

Assessment Blueprint for Nuclear Medicine

Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
CORE NUCLEAR MEDICINE CURRICULUM: BASIC SCIENCE						
Objective: to provide the trainee with a working knowledge of the basic science appropriate to Nuclear Medicine						
I Physics and mathematics						
K	Structure and modes of decay of radioactive atoms	✓				
	Interaction of emissions from radioactive atoms with matter	✓				
	Biological implications of and radiation hazards from ionising radiation	✓				
	Molecular biology	✓				
	Probability theory	✓				
	Parametric and non-parametric statistics	✓				
	Appropriate mathematics and physics applied to radionuclide tracer theory, modelling of tracer kinetics and quantitative imaging	✓				
S	Practices these effectively			✓		
A	Recognises the need to understand the basic science appropriate to Nuclear Medicine				✓	
Objective: to provide the trainee with a working knowledge of the basic science appropriate to Nuclear Medicine						
II Instrumentation and computers						
K	Theory of systems used to detect and analyse emissions from radioactive atoms	✓				
	Knowledge of how detection systems are used, calibrated and tested in Nuclear Medicine	✓				✓
	Principles of collimation and practical experience with the use of collimators	✓				✓
	Principles of single-photon emission tomography and co-incidence counting	✓				✓
	Principles of image reconstruction	✓				✓
S	Practical experience with the use of monitoring devices, probes, well counters, dose calibrators, gamma cameras, and positron emission tomography systems			✓		✓
	Use of computers to display and process images			✓		✓
A	Willing to learn new skills and keep up to date with developments in technology			✓	✓	
Objective: to provide the trainee with a working knowledge of the basic science appropriate to Nuclear Medicine						
III Radiation biology and radiation protection						

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K = Knowledge; S = skills; A = attitudes, behaviours
G = Assessed within generic curriculum

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K	Theory of biological effects of high and low-level radiation from unsealed sources	✓				
	Calculation of radiation dose from radiopharmaceuticals (Effective dose [ED])	✓				
	Basic principles of radionuclide therapy	✓	✓			
	Nature of the cancerous process and the radiobiological basis of cancer radionuclide therapy	✓	✓			
	Management of radiation accidents relating to Nuclear Medicine	✓				
S	The safe handling of radiopharmaceuticals			✓		
	Deploy appropriate signs in Nuclear Medicine Departments			✓		
	Write local rules for the use of unsealed source radiation			✓		
	Demonstrate ability to handle incidents of radioactive spillage or contamination			✓		
A	Appreciate the importance of safe handling of radiopharmaceuticals for self and for others			✓	✓	
Objective: to provide the trainee with a working knowledge of the basic science appropriate to Nuclear Medicine						
IV Radiochemistry and radiopharmacy						
K	Production of radionuclides using reactors, cyclotrons and generators	✓				
	Physical properties of radionuclides, clinical applications	✓				
	Physicochemical and biological properties of different radiopharmaceuticals in routine clinical practice, clinical trials and under development	✓				✓
	Different formulations used in Nuclear Medicine	✓				✓
	Cell Labelling techniques	✓				✓
	Principles of Quality Assurance (QA) in the radiopharmacy	✓				✓
	Quality control parameters which determine the quality of radiopharmaceuticals including radionuclide & radiochemical purity	✓				✓
	Principles of aseptic preparation	✓				
S	Perform elution of a technetium generator			✓		
	Prepare a cold kit			✓		
	Perform cell labelling			✓		
	Perform simple tests of radionuclide and radiochemical purity			✓		
	Demonstrate techniques of aseptic preparation			✓		
A	Show attention to detail in handling radiopharmaceuticals and in ensuring radiochemical and radionuclide purity and also aseptic technique			✓	✓	
Objective: to provide the trainee with a working knowledge of the basic science appropriate to						

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Nuclear Medicine						
V Tracer principles and techniques and in vitro studies						
K	Kinetics of radioactive tracers used in Nuclear Medicine	✓				✓
	Use of principles of kinetics and modelling techniques to calculate parameters such as glomerular filtration rate etc	✓				✓
	Physiological principles of tracer techniques	✓				✓
	Errors associated with the quantitative measurements	✓				✓
	Principles of RIA (Radioimmunoassay)	✓				✓
	Principles of ELISA (Enzyme-linked immunoadsorbant assay)	✓				✓
S	See individual non-imaging diagnostics					
A	See individual non-imaging diagnostics					
Objective: to provide the trainee with a working knowledge of the basic science appropriate to Nuclear Medicine						
VI The regulatory framework of Nuclear Medicine						
K	National and international regulatory requirement on the practice of nuclear medicine including: IRR99; MARS legislation; ARSAC; RSA 93; IR(ME)R 2000; Medical guidance notes; Product licenses and other appropriate legislation.	✓				
	Regulatory requirements which apply to the design and operation of radiopharmacies GMP 1997 (Orange Guide)	✓				
	Regulations controlling transport of radioactive materials in the UK RM(Road Transport) (GB) R 1996	✓				
	Mechanism by which the regulations are applied and policed within the UK	✓				
	Health and safety regulations governing safe practice e.g. COSHH Regulations 1999	✓				
	ALARA (as low as reasonably achievable) and ALARP (as low as reasonably practical)	✓				✓
	Any subsequent revisions of or additions to the above legislation	✓				
S	Demonstrate ability to translate the regulations into local practice			✓		
A	Show willingness to keep up with developments in the regulations governing nuclear medicine				✓	
	Appreciates the need to work with others in ensuring that the regulations are strictly adhered to				✓	

