



## Guidance on content and learning objectives for 2-week Molecular Pathology Attachment for Histopathology Trainees

It is expected that the trainees would undertake the attachment in Stage B or early Stage C in training in a molecular pathology laboratory in a GMC approved location.

### Aim of the Attachment:

This attachment aims to introduce pathology trainees to the principles of molecular testing of clinical samples, from sample requirements, through sample preparation, test methodology, analysis and interpretation, and integration of molecular test results with histopathology reports and MDM discussions. The trainee should have a clear understanding of the breadth of molecular testing available and the need for integrated reporting.

A detailed knowledge sample QC, test validation and analysis is outside the scope of a 2-week attachment, but the trainee should be aware of these processes and their importance.

### Objectives of the Attachment:

On completion of the attachment, the trainee will:

- know how samples should be handled and prepared for different types of molecular tests
- know how to assess samples for specific molecular tests
- understand the principles of key molecular technologies
- Know the molecular tests currently available in pathology, their clinical context and their clinical utility
- appreciate how molecular test results are analysed and interpreted
- have experience of integrating molecular test results into a histopathology report and how this influences management through MDM discussion
- understand the importance of QC, internal and external QA, test validation and data management

### Specific Learning Topics:

- Sample handling requirements: impact of fixation, preparation of sample for nucleic acid extraction, concept of sample enrichment through macrodissection
- Sample assessment including assessing neoplastic cell content, percent necrosis
- Methods of DNA and RNA extraction
- Principles of different molecular technologies:
  - In-situ hybridization (FISH, CISH, DDISH)
  - PCR and real-time PCR, including high throughput techniques
  - Sanger sequencing
  - Next generation sequencing
  - Cancer panels
  - 100,000 Genome Project
- A detailed understanding of which molecular tests are used for which sample type, to include:
  - Her2 Amplification



- Mutation analysis for: c-kit, PDGFRA, EGFR, BRAF, KRAS/NRAS, ALK
- Microsatellite Instability testing
- Mismatch Repair gene expression
- EML4-ALK translocation
- Sarcoma translocations
- Lymphoma translocations
- Analysis and Interpretation of results
- Integration of results into histopathology report
- Attendance at MDM discussion

### **Teaching Delivery:**

- Laboratory attachment to shadow sample preparation and each test type.
- Case studies: select a number of samples undergoing different types of testing, for example may include a lymphoma, a breast cancer, a lung cancer and a sample consented for 100,000 Genome project. The trainee would be responsible for tracking these samples through the lab, writing a case report on the clinical need and utility for the test, the details of methodology, how the result was interpreted, and should aim to attend relevant MDM (can be outside the 2-week attachment period).
- Core knowledge on molecular biology and details of technologies will need to be supplemented with recommended text and papers, and e-learning modules. A central list of core reading and e-learning resources could be provided (CM-Path aim to have this type of information on the website).

### **Assessment:**

- Submission of at least 2 Case reports as work place based assessments
- Completion of TRIG 1 e-learning module –
  - <https://www.genomicseducation.hee.nhs.uk/courses/courses/introduction-to-genomics/>
  - <http://www.pathologylearning.org/trig>