cartilage in the late stage, bony spur forms in RA. These symptoms are very important in RA pathological development.
Methods: In this study, CIA was used as an animal model to elucidate further the pathological process of bony spur. The destruction of joints in the CIA model was observed by radiology and histology.
Results: In the radiological observation, bony spur formed in the knee and foot joint, which worsened as the disease progressed. Meanwhile, fusion and damage of articular cartilage was observed, and many osteoclasts were found in the histological sections.
Conclusion: Based on previous research on the CIA model and related investigations, the bony spur may have another main pathological process in the later stages of RA.

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miRNA EXPRESSION PROFILES DURING ADIPOGENIC AND OSTEOGENIC DIFFERENTIATION OF MOUSE BMSCs

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Objective: Identification of miRNA expression profiles during adipogenic and osteogenic differentiation of mouse bone marrow mesenchymal stem cells (BMSCs).
Materials and methods: BMSCs were isolated from the femurs and tibias of 4- to 6-week-old male C57BL/6 mice as previously described, and cultured in α-MEM supplemented with 10% FBS. Then BMSCs were identified by in vitro multi-lineage differentiation assays, including adipogenesis, osteogenesis and chondrogenesis. Subsequently, the cells were cultured in adipogenesis differentiation medium for 6 days and in osteogenesis differentiation medium for 10 days, respectively. Uninduced cells were included as control. miRNA profiles were analyzed using Agilent Mouse miRNA microarray slide (8 X 60K, Part number G4872A). Hierarchical clustering was performed with Multi-experiment Viewer (MeV) software. A selected subset of miRNAs changed more than 1.8-fold was selected for further real-time PCR analysis.
Results: The miRNA microarray analysis showed that 66 miRNAs were differentially expressed during adipogenic or osteogenic differentiation of mouse BMSCs. Real-time PCR analysis showed that, compared with the control, the expression level of miR-218-5p was increased 10-fold and 2.8-fold after adipogenic induction for 6 days and osteogenic induction for 10 days, respectively. Within the first three days of induction, miR-218-5p was increased 5.9-fold during adipogenic differentiation, yet without significant difference during osteogenic differentiation. The expression levels of miR-146a-5p and miR-223-3p were decreased 10.8-fold and 6.6-fold, respectively, during osteogenic differentiation.
Conclusions: miR-218-5p was increased during both adipogenic and osteogenic differentiation, with a significant predominance in adipogenic differentiation. In addition, miR-146a-5p and miR-223-3p were decreased during osteogenic differentiation. An effort will be made to understand their roles and mechanisms.
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ABNORMAL BONE MICRO-ARCHITECTURE AND ROD-PLATE CONFIGURATION IN OSTEOPENIC ADOLESCENT IDIOPATHIC SCOLIOSIS (AIS)

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Objectives: Multiple studies have documented the presence of systemic osteopenia in AIS. Osteopenia was associated with severe curves and was reported to be one of the significant prognostic factors for curve progression in AIS. This study aimed to evaluate bone quality and bone strength parameters including rod-plate configuration and finite element analysis (FEA) with in vivo High-Resolution Peripheral Quantitative Computed Tomography (HR-pQCT) and to investigate their relationship with osteopenia in AIS Vs normal controls.
Material and Methods: 101AIS and 105 controls between 11-14 years old were recruited. Areal bone mineral density (aBMD) of bilateral femoral necks was measured with Dual Energy X-ray Absorptiometry (DXA). Subjects were classified into the osteopenic (Z-score$<$or$=$-1) and non-osteopenic (Z-score$>$-1) group. Bone Morphometry, volumetric bone mineral density (vBMD) and Trabecular Bone Micro-architecture were measured using HR-pQCT. Structural Model Index (SMI) quantifying the trabecular rod/plate configuration (a higher index indicating more rod-like configuration) and FEA in terms of Stiffness, Failure Load and Apparent Modulus were calculated with a standard algorithm.
Results: In the AIS group, osteopenic subjects showed higher SMI, lower Stiffness, lower Failure Load and lower Apparent Modulus when compared with non-osteopenic subjects (% difference $=$ 15.5%, -24.5%, -23.1% & -20.5% respectively, all with $p<0.001$). Similar differences in FEA profiles were noted between osteopenic and non-osteopenic subjects in the control group. In contrast, no significant difference in SMI was found between osteopenic and non-osteopenic controls. When all osteopenic subjects were considered, osteopenic AIS subjects had higher SMI when compared with osteopenic controls (% difference $=$ 9.1%, $p=0.012$).
Conclusions: This study showed that osteopenia was associated with lower bone strength and a specific pattern of SMI indicating preponderance of rod-like configuration in AIS subjects. Notably the association of higher SMI with osteopenia was seen in AIS but not in normal controls, thus providing strong evidences that osteopenia in AIS was different from osteopenia in non-AIS controls. Further investigations exploring the underlying biochemical and biomechanical mechanisms that bring about these specific endophenotypes are warranted for gaining further understanding of the etiopathogenesis of AIS.
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EVALUATING BONE STRENGTH WITH FINITE ELEMENT ANALYSIS FOR ADOLESCENT IDIOPATHIC SCOLIOSIS (AIS): A CASE-CONTROL STUDY WITH HR-pQCT

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Objectives: Although Adolescent Idiopathic Scoliosis (AIS) was associated with low bone mass, reports on bone mechanical properties in AIS are sparse. The objective of this study is to evaluate bone mechanical properties with finite element analysis (FEA) using in-vivo High-Resolution Peripheral Quantitative Computed Tomography (HR-pQCT) in AIS and compare that with normal controls.
Material and Methods: 97 AIS girls and 99 female controls between 11-14 years old were recruited. Dietary calcium intake and physical activity level were assessed with a standard Food Frequency Questionnaire and the Modified Baecke Questionnaire respectively. With HR-pQCT, an established model on morphology and micro-structure of the non-dominant distal radius was generated for FEA in terms of Stiffness, Failure Load and Apparent Modulus. Multivariate linear regression analysis was used to investigate the difference between AIS and controls after adjusting for age in Model 1 and for age, calcium intake and physical activity level in Model 2.
Results: 2-tailed Student's t-test showed AIS subjects had lower Stiffness, lower Failure Load and lower Apparent Modulus when compared with normal controls (% difference $=$ -6.81%, -7.10% & -8.10% respectively, all with $p<0.05$). AIS girls had lower Failure Load ($B=-136.0$, $p=0.04$) and lower Apparent Modulus ($B=-146.2$, $p=0.021$) in Model 1 with adjustment for age. In Model 2, difference in Apparent Modulus remained statistically significant with AIS being associated with lower Apparent Modulus after adjustment for age, calcium intake and physical activity level ($B=-137.1$, $p=0.037$).