



Name: Kar H Teoh
Country of residence: United Kingdom
Country of visiting fellowship: Berlin, Germany
Name of the host: Prof Perka/Prof Schultz
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EFORT visiting fellowship Report

I have been privileged to be awarded the EFORT foundation fellowship to the Center for Musculoskeletal Surgery, University Hospital Charité, Berlin, Germany. The department is headed by Prof. Dr. Carsten Perka & Prof. Dr. Michael Schütz, both of which have excellent international standing in the Trauma and Orthopaedic community. Prof. Perka's interests are in the designing of revision acetabulum implants for bone defect reconstruction, optimized knee kinematics from total knee arthroplasty, development and evaluation of different joint preserving and replacing operational techniques for revision joint replacement and minimal invasive and navigated hip replacement. Prof Schütz's research interests include fracture healing, the development of trauma surgery implants and treatment methods, and the development of trauma systems. He is also the current Chairman of AO Development Incubator which provides funding for innovative translational, musculoskeletal research. Both of them are the co-editors for the AO Periprosthetic Fracture Management Manual.

The University Hospital Charité, Berlin is Europe's largest teaching University clinic, and is affiliated with both Humboldt University and Free University Berlin. Charité is one of Germany's most research-intensive medical institutions and has the largest endowment. It has been consistently ranked by Focus as the best of over 1000 hospitals in Germany since 2012. More than half of all German Nobel Prize winners in Physiology or Medicine came from the Charité. Its medical school is one of the most prestigious and competitive in Germany.

The Center for Musculoskeletal Surgery likewise is one of the most famous and prestigious centre in Germany and Europe and very popular for local residency training and overseas visiting fellowships. Prof Julius Wolff was the founder of the Orthopaedic clinic at Charité in 1890. His classic work entitled "The Law of Transformation of Bone" ("Das Gesetz der Transformation der Knochen") which was published in 1892 described a relationship between the form and function of bone known as the famous Wolff's law of bone adaptation. The musculoskeletal research centre at Charité is named after him, Julius Wolff Institute. The Center for Musculoskeletal Surgery is based on two sites: Campus Charité Mitte (Figure 1) and Campus Virchow-Klinikum (Figure 2). The orthopaedic surgery department at University Hospital Charité consisted of two specialties which was common nearly everywhere in Germany: orthopaedic and traumatology surgery. Merger of these 2 departments at University Hospital Charité occurred in 2003 with formation of the Center for Musculoskeletal Surgery.



Figure 1. Campus Charité Mitte



Figure 2. Campus Virchow-Klinikum

Charité is a Level 1 Trauma Centre and has an international reputation for its interdisciplinary polytrauma care. It is one of the AO trauma centres for fellowships. The department is also well known for its endoprosthesis surgery, septic surgery and treatment of spinal disorders. Trauma, Septic surgery, Foot & Ankle and Upper limb are mainly based at Virchow while Endoprosthesis, Sports surgery and Spinal surgery are mainly based at Mitte (Figure 3). My fellowship was arranged such that I spent half of my fellowship in each centre to get the best of both worlds.

My main objectives of the fellowship were:

- To gain further experience and learn the latest techniques in primary and revision arthroplasty from a world leader in this field
- To increase my surgical exposure in managing periprosthetic fracture and septic joint surgery from one of the leading centre in Europe
- To enhance my decision-making skills and avoid pitfalls in management of polytrauma and complex periarticular trauma from a centre of excellence
- To understand of the host country's healthcare model
- To use this unique opportunity to interact, as well as exchange knowledge and experiences with orthopaedic surgeons from host centres and visiting fellows
- To create avenues for networking and collaboration for future research



Figure 3. Amazing panoramic view of Berlin from the Orthopaedic ward

1) Description of clinical activities during the fellowship.

Each day started with the daily business departmental meeting at 730am with the whole department and a radiologist present. All the previous day's admissions are presented and discussed. The post operatively image intensifier images from the previous day's surgery are also presented and critically analysed by the department. There is also a daily afternoon 'indication' meeting at 3pm to discuss the cases which will be operated on the next day.

Following the daily business meeting, I would go for to theatre or clinics. It usually works out to be 4 days of theatre and 1 day of clinic during the week. I was allowed to scrub and assist for cases I was interested in for the whole duration. The Oberazts were always happy to explain to me things which I was not sure of. As the workload of Charité is mainly tertiary, I got to see many complex cases (dysplastic hips, young adult hip problems, periprosthetic fracture, septic surgery). The 'easy' cases as I have been told are taken by the other outlying hospitals in Berlin. While this may not be ideal for the residents in terms of operating experience, it was ideal for me as a visiting fellow. There were 6 theatres in Virchow and 3 theatres in Mitte. There was always something new or interesting each day. I was shown the Charité way of operating and



their treatment philosophy during the fellowship. I particularly enjoyed this aspect of the fellowship and it was an enriching experience.

