AB0105

EFFECTS OF CARRAGEENAN INDUCED SYNOVITIS ON JOINT DAMAGE AND PAIN IN A RAT MODEL OF KNEE OSTEOARTHRITIS

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Background: Knee osteoarthritis (OA) is associated with ongoing pain and joint damage that can be punctuated by acute flares of pain and inflammation. Acute synovitis in normal knees might resolve without long-term detriment to joint function.

Objectives: We hypothesised that osteoarthritis is associated with impaired resilience to acute inflammation.

Methods: We induced synovitis by intra-articular injection of carrageenan into rat knees with or without meniscal transection-induced OA, and measured synovitis, weightbearing asymmetry (an index of pain behaviour), and joint damage up to 35 days after OA induction (23 days after carrageenan-injection).

Results: Intra-articular injection of carrageenan was followed by weightbearing asymmetry for 1 week, synovitis, indicated by a transient increase in knee diameter for 2 days after injection, and a more sustained (through day 23) increase in synovial macrophages, endothelial cell proliferation and vascular density compared with naïve controls. Meniscal transection was followed by weightbearing asymmetry and histological evidence of OA through day 35. Carrageenan-injection in OA knees was followed for 2 days by increased weightbearing asymmetry compared either to OA knees, or to carrageenan-injected, SHAM-operated knees. OA structural damage and synovitis at day 35 were greater after carrageenan injection on day 12 compared to saline-injected, MNX-operated knees, and compared to carrageenan-injected, SHAM-operated knees. Carrageenan injection alone did not induce OA in SHAM-operated knees.

Conclusions: OA knees were more sensitive to pain behaviour, inflammation and structural damage following an episode of acute inflammatory pain flare than were non-arthritic knees. Preventing inflammatory flares may be particularly important in preventing symptoms and long term joint damage in OA.

Disclosure of Interest: None declared

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AB0106

FIBRIN-TRIGGERED CHONDROSYNOVIAL ADHESION AS A NOVEL MECHANISM OF CARTILAGE DAMAGE IN RHEUMATOID ARTHRITIS

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Background: Synovial pannus infiltration and inflammatory cytokines production are the main factors responsible for cartilage damage in rheumatoid arthritis (RA). The crosstalk between inflammation and coagulation further amplifies and maintains chronic inflammation. Although synovial extravascular fibrin deposits in synovial fluid and synovial membranes being hallmarks of RA, there are no reports on direct fibrin deposition is widespread in RA, little is known about fibrin deposition and its relation to cartilage damage in RA.

Objectives: To investigate if fibrin deposition occurs in murine and human RA cartilage, and its relationship with cartilage degradation. Moreover, to determine the possible mechanism by which fibrin could play a role in the pathogenesis of RA.

Methods: Full-thickness cartilage explants were obtained from RA patients undergoing total knee replacement. Immunohistochemistry was performed on paraffin sections to study fibrin deposition, while Safranin-O staining was used to investigate cartilage damage. An *in vitro* model of chondrosynovial adhesion was established using primary human RA synoviocytes seeded on human RA cartilage explants. Adherent synoviocytes to cartilage were evaluated on H and E-stained histological sections and fibrin immunohistochemistry was performed on adjacent sections. Antigen induced arthritis (AIA) was induced in wild-type (WT) and fibrinogen knock-out mice and paraffin sections of knee joints assessed for fibrin deposition, cartilage damage, and chondrosynovial adhesion.

Results: In human RA cartilage, the extent of fibrin deposits positively correlated with the degree of cartilage degradation (figure 1). In WT mice, fibrin deposition was preferentially found on damaged cartilage and on cartilage areas in direct contact with synovial membrane (i.e. chondrosynovial adhesions) (figure 2). In contrast, cartilage degradation and chondrosynovial adhesion were significantly lower in fibrin deficient mice (figure 2). Moreover, loss of superficial cartilage layers stained with fibrin was observed in regions of chondrosynovial adhesion (figure 3). Finally, in the *in vitro* model, synoviocytes were found to adhere to human OA cartilage, especially in severely damaged and fibrin-rich areas (figure 4).

Abstract AB0106 – Figure 1

Conclusions: Our results demonstrate that fibrin deposition on cartilage is highly associated with chondrosynovial adhesion and subsequent cartilage erosion in RA. We hypothesise that fibrin mediates chondrosynovial adhesion especially during joint resting periods (i.e. night-time), leading to mechanical stripping of superficial cartilage layers following motion.

Disclosure of Interest: None declared

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AB0107

INFLUENCE OF COBALT (II) + AND CHROMIUM (III)-IONS ON BONE FORMATION IN HUMAN OSTEOBLAST-LIKE CELLS IN-VITRO

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Background: Healthy bone is a result of the homeostasis between bone formation and resorption. The process of bone formation includes two major functions, which are the secretion of the organic matrix (mainly type I collagen) and the deposition of minerals into this matrix. This function of osteoblasts can be affected by numerous factors, as hormones, inflammation, mechanical load and other external stimuli.

