Research Institute Davos

A **PhD studentship** is available in the **Infection Biology Focus Area** of the AO Research Institute Davos (ARI) and the Amsterdam University Medical Centers, University of Amsterdam (AMC).

The successful applicant will be working within a multi-disciplinary team investigating host-pathogen interactions in the context of *Staphylococcus aureus* infection of bone. The position may be particularly suitable for candidates experienced in microbiology and immunology with an interest in developing cross disciplinary skills and working in a multidisciplinary environment.

The successful candidate will be jointly supervised by the Fintan Moriarty (ARI), and Esther de Jong and Sebastian Zaat (AMC), including to the extensive in-house facilities and expert collaborators at both institutions. The candidate will graduate at the University of Amsterdam.

**Your position will include:**

- The direct interaction of *Staphylococcus aureus* with bone cells, as well as indirect effects mediated by interactions with cells of the immune system.
- Summarize the current state of the art in the field of osteoimmunology relating to infection.
- Project related travel between Switzerland and the Netherlands will be required.

**Your profile:**

- Undergraduate and Master's degree in Microbiology, Cell Biology, Immunology, Biomedical Sciences or related field
- Specific experience in the fields of bacterial infection or cell culture is preferred
- Ability to work and communicate well within a team, and meet deadlines is essential
- A working level of spoken and written English
- Independent, structured and accurate way of working

Applications will be accepted until the position is filled. Ideal starting date is January 2022.

If you feel you meet these requirements, please send your complete application and motivation letter, curriculum vitae, certificates to: Fintan.moriarty@aofoundation.org;

**About the workplaces**

ARI is in Davos, a Swiss mountain resort renowned for winter and summer mountain sports: https://www.davos.ch/en/

The mission of the **AO Research Institute Davos** (ARI) is to advance patient care through innovative orthopaedic research and development concerning musculoskeletal, spine and cranio-maxillo-facial trauma, degenerative musculoskeletal diseases, infections, and congenital disorders. https://www.aofoundation.org/what-we-do/research-innovation/about

**AMC**: At the Amsterdam UMC the Departments of Medical Microbiology and Infection Prevention (Dr. S.A.J. Zaat) and the Department of Experimental Immunology (Prof. Dr. E.C. de Jong) will be involved in the supervision and graduation program and will offer guidance during laboratory visits to the Amsterdam UMC during the project. In Dr. Zaat's research line "Biomaterial-associated infection (BAI) and novel antimicrobial strategies", the research focusses on pathogenesis, prevention and treatment of BAI and other infections. Prof de Jong's research is focussed on role of neutrophils and antigen presenting cells in immunity.

**About the project**

Fracture-related infection (FRI) can lead to failure of fracture healing, pathological bone remodelling, localized inflammation, and soft tissue complications. The predominant pathogen in FRI, *Staphylococcus aureus*, can degrade bone independent of any host activity. However, significant osteolysis occurs with virulence-attenuated mutants, suggesting that a substantial proportion of the pathology is caused by the host response. A better mechanistic understanding of how bacteria invade, survive within, and trigger pathological remodelling of bone could lead to new therapies aimed at prevention or treatment of FRI. With this proposed project, we wish to study the 3-way interaction between 1) *S. aureus*, 2) host immune cells, and 3) bone.

At each stage of the study, key bacterial virulence factors will be assessed through proteomics and further evaluated using mutant bacterial strains to provide new insights into the mechanisms underlying the observed effects. In parallel the signalling and activation of cells of the immune system by bacteria, and how this leads to bone loss, will be studied in vitro, ex vivo and in vivo utilising flow cytometry, computed tomography and measurement of the secreted factors involved in these processes. The outcome of the project should be the availability of an advanced model for bone pathology due to infection, and a better understanding the processes involved in FRI-induced bone loss.