BIR
The British Institute of Radiology

29 SEPTEMBER - 2 OCTOBER 2020

APPROVED BY THE BIR

BIR/IDUG MOLECULAR RADIOTHERAPY DOSIMETRY

Virtual event

CPD: 4 CREDITS (1 PER DAY)

BIR/IDUG MOLECULAR RADIOTHERAPY DOSIMETRY

Virtual event

CPD: 4 CREDITS (1 PER DAY)

Following three highly successful BIR/IDUG conferences in 2014, 2016 and 2018, this is an excellent opportunity to hear about the future of molecular radiotherapy dosimetry. Because of the ongoing uncertainty, this event will now be held virtually over four consecutive days during hour-long sessions. If you are unable to attend any of the live sessions, you will be able to access them on demand after the live sessions if you have registered for this event.

Programme organiser

Dr Daniel McGowan, Principal Clinical Scientist, Oxford University Hospitals NHS Foundation Trust, IDUG Chair-Emeritus

Sponsors

A special thank you to all of our industry partners for their support on this event

HERMES MEDICAL SOLUTIONS

mim SOFTWARE

SIRTeX Advancing to the next level.

TERUMO

Follow us

Follow us on social media including Twitter, Facebook and LinkedIn

Join us

Join the BIR today to benefit from reduced delegate rates for our events.

For membership information visit: www.bir.org.uk/join-us

This course provides 4 CPD credits in accordance with the CPD Scheme of the Royal College of Radiologists

29 SEPTEMBER - 2 OCTOBER 2020

Day 1: Tuesday 29 September
12:00-13:00 BST

New dosimetry applications Chair: Dr Jill Tipping, IDUG Co-Chair	
12:00	**Radium dosimetry** Dr Iain Murray, Principal Physicist, The Royal Marsden NHS Foundation Trust
12:20	**Q&A**
12:30	**Radiobiology** Dr Samantha Terry, Lecturer in Radiobiology, King's College London
12:50	**Q&A**
13:00	**Close of session**

Day 2: Wednesday 30 September
12:00-13:00 BST

Neuroendocrine dosimetry Chair: Dr Daniel McGowan, IDUG Chair-Emeritus	
12:00	**Clinician's view** Dr Tarek Abdel-Aziz, Surgery Lead, University College London Hospital
12:20	**Q&A**
12:30	**Physicist's view** Dr Matt Aldridge, Clinical Scientist, University College London Hospital
12:50	**Q&A**
13:00	**Close of session**

Day 3: Thursday 1 October
12:00-13:00 BST

PSMA dosimetry Chair: Dr Matt Aldridge, IDUG Co-Chair	
12:00	**Clinician's view** Dr Nat Lenzo, Nuclear Medicine Physician, Genesis AU
12:20	**Q&A**
12:30	**Physicist's view** Mr Nathaniel Scott, Medical Physicist, Genesis UK
12:50	**Q&A**
13:00	**Close of session**

Day 4: Friday 2 October
12:00-13:00 BST

Future dosimetry standards Chair: Bruno Rojas, IDUG Secretary	
12:00	**MRT dosimetry project** Dr Andrew Robinson, Head of Nuclear Medicine Metrology, National Physical Laboratory
12:20	**Q&A**
12:30	**IRMER guidance on dosimetry** Ms Louise Fraser, Scientific Advisor, Public Health England
12:50	**Q&A**
13:00	**Close of event**

THE HOLMIUM PLATFORM

Three integrated products
DELIVERING INDIVIDUALIZED SIRT
at its full potential

from ACCESS to CLOSURE
INTERVENTIONAL ONCOLOGY

TERUMO
INTERVENTIONAL SYSTEMS

IS9868B0920MVI

HERMES MEDICAL SOLUTIONS

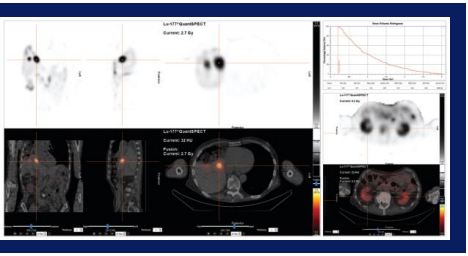
HERMES **SOLUTIONS FOR DOSIMETRY**

VOXEL DOSIMETRY

FULLY APPROVED VOXEL DOSIMETRY
Voxelwise dose distribution calculation for truly personalized medicine, 510(k) FDA cleared and CE marked

PURE THERANOSTIC APPROACH
Optimize dose distribution with full flexibility in imaging and therapy radionuclides