In patients with artificial joint replacements, the release of particles or ions from arthroplasties may exert local effects on the periprosthetic tissue leading to prosthesis loosening.

Objectives: It was the aim of the study to analyse the effect of Co²⁺ and Cr³⁺ ions on the capability of osteoblast-like cells to form bone.

Methods: Two human osteoblast-like cell lines MG63 and SaOs-2 were used to study the influence of Co²⁺ and Cr³⁺ ions on matrix secretion and mineralization. Cells (3 × 10⁵) were seeded in 2 ml DMEM (10% FCS) onto 12 well plates and stimulated with CoCl₂ and CrCl₃ in concentrations between 50–250 μM for 24 hours. Total RNA was extracted and changes of expression levels of collagen1A1 were analysed by real-time PCR. Secretion of collagen1 was analysed by Sirius Red staining (0.1% in water-saturated picric acid). After extraction of dye with 0.1N NaOH the absorption was measured at 540 nm.

For mineralization the cells were cultured for up to 4 weeks in DMEM (10% FCS) supplemented with 0.2 mM ascorbic acid, 10 nM dexamethasone and 10 mM glycerophosphate and different concentrations of Co²⁺ and Cr³⁺. Calcium deposits were detected by 1% Alizarin Red S staining (pH 4.1), for quantification the dye was extracted using cetylpyridinium chloride, the absorption was determined at 562 nm.

Results: We observed that SaOs-2 cells, the more differentiated cells compared to MG63, exhibited a high potential for mineralization but secreted low amounts of collagen type 1. In contrast, MG63 cells produced high amounts of collagen1 and had a low potential for mineralization. When cultures were treated with Co²⁺ and

Cr^{3+} , we found that bivalent cobalt ions and trivalent chromium ions had different effects on osteoblasts. While Co^{2+} reduced the secretion of collagen type 1 in osteoblast-like cells, Cr^{3+} did not impair the collagen type 1 production. The secretion of this protein was partially attributable to a reduced gene transcription. In contrast, the mineralization was not impaired by Co^{2+} . However, Cr^{3+} at a concentration of 250 μM resulted in a decrease of mineralisation by 89% compared to controls. Even at the concentration of 50 μM a reduced mineralization by 34% was observed. The increase of the phosphate source resulted in an increased mineralization, suggesting that the capture of phosphate by Cr^{3+} (formation of CrPO_4), which is required for the mineralization could explain the inhibitory effect of chromium.

Conclusions: Our data suggest that Co^{2+} and Cr^{3+} ions affect bone formation at various stages of differentiation. While Co^{2+} ions impair the formation of the bone organic matrix, Cr^{3+} ions affect the deposition of inorganic minerals. Whether the inhibitory effect of chromium ions on the mineralization is caused by soluble Cr^{3+} ions itself or by solid CrPO_4 needs to be clarified in further studies.

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Rheumatoid arthritis – etiology, pathogenesis and animal models

AB0108 RELATIONSHIP BETWEEN PROGRANULIN AND MUSCULOSKELETAL ULTRASOUND IN RHEUMATOID ARTHRITIS

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Background: Progranulin (PGRN) is a pluripotent, secretory growth factor, mainly present in cells of the epithelium, central nervous system and immune system. PGRN known to directly regulate regulatory T cells and recently found to be upregulated in Rheumatoid Arthritis (RA) and related to its activity. No attempts was made to explore the relation between PGRN and RA activity measured by clinical and Ultrasound score (USS).

Objectives: To explore PGRN levels in the serum of patients with RA, and its correlation with disease activity assessed clinically combined by ultrasonography (USS).

Methods: RA patients: 52 RA patients were included in this study. They were consecutively recruited from the outpatient clinic of Rheumatology Department for regular follow-up at Fayoum University Hospitals. Patients were classified according to the 2010 ACR/EULAR criteria. Control group: 20 age and sex matched healthy volunteers were recruited as controls for level of serum PGRN. Informed consent was obtained from all patients and controls for inclusion in the study.

All patients were subjected to full history taking, and clinical examination. Assessment of disease activity by modified DAS-28 score. Progranulin is measured by an ELISA Kit (Elabscience), this kit uses sandwich-ELISA as the method.

The ultrasound examination was performed with GE LOGIQ 7 PRO equipment using a linear transducer with 18 MHz frequency. The patients were examined according to the German US7 score in 7 joint areas.

Results: Demographic and clinical data of the RA group: Females represents 90.4% (47 of 52). Age ranged from 21–72 years, mean age was 42.8 ± 10.4 years. Disease duration ranged from 1 to 30 years, median 4 years. Their mean ESR level was 36.4 ± 16 (Range: 5–70). The median of Ultrasound score assessment was 8 while the mean was 8.73 ± 6.9 (Range: 0–33).

