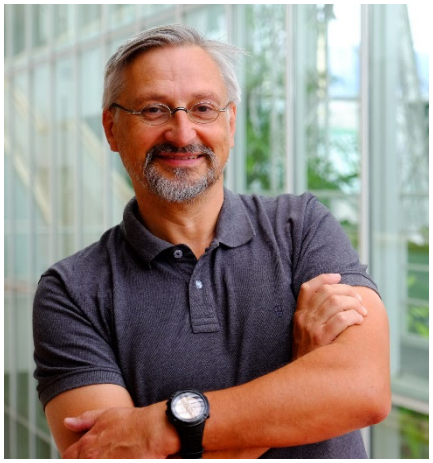
Doctoral College
Metabolic & Cardiovascular Disease

DE_RECONSTRUCTING THE BONE MARROW NICHE

GUEST LECTURE by



Prof. Dr. Günter Lepperdinger

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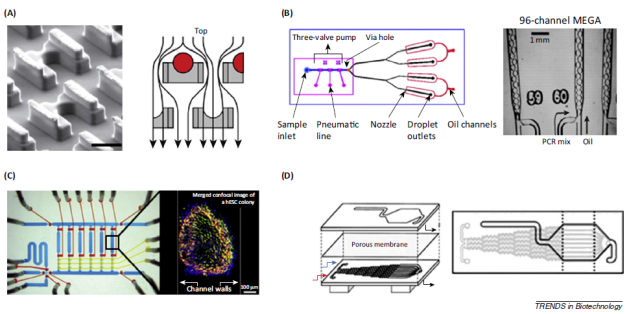
Wednesday, 21.06.2023, 16:00

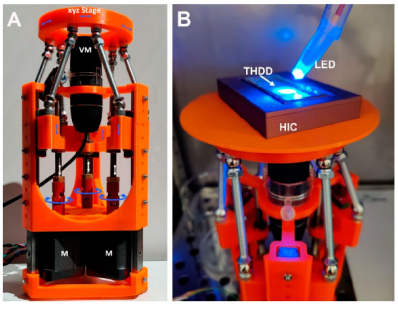
MC1.D.01.007 (seminar room MC4; MED Campus, tract D, 1st floor)

During the previous decades, knowledge has been gained from (i) cell explantation, (ii) cell cultivation, (iii) cell manipulation and lastly also by means of (iv) cell implantation or grafting. It is generally accepted that bone and bone marrow harbor various types of **stem and precursor cells**, yet also numerous sorts of **immune competent cells**. The bone marrow cavity is considered a protective space for cell-cell interaction and provides niches for highly controlled homeostatic amplification of cells, which may also spread throughout the body throughout the entire lifespan.

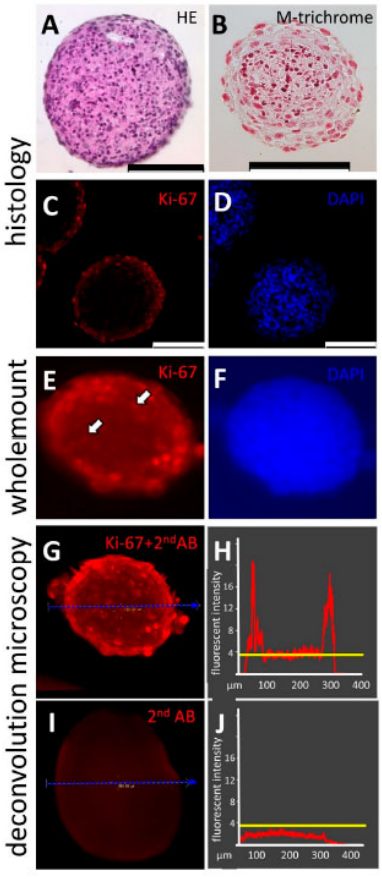
We previously isolated **stem cells from mesenchymal stroma** of human bone and investigated **aging-related changes**. To that end, the major attempts undertaken by the scientific community still does not allow broad administration of *ex vivo* amplified cells in cell-based therapies. This in mind, we recently switched gear and set out to provide new means that allow **RE-constructing human bone and bone marrow** in a lab setting. For this purpose, we established a new **3D-cell model** that based on fetal osteoblasts undergoes **guided self-organization into osteogenic primordia** that can be either studied as such or used in conjunction with **organ-on-chip technology**. 3D cell aggregates are closer to the *in vivo* situation. Organ-on-chip technology permits distinctive guiding and online monitoring of cultivated cells as well as the molding of cellular environment(s) by incorporating distinct biomaterials.



Microfluidic stem cell cultures.
Ertl et al. (Trends Biotechnol. 2014, 32(5):245-53)



The delta kinematic microscopic stage/chip monitoring microscope, δ-M, with an incubation chamber.
Struber et al. (Bioengineering 2022, 9:60)



Histological analysis of cell aggregates from the human osteoblasts cell line, hFOB1.19 on 3 µm paraffin sections.
Struber et al. (Bioengineering 2022, 9:60)