

International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry (IDOS 2019)

18 – 21 June 2019

PROGRAMME

Organized by the
International Atomic Energy Agency (IAEA)

IAEA Headquarters Vienna, Austria

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Location of the Event:

International Atomic Energy Agency
Vienna International Centre (VIC)
Building M

Wagramer Strasse 5
A-1400 Vienna, Austria
Tel.: (+43 1) 2600 21330

Working Language:

English

Resolutions:

No resolutions may be submitted for consideration on any subject; no votes will be taken.

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TIMETABLE

Key: EC – Educational Course
PL – Plenary
T – Topical
PTD – Plenary Topical Discussion

Tuesday, 18 June 2019

| Time | Session No. | Session Title / Break | Venue |
|---------------|-------------|--|-------------------------------------|
| 08:30 – 09:15 | 1 | EC: TRS-483 | Board Room A |
| 08:30 – 09:15 | 3 | EC: Interventional Radiology Dosimetry | M3 |
| 09:15 – 10:00 | 2 | EC: Advances in Brachytherapy Dosimetry | Board Room A |
| 09:15 – 10:00 | 4 | EC: DICOM-Based Dose Reporting | M3 |
| 10:00 – 11:00 | 5 | PL: Opening Session: Welcome | Board Room B/M1 |
| 11:00 – 11:30 | | <i>Break</i> | |
| 11:30 – 13:00 | 6 | T: Small Field Dosimetry | Board Room B/M1 |
| 11:30 – 13:00 | 7 | T: Computational Dosimetry | Board Room A |
| 13:00 – 14:30 | | <i>Lunch Break</i> | |
| 14:30 – 15:30 | 8 | T: Traceability | Board Room B/M1 |
| 15:30 – 16:15 | 9 | PL: Poster Highlights | Board Room B/M1 |
| 16:15 – 17:00 | | Poster Viewing | Outside Board Room A – Second Floor |
| 17:00 – 18:00 | 10 | PL: Dosimetry Audits in Radiotherapy: Past, Present and Future | Board Room B/M1 |
| 18:00 – 20:00 | | Welcome Reception | M-Building – Ground Floor |

Wednesday, 19 June 2019

| Time | Session No. | Session Title / Break | Venue |
|---------------|-------------|---|-----------------|
| 08:00 – 09:30 | 11 | EC: Dose Considerations for Imaging in Radiotherapy | Board Room A |
| 08:00 – 08:45 | 12 | EC: Nuclear Medicine Dosimetry | M3 |
| 08:45 – 09:30 | 13 | EC: Physics and Dosimetry of Alpha Emitters | M3 |
| 09:30 – 10:30 | 14 | PL: Development of Standards | Board Room B/M1 |
| 10:30 – 11:00 | | <i>Break</i> | |
| 11:00 – 12:30 | 15 | T: Status of the Update of TRS-398 | Board Room B/M1 |
| 11:00 – 12:30 | 16 | T: Dosimetry in Nuclear Medicine | Board Room A |
| 12:30 – 14:00 | | <i>Lunch Break</i> | |

| Time | Session No. | Session Title / Break | Venue |
|---------------|-------------|--|-----------------|
| 14:00 – 14:45 | 17 | PTD: Is Patient-Specific Dosimetry in Radionuclide Therapy Improving Patient Care? | Board Room B/M1 |
| 14:45 – 15:30 | 18 | T: Out of Field Dosimetry | Board Room A |
| 14:45 – 15:30 | 19 | T: Dosimetry as a Tool in Optimization and Auditing | M3 |
| 15:30 – 16:00 | | <i>Break</i> | |
| 16:00 – 18:00 | 20 | T: Protons and Beyond | Board Room B/M1 |
| 16:00 – 17:00 | 21 | T: Dosimetry for Radiobiology Experiments | M3 |
| 17:00 – 18:00 | 22 | T: Occupational Dosimetry | Board Room A |

Thursday, 20 June 2019

| Time | Session No. | Session Title / Break | Venue |
|---------------|-------------|---|-----------------|
| 08:00 – 09:30 | 23 | EC: Estimation of Uncertainties | Board Room A |
| 08:00 – 09:30 | 24 | EC: Quantitative Imaging for Radionuclide Therapy | M3 |
| 09:30 – 10:30 | 25 | PTD: Moving from Measurable to Patient-Specific Dose Quantities | Board Room B/M1 |
| 10:30 – 11:00 | | <i>Break</i> | |
| 11:00 – 12:30 | 26 | T: Updates in Reference Dosimetry | Board Room B/M1 |
| 11:00 – 12:30 | 27 | T: Dosimetry in Therapeutic Nuclear Medicine | Board Room A |
| 12:30 – 14:00 | | <i>Lunch Break</i> | |
| 14:00 – 14:45 | 28 | PTD: Black Box Dosimetry | Board Room B/M1 |
| 14:45 – 16:00 | 29 | T: Dosimetry Audits for New Technology | Board Room A |
| 14:45 – 16:00 | 30 | T: Monte Carlo in Diagnostic Radiology and Nuclear Medicine | M3 |
| 16:00 – 16:30 | | <i>Break</i> | |
| 16:30 – 18:00 | 31 | T: Clinical Dosimetry for Diagnostic and Interventional Radiology | Board Room B/M1 |
| 16:30 – 18:00 | 32 | T: Dosimetry in the Presence of Magnetic Fields | Board Room A |

Friday, 21 June 2019

| Time | Session No. | Session Title / Break | Venue |
|---------------|-------------|--|--------------|
| 08:00 – 08:45 | 33 | EC: Are your Radiotherapy Dose Calculations Correct? | Board Room A |
| 08:00 – 08:45 | 35 | EC: Dosimetry in Mammography and Tomosynthesis | M3 |

| Time | Session No. | Session Title / Break | Venue |
|----------------------|-------------|--|-----------------|
| 08:45 – 09:30 | 34 | EC: QA Detectors and Dosimetry Processes | Board Room A |
| 08:45 – 09:30 | 36 | EC: CT Dosimetry | M3 |
| 09:30 – 10:30 | 37 | PTD: Updates and Challenges in Detector Technology | Board Room B/M1 |
| <i>10:30 – 11:00</i> | | <i>Break</i> | |
| 11:00 – 12:00 | 38 | T: Novel Dosimetry | Board Room A |
| 11:00 – 12:00 | 39 | T: Use of Effective Dose as an Indicator of Patient Risk | M3 |
| 12:00 – 12:30 | | Closing Session | Board Room B/M1 |

TUESDAY, 18 JUNE 2019

08:30 – 09:15 **TRS-483**
Session Type: **Educational Course**
Venue: **Board Room A**
Chair: **K. Christaki, IAEA**
Invited Speaker: **P. Andreo, Sweden**

08:30 – 09:15 **Interventional Radiology Dosimetry**
Session Type: **Educational Course**
Venue: **M3**
Chair: **H. Delis, Greece**
Invited Speaker: **R. Padovani, ICTP**

09:15 – 10:00 **Advances in Brachytherapy Dosimetry**
Session Type: **Educational Course**
Venue: **Board Room A**
Chair: **B. Healy, IAEA**
Invited Speaker: **P. Papagiannis, ESTRO**

