MEDICAL POLICY

univera HEALTHCARE an excellus company

SUBJECT: AUTOLOGOUS CHONDROCYTE IMPLANTATION	**EFFECTIVE DATE: 10/18/01** **REVISED DATE: 01/17/02, 03/20/03, 01/15/04, 01/20/05, 11/17/05, 07/20/06, 06/21/07, 05/14/08, 04/16/09, 05/27/10, 05/19/11, 05/24/12, 04/18/13, 03/20/14, 03/19/15, 02/18/16, 04/20/17, 04/18/18, 06/21/18**
POLICY NUMBER: 7.01.38 **CATEGORY: Technology Assessment**	**PAGE: 1 OF: 8**

- ***If a product excludes coverage for a service, it is not covered, and medical policy criteria do not apply.***
- ***If a commercial product (including an Essential Plan product) or a Medicaid product covers a specific service, medical policy criteria apply to the benefit.***
- ***If a Medicare product covers a specific service, and there is no national or local Medicare coverage decision for the service, medical policy criteria apply to the benefit.***

POLICY STATEMENT:

I. Based upon our criteria and assessment of peer-reviewed literature, autologous chondrocyte implantation (ACI) is **medically appropriate** for treatment of symptomatic isolated cartilage defects of the distal femoral articular surface (e.g., medial condyle, lateral condyle or trochlea) caused by acute or repetitive trauma when all of the following are present:

A. Severe, disabling pain and a loss of knee function which interferes with the ability to carry out age appropriate activities of daily living and/or demands of employment;

B. A distal femoral articular surface (i.e., medial condyle, lateral condyle or trochlea) defect of 1-10 cm^2 in size has been identified during arthroscopy or during an MRI which is classified by the Modified Outerbridge Scale as Grade III or Grade IV or symptomatic, full- thickness articular cartilage lesions of the trochlea;

C. Failure of non-surgical management for at least 3 months in duration;

D. Presence of ALL of the following on physical examination:
1. A stable knee with intact or reconstructed ligaments (ACL or PCL);
2. Normal joint alignment; and
3. Normal joint space.

E. Absence of osteoarthritis or generalized tibial chondromalcia;

F. Normal articular cartilage at the lesion border (contained lesion);

G. Absence of corresponding tibial or patellar lesion ("kissing lesion") with a Modified Outerbridge Scale of Grade III or Grade IV;

H. Body Mass Index (BMI) 35 or less;

I. Age 15-55 years; and

J. Individual must be capable and willing to participate in a supervised post-operative physical rehabilitation program.

II. Based upon our criteria and assessment of peer-reviewed literature, autologous chondrocyte implantation (ACI) has not been medically proven to be effective and is **investigational** for use in sites or indications other than those stated above.

Refer to Corporate Medical Policy # 7.01.59 regarding Osteochondral Grafting.

POLICY GUIDELINES:

The Federal Employee Health Benefit Program (FEHBP/FEP) requires that procedures, devices or laboratory tests approved by the U.S. Food and Drug Administration (FDA) may not be considered investigational and thus these procedures, devices or laboratory tests may be assessed only on the basis of their medical necessity.

DESCRIPTION:

Destruction of the articulating surface of the synovial joint of the knee results in increased pain and loss of function to the joint. Damaged articular cartilage fails to heal on its own making repair of articular surfaces difficult. Autologous chondrocyte implantation (ACI) is a surgical treatment for patients with deep cartilage defects in the knee.

Carticel® received FDA approval through a biologics license for the culturing of chondrocytes. The approval restricted Carticel® to use for the repair of symptomatic cartilaginous defects of the femoral condyle (medial, lateral, or trochlear), caused by acute or repetitive trauma in patients who have had an inadequate response to a prior arthroscopic or other surgical repair procedure.

Methods to improve the ACI procedure have been investigated, including the use of a scaffold or matrix-induced/applied ACI (MACI) composed of biocompatible carbohydrates, protein polymers or synthetics (e.g., matrix based ACI, Hyalograft C, Cartipatch). The use of minced cartilage techniques are also under development. The tissue fragments are mixed intra-operatively with fibrin glue before implantation. It is thought that mincing the tissue helps with cell migration.

