

GSI – SEMINAR

Im Theorieseminarraum, SB3 Raum 3.170a

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"MatriGrid®-technology – Structures and methods for realistic “organotypic” cell culture devices”

In contrast to common cell culture systems organs and tissues have a 3-dimensional shape and consist of different cell types. Furthermore, a strict organization of these different cell types within the organ is essential to fulfill their specific function. The gap between present cell culture techniques and physiological organ structure must be closed to get more predictive cell culture models for drug and toxicity studies to reduce animal tests.

Engineering chemical cues with defined geometries can directly regulate cell adhesion, migration, morphology or cell-cell interactions [1]. For that reason, many sophisticated methods (typically applied only to planar substrates) are available for generating patterned surfaces to guide the cell attachment and growth. The Nano-Biosystems Engineering Group invented and established a set of methods to allow directed cell adhesion on topographically structured surfaces. With an organ specific combination of the MatriGrid®-technology and the use of nanobioreactors it is now possible to produce “organotypic” cell culture devices.

One of the world's biggest health concerns are lung diseases which produce huge cost related to primary care, hospital care and treatments. More importantly 3 out of 10 leading causes of death are lung specific and are projected to cause 1 in 5 deaths worldwide [2, 3]. That's why predictive lung models and exposure systems are needed to gain information about the effect of air pollution on lung tissue. The second part of our presentation will focus on lung models and possibilities to expose them with xenobiotics (e.g. nanoparticles). The Nano-Biosystems Engineering Group established a 3D-co-culture model and a simple but effective exposure system.

[1] Y.Ito Surface micropatterning to regulate cell functions. Biomaterials 20, 2333–2342 (1999).

[2] Gibson, G. J. et al.: The European lung white book [New edition], ISBN 978-1-84984-042-2.

[3] Who (2014): Mortality and global health estimates. http://www.who.int/gho/mortality_burden_disease/en/, last check on 2016.10.26

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