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
CORE IMAGING: CARDIOVASCULAR SYSTEM						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate coronary artery disease using radionuclide techniques						
I Myocardial perfusion and infarct imaging (see also PET imaging)						
K	Cardiac & coronary anatomy, cardiac physiology and pathophysiology.	✓				✓
	Principles of myocardial perfusion and SPECT imaging including ECG-gated SPECT	✓				✓
	Radiopharmaceuticals currently used for myocardial perfusion imaging (e.g. ²⁰¹ Tl and the ^{99m} Tc-labelled tracers) and infarction imaging (e.g. ^{99m} Tc-pyrophosphate and antimyosin antibodies) and those in development	✓				✓
	Principles of physiological and pharmacological stress tests	✓				✓
	Imaging protocols used to evaluate myocardial viability, ischaemia and function	✓				✓
	Indications for myocardial perfusion and infarction imaging	✓				✓
	Role of comparative assessment methods including the exercise ECG, stress echocardiography and coronary angiography	✓				✓
	Radiation protection issues	✓			✓	
S	A. Preparation of the patient prior to the test.			✓		
	Measurement and drawing up of tracer			✓		
	Performance of cardiac stress test using physiological or pharmacological techniques			✓		
	Injection of the tracer			✓		
	Setting up of instrumentation for ECG-gating and SPECT acquisition			✓		
	Performance of the scans developing good technique allied to a knowledge of the pitfalls			✓		
	Techniques of tomographic reconstruction, qualitative and quantitative analysis, and display, including knowledge of image artefacts			✓		
	Image interpretation and reporting including sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Audit outcome of scan results			G		
A	Recognise the importance of proper vetting of request forms and for patient evaluation prior to the test.			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE NUCLEARMEDICINE CURRICULUM: CARDIOVASCULAR SYSTEM						
Objective To provide the trainee with the knowledge, skills and attitudes to evaluate ventricular function using radionuclide techniques						
II Radionuclide ventriculography						
K	Cardiac physiology and pathophysiology	✓				✓
	Principles of radionuclide ventriculography (first pass and equilibrium techniques, rest and exercise studies)	✓				✓
	Radiopharmaceuticals used for assessment of radionuclide ventriculography (^{99m} Tc-labelled red cells)	✓				✓
	Indications for radionuclide ventriculography	✓				✓
	Role of comparative techniques such as echocardiography and contrast ventriculography	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Measurement and drawing up of tracer			✓		
	Injection of the tracer			✓		
	Setting up of instrumentation for gated acquisition			✓		
	Performance of rest and stress scans developing good technique allied to a knowledge of the pitfalls			✓		
	Data processing and quantification			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Audit outcome of results			G		
A	Recognise the need for proper vetting of request forms and for patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	

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CORE CURRICULUM: CENTRAL NERVOUS SYSTEM						
Objective: To provide the trainee with the knowledge, skills and attitudes to evaluate the central nervous system (cns) using radionuclide techniques						
Central nervous system imaging						
K	Basic neuroanatomy, neurophysiology and neurochemistry.	✓				✓
	Radiopharmaceuticals currently in use for cns imaging and those in development	✓				✓
	Indications for cerebral blood flow (rCBF) imaging using tracers such as HMPAO	✓				✓
	Indications for blood-brain barrier imaging	✓				✓
	Indications for neuroreceptor imaging	✓				✓
	Role of comparative imaging tests such as ultrasound, CT and MR scanning	✓				✓
	Radiation protection issues	✓				
	CSF leaks?	✓				✓
S	Preparation of the patient prior to the test			✓		
	Choice of radiopharmaceutical and imaging protocol			✓		
	Radiotracer preparation and its quality assurance			✓		
	Radiopharmaceutical injection			✓		
	Setting up of instrumentation for SPECT acquisition and performance of scan			✓		
	Data processing, image reconstruction and quantification			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Audit outcome of studies				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: ENDOCRINE SYSTEM						

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
Objective To provide the trainee with the knowledge, skills and attitudes to evaluate endocrine disorders using radionuclide techniques						
Adrenal Imaging						
K	Basic science including the biochemistry of adrenal disorders	✓				
	Clinical syndromes associated with adrenal disease	✓				
	Basic science of adrenal imaging with ¹²³ I MIBG and cholesterol imaging agents	✓				
	Indications for radionuclide adrenal imaging	✓				
	Sensitivity and specificity of the tests	✓				
	Role of comparative tests in the diagnosis of adrenal disorders	✓				
	Radiation protection associated with ¹²³ I MIBG and cholesterol imaging agents	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Measurement and drawing up of the tracer			✓		
	Injection of the radiopharmaceuticals			✓		
	Performance of the scans developing good technique allied to a knowledge of the pitfalls associated with the study			✓		
	Use of renal subtraction scanning			✓		
	Image processing and display			✓		
	Image interpretation including the reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Audit of the outcome of the tests				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: ENDOCRINE SYSTEM						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate thyroid disorders using radionuclide techniques						
Thyroid Scans and Uptake Measurements						

