

10 -14 June NSFS Conference 2019

Effective collaboration between authorities and CT Manufacturers on CT dose optimisation

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HERCA is a voluntary association

- ▶ HERCA, the Heads of European Radiological protection Competent Authorities, was founded in 2007.
- ▶ It is a voluntary association in which the heads of the Radiation Protection Authorities work together in order to identify and discuss common interests in significant regulatory issues.

32 countries (EU MS + IS, NO, CH, RS)

56 organisations (RPA + TSO),

310 nominations

Observers

EC, IAEA, OECD/NEA, WHO, US FDA

HERCA WG on Medical Applications



Member States

- 21 EU Member States
- 3 additional European States (Iceland, Norway and Switzerland)
- 4 international organisations (EC, IAEA, WHO, FDA)

Work Packages : Justification, Inspection, Clinical audit, Equipment and others

WP CT Manufacturers Stakeholder involvement

- Tremendous developments in CT technology in the last few years
- CT is of great benefit to individual patients and to society
- However for medical exposures there is a steady increase in collective effective dose in developed countries mainly due to CT scanning



CT Manufacturers stakeholder involvement

- HERCA saw the need for actions to be taken against the increasing trend to higher medical exposures
- CT Manufacturers were considered to be one of the most important stakeholders
- 2010 HERCA started a dialogue with GE, Philips, Siemens, Toshiba and COCIR
- COCIR represents the radiological, electromedical and IT industry in Europe



CT Manufacturers stakeholder involvement

COCIR provided a voluntary self commitment in 2011 for the following actions:

1. The development and implementation of a standardised benchmarking of CT systems by characterising dose efficiency in relation to image quality
2. The implementation of dose reduction measures in CT
3. The implementation of dose management and reporting tools
4. The provision of specific training curricula

Characterisation of CT systems standardised benchmarking



MITA[®]
MEDICAL IMAGING
& TECHNOLOGY ALLIANCE
A DIVISION OF **NEMA**

Aim: Manufacturers provide a methodology for CT system characterisation through standardised test methods and conditions

- Industry designed a reference phantom for objective quantification of head and body Low Contrast Detectability (LCD). This methodology offers the potential to quantitatively assess LCD for clinical protocols in the body and in the head in relation to dose.

NEMA[®]

National Electrical Manufacturers Association

*The Association of Electrical Equipment
and Medical Imaging Manufacturers*

Standards

All Standards

All Standards by Product

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Field Representative
Program

International Activities

International and Regional
Standardization Committee
(IRSC)



Computed Tomography Image Quality (CTIQ): Low-Contrast Detectability (LCD) Assessment When Using Dose Reduction Technology

NEMA > Standards

Status: **Active**

Document ID: 100816

NEMA/MITA WP 1-2017 [DOWNLOAD] [BUY]

Gives stakeholders such as regulators, radiologists, medical doctors, CT technologists, and medical physicists an overview of the current techniques and tools (phantoms) that MITA has utilized to assess low contrast detectability (LCD) as a function of radiation dose.

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Number of pages: 17

Characterisation of CT systems standardised benchmarking

HERCA Panel of Experts

- Closely involved in the process
- Carried out tests with the head phantom on a number of CT scanners
- Tests showed that it is possible to characterise a CT scanner by using this phantom.
- The quantification of low-contrast detectability as a function of dose reduction provides a practical, repeatable method for measuring performance of both FBP and IR.
- The phantom is an effective tool for conducting observer studies that yield data in a manner precise enough for regulatory purposes.

Implementation of dose reduction measures in CT



Aim : to foster development and propagation of dose reduction measures across CT scanners

- CT manufacturers committed to continued innovation in dose reduction and optimised dose management
- This commitment standardised a process for periodically incorporating dose reduction capabilities into a standard/ list that defines the minimum required on a new CT system configuration

Implementation of dose reduction measures in CT

A great number of dose reduction features are now available on modern CT scanners.

The most important ones being:

- Predefined protocols for adults and children
 - ✓ Dedicated protocols for children where the x-ray exposure is automatically adapted to the child's size , weight and age
- Dose modulation options
 - ✓ Tube current is automatically adjusted to the patient size
 - ✓ Tube voltage is automatically adjusted for each individual patient for a specific examination
- Iterative reconstruction algorithms support dose reduction while maintaining diagnostic image quality

Implementation of dose reduction measures in CT

- A number of publications have shown that by using these tools the dose length product per CT examination can be reduced by between 20% and 70% depending on the part of anatomy being examined
- CT Manufacturers continue to work on dose reduction capabilities and then have these put into IEC standards so that these capabilities become part of CT product configurations

Dose management and reporting tools

Aim: Manufacturers develop dose management and reporting tools

NEMA standards were developed:

