

# EINLADUNG

zum Gastvortrag

von

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am

**Dienstag, 22.11.2016, 14.30 Uhr (s.t.)**

Technische Universität Wien, Karlsplatz 13, 1040 Wien  
**Seminarraum 202** (Stiege 2, 2. Stock + Halbstock)

## **Computational modelling and quantitative imaging for probing the cell's microenvironment**

**Abstract:** Local microenvironmental factors are key regulators of cell fate, which must be taken into account for the development of regenerative therapies. In my lecture I will present a number of quantitative tools to provide insight in the relation between local chemical or physical factors and cell behaviour, in particular on the role of mass transport and cell-matrix mechanical interactions in the context of bone regeneration and angiogenesis respectively. Methodologies cover the use of computational models (reaction-diffusion models for addressing mass transport limitations in 3D cell culturing; hybrid, multiscale models of bone regeneration; meshless, particle-based cell and matrix mechanical models) and quantitative optical microscopy for measuring molecular transport, structural and mechanical properties of hydrogels as well as cellular forces in 3D contexts.

*Further reading:*

Carlier, A., Akdeniz Skvortsov, G., Hafezi, F., Ferraris, E., Patterson, J., Koç, B., Van Oosterwyck, H. (2016). *Computational model-informed design and bioprinting of cell-patterned constructs for bone tissue engineering. Biofabrication*, 8 (2), art.nr. 025009.

Jorge Peñas, A., Izquierdo-Alvarez, A., Aguilar-Cuenca, R., Vicente-Manzanares, M., Garcia-Aznar, J., Van Oosterwyck, H., de-Juan-Pardo, E., Ortiz-de-Solorzano, C., Muñoz-Barrutia, A. (2015). *Free Form Deformation -based Image Registration Improves Accuracy of Traction Force Microscopy. PLoS One*, art.nr. 10(12):e0144184.

Carlier, A., van Gastel, N., Geris, L., Carmeliet, G., Van Oosterwyck, H. (2014). *Size does matter: an integrative in vivo-in silico approach for the treatment of critical size bone defects. PLoS Computational Biology*, 10 (11), art.nr. e1003888.

Odenthal, T., Smeets, B., Van Liedekerke, P., Tijssens, E., Van Oosterwyck, H., Ramon, H. (2013). *Analysis of initial cell spreading using mechanistic contact formulations for a deformable cell model. PLoS Computational Biology*, 9 (10), e1003267.

Demol, J., Lambrechts, D., Geris, L., Schrooten, J., Van Oosterwyck, H. (2011). *Towards a quantitative understanding of oxygen tension and cell density evolution in fibrin hydrogels. Biomaterials*, 32 (1), 107-118.