



NCS 09-001

Delft, October 12

## ANNUAL REPORT 2008

### 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, 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)

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:

E. van Dijk, Nederlands Meetinstituut  
Project manager Research&Development  
P.O. box 654, 2600 AR DELFT  
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## Board

On December 31, 2008 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	(VSL)
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)
Ing. J.M.J. Hermans	(NVKFM)

The board of the NCS met four times in 2008, on March 12, June 25, September 22 and December 11.

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. NCS Subcommittee "*Uniformity of Dosimetry Protocols*"

No meetings were held by the Subcommittee 'Uniformiteit Dosimetrieprotocollen' in 2008.

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 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 February 2008 the review of the draft Code of Practice by the external reviewers to Dr. Jan Seuntjens (McGill University) and Prof. Dr. Jan van Dam (retired from the Catholic University, Leuven) was completed. The review comments and final remarks of the NCS board were included in the text in March and the report was published as NCS Report 18.

On May 30, a one-day meeting was organised in co-operation with the Kring Radiotherapeutische fysica of the NVKF and NVKFM at NMi, Delft. The Codes of Practice published in NCS Report 18 were presented by members of the Subcommittee.

NCS Report 18 was also presented on October 3 by members of the Subcommittee on a Continuous Education day of the BHPA at the FANC organisation in Brussels.

The influence of the sleeve-thickness used during calibrations of ionisation chambers and on experimental determined beam quality correction factors (kQ) for photon beams used in NCS report 18 will be further investigated. Measurements in Co-60 beams were conducted at NMi during the second half of 2008. Further measurements in clinical accelerator beams will be

conducted in 2009.

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

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

The members of the subcommittee 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. In 2006 the first three chapters of the NCS report were written, including exposure conditions and correction methods for personal dosimetry. In addition, the fourth chapter on possible alternatives for the protocol –regarding protective devices, number of dosimeters and their wearing positions and correction factors– was prepared and discussed.

In 2007 several drafts of the Code of Practice (CoP) circulated among the members of the subcommittee. Since consensus within the subcommittee could not be reached a final meeting was needed which was held on February 11, 2008. During this meeting consensus was reached. The final draft was prepared and circulated for comments within the subcommittee. When the draft CoP was finalised it was sent to the Advisory Platform Radiology and Nuclear Medicine and to the Netherlands Society of Cardiology (NVVC). The NVVC agreed by mail. The Advisory Platform would like to include recommendations for protective clothing consisting of lead-free materials. This latter desire could, however, not be realised within the contract with the Ministry of Social Affairs and Employment. Also professionals from radiology departments were given the opportunity to make comments. Taking the responses into account, in October 2008 the Code of Practice for personal dosimetry of professionals wearing protective clothing during radiological procedures was published as NCS Report 19.

Members of the subcommittee:  
Dr. J. Zoetelief (chairman)  
Dr. J.W.E. van Dijk  
Mr. L. Ebben  
Y. Franken MSc  
T. Grimbergen MSc  
W. Hummel MSc  
Dr. P.J.H. Kicken  
Dr. F.W. Schultz (secretary)  
Dr. G. Voorhout  
Mr. D. Zweers

4. *Subcommittee: Quality control of low -energy-photon emitting seeds in Brachytherapy*

The subcommittee has gathered three times in 2008, on February 19<sup>th</sup>, May 13<sup>th</sup> and October 29<sup>th</sup>. The meetings were held in Utrecht (UMC) and 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 in Belgium and The Netherlands, and promote efforts to make calibration methods at each center traceable to (inter)national measurement standards.

To study the clinical practice the subcommittee has performed earlier on-site visits 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.

By the end of the 2007 - beginning 2008 all 31 institutions that participated in the site visits received a written report with the results of the tests and measurements performed at their location. These results are also incorporated in the report on recommendations for quality control of low energy photon emitting sources in brachytherapy.

In 2008 the subcommittee continued the preparation of this report. The chapters describing the manufacturing process and quality control by the manufacturer as well as the presentation of the results of the site visits were thoroughly discussed. Reference data for all sources available in Belgium and The Netherlands were collected. The subcommittee expects to be able to present a draft in the spring of 2010.

The results of the on-site visits and the work of the subcommittee were presented in a poster session at the ABS/GEC-ESTRO Meeting (Boston, May 2008).