- CT Dose Check Standard allows the setting of dose values which should not be exceeded for each CT protocol and gives user feedback when dose is exceeded
- Access controls for CT : identification, interlocks and Logs standard it relates to who has access/permission to use the CT for clinical or other uses
- Supplemental requirements for user information and system function related to dose in CT it identifies uniform and standardised information to be provided to the users of CT

Dose management and reporting



Dose management tools offer the following benefits:

- Establishment of DRLs
- Verification of compliance with DRLs
- Dose optimisation
- Can be used as an education and training tool
- Allow for large scale data capture from CT scanners to be used for QA , dose optimisation and epidemiological studies
- Immediate access to patients previous dose records can help in the justification process

All COCIR CT manufacturers provide a display of dose metrics and export capability

Provision of specific training curricula

Aim: Manufacturers ensure the appropriate, safe and effective use of imaging equipment by the clinical user.

This includes:

- The provision of specific training curricula on dose reduction techniques
- How to use these techniques in daily practice
- Enable users to reduce patient dose

Provision of specific training curricula

Manufacturers provide training in the following manner:

- Hands on and didactic training to reinforce skills
- Operator manuals to demonstrate information on dose optimisation and dose reduction techniques
- Information on dose related displays, indices and where dose information is located
- Onsite training, classroom instruction, online tutorial, publications and seminars

Multi-stakeholder meetings

CT manufacturers and HERCA acknowledged the need to raise awareness concerning training and education via the involvement of other stakeholders

- Three multi-stakeholder meetings 2015, 2016 and 2017



Multi-stakeholder meetings

- Participants: HERCA, COCIR, ESR, EANM, ESTRO, EFOMP, EFRS and ISSRT
- Observers: IAEA, WHO, EC and IRPA

Result from the meetings: commitments received from ESR, EANM, EFRS and EFOMP



ESR



The banner features a background image of medical professionals in a clinical setting. On the left, a woman with short blonde hair is smiling. In the center, a man in a white lab coat is partially visible. On the right, a man in a blue shirt is looking towards the camera, with a woman in a blue lab coat and glasses looking at him. The banner includes the ESR EuroSafe Imaging logo in the top left and the ESR logo with 'EUROPEAN SOCIETY OF RADIOLOGISTS' in the top right. Two overlapping circles contain the text 'EuroSafe Imaging Together for patient safety' and 'Become a Friend of EuroSafe Imaging!'. A navigation menu at the bottom consists of teal and grey buttons.

ESR
EUROSAFE
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EuroSafe
Imaging
**Together
for patient
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ESR - IAEA

The screenshot shows the IAEA RPOP website. At the top, there is a search bar for RPOP. The main navigation bar includes links for Home, Information for, Additional Resources, Special Groups, Member Area, Register, and About Us. A left sidebar contains categories: Information for Health Professionals, Member States, and Patients and Public. Below this is a Social Media section with a Facebook link and a 'Like Page' button for the RPOP Facebook page. The main content area features a breadcrumb trail: Home » Training » Free Webinars. The primary heading is 'Past webinar: Tips and tricks in CT (29 August 2017, 3 pm CET)'. Below this is a sub-heading 'Tips and Tricks in CT' and a small image of a person in a CT scanner. To the right of the image, the time and presenter are listed: 'Time: 29 August 2017, 3 pm CET (check time in your country)' and 'Presenter: G. Frija, J. Santos'. A 'How' icon is visible on the right. A prominent link reads 'Recording: if you wish to listen to a recording, please click here'. Below the link, it states the webinar is organized jointly with the EuroSafe Imaging campaign of the European Society of Radiology. A paragraph describes EuroSafe Imaging as the European Society of Radiology's flagship campaign to promote quality and safety in medical imaging. A final paragraph notes the increased use of CT in medical imaging and its contribution to patient exposure to ionising radiation.