VALIDATED MONTE CARLO DOSIMETRY ALGORITHM
Accurate and fast, personalized to the patient anatomy



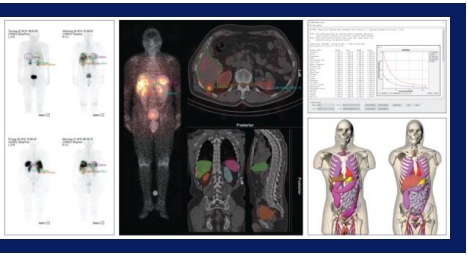
ORGAN DOSIMETRY WITH OLINDA/EXM®

ONE INTEGRATED WORKFLOW
Reduced processing time

510K CLEARANCE AND CE MARKED
Full compliance with legal requirements

AUTOMATIC ALIGNMENT OF IMAGES
Minimized errors for SPECT/CT and planar wholebody dosimetry

MORE THAN 1000 RADIONUCLIDES
Full range of radionuclide therapies supported



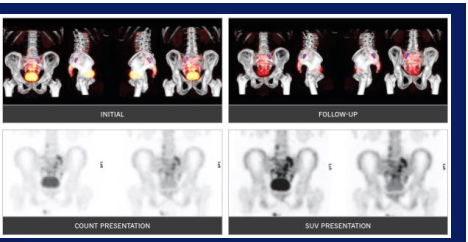
SUV SPECT® – HYBRID RECON™

SUV SPECT® VENDOR NEUTRAL QUANTITATIVE RECONSTRUCTION
Voxel values in Bq/ml or SUV for all radionuclides and all SPECT cameras

FASTEST GPU ACCELERATION ON THE MARKET
Dramatically reduced reconstruction times, up to 24 times faster[1]

FULL COLLIMATOR MODELLING
Advanced resolution recovery for high energy radionuclides: ^{131}I; ^{123}I; ^{90}Y; ^{166}Ho

PLANAR REPROJECTION
Generate accurate planar images from the SPECT recon



ADVANCED NUCLEAR IMAGING SOLUTIONS
TO SIMPLIFY YOUR WORKFLOW

www.hermesmedical.com - info@hermesmedical.com

Let's talk about your dosimetry workflow.

Not all dosimetry solutions are the same.

Nuclear Medicine requires a comprehensive MRT solution that improves dosimetry practices without adding significant time to the workflow.

MIM SurePlan™ MRT

Advancing Molecular Radiotherapy

Calculating patient-specific dose doesn't have to add significant time to your workflow. MIM SurePlan MRT provides a single solution for effective dosimetry, organ and tumor segmentation, deformable registration, and communication tools that help reduce clinical effort.

Timesaving Tools

Automated segmentation significantly reduces the time required to generate organ volumes, such as the kidneys and liver. Industry-leading PET and SPECT segmentation tools are available for tumors and other volumes of interest (VOIs).

Multi-Tracer Theranostics Support

MIM SurePlan MRT offers imaging tools for multiple Molecular Radiotherapy tracers, such as Lu-177 dotatate, I-131 mIBG, [I-131] NAI for thyroid, and more, providing confirmation of dose delivery in the patient.

Quantitative SPECT and Planar Corrections

No new cameras required. SPECTRA Quant™ provides dosimetry with vendor-neutral quantitative SPECT reconstruction. Generate quantitative images from imaging to measure dose as opposed to measuring the amount of activity from user to user.

Visit **https://go.mimsoftware.com/eu/personalized-dosimetry** to schedule a demo or learn more.

MIM Software Inc. • 25800 Science Park Drive - Suite 180, Cleveland, Ohio 44122 • 866-421-2536

Biographies and abstracts

Dr Tarek Abdel-Aziz, Consultant Endocrine Surgeon, University College London Hospital

Dr Tarek Abdel-Aziz is an Endocrine Surgeon at University College London Hospital with a special interest in Adrenal functioning tumours. He is interested in surgical innovation and medical education at UCL.

Phaeochromocytomas and paragangliomas (PPGL): value of functional studies in prediction of postsurgical disease recurrence.

Phaeochromocytomas and paragangliomas (P&P) are rare chromaffin tumours. Disease recurrence following surgical resection is usually insidious. Accurate preoperative prediction of the risk of malignancy of (P&P) still remains a challenge.