*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*

##### *5. Subcommittee "Quality Control of stereotactic radiotherapy: Recommendations on dosimetry procedures and Quality Control"*

In the Netherlands and Belgium there are a rapidly growing number of radiotherapy centers that are being equipped for intracranial as well as extracranial stereotactic radiotherapy. Momentarily the development of stereotactic radiosurgery (SRS) and stereotactic radiotherapy (SRT) is focused in the direction of the imaged guided "frameless" radiotherapy with dedicated linacs (Novalis and Cyberknife), mainly for intracranial lesions. "Frameless" here means "without an invasive frame, fixed on the skull of the patient with the aim to fix the patient on the treatment couch". Nowadays, an alternative is a non-invasive mask system with high positioning accuracy in combination with image guided positioning of the patient. As 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 and more attention to QA than performed 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 automatic compensation of tumor movements. For the standard QA of the various subsystems NCS reports are available (NCS- 2, NCS-9, NCS-11, NCS-12 en NCS-15). The increasing complexity of SRT/SRS and the increasing number of radiotherapy centers that offer that kind of SRT/SRS treatments justify a NCS report on stereotactic radiotherapy. Specific topics of image-guided radiotherapy techniques have to be incorporated in relation to stereotactic treatment.

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 as well as for dedicated fully integrated systems. The report will also give brief descriptions of the present dedicated systems for intracranial and extracranial stereotactic irradiation.

The subcommittee "Quality Control of stereotactic radiotherapy" was started in January 2006. In 2008 the subcommittee had 3 meetings alternately held in Belgium and The Netherlands. A first draft was compiled. Meanwhile the members are preparing other chapters of the report and updating the existing chapter in the drafts.

A prototype phantom is designed and constructed for end to end tests 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.

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.

#### 6. Subcommittee "film dosimetry"

3 Sep 2008 a proposal for topics and allocation of tasks was distributed among the subcommittee. Several comments were included in the proposal which is attached to this report. It was also proposed to include a chapter on the subject of film dosimetry for ortho-voltage X-rays (because of the increasing importance of experimental setups for laboratory animals).

Some chapters will summarize the literature of a subject, while other chapters contain more hot research topics. Each authors will write his/her contribution from his own interest and background. The final editing is the responsibility of the chairman.

Because of the sudden introduction of the new type radiochromic film EBT2 and the withdrawal of the EBT type none of the users is able to reproduce the results with the new type EBT2. A new calibration method is required. Only after solving this problem the subcommittee will continue its work on the report.

Members of this NCS subcommittee are:  
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  
Prof. Dr. C. De Wagter

## 7. Subcommittee 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. The audit focuses on measurements in at least one, preferably a 6 MV, photon beam. Measurements in other energies will be included when available. It is the intension to visit every institute in the Netherlands and Belgium.

In 2008 the subcommittee was initiated. There have been four meetings and it was extended with two Belgian members. The project plan was finalized, the measuring protocol was drafted and tested several times and a logistic plan was set-up.

The responsible physicists of all radiotherapy departments in Belgium and The Netherlands received an information letter about the audit. A questionnaire was drafted and send to all these RT-departments.

A special website was set-up for the members. (<http://www.nvkfm.nl/dosimetrieforum>)

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  
PhD. K. Feyen

## 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 "radiology and nuclear medicine"*

### 2008 Report from the NCS Platform for Radiology and Nuclear Medicine

#### *Diagnostic reference levels*

Main achievement in 2008 was 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 R.W. Bouwman, C.R.L. Cromptvoets-Jeukens, T.D. Geertse, J. Geleijns, W.A. Hummel, P. Stoop, G.J. Streekstra, W.J.H. Veldkamp (chairman), D. Zweers, W.C. Krispijn (project manager). The working group prepared diagnostic reference levels for mammography (three compressed breast thicknesses), radiography (PA chest, abdomen), and computed tomography (CT angiography of the chest, routine CT abdomen). In October 2008 a NCS document on diagnostic reference levels was published. During a workshop in November 2009 with 120 participants, the NCS document on diagnostic reference levels was presented to representatives of the Dutch Ministry of Health. Simultaneously a website was published to promote implementation of diagnostic reference levels in the Netherlands (<http://www.referentieniveau.nl/>). In addition, the diagnostics reference levels were presented at conferences and a refresher course of involved professional groups (Annual Conference of the Dutch Society for Medical Physics, Annual Conference of the Belgian Society for Medical Physics, Annual Conference of The Dutch Society Medical Imaging and Radiotherapy, National Refresher Courses of the Dutch Society for Radiology).