Although I could not understand German, I still attended clinics once a week. The doctors were always very kind to explain the patient's problem and the rationale of his management plan to me. I felt it was important to attend clinics even with the language barrier as I wanted to know the clinical outcome of the patients post operatively too. There were many tertiary referral cases with interesting pathology which usually brought on thought-provoking discussions. In fact, there is rarely a straightforward case. Being in a centre of excellence like this has definitely broaden my orthopaedic horizon.

2) Description of scientific activities during the fellowship

There is teaching once a week for the residents at 7am in the morning. The department is highly involved in research concentrating on basic and applied research in Orthopaedics and Trauma surgery. This is performed at Julius Wolff Institute headed by Prof Duda. I was given a tour of the centre during my fellowship and they explained to me the focus of their current research interests. This include:

- understanding the interaction between movement and loading within joint replacements and during fracture healing
- enable musculoskeletal mobility
- identification of underlying principles in compromised healing situations, including delayed bone healing, bone defect healing, muscle trauma, ligament injury and arthrosis with a focus on mesenchymal stem cells research

I would like to thank Dr Sven Geissler for having me in his research unit and showing me around. He is passionate about translating his research from bench to bedside. He tells me that the unique part in Charite is the clinicians ask the clinical questions and as scientist, they try to answer it and provide solutions with basic science research. The unit does several phase 1 and 2 clinical trials.

More recently, the unit has been chosen by AO for the AOTESA Stephan Perren AOTrauma Research Traveling Fellowship where young and enthusiastic researchers with specific interest in trauma care visit both the AO Research Institute, Davos, Switzerland and Julius Wolff Institute, Berlin, Germany for two weeks each.

3)Description of social aspects of the fellowship.

I managed to pick up a lot of German 'theatre words' by the end of the fellowship, although my spoken German remains pretty basic. There were also several visiting fellows (America, Thailand, Japan) who were in the unit at the same time with me. I enjoyed the cultural exchange and interaction with them, learnt about their healthcare model and how different trauma and orthopaedics is practiced in their country.



I became interested in German history as well while on fellowship. The history of Berlin and Germany is just incredible, and I found myself wanted to read more and more on it. During my free weekends, I visited the numerous museums in Berlin to immerse myself in the culture. The historical sights in Berlin were also very pretty (Figure 4). I also found time to visit the surrounding areas during my fellowship (Dresden, Leipzig). Being an avid football fan, I went to the Europa league game of RB Leipzig vs Marseille and home games of Hertha Berlin. With its rich cultural history, I basically could find any type of food I wanted to eat. I will definitely miss the famous gemuse kebabs and currywurst of Berlin.



Figure 4. Sights of Berlin (Top to bottom: City Hall, Berlin Wall, Opera House, Alexanderplatz, Tower, Cathedral, Charlie Checkpoint, Brandenburg Square)



As Charité has such a long illustrious history, I was interested to find out more of this institution. Due to the Cold War/Berlin Wall, Humboldt University which was established in 1810 and mainly had building in East Berlin were cut off from the Allied side. Therefore, a new University needed to be founded in Allies controlled West Berlin which became known as Free University Berlin. The illustrious Alumni Surgeons and Nobel Prize winners includes Bernhard von Langenbeck, Rudolf Virchow, Robert Koch, August Bier and Emil Theodor Kocher, Friedrich Trendelenburg, etc. It was like a walking medical dictionary as I realised so many medical terms and diseases I learnt in medical school were coined here: Virchow's triad, Virchow's node, Kocher approach to hip and elbow, Loop of Henle, Creutzfeldt-Jakob Disease, Romberg's sign, Trendelenburg's sign, Bier's block, Henoch-Schönlein purpura, Wolff's Law, Wernicke encephalopathy, schwann cells, ... I was recommended to watch a German drama series named Charité on Netflix. It describes the accomplishments of several famous German physicians and scientists (Virchow, Ehrlich, Behring, Koch) at the prestigious Charité hospital in Berlin towards the end of the 19th century and it aided my understanding of this illustrious institution.

4) Technical skills that I learnt during the fellowship.

- Minimally invasive anterolateral approach (Watson Jones) for hip arthroplasty
- Use of templating software for both arthroplasty and trauma surgery
- How to approach a dysplastic hip needing arthroplasty
- Management of young adult hip pathology (Periacetabular osteotomy [PAO], hip arthroscopy, Ganz open surgical dislocation with trochanteric flip)
- Use of personalised acetabular prosthesis for pelvic discontinuity (Figure 5)
- Techniques for revision arthroplasty surgery
- Techniques for septic surgery
- Techniques for dealing with periprosthetic fracture



Figure 5. Personalised acetabular prosthesis

5) Theoretical knowledge that I learnt during the fellowship.



