FACULTY OF PATHOLOGY

ROYAL COLLEGE OF PHYSICIANS OF IRELAND

Post **CSCST** TRAINING IN

NEUROPATHOLOGY
Molecular Pathology

This curriculum of training in Neuropathology-Molecular Pathology under the was developed in 2017 and undergoes an annual review by the Subject Matter Expert, Dr Francesca Brett, Dr Ann O'Shaughnessy, Head of Education, Innovation & Research and by the Training Committee. The curriculum is approved by the Faculty of Pathology.

Version	Date Published	Last Edited By	Version Comments
1.0	01/07/2018	Keith Farrington	No Changes

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Introduction

Molecular Pathology is the specialty concerned with the study and diagnosis of disease through the examination of molecules within organs, tissues or bodily fluids. The discipline seeks to describe and understand the origins and mechanisms of disease at the level of macromolecules e.g. DNA, RNA, and proteins largely using patient samples. Molecular pathology can be used to diagnose disease and/or to guide the prevention and treatment of disease.

This Post CSCST 1 year Clinical Fellowship will give the opportunity to undertake advanced clinical training as a sub specialist in Molecular Pathology

Entry Requirements

Applicants for the Post CSCST Fellowship in Molecular Pathology will have successfully completed the RCPI Higher Specialist Training programme in Histopathology within two years of the start date of the Post CSCST Fellowship programme.

Prior experience in Molecular Pathology during Histopathology training would be an advantage.

Recruitment and Selection

Post CSCST Fellowship training in Molecular Pathology will build on broad basic and early core specialist training in Histopathology. This is in line with training models internationally. Selection of candidates for Post CSCST Fellowship training in Molecular Pathology will be via a competitive recruitment process coordinated by the relevant Training Body. Recruitment will follow similar timeline where possible to HST recruitment and post will commence in July of each year (unless otherwise specified).

Duration and Organisation of Training

The Post CSCST Fellowship in Molecular Pathology is a one year training programme designed to dovetail with the Irish Higher Specialist Training programme in Histopathology The curriculum is competency-based, however it is anticipated that the candidate will complete training within one year.

The curriculum takes into account the major areas of competence required by the subspecialist in Molecular Pathology and will be supervised by the Faculty of Pathology of the Royal College of Physicians in Ireland. Doctors who have successfully completed the RCPI Higher Specialist Training programme in Histopathology and are within two years of completion will be deemed eligible to apply for the Post CSCST Fellowship in Molecular Pathology. Completion of this program will ensure the knowledge and competencies in all areas of the curriculum, meeting international standards for best practice and allowing candidates to practice as a subspecialist in Molecular Pathology.

Training Programme

The training programme offered will provide opportunities to fulfil all the requirements of the curriculum of training for Molecular Pathology in approved training hospitals. Each post within the programme will have a named trainer/educational supervisor and the programme will be under the Direction of the NSD in Histopathology

Trainee Numbers

It is expected that the Post CSCST Fellowship in Molecular Pathology will be awarded to one candidate per year.

ePortfolio

The trainee will be required to keep their ePortfolio up to date and maintained throughout their Fellowship training. The ePortfolio will be countersigned as appropriate by the Trainer to confirm the satisfactory fulfilment of the required training experience and the acquisition of the competencies set out in the Curriculum. This will remain the property of the Trainee and must be produced at the end of year Evaluation meeting. At the end of year Evaluation, the ePortfolio will be examined. The results of any assessments and reports by the named trainer/educational supervisor, together with other material capable of confirming the trainee's achievements, will be reviewed.

Programme Management

- Coordination of the training programme will lie with the Medical Training Department.
- The training year will usually run from July to July in line with HST programmes
- Annual evaluations will usually take place between April and June each year
- Each trainee will be registered to the ePortfolio and will be expected to fulfil all requirements relating to the management of yearly training records
- Opportunities for audit and research may be available
- Each trainee will be issued with a training agreement on appointment to the training programme and will be required to adhere to all policies and procedures relating to Post CSCST Fellowships.