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
K	Developmental anatomy physiology and biochemistry of the thyroid gland	✓				✓
	Clinical presentation and management of thyroid disorders	✓				✓
	Science of thyroid imaging and uptake using ^{99m} TcO ₄ and ¹²³ I tracers and the perchlorate discharge test	✓				✓
	Indications for radionuclide thyroid imaging	✓				✓
	Role of complementary and comparative investigations including thyroid biochemistry, immunology, ultrasound and CT scans and FNA in the evaluation of thyroid disorders	✓				✓
	Radiation protection associated with the radiopharmaceuticals	✓			✓	
S	Preparation of the patient for the test			✓		
	Clinical evaluation of the thyroid gland			✓		
	Measurement and drawing up of the radiopharmaceuticals			✓		
	Injection of the tracer			✓		
	Choice of collimator			✓		
	Performance of the scans developing good technique allied to knowledge of the pitfalls associated with the study			✓		
	Data and image processing, quantification and image display			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess the utility, pitfalls, normal variants and artefacts			✓		
	Correlating the scan and clinical findings			✓		
	Audit of outcome				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: ENDOCRINE SYSTEM						
Objective To provide the trainee with the knowledge, skills and attitudes to evaluate parathyroid disorders using radionuclide techniques						
Parathyroid Imaging						
K	Developmental anatomy and physiology of the parathyroid glands	✓				✓

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Clinical presentation of hyperparathyroidism	✓				✓
	Basic science of parathyroid imaging using $^{201}\text{Tl}/^{99\text{m}}\text{Tc}$ and $^{99\text{m}}\text{Tc}/^{123}\text{I}$ subtraction and washout $^{99\text{m}}\text{TcMIBI}$ imaging as well as those tracers/protocols in development	✓				✓
	Indications for radionuclide parathyroid imaging	✓				✓
	Role of comparative tests in the evaluation of parathyroid disorders including ultrasound, selective venous catheterisation etc	✓				✓
	Utility of intra-operative probe detection	✓				
	Radiation protection associated with the scans				✓	
S	Preparation of the patient prior to the test(s)			✓		
	Choice of imaging protocol			✓		
	Measurement and drawing up of the radiopharmaceuticals			✓		
	Administration of the radiopharmaceuticals			✓		
	Performing the scans developing good technique allied to knowledge of the pitfalls associated with the study			✓		
	Image processing and display			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, pitfalls, normal variants and artefacts			✓		
	Audit of outcomes				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test.			✓		✓
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓		✓
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician					✓
	Consider the importance of audit in the outcome of results					✓
	Show openness to critical feedback of reports					✓
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature					✓
	Show awareness of health and safety issues					✓
CORE IMAGING: GASTROINTESTINAL SYSTEM						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate gastrointestinal disorders using radionuclide techniques						
I Salivary Gland Imaging						
K	Physiology and pathophysiology of salivary gland disorders.	✓				✓
	Basic science of salivary gland function using $^{99\text{m}}\text{TcO}_4$	✓				✓
	Indications for radionuclide salivary gland studies	✓				✓
	Comparative investigations	✓				✓

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Measurement and drawing up of the radiopharmaceutical			✓		
	Radiopharmaceutical and salivary gland excretory stimulation administration			✓		
	Performing the scans developing good technique and a knowledge of the pitfalls associated with the study			✓		
	Data processing, image display and quantification			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, pitfalls, normal variants and artefacts			✓		
	Audit of outcome			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate gastrointestinal disorders using radionuclide techniques						
II Oesophageal transit and gastro-oesophageal reflux						
K	Physiology and pathophysiology of oesophageal transit and the lower oesophageal sphincter	✓				✓
	Basic science of oesophageal motility and gastro-oesophageal reflux using tracers e.g. ^{99m} Tc colloid or DTPA	✓				✓
	Indications for radionuclide oesophageal transit and reflux measurements	✓				✓
	Comparative investigations including oesophageal imaging and manometry	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Measurement and drawing up of the radiopharmaceutical			✓		
	Radiopharmaceutical administration including patient instruction and positioning			✓		

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	Performing the scans using appropriate acquisition techniques and knowledge of the pitfalls associated with the study			✓		
	Image processing including quantification and display			✓		
	Image and data interpretation and reporting of sufficient number of patient studies to assess utility, pitfalls, normal variants and artefacts			✓		
	Audit of outcome			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
Objectives. To provide the trainee with the knowledge, skills and attitudes to evaluate gastrointestinal disorders using radionuclide techniques						
III Gastrointestinal Transit Measurements						
K	Physiology and pathophysiology of gastric emptying and small bowel and colonic transit.	✓				✓
	Clinical conditions known to lead to gastroparesis and to slow transit constipation	✓				✓
	Radiopharmaceuticals used to assess solid and liquid phase gastric emptying and to define the limits of the stomach	✓				✓
	Radiopharmaceuticals used to assess small and large bowel transit including the use of large bowel stimulants	✓				✓
	Indications for the above studies	✓				✓
	Comparative tests of gastric emptying, small bowel and colonic transit assessment	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test(s)			✓		
	Preparation and administration of radiopharmaceuticals			✓		
	Performing the scans using appropriate acquisition techniques and a knowledge of the pitfalls			✓		
	Data processing with ROI positioning and calculation of T½ emptying			✓		
	Recognition of patterns of emptying (e.g. gastric dumping)			✓		