- Diagnosis and management of young adult hip pathology
- Management of Prosthetic Joint Infection (PJI)

Charité is currently one of the world's leader in management of PJI due to the research and clinical interests of Prof Perka and Prof Trampuz. Prof Trampuz established the sonication procedure of removed implants in detection of low grade PJI. During my stay, my knowledge of diagnosis, treatment and prevention of implant-associated infections improved.

- Management of periprosthetic fracture

As mentioned above, both professors are the co-editors for the AO Periprosthetic Fracture Management Manual. This introduced the new Unified Classification System on periprosthetic fractures and brings together the latest global knowledge on periprosthetic fractures pertaining to all relevant anatomical regions, surgical pitfalls, and complex cases.

6) New knowledge and skills that I can implement in my own practice.

- Use of templating software for both arthroplasty and trauma surgery
- Minimally invasive anterolateral approach (Watson Jones) for hip arthroplasty
- Improved management of periprosthetic fractures for my patients
- Improved management of Prosthetic Joint Infection (PJI) – the use of sonification is an excellent idea but this is not readily available in most hospital. Their current research focuses on use of dithiothreitol (DTT) vs sonification.
- Indication meeting - I would have appreciated having this in my training but unfortunately we were based in too many outlying hospitals for this to happen. I strongly believe this meeting serve as a good learning opportunity for the department especially the residents and fellows and it would be nice to have this in my unit in future.
- Not using the yankauer sucker for the knee in arthroplasty cases once it is used to suck spill over fluid on the drapes (from soon to published paper from the department, this shows that all the distillate grew bacteria). They routinely now use a new sucker after irrigation prior to implantation of the TKA.
- Use of ex fix rods and cement rather than expensive modular spacers in septic knee arthroplasty cases (Figure 6)



Figure 6. First stage revision of infected TKR

7) Overall reflective statement over how the fellowship contributed to my professional development.



A fellowship is not only about the clinical experience. It is about learning the host country's culture, understanding the healthcare model and its issues, their orthopaedic training pathway, how their residents feel about it and comparing it to mine in United Kingdom. By the end of my fellowship, I definitely felt I have fully immersed myself in the system and have a good grasp of how things work in Germany. As always there is a flip side of the coin when coming from the other side but I will take the good things back and try to implement it in my future practice like the incredible German efficiency of starting the list at 8am sharp! I have also made new friends and I hope to continue to keep in touch with them. I am sure I will meet them at some future European conferences or collaborate on future researches. All in all, this was a wonderful privileged opportunity for me to be based in the most famous hospital in Germany.

During my time at Charité, I was also chosen as the first EFORT-APOA exchange fellow where I attended the 20th APOA congress in Antalya and participated in their Young Ambassadors programme (Figure 7). From the bottom of my heart, I would like to thank EFORT for all these wonderful opportunities you have given me in my early budding career. I hope to contribute to the workings of this wonderful organisation in the near future. I also attended the 19th EFORT Annual Congress at Barcelona where I presented my researches. It was great to have the opportunity to meet the amazing people behind the scenes like Prof Önder Aydingöz (EFORT president) (Figure 8), Prof Li Felländer-Tsai (Chair of the EFORT Travelling & Visiting Fellowships), Mrs. Sanni Hiltunen (Project Manager, Educational Programmes) (Figure 9) and Nina Nürnberger (Corporate Governance & Membership Services Manager). During this congress, EFORT has started a new initiative where past and present EFORT fellows have ribbons attached on their congress badge stating EFORT alumni group so they can easily identify each other, get in contact with each other, exchange fellowship experiences and establish new contacts. I believe this is a wonderful idea and I am delighted to be part of this unique family.

Acknowledgements

This fellowship would not have been possible without several important people at Charité. I would like to thank both Professors at Charité for having me at their unit, their passion for education and their generous hospitality (Figure 10). I would also like to thank Dr Sebastian Manegold, Dr Viktor Janz, Dr Serafeim Tsitsilonis, Dr Alex Springer, Dr Vanessa Lembke, Dr David Kruger and PA Hasret Erek for making my stay so welcoming and for helping me out in every possible way. Mrs Münzer, Prof Perka's secretary deserve a special mention for all the pre-arrival work she has done and for coordinating this fellowship. Lastly, many thanks to Smith and Nephew for sponsoring this wonderful opportunity.



Figure 7. APOA Young Ambassadors 2018



Figure 8. With Prof Aydingor at APOA



Figure 9. With Prof Li Felländer-Tsai and Mrs. Sanni Hiltunen at EFORT 2018 and the alumnus ribbon



Figure 10. With Prof Perka