our study was to investigate the efficacy of cells transplantation in an experimental animal model by means of autologous mesenchymal stem cells, obtained from bone marrow, grown onto a hyaluronan-based scaffold (Hyaff®-11).
**Methods:** Rabbit knee joints were subjected to anterior cruciate ligament resection to surgically induce OA. After 8 weeks necessary for the detection of cartilage surface damage and proteoglycan loss, mesenchymal stem cells obtained from bone marrow harvested from the iliac crest and seeded onto Hyaff®-11 scaffold were put on the chondyle surface and the animals were sacrificed 3 and 6 months after surgery. Cartilage obtained from animals treated with the scaffold alone or left untreated was used as control. Morphological, histological and immunohistological evaluations were performed on the different tissues. Real-Time PCR analysis was performed on cartilage tissues to evaluate the gene expression profiles.
**Results:** OA changes developed in all animals subjected to ACL resection. The predominant macroscopically observed OA changes were mild (lateral femoral condyle) or medium (medial femoral condyle) ulcerations. Statistically significant differences in the quality of the regenerated tissue were found between the grafts carried out with biomaterial carrying mesenchymal stem cells compared to the biomaterial alone or controls in particular at six months.
**Conclusions:** In conclusion, from our data it is possible to demonstrate that Hyaff®-11 is a promising scaffold for mesenchymal transplantation and should be applicable to humans for the treatment of early osteoarthritis.

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#### EFFECT OF LOW-INTENSITY PULSED ULTRASOUND ON THE MATRIX SYNTHESIS OF SCAFFOLD -FREE CARTILAGE CULTURE

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**Purpose:** The aim of this study is to evaluate the effect of low-intensity pulsed ultrasound (LIPUS) on the matrix-synthesis of scaffold-free cartilage culture.
**Methods:** Chondrocytes are collected from articular cartilage of Wistar rats. The collected primary chondrocytes (passage 0) were cultured up to subconfluent. The cells were then condensed to various densities ranging from $10^5$ -$10^7$cells/cm$^2$ (P1). The cells were stimulated by LIPUS for 20 min/day. The mode of the applied ultrasound is a 200$\mu$s burst sine wave of 1.5 MHz repeating at 1kHz with an intensity of 30mW/cm$^2$. To investigate effect LIPUS stimulation on the matrix-synthesis of the P1 chondrocytes, mRNA expression of type II collagen (col2) and aggrecan was studied using real-time polymerase chain reaction (RT-PCR). Synthesis of type II collagen and proteoglycan was also assessed histochemically.
**Results:** The chondrocytes prepared at $10^6$ or $10^7$cells/cm$^2$ detached from the culture well to form chondrocyte sheet on the day 3 of P1 culture. However, the cells prepared at $10^5$ cells/cm$^2$ remained in the monolayer. The expression of col2 and aggrecan mRNA was significantly lower in the cells prepared at $10^5$ cells/cm$^2$ than that of $10^6$ or $10^7$cells/cm$^2$. No col2 or aggrecan synthesis was detected histochemically in the cells prepared at $10^5$ cells/cm$^2$, implicating de-differentiation of these cells.
The chondrocytes sheet formed *via* cell condensation at $10^6$ and $10^7$cells/cm$^2$ grew in thickness until the 7th day of P1 culture. However, the col2 and aggrecan mRNA expression of the cells prepared at $10^7$cells/cm$^2$ was significantly lower on the day 7 than that of $10^6$ cells/cm$^2$. Histological examination revealed that the cells prepared at $10^7$cells/cm$^2$ did not increase the intensity of col2 and aggrecan on day7, implicating attenuation of matrix synthesis.
The chondrocyte sheet formed *via* cell condensation at $10^6$ cells/cm$^2$ grew in size until the 14$^{th}$ day of P1 culture. However, the col2 and aggrecan mRNA expression was significantly decreased on day 14, implicating that the chondrocyte sheet did not sustain matrix synthesis during the time period between day 7 to 14. However, LIPUS stimulation sustained the expression of col2 and aggrecan mRNA until day 14. The resultant scaffold-free cartilage was histochemically similar to the articular cartilage.
**Conclusions:** The chondrocytes prepared at $10^6$ and $10^7$ cells/cm$^2$ developed into chondcrocyte sheet, but only the former developed into scaffold-free cartilage when stimulated by LIPUS.

## Therapy – Non-Pharmacologic

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#### PATELLAR TAPING AND BRACING FOR THE TREATMENT OF CHRONIC KNEE PAIN: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Purpose:** Chronic knee pain is a leading cause of disability, with the most frequent presentations being anterior knee pain and knee osteoarthritis (OA) in younger (<50 yr) and older (>50 yr) individuals, respectively. The mainstay of treatment for chronic knee pain is the management of symptoms with two frequently used treatments being therapeutic tape and bracing of the patella. While clinically popular and recommended, the effectiveness of patellar taping and bracing in managing chronic knee pain remains debated. This systematic review and meta-analysis aimed to evaluate the evidence for patellar taping and bracing in managing chronic knee pain.
**Methods:** Randomized or quasi-randomized studies assessing patellar taping or bracing effects on chronic knee pain were sourced from seven electronic databases (up to November 2006), and assessed using the PEDro scale. Pain scores were converted to percentages of the maximum possible score and reported as mm on a 100 mm analogue scale. Weighted mean differences were determined, and pooled estimates of taping and bracing effects obtained using random effects models. Heterogeneity between trials and publication bias were explored using sensitivity analyses and funnel plots, respectively.
**Results:** Of 16 eligible trials, 13 investigated patellar taping or bracing effects in individuals with anterior knee pain, while three investigated taping effects in individuals with knee OA. Methodological quality of taping studies was significantly higher than bracing studies (4.8$\pm$2.1 vs. 2.8$\pm$0.8; $P<0.05$). Tape applied to exert a medially-directed force on the patella decreased chronic knee pain compared to no tape and sham tape by 16.1 mm (100 mm scale; 95% CI -22.2 mm to -10.0 mm, $P<0.001$) and 10.9 mm (-18.4 mm to -3.4 mm, $P<0.001$), respectively. For anterior knee pain and OA, medially directed tape compared to no tape decreased pain by 14.7 mm (-22.8 mm to -6.9 mm, $P<0.001$) and 20.1 mm (-26.0 mm to -14.3 mm, $P<0.001$), respectively. There was disputable evidence from low quality studies for patellar bracing benefits.
**Conclusions:** There was evidence that tape applied to exert a medially-directed force on the patella produces a clinically meaningful change in chronic knee pain. There was limited evidence to demonstrate the efficacy of patellar bracing. These outcomes were limited by the presence of high heterogeneity between study outcomes and significant publication bias, which