



## Funded PhD studentship in Prosthetic Dentistry *Katholieke Universiteit Leuven, Faculty of Medicine*

A PhD studentship is available in the BIOMAT Research Cluster laboratory (<http://med.kuleuven.be/biomat/>) to investigate the effect of high-frequency loading on implant osseointegration in compromised bone.

The Katholieke Universiteit Leuven is the research-leading university in Belgium, and is ranked within the top 100 world universities (QS World University Rankings 2010). The scientific environment is excellent. The BIOMAT Research Cluster laboratory is located at the Leuven University Hospitals, in Leuven city center. Leuven is situated in the heart of Europe, 20 minutes from Brussels.

### PROJECT DESCRIPTION

Implant therapy is a well-established treatment to replace missing teeth. Its success depends on osseointegration, implying direct bone apposition to the functionally loaded implant. Systemic diseases such as osteoporosis negatively affect bone and compromise implant prognosis. Inversely, mechanical loading, more specifically low-magnitude high-frequency (LMHF) mechanical stimuli, has the potential to stimulate implant osseointegration, as recently evidenced by the BIOMAT Research Cluster (Ogawa et al. 2011a,b). How the specific microenvironment in impaired bone jeopardizes implant osseointegration and how and to which extent mechanical interventions can influence the implant anchorage into osteoporotic bone remain unclear. The project consists of 2 work packages. The ovariectomized rat will be used as animal model. The first work package will target (i) the assessment of the alteration of the proliferative and osteoblastogenesis potential of the progenitor cells in osteoporotic bone (*in vitro*) and (ii) the unraveling of the osseointegration cascade up to the genetic (qPCR) and proteomic (2-DE and MS) level (*in vivo*). Gaining insight into the fundamental processes of osseointegration will elucidate the mechanisms by which osteoporosis affects osseointegration. In the second work package, LMHF implant loading will be introduced for assessing the efficacy of LMHF mechanical loading strategies for improved implant osseointegration in impaired bone. In the *in vivo* part, LMHF loading of the implant will be applied through whole body vibration or through controlled individual limb loading. Peri-implant tissue healing and implant osseointegration will be evaluated by means of histology and immunohistochemistry. The *in vitro* part of work package 2 will attempt to identify and assess functionality of the key proteins that are involved in the response of cells to LMHF stimuli. Rat bone marrow progenitor cells will be plated onto titanium discs and high-frequency vibration loading will be implemented through a custom-made oscillating platform. The osteogenic response to LMHF loading will be investigated by means of phenotypic and genotypic cell differentiation assays and by proteomic secretome analysis (LC-ESI-MS/MS). The ultimate objective of the project is to enhance titanium implant osseointegration in patients with deficient bone and bone healing potential through controlled mechanical implant loading.

### QUALIFICATIONS

The candidate should be a holder of a university degree and should have a particular interest in cell biology (Biology, Biochemistry, Bio-engineering, Biomedical Science). A "distinction" degree is a minimal request for acceptance. Mastering fluently the English language is a prerequisite. Candidates applying for this position should be willing to work with animal models.

### FUNDING

Funding is available for 4 years. The research project will be conducted towards a PhD degree.

### HOW TO APPLY

An application requires a written solicitation, extended CV, and contact information for 3 references, addressed to:

Prof. I. Naert  
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### CLOSING DATE

The closing date for applicants wishing to start in Jan 2012 is 1<sup>st</sup> Oct 2011.

### INTERVIEWS

Interviews will take place in mid to end-October 2011 in the BIOMAT Research Cluster.

Applicants invited for the interview will be asked to give a short presentation as part of the selection process.

### FURTHER INFORMATION

Catholic University of Leuven, and 'Living in Leuven' on <http://www.kuleuven.be/english/>  
PhD program of the Faculty of Medicine on <http://gbiomed.kuleuven.be/phd/>