Specialty Section

Surgical Neuropathology Overview

Objectives: To accurately diagnose and report pathological neurological disorders

KNOWLEDGE

Basic knowledge

- Knowledge of the normal anatomy, function and development of the nervous system
- Comprehensive working knowledge of the WHO Classification of CNS tumours, incorporating genetics and molecular diagnostics and understands their importance for treatment and prognosis.
- Be familiar with the clinical, radiological and genetic information required to ensure accurate pathological diagnoses of neurological disorders
- Tumours: Knowledge of the major primary and metastatic tumours of the brain, spinal cord and their surrounding tissues.
- Knowledge of genetics of nervous system tumours and their relevance to diagnosis, prognosis and treatment
- Non-neoplastic lesions: Knowledge of the range of common inflammatory and degenerative lesions and malformations in neurosurgical pathology practice
- Central spinal fluid (CSF) cytopathology: Knowledge of CSF cytopathology in the diagnosis of diseases of the brain and spinal cord

SKILLS

- Develop the ability to solve clinical problems by applying knowledge of basic principles of pathology to the nervous system
- Smears and frozen sections: Develop the ability to prepare smears; interpret smears and cryostat sections; to recognise the limitations of intraoperative diagnoses
- Histology and immunocytochemistry: Develop ability to interpret histology and immunocytochemistry for the accurate diagnosis of tumours and non-neoplastic lesions of the central and peripheral nervous system tumours
- Ordering – informed, appropriate ordering of molecular diagnostic investigations
- Develop the practice of integrating clinical, radiological and pathological data in formulating accurate pathological diagnoses
- Develop the practice of integrating clinical, radiological (CT, MRI, etc.) and pathological data for accurate diagnosis
- Acquire skill in the interpretation of CSF cytopathology
- Apply genetic information in the diagnosis and management of central and peripheral nervous system (CNS) disease

ASSESSMENT & LEARNING METHODS

- Record of the number and range of specimens handled

Autopsy and Post-Mortem Brain Pathology

Objectives: To develop skills in autopsy techniques for the examination of the central and peripheral nervous system at autopsy.

KNOWLEDGE

- Autopsies: Possess sufficient knowledge of the anatomy and pathology of the central and peripheral nervous systems and how the nervous system interacts with the other organ systems in the body
- Fixed brains: possess sufficient knowledge of anatomy and pathology of the nervous system in all age groups including foetuses for the selection of appropriate blocks for histology and for evaluating trauma, vascular disease, infections, tumours, multiple sclerosis, dementias, epilepsy, foetal and childhood disorders of the nervous system
- Possess knowledge of health and safety, law, ethics and legal practices as they apply to the practice of neuropathology
- Familiarity with the sampling procedures for dementia cases and the ability to integrate the pathological findings in the light of the clinical information received.

SKILLS

- Develop skills in adult autopsy including CJD autopsy
- Develop special skills such as removal of spinal cord, vertebral artery dissection, sinus examination, muscle and nerve biopsy, brachial plexus examination, ophthalmic examination,
- Develop skills in Brain 'cutting' and sampling (adult, paediatric and perinatal)
- Recognise limitations and when to refer cases or specimens to a specialist laboratory.
- Interpret histological and immunocyto-chemical preparations for the evaluation of major pathological lesions of the nervous system
- Understand the relevance of clinical and radiological data in planning and successfully completing a neurological autopsy

ASSESSMENT & LEARNING METHODS

- Record of the number and range of specimens handled
- DOPS: Cutting unfixed brain
- DOPS: Selection of blocks for microscopy
- DOPS: Assess sample for histology

Neurosurgical biopsy

Objectives: To diagnose and advise on masses/ lesions of the neurological system

KNOWLEDGE

- Microscopical and clinical features of:
    - lesions in bones of skills or vertebrae
    - lesions arising from the meningeal coverings of the brain or spinal cord
    - lesions of the sella turcica
    - lesions in the region of the pineal gland
    - lesions within the brain or spinal cord
    - lesions arising from nerve root or from the trunk of a cranial or peripheral nerve
    - lesions causing intractable epilepsy
- Microscopical and clinical features of dementia including degenerative disease
- Microscopical and clinical features of focal or diffuse cerebral white matter abnormalities
- Microscopical and clinical features of focal or diffuse meningeal or cerebral lesions in the immunosuppressed patient
- Microscopical and clinical features of vascular pathology

