The Royal College of Radiologists
RCR-Cyclotron Trust Visiting Fellowships 2016/17 (Clinical Oncology)

POST-VISIT REPORT

Date for Return: This report must be completed and emailed to the RCR within months of the end of your visit

Please complete all sections of this form.

1. Name of Visiting Fellow	Paul Clarke	
2. Name of joint Visiting Fellow (if applicable)	Suliana Teoh	
3. Institution(s) of Visiting Fellow(s)	Oxford University Hospitals NHS Foundation Trust	
4. Name of Host(s)	Dr Martin Grossmann	
5. Institution(s) of host(s)	Paul Scherrer Institute	
6. Expenses claimed	£573.89	
7. Visit Dates (ACTUAL)	a. 08/01/18	b. 12/01/18
8. 2nd visit dates (if applicable)	a. Start date	b. End Date
9. Aims of the visit		
- To learn about proton treatments using pencil beam scanning (PBS) and understanding the implications of this treatment technique on delivery, planning and verification methods. - To observe treatment delivery using PBS in order to gain an understanding of patient setup, immobilisation and the image guidance used. - To learn about the interplay effect between pencil beam scanning and breathing motion and techniques used to mitigate this. - To learn about the methods used to test the robustness of treatment plans created for lung cancer patients.		
10. Activities undertaken		

Treatment

- Monday (am) – presentation about the Paul Scherrer Institute including gantry details, treatment history and patient numbers. Observed air gap optimisation for a brain plan.
- Monday (pm) - Tour of the institute including seeing the beamline for all gantries.

- Tuesday (am) – observation of patient treatments using PBS delivery for a craniospinal patient and a lung cancer patient. Observation of immobilisation for a paediatric brain patient which involved the creation of a bite-block.
- Tuesday (pm) – acceptance testing on the new gantry at PSI. The particular tests seen were related to the treatment couch and how accurately the system moved about its isocentre and executed a range of predetermined shifts whilst different patient weights were simulated.

- Wednesday (am) – observation of the daily checks on gantry 2 involving the measurement using ion chambers and a scintillator screen combined with CCD camera for a range of dosimetric measurements. We sat in on the morning meeting in which a craniospinal plan was presented by the dosimetrist. Observed patient treatment on gantry 1.
- Wednesday (pm) – planning session in which a craniospinal plan was demonstrated which included explaining the plan objectives, OAR constraints and how the planning software calculates the junctions when multiple fields are required.
- Wednesday (evening) – gantry 3 leakage test (part of gantry commissioning).

- Thursday (am) – observation of treatments on the dedicated eye treatment beamline. This included an explanation of the patient pathway, creation of patient mask/bite block, patient imaging used for planning.
- Thursday (pm) – presentation on the 4D lung treatments at PSI. This included an explanation of the rescanning technique used and the robustness tests performed which utilised the different phase images from the 4DCT. Attended MDT meeting.

- Friday (am) – weekly QA on the eyeline facility which involved measuring the beam flatness and symmetry (passive scattering system).
- Friday (pm) – observed verification of plans for eye treatments and PBS plans.

11. Benefits of the visit (short term)

- Improved understanding of the fundamental interactions that affect PBS delivery and that require accurate modelling in dose calculation.
- Improved understanding of the use of deformable registration and how it can be used in assessing plan robustness for PBS lung treatments.
- Improved understanding of how the interplay effect in lungs can reduce target coverage and the techniques used to minimise this.
- Improved understanding of pencil beam scanning and the complexities involved in delivering highly accurately spots.
- First-hand experience of the quality assurance and plan verification tests required by using PBS compared to a passive scattering system.
- By seeing the dose distributions and OAR doses for different treatment sites I gained a greater appreciation for the advantages of using proton beams compared to photon beams and how this can lead to dose escalation/improved target coverage.
- Knowledge of eye treatments and how this necessitates the use of passive scattering for beam delivery.
- Knowledge of the dosimetric tolerances and equipment specifications used in proton therapy in order to meet the requirements for treatment accuracy.

12. Envisaged benefits of the visit (longer term)

- Improved understanding of the indications for proton beam treatment.
- Knowledge gained can be disseminated to colleagues through presentations/reports.
- With the NHS introducing proton centres to the UK the knowledge and the experience gained from the trip to PSI could be valuable. Moreover, the potential collaborative links with physicists at PSI could help with any future research or implementation of proton beam therapy.

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

14. When do you intend to submit an article for the RCR Newsletter?

2 months

15. Any additional comments

I would like to thank to Dr Martin Grossman for organising an excellent program for us and to everyone at PSI who took the time to demonstrate their work and patiently and thoroughly answer our questions.

Signed:	**Paul Clarke**	**Date:**	**19/01/2018**
Report approved by:			
Date			

Please return this form to Mr David Christopher, Professional Manager:
david_christopher@rcr.ac.uk