09:15 – 10:00 **DICOM-Based Dose Reporting**
Session Type: **Educational Course**
Venue: **M3**
Chair: **H. Delis, Greece**
Invited Speaker: **M. Mahesh, AAPM**

TUESDAY, 18 JUNE 2019

10:00 – 11:00 **Opening Session: Welcome**

Session Type: **Plenary**

Venue: **Board Room B/M1**

Chair: **D. van der Merwe, IAEA**

Invited Speaker: **P. Andreo, Sweden**

| Time | Name | Designating Member State/Organization | Title |
|---------------|-----------------------|--|---|
| 10:00 – 10:15 | N. Mokhtar | Deputy Director General, Head of Department of Nuclear Sciences and Applications | Opening Addresses |
| | D. Yang | Deputy Director General, Head of Department of Technical Corporation | |
| | M. Abdel-Wahab | Director, Division of Human Health | |
| 10:15 – 11:00 | P. Andreo | Sweden | Half a Century of IAEA Radiation Dosimetry Developments |

TUESDAY, 18 JUNE 2019

11:30 – 13:00 **Small Field Dosimetry**

Session Type: **Topical**

Venue: **Board Room B/M1**

Chair: **H. Palmans, Austria**

Co-Chair: **K. Christaki, IAEA**

Invited Speaker: **M. S. Huq, AAPM**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|---|---------------------------------------|---|
| 11:30 - 11:50 | 336 | M. S. Huq R. Alfonso-Laguardia M. Arib et al. | AAPM | Implementation of the International Code of Practice on Dosimetry of Small Static Fields used in External Beam Radiotherapy (TRS-483) |
| 11:50 - 12:00 | 30 | S. Wegener B. Herzog O. A. Sauer | Germany | Detector choice for depth dose curves including the build-up region of small MV photon fields |
| 12:00 - 12:10 | 158 | B. Casar E. Gershkevitch I. Mendez | Slovenia | Output correction factors for eight ionization chambers in small static photon fields |
| 12:10 - 12:20 | 271 | L. Mirzakhani R. Bassalow D. Zaks et al. | ESTRO | Reference dosimetry of a new biology-guided radiotherapy (BgRT) system following the IAEA TRS-483 CoP |
| 12:20 - 12:30 | 74 | Z. Msimang D. van der Merwe N. Maphumulo | South Africa | Uncertainty contributors in the dosimetry of small static fields |
| 12:30 - 12:40 | 292 | P. Kazantsev K. Repnin P. Wesolowska et al. | IAEA | Small field photon beams audit pilot study: Preliminary results |
| 12:40 - 12:50 | 215 | V. Desai Z. Labby L. DeWerd W. Culbertson | USA | On the implementation of the plan class-specific reference field concept using multidimensional clustering of plan features |
| 12:50 - 13:00 | - | - | - | Discussion |

TUESDAY, 18 JUNE 2019

11:30 – 13:00 **Computational Dosimetry**

Session Type: **Topical**

Venue: **Board Room A**

Chair: **M. McEwen, Canada**

Co-Chair: **P. Toroi, IAEA**

| Time | No. | Name | Designating Member State/Organization | Title of Paper/Presentation |
|---------------|-----|--|---------------------------------------|---|
| 11:30 - 11:45 | 140 | A. Bourgouin M. McEwen | Canada | Determination of Wair in high-energy clinical electron beams using aluminium detectors |
| 11:45 - 12:00 | 309 | X. J. Wang B. Miguel J. Seuntjens J. M. Fernández-Varea | Canada | Impact of different theoretical models in the calculation of Compton mass energy-transfer coefficients |
| 12:00 - 12:15 | 244 | J. B. Christensen C. E. Andersen | Denmark | Ionization quenching in organic plastic scintillators for particle dosimetry |
| 12:15 - 12:30 | 73 | R. Vijitha S.W. Peterson | Sri Lanka | Comparing measured and simulated prompt gamma cross-section data for carbon target using AFRODITE clover detector system |
| 12:30 - 12:45 | 104 | T. Sander A. Subiel S. E. Galer | UK | Monte Carlo calculated conversion and correction factors for NPL's HDR ¹⁹² Ir brachytherapy absorbed dose standard and measured dose rate constant for the HDR ¹⁹² Ir Flexisource |
| 12:45 - 13:00 | 266 | J. G. Hjørringgaard L. R. Lindvold C. Ankjærgaard et al. | Denmark | Towards traceable low-energy x-ray dosimetry with alanine: Modelling the spectral distribution of a 50 kV x-ray tube |

TUESDAY, 18 JUNE 2019

14:30 – 15:30 **Traceability**
Session Type: **Topical**
Venue: **Board Room B/M1**
Chair: **D. van der Merwe, IAEA**
Invited Speaker: **M. McEwen, Canada**
 S. Judge, BIPM

| Time | No. | Name | Designating Member State/Organization | Title of Paper/Presentation |
|---------------|-----|---|---------------------------------------|--|
| 14:30 - 14:45 | 344 | S. Judge D. Burns R. Coulon et al. | BIPM | The international measurement system for ionizing radiation |
| 14:45 - 15:00 | 348 | M. McEwen | Canada | The role of the CIPM Consultative Committee on Ionising Radiation (CCRI) |
| 15:00 - 15:15 | 350 | P. Toroi | IAEA | The IAEA/WHO Network of Secondary Standards Dosimetry Laboratories |
| 15:15 - 15:22 | 131 | S. M. Tajudin Y. Namito T. Sanami H. Hirayama | Malaysia | Calibration of survey meters by using a newly developed quasi-monoenergetic of ~190 keV photon field: A preliminary result |
| 15:22 - 15:29 | 196 | W. Bulski P. Ulkowski K. Chelminski et al. | Poland | Well chamber calibration experience of the Polish SSDL |

TUESDAY, 18 JUNE 2019

15:30 – 16:15 **Poster Highlights**

Venue: **Board Room B/M1**

Chair: **V. Tsapaki, IOMP**

Invited Speakers: **A. Meghziene, IAEA**
C. Kessler, BIPM
D. Followill, USA
P. Allisy, France
R. Cruz-Suarez, IAEA

17:00 – 18:00 **Dosimetry Audits in Radiotherapy: Past, Present and Future**

Session Type: **Plenary**

Venue: **Board Room B/M1**

Chair: **M. Abdel-Wahab, IAEA**
A. Velazquez Berumen, WHO

Invited Speakers: **J. Izewska, IAEA**
D. Followill, USA
C. Clark, UK

WEDNESDAY, 19 JUNE 2019

08:00 – 09:30 **Dose Considerations for Imaging in Radiotherapy**

Session Type: **Educational Course**

Venue: **Board Room A**

Chair: **K. Christaki, IAEA**

Invited Speakers: **B. Healy, IAEA**
 C. Martin, ICRP

08:00 – 08:45 **Nuclear Medicine Dosimetry**

Session Type: **Educational Course**

Venue: **M3**

Chair: **G. L. Poli, IAEA**

Invited Speaker: **K. Bacher, EANM**

| Time | Name | Designating Member State/Organization | Title |
|---------------|------------------|---------------------------------------|---|
| 08:00 – 08:45 | K. Bacher | EANM | Dosimetry for diagnostic and therapeutic nuclear medicine |