In 2017, Carticel®, the first generation ACI with a collagen cover wass being phased out and replaced with a preparation of ACI that seeds the chondrocytes onto a bio-resorbable collagen sponge. The only FDA-approved MACI product to date is supplied in a sheet, which is cut to size and fixed with fibrin glue. This procedure is considered to be technically easier and less time consuming than the first generation technique, which required suturing of a periosteal or collagen patch and injection of chondrocytes under the patch. The entire matrix-induced ACI procedure consists of 4 steps: (1) initial arthroscopy and biopsy of normal cartilage, (2) culturing of chondrocytes on an absorbable collagen matrix, (3) a separate arthrotomy to place the implant create a periosteal flap and, and (4) postsurgical rehabilitation. The initial arthroscopy may be scheduled as a diagnostic procedure; as part of this procedure, a cartilage defect may be identified, prompting biopsy of normal cartilage in anticipation of a possible chondrocyte transplant. The biopsied material is then sent for culturing and returned to the hospital when the implantation procedure (ie, arthrotomy) is scheduled.

Modified Outerbridge Classification is a system that has been developed for judging articular cartilage injury to the knee. This system allows delineation of varying areas of chondral pathology, based on the qualitative appearance of the cartilage surface and can assist in identifying those injuries that are suitable for repair techniques. The characterization of cartilage in this system is as follows:

1. Grade I – softening with swelling;
2. Grade II – fragmentation and fissuring less than one square centimeter (1 cm2);
3. Grade III – fragmentation and fissuring greater than one square centimeter (1 cm2);
4. Grade IV – subchondral bone exposed.

RATIONALE:

Genzyme Tissue Repair's Carticel autologous chondrocytes received approval by the FDA of its biologics license for repair of symptomatic cartilaginous defects of the femoral condyle (medial, lateral, or trochlear), caused by acute or repetitive trauma in patients who have had an inadequate response to a prior arthroscopic or other surgical repair procedure. There is sufficient data published in the peer-reviewed literature to conclude that autologous chondrocyte transplantation results in relief of symptoms and improved function in patients who had failed conservative management and arthroscopic or other surgical treatments. Several studies include reports of histological examinations of the graft site showing stable hyaline cartilage after surgery. Studies in the United States enrolled patients between the ages of 15 and 45 years.

K Zaslav and colleagues (2009) conducted a prospective, cohort study (STAR) to assess the effectiveness of autologous chondrocyte implantation in patients who failed prior treatments for articular cartilage defects of the knee. STAR was a prospective, open-label 4-year study in 154 patients (mean age: 35 years; 69% male) from 29 clinical centers. Each patient served as his or her own control, undergoing ACI after having failed or experienced an inadequate response to a prior cartilage repair procedure. Outcomes included change from baseline in knee function, knee pain, quality of life, and overall health. Duration of benefit after autologous chondrocyte implantation was compared with the failed prior non-autologous chondrocyte implantation procedure. One hundred twenty-six patients (82%) completed the protocol. Seventy-six percent of patients were treatment successes at study end, while 24% were deemed treatment failures. Preoperative mean knee pain score was 3.0 (SD, 1.8; 0 = severe, 10 = normal). Mean improvements were observed from

baseline to all time points (P < .001) for all outcome measures. Preoperative to 48-month values, respectively, were as follows: On the Knee injury and Osteoarthritis Outcome Score subscales of pain: 48.7 to 72.2; other symptoms: 51.8 to 70.8; sports/recreation: 25.8 to 55.8; knee quality of life: 20.9 to 52.2; and activities of daily living: 58.6 to 81.0; on the Modified Cincinnati Overall Knee score: 3.3 to 6.3; on the visual analog scale: 28.8 to 69.9; and on the SF-36 Overall Physical Health: 33.0 to 44.4. Seventy-six patients (49%) had subsequent surgical procedure(s), predominantly arthroscopic. The authors concluded that patients with moderate to large chondral lesions with failed prior cartilage treatments can expect sustained and clinically meaningful improvement in pain and function after autologous chondrocyte implantation.

