PhD / postdoc positions on the role of cell-matrix interaction for angiogenesis – KU Leuven, Belgium

The Mechanobiology and Tissue Engineering research group (headed by prof. Hans Van Oosterwyck) of the Biomechanics section at KU Leuven (Belgium) is looking for highly motivated, interdisciplinary PhD and postdoctoral researchers to work within the framework of an ERC Starting grant on the role of cell-matrix interaction for angiogenesis.

Project background

Angiogenesis, the formation of new blood vessels from the existing vasculature, is a process that is fundamental to tissue growth, repair and disease. The control of angiogenesis is of importance for tissue regenerative therapies as well as for the treatment of major diseases, such as cancer. The extracellular matrix is one of the key controlling factors of angiogenesis, among others through its importance for the migration of endothelial cells that make up new vessels, and the way they mechanically interact with the matrix.

The European Research Council (ERC) recently awarded an ERC Starting grant (ERC StG) to Hans Van Oosterwyck, entitled ‘In silico and in vitro Models of Angiogenesis: unravelling the role of the extracellular matrix’ (acronym ‘MAtrix’, budget 1.5 MEuro, starting date 1 November, 2012, project duration 5 years). Within the MAtrix project novel computational and experimental approaches will be developed to study mechanisms of cell-matrix mechanical interactions in a more quantitative way. Central to the project is the creation of a multiscale computational framework (‘in silico’ model) that relates the extracellular microenvironment to intracellular processes and that provides feedback mechanisms between mechanical and biochemical signals. Another important aspect is its interdisciplinary character, involving a tight coupling between computer simulations and in vitro experiments. As such, MAtrix will integrate technologies from various disciplines, such as computational modelling, optical microscopy, cellular biomechanics, biomaterials and biology.

Vacancies

In total 3 PhD positions and 1 postdoc position will become available between 1 November 2012 and 1 November 2013. Two of these positions are available from 1 November 2012:

PhD position on multiscale / multiphysics modelling of angiogenesis (PhD1): the candidate will develop a novel multiscale / multiphysics computational model of endothelial cell migration and sprout formation, with an emphasis on the importance of cell-matrix interaction and the feedback between mechanical and biochemical signals. The candidate is expected to acquire an interdisciplinary research profile that combines excellent mathematical / computational skills with a profound knowledge on the biophysics and molecular signaling of angiogenesis. He / she should preferentially have an MSc degree in mathematical or computational biology, biomedical or bio(science) engineering, biophysics or related. Although the focus is on computational aspects, the candidate is expected to have an interest in experimental work as well, and will have the ability to carry out in vitro validation experiments (see also description of postdoc position). Funding is available for a full PhD track (four years).

Postdoc position on optical microscopy and imaging of in vitro angiogenesis: the candidate will establish an advanced optical microscopy based imaging platform for the in vitro study of angiogenesis, in order to acquire quantitative data at intracellular, cellular and extracellular levels. He / she must develop experimental protocols and image processing algorithms for the quantitative analysis of endothelial cell migration and sprout formation in hydrogel systems. A profound knowledge on (nonlinear) optical microscopy of living systems, preferentially in the context of angiogenesis and/or cell mechanics, combined with image processing and cell culturing skills, is required, and must be demonstrated by the candidate’s track record and list of publications. Funding is available for at least three years.
Two more PhD positions will become available from 1 November 2013. One PhD position (PhD2) will require a combined experimental / computational research profile, combining cell mechanical experiments with the in silico model of angiogenesis, and further extending it. Candidates should preferentially have an MSc degree in biomedical or bio(science) engineering, biophysics or related. Another PhD position (PhD3) will involve mostly experimental work, and combines biomaterials (biopolymer) design with performing in vitro angiogenesis experiments, applying and extending the optical microscopy imaging platform. Candidates should preferentially have an MSC degree in biomedical, bio(science), chemical or materials engineering or related. Funding is available for full PhD tracks (four years).

Research environment
The Mechanobiology and Tissue Engineering research group, headed by Hans Van Oosterwyck, focuses on the role of the microenvironment for cell behaviour, and in particular on the importance of mechanical signals and mass transport. Multiscale computer models are being developed to quantify the microenvironment and to relate it to cell fate. The group follows an integrative and interdisciplinary approach by tightly coupling computer models to experiments. Main applications are skeletal tissue regeneration and engineering as well as angiogenesis. The group currently consists of 6 PhD students and 1 postdoc.

The candidates will be part of an interdisciplinary research team that is further supported by the following research groups from Science, Engineering and Technology as well as Biomedical Sciences at KU Leuven: the Laboratory of Angiogenesis and Neurovascular Link (Vesalius Research Center; prof. Peter Carmeliet), Molecular Imaging and Photonics (profs. Johan Hofkens and Maarten Roeffaers), Mechatronics, Biostatistics and Sensors (prof. Herman Ramon) and Prometheus, the Skeletal Tissue Engineering division (prof. Jennifer Patterson). Together, these groups consolidate expertise on computational biology and mechanics; cell and matrix mechanics; cell and molecular biology; in vivo, in vitro and in silico models of angiogenesis; optical microscopy; biomaterials and tissue engineering.

The KU Leuven is located in the heart of Europe in the small historical college town of Leuven, about 30 km east from the nation’s capital Brussels. The city and the campus offer a vibrant international and young environment with a tradition of hospitality and a rich socio-cultural life. Good knowledge of English is sufficient for all communications both within and outside the research group.

How to apply?
Applications (letter of motivation and CV, including the names of at least two references) must be sent to Hans Van Oosterwyck (hans.vanoosterwyck@mech.kuleuven.be) before 1 October, 2012. Applications are invited for the vacancies that are available from 1 November, 2012 in the first place, but candidates for the ones available from 1 November 2013 can already contact the grant holder. Please clearly indicate which vacancy you are applying for.

More information
http://www.kuleuven.be/english