finalised by the end of 2005.

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

### 4. *Subcommittee "Treatment planning systems"*

In 1996 the NCS installed the task group Treatment Planning Systems in order to produce a report with guidelines for the quality assurance (QA) of 3-D treatment planning systems (TPS). Early 2000 most chapters of this report had been written and the existing material was made available as a pre-release on the website of the NCS ([www.ncs-dos.org](http://www.ncs-dos.org)) in March 2000.

In the course of 2000 and 2001 a number of colleagues sent comments after reading the material and some also gave feedback after applying the report guidelines in practice; this information was used to improve the report. In addition missing parts of chapters were added. In 2004 an overall revision of the report was carried out and after a major re-editing process, a final version was submitted to the NCS board in September. In December the comments of the board were received and a corrected version was to be prepared for the board meeting of March 2005. The title of the new report will be: "Quality assurance of 3-D treatment planning systems for external photon and electron beams; *practical guidelines for initial verification and periodic quality control of radiation therapy treatment planning systems*"

Members of the subcommittee are:  
Dr. I.A.D. Bruinvis (chairman)  
Drs. R.B. Keus  
Dr. W.J.M. Lenglet  
Dr. G.J. Meijer  
Dr. B.J. Mijnheer  
Dr. A.A. van 't Veld  
Dr.ir. J.L.M. Venselaar

5. *Subcommittee "Electronic Personal Dosemeters"*

The tasks of this subcommittee were ended at the end of 2004.

Members of the subcommittee are:  
Dr. A.J.J. Bos (chairman)  
Mr. D. Zweers (secretary)  
Dr. J.W.E. van Dijk  
Dr. J. Geleijns  
Ir. W. de Vries

6. *Subcommittee "Quality control of sealed betasources used in medicine"*

NCS subcommittee "Quality Control of sealed beta sources" published its report in December 2004. Before 2000, hardly no standardization was present in the quality control of sealed beta sources used for intravascular brachytherapy and eye irradiations. NCS report 14 contains recommendations on detectors for the calibration and characterization of sealed beta sources used for brachytherapy. The dosimetrical procedures are specified in one of the appendices. As a supplement to NCS report 13, the recommended quality control procedures for beta sources are provided.

Members of the subcommittee are:  
Ir. W.J.F. Dries (chairman)  
Drs. A.H.L. Aalbers  
Ir. H.J. van Kleffens  
Ir. R.P. Kollaard  
Dr.ir. J. van der Marel  
Dr. J.P.A. Marijnissen  
Dr. M. Piessens  
Dr.ir. D.R. Schaart  
Ir. H. de Vroome

7. *Subcommittee "Monte Carlo Treatment Planning"*

The main goal of the subcommittee is the preparation of a report containing:

- Introduction to general aspects of dosimetry Monte Carlo (MC) codes
- Overview of topics specific for Monte Carlo treatment planning (MCTP) in radiotherapy
- Overview of existing MCTP dose engines and commercially available MCTP systems
- Overview of commissioning techniques specific for MCTP
- Guidelines for potential customers and vendors of MCTP systems

As the Monte Carlo method cannot be regarded as common knowledge for medical physicists working in radiotherapy departments, the main aim of the report is to provide the reader enough insight in MC, particularly with respect to treatment planning, to enable understanding of available commercial systems and the approximations used in these systems. The report may be of help to medical physicist in discussions with the vendors.

This group officially started activities at the end of 2003. In 2004 five meetings were held, namely on: March 24, May 19, September 15, October 11 and December 15.

During these meetings it was decided to prepare a topical review based on the report for Phys. Med. Biol. (PMB). The review paper is intended to be sent to PMB in January 2005, while a first draft of the NCS report is expected in March 2005. After finishing the first report, which is based solely on literature (such a report is urgently needed as all vendors start supplying MCTP systems), the subcommittee will focus on research and more specifically on determining the value of MCTP compared with the best available conventional dose engines (superposition/convolution algorithms) for several clinical cases and heterogeneous phantoms. This should lead to a second report in 2007.

Preliminary results were presented on November 25, 2004 at the meeting of the "kring RKF" of the NVKF in Utrecht about "Commissioning and QA of TPS" and will be presented at the BHPA meeting in Namur in January 2005.

Members of the subcommittee are:

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

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

This subcommittee was formed in 2003 and has gathered four times in 2004, namely on February 11<sup>th</sup>, May 26<sup>th</sup>, September 1<sup>st</sup> and December 15<sup>th</sup>. Alternatively these meetings were held alternating between Brussels (UCL-Woluwe) and Utrecht (UMC).