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	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Audit of outcome			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues					✓
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate gastrointestinal disorders using radionuclide techniques						
IV Gastrointestinal blood loss and Meckel's diverticulum imaging						
K	Anatomy and pathophysiology of gastrointestinal (GI) blood loss and Meckels diverticulum.	✓				✓
	Basic science of measuring GI bleeding using radionuclides including ^{99m} Tc colloid or labelled autologous red cells (in vivo or in vitro)	✓				✓
	Principles of detection of Meckel's diverticulum using ^{99m} TcO ₄ .	✓				✓
	Indications for GI blood loss studies and Meckel's test	✓				✓
	Comparative tests for sources of GI blood loss and diagnosis of Meckels diverticulum.	✓				✓
	Radiation protection issues	✓			✓	
S	Preparation of the patient prior to the test			✓		
	Measurement and drawing up of the radiopharmaceutical			✓		
	Preparation and administration of radiopharmaceutical			✓		
	Performing the scans developing good technique and a knowledge of the pitfalls associated with the study			✓		
	Data processing and image display			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts				✓	
	Audit of outcome				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test.			✓	✓	

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	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate gastrointestinal disorders using radionuclide techniques						
V Hepatic and Splenic function assessment						
K	Anatomy and physiology of the liver blood flow, Kupffer cell and the spleen	✓				✓
	Radiopharmaceuticals used to evaluate hepatic reticuloendothelial (RES) function and suspected liver haemangioma	✓				✓
	Hepatic blood flow measurements, first pass techniques, calculation of hepatic perfusion index (HPI) and choice of tracer (^{99m}Tc colloid or $^{99m}\text{TcO}_4$)	✓				✓
	Assessment of hypersplenism using colloid or denatured red cells	✓				✓
	Comparative tests of hepatic blood flow, RES and splenic function	✓				✓
	Radiation protection issues	✓		✓		
	S	Preparation of the patient prior to the test.			✓	
Choice of appropriate radiopharmaceutical and imaging protocol				✓		
Administration of the radiopharmaceutical				✓		
Performing the scans ensuring good technique and developing knowledge of the pitfalls				✓		
Data processing, calculation of the HPI and image display				✓		
Data and image interpretation and reporting of sufficient number of patient studies to assess utility, pitfalls, normal variants and artefacts				✓		
Audit of outcome				G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test.			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	

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	Show openness to critical feedback of reports				✓		
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓		
	Show awareness of health and safety issues				✓		
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate gastrointestinal disorders function using radionuclide techniques							
VI Hepatobiliary function							
K	Clinical spectrum of biliary disorders including knowledge of operative procedures	✓				✓	
	Physiology and pathophysiology of bile formation, gallbladder and sphincter of Oddi function	✓				✓	
	Basic science of ^{99m} Tc HIDA derivatives and pharmacology of cholecystokinin analogues	✓				✓	
	Use of ^{99m} Tc HIDA or derivatives to evaluate <ul style="list-style-type: none"> ➢ Biliary obstruction ➢ Acute cholecystitis Biliary leaks ➢ Gallbladder dyskinesia ➢ Sphincter of Oddi dysfunction ➢ Duodenogastric bile reflux 	✓				✓	
	Alternative methods of assessing the biliary tract	✓					✓
	Radiation protection issues	✓			✓		
S	Preparation of the patient prior to the test			✓			
	Measurement and drawing up of the radiopharmaceutical			✓			
	Choice of imaging protocol and administration of the radiopharmaceutical			✓			
	Performing the scan ensuring good technique and awareness of the pitfalls of the study			✓			
	Timing the administration of the gall bladder provocation agent			✓			
	Data processing and quantification of gallbladder function			✓			
	Image interpretation and reporting sufficient numbers of patient studies to assess utility, sources of error, normal variants and artefacts			✓			
	Audit				G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test.			✓	✓		
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓		
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓		
	Consider the importance of audit in the outcome of results				✓		

Assessment Blueprint for Nuclear Medicine

Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: INFECTION/INFLAMMATION						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate sites of infection/inflammation using radionuclide techniques						
Imaging sites of infection or inflammation						
K	Basic science of infection/inflammation including cellular mechanisms	✓				✓
	Clinical spectrum of occult sepsis	✓				✓
	Radiopharmaceuticals used for infection/inflammation imaging including ⁶⁷ Gallium citrate, ^{99m} TcHMPAO or ¹¹¹ Indium autologous white cells, ^{99m} TcHIG and other infection/inflammation imaging agents in current use or in development	✓				✓
	Indications for use of radioactive tracers to image occult infection or inflammation	✓				✓
	Role of complementary and comparative investigations for the diagnosis of occult infection or inflammation	✓				✓
	Radiation protection issues	✓		✓		
S	Patient preparation.			✓		
	Choice of appropriate radiopharmaceutical and imaging protocol			✓		
	Preparation (including cell labelling skills) and administration of the radiopharmaceutical			✓		
	Performing the scans ensuring good technique and developing knowledge of the pitfalls			✓		
	Image processing and display			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility sources of error, normal variants and artefacts.			✓		
	Audit				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test.			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE CURRICULUM: LYMPHOSCINTIGRAPHY						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate regional lymphatic drainage using radionuclide techniques (see common objectives)						
Lymphoedema evaluation and Sentinel Node Localisation						
K	Regional lymphatic anatomy and physiology	✓				✓
	Mechanisms of tumour spread and concept of the sentinel node	✓				✓
	Basic science of radiopharmaceuticals used to identify regional lymphatic drainage	✓				✓
	Indications for lymphoscintigraphy	✓				✓
	Comparative regional lymphatic localisation techniques	✓				✓
	Radiation protection issues	✓			✓	
S	Preparation of the patient prior to the test				✓	
	Choice of radiopharmaceutical				✓	
	Injection techniques				✓	
	Performing the scans ensuring good technique and knowledge of the pitfalls				✓	
	Surface localisation of the sentinel node				✓	
	Calibration and use of the hand-held probe				✓	
	Performance and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts				✓	
	Audit				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test				✓	✓
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease				✓	✓
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician					✓
	Consider the importance of audit in the outcome of results					✓
	Show openness to critical feedback of reports					✓
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature					✓
	Show awareness of health and safety issues					✓
CORE IMAGING: ONCOLOGY						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate cancer using						

