Metabolic insights into chondrocyte function and osteoarthritis therapeutics
Chair: Feng-Sheng Wang
Co-Chair: Holger Jahr
Speakers: Holger Jahr, Feng-Sheng Wang, Wei-Shiung Lian

Updated Bio Sketch (Jahr), 100 words

Dr. Jahr is an Associate Professor and Head of the Molecular Musculoskeletal Research Group of the Department of Anatomy and Cell Biology, University Hospital RWTH Aachen, Germany, where he is also Director of the Translational Biomaterials Research. Dr. Jahr was group leader Molecular Orthopaedics in Rotterdam, Research Fellow at Stanford Medical School, Head of Orthopaedic Research in Aachen, and is a visiting professor at the Maastricht UMC+ and the Delft University of Technology. His group developed different types of bioreactors to address cell biological and genetic aspects of skeletal tissue regeneration with a focus on chondrocyte metabolism to understand arthritic disorders.

Slightly edited originally submitted Symposium Abstract:

Osteoarthritis (OA) accounts for a leading cause of joint pain, deformation, and disability of the elderly. Cartilage breakdown provoking a plethora of articular deterioration, like synovitis, osteophyte formation, subchondral bone damage, etc., is a notable feature of the disease. Having productive insight into how chondrocytes maintain extracellular matrix metabolism to sustain cartilage integrity facilitates the development of emerging molecular remedies for OA and degenerative joint disorders. Thanks to high throughput RNA sequencing, metabolomics, and bioinformatics approaches, gut microbiota, short-chain fatty acids, and mTOR regulators, etc. are correlated with articular cartilage damage in OA. Analyses of cartilage-specific knockout and transgenic mouse model revealed that these metabolites modulate inflammatory reaction, mitochondrial function, autophagic activity, and epigenetic programs, which control survival and extracellular matrix synthesis in chondrocytes. These profound findings prompt us to develop innovative remedy potentials, like fecal microbiota transplantation, short-chain fatty acid administration, mitochondria function modulators, and hypoxia regulators, etc., effectively improving immune response, proteoglycan anabolism, and chondrocyte survival, as well as compromising joint damage, gait and mobility alteration. This symposium invites 3 scientists who devoted to deliver new insight into cartilage biology and highlight the perspective of new therapeutic potentials with probiotics and metabolites for cartilage integrity and osteoarthritis.

Speaker: Holger Jahr

Title of talk: ***Metabolic changes in chondrocytes by microenvironmental influences.***

Abstract

While the other talks in this Symposium will focus on emerging novel Osteoarthritis-modulating factors and potential future molecular remedies, in my lecture I would like to give an overview about our current understanding of microenvironmental factors which impact chondrocytes and thus potentially alter disease progression. In line with the topic, "hypoxia" has been shown to influence the metabolism of healthy and pathologically altered chondrocytes as well as extracellular matrix turnover and cell survival. Moreover, specific changes in the local microenvironment and how they influence chondrocyte differentiation *in vitro* and *in vivo* will be discussed. To this end, I will address our current understanding of the molecular regulation of chondrocyte terminal differentiation and how this alters the course of osteoarthritic symptom development through the initiation of a disease-amplifying feedback loop. Finally, among others, altering mammalian target of rapamycin (mTOR) signaling, using FK506- or "hyperosmotic" treatment strategies, or pharmaceutically targeting epigenetics, will be illustrated as promising future options to improve current treatment strategies of focal chondral lesions and inhibit the progression of Osteoarthritis.