



FIDELIO
Bone health in Diabetes

Training network for research into bone Fragility In Diabetes in Europe – towards a personalised medicine approach

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PhD student – Early Stage Researcher (ESR6) Development of diabetes-sensitive computational models of bone strength for the clinical diagnosis and pre-clinical tracking of diabetic bone fragility

About FIDELIO

The EU-funded Innovative Training Network FIDELIO (<https://www.fidelio-project.eu>) aims to train the next generation of scientists in order to tackle the challenges of diabetic bone disease from various angles and with the newest technologies available. Interdisciplinary training and implementation of innovative approaches are key. Within this consortium, we will comprehensively unravel the genetic and environmental mechanisms that contribute to bone fragility in diabetes, identify predictors and clinical markers for patient stratification, decipher the underlying molecular mechanisms of bone fragility in diabetes, and establish potential interventions through a personalised medicine approach.

The research programme will address different aspects of diabetic bone disease from the viewpoints of epidemiology, genetics, miRNAs, microbiome, bone biology, bone biomechanics and microstructure, preclinical and clinical research. It will utilise advanced imaging and computational approaches, diabetes mouse models and access to clinical cohorts and registry data to obtain a comprehensive overview of how these mechanisms combine in diabetes to cause increased fracture risk.

With this interdisciplinary approach, we can explore the impact of biological pathways in mouse models and/or humans, and interactions with diet, exercise and other exposures. Collaborations with industry will allow early identification of IP, access to state of the art technologies, and will complement the academic ESR training programme with entrepreneurship and industrial mentoring.

About the host organization

The **Universitätsklinikum Hamburg-Eppendorf (UKE)** is one of Europe's most modern clinics. Here specialists from all fields of medicine and life sciences are brought together under one roof. State-of-the-art medical technology, innovative information technology, and architecture created with the provision of medical care at the forefront, all with the aim of optimally supporting doctors, nursing staff, and therapists. With a strong focus on research, ideal conditions for the interlinkage between modern medicine, translational research, and teaching are found at the UKE. More than 11,000 employees work around the clock with the singular aim of providing the best medical care to our patients. Webpage: <https://www.uke.de/english/index.html>

The Heisenberg Research Group (Busse lab) at the Department of Osteology and Biomechanics focusses on bone quality assessment. Basic, translational and clinical research is performed on multiple aspects of musculoskeletal health. Webpage: <https://www.uke.de/english/departments-institutes/institutes/osteology-and-biomechanics/index.html>

The Busse lab has expertise in **osteoporosis, musculoskeletal disorders, bone matrix quality analysis, high-resolution imaging and biomechanical testing**. The group consists of an international, multidisciplinary team with backgrounds in the fields of biology, chemistry, physics, medicine, bioengineering and computational analysis all working together to address key questions in musculoskeletal health.

Task description

Your PhD project:

The candidate will focus on bone strength in diabetic bone with the help of computational models. The project will involve the following tasks: i) investigate how microdamage, cross-linking and bone porosity affect bone quality in diabetes. Therefore, the ESR will work on biomechanical testing as well as micro-CT imaging of bone specimens. ii) The candidate will work on the development of a micro-FE model incorporating matrix properties to predict fracture risk in diabetic bone. Therefore, the candidate will also focus on data obtainment from murine diabetes models (collaboration with the University of Dresden, Germany). iii) The candidate will work on the development of a qCT-based FE model incorporating crucial bone quality factors utilizing data from human diabetic cohorts and age-matched controls in order to build and validate clinical FE models.

Secondments:

You will embark on secondments to other FIDELIO partners (SCANCO (CH), ETH (CH), IBM (CH); UCBM (IT) or SDU (DK)) to access experimental models and tools or receive additional training from experts in the field. This will include a focus on computational models and methods, high-resolution image processing and micro-FE modelling. Further, code optimisation and/or acceleration of computation as well as testing FE models using prospective or retrospective fracture data. Total secondment time is 5 months.

Benefits of working in an ITN:

- You will be working within our international, interdisciplinary team of >30 researchers with experience in a broad range of sciences.
- You will get in contact with the other members of this international consortium and will benefit from the joint training platform to develop skills necessary for developing a thorough understanding of the mechanisms of diabetes and the bone metabolism and for obtaining industry skills.

Profile and requirements

- Applicants must hold an MSc or equivalent in the field of biomedical engineering, biomechanical engineering, bioinformatics, computer sciences or a related program
- Applicants must have knowledge and/or experience in finite element modelling
- Willingness to work with bone specimens from animals and humans is a prerequisite
- Applicants can be of any nationality
- Applicants must have an ability to understand and express themselves in both written and spoken English to a level that is sufficiently high for them to derive the full benefit from the network training
- Applicants must be eligible to enroll on a PhD program at the host institution (or a designated university in case the host institution is a non-academic organization)

In addition:

H2020 MSCA Mobility Rule: researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of the host organization (Germany) for more than 12 months in the 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status are not taken into account.

Eligible researchers must not have spent more than 12 months in the 3 years immediately prior to the date of selection in the same appointing international organisation.

H2020 MSCA eligibility criteria: Early Stage Researchers (ESRs) must, at the date of recruitment by the host organization, be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree. Full-Time Equivalent Research Experience is measured from the date when the researcher obtained the degree entitling him/her to embark on a doctorate (either in the country in which

the degree was obtained or in the country in which the researcher is recruited, even if a doctorate was never started or envisaged).

Benefits

- You will be employed by the host organization for 36 months (with the option of an extension of the employment later on).
- A competitive salary plus allowances. Moreover, funding is available for technical and personal skills training and participation in international research events.
- You will benefit from the designed training program offered by the host organization and the consortium.
- You will participate in international conferences and secondments to other organizations within the FIDELIO network and in outreach activities targeted at a wide audience

Please find additional information in the [Information package for Marie Curie fellows](#)

Application

Interested candidates are invited to apply online at <https://www.fidelio-project.eu/contact/>.

Expected start date: August 2021

More information can be found on <https://www.fidelio-project.eu>

Additional information

We in the FIDELIO consortium value diversity and we commit to equal treatment of all applicants irrespective of gender, sexuality, health status as well as social, cultural or religious background.

For additional information about the research project and this individual position, please contact:

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