Purpose: The objectives of this study was to evaluate the clinical outcome and the safety of MACI® in consecutive patients treated for symptomatic articular cartilage defects of the knee joint at different times (2 weeks, 1 month, 3 months, 6 months, 12 months and 24 months) post-injury or surgery.

Methods and Materials: This study was a prospective, monocenter, cohort study and 21 patients (85.7% males, 14.3% females; mean age 35.18 years) were followed for 24 months. The defects were treated with autologous chondrocytes seeded on a collagen type I/III membrane (MACI®). The clinical outcome was determine with standard scores (ICRS) and the radiological morphology using high resolution magnetic resonance imaging (MRI) and the MOCART scoring system.

Results: With the IKDC objective scoring system at 24 months a normal or nearly normal knee was found in 76.2%. The Lysholm score increased from 54.7 after the knee injury to 83.8 after 24 months (p<0.001). The level of Tegner's sport activity increased from 23.1 to 69.6 (p<0.001). In the MRI evaluation 24 months after implantation 88% of femoral grafts were completely present and in position. No product-specific adverse events were recorded.

Conclusions: Based on the results obtained, we conclude that MACI® is a successful and safe therapeutic option for the treatment of cartilage lesions of the knee, in particular traumatic lesions of the femoral condyle.

Purpose: Matrix associated autologous chondrocyte transplants (MACT’s) are implanted in the debrided cartilage defect without the use of a periosteal flap or further surgical fixation. A sufficient attachment is essential for the successful use and detachment of the graft may lead to treatment failure. To determine the adherence rate of the CaReS® technique we performed high resolution magnetic resonance imaging (MRI) in the early postoperative period.

Methods and Materials: This study was a prospective, monocenter, cohort study and 25 patients (60% males, 40% females; mean age 29.7 years) were included. Only femoral, full-thickness cartilage defects (lateral, 48% and medial, 52%; mean defect size: 5.4 cm²) were treated with a three-dimensional Collagen type I gel with cultivated autologous chondrocytes (CaReS®). The defects were debrided without violating the subchondral bone and a stable containment of healthy articular cartilage was obtained. The grafts were fixed only with fibrin glue (Tissucol®). High resolution MRI was performed in all patients between day 25 and 35 after operation. The implants were graded as completely attached, partially attached or detached.

Results: In 92% a completely attached graft was found and the cartilage defect site was totally covered by the implanted construct and repair tissue. In 8% a partial attachment occurred with partial filling of the cartilage defect. A complete detachment of the graft was not observed.

Conclusions: The implantation and fixation of a collagen gel with autologous chondrocytes (CaReS®) in a full thickness cartilage defect of the femoral condyle only with fibrin glue and with no further surgical fixation leads to a high attachment rate in the postoperative period.

Purpose: Matrix associated autologous chondrocyte transplantation (MACT) has been applied for more than one decade, we have little experience in the biological characteristics of the repair tissue after MACT in patients. In the present study biopsies of MACT-patients were analysed in order to describe the cell and matrix properties of the repair tissue.

Methods and Materials: Subjective biopsies of different defect regions taken 1 to 1.5 years after a MACT with a hyaluronan matrix (Hyalograf®-C) were analysed by histochemical, immunohistochemical and ultrastructural methods.

Results: Biopsies showed regeneration tissue of various qualities. Differentiated samples strongly resemble native cartilage, containing collagen type II, a high amount of proteoglycan and differentiated chondrocytes. The cement line was continuous and the tissue surface smooth. In contrast, fibrous tissue mainly consisted of collagen type I strands forming a three-dimensional meshwork without a significant amount of proteoglycan. Despite the undifferentiated matrix, cells frequently had a differentiated morphology and formed chondrons. Differences in repair tissue quality were evident between the patients but also between the biopsies of different defect regions of a single patient.

Conclusions: The morphological analysis of the biopsies confirmed the initiation of hyaline cartilage formation after Hyalograf® implantation. Less differentiated samples showed a fibrous matrix with morphologically differentiated chondrocytes. In these cases the cartilage morphotype was not correlated with collagen type II and proteoglycan synthesis. Failure of hyaline matrix formation is supposed to refer to a physiologically non-differentiated stage of morphologically differentiated chondrocytes.