SKILLS

- Preparation and interpretation of intra-operative biopsy (see later section)
- Preparation and interpretation of neurosurgical biopsy
- Preparation and interpretation of CT and MR-guided bone needle biopsy
- Dissection, preparation and examination of neurosurgical lobectomy
- Tissue selection – Fresh v FFPE. Tumour percentage and its relevance.
- Apply WHO classification to a tumour
- Clarity in communication of diagnosis
- Effectiveness in advising on likely biological behaviour of the lesion

ASSESSMENT & LEARNING METHODS

- Record of the number and range of tumour specimens handled
- Case Based Discussion (CBD)

Intra-operative biopsy diagnosis

Objectives: To be able to perform an intra-operative diagnosis using smear and/or frozen section techniques

KNOWLEDGE

- Role of intra-operative diagnosis
- Limitations in intra-operative diagnosis
- Pitfalls in intra-operative diagnosis
- Role of imaging studies in making intra-operative diagnosis

SKILLS

- Preparation and interpretation of intra-operative wet smear preparation stained with toluidine blue or haematoxylin and eosin
- Preparation and interpretation of frozen section stained with haematoxylin and eosin
- Clarity and efficiency in communication of diagnosis with surgeon
- Effectiveness in advising on likely biological behaviour of the lesion
- Select appropriate range of histological techniques for investigation of infectious, metabolic and/or neurodegenerative disease
- Determine adequacy of biopsy

ASSESSMENT & LEARNING METHODS

- Record of the number and range of specimens handled

Cerebrospinal fluid cytology

Objectives: To examine cerebrospinal fluid to detect inflammatory and neoplastic disorders of the CNS and its coverings

KNOWLEDGE

- Features of cells normally present in the CSF
- Features of neoplastic and non-neoplastic pathologic cells within the CSF

SKILLS

- Distinguish between normal appearances, reactive pleocytosis and neoplastic pleocytosis
- Identify micro-organisms in some instances
- Appropriately select immunocytochemical preparations to assist differential diagnosis

ASSESSMENT & LEARNING METHODS

- Record of the number and range of specimens handled

Molecular Neuropathology

Objective; To integrate molecular oncology findings into the surgical pathology report.

KNOWLEDGE

- Understand role for molecular tests in diagnosis, prognosis and predictive tumour neuropathology
- Understand molecular techniques used in modern Neuropathologic diagnostics – FISH, array comparative genomic hybridisation, next generation sequencing, methylation profiling,

SKILLS

- Appropriately identify tumour specimen for freezing/ banking
- Appropriately identify cases for referral for molecular genetics including 1p19q status, MGMT methylation, BRAF fusion and BRAFV600 mutation analysis, IDH1/2 mutation analysis, histone mutation analysis, methylation profiling and classification, and newer tests as they evolve
- Integrate molecular results into final (integrated) diagnosis
- Communicate, with clarity, these techniques, results and interpretation to surgical and oncology colleagues

ASSESSMENT & LEARNING METHODS

- Record of the number and range of specimens handled
- DOPS: Cutting unfixed brain
- DOPS: Selection of blocks for microscopy

Molecular Pathology

Objective:

- To achieve expertise in the integration and interpretation and reporting of molecular, histological and cytogenetic pathology

KNOWLEDGE

- Molecular diagnostics and molecular genetics in human disease with emphasis on disorders of the nervous system particularly brain tumours
- Molecular, cytogenetic and immune histochemical laboratory tests as they pertain to disorders of the nervous system including brain tumours
- Interpret molecular and cytogenetic laboratory tests.
- Real world experience with innovative and cutting edge technologies in molecular pathology
- Laboratory management, quality assurance, troubleshooting of molecular tests, assay development and evaluation
- A sound knowledge base of the basic science of molecular biology and molecular genetics

SKILLS

- Expertise in integrating molecular, histologic and clinical data
- Research skills and participation in a research project
- Good communications skills with laboratory and clinical physicians, patients, technologists and ancillary staff
- Sensitivity to ethical issues in genetics, particularly those raised by molecular diagnostic testing

ASSESSMENT & LEARNING METHODS

- DOPS
- Record of the number and range of specimens handeled

Minimum Requirements

- These are the minimum number of cases you are asked to document as part of your training. It is recommended you seek opportunities to attain a higher level of exposure as part of your self-directed learning and development of expertise.
- You should expect the demands of your post to exceed the minimum required number of cases documented for training.
- If you are having difficulty meeting a particular requirement, please contact your specialty coordinator.