In December 2016, the U.S. Food and Drug Administration (FDA) approved MACI® (autologous cultured chondrocytes on porcine collagen membrane) for the repair of symptomatic single or multiple full-thickness cartilage defects of the knee with or without bone involvement in adults. MACI is the first FDA-approved cellularized scaffold product that applies tissue engineering processes to grow cells on scaffolds using healthy cartilage tissue from the patient's own knee. The approval of MACI is based on the SUMMIT study (Superiority of MACI implant versus Microfracture Treatment in patients with symptomatic articular cartilage defects in the knee). In the open-label, multi-center Phase 3 SUMMIT study, 144 patients with symptomatic articular cartilage defects in the knee were randomized to receive treatment with MACI implant or microfracture bone marrow stimulation (MFX) and followed for two years (D Saris, et al. 2014). The study found that treatment with MACI was clinically and statistically significantly better, as measured by greater improvement in KOOS pain and function (SRA) scores in the MACI group compared to the microfracture groups (p=0.001) than MFX, with similar structural repair tissue and safety. The SUMMIT study investgators concluded that "MACI offers a more efficacious alternative than MFX with a similar safety profile for the treatment of symptomatic articular cartilage defects of the knee." Patients from the two-year SUMMIT study had the option to enroll in a three-year follow-up study (extension study). A majority of the patients who completed the SUMMIT study also participated in the extension study. Overall efficacy data support a long-term clinical benefit from the use of MACI in patients with cartilage defects of the knee.

Three-year follow-up results of the SUMMIT extension study were presented at the 2015 AAOS annual meeting. In the SUMMIT Extension trial, 128 patients (men and women aged 18 to 55) from the original SUMMIT study continue to be followed. The co-primary endpoints of the extension study are change in knee injury and osteoarthritis outcome (KOOS) pain and function scores at year 3, the same primary endpoint from the two-year SUMMIT trial. Patients treated with MACI versus MFX continue to show a statistically significant improvement from baseline in the co-primary endpoint of KOOS pain and function at year 3 (p = 0.046) with higher responder rates in the MACI group (81.5%) than in the MFX group (66.7%). Patients treated with MACI versus MFX also showed significant improvement in knee-related quality of life and other measures. The authors concluded that "the co-primary endpoints of pain and function showed significant improvement with MACI, which was statistically significantly better than with MFX." The incidences of treatment emergent adverse events and serious adverse events were similar between treatment groups at year 3 and no unexpected safety findings were reported.

Based on mid-term outcomes that approximate those of first generation ACI and the lack of alternatives, second generation ACI may be considered an option for large disabling full-thickness cartilage lesions of the knee. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

In a systematic review, Samsudin and Kamarul (2016) evaluated the current evidence for ACI generations relative to other treatment modalities, different cell delivery methods and different cell source application. Literature search was performed to identify all level I and II studies reporting the clinical and structural outcome of any ACI generation in human knees using the following medical electronic databases: PubMed, EMBASE, Cochrane Library, CINAHL, SPORTDiscus and NICE healthcare database. The level of evidence, sample size calculation and risk of bias were determined for all included studies to enable quality assessment. A total of 20 studies were included in the analysis, reporting on a total of 1,094 patients. Of the 20 studies, 13 compared ACI with other treatment modalities, 7 compared different ACI cell delivery methods, and 1 compared different cell source for implantation. Studies included were

heterogeneous in baseline design, preventing meta-analysis. Data showed a trend towards similar outcomes when comparing ACI generations with other repair techniques and when comparing different cell delivery methods and cell source selection. Majority of the studies (80 %) were level II evidence, and overall the quality of studies can be rated as average to low, with the absence of power analysis in 65 % studies. The authors concluded that at present, there are insufficient data to conclude any superiority of ACI techniques. Considering its 2-stage operation and cost, it may be appropriate to reserve ACI for patients with larger defects or those who have had inadequate response to other repair procedures until hard evidence enables specific clinical recommendations be made.

There is insufficient evidence in the literature to support the use of chondrocyte implantation other than the femoral condyle of the knee. The evidence on ACI for individuals who have focal articular cartilage lesions in joints other than the knee is limited. Relevant outcomes are symptoms, functional outcomes, implant survival, quality of life, and resource utilization. The greatest amount of literature is for ACI of the talus. A systematic review (Zengerink, et al.) found that outcomes following treatment with ACI were inferior to microfracture. The evidence is insufficient to determine the effects of the technology (ACI for joints other than knee) on health outcomes.

