Objectives: To evaluate the possible effects of impact and loading on the metacarpal cartilage and hand functions in young athletes.

Methods: A total of 42 male athletes (19 weight-lifters and 23 volleyball players) and 46 healthy control subjects were enrolled. Demographic and clinical characteristics (age, height, weight, smoking habit, duration/type of sport, dominant hand) were recorded. The 2nd to 5th finger metacarpal head cartilage thicknesses were measured bilaterally using ultrasonography. Handgrip strength was measured with Jamar dynamometer; pinch strengths (lateral, tip to tip and three jaw chuck pinch) were measured using a pinchmeter. Michigan Hand Outcomes Questionnaire was also completed for each and every participant.

Results: Metacarpal cartilage thicknesses of the athletes (more predominant in weightlifters) were found to be thicker than those of the healthy controls (all $p < 0.001$). There were no differences between the dominant and non-dominant hands (all $p > 0.05$). Athletes' handgrip and pinch strengths were higher than those of the controls. In the weightlifting group, Michigan Hand Outcome Questionnaire work performance and pain scores were worse than the other groups.

Conclusion: The presence of increased cartilage thickness measurements in the athletes suggests that sports activities might affect the metacarpal articular cartilage. Highest pain scores and lowest work performance scores in the weightlifters with highest metacarpal cartilage thickness might suggest that impact and loading during their sports play could lead to cartilage edema.

REFERENCES

- [1] Gratzke C, Glaser C, Englmeier KH, et al. Comparison of cartilage morphology in professional weight lifters and sprinters with normal volunteers suggests that human articular cartilage cannot adapt to functional stimulation. *Osteoarthritis Cartilage* 2002;10: S11.
- [2] Onat SS, Ata AM, Serrano S, et al. Ultrasonographic measurements of the metacarpophalangeal and talar cartilage thicknesses: A reliability study in healthy subjects. *J Back Musculoskelet Rehabil*. 2018; 31:253-7.
- [3] Sun HB. Mechanical loading, cartilage degradation, and arthritis. *Ann N Y Acad Sci* 2010; 1211:37-50.
- [4] Sadeghi H, Shepherd DET, Espino DM. Effect of the variation of loading frequency on surface failure of bovine articular cartilage. *Osteoarthritis Cartilage*. 2015;23(12):2252-2258.
- [5] Eckstein F, Hudelmaier M, Putz R. The effects of exercise on human articular cartilage. *J Anat* 2006; 208:491-512.
- [6] Yıldızgören MT, Ekiz T, Nizamoğulları S, et al. Effects of habitual knuckle cracking on metacarpal cartilage thickness and grip strength. *Hand Surg Rehabil* 2017; 36:41-3.

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AB0086 BCP AND CPPD CRYSTALS INFLUENCE THE CHONDROCYTE PHENOTYPE IN DIFFERENT WAYS

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Background: Calcification of cartilage with BCP crystals is a common finding during osteoarthritis (OA) and is directly linked to the severity of the disease and hypertrophic differentiation of chondrocytes. In some OA cartilage samples calcium pyrophosphate dihydrate (CPPD) crystals can be found. The mechanism underlying the formation of the CPPD crystals and their effects on the chondrocytes are not completely understood.

Objectives: The aim of this study was to evaluate the effect of CPPD compared to BCP crystals on the chondrocyte phenotype in OA cartilage.

Methods: Cartilage samples of patients with chondrocalcinosis were used and compared with samples of severe OA patients without chondrocalcinosis and healthy cartilage samples served as control. Radiological presence of chondrocalcinosis was evaluated using standard X-ray pictures, as well as macroscopically inspection. The cartilage samples were stained using von Kossa/Safranin-orange staining. These stainings were used for OA severity scoring using the Chambers-Score. Chondrocyte differentiation markers were evaluated using Collagen 2 and X, as well as Sox9 and aggrecan as markers for chondrocyte hypertrophic differentiation in immunohistochemistry and qRT-PCR. TUNEL staining was performed to investigate cell death. In vivo results were validated using qRT-PCR for the expression of the respective genes after stimulation of C28 chondrocytes with CPPD and BCP crystals.

Results: Radiologically detectable cartilage calcifications were evident in chondrocalcinosis patients, but absent in OA patients without chondrocalcinosis.

