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Targeting abnormal chondrocytes dedifferentiation and loss of pericellular matrix in osteoarthritis

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Statement of the Research: Osteoarthritis (OA) is a complex degenerative joint disease that advances with pain, deformity, and gradual loss of joint function and leads, if untreated, to severe disability of the affected individual. During osteoarthritis chondrocytes seem to change their spatial arrangement from single to double strings, small and big clusters. Since the pericellular matrix (PCM) appears to degrade alongside this reorganisation, it has been suggested that spatial patterns act as an image-based biomarker for osteoarthritis. Aim of the present study was to investigate the biochemical changes of the main PCM components perlecan collagen type III, and biglycan as a function of spatial chondrocyte organisation.

Methodology & Theoretical Orientation: Cartilage samples from the main loading zone of femoral condyles obtained from patients receiving total knee arthroplasty were cut and sorted according to their locally predominant spatial cellular pattern. On these sorted specimens qualitative analyses were performed by immunofluorescence microscopy. Local protein content was measured by means of ELISA.

Results: All investigated proteins showed clear differences in spatial distribution and protein content according to the locally predominant spatial cellular pattern, the only exception being collagen type III. Perlecan and biglycan showed a significant decrease in the course of the change from strings to big clusters. For perlecan, the fluorescence signal that was originally well defined pericellularly, later presented with a diffuse and not well localised signal.

Conclusion & Significance: With the exception of collagen type III, two essential and main components of the PCM suffer significant degenerative changes in the course of spatial cellular rearrangement. This loss of coordinated expression and integration of these proteins into the matrix will entail changes not only in the microbiomechanic characteristics of the PCM, but probably also in the translation from mechanical stimuli into a coordinated signaling response inside the cell.

Biography

Marina Danalache has received her B.Sc. degree in Biomedical engineering from the "G.T.Popa" University of Medicine and Pharmacy, Iasi and M.Sc. degree in the same field from Furtwangen University of Applied Science, Germany. She is currently doing her Ph.D. in department of Orthopedic Surgery, at University of Tübingen- Germany. Her research focus is placed on identifying new targets involved in the initiation and progression of articular cartilage destruction occurring in osteoarthritis.

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