The use of minced cartilage techniques are also under development. DeNovo NT (natural tissue) Graft and DeNovo® ET Live Chondral Engineered Tissue Graft (Neocartilage) are produced by ISTO Technologies (exclusively distributed by Zimmer, Inc.). DeNovo NT consists of manually minced cartilage tissue pieces obtained from juvenile allograft donor joints. As there are no chemicals used and minimal manipulation, it is regulated as an allograft tissue rather than a biological implant. Therefore, the allograft tissue does not require FDA approval for marketing. DeNovo NT is currently available in the USA. Neocartilage uses juvenile allogeneic cartilage cells that are isolated and expanded in vitro, similar to other ACI techniques. Neocartilage is currently being studied in human clinical trials in the USA under an FDA approved investigational new drug (IND) application.

CODES: Number Description

Eligibility for reimbursement is based upon the benefits set forth in the member's subscriber contract.

CODES MAY NOT BE COVERED UNDER ALL CIRCUMSTANCES. PLEASE READ THE POLICY AND GUIDELINES STATEMENTS CAREFULLY.

Codes may not be all inclusive as the AMA and CMS code updates may occur more frequently than policy updates.

CPT:	27412	Autologous chondrocyte implantation, knee

HCPCS:	J7330	Autologous cultured chondrocytes, implant
	S2112	Arthroscopy, knee, surgical for harvesting of cartilage (chondrocyte cells)
ICD9:	715.16	Osteoarthrosis, localized, primary, lower leg
	715.26	Osteoarthrosis, localized, secondary, lower leg
	715.36	Osteoarthrosis, localized, not specified whether primary or secondary, lower leg
	715.96	Osteoarthrosis, unspecified whether generalized or localized, lower leg
	716.16	Traumatic arthropathy, lower leg
	717.9	Unspecified internal derangement, knee
	718.86	Other joint derangement, lower leg
	719.86	Other specified disorders of joint, lower leg
	732.7	Osteochondritis dissecans

	733.90	Other unspecified disorder of bone and cartilage
ICD10:	M12.561-M12.569	Traumatic arthropathy (code range)
	M17.0- M17.9	Osteoarthritis of knee (code range)
	M23.50-M23.52	Chronic instability of knee (code range)
	M23.90-M23.92	Unspecified, internal derangement of knee (code range)
	M25.261-M25.269	Flail joint, knee (code range)
	M25.361-M25.369	Other instability, knee (code range)
	M25.861-M25.869	Other specified joint disorder, knee (code range)
	M85.9	Disorder of bone density and structure, unspecified
	M89.9	Disorder of bone, unspecified
	M93.20	Osteochondritis dissecans of unspecified site
	M93.261-M93.269	Osteochondritis dissecans knee (code range)
	M94	Disorder of cartilage, unspecified

REFERENCES:

*Almqvist KF, et al. Treatment of cartilage defects in the knee using aliginate beads containing human mature allogeneic chondrocytes. Am J Sports Med 2009 Oct;37(10):1920-9.

Basad E, et al. Matrix-induced autologous chondrocyte implantation (MACI) in the knee: clinical outcomes and challenges. Knee Surg Sports Traumatol Arthros 2015 Dec;23(12):3729-35.

*Bentley G, et al. Minimum ten-year results of a prospective randomized study of autologous chondrocyte implantation versus mosaicplasty for symptomatic articular cartilage lesions of the knee. J Bone Joint Surg Br 2012 Apr;94(9):504-9.

*Bhosale AM, et al. Midterm to long-term longitudinal outcome of autologous chondrocyte implantation in the knee joint: a multilevel analysis. Am J Sports Med 2009 Nov;37 Suppl 1:131S-8S.

Biant LC, et al. Long-term results of autologous chondrocyte implantation in the knee for chronic chondral and osteochondral defects. Am J Sports Med 2014 Sep;42(9):2178-83.

BlueCross BlueShield Association. Autologous chondrocyte transplantation and other cell-based treatments of focal articular cartilage lesions. Medical Policy Reference Manual Policy #7.01.48. 2014 Jun 12.

*BlueCross BlueShield Association Technology Evaluation Center (TEC) Assessment Program. Autologous chondrocyte transplantation. 2003 Jun 18(2):1-80.

Campbell AB, et al. Return to sport after articular cartilage repair in athletes' knees: a systematic review. Arthroscopy 2015 Oct 30 [Epub ahead of print].

*Clar, et al. Clinical and cost-effectiveness of autologous chondrocyte implantation for cartilage defects in knee joints: systematic review and economic evaluation. Health Tech Assess 2005;9(47).

Clave A, et al. Third-generation autologous chondrocyte implantation versus mosaicplasty for knee cartilage injury: 2-year randomized trial. J Orthop Res 2016 April;34(4):658-665.