Material and Methods: Aim of this study was to evaluate 68Gallium Dotatate PET/CT(68GaDO) and 18FDG-PET/CT imaging modalities in addition to [(123)I]-metaiodobenzylguanidine(MIBG) which is the gold standard diagnostic modality. We aimed to assess first diagnostic sensitivity of these functional scans in biochemically-diagnosed tumours compared to MIBG, second to assess their ability to predict recurrent disease based on SUV intensity in relation to histological Phaeochromocytomas of the Adrenal Gland Scaled Score (PASS) and proven disease recurrence. Other parameters included demographics, operation, resection status, tumour size, plasma metanephrines, 3-methoxytyramine (3MT), genetics, and follow up. Statistical analysis performed with SPSS.17

Results:
16 patients (F=11, 50(12-82) years) were studied prospectively. MIBG, 68GaDO, 18FDG-PET/CT were positive in 14/16(87.5%), 15/16(94%), and 14/16(87.5%) respectively. Compared to MIBG, sensitivity of 68GaDO and 18FDG-PET/CT were 100% and 87.5% respectively. 18FDG-PET/CT detected mediastinal lymphadenopathy in 3(19%)patients (False positive for metastatic disease in 2/3(67%) which were shown to be inflammatory. Five (31%) patients developed disease recurrence (malignancy=3, VHL=2) over a follow-up period of 14.5(6-132) months. Recurrence was higher with PASS=or>4 vs. PASS<4 (p=0.039), in R1 vs R0 resection (p=0.001), in patients with higher 18FDG-PET/CT SUV (8.1(7-25.6) vs 4.5(2.2-14.5), p=0.006) and 68GaDO SUV (31.6(20-43.8) vs 19.1(14-28.7), p=0.037) recurrence vs. no recurrence respectively. Plasma metanephrine levels, 3MT, surgical approach, tumour size were not associated with recurrence.

Mr Matt Aldridge, Clinical Scientist, University College London Hospital

Mr Matt Aldridge works within Radiotherapy Physics and Nuclear Medicine at UCLH. Currently he is co-chair of the IDUG group, working to promote Molecular Radiotherapy in the UK. The group undertake audits of practice, provide training and issue guidelines for MRT.

Quantitative techniques in neuroendocrine molecular radiotherapy

The talk aims to provide an overview of dosimetry relating to neuroendocrine MRT. It will also introduce quantitative measurement techniques to neuroendocrine MRT.

Biographies and abstracts

Ms Louise Fraser, Scientific Adviser, ARSAC, Public Health England

Ms Louise Fraser is a clinical scientist specialising in nuclear medicine. Louise currently works within the Medical Exposures Group at Public Health England (PHE) and leads the scientific secretariat for the Administration of Radioactive Substances Advisory Committee (ARSAC). In this role her responsibilities include overall management of the application process for employer and practitioner licences under IR(ME)R and research approvals for studies involving the administration of radioactive substances. Louise also provides independent advice on nuclear medicine practice and radiation safety to government, professional bodies, healthcare professionals and members of the public. Louise has recently been involved in working parties to develop guidance on IR(ME)R implications for clinical practice for diagnostic and therapeutic nuclear medicine.

IRMER guidance on dosimetry

The Ionising Radiation (Medical Exposure) Regulations 2017 (2018 in Northern Ireland) (IR(ME)R) provide a radiation safety framework for patients and individuals who undergo medical and non-medical exposures to ionising radiation. IR(ME)R includes regulations that are specific to molecular radiotherapy.

This presentation will discuss the regulatory requirements relating to this growing area of practice within the UK and summarise the different guidance documents that are available on this topic.

Mr Nat Lenzo, Nuclear Physician and General Physician, Group Clinical Director for Theranostics, GenesisCare – Oncology (Theranostics), Fiona Stanley Hospital, Perth, Australia

Mr Nat Lenzo completed his undergraduate medical science degree and then medical degree at the University of Western Australia (UWA). He trained in general medicine and nuclear medicine in Australia. Completed Nuclear Medicine Fellowship at the University of Michigan. He has completed additional post-graduate Master's degrees in Medicine (ECU), Business Administration (UWA) and Advanced Oncology (Ulm).

Mr Lenzo has previously held positions of Head of Department of Nuclear Medicine at Royal Perth Hospital; Inaugural Head of WA PET-Cyclotron Service, Sir Charles Gairdner Hospital, Perth and Head of Acute and General Medicine at Fremantle Hospital in Western Australia. He has had over 50 publications in peer reviewed journals predominantly in the areas of molecular imaging and Theranostic and presented over 100 abstracts at national and international meetings.