08:45 – 09:30 **Physics and Dosimetry of Alpha Emitters**

Session Type: **Educational Course**

Venue: **M3**

Chair: **G. L. Poli, IAEA**

Invited Speakers: **S. Palm, Sweden**
 A. Haug, Austria

| Time | Name | Designating Member State/Organization | Title |
|---------------|----------------|---------------------------------------|--|
| 08:45 – 09:00 | A. Haug | Austria | Current status of alpha particle therapies |
| 09:00 – 09:30 | S. Palm | Sweden | Physics and dosimetry of alpha emitters |

WEDNESDAY, 19 JUNE 2019

09:30 – 10:30 **Development of Standards**

Session Type: **Plenary**

Venue: **Board Room B/M1**

Chair: **S. Judge, BIPM**

Co-Chair: **P. Toroi, IAEA**

Invited Speaker: **V. Smyth, UK**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|---|---------------------------------------|--|
| 09:30 - 09:50 | 186 | V. Smyth I. Billas D. Shipley et al. | UK | Development of a new primary standard of absorbed dose to water for radiopharmaceutical therapy |
| 09:50 - 09:58 | 280 | B. Côté J. Seuntjens A. Sarfehnia J. Renaud | Canada | Aerrow-Mini: A probe-format graphite calorimeter for absolute dosimetry of small high-energy photon fields |
| 09:58 - 10:06 | 49 | R. Minniti P. Bergstrom F. Bateman | USA | Design of a brass wall spherical ionization chamber for realizing air kerma in megavoltage photon beams |
| 10:06 - 10:14 | 18 | C. Salata A. Mantuano M. G. David et al. | Brazil | Absorbed dose to water standard using Fricke dosimetry for 192Ir brachytherapy sources |
| 10:14 - 10:22 | 108 | E. Mainegra-Hing | Canada | Can we use Monte Carlo calculated free-air chamber attenuation corrections? |
| 10:22 - 10:30 | 313 | R. Thomas A. Lourenco H. Palmans N. Lee | UK | Design, development and operation of a primary standard graphite calorimeter for proton beam dosimetry |

WEDNESDAY, 19 JUNE 2019

11:00 – 12:30 **Status of the Update of TRS-398**

Session Type: **Topical**

Venue: **Board Room B/M1**

Chair: **D. Burns, BIPM**

Co-Chair: **K. Christaki, IAEA**

Invited Speakers: **P. Andreo, Sweden**
 R.-P. Kapsch, Germany
 S. Vatnitsky, Austria
 M. McEwen, Canada

| Paper No. | Name | Designating Member State/Organization | Title of Paper |
|-----------|---|--|---|
| 345 | P. Andreo D. T. Burns P.-P. Kapsch et al. | Sweden | Status of the update of the IAEA TRS-398 Code of Practice |

WEDNESDAY, 19 JUNE 2019

11:00 – 12:30 **Dosimetry in Nuclear Medicine**

Session Type: **Topical**

Venue: **Board Room A**

Chair: **J. Gear, EANM**

Co-Chair: **G. L. Poli, IAEA**

Invited Speakers: **I. Gardin, ISO**
 M. Bardies, IOMP
 S. Palm, Sweden
 A. P. Robinson, UK

| Time | No. | Name | Designating Member State/Organization | Title of Paper/Presentation |
|---------------|-----|--|---------------------------------------|---|
| 11:00 - 11:15 | - | M. Bardies | IOMP | Model-based vs. patient specific – implications for nuclear medicine dosimetry |
| 11:15 - 11:30 | 335 | I. Gardin | ISO | Cell-level dosimetry |
| 11:30 - 11:45 | 189 | A. P. Robinson C. Bobin M. Lassmann et al. | UK | Outcomes of the MRTDosimetry project: Metrology for clinical implementation of dosimetry in molecular radiotherapy |
| 11:45 - 12:00 | 138 | S. Palm | Sweden | Clinical alpha-particle dosimetry |
| 12:00 - 12:10 | 86 | C. F. Calderón Marín J. J. González G. Sgouros | Cuba | Adaptive biological treatment planning for peptide radionuclide radiotherapy |
| 12:10 - 12:20 | 274 | S. Fazlic H. Weatherburn | Bosnia and Herzegovina | Parametric optimization of predictive mathematical model for the final thyroid mass determination, assuming heterogeneity of thyroid gland mass density |
| 12:20 - 12:30 | 22 | M. Takahashi J. Fernández-Varea A. Santos et al. | Brazil | Patient specific dosimetry in radiosynovectomy ¹⁵³ Sm-HA |

WEDNESDAY, 19 JUNE 2019

14:00 – 14:45 **Is Patient-Specific Dosimetry in Radionuclide Therapy Improving Patient Care?**

Session Type: **Plenary Topical Discussion**

Venue: **Board Room B/M1**

Chairs: **K. Bacher, EANM
D. Paez, IAEA**

Invited Speakers: **A. Haug, Austria
M. W. Konijnenberg, EANM**

| Time | No. | Name | Designating Member State/Organization | Title of Paper/Presentation |
|---------------|-----|---------------------------|---------------------------------------|---|
| 14:00 - 14:15 | - | A. Haug | Austria | The NM physician point-of-view |
| 14:15 - 14:30 | 334 | M. W. Konijnenberg | EANM | Is patient-specific dosimetry in radionuclide therapy improving patient care? The physicist point-of-view |
| 14:30 - 14:45 | - | - | - | Discussion |

WEDNESDAY, 19 JUNE 2019

14:45 – 15:30 **Out of Field Dosimetry**

Session Type: **Topical**

Venue: **Board Room A**

Chair: **S. Kry, GHG**

Co-Chair: **K. Christaki, IAEA**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|--|---------------------------------------|--|
| 14:45 - 14:56 | 9 | G. K. Jain A. Chougule R. Verma | India | Dosimetric inefficacy of non-tissue equivalent commercial optically stimulated luminescence dosimeter for in vivo dosimetry of out of radiation field exit dose measurements in external beam radiotherapy |
| 14:56 - 15:07 | 167 | A. Alem-Bezoubiri H. Mazron A. C. Chami | Algeria | Sensitivity analysis to neutron dose at patient's organs according to some parameters in a LINAC in the case of a bladder treatment |
| 15:07 - 15:18 | 213 | A. Toutaoui H. Mahmoudi M. Belmessaoud et al. | Algeria | Imaging dose from different imaging modalities in image guided radiotherapy of head and neck |
| 15:18 - 15:29 | 314 | M. De Saint-Hubert Ž. Knežević M. Majer et al. | Belgium | Out-of-field dosimetry in proton versus photon radiotherapy – an outline of the EURADOS Working Group 9 measurement campaigns in pediatric phantoms |