Cvetanovich GL, et al. Autologous chondrocyte implantation improves knee-specific functional outcomes and health-related quality of life in adolescent patients. Am J Sports Med 2017 Jan;45(1):70-76.

DiBartola AC, et al. Clinical outcomes after autologous chondrocyte implantation in adolescents' knees: a systematic review. Arthroscopy 2016 Sept;32(9):1905-1916.

Ebert JR, et al. Prospective clinical and radiologic evaluation of patellofemoral matrix-induced autologous chondrocyte implantation. Am J Sports Med 2015 Jun;43(6):1362-72.

Ebert JR, et al. Incidence, degree, and development of graft hypertrophy 24 months after matrix-induced autologous chondrocyte implantation: association with clinical outcomes. Am J Sports Med 2015 Sep;43(9):2208-15.

Ebert JR, et al. Two-year outcomes of a randomized trial investigating a 6-week return to full weightbearing after matrix-induced autologous chondrocyte implantation. Am J Sports Med 2016 Nov 23. [Epub ahead of print].

Ebert JR, et al. A prospective clinical and radiological evaluation at 5 years after arthroscopic matrix-induced autologous chondrocyte implantation. Am J Sports Med 2017 Jan;45(1):59-69.

Filardo G, et al. Treatment of "patellofemoral" cartilage lesions with matrix-assisted autologous chondrocyte transplantation: A comparison of patellar and trochlear lesions. Am J Sports Med 2014 Mar;42(3):626-34.

*Giannini S, et al. Surgical treatment of osteochondral lesions of the talus by open-field autologous chondrocyte implantation: a 10-year follow-up clinical and magnetic resonance imaging T2-mapping evaluation. Am J Sports Med 2009 Nov;37 Suppl 1:112S-8S.

Giannini S, et al. Arthroscopic autologous chondrocyte implantation in the ankle joint. Knee Surg Sports Traumatol Arthrosc 2014 Jun;22(6):1311-9.

Gille J, et al. Matrix-associated autologous chondrocyte implantation: a clinical follow-up at 15 years. Cartilage 2016 Oct;7(4):309-315.

Gillogly SD, et al. Autologous chondrocyte implantation and anteromedialization for isolated patellar articular cartilage lesions: 5-to 11–year follow-up. Am J Sports Med 2014 Apr;42(4):912-20.

Gobbi A, et al. Matrix-induced autologous chondrocyte implantation versus multipotent stem cells for the treatment of large patellofemoral chondral lesions: a nonrandomized prospective trial. Cartilage 2015 Apr;6(2):82-97.

Gomoll AH, et al. Autologous chondrocyte implantation in the patella: a multicenter experience. Am J Sports 2014 May;42(5):1074-81.

*Gooding CR, et al. A prospective, randomized study comparing two techniques of autologous chondrocyte implantation for osteochondral defects in the knee: Periosteum covered versus type I/III collagen covered. Knee 2006;13:203-10.

Goyal D, et al. Evidence-based status of second-and third-generation autologous chondrocyte implantation over first generation: a systematic review of level I and II studies. Arthroscopy 2013 Nov;29(11):1872-8.

*Kim MK, et al. Autologous chondrocyte implantation in the knee using fibrin. Knee Surg Sports Traumatol Arthrosc 2009 Sep 18 [Epub ahead of print].

Knutsen G, et al. A randomized multicenter trial comparing autologous chondrocyte implantation with microfracture: long-term follow-up at 14 to 15 years. J Bone Joint Surg Am 2016 Aug 17;98(16):1332-1339.

Kwak SK, et al. Autologous chondrocyte implantation of the ankle: 2- to-10-year results. Am J Sports Med 2014 Sep;42(9):2156-64.

*Loken S, et al. Autologous chondrocyte implantation to repair knee cartilage injury: ultrastructural evaluation at 2 years and long-term follow-up including muscle strength measurements. Knee Surg Sports Traumatol Arthrosc 2009 Nov;17(11):1278-88.

Meyerkort D, et al. Matrix-induced autologous chondrocyte implantation (MACI) for chondral defects in the patellofemoral joint. Knee Surg Sports Traumatol Arthrosc 2014 Oct;22(10):2522-30.

Minas T, et al. The John Insall Award: A minimum 10-year outcome study of autologous chondrocyte implantation. Clin Orthop Relat Res 2014 Jan;472(1):41-51.

