

The research project(s) the ACF will undertake in support of the theme

The research project would be on discovering biomarkers for brain tumours based on *omic* incl radiomic methods and bioinformatic analysis and will be building on existing research.

The project is led by Professor CO Hanemann, director of the South West Brain Tumour Centre of Excellence and Dr Lucy McGavin.

The applicants for this ACF can be for Clinical Radiology ST2 & ST3, Neurosurgery ST1 & ST3, Neurology ST3.

University Hospitals Plymouth provides a full range of neurosciences services. Also Clinical Radiology provides full breadth of training with site-specialist training including Neuroradiology. The links in Plymouth, between neuroscience, neurology, neuropathology, neuroradiology and the tertiary referral services of neurosurgery and neuro-oncology and intracranial stereotactic radiosurgery/radiotherapy are a strength.

There is a well-established literature on 'radiomics' in the pre-operative assessment of intrinsic brain tumours, primarily glioblastoma and other tumours such as lung and breast. This research concentrates on correlation between radiological features (manually derived, computerised feature extraction, and semantic descriptors), proteomic markers, and tumour genetics / histological grade in order to predict clinical outcomes. The use of these analytical approaches to meningiomas, the most common primary brain tumour, are much less well established. They primarily focus on multimodal analysis with or without use of machine learning, to establish predictors of grade and treatment outcome from traditional radiological features, in combination with more complex texture analysis or use of more advanced imaging features such as diffusion characteristics. The proposed research project aims to build on those approaches used in glioblastoma research, and use of machine learning, in order to correlate the radiomic, radiological and histological findings in meningiomas and integrating theme with existing proteomic findings for operated meningioma in order to develop better predictive models of tumour grade and clinical outcome. In addition we will do serial MRI and analysis of blood biomarker candidates, which resulted from our previous work in non-operated meningiomas.

The training will be in Plymouth where both clinical and academic activities occur. The assessment of clinical progress will be competence-based with the CCT date tailored to the needs of the individual trainee. Assessment of the trainee's progress will be made at a joint academic/clinical ARCP.

The research component of the post will take place in the Peninsula Medical School and the ACF will be part of an active brain tumour team in the centre. We provide a permissive environment with core infrastructure platforms for effective trans-disciplinary research. Research time can either be on day release (typically one day per week) or blocks of 3 months within a training year, by mutual agreement. For this project at least some block research time would be useful. The research aims to enable the ACF to submit at least one paper to a good impact peer-reviewed journal, and work towards obtaining funding for a higher degree.

The trainee will have both an Academic Educational Supervisor and Clinical Educational Supervisor. who will work together to draw up a bespoke clinical and academic training programme appropriate for the trainee's specialty. ACFs are linked via email and social activities to the existing cohort. Biannual networking events are arranged for the trainees and provide a forum for discussing career progression

challenges. The trainees also have an active social network, which provides opportunity for mutual support and growth of the clinical academic community.

Academic training will be tailored to individuals' needs but trainees will be encouraged to take part in the PUPSMD research training programme. Details of the training opportunities are provided in a local 'ACF guide' provided to all trainees. All ACFs are supported to achieve up to 60 credits (Certificate Stage) via a range from the MClInRes, MClInEd and ResM programmes. ACFs can also access the extensive early career researcher training opportunities that are provided by the University of Plymouth, via its Researcher Development Programme, with sessions available in each of the four key domains: Personal Effectiveness; Research Governance and Organisation; Engagement, Influence and Impact. Training is also provided in 'Applying for Research Funding' to assist trainees in moving on to a PhD.