A proposal for developing diagnostic reference levels for pediatric radiology (micturating cystourethrogram (MCUG), and radiography (chest and abdomen) and adult cardiovascular imaging (coronary angiography by cardiac catheterization and computed tomography) was prepared in cooperation with the Dutch Ministry of Health. To achieve this a new working NCS group will be established in 2009, this activity will start and will be finalized in 2010.

#### *Protocol for occupational dosimetry in fluoroscopy applications for workers wearing a lead apron*

The NCS Platform for Radiology and Nuclear Medicine advised on the NCS Protocol for Occupational Dosimetry in Fluoroscopy Applications for Workers Wearing a Lead Apron. Main finding was that exclusion of protective aprons that do not contain lead but another attenuating material seriously hampers the practical value of the proposed NCS Protocol.

#### *Meetings*

There was one plenary meeting of the NCS Platform for Radiology and Nuclear Medicine in 2008, there were various written consultations of the NCS Platform for Radiology and Nuclear Medicine in 2008, there were four meetings of the NCS working group.

Membership advisory platform 'Radiology and Nuclear Medicine':

Prof. Dr. 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 2008

	<i>Income</i> (€)	<i>Costs (€)</i>
Savings-account on December 31, 2007	11053.93	
Current-account on December 31, 2007*	655.34	
Belgian current-account on December 31, 2007	1190.34	
Checks and cash on December 31, 2006		
Contribution Radiological Society of The Netherlands 2006 + 2007	1055.00	
Contribution Dutch Society for Medical Physics 2006	105.00	
Contribution Netherlands Society for Radiotherapy and Oncology 2007	800.00	
Contribution Dutch Society for Nuclear Medicine 2006 + 2007	295.00	
Contribution Society for Radiological Protection of the Netherlands 2006	105.00	
Contribution Netherlands Radiobiological Society 2007		
Contribution Dutch Society of Techn. and other Spec. in Medical Physics	65.00	
Contribution Dutch Society for Medical Imaging and Radiotherapy 2006 + 2007	415.00	
Belgian Hospital Physicists Association 2007	200.00	
Meeting at NMI	720.00	
Final payment NCS Pb aprons project SZW	3926.04	
Interest savings-account	155.82	
Interest current account	31.61	
Capitalisation Belgian current-account		
Sales of NCS Reports	487.49	
Delayed costs catering fifth lustre		3026.55
Costs Chamber of Commerce		27.00
Banking costs		51.14
Banking costs Belgian account		11.95
Costs of subcommittees meetings/final dinner		319.50
Costs web site		619.99
Costs Pb aprons project SZW		68.40
Costs meetings NCS board		
Printing costs		2129.47
Non-cashable cheques		
Cheques and cash on December 31, 2008		
Savings-account on December 31, 2008		11209.75
Current-account on December 31, 2008*		2902.93
Belgian current-account on December 31, 2008		893.89
Total	21260.57	21260.57

## NCS BUDGET 2009

	<i>Income</i> (€)	<i>Costs (€)</i>
Contributions scientific societies	3000.00	
Interest savings-account	150.00	
Sales of NCS Reports	225.00	
Costs Chamber of Commerce		25.00
Banking costs		50.00
Costs of board and subcommittees meetings		300.00
Costs web site		1000.00
Costs of printing NCS Reports		2000.00
Total	3375.00	3375.00

\*Not including Pb apron project SZW

**NCS Balance sheet 31-12-2008**

all amounts in Euro

	debet		credit
Savings account	11209.75		
Current account	-397.07		
Belgian current account	893.89	Equity capital	€ 11,706.57
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	€ 11,706.57		€ 11,706.57

**NCS Income and expenses 2008**

## Contributions:

NVvR	€ 1,055.00		
NVKF	€ 105.00		
NVRO	€ 800.00		
NVNG	€ 295.00		
NVS	€ 105.00		
NVRB			
NVKFM	€ 65.00	Delayed costs	
NVMBR	€ 415.00	catering	€ 3,026.55
SBPH/BVZF	€ 200.00	Printing costs NCS reports	€ 2,129.47
meeting Nmi	€ 720.00	Banking costs Dutch acc.	€ 51.14
		Banking costs Belgian acc.	€ 11.95
Interest savings acc.	€ 155.82	Maintenance web	
		site	€ 619.99
Interest current acc.	€ 31.61	Chamber of	
Sales of NCS reports	€ 487.49	commerce	€ 27.00
Corrected final payment		Subcommittees	€ 319.50
Pb/SZW	€ 626.04	NCS board meetings	
		Costs Pb apron	€ 68.40
		Credit balance	
		(deficit)	-€ 1,193.04
	-----		-----
	€ 5,060.96		€ 5,060.96