WEDNESDAY, 19 JUNE 2019

14:45 – 15:30 **Dosimetry as a Tool in Optimization and Auditing**

Session Type: **Topical**

Venue: **M3**

Chair: **H. Delis, Greece**

Co-Chair: **P. Allisy, France**

Invited Speaker: **V. Tsapaki, IOMP**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|---|---------------------------------------|---|
| 14:45 - 15:00 | 351 | V. Tsapaki | IOMP | Dosimetry as a tool in optimization and auditing |
| 15:00 - 15:10 | 23 | F. Santos W. Abujaile A. Mourão | Brazil | Organ dose evaluation in neck computed tomography scans using a male anthropomorphic phantom |
| 15:10 - 15:20 | 43 | P. Costa L. Giansante D. Nersissian E. Gebrim | Brazil | Evaluation of lung and thyroid doses in paediatric CT |
| 15:20 - 15:30 | 322 | D. Joseph C. Nzotta M. Alhamdu N. Boboin | Nigeria | Radiation protection dosimetry and diagnostic reference levels for x-ray imaging procedures: An excerpt from ICRP publication 135 |

WEDNESDAY, 19 JUNE 2019

16:00 – 18:00 **Protons and Beyond**

Session Type: **Topical**

Venue: **Board Room B/M1**

Chair: **S. Vatnitsky, Austria**

Co-Chair: **K. Christaki, IAEA**

Invited Speaker: **O. Jäkel, ICRU**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|---|---------------------------------------|---|
| 16:00 - 16:20 | 339 | O. Jäkel C. Bertb P. Fossati et al. | ICRU | The new ICRU report on prescribing, recording and reporting light ion beam therapy |
| 16:20 - 16:40 | 289 | H. Palmans J. Medin S. Vynckier et al. | Austria | Reference dosimetry of scanned proton beams – state of the art |
| 16:40 - 16:52 | 230 | F. Romano D. Shipley H. Palmans | UK | Monte Carlo correction factors for a proton calorimeter in clinical proton beams |
| 16:52 - 17:04 | 185 | M. Bolsa Ferruz H. Palmans A. Carlino et al. | Austria | GATE/Geant4 as a Monte Carlo simulation toolkit for light ion beam dosimetry |
| 17:04 - 17:16 | 125 | S. J. Jin J. Zhang K. Wang Z. P. Wang | China | The preliminary measurement for the absorbed-dose to water of carbon ion beam with ion chambers |
| 17:16 - 17:28 | 241 | J. Osorio Moreno R. Dreindl L. Grevillot et al. | Austria | Dose monitor calibration for a synchrotron based scanned proton beam facility - MedAustron experience |
| 17:28 - 17:40 | 298 | S. Greilich L. Burigo O. Jäkel | Germany | Stopping-power ratios and beam quality factors for ion carbon beams – impact of new ICRU90 key data |
| 17:40 - 17:52 | 304 | A. Lourenco A. Kacperek I. Patel | UK | Ionisation chamber intercomparisons in a low-energy passively-scattered and two high-energy pencil beam scanning proton beams |

WEDNESDAY, 19 JUNE 2019

16:00 – 17:00 **Dosimetry for Radiobiology Experiments**

Session Type: **Topical**

Venue: **M3**

Chair: **H. Rabus, EURADOS**

Co-Chair: **O. Belyakov, IAEA**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|---|---------------------------------------|---|
| 16:00 - 16:15 | 21 | G. Santos Joana B. Seniwal T. Fonseca | Brazil | Study of the electrons range in soft tissue with the energy of 50 keV |
| 16:15 - 16:30 | 28 | T. Fonseca B. Seniwal | Brazil | Microdosimetric calculations for I-123 using Geant4-DNA |
| 16:30 - 16:45 | 67 | I. Silvestre A. Westhorpe M. Barry et al. | UK | Characterization of DoseWire inorganic scintillator for relative measurements in small animal irradiators |
| 16:45 - 17:00 | 255 | A. Subiel I. Silvestre M. Barry | UK | Dosimetry considerations in pre-clinical radiation research with medium energy X-rays |

WEDNESDAY, 19 JUNE 2019

17:00 – 18:00 **Occupational Dosimetry**
Session Type: **Topical**
Venue: **Board Room A**
Chair: **F. Shannoun, UNSCEAR**
Co-Chair: **R. Cruz-Suarez, IAEA**
Invited Speaker: **C. Challeton-de Vathaire, ISO**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|---|---------------------------------------|--|
| 17:00 - 17:15 | 340 | C. Vathaire D. Bingham J.-F. Bottollier-Depois et al. | ISO | ISO/TC 85/SC 2 standards for staff radiation protection in medicine |
| 17:15 - 17:25 | 24 | M. A. Rivera Cardona C. E. Ribeiro Alves | Brazil | Compulsory use of extremity dosimetry in nuclear medicine facilities |
| 17:25 - 17:35 | 54 | C. Martin A. Hughes D. Temperton T. Jupp | ICRP | The UK approach to monitoring finger doses in nuclear medicine |
| 17:35 - 17:45 | 300 | F. Vanhavere E. H. Silva C. Martin N. Buls | Belgium | Correlation between the dose measured with eye lens dosimeters and the eye lens dose, when lead glasses are used |

THURSDAY, 20 JUNE 2019

08:00 – 09:30 Estimation of Uncertainties

Session Type: Educational Course

Venue: Board Room A

Chair: P. Toroi, IAEA

Invited Speakers: H. Palmans, Austria
W. Lechner, Austria
Z. Msimang, South Africa

08:00 – 09:30 Quantitative Imaging for Radionuclide Therapy

Session Type: Educational Course

Venue: M3

Chair: G. L. Poli, IAEA

Invited Speakers: Y. Dewaraja, SNMMI
H.-S. Jans, Canada
J. Gear, EANM

| Time | No. | Name | Designating Member State/Organization | Title of Paper/Presentation |
|---------------|-----|--------------------|---------------------------------------|--|
| 08:00 - 08:25 | 149 | H.-S. Jans | Canada | Calibration of activity meters (aka. dose calibrators) in nuclear medicine |
| 08:25 - 09:05 | - | Y. Dewaraja | SNMMI | Quantitative imaging in NM – calibration methods and standards for different radionuclides |
| 09:05 - 09:30 | - | J. Gear | EANM | Uncertainties in internal dosimetry |

THURSDAY, 20 JUNE 2019

09:30 – 10:30 **Moving from Measurable to Patient-Specific Dose Quantities**

Session Type: **Plenary Topical Discussion**

Venue: **Board Room B/M1**

Chair: **C. Martin, ICRP**

Co-Chair: **P. Toroi, IAEA**

Invited Speakers: **H.-G. Menzel, ICRU**
 F. Shannoun, UNSCEAR
 K. H. Ng, Malaysia

| Time | Name | Designating Member State/Organization | Title |
|---------------|---------------------|--|--|
| 09:30 - 09:45 | H.-G. Menzel | ICRU | Fundamental quantities and units for the dosimetry of ionizing radiation |
| 09:45 - 10:00 | F. Shannoun | UNSCEAR | Challenges in population dose estimations |
| 10:00 - 10:15 | K. H. Ng | Malaysia | Patient doses in a clinical setting |
| 10:15 - 10:30 | - | - | Discussion |