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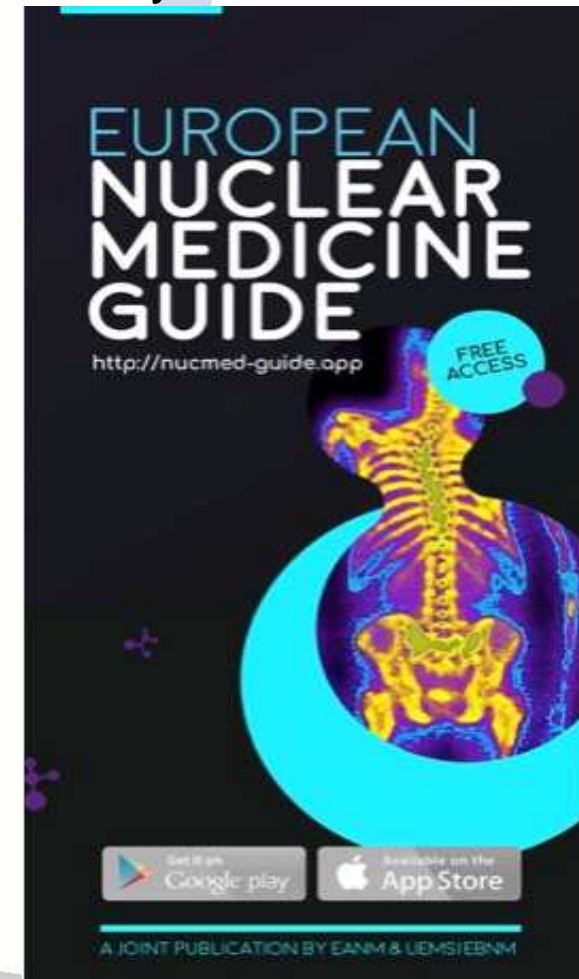
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Past webinar: Tips and tricks in CT (29 August 2017, 3 pm CET)
Tips and Tricks in CT
Time: 29 August 2017, 3 pm CET (check time in your country)
Presenter: G. Frija, J. Santos
Recording: if you wish to listen to a recording, please click here
Organized jointly with the EuroSafe Imaging campaign of the European Society of Radiology
EuroSafe Imaging is the European Society of Radiology's flagship campaign to promote quality and safety in medical imaging. The mission of EuroSafe Imaging is to support and strengthen medical radiation protection across Europe following a holistic, inclusive approach.
The escalated use of computed tomography (CT) in medical imaging, both for diagnostic and therapeutic procedures, is significantly contributing to the increased patient exposure to ionising radiation and consequently to increased population dose, especially in developed countries.

EANM

In 2016, the EANM board approved two specific voluntary self-commitments aimed at optimising CT-use.

- New and revised guidelines will include, where relevant, specific suggestions on the optimized use of CT
- EANM will include, in future congresses, relevant education to support the optimized use of CT in hybrid modalities



EANM

For the EANM congress 2017 in Vienna, 2 sessions are planned:

- One “symposium“ proposed by the Radiation Protection Committee, and
- One “Joint EANM- EFOMP“ session proposed by the Physics Committee



Committee Symposium (Radioprotection)
Monday, October 23, 16:30-18:00

Topic
CT-Optimisation of Hybrid Imaging

Chairs
Michael Lassmann (Wurzburg)
Kristoff Muylle (Ostend)

EFOMP



- Organised a number of courses on CT dose optimization in 2016, 2017 and 2018
- Has established memoranda of agreement with subject societies ESTRO, EANM, ESR and EFRS
- Signed a memorandum of understanding with COCIR in Vienna on the 3rd of March 2017



MoU EFOMP-COCIR

signed in Wien March 2017



Organization of a joint EFOMP-COCIR ESMPE edition on **“CT Technology-Dosimetry-Optimization – 25-27 January 2018 - Prague**

EFOMP will organize a session (three hours)

1. Risk assessment in CT imaging
2. Image quality parameters in modern CT imaging
3. Image reconstruction in CT - from traditional FBP to iterative methods

EFOMP will organize a session (four hours)

1. Patient specific dosimetry in CT
2. Managing patient dose with CT dose tracking systems
3. CT DRLs, notification values, alert values
4. EFOMP Guidelines on the transposition of EU BSS art. 60 in CT

A joint session and a round table EFOMP-COCIR on CT acquisition protocol optimization



MEMORANDUM OF UNDERSTANDING signed in Wien March 2017



Organization of a joint EFOMP-COCIR ESMPE edition on **“CT Technology-Dosimetry-Optimization – 25-27 January 2018 - Prague**

COCIR will organize a session (four hours) to explain how different vendors implement in their equipment:

1. TCM modulation
2. Iterative reconstruction
3. Automatic kV selection
4. Registration and display of dosimetry indexes

COCIR will organize a session (four hours) to explain how different vendors are planning future developments

1. Physics and technology - Single tube multi energy or double tube?
2. Spectral multi energy acquisitions - CT photon counting
3. Organ dedicated CT
4. CT dose metrics

A joint session and a round table (four hours) EFOMP-COCIR on CT

Outcomes from the HERCA WP CT manufacturers

- 2014 Position paper :
“The process of CT dose optimisation through education and training and the role of the CT manufacturers”
- 2015 : Addendum to the position paper with the feedback from the stakeholders
- 2017 : Report “CT Manufacturers Stakeholder involvement”
- 2012-2017 six press releases
- CT dose reduction and dose management tools available for the benefit of the patient





Thank you for your attention

For further information see
www.herca.org