The goals of the subcommittee are:

- Description of current practice: clinical, QC
- 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

Already in 2003 a survey was issued in order to document the current practice in Belgium and The Netherlands. This survey clearly demonstrated the need for clear QC guidelines and the problems with respect to the verification of the source strength (equipment, methodology, calibration and traceability).

During the 2004 meetings attention focussed on a better understanding of the production and quality control procedures used by the four manufacturers that are active on the market in Belgium and The Netherlands. For this correspondence by email was used, and a visit to a production plant in Belgium was organized.

In addition the tasks, procedures and logistics for a visiting QA team thoroughly discussed. Two leading companies in this field have provided equipment on loan, and calibration possibilities at the NMi have been studied. Partly this has been done in separate subgroup meetings. It is intended to start the on-site visits before the summer of 2005.

Finally preparation of a report on recommendations for quality control of low-photon-energy emitting seeds in brachytherapy has been initiated.

Members of the subcommittee are:

Ing. A. Rijnders, chairman  
Drs. A.H.L. Aalbers  
Lic. S. Bernard  
Lic. M. Debrabandere  
Dr. C. Koedooder  
Dr. R. Moerland  
Lic. B. Thissen  
Dr. ir. A. van't Riet  
Prof.dr. S. Vynckier

## Advisory platforms

### *Advisory platform "radiology and nuclear medicine"*

In November the "QC light" protocols for quality control in radiology departments were presented during a symposium in Leiden. Nearly all Dutch hospitals were represented as well as the government and industry. The QC light protocols had been developed by a working party of physicists after an initiative from the platform. The platform for radiology and nuclear medicine did not meet itself in 2004.

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 2004

### NCS FINANCIAL OVERVIEW 2004

(all amounts in Euro)

	<b>Income</b>	<b>Costs</b>
	€	€
Savings-account on December 31, 2003	10417.02	
Current-account on December 31, 2003	2134.51	
Belgian current-account on December 31, 2003	<u>757.91</u>	
Checks and cash on December 31, 2003		
Contribution Netherlands Society for Radiology 2003	455.00	
Contribution Netherlands Society for Clinical Physics 2003	0.00	
Contribution Netherlands Society for Radiotherapy and Oncology 2003	685.00	
Contribution Netherlands Society for Nuclear Medicine 2003+2004	190.00	
Contribution Netherlands Society for Radiological Protection 2003	105.00	
Contribution Netherlands Society for Radiobiology 2003	75.00	
Contribution Netherlands Society for Medical Imaging 2003	115.00	
Belgian Hospital Physicists Association 2002 + 2003	100.00	
Interest savings-account	172.29	
Capitalisation Belgian current-account		
Sales of NCS Reports	146.87	
Costs Chamber of Commerce		38.82
Banking costs		101.45
Banking costs Belgian account		5.39
Costs of board and subcommittees meetings		
Costs web site		525.21
Non-cashable cheques		
Cheques and cash on December 31, 2004		
Savings-account on December 31, 2004		10589.31
Current-account on December 31, 2004		3240.90
Belgian current-account on December 31, 2004		<u>852.52</u>
Total	<u>15353.60</u>	<u>15353.60</u>

### NCS BUDGET 2005

(all amounts in Euro)

	<b>Income</b>	<b>Costs</b>
	€	€
Contributions scientific societies	1600.00	
Interest savings-account	200.00	
Sales of NCS Reports	300.00	
Contributions from others to printing costs of NCS Reports	1500.00	
Costs Chamber of Commerce		35.00
Banking costs		100.00
Costs of board and subcommittees meetings		0.00
Costs web site		100.00
Costs of printing NCS Reports		<u>3365.00</u>
Total	<u>3600.00</u>	<u>3600.00</u>



**NCS Balance sheet 31-12-2004**

all amounts in Euro

	debet		credit
Savings account	€ 10,589.31		
Current account	€ 3,240.90		
Belgian current account	€ 852.52	Equity capital	€ 14,682.73
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	€ 14,682.73		€ 14,682.73

**NCS Income and expenses 2004**

Contributions:			
NVvR	€ 455.00		
NVKF	€ -		
NVRO	€ 485.00		
NVNG	€ 190.00		
NVS	€ 105.00		
NVRB	€ 75.00		
NVRL	€ 115.00		
SBPH/BVZF	€ 100.00		
Interest	€ 172.29	Banking costs	€ 106.84
Sales of NCS reports	€ 146.87	Maintenance web site	€ 525.21
		Chamber of commerce	€ 38.82
		Credit balance	€ 1,173.29
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	€ 1,844.16		€ 1,844.16