THURSDAY, 20 JUNE 2019

11:00 – 12:30 Updates in Reference Dosimetry

Session Type: Topical

Venue: Board Room B/M1

Chair: B. Healy, IAEA

Co-Chair: K. Christaki, IAEA

Invited Speaker: M. Pinto, Italy

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|--|---------------------------------------|--|
| 11:00 - 11:20 | 341 | M. Pinto C. E. Andersen F. Delaunay et al. | Italy | The contribution of the RTNORM EU consortium to the update of the $k_{Q,Q0}$ factors for the International Dosimetry Code of Practice IAEA TRS 398 |
| 11:20 - 11:31 | 168 | J. Bancheri S. Ketelhut L. Büermann J. Seuntjens | Canada | Monte Carlo determination of chamber correction factors for medium energy X-ray beams between 50 and 300 kV |
| 11:31 - 11:42 | 247 | R. Hill P. Andreo | Australia | A study on the Monte Carlo calculation of kilovoltage x-ray beam backscatter factors |
| 11:42 - 11:53 | 46 | S. Ketelhut L. Büermann J. Bancheri J. Seuntjens | Germany | Measurement of chamber correction factors k_{ch} for medium-energy therapeutic X-rays between 70 kV and 300 kV generating voltage |
| 11:53 - 12:04 | 50 | L. Büermann | Germany | Phantom-based absorbed dose determination in low energy kV x ray beams |
| 12:04 - 12:15 | 246 | C. P. Oliver V. Takau M. D. Hanlon et al. | Australia | The ARPANSA PSDL measured and calculated MV photon k_Q values for the revision of IAEA TRS-398 |
| 12:15 - 12:26 | 77 | B. Muir W. Culberson S. Davis et al. | Canada | Updating the TG-51 protocol for reference dosimetry of high-energy electron beams |

THURSDAY, 20 JUNE 2019

11:00 – 12:30 **Dosimetry in Therapeutic Nuclear Medicine**

Session Type: **Topical**

Venue: **Board Room A**

Chair: **I. Gardin, ISO**

Co-Chair: **G. L. Poli, IAEA**

Invited Speakers: **Y. Dewaraja, SNMMI**
 M. W. Konijnenberg, EANM

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|--|---------------------------------------|--|
| 11:00 - 11:25 | 333 | M. W. Konijnenberg | EANM | Dosimetry for radiopeptide therapy |
| 11:25 - 11:50 | 332 | Y. Dewaraja | SNMMI | Dosimetry in radioembolization therapy of hepatic malignancies: value of post-therapy imaging-based dose estimates |
| 11:50 - 12:00 | 320 | N. Poon-iad A. Teyateeti P. Chaudakshetrin | Thailand | Selective internal radiotherapy dose calculation: A pilot study to compare lung shunt fraction on planar and SPECT/CT imaging |
| 12:00 - 12:10 | 171 | M. Terán Gretter S. Rodriguez N. Niell et al. | Uruguay | ¹⁷⁷ Lu peptide receptor therapy: Dosimetric experience in Uruguay |
| 12:10 - 12:20 | 26 | S. K. Gupta P. Thakral P. K. Bajpai | India | Dosimetric analyses of critical organs (kidney, liver and spleen) of patients with neuroendocrine tumors treated with ¹⁷⁷ Lu-DOTATATE |
| 12:20 - 12:30 | 130 | N. R. Hidayati A. R. Dewi E. Rosilawaty et al. | Indonesia | Pre therapy dosimetry patient with ¹⁷⁷ Lu-PSMA CC34: Indonesia experience |

THURSDAY, 20 JUNE 2019

14:00 – 14:45 **Black Box Dosimetry**

Session Type: **Plenary Topical Discussion**

Venue: **Board Room B/M1**

Chairs: **E. Zubizarreta, IAEA**
 M. Perez, WHO

Invited Speakers: **B. Healy, IAEA**
 C. Clark, UK
 J. A. Polo Rubio, IAEA

THURSDAY, 20 JUNE 2019

14:45 – 16:00 **Dosimetry Audits for New Technologies**

Session Type: **Topical**

Venue: **Board Room A**

Chair: **S. Kry, GHG**

Co-Chair: **P. Kazantsev, IAEA**

Invited Speaker: **N. Jornet, ESTRO**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|---|---------------------------------------|---|
| 14:45 - 15:00 | 337 | N. Jornet C. Clark | ESTRO | Dosimetry audits for advanced techniques: Challenges and potential solutions |
| 15:00 - 15:10 | 61 | T. Santos M. Carmo Lopes E. Gershkevitsh J. Izewska | Portugal | IMRT audit in Portugal: results of an IAEA national supported project |
| 15:10 - 15:20 | 297 | R. Souza L. da Rosa D. Braz | Brazil | Development of a quality control system for intensity modulated radiotherapy |
| 15:20 - 15:30 | 278 | M. McEwen P. Sharpe I. Mansour C. Gouldstone | Canada | Comparison of alanine dosimetry systems at radiation therapy levels |
| 15:30 - 15:40 | 45 | A. Carlino H. Palmans C. Gouldstone et al. | Austria | Novel dosimetry audit based on end-to-end testing with alanine detectors in proton beam therapy |
| 15:40 - 15:50 | 148 | P. Taylor J. Lowenstein P. Alvarez et al. | USA | Proton therapy QA around the globe: IROC Houston's multi-institutional audit program |
| 15:50 - 16:00 | 183 | A. Fukumura H. Mizuno N. Kanematsu et al. | Japan | Quality assurance activities for multi-institutional clinical trial of carbon-ion radiotherapy in Japan |

THURSDAY, 20 JUNE 2019

14:45 – 16:00 **Monte Carlo in Diagnostic Radiology and Nuclear Medicine Dosimetry**

Session Type: **Topical**

Venue: **M3**

Chair: **Y. Dewaraja, SNMMI**

Co-Chair: **G. L. Poli, IAEA**

Invited Speakers: **M. Bardies, IOMP**
P. Andreo, Sweden

| Time | No. | Name | Designating Member State/Organization | Title of Paper/Presentation |
|---------------|-----|---|---------------------------------------|--|
| 14:45 - 15:10 | - | P. Andreo | Sweden | Monte Carlo in Diagnostic Radiology |
| 15:10 - 15:30 | - | M. Bardies | IOMP | Monte Carlo in Nuclear Medicine |
| 15:30 - 15:50 | 315 | M. Bardies M. Chauvin D. Borys et al. | IOMP | OpenDose: An open database of reference data for nuclear medicine dosimetry |
| 15:50 - 16:00 | 70 | P. Pérez M. Valente | Argentina | DOSIS: a patient-specific MC based dosimetry toolkit for nuclear medicine procedures |