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
radionuclide techniques (see also PET section)						
Imaging tumour sites using radionuclide techniques						
K	Basic science of tumour biology, metabolism, and spread	✓				✓
	Characteristics of solid organ tumours and haematological malignancies	✓				✓
	Principles of tumour localisation	✓				✓
	Radiopharmaceuticals currently used to detect tumours (e.g. ⁶⁷ Ga, ²⁰¹ Tl, pentavalent DMSA, 18FDG radiolabelled antibodies, and peptides) and those in development	✓				✓
	Knowledge of imaging protocols including whole body or planar static imaging, SPECT and SPECT/CT	✓				✓
	Indications for radionuclide tumour imaging including sensitivity and specificity of the investigations	✓				✓
	Role of comparative tumour imaging techniques including CT and MR imaging.	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Measurement and drawing up of tracer			✓		
	Injection of the tracer			✓		
	Performing the scan aiming for good technique and awareness of the pitfalls of the study			✓		
	Image reconstruction and display			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Review of sequential data on patients and comparison with other methods of assessment			✓		
	Audit of outcome			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
CORE IMAGING: OPHTHALMIC SYSTEM						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate nasolacrimal drainage using radionuclide techniques						
NASOLACRIMAL DRAINAGE						
K	Physiology and pathophysiology of nasolacrimal ducts	✓				✓
	Basic science of nasolacrimal drainage using $^{99m}\text{TcO}_4$	✓				✓
	Indications for measurement of nasolacrimal drainage	✓		✓		✓
	Comparative tests	✓		✓		✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Ocular radiopharmaceutical instillation techniques			✓		
	Performing the scans developing good technique and a knowledge of the pitfalls associated with the study			✓		
	ROI placement and quantification			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Audit				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: PAEDIATRICS						
Objective. To provide the trainee with the knowledge, skills and attitudes to assess disorders in children using radionuclide techniques						
Imaging children using radionuclides						
K	Understanding of growth and maturation in children with special reference to the handling of radiotracers by immature organs.	✓				✓
	Specific indications for radionuclide investigations in children especially of the renal tract, biliary tract and skeleton	✓				✓
	Comparative diagnostic investigations in children (ultrasound, CT imaging, MR scans etc)	✓				✓

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Knowledge of statutory issues relating to children (e.g. Childrens' Act)	✓				
	Principles of consent in children	✓				
	Radiation protection issues appropriate to children	✓				
	Knowledge of Child Protection Issues	✓		✓		
S	General preparation of the child for the test			✓		
	Specific preparation of the child for particular tests			✓		
	Choice of radiopharmaceutical dose and imaging protocol appropriate to the child			✓		
	Use of injection techniques appropriate to children			✓		
	Performing each stage of the scan in children			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts in children			✓		
	Audit of the outcome of results				G	
	Maintainance of a safe environment			✓		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
	Show awareness of child protection issues				✓	
CORE IMAGING: PULMONARY SYSTEM						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate pulmonary disorders using radionuclide techniques (see common objectives)						
I Pulmonary Embolism (PE)						
K	Clinical risk factors and presentation of PE	✓				✓
	Basic science of pulmonary perfusion and ventilation	✓				✓
	Indications for and evidence base supporting ventilation perfusion (VQ) imaging	✓				✓
	Principles of perfusion imaging	✓				
	Knowledge of ventilation agents including ? ⁸⁹ Krypton, ^{99m} Tc DTPA and Technegas	✓				

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Characteristics of aerosol and gas delivery systems	✓				
	Role of comparative imaging techniques including contrast pulmonary angiography and CTPA	✓				✓
	Contribution of D-dimer measurements, leg ultrasound and contrast venography to facilitate diagnosis of PE	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Choice of radiopharmaceutical and imaging protocol			✓		
	Techniques of radiopharmaceutical injection and inhalation			✓		
	Performing the scans ensuring good technique and developing knowledge of the pitfalls			✓		
	Data processing and image display			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts.			✓		
	Audit of outcome				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
Show awareness of health and safety issues					✓	
CORE IMAGING: PULMONARY SYSTEM						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate pulmonary disorders using radionuclide techniques						
II Regional Ventilation, Mucociliary and Small Solute Clearance						
K	Clinical features and management of obstructive pulmonary disease, bronchiectasis and alveolitis	✓				✓
	Basic science of regional ventilation, the mucociliary escalator and alveolar-capillary membrane integrity	✓				✓
	Principles of aerosol physics	✓				
	Characteristics of aerosol delivery systems	✓				
	Indications for measurement of regional ventilation and small solute clearance including evidence base	✓		✓		✓