Serum PGRN concentrations in RA patients and healthy controls: The median of serum PGRN levels in RA patients was 65 ng/ml (mean, 92.54 ± 45.4) which is much higher in comparison to those in normal controls, median 31 ng/ml (mean, 32.74 ± 9.2); the difference showed high statistical significance, $p < 0.001$.

Correlation analysis: The relationships between PGRN levels and other continuous variables were analysed using Spearman's rank correlation. There was high statistically significant correlation between PGRN level and USS score ($r = 0.37$, $p = 0.006$). Also, there was high statistically significant correlation between PGRN level and ESR ($r = 0.67$, $p < 0.000$) and between PGRN level and DAS 28 ($r = 0.74$, $p < 0.000$). There was high statistically significant correlation between USS score and ESR level ($r = 0.54$, $p < 0.000$) and between USS score and DAS 28 ($r = 0.68$, $p < 0.000$).

Conclusions: The serum Progranulin levels were higher in the serum of RA patients than age and sex matched controls. It is positively correlated with diseases activity measured by DAS 28, ESR and Ultrasound activity measured by

German US7 score. Serum PGRN levels may be a useful biomarker in RA disease. Ultrasound positively correlated with ESR and DAS 28 in our cohort of RA patients.

REFERENCE:

- [1] Chen J, Li S, Shi J, Zhang L, et al. Serum progranulin unrelated with Breg cell levels, but elevated in RA patients, reflecting high disease activity. *Rheumatology international* 2016 Mar 1;36(3):359–64.

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AB0109 CHARACTERISATION AND COMPARISON OF SERUM BIOMARKERS IN PATIENTS WITH RHEUMATOID ARTHRITIS VERSUS OSTEOARTHRITIS USING MASS SPECTROMETRY

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Background: There is increasing interest in biomarkers in medicine, especially for their use as a diagnostic tool and in disease outcome prognosis. Rheumatoid arthritis (RA) is a chronic autoimmune disease with important debilitating outcome potential, therefore a biomarker panel may improve early diagnosis meaning better therapeutic management and lower social costs. Recently, mass spectrometry has emerged as one of the leading methods to identify new biomarkers for different pathologies as well as being able to determine their potential interactors in their cellular pathway.

Objectives: To characterise biomarkers using mass spectrometry, from sera of patients with RA and make a comparison between RA, osteoarthritis (OA) and healthy controls.

Methods: Blood was collected from 26 subjects, 12 patients with RA, 12 patients with OA, and 2 HC, centrifuged and sera was collected in dedicated tubes. Sera were separated by SDS-Page electrophoresis and stained with Coomassie staining. The samples were subjected to in gel digestion followed by LC/MS analysis. The obtained spectra were searched with Proteome Discoverer v1.4 using SEQUEST algorithm.

Results: A total of 985 proteins were identified, from which 323 were specific to the RA study group and 159 were characteristic to the OA group. Prevalent peptides found in the RA group were EGF-containing fibulin-like extracellular matrix protein 2, isoform DeltaLf of lactotransferrin, BPI fold-containing family B member 1 and isoform 2 of BPI fold-containing family A member 1. In the OA study group there was a prevalence in homeobox protein TGIF1, major facilitator superfamily domain-containing protein 9, methyltransferase-like protein 23, a fragment of the salivary acidic proline-rich phosphoprotein, serine/threonine-protein phosphatase 4 regulatory subunit 1, zinc finger protein 229.

Conclusions: Our results show a prevalence of peptides linked to cell migration, proliferation and activation in the RA sera as compared to peptides related to cell turnover and tissue senescence observed in OA sera. We believe further mass spectrometry studies of biomarkers in larger cohorts to be a promising tool for diagnosis and outcome prognosis in RA.

Disclosure of Interest: None declared

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AB0110 SERUM AND SALIVARY IGA1 AND IGA2 ACPA SUBCLASSES IN ESTABLISHED RHEUMATOID ARTHRITIS AND ASSOCIATIONS TO SMOKING

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Background: A prevailing hypothesis regarding the pathogenesis of rheumatoid arthritis (RA) involves an association between mucosal immunity and the development of RA. A pathogenetic role for antibodies against citrullinated peptides (ACPA) is assumed, and there are indications of mucosal immunisation in the lungs, the oral mucosa and the intestinal mucosa preceding overt RA.¹

IgA antibodies are produced both locally, at mucosal membranes, and systemically. Among the two IgA subtypes, IgA1 dominates in serum IgA2 in mucosal secretions.

We have previously reported the presence of ACPA of IgA isotype in both serum and saliva of RA patients,² and that IgA ACPA is associated with cigarette smoking.³