Osteoarthritis and Cartilage 30 (2022) S5–S6

Osteoarthritis and Cartilage

Invited Speakers

I-1
TISSUE ENGINEERING TO TREAT CARTILAGE DEFECTS AND MODEL OSTEOARTHRITIS

Gerjo J.V.M. van Osch. *Erasmus MC, University Medical Center Rotterdam, the Netherlands*

Tissue engineering and regenerative medicine (TERM) has been a growing area of research since the 1990's. Since the inception of this burgeoning field, cartilage has been a target tissue. It was thought this would be a relatively simple tissue to engineer, consisting of one cell type and no blood vessels or nerves. Moreover, there was and remains an unmet clinical need for functional repair of cartilage defects. This led to the development of one of the first cell therapies in clinical application (i.e. Autologous Chondrocyte Implantation) and efforts are ongoing to develop new and improved cartilage repair therapies.
Being multidisciplinary by nature, TERM can quickly include and utilise new technologies from other areas - such as stem cell biology, immunology, molecular imaging, biomaterials and additive manufacturing/3D-printing – opening up possibilities for large steps forward in the improvement of cartilage repair. For clinical translation it is also necessary to take into account technical aspects related to safety, patient selection and outcome evaluation. Next to the traditional approach of combining cells and scaffolds, the development of "smart biomaterials" that can stimulate the endogenous repair response, for example by delivery of growth factors or RNA targeting molecules or adapting its physicochemical properties, has gained much attention.
Besides the opportunities that tissue engineering offers for cartilage repair in patients, even more promising opportunities are apparent for disease modelling. In addition to the commonly used material that is available from joint replacement surgery, tissue engineering can be applied to generate human tissue models in the lab to model healthy cartilage, cartilage with early OA changes or cartilage from cells with a genetic defect. This will be of use to investigate the molecular mechanisms of osteoarthritis as well as to develop and test new treatments for early-stage osteoarthritis. Here utilisation of knowledge and technologies from other fields such as iPSC, single cell RNA-sequencing, high-throughput proteomics and high-resolution imaging offer exciting opportunities.

References:

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Zhou L, van Osch GJVM, Malda J, Stoddart MJ, Lai Y, Richards RG, Ki-Wai Ho K, Qin L. Innovative Tissue-Engineered Strategies for Osteochondral Defect Repair and Regeneration: Current Progress and Challenges. Adv Healthc Mater. 2020 Oct 26:e2001008.

Wu J, Vunjak-Novakovic G. Bioengineering human cartilage-bone tissues for modeling of osteoarthritis. Stem Cells Dev. 2022 Jan 28.

I-2
ON THE ROLE OF ARTIFICIAL INTELLIGENCE IN SOLVING THE OSTEOARTHRITIS PUZZLE

Valentina Pedoia.

Active multi-disciplinary research is ongoing to discover quantitative biomarkers for early diagnosis, monitoring and assessment of joint degeneration. Medical imaging has played a substantial role in this area. Advanced quantitative imaging techniques, novel computerized image post-processing and more recent machine learning (ML) techniques have made possible further advances towards quantitative characterization of early joint degeneration and identification of imaging biomarkers associated with OA. Deep learning advances are revolutionizing the use of imaging in clinical research by augmenting activities ranging from image acquisition to post-processing. Automation is key to reducing the long acquisition times and processing of MRI, conducting large-scale longitudinal studies, and quantitatively defining morphometric and other important clinical features of both soft and hard tissues in various anatomical joints. In this talk, I'll explore how recent applications of DL have improved imaging-based understanding of knee OA. I'll illustrate how DL techniques are applied at all stages of imaging to enable automation of acquisition analysis and new imaging biomarkers discovery.

I-3
COVID-19 & OA: FROM A PHARMACOLOGICAL PERSPECTIVE

Karin Magnusson.

What does it mean to OA patients to contract COVID-19 and how has the COVID-19 pandemic with its disease control measures affected the health care services for OA patients? This talk will include a presentation of knowledge about the risk for contracting severe COVID-19 as well as the consequences of having mild and severe COVID-19 in the short and the long term. It will also include knowledge of how different disease control measures that were implemented to control the virus, affect the care for OA patients. The session will touch upon topics like long-covid, effects of lockdown restrictions and how they relate to OA. It will also touch upon the interaction between commonly used OA interventions and commonly used interventions for COVID-19.

I-4
THE SCIENCE OF PLACEBO, TO UNDERSTAND THE IMPORTANCE OF PLACEBO EFFECTS IN OA:

David Felson.

A placebo is an inert substance that produces beneficial therapeutic effects. In the context of clinical trials, the placebo response refers to an improvement in symptoms in study participants assigned to placebo treatment. High placebo responses pose a substantial impediment to distinguishing active treatment effects and may in part account for the

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