THURSDAY, 20 JUNE 2019

16:30 – 18:00 **Clinical Dosimetry for Diagnostic and Interventional Radiology**

Session Type: **Topical**

Venue: **Board Room B/M1**

Chair: **V. Tsapaki, IOMP**

Co-Chair: **H. Delis, Greece**

Invited Speaker: **J. Damilakis, EFOMP**

| Time | No. | Name | Designating Member State/Organization | Title of Paper/Presentation |
|---------------|-----|---|---------------------------------------|---|
| 16:30 - 16:50 | 338 | J. Damilakis | EFOMP | Clinical dosimetry for diagnostic and interventional radiology |
| 16:50 - 17:00 | 51 | L. Büermann S. Rosendahl S. Ketelhut et al. | Germany | Steps toward personalized dosimetry in computed tomography |
| 17:00 - 17:10 | 72 | A. M. L. Gómez P. C. Santana A. P. Mourão | Brazil | Dosimetry in head and neck in computed tomography scans |
| 17:10 - 17:20 | 141 | E. Salomon P. Homolka 1 L. Csete P. Toroi | Austria | Performance of semiconductor dosimeters for air kerma and quality control measurements in mammography |
| 17:20 - 17:30 | 202 | K. H. Ng S. Lau Y. F. A. Aziz | Malaysia | Patient-specific mean glandular dose estimated from full field digital mammography and digital breast tomosynthesis |
| 17:30 - 17:40 | 276 | C. Fedon M. Caballo O. Diaz I. Sechopoulos | EFOMP | Fibroglandular tissue distribution in compressed breasts for a new breast dosimetry model |
| 17:40 - 17:50 | 294 | M. T. B. Toossi H. Zare Z. Eslami et al. | Islamic Republic of Iran | Assessment of entrance skin dose of four groups of children arising from angiography procedures |

THURSDAY, 20 JUNE 2019

16:30 – 18:00 **Dosimetry in the Presence of Magnetic fields**

Session Type: **Topical**

Venue: **Board Room A**

Chair: **R.-P. Kapsch, Germany**

Co-Chair: **K. Christaki, IAEA**

Invited Speaker: **O. Jäkel, ICRU**

| Time | No. | Name | Designating Member State/Organization | Title of Paper/Presentation |
|---------------|-----|---|---------------------------------------|--|
| 16:30 - 16:50 | 346 | O. Jäkel | ICRU | Ion chamber dosimetry in a magnetic field for MR-Linac applications |
| 16:50 - 17:04 | 47 | A. Krauss U. Ankerhold K. Spindeldreier S. Klüter | Germany | A water calorimeter for absorbed dose to water measurements in an MR-linac |
| 17:04 - 17:18 | 229 | J. Renaud A. Sarfehnia J. Bancheri J. Seuntjens | Canada | Calorimetry-based clinical reference dosimetry of a 1.5 T MRI-linac in water and solid phantoms using Aerrow |
| 17:18 - 17:32 | 287 | M. D'Souza H. Nusrat J. Renaud et al. | Canada | Design and performance of an MR-compatible calorimeter |
| 17:32 - 17:46 | 56 | S. Pojtinger R.-P. Kapsch O. Dohm D. Thorwarth | Germany | FEM corrections for Monte Carlo simulations of ionization chambers in magnetic fields |
| 17:46 - 18:00 | 253 | R. Brown U. Jelen J. Begg J. Lye | Australia | Developing a dosimetry audit for MRI linacs |

FRIDAY, 21 JUNE 2019

08:00 – 08:45 **Are Your Radiotherapy Dose Calculations Correct?**

Session Type: Educational Course

Venue: Board Room A

Chair: K. Chelminski, IAEA

Invited Speaker: S. Kry, GHG

08:00 – 08:45 **Dosimetry in Mammography and Tomosynthesis**

Session Type: Educational Course

Venue: M3

Chair: H. Delis, Greece

Invited Speaker: I. Sechopoulos, Netherlands

08:45 – 09:30 **QA Detectors and Dosimetry Processes**

Session Type: Educational Course

Venue: Board Room A

Chair: K. Chelminski, IAEA

Invited Speaker: N. Jornet, ESTRO

| Paper No. | Name | Designating Member State/Organization | Title of Paper |
|-----------|------------------|--|-------------------------------------|
| 342 | N. Jornet | ESTRO | QA: Detectors and dosimetry methods |

08:45 – 09:30 **CT Dosimetry**

Session Type: Educational Course

Venue: M3

Chair: H. Delis, Greece

Invited Speaker: M. Mahesh, AAPM

FRIDAY, 21 JUNE 2019

09:30 – 10:30 **Updates and Challenges in Detector Technology**

Session Type: **Plenary Topical Discussion**

Venue: **Board Room B/M1**

Chair: **S. Kry, GHG**

Co-Chair: **P. Toroi, IAEA**

Invited Speaker: **M. McEwen, Canada**
 L. Büermann, Germany
 S. Kry, GHG

| Time | No. | Name | Designating Member State/Organization | Title of Paper/Presentation |
|---------------|-----|--------------------|---------------------------------------|---|
| 09:30 - 09:45 | 347 | M. McEwen | Canada | Ionisation chamber dosimetry – updates and challenges |
| 09:45 - 10:00 | - | S. Kry | GHG | Detectors used in radiotherapy audits |
| 10:00 - 10:15 | 343 | L. Büermann | Germany | Non-invasive x-ray multimeters used in diagnostic radiology |
| 10:15 - 10:30 | - | - | - | Discussion |

FRIDAY, 21 JUNE 2019

11:00 – 12:00 **Novel Dosimetry**
Session Type: **Topical**
Venue: **Board Room A**
Chair: **H. Palmans, Austria**
Co-Chair: **P. Toroi, IAEA**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|---|---------------------------------------|--|
| 11:00 - 11:15 | 279 | M. McManus A. Subiel F. Romano H. Palmans | UK | Ion recombination in ultra-short high dose-per-pulse Very High Energy Electrons (VHEEs) |
| 11:15 - 11:30 | 160 | H. Rabus C. Villagrasa G. Baiocco et al. | EURADOS | Assessing the contribution of cross sections to the uncertainty of Monte Carlo simulations in micro- and nanodosimetry |
| 11:30 - 11:45 | 165 | S. Ngcezu H. Rabus | South Africa | Nanodosimetric track analysis in a spread-out proton Bragg peak |
| 11:45 - 12:00 | 218 | J. Tikkanen T. Siiskonen V. Litichevskiy et al. | Finland | Novel radiation detectors for x-ray imaging and radiation therapy |

FRIDAY, 21 JUNE 2019

11:00 – 12:00 **Use of Effective Dose as an Indicator of Patient Risk**

Session Type: **Topical**

Venue: **M3**

Chair: **H. Menzel, ICRU**

Co-Chair: **H. Delis, Greece**
M. Pinak, IAEA

Invited Speaker: **C. Martin, ICRP**

| Time | No. | Name | Designating Member State/Organization | Title of Paper |
|---------------|-----|--|---------------------------------------|---|
| 11:00 - 11:30 | 53 | C. Martin J. Harrison | ICRP | ICRP proposals for the application of effective dose in medicine |
| 11:30 - 11:40 | 194 | M. A. Said M. Z. Zaini N. Ali | Malaysia | Comparison of effective dose received by patients undergoing whole-body PET-CT procedure using 18F-FDG and 68Ga-DOTATATE |
| 11:40 - 11:50 | 301 | L. Stadnyk O. Nosyk, O. Shalopa | Ukraine | Using the national diagnostic reference levels for estimation of effective and equivalent organ doses of patients in conventional diagnostic radiology |
| 11:50 - 12:00 | 310 | L. Stadnyk O. Nosyk, O. Shalopa | Ukraine | Assessment of collective effective, equivalent organ doses and radiation risks for Ukrainian population due to conventional X-Ray diagnostic examinations |