He is currently holding adjunct positions as Clinical Professor in Medicine at both Curtin University in Perth and Notre Dame University in Fremantle, Western Australia. He has helped set up PET centres and cyclotron centres in Australia and Indonesia. He founded Theranostics Australia in 2015. He joined GenesisCare in 2018 to help start their Theranostics division. GenesisCare is the largest private oncology organisation worldwide with around 6000 employees across 3 continents. GenesisCare currently has 5 Theranostics centres in Australia and 2 in the UK, and are in the process of setting up a further 10 Theranostics centres between Australia, UK and the USA.

PSMA Dosimetry – a Nuclear Physician's perspective

Dose to tumour and dose to surrounding tissue has been the central crux of conventional radiotherapy for over 50 years.

Biographies and abstracts

Techniques have been developed over this time to calculate and maximise dose to the malignant tumour and minimise dose to surrounding benign organs with the premise that if sufficient dose to malignant cells can be delivered safely then irreversible cell death will ensue and patient outcomes will improve. By and large this appears to have been shown to be true in radiotherapy practice. In therapeutic nuclear medicine however this approach has rarely been used for a multitude of reasons including: difficulty in accurate calculation, logistics of obtaining appropriate data, cost and most importantly, questions of whether improved outcomes are truly achieved by using this time and resource intensive and often patient inconvenient approach. A brief rationale for and against routine dosimetry in therapeutic nuclear oncology with the radioligand therapy Lutetium-PSMA will be discussed in this talk

Mr Iain Murray, Deputy Head of Radioisotope Physics, Royal Marsden NHS Foundation Trust

Iain is Deputy Head of Radioisotope Physics at the Royal Marsden. He is a state registered clinical scientist who specialises in the physics of both molecular imaging and molecular radiotherapy using unsealed radioactive sources. Before joining the team in 2012, he worked as a clinical scientist at Barts Health NHS Trust and in 2011 was awarded a PhD in radiobiology from Queen Mary University of London.

His current research is focused on the imaging of alpha emitting radionuclides used in molecular therapy such as thorium-227 and radium-223, as well as alternative surrogate techniques, including the use of Fluoride PET imaging to predict the response of prostate cancer bone metastases treated with radium-223.

Radium dosimetry

Radium-223 has been used worldwide to treat patients with metastatic castrate resistant prostate cancer.
Although Radium-223 is primarily an alpha emitter, a number of gamma photons are emitted allowing images to be acquired. There are numerous examples in the literature of imaging protocols that have been applied clinically, despite the requirement to use either medium or high energy collimators.
ARSAC now recommend the absorbed dose to target and non-target tissues should be measured and recorded following each administration of a radioactive treatment. A number of Ra-223 imaging protocols have been developed that are quantitative in nature and therefore facilitate dosimetry. Initially these imaging protocols were based on planar imaging. More recently a growing number of publications have advocated the use of SPECT imaging for quantitative image assessment of Radium-223 distribution.

In addition to gamma camera imaging, further tools are available to better understand the biodistribution of alpha emitters in-vivo. Compartmental modelling can be used to bring together whole-body in-vitro measurements of radioactivity concentration in blood as well as imaging data. Compartmental modelling also provides a basis for further understanding the transport of Ra-223 between the endosteal layer and the mineral bone matrix at a microscopic level beyond the resolution of gamma cameras.

Biographies and abstracts

Mr Nathaniel Scott, Medical Physicist – Nuclear Medicine, GenesisCare UK

Mr Nathaniel Scott trained as a Medical physicist at the Churchill hospital in Oxford under the Scientist Training Programme, where he specialised in Imaging and Nuclear Medicine. He gained his MSc in Medical Physics at Kings College London, graduating in 2018.

He currently works for GenesisCare across multiple sites in the UK sites where he is responsible for the calibration and testing of equipment relating to nuclear medicine, and providing physics support to the nuclear medicine therapy team. He also has a wide involvement in the implementation of radiation safety throughout the company and deliver training sessions to clinical staff and senior management.

He has a keen interest in quantitative imaging and dosimetry which he is aiming to implement across GenesisCare. This will help to deliver personalised therapies to individual patients with the aim of improving treatment outcomes.

In his spare time, he is an active member of Oxford Triathlon club and attempt to play golf.

Lu-177 PSMA Dosimetry – A Physicist's Perspective

This talk aims to provide an overview of Lu-177 PSMA therapy and a literature review of the current use of dosimetry. It will also provide an understanding of what is required from a 'Physics' perspective to carry out quantitative SPECT/CT imaging and implement dosimetry into the clinical pathway.

Mr Nathaniel Scott, Medical Physicist – Nuclear Medicine, GenesisCare UK

Mr Nathaniel Scott trained as a Medical physicist at the Churchill hospital in Oxford under the Scientist Training Programme, where he specialised in Imaging and Nuclear Medicine. He gained his MSc in Medical Physics at Kings College London, graduating in 2018.

