



Clinical
Oncology

The Royal College of Radiologists

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RCR-Cyclotron Trust Visiting Fellowships 2015/16 (Clinical Oncology)

POST-VISIT REPORT

1. Name of Visiting Fellow	Dr Jason Cashmore	
2. Name of joint Visiting Fellow (if applicable)	Dr Sundus Yahya	
3. Institution(s) of Visiting Fellow(s)	University Hospitals Birmingham, NHS foundation trust	
4. Name of Host(s)	Dr Li and team	
5. Institution(s) of host(s)	UFPTI	
6. Expenses claimed		
7. Visit Dates (ACTUAL)	a. Start Date 06/06/2016	b. End Date 18/06/2016
8. 2 nd visit dates (if applicable)	a. Start date	b. End Date
9. Aims of the visit Specific aims of visit Clinical	<ul style="list-style-type: none">• Greater understanding of appropriate use of protons vs photon treatment including benefits and limitations.• Discuss issues of uncertainty in Bragg peak position.• Awareness of acute/late toxicity in patients treated with proton therapy.• Understanding of surface doses and skin reactions.• Develop an understanding of on-going and upcoming clinical trials and the rationale for these• On-treatment imaging techniques / frequency .• Basis for PTV margins used.• Dose calculations for re-treatment, particularly for patients (treated with primary proton therapy) presenting with relapse.• Establish greater academic collaboration for research projects.	

Dosimetry

- Gain knowledge of the principles of proton dosimetry and verification methods.
- Appreciation of methods of proton maintenance and calibration, traceable standards and equipment used for this.
- Experience Cyclotron operation / maintenance.
- Experience patient specific QA process and equipment used.
- Understand methods used for production of range compensators / apertures for scattered beam treatments, and timescales for manufacture Treatment planning.
- Rationale for choice of proton beam over IMRT and PBS over double-scatter.
- Improve knowledge of PBS treatment planning.
- Gain understanding of TPS used and algorithms used for dose calculation.
- Methods for coping with artefacts from metal implants / dental amalgam.

10. Activities undertaken

1. Welcomed by the fellowship and resident programme training administrator.
2. Introduction with the faculty and tour of the department (including treatment rooms/ gantry, engineering workshop, PET CT, MR facilities).
3. Discussions with physicist regarding proton uncertainties.
4. Attendance at Paediatric Tumour board meetings at Namour General Hospital and Wolfson Children's Hospital as well as Lung, breast, head and neck, sarcoma, Skull base/ neuro, Hepatobiliary/ GI tumour boards.
5. Attendance at Chart review meeting which involved primary physicians presenting all their cases and volumes contoured, followed by dosimetry and planning discussions.
6. Treatment planning with dosimetrists and proton therapy plan review with chief dosimetrist and oncologist discussing planning techniques, beam arrangements, dose constraints/ boost techniques/ metal issues.
7. Observed early morning run up of accelerators and QA tests performed before treatment.
8. Observed paediatric patients treatment delivery, including observing anaesthetists team working procedures used to allay anxieties (children and parental), induction and recovery phases of anaesthesia, drugs used and challenges faced including treatment delivery on the machines.

9. Observed patient specific QA for proton therapy.
10. Observed proton beam planning including beam shaping, patching/ matching technique, working around air spaces, smearing, impact of metal, double / uniform scattering, pencil beam scattering, IMPT and understanding methods used for production of range compensators / apertures for scattered beam treatments.
11. Observed the manufacture of patient specific compensators and apertures, and the QA of these devices before treatment.
12. Attendance at organised lectures, "Management of the retrosternal thyroid- Work-up and surgical perspectives" by Head and Neck surgeon.
13. Spent time with IBA engineers to observe the challenges faced at the machines and cyclotron itself as well as therapy radiographers to observe treatment delivery/ verification procedures.
14. Attended patient lunch time symposiums with feedback from patients currently on treatment.
15. Spent 2 days over the weekend with IBA and physics teams collecting data for pencil beam acceptance testing, including beam line maintenance and resolution of accelerator issues for fast beam scanning.

11. Benefits of the visit (short term)

1. Greater understanding of the utilisation of proton therapy with indications, challenges and benefits of treatment as well as understanding side effects profile and their management.
2. Gained valuable experience regarding the uncertainties associated with proton beam therapy and their application to treatment planning.
3. Comparisons of proton plans vs IMRT plans and difficulties/ uncertainties around both and dosimetric constraints.
4. It was valuable to follow through patients sent from our centre for treatment through NHS overseas programme and be involved in their treatment planning.
5. With the plans for development of Proton centres in the UK and more patient awareness about proton therapy, this visit has provided me with valuable experience in patient selection, dosimetry practicalities, side effects profile as well as re-irradiation issues.
6. Established links with physicists to allow future collaborations and develop research projects across sites.
7. Gained a greater understanding of cyclotron and beam line operation, and how this relates to the forthcoming UK services.
8. We plan to share and disseminate the knowledge to colleagues gained through departmental and grand round teaching sessions.
9. Gained experience of the US healthcare system and the challenges this benefits/challenges this can produce relative to the NHS.

12. Envisaged benefits of the visit (longer term)

The visit to UFPTI has given me a valuable insight into the use of protons in radiotherapy and the advances in technology required to fully utilise the benefits of the proton Bragg peak for treatment.

Observing the treatment planning of multiple sites and chart review sessions has aided my understanding of the benefits of proton therapy, and the selection of patients suitable for this treatment modality. Going forward we will have a much greater understanding of the patient groups, and tumour/OAR anatomy that would benefit from proton therapy.

Spending time with the IBA engineers and physics teams during PBS acceptance testing was extremely useful, and has given me a much greater understanding of the complexities of proton delivery and the technology required to deliver scanned proton beam treatments, and the limitations of scattered beam technologies.

I feel better equipped to explain the practicalities and technical challenges faced by proton therapy. This will enable me to give a more educated viewpoint to clinical staff as queries regarding proton therapy become more common place.

With the knowledge gained we plan to run a series of research projects comparing treatment planning techniques/ technologies (IMRT/PBS) for various treatment sites, and strategies for dealing with anatomical variation during treatment.

With the development of UK proton centres a first hand understanding of dosimetry and potential side effects will prove valuable in future patient management.

13. Please outline any problems you encountered before, during or after your visit

Although the centre is set up very well to accommodate visiting clinical staff, the arrangements for visiting physicists are much more ad hoc. Staff are very friendly, and knowledgeable, but the visitor is most often left to navigate the centre and organise their own experience.

14. Any additional comments

Many thanks to the RCR-Cyclotron and CO PSSB for providing us with this opportunity, and to Rozina Behrooz at UFPTI for organising our visit.

Special thanks to the physics team especially Stella and Witold, and the dosimetry team Debbie, Cari and Mann. Many thanks also to the IBA engineers who took the time to explain cyclotron and beam line operation.

Signed: Jason Cashmore

Date: July 7th 2016

Report approved by: Clinical Oncology Professional Support & Standards Board (CO PSSB)

Date: 22.09.16