Curriculum Requirement	Required/Desirable	Minimum Requirement	Reporting Period	Form Name
Section 1 - Training Plan				
Personal Goals Plan (Copy of agreed Training Plan for your current training year signed by both Trainee & Trainer)	Required	1	Training Post	F052
Personal Goals Review Form	Required	1	Training Post	F137
Weekly Timetable (Sample Weekly Timetable for Post/Clinical Attachment)		1	Training Post	F045
Section 2 - Training Activities				
Surgical Neuropathology (number of cases handled)				
Cut ups	Desirable	25	Training Programme	F 113
Frozen sections reported and diagnosis made	Required	25	Training Programme	F 113
CSF cytology	Required	25	Training Programme	F 113
Tumour pathology	Required	25	Training Programme	F 113
Autopsies				
Adult autopsies	Desirable	2	Training Programme	F114

Curriculum Requirement	Required/Desirable	Minimum Requirement	Reporting Period	Form Name
CJD autopsy	Required	1	Training Programme	F114
Adult Brain cuts				
• Neurodegenerative	Desirable	1	Training Programme	F114
• Trauma	Desirable	1	Training Programme	F114
• Epilepsy	Desirable	1	Training Programme	F114
• HIE	Desirable	1	Training Programme	F114
Forensic brain cuts	Desirable	1	Training Programme	F114
Inquests	Desirable	1	Training Programme	F005
Special autopsy techniques: • Spinal cord removal • Vertebral artery dissection	Desirable	2	Training Programme	F114
Special Techniques				
Molecular integration (including FISH, MGMT assays,)	Required	30	Training Programme	F117
Independent Reports Written				
Surgical tumour neuropathology	Required	20	Training Programme	F004
Autopsy including brain cuts	Desirable	5	Training Programme	F004
Complicated cases handled	Required	5	Training Programme	F003

Curriculum Requirement	Required/Desirable	Minimum Requirement	Reporting Period	Form Name
Section 3 - Educational Activities				
BNS Study Days	Desirable	1	Training Programme	F008
Participation at In-house activities minimum of 1 per month from the categories below:				
Neuroscience Grand Rounds	Required	10	Training Programme	F011
Journal Club	Required	10	Training Programme	F011
MDT Meetings	Required	10	Training Programme	F011
Additional Experience				
Attend neuroradiology reporting	Required	1	Training Programme	F011
Observe neurosurgery	Required	1	Training Programme	F011
Delivery of Teaching				
Lecture	Desirable	1	Training Programme	F013
Tutorial	Desirable	1	Training Programme	F013
Neuroscience MDT	Required	2	Training Programme	F013
Research	Desirable	1	Training Programme	F014
Audit activities and Reporting (1 per year either to start or complete, Quality Improvement (QI) projects can be uploaded against audit)	Required	1	Training Programme	F135
Fellowship Report to IICN (All fellowship activities reported)	Required	1	Training Programme	F135

Curriculum Requirement	Required/Desirable	Minimum Requirement	Reporting Period	Form Name
Publications	Desirable	1	Training Programme	F016
Presentations	Desirable	1	Training Programme	F017
National/International meetings (INA, AANP, BNS, IICN)	Desirable	1	Training Programme	F010
Additional Qualifications	Desirable	1	Training Programme	F065
Committee Attendance (1 per year)	Desirable	1	Training Programme	F063
Section 4 - Assessments				
DOPS				
Cut-up (competently handle specimens)	Required	3	Training Programme	F022
Remove spinal cord, vertical artery section.	Required	1	Training Programme	F022
Remove and dissect adult brain	Required	1	Training Programme	F022
CBD	Required		Training Programme	F020
Reporting (Identify cases requiring specialist opinion)	Required	2	Training Programme	F020
Diagnose frozen section and give appropriate advice	Required	1	Training Programme	F020
Use molecular techniques to supplement routine histopathology in forming a diagnosis	Required	1	Training Programme	F020
Neurodegenerative disease	Desirable	1	Training Programme	F020
Quarterly Assessments	Required	4	Training Programme	F092
End-of-Post/End-of-Year Assessments	Required	1	Training Programme	F092