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test.			✓		
	Choice of radiopharmaceutical and imaging protocol			✓		
	Techniques of radiopharmaceutical delivery			✓		
	Performing the test ensuring good technique and developing knowledge of the pitfalls			✓		
	Data processing, image display and quantification			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Audit			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test.			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: SKELETAL SYSTEM						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate the skeletal disorders using radionuclide techniques						
I Bone scans						
k	Anatomy and physiology of the skeleton	✓				✓
	Clinical presentation and management of disorders affecting the skeleton	✓				✓
	Basic science of ^{99m} Tc diphosphonate bone scans	✓				✓
	Basic science of ^{99m} Tc colloid bone marrow scans	✓				✓
	Indications for bone and marrow scans including understanding of the evidence base	✓		✓		✓
	Use of bone scans in conjunction with other radionuclide imaging to assess bone or peri-prosthetic infections (see section on infection/inflammation)	✓				✓
	Knowledge of imaging protocols including three-phase imaging, whole body or spot planar static imaging SPECT and SPECT/CT	✓				

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Role of comparative imaging (plain XR, CT and MR scans) for the assessment of skeletal disorders	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient for and during the test			✓		
	Choice of appropriate imaging protocol			✓		
	Radiopharmaceutical injection			✓		
	Performing the test ensuring good technique and developing knowledge of the pitfalls			✓		
	Image reconstruction, display, interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Audit			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test.			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE CURRICULUM: SKELETAL SYSTEM						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate skeletal disorders						
II Bone densitometry						
K	Clinical risk factors, presentation and management of osteoporosis.	✓				✓
	Basic physiology and biochemistry of bone metabolism	✓				
	Basic science of DEXA scans and other methods e.g. USS, QCT etc	✓				✓
	Indications for bone densitometry measurements including knowledge of the evidence base	✓		✓		✓
	Quality control	✓				
	Radiation protection issues	✓		✓		
S	Preparation of the patient for the test			✓		
	Performing the test ensuring good technique and developing knowledge of the pitfalls			✓		
	Data analysis and computation of scan results			✓		

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Interpretation of the results			✓		
	Ability to give advice with regard to therapy			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: UROGENITAL SYSTEM						
Objective. To provide the trainee with the knowledge, skills and attitudes to evaluate urogenital disorders using radionuclide techniques						
Renal and bladder function						
K	Basic science associated with the urogenital tract.	✓				✓
	Radiopharmaceuticals used for renal imaging (e.g. DMSA, DTPA and MAG3)	✓				✓
	Principles of dynamic renography	✓				✓
	Computation of differential renal function	✓				✓
	Computation of renal transit/drainage	✓				✓
	The use of interventions such as Frusemide and Captopril	✓				✓
	Urodynamic studies (reflux, cystography)	✓				✓
	Assessment of renal transplants	✓				✓
	Assessment of testicular torsion and varicoceles	✓				✓
	Role of comparative renal imaging such as ultrasound, CT etc)	✓				✓
	Radiation protection issues	✓			✓	
S	Preparation of the patient prior to the test			✓		
	Choice of radiopharmaceutical and imaging protocol			✓		
	Techniques of radiopharmaceutical injection for renal studies			✓		
	Performing the scans ensuring good technique and developing knowledge of the pitfalls			✓		
	Data processing, display and quantification			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts.			✓		
	Audit				G	

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: PET SCANNING						
Objective. To provide the trainee with the knowledge, skills and attitudes to have a working knowledge of PET scanning						
I Basic science appropriate to PET Scanning						
K	Theory of the production and decay of positron radionuclides used in clinical PET	✓				
	Compartmental analysis methods	✓				
	Appropriate mathematics and physics applied to PET tracer theory, modelling of tracer kinetics and quantitative imaging	✓				
	Radiopharmacy of the tracers used in PET	✓				
	Physiological principles of the techniques	✓				
	Dosimetry of the various tracers used	✓				
	Legal aspects associated with tracers	✓				
	Methods of measurement of tracer activity and scanning equipment	✓				
	Errors associated with the quantitative measurements	✓				
	Knowledge of gamma camera and dedicated PET systems	✓				
Method of acquiring PET images	✓					
Objective. To provide the trainee with the knowledge, skills and attitudes to have a working knowledge of PET scanning						
II PET in Oncology						
K	Basic science of tumour metabolism	✓				✓
	PET tracers used for tumour detection including FDG and methionine	✓				✓
	Normal variation in tracer distribution in whole body and local views	✓				✓
	PET in tumour diagnosis e.g. pulmonary nodules	✓				✓
	PET in tumour staging e.g. lung cancer, lymphoma, germ cell tumours etc	✓				✓