Chondrocalcinosis cartilage exhibited an increased collagen 10 expression compared to healthy cartilage, as well as to severe OA cartilage containing BCP calcification. Interestingly, aggrecan and collagen 2 were not reduced in chondrocalcinosis cartilage, but markedly reduced in OA cartilage. TUNEL positive cells were significantly increased in CPPD cartilage compared to OA cartilage, although the histological OA severity was lower. qRT-PCR indicated no relevant influence of CPPD crystals on hypertrophic marker genes, whereas BCP crystals significantly induced hypertrophic differentiation.

Conclusion: BCP and CPPD crystals seem to trigger differential effects on the chondrocyte phenotype. BCP crystals induce hypertrophic differentiation, which is not induced by CPPD crystals.

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AB0087 DLX5 AND DLX6 PROMOTES THE COMMITMENT OF MSC TO OSTEOBLASTIC LINEAGE AND CORTICAL BONE FORMATION

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Background: Osteoporosis which affects 200 million women worldwide is the consequence of an imbalance of low anabolism to high catabolism, causing a risk of fracture. Impaired anabolism involved reduced osteoblast differentiation. The osteoblast differentiation is mediated by transcription factors, including Dlx5 and Dlx6. Dlx5 is known to have a role in osteoblast/osteoclast couple and as a promoter of osteoblast lineage commitment [1, 2]. Thus, Dlx5 is a transcriptional actor of Runx2 [3], a key element of osteoblastic differentiation.

Objectives: The goal of this project is to expand our knowledge about bone formation and cellular precursors of osteoblasts, focusing on Dlx5 and Dlx6.

Methods: We analyze the kinetic expression of Dlx5, Dlx6 and osteoblastic markers during the osteoblastic differentiation from murine osteoblastic progenitor derived from calvaria and bone marrow. Same analysis was carried out in osteoblastic precursors from control cells, Dlx5/Dlx6 cells with *ex vivo* recombination or from KO mice in parallel to human bone marrow cells. We analyzed the bone phenotype of mutated mice in the absence of expression of Dlx5 and Dlx6 under *Osx* promoter.

Results: Dlx5 and Dlx6 increases at D7 during osteoblastic differentiation in the murine bone marrow and then was stable to D21. The absence of Dlx5/6 in cells derived from calvaria and bone marrow resulted in decreased levels of osteocalcin and alkaline phosphatase. *Dlx5/6^{fl/fl} Osx-Cre* mice were lethal. *Dlx5/6^{fl/+} Osx-Cre* mice does not affect cortical and trabecular parameters at 6 weeks but had a significant lower cortical thickness and also lower Tb. BV/TV and Tb. Th along with a lower BMD at 3 months in both sexes. Moreover, periosteal volume was also lower in mutated mice. The skulls revealed a lack of sutures closures and dental abnormalities at 6 weeks and 3 months in both sexes.

Conclusion: The deletion of these transcription factors under the action of the *Osx* promoter generates lethality, in favor of an essential role in bone development. Heterozygous mutation show impaired bone acquisition during growth. To obtain a total deletion of Dlx5 and Dlx6 in osteoblastic precursor cells, a new murine model of conditional induced deletion is generated. Dlx5 and Dlx6 promote osteoblastic differentiation with an effect on late bone markers, in favor of a role in terminal differentiation. Analysis *in vitro* of Dlx5 and Dlx6 will be confirmed by ongoing *in vivo* experimentation.

REFERENCES

- [1] - Samee N, Geoffroy V, Marty C, Schiltz C, Vieux-Rochas M, Levi G, et al. Dlx5, a positive regulator of osteoblastogenesis, is essential for osteoblast-osteoclast coupling. *Am J Pathol* 2008;173(3):773-80.
- [2] - Samee N, Geoffroy V, Marty C, Schiltz C, Vieux-Rochas M, Clement-Lacroix P, et al. Increased bone resorption and osteopenia in Dlx5 heterozygous mice. *J Cell Biochem* 2009;107(5):865-72.
- [3] - Hassan MQ, Tare RS, Lee SH, Mandeville M, Morasso MI, Javed A, et al. BMP2 commitment to the osteogenic lineage involves activation of Runx2 by DLX3 and a homeodomain transcriptional network. *J Biol Chem* 2006;281(52):40515-26.

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