FRIDAY, 21 JUNE 2019

12:00 – 12:30 **Closing Session**
Session Type: **Plenary**
Venue: **Board Room B/M1**
Chair: **A. Meghziene, IAEA**
Invited Speaker: **M. S. Huq, AAPM**

| Time | Name | Designating Member State/Organization | Title |
|---------------|-------------------------|--|----------------------|
| 12:00 - 12:20 | M. S. Huq | AAPM | Symposium highlights |
| | D. van der Merwe | IAEA | Closure |

POSTERS

PRIMARY STANDARDS DOSIMETRY LABORATORIES

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|---|---------------------------------------|--|
| 48 | K. Holm U. Weber Y. Simeonov et al. | Germany | Absorbed dose to water measurements in the SOBP of a clinical carbon ion beam using water calorimetry |
| 65 | K. Wang S. Jin Z. Wang J. Zhang | China | Development of a water calorimeter as the absorbed dose-to-water primary standard of high energy photon and electron beams for China |
| 68 | F. Delaunay C. Andersen L. de Prez S. Duane | France | Experimental $k_{Q,00}$ from RTNORM EMPIR project |
| 216 | T. Schneider | Germany | Primary standards and measurement methods for X-ray emitting electronic brachytherapy devices – EMPIR project: PRISM-eBT |
| 226 | M. Pinto M. Pimpinella B. Rapp et al. | Italy | p_Q and $k_{Q,00}$ factors for medium energy x-rays from the RTNORM EMPIR |
| 251 | C. E. Andersen | Denmark | Designing a state-of-the-art dosimetry laboratory for accelerator-based megavoltage photon beam calibrations and research |

SECONDARY STANDARDS DOSIMETRY LABORATORIES

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|---|---------------------------------------|--|
| 31 | C. Omondi E. Cheruiyot W. Adwet M. Nguli | Kenya | Calibration of radiation protection medical monitoring instruments using caesium-137 gamma calibration system |
| 57 | O. Ciraj-Bjelac M. Zivanovic N. Krzanovic | Serbia | Improved calibration service in the field of diagnostic radiology |
| 88 | S. Shahid K. Masood M. Riaz et al. | Pakistan | High energy beams dosimetric intercomparison study at Institute of Nuclear Medicine and Oncology (INMOL) Lahore, Pakistan |
| 94 | A. Herrati K. Khalal-Kouache | Algeria | Establishment of IEC-61267 RQR X-ray qualities at SSDL of Algiers |
| 105 | D. De la Cruz J. Álvarez M. Cabrera | Mexico | The SSDL-ININ Calibration and Measurement Capability (CMC) for reference air kerma rate K_R in LDR ^{137}Cs and HDR ^{192}Ir for well chambers |
| 119 | A. Herrati | Algeria | Establishment of PTB mammography qualities based on W-anode and Al-filtration at SSDL of Algiers |
| 136 | M. Zivanovic N. Krzanovic O. Ciraj Bjelac | Serbia | Stability checks of secondary standards used for calibrations in diagnostic radiology |
| 144 | L. A. Magalhães L. Campos | Brazil | A determination of a correction factor from ^{60}Co to ^{192}Ir obtained by a Monte Carlo simulation |
| 147 | H. J. Mendoza M. A. Montes D. De la Cruz et al. | Mexico | The SSDL-ININ-MEXICO CMCs for Dosimetry |
| 214 | N.Q. Nguyen N. T. Le B. D. Ky H. Q. Nguyen | Vietnam | Geometry correction factors for rectangular neutron devices |
| 228 | J. Huikari T. Siiskonen A. Kosunen P. Pousi | Finland | Personal dose equivalent of neutron radiation at radiation metrology laboratory of STUK |
| 233 | L.N.Thiem N. N.Quynh P. D.Khue N. H.Quyet | Vietnam | Calibrations of neutron survey meters used at a medical linear accelerator facility |

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|--|---------------------------------------|--|
| 318 | N. Kartubi A. F. Firmansyah Pardi C. T. Budiantari | Indonesia | Determination of eye lens dose, Hp(3) using TLD-700H at PTKMR-Batan |
| 319 | N. Kartubi R. Syaifudin S. S. Lolaningrum A. F. Firmansyah | Indonesia | The performance of TLD-BARC's PTKMR-Batan on the intercomparison of Hp(10) in the year of 2016-2018 held by SSDL Jakarta |

DOSIMETRY AUDITS

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|---|---------------------------------------|---|
| 113 | C. Trauernicht M. du Toit M. Mohlapholi et al. | South Africa | Independent Dosimetry Audits as Best Practice in Radiotherapy |
| 127 | H. V. Maselesele Z. N. Msimang | South Africa | Development of a Dosimetry Audit Methodology for Advanced Radiotherapy |
| 164 | F. Hasford E.K. Addison E.K. Sosu et al. | Ghana | Follow Up of Medical Physics Audit of Radiotherapy Centres in Ghana |
| 166 | T. Santos T. Ventura M. Capela et al. | Portugal | Influence of film dosimetry protocols on IMRT audit results |
| 179 | H. Mizuno A. Fukumura W. Yamashita et al. | Japan | 10 years RPLD postal dose audits for radiotherapy in Japan |
| 184 | H. Kim J. Lee M. Song | Republic of Korea | National dosimetry quality audits in radiotherapy |
| 190 | K. Arbabi A. Rajabi M Akbari A. Alipoor | Islamic republic of Iran | 10 years dosimetric quality audit of radiotherapy centers in Iran: SSDL's periodic on-site visit program during 2007-2017 |
| 207 | G. M. Ishak-Boushaki A.-H. Benali M. Allab | Algeria | Energy responses of Radiophotoluminescent glass dosimeters to photons and electrons used in radiotherapy treatments |
| 212 | C. Pesznyak B. Melles-Bencsik E. Gershkevits | Hungary | IAEA supported national IMRT dosimetry audit in Hungary |
| 261 | P. Kazantsev P. Wesolowska E. Gershkevitch et al. | IAEA | The IAEA end-to-end on-site IMRT audit methodology: First national implementation results |
| 270 | P. Wesolowska P. Kazantsev T. Bokulic et al. | IAEA | National trial runs of a remote end-to-end dosimetry audit for IMRT and VMAT treatments |
| 282 | O. C. Choi H. Weatherburn | UK | An in-vivo dosimetry audit of superficial radiotherapy treatment using TLD-100H dosimeters |

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|---------------------------------|---------------------------------------|---|
| 325 | L. Stadnyk O. Shalopa | Ukraine | Analysis of results of national and IAEA/WHO dosimetry quality audit in radiotherapy departments of Ukraine: problems and prospects for improvement |

