

## **BDIAP Innovation Grant Report Cytology Placement April 2024**

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**Year Bursary awarded:** 2024

**Present Post:** Histopathology Specialist Registrar, Leeds Teaching Hospital Trust

**Department Innovation Grant completed:**

- Two weeks at Cytology Department, Brigham Women's Hospital, Boston, US.
- One week at Cytology Department, Pittsburgh University Hospital, UPMC, Pittsburgh, US.

### **1. CYTOLOGY PLACEMENT BRIGHAM WOMEN'S HOSPITAL**

I am a Stage D academic-clinical trainee with a special interest in cytology (both gynae and non-gynae) and I am working towards taking on a consultant post that will include cytology and surgical pathology as well as research.

During my observership at Brigham Women's Hospital (Harvard, Boston) I was extremely fortunate to be able to report with Professor Cibas, Dr Mito and Dr Cervera. As you are aware, Professor Cibas is a very experienced cytopathologist and he has written international cytology guidelines, cytology textbooks and research articles. He was very generous with his time and his teaching was excellent. This opportunity to report with highly experienced clinicians was incredibly valuable for me and has widened my perspective significantly on how to report a wide range of cytology specimens.

Through the cytology teaching I was able to significantly extend my clinical experience in gynae and non-gynae cytology. During the period, I reviewed all routine cytology cases and discussed selected cytology cases (over 250 live cases) and most referral cases. I reviewed a large part of their teaching collection (review of over 900 cases with focus on gynae-, pancreas-, thyroid-, serous fluids, and urine cytology). I attended multiheaded difficult cytology case discussions, rapid on-site evaluations and reported these in conjunction with the faculty members and fellows. In addition, I was able to observe cytology clinics, including on lymph node aspiration. This was a horizon-broadening experience for me as these procedures are not performed in the Cytology department at Leeds Teaching Hospitals and to my understanding are only currently performed in selected centres in the UK.

During the fortnight, I was able to get a good overview of the cytology facilities and understand their processing pathways. This includes their gynae-cytology pathway including the Hologic system. Boston also has over 20 years' experience in using an automated/ AI system for gynae-cytology. The Centre was one of the first sites in the US that trialled such systems and one of the first adopters of this technology into the clinical cytology setting. The system scans all slides and then presents the most representative 20 fields of view to the Cytology Biomedical Scientists. If the case is classified as NILM, then the slide can be signed out by technical staff as negative. For any other finding the Cytology biomedical staff will refer the case to the Cytology Fellows, who will review the case. Ultimately, like in the UK, the case will be reviewed by a faculty member and signed out. Feedback is then given to the Fellows, trainees, and Cytology Biomedical staff.

It was very interesting to understand that HPV primary screening, although recommended by the US guidelines, is currently not used in the clinical setting. HPV co-testing is performed in most centres. Some cytopathologists also voiced clear concerns about introducing HPV primary testing as there seems to be, in their opinion, a small percentage of cases that might be missed. Another interesting difference is that the cytology and the surgical gynaecological departments have conferences to review any discordant cases together. In contrast, no tumour board or colposcopy meetings were undertaken to my understanding, which I personally think is a great tool to improve patient outcomes. I am still in contact with the department and have been able to continue attending their cytology departmental sessions. I am further exploring opportunities to work together on cytology research.

Brigham Women's Hospital and Massachusetts General Hospital hold a lunchtime session each day for all residents. I was able to attend these daily residents teaching sessions, including slide seminar sessions on uropathology and soft tissue pathology, additional extra research sessions on for example digital pathology, lung research and tumour microenvironments. Further, the Dana Farber Institute, which is associated with the Brigham Women Hospital, holds excellent research talks, which I attended.

More generally, I was able to attend multi-header sessions and sign out sessions for surgical pathology, including soft tissue, uropathology (Professor Hirsch) and gynae pathology (Professor Nucci).

## **2. CYTOLOGY AI IN CYTOLOGY PITTSBURGH (UPMC)**

Pittsburgh University Hospital has a world leading research group in AI in cytology. During my week at Pittsburgh, I was able to report a range of Cytology cases and I identifying interesting Cytology case for presentations and publications. I further learned about the digital Cytology system workflow, scanning facilities and AI systems. This includes the cytology scanning service for rapid on-site evaluation and the various scanners they use. Further, I learned about the AI programmes the team uses for prostate, breast, KI-67 and ZN evaluation. I was able to talk with the relevant clinical teams and how they are integrating these systems into the clinical diagnostic pathway. The most advanced was the urology group, which is using a system to evaluate prostate core biopsies. These are providing pathology with a range of information on each core biopsy. This was particularly interesting as we are not using this kind of system currently in Leeds.

In addition, it was valuable to visit the women's hospital, which performs PAP smears. They are one of the academic centres which are currently using the new AI Genius Digital Diagnostic System by Hologic to access Gynaecological smears. They are further exploring the use of this system for urine cytology. Professor Cheng discussed their promising pilot data and implications of the usage of the system in clinical practice. I was able to see the instrument and the pictures that it produces for review.

On the teaching side I completed a tour of the anatomy site with Jim Maksin, which was wonderful as they are using cutting edge technology for their teaching. This includes their new anatomy table, which allows digital dissection of a body and specific further learning modules on anatomy. Since last Summer they also have VR system which they use for their anatomy teaching as well as operation planning. It was great to explore this technology on my own as well as in a group teaching session.

## **CONCLUSION**

I want to pass on a huge thank you to the Committee for awarding me this Scholarship. These observerships allowed me to deepen my research interest in digital pathology through learning from a world-leading research group in AI in cytology. While surgical pathology is now increasingly digitalised, this shift has not yet happened for cytology. Exploring recent technologies and seeing the new ways in which the new AI Genius Digital Diagnostic System by Hologic can scan multiple layers to create good cytology pictures was extremely interesting. Further, I was able to build new research relationships during both attachments. I am extremely fortunate to be able to stay in close contact with the Cytology Department of Brigham Women's Hospital (Harvard, Boston) through attending their monthly Cytology paper review discussion. I am now exploring synergistic themes for further research activities in cytology. This includes quality assurance in cytology and innovative technologies in cytology like AI. I am currently writing up a range of interesting cytology cases, which I am planning to publish and present in the future at Cytology meetings.