He currently works for GenesisCare across multiple sites in the UK sites where he is responsible for the calibration and testing of equipment relating to nuclear medicine, and providing physics support to the nuclear medicine therapy team. He also has a wide involvement in the implementation of radiation safety throughout the company and deliver training sessions to clinical staff and senior management.

He has a keen interest in quantitative imaging and dosimetry which he is aiming to implement across GenesisCare. This will help to deliver personalised therapies to individual patients with the aim of improving treatment outcomes.

In his spare time, he is an active member of Oxford Triathlon club and attempt to play golf.

Lu-177 PSMA Dosimetry – A Physicist's Perspective

This talk aims to provide an overview of Lu-177 PSMA therapy and a literature review of the current use of dosimetry. It will also provide an understanding of what is required from a 'Physics' perspective to carry out quantitative SPECT/CT imaging and implement dosimetry into the clinical pathway.

Biographies and abstracts

Ms Samantha Terry, Lecturer in Radiobiology, King's College London

Ms Samanth Terry is currently a lecturer in Radiobiology at King's College London. She has been in this position since 2015 after having worked as a postdoctoral researcher in the same Department of Imaging Chemistry and Biology, albeit on radionuclide imaging of multiple myeloma. Prior to this, she spent 2011-2014 as a Roche Postdoctoral Research Fellow at the Radboud UMC in the Netherlands on radionuclide imaging of the tumour microenvironment and arthritis. 2009-2011 was spent as a postdoctoral researcher at the University of Oxford looking into the effect of chromatin density on molecular radionuclide therapy. More than a decade ago, she studied my PhD under Dr Peter Bryant at the University of St Andrews discovering how chromosomes are damaged after external beam irradiation.

What the Gy? – and other radiobiological questions

Although it is very important to provide dosimetric calculations, in molecular radiotherapy it mostly just brings up more questions that it answers. Such as, what does this Gy value actually mean biologically? How valuable and insightful are the dose limits currently set to organs? What radiation dose is adequate for tumour control? How accurate is dosimetry even for radionuclides that emit Auger electrons. In this talk, I will describe the research we and others are doing to try to answer these questions and others.

Mr Andrew Robinson, Head of Nuclear Medicine Metrology, National Physical Laboratory

Mr Andrew Robinson is the Head of Nuclear Medicine Metrology at the National Physical Laboratory, UK. Since joining NPL in 2016, Andrew has led NPL's work in nuclear medicine, including the establishment of the nuclear medicine imaging laboratory and development of traceability for quantitative nuclear medicine imaging. From 2016-2019 he was the coordinator for the EMPIR project MRTDosimetry focused on developing metrology for clinical implementation of dosimetry in molecular radiotherapy.

His main research interests are the development of metrological traceability for SPECT and PET activity quantification. This includes the application of Monte Carlo and 3D printing techniques to nuclear medicine imaging activity quantification. Other research interests include the production of new isotopes for medical applications at CERN MEDICIS, imaging optimisation for new theranostic isotopes combinations, and the development of scientific computing techniques and high throughput computing cluster design.

Andrew currently holds honorary research positions with The Christie NHS Foundation Trust and The University of Manchester.

MRTDosimetry: a pan-European project establishing metrology for clinical implementation of dosimetry in molecular radiotherapy

The MRTDosimetry project ran from 2016-2019 with the aim to provide metrology for the clinical implementation of absorbed dose calculations in Molecular Radiotherapy (MRT). The project built on the results and outputs from the preceding EMRP project "MetroMRT", which took the first steps towards providing data, methods, protocols and guidance for MRT dosimetry in collaboration with many European MRT clinics as well as radiopharmaceutical companies and camera manufacturers. The focus of this follow-on project was "clinical implementation" and it is strongly directed by the involvement of leading MRT clinics across Europe as well as building on metrology expertise. In addition to 12 clinical consortium members and 6 European Metrology institutes, the project involved 22 collaborators representing commercial, clinical and academic organisations. The outcomes and resources developed in the MRTDosimetry project will be presented and the potential clinical impact of this work will be discussed.

BIR/IDUG MOLECULAR RADIOTHERAPY DOSIMETRY

Virtual event

BIR
The British Institute of Radiology

@BIR_News

/britishinstituteofradiology

The British Institute of Radiology

48–50 St John Street, London, EC1M 4DG
www.bir.org.uk

Registered charity number: 215869

APPROVED BY THE BIR