PhD Positions – Periodontal Remodelling and Systemic Diseases

Collaborative Research Centre (CRC/SFB 1739)

University Hospital RWTH Aachen, RWTH Aachen University

Welcome to RWTH Aachen University and University Hospital RWTH Aachen!

Are you interested in understanding how systemic diseases influence tissue regeneration and degeneration? Do you want to work at the interface of dentistry, medicine, biology, engineering, and translational research?

Join the newly funded Collaborative Research Centre (CRC/SFB 1739): "Soft tissue–alveolar bone crosstalk – Impact of systemic diseases on mechanisms of periodontal remodelling", funded by the German Research Foundation (DFG).

We are recruiting highly motivated doctoral researchers to investigate how chronic diseases such as chronic kidney disease, cardiovascular disease, liver disease, hematological malignancies, and skeletal disorders affect the biological mechanisms that maintain periodontal health and tissue regeneration.

About CRC/SFB 1739

Periodontal remodelling is essential for maintaining oral health, preserving tooth support, enabling orthodontic treatment, and preventing tissue degeneration. However, increasing evidence demonstrates that systemic diseases profoundly influence periodontal homeostasis and regenerative capacity.

CRC/SFB 1739 brings together researchers from dentistry, medicine, life sciences, engineering, imaging, computational biology, and molecular medicine to establish a new interdisciplinary framework for understanding periodontal-systemic crosstalk and developing innovative diagnostic and therapeutic strategies.

The consortium includes more than 30 principal investigators and combines expertise from clinical dentistry, internal medicine, cardiovascular research, nephrology, oncology, imaging, stem cell biology, biomaterials, microbiology, systems biology and molecular medicine.

Doctoral researchers will contribute to projects addressing:

- Mechanisms of periodontal remodelling in health and disease
- Chronic kidney disease and periodontal crosstalk

- Cardiovascular disease and heart failure
- Liver disease and metabolic dysfunction
- Hematological malignancies
- Inflammation and immune regulation
- Stem cell biology and tissue regeneration
- Oral microbiome and biofilm research
- Advanced imaging technologies
- Omics technologies, proteomics, metabolomics and mass spectrometry
- Biomaterials and tissue engineering
- Experimental disease models
- Translational and clinical research

Depending on the selected project, PhD candidates will work with patient cohorts, experimental models, advanced imaging technologies, molecular biology, mass spectrometry, bioinformatics, biomaterials, or computational approaches.

Doctoral project

Promotors:
Univ.-Prof. Dr. med. Dr. med. dent. Frank Hölzle, Department of Oral and Maxillofacial Surgery
Priv.-Doz. Dr. Emiel P.C. van der Vorst, Medical Clinic I – Cardiology

We offer a doctoral research opportunity investigating how obesity and type 2 diabetes mellitus (T2DM) influence oral tissue remodelling and regenerative processes following reconstructive surgery in the oral cavity. Oral cavity defects resulting from tumour resection, trauma, chronic inflammation, tissue necrosis, or congenital anomalies often require complex reconstruction to restore essential functions such as speech, swallowing, breathing, and appearance. Although autologous tissue transfer represents the gold standard for reconstruction, successful healing depends on effective tissue remodelling and regeneration.

Growing evidence indicates that cardiometabolic comorbidities, particularly obesity and T2DM, negatively affect wound healing, vascularisation, and immune responses, thereby increasing the risk of flap failure, tissue necrosis, and infection. However, the underlying mechanisms remain insufficiently understood.

The doctoral candidate will contribute to a multidisciplinary research programme examining the effects of obesity and T2DM on intraoral tissue remodelling. The project combines in vivo, in vitro, and translational approaches, including murine intraoral flap models, advanced imaging and histological analyses, perfusion monitoring, cytokine profiling, and cellular studies focusing on gingival fibroblasts and endothelial cells. In addition, the project will investigate whether reversal of metabolic disease can restore

regenerative capacity and improve surgical outcomes. Clinical validation studies will ensure the translational relevance of the findings.

This PhD project provides an excellent opportunity to gain expertise in tissue regeneration, wound healing, oral biology, vascular biology, and translational research. The results are expected to advance our understanding of how cardiometabolic diseases affect oral tissue regeneration and may contribute to the development of improved therapeutic strategies for reconstructive head and neck surgery.

What You Bring

We are looking for ambitious and enthusiastic candidates who:

- Hold (or will soon obtain) an **MSc degree in Biology, Biomedicine, Biotechnology, Molecular Medicine,** or a related discipline.
- Have a strong interest in translational biomedical research.
- Enjoy working in interdisciplinary teams.
- Possess excellent communication skills.
- Are highly motivated and scientifically curious.
- Have good written and spoken English skills.

What We Offer

As a doctoral researcher within CRC/SFB 1739, you will benefit from:

- A funded PhD position according to the German public service salary scale (TV-L E13 65%).
- Access to state-of-the-art research infrastructure.
- Participation in a newly established DFG-funded Collaborative Research Centre.
- Interdisciplinary supervision by leading experts in dentistry, medicine and life sciences.
- Structured doctoral training through the Integrated Research Training Group. Opportunities for international collaboration and scientific exchange.
- A vibrant and highly collaborative research environment.

Doctoral Degree Opportunities

Depending on the candidate's academic background and supervising faculty, doctoral researchers may pursue:

Dr.rer.nat.
Dr. rer. medic.

subject to the applicable doctoral regulations and admission requirements.

Integrated Research Training Group (IRTG)

All doctoral researchers will become members of the CRC 1739 Integrated Research Training Group (IRTG), which provides:

- Structured doctoral training
- Interdisciplinary supervision
- Scientific and transferable skills workshops
- Career development support
- International networking opportunities
- Research exchanges with collaborating institutions
- Mentoring and individual career planning

The IRTG is designed to foster interactions between dental, medical and basic science disciplines and to train the next generation of researchers in periodontal-systemic disease research.

About RWTH Aachen University

RWTH Aachen University is one of Europe's leading universities for science, engineering and medicine. University Hospital RWTH Aachen provides a highly interdisciplinary research environment and is internationally recognized for excellence in translational biomedical research, systems medicine and organ crosstalk research.

Interested?

For more information, contact **Dr. Emiel van der Vorst** (evandervorst@ukaachen.de).

To apply, submit your CV, motivation letter, and reference letter.

application procedures can be found on the CRC/SFB 1739 website: https://www.ukaachen.de/kliniken-institute/sfb1739-weichgewebe-knochen-crosstalk/karriere/