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	PET in the detection of recurrent disease e.g. colorectal cancer	✓				✓
	Role of PET tracer imaging compared to other imaging methods including CT and MR scans	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Measurement and drawing up of tracer			✓		
	Injection of the tracer			✓		
	Methods of scanning and data manipulation			✓		
	Image reconstruction and display			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Review of sequential data on patients and comparison with other methods of assessment			✓		
	Audit of results				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
Objective. To provide the trainee with the knowledge, skills and attitudes to have a working knowledge of PET scanning						
III PET in Neuropsychiatry						
K	Basic neurophysiology, neurochemistry and cross-sectional neuroanatomy	✓				✓
	PET tracers used for brain imaging	✓				✓
	Normal variation in PET tracer distribution within the brain	✓				✓
	Role of PET in the diagnosis of common brain disorders such as epilepsy and dementia	✓				✓
	PET in the evaluation of brain tumours	✓				✓
	Role of PET tracer imaging compared to other imaging methods including CT and MR scans	✓				✓
	Radiation protection issues	✓		✓		

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
S	Preparation of the patient prior to the test			✓		
	Measurement and drawing up of tracer			✓		
	Injection of the tracer			✓		
	Methods of scanning and data manipulation			✓		
	Image reconstruction and display			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Review of sequential data on patients and comparison with other methods of assessment			✓		
	Audit of results			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
Objective. To provide the trainee with the knowledge, skills and attitudes to have a working knowledge of PET scanning						
IV PET in Cardiology						
K	Coronary and cardiac anatomy, cardiac physiology and pathophysiology	✓				✓
	Assessment of myocardial ischaemia using ⁸² Rb, ¹³ N-ammonia, ¹⁵ O-water	✓				✓
	FDG PET for assessment of myocardial viability	✓				✓
	Control and monitoring of glucose metabolism for FDG injection	✓				✓
	Principles of pharmacological cardiac stress tests	✓				✓
	Normal variation in FDG tracer distribution within the heart	✓				✓
	Role of PET tracer imaging compared to other imaging methods including cardiac stress echo and coronary angiography	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test.			✓		
	Measurement and drawing up of tracer			✓		

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Performance of cardiac stress testing using pharmacological techniques			✓		
	Injection of the FDG, NH ₃ and any new tracers			✓		
	Production of parametric perfusion images and calculation of numeric results			✓		
	Image interpretation and reporting of sufficient number of patient studies to assess utility, sources of error, normal variants and artefacts			✓		
	Review of sequential data on patients and comparison with other methods of assessment			✓		
	Audit of results			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: MULTI-MODALITY IMAGING INCORPORATING NUCLEAR MEDICINE AND COMPUTED TOMOGRAPHY						
Objective: To provide the trainee with the knowledge, skills and attitudes to have a working knowledge of Cross-sectional imaging using CT scanning in the context of PET-CT and SPECT-CT						
CT Scanning in the context of PET-CT and SPECT-CT						
k	Cross-sectional anatomy and normal variants as demonstrated by CT	✓				✓
	Basic Science of CT Imaging	✓				✓
	CT Scanner, PET-CT and SPECT-CT hardware	✓				✓
	CT protocols for PET-CT and SPECT-CT and how they differ from diagnostic CT	✓				✓
	The indications, contraindications, complications and principles for use of gastro-intestinal and intravenous CT contrast media	✓				✓
	Principles of co-registering CT images with PET and SPECT and other CT post-image acquisition processing techniques	✓				✓
	The applications of CT in the brain, head & neck, chest, abdomen and pelvis, musculoskeletal system and vascular system	✓				✓
	Radiation protection issues of CT Imaging	✓		✓		

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Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Legal aspects associated with CT Imaging	✓				
S	Preparation of the patient prior to the test			✓		
	Assessment of the need and/or contra-indications for CT contrast media and treatment of complications			✓		
	Assessment of CT image quality and identification of artefacts			✓		
	Image interpretation of a sufficient number of PET-CT and/or SPECT-CT studies to assess utility, sources of error, normal variants and artefacts, including an ability to (i) assign PET/SPECT abnormalities to specific anatomical structures, (ii) assimilate CT appearances into the assessment of the significance of PET or SPECT findings, and (iii) recognise CT abnormalities that are not associated with radiotracer uptake			✓		
	Review of sequential data on patients and comparison with other methods of assessment			✓		
	Audit of results			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Recognise the limitations of CT imaging used for PET-CT and SPECT-CT and the need for an additional radiological opinion or examination where necessary				✓	
	Appreciate the importance of keeping up-to-date with hardware and software developments and with the relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CORE IMAGING: NON-IMAGING DIAGNOSTICS						
Objective. To provide the trainee with the knowledge, skills and attitudes to employ radionuclide non-imaging diagnostic tests in the measurement of human disease						
I Glomerular Filtration Rate						
K	Physiology and pathophysiology of glomerular filtration (GFR).	✓				✓
	Indications for GFR measurements	✓				✓
	Methodology of GFR measurements using ⁵¹ Cr-EDTA or ^{99m} Tc-DTPA including single and multiple sample techniques and volume of distribution	✓				✓
	Role of comparative methods of measuring GFR	✓				✓
	Radiation protection issues	✓		✓		