Mundi R, et al. Cartilage restoration of the knee: a systematic review and meta-analysis of level 1 studies. Am J Sports Med 2016 July;44(7):1888-1895.

*Nam EK, et al. Autologous chondrocyte implantation of the ankle: 1 2-to-5-year follow-up. Am J Sports Med 2009 Feb;37(2):274-84.

Nawaz SZ, et al. Autologous chondrocyte implantation in the knee: mid-term to long-term results. J Bone Joint Surg Am 2014 May 21;96(10):824-830.

Niethammer TR, et al. Incomplete defect filling after third generation autologous chondrocyte implantation. Arch Med Sci 2016 Aug 1;12(4):785-792.

Niemeyer P, et al. Long-term outcomes after first generation autologous chondrocyte implantation for cartilage defects of the knee. Am J Sports Med 2014 Jan;42(1):150-7.

Niethammer TR, et al. Bone marrow edema in the knee and its influence on clinical outcome after matrix-based autologous chondrocyte implantation: results after 3-year follow-up. Am J Sports Med 2015 May;43(5):1172-9.

Oussedik S, et al. Treatment of articular cartilage lesions of the knee by microfracture or autologous chondrocyte implantation: a systematic review. Arthroscopy 2015 Apr;31(4):732-44.

Pareek A, et al. Long-term outcomes after autologous chondrocyte implantation: a systematic review at mean follow-up of 11.4 years. Cartilage 2016 Oct;7(4):298-308.

Pestka JM, et al. Clinical outcomes after cell-seeded autologous chondrocyte implantation of the knee: when can success or failure be predicted? Am J Sports Med 2014 Jan;42(1):208-15.

Pestka JM, et al. Return to sports activity and work after autologous chondrocyte implantation of the knee: which factors influence outcomes? Am J Sports Med 2015 Dec 9 [Epub ahead of print].

Randsborg PH, et al. Focal cartilage defects in the knee- a randomized controlled trial comparing autologous chondrocyte implantation with arthroscopic debridement. BMC Musculoskeletal Disord 2016 March 8;17:117.

Riboh JC, et al. Comparative efficacy of cartilage repair procedures in the knee: a network meta-analysis. Knee Surg Sports Traumatol Arthrosc. Sep 07 2016 [Epub ahead of print].

Richter DL, et al. Knee articular cartilage repair and restoration techniques: a review of the literature. Sports Health 2015 Oct 12 [Epub ahead of print].

Rosa D, et al. Long-term clinical results and MRI changes after autologous chondrocyte implantation of the knee in young and active middle aged adults. J Orthop Traumatol 2016 March;17(1):55-62.

Samsudin EZ, et al. The comparison between the different generations of autologous chondrocyte implantation with other treatment modalities: a systematic review of clinical trials. Knee Surg Sports Traumatol Arthrosc 2016 Dec;24(12):3912-3926.

*Saris DB, et al. Treatment of symptomatic cartilage defects of the knee: characterized chondrocyte implantation results in better clinical outcome at 36 months in a randomized trial compared to microfracture. Am J Sports Med 2009 Nov;37 Suppl 1:10S-9S.

Saris D, et al. Matrix-applied characterized autologous cultured chondrocytes versus microfracture: two-year follow-up of a prospective randomized trial. Am J Sports Med 2014 Jun;42(6):1384-94.

*Van Assche D, et al. Physical activity levels after characterized chondrocyte implantation versus microfracture in the knee and the relationship to objective functional outcome with 2-year follow-up. Am J Sports Med 2009 Nov;37 Suppl 1:42S-9S.

Wylie JD, et al. Failures and reoperations after matrix-assisted cartilage repair of the knee: a systematic review. Arthroscopy 2016 Feb;32(2):386-392.

*Zaslav K, et al. A prospective study of autologous chondrocyte implantation in patients with failed prior treatment for articular cartilage defect of the knee: results of the Study of the Treatment of Articular Repair (STAR) clinical trial. Am J Sports Med 2009 Jan;37(1):42-55.

*key article

KEY WORDS:

Carticel, Matrix-induced, MACI, Minced cartilage, Neocartilage, Scaffold-induced

CMS COVERAGE FOR MEDICARE PRODUCT MEMBERS

Based on our review, autologous chondrocyte implantation is not addressed in National or Regional Medicare coverage determinations or policies.