DIAGNOSTIC RADIOLOGY MEDICAL PHYSICS

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|--|---------------------------------------|---|
| 35 | G. K. Jain A. Chougule R. Verma | India | Measurement of thyroid radiation doses by OSLD during mammography screening |
| 39 | M. Alsabbagh J. Wong A. Tajuddin et al. | Jordan | Measurement techniques comparisons in CT scan: Paediatric neck phantom study |
| 41 | S. C. Uniyal V. Chaturvedi M. Biswas | India | Audit and optimization of patient skin radiation dose during percutaneous nephrolithotomy: A preliminary experience |
| 42 | P. Costa D. Nersissian V. Guerra E. Gebrim | Brazil | Optimization of doses in paediatric CT: preliminary results of an IAEA/CRP project |
| 90 | S. A.-Cholakova E. Kulama Z. Buchakliev V. Arsov | EFOMP | Patient doses from contrast enhanced spectral mammography |
| 99 | O. Ciraj-Bjelac J. Dabin J. Farah et al. | Serbia | Patient maximum skin dose in interventional radiology and cardiology procedures: Summary of EURADOS Working Group 12 activities |
| 111 | R. R. Haghghi S. Moshiri M. E. Fazilat Moaddeli et al. | Islamic Republic of Iran | Comparison of average glandular dose and image quality of electronic and geometric magnification mammogram: A phantom study |
| 116 | S. Iman Saufi S. Husaini | Malaysia | Scattered dose measurement for a mobile C-arm fluoroscopy system: Patient thickness factor |
| 157 | V. Trojani M. Bertolini A. Nitrosi M. Iori | Italy | Machine learning as a novel tool in x-ray angiographic imaging optimization: Comparison to a validated Channelized Hotelling Observer model (CHO) |
| 159 | J. Achuka M. Aweda M. Usikalu | Nigeria | Diagnostic reference levels for routine radiography examinations of model adult human subjects in southwest Nigeria |
| 195 | J. Saaring D. Šutov | Estonia | CTDI of wide beam collimation diagnostic CBCT |
| 208 | A. Bouaoun L. Ben Omrane W. Douira Khomssi et al. | Tunisia | Patient doses in common Pediatric CT examinations in Tunisia: Implementation of National Diagnostic Reference Levels |

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|---|---------------------------------------|---|
| 217 | T. Razakarimanana R. D. Randriantsizafy J. L. R. Zafimanjato et al. | Madagascar | Establishment of Diagnostic Reference Levels (DRLs) for medical radiography examinations in Madagascar |
| 239 | E. F. Maguranyanga N. Ncube G. Azangwe | Zimbabwe | A baseline study of Diagnostic Reference Levels for the three most frequent X-ray procedures in the Bulawayo Metropolitan Province: The possibility of dose reduction |
| 264 | C. Rizk G. Fares F. Vanhavere J. Farah | Lebanon | Patient dose reduction in three Lebanese interventional cardiology suites |
| 331 | F. Niksirat A. S. Monfared M. R. Deevband et al. | Islamic Republic of Iran | Diagnostic reference levels for diagnostic radiology examinations in northern Iran |

RADIOTHERAPY MEDICAL PHYSICS

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|--|---------------------------------------|--|
| 4 | M. Piksis | Latvia | Novel technique for radiation dose visualization in large space |
| 33 | B. Petrovic M. Marjanovic I. Gencil V. Malešević | Serbia | Angular dependence of absorbed dose at two dimensional detector Matrixx- comparison to manufacturer provided data |
| 114 | A. Abdelaal E. M. Attalla W. M. Elshemey | Egypt | Markus and pinpoint ionization chamber detectors behavior with out-of-field dose |
| 128 | S. Savatović S. Peric M. Severgnini G. Giannini | Italy | Neutron dose measurements comparison from medical LINAC with different detectors |
| 142 | E. Gershkevitch B. Casar I. Mendez | Estonia | Dosimetric measurements of stereotactic cones using eight different detectors |
| 169 | D. Z. Ndlovu G. Azangwe | Zimbabwe | Monte Carlo dosimetric characterization of a Bebig Co0.A86 Co-60 brachytherapy source |
| 181 | A. T. Feye P. Chiovati | Ethiopia | Comparison of beam characteristics in reference and non-reference conditions and treatment plans for flattening and flattening free photon beams |
| 182 | J. D. Kisukari P. Chiovati | United Republic of Tanzania | Characterization of diamond detector for dosimetry in the reference and non-reference conditions in the flattened and flattening filter free beams |
| 211 | A. Toutaoui S. Bencheikh R. Louelh et al. | Algeria | Impact of use of IAEA TRS483 correction factors on commissioning of small field dose calculation algorithm |
| 242 | A. Allaith | Bahrain | Small field dosimetry in clinical practice: estimation of micro ionization chamber correction factor using radiochromic film |
| 281 | F. Kiragga R. Vidimari | Uganda | Commissioning of total body irradiation for a new installation |
| 305 | W. Lechner D. Georg H. Palmans | Austria | An analytical formalism for the assessment of dosimetric uncertainties due to positioning uncertainties |

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|---|---------------------------------------|--|
| 312 | M. Arib A. Nobah W. Al-Najar et al. | Saudi Arabia | Testing the IAEA/AAPM code of practice TRS 483 for small fields dosimetry at KFSHRC in Varian True Beam, Cyberknife and Tomotherapy machines |

NUCLEAR MEDICINE MEDICAL PHYSICS

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|---|---------------------------------------|--|
| 71 | F. Santos F. Paiva P. Santana A. Mourão | Brazil | Dosimetric study of pediatric PET/CT tests |
| 151 | N. R. Hidayati D. Andini S. Tri Wahyudi et al. | Indonesia | Development of internal dosimetry tool using PYTHON 3.7 for human dose estimation of new radiopharmaceuticals in Indonesia |
| 193 | A. Nabipour Chakoli R. Serkan M. Sadeghi | Islamic Republic of Iran | Technetium-99m nanoradiopharmaceuticals for decreasing the patients internal dose |
| 199 | A. A. Parach S. Taghizadeh S. K. Razavi-Ratki | Islamic Republic of Iran | Patient specific dosimetry of 99m-Tc-MDP by SPECT/Planar Images and NCAT Phantom using GATE |
| 323 | H. Poorbaygi S. Namdarian A. Hadadi M. Aboudzadeh | Islamic Republic of Iran | Activity quantification on planar imaging for an animal SPECT imaging system (HiRe SPECT) |

RADIATION PROTECTION

| Paper No. | Author | Designating Member State/Organization | Title of Paper |
|-----------|---|---------------------------------------|--|
| 69 | F. P. González R. V. Cruz O. F. Rodríguez P. B. Hernández | Cuba | Calculation of the dose received by Occupationally Exposed Workers in the Radiotherapy service of the Hospital "V. I. Lenin." |
| 78 | O. Ciraj-Bjelac N. Krzanovic M. Zivanovic | Serbia | Active Personal Dosimeter response for non-standard 100 kV X-ray beams |
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