Assessment Blueprint for Nuclear Medicine

Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
S	Preparation of the patient prior to the test			✓		
	Preparation and injection of ⁵¹ Cr-EDTA and timing of blood samples			✓		
	Data processing and calculation of GFR including application of mono and bi-exponential fits and surface area correction			✓		
	Assessing the sources of error and reviewing sequential data on patients comparing the outcome with the serum urea and creatinine			✓		
	Audit of results				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test.			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
Objective. To provide the trainee with the knowledge, skills and attitudes to employ radionuclide non-imaging diagnostic tests in the measurement of human disease						
II Gastrointestinal measurements including B12 absorption, SeHCAT and urea breath tests						
K	Basic science of malabsorption	✓				✓
	Methodology and indications for B12 absorption tests	✓				✓
	Methodology and indications for SeHCAT	✓				✓
	Methodology and indications for ¹⁴ C-urea breath tests and other ¹⁴ C tests	✓				✓
	Comparative tests that are available	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Administration of the radiopharmaceutical			✓		
	Collection and measurement of the samples			✓		
	Calculation of the results			✓		
	Reporting sufficient numbers of studies to assess utility and sources of error			✓		
	Review of sequential data before and after treatment			✓		
	Audit of results				G	
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	

Assessment Blueprint for Nuclear Medicine

Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
Objective. To provide the trainee with the knowledge, skills and attitudes to employ radionuclide non-imaging diagnostic tests in the measurement of human disease						
III Plasma volume, red cell mass, blood cell survival and ferrokinetic studies						
K	Basic science of red cell mass and survival	✓				✓
	Methodology and indications for red cell mass measurement	✓				✓
	Methodology and indications for red cell survival measurement	✓				✓
	Radiation protection issues	✓		✓		
S	Preparation of the patient prior to the test			✓		
	Administration of the radiopharmaceutical			✓		
	Collection and measurement of the samples			✓		
	Calculation of the results			✓		
	Assessment of the sources of error			✓		
	Reporting sufficient numbers of studies to assess utility and pitfalls			✓		
	Audit of the use the clinician makes of the results			G		
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease			✓	✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
CURRICULUM: THERAPY						
Objective. To provide the trainee with the knowledge, skills and attitudes to prescribe, administer and monitor the use of radiopharmaceuticals for therapy						

Assessment Blueprint for Nuclear Medicine

Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
I ¹³¹I therapy for thyrotoxicosis						
K	Clinical presentation, and diagnosis of thyrotoxicosis	✓	✓			
	Causes of thyrotoxicosis including autoimmune thyroid disease, single toxic thyroid nodule and toxic multinodular goitre etc	✓	✓			
	Drug treatment of thyrotoxicosis	✓	✓			
	Patient selection for ¹³¹ I therapy and awareness of alternative treatment options	✓	✓			
	Statutory and environmental factors governing the use of ¹³¹ I therapy for thyrotoxicosis	✓	✓			
	Radiation protection issues	✓	✓			
S	Obtaining informed consent for therapy		✓			
	Providing appropriate radiation protection instructions to the patient/carer/family members		✓			
	Ability to assess the presence and therapy of dysthyroid eye disease		✓			
	Instructing patient when to stop antithyroid medication		✓			
	Assessing and administering the appropriate activity of ¹³¹ I		✓			
	Assessing response to therapy		✓			
	Auditing the outcome of therapy		✓			
A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test		✓		✓	
	Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease		✓		✓	
	Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician				✓	
	Consider the importance of audit in the outcome of results				✓	
	Show openness to critical feedback of reports				✓	
	Appreciate the importance of keeping up-to-date with developments and with relevant medical literature				✓	
	Show awareness of health and safety issues				✓	
Objective. To provide the trainee with the knowledge, skills and attitudes to prescribe, administer and monitor the use of radiopharmaceuticals for therapy						
II Radiation synovectomy						
K	Joint anatomy and pathogenesis of inflammatory arthritis	✓	✓			
	Principles of radiation synovectomy using ⁹⁰ Ycolloid, ¹⁸⁶ Re sulphide and ¹⁶⁹ Er citrate	✓	✓			
	Patient selection for radiation synovectomy and awareness of alternative treatment options	✓	✓			
	Knowledge of efficacy and potential complications of treatment	✓	✓			

Assessment Blueprint for Nuclear Medicine

Curriculum area	Competence	Dip.	Mini-CEX	DOPS	MSF	CbD
	Radiation protection issues	✓	✓	✓		
S	Obtaining informed consent for therapy		✓	✓		
	Providing appropriate radiation protection instructions to the patient/carer		✓	✓		
	Measurement and drawing up of radiopharmaceutical			✓		
	Performance of intra-articular injection of the radiopharmaceutical			✓		
	Use of intra-articular corticosteroids where appropriate			✓		
	Ensuring adequate immobilisation of the injected limb to prevent lymphatic uptake			✓		
	Response and toxicity monitoring			✓		
	Auditing the outcome of therapy			G		
	A	Recognise the importance of proper vetting of request forms and of patient evaluation prior to the test			✓	✓
Show willingness to provide explanation to patient as to nature of the investigation and to put them at ease				✓	✓	
Appreciate the importance of timely reporting and of prompt and accurate communication of the result to the referring clinician					✓	
Consider the importance of audit in the outcome of results					✓	
Show openness to critical feedback of reports					✓	
Appreciate the importance of keeping up-to-date with developments and with relevant medical literature					✓	
Show awareness of health and safety issues					✓	