MASSACHUSETTS

Blue Cross Blue Shield of Massachusetts is an Independent Licensee of the Blue Cross and Blue Shield Association

Medical Policy

Autologous Chondrocyte Implantation for Focal Articular Cartilage Lesions

Table of Contents

Policy Number: 374

BCBSA Reference Number: 7.01.48 (For Plan internal use only)
NCD/LCD: N/A

Related Policies

- Autografts and Allografts in the Treatment of Focal Articular Cartilage Lesions, #111
- Meniscal Allograft Transplantation and Collagen Meniscus Implants, #110
- Continuous Passive Motion in the Home Setting, #407
- Orthopedic Applications of Stem Cell Therapy (Including Allograft and Bone Substitute Products Used With Autologous Bone Marrow), #254

Policy

Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity Medicare HMO Blue℠ and Medicare PPO Blue℠ Members

Autologous chondrocyte implantation may be considered **MEDICALLY NECESSARY** for the treatment of disabling full-thickness articular cartilage defects of the knee caused by acute or repetitive trauma, when **all** of the following criteria are met:

- Adolescent patients should be skeletally mature with documented closure of growth plates (eg, ≥15 years). Adult patients should be too young to be considered an appropriate candidate for total knee arthroplasty or other reconstructive knee surgery (eg, <55 years)
- Focal, full-thickness (grade III or IV) unipolar lesions of the weight-bearing surface of the femoral condyles, trochlea, or patella at least 1.5 cm^2 in size
- Documented minimal to absent degenerative changes in the surrounding articular cartilage (Outerbridge Grade II or less), and normal-appearing hyaline cartilage surrounding the border of the defect
- Normal knee biomechanics or alignment and stability achieved concurrently with autologous chondrocyte implantation.

Autologous chondrocyte implantation for all other joints, including talar, and any indications other than those listed above is **INVESTIGATIONAL**.

Prior Authorization Information

Inpatient

- For services described in this policy, precertification/preauthorization **IS REQUIRED** for all products if the procedure is performed **inpatient**.

Outpatient

- For services described in this policy, see below for products where prior authorization **might be required** if the procedure is performed **outpatient**.

	Outpatient
Commercial Managed Care (HMO and POS)	Prior authorization is **required**.
Commercial PPO and Indemnity	Prior authorization is **required**.
Medicare HMO Blue℠	Prior authorization is **required**.
Medicare PPO Blue℠	Prior authorization is **required**.

CPT Codes / HCPCS Codes / ICD Codes

Inclusion or exclusion of a code does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage as it applies to an individual member.

Providers should report all services using the most up-to-date industry-standard procedure, revenue, and diagnosis codes, including modifiers where applicable.

The following codes are included below for informational purposes only; this is not an all-inclusive list.

The above medical necessity criteria MUST be met for the following codes to be covered for Commercial Members: Managed Care (HMO and POS), PPO, Indemnity, Medicare HMO Blue and Medicare PPO Blue:

CPT Codes

CPT codes:	Code Description
27412	Autologous chondrocyte implantation, knee

ICD-10-PCS Procedure Codes

ICD-10-PCS procedure codes:	Code Description
0SUC07Z	Supplement Right Knee Joint with Autologous Tissue Substitute, Open Approach
0SUC37Z	Supplement Right Knee Joint with Autologous Tissue Substitute, Percutaneous Approach
0SUC47Z	Supplement Right Knee Joint with Autologous Tissue Substitute, Percutaneous Endoscopic Approach
0SUD07Z	Supplement Left Knee Joint with Autologous Tissue Substitute, Open Approach
0SUD37Z	Supplement Left Knee Joint with Autologous Tissue Substitute, Percutaneous Approach
0SUD47Z	Supplement Left Knee Joint with Autologous Tissue Substitute, Percutaneous Endoscopic Approach

Description

Articular Cartilage Lesions

Damaged articular cartilage typically fails to heal on its own and can be associated with pain, loss of function, and disability, and may lead to debilitating osteoarthritis over time. These manifestations can severely impair a patient's activities of daily living and adversely affect quality of life.

Treatment
Conventional treatment options include debridement, subchondral drilling, microfracture, and abrasion arthroplasty. Debridement involves the removal of synovial membrane, osteophytes, loose articular debris, diseased cartilage, and is capable of producing symptomatic relief. Subchondral drilling, microfracture, and abrasion arthroplasty attempt to restore the articular surface by inducing the growth of fibrocartilage into the chondral defect. Compared with the original hyaline cartilage, fibrocartilage has less capability to withstand shock or shearing force and can degenerate over time, often resulting in the return of clinical symptoms. Osteochondral grafts and autologous chondrocyte implantation attempt to regenerate hyaline-like cartilage and thereby restore durable function. Osteochondral grafts for the treatment of articular cartilage defects are discussed in policy #111.

With autologous chondrocyte implantation, a region of healthy articular cartilage is identified and biopsied through arthroscopy. The tissue is sent to a facility licensed by the U.S. Food and Drug Administration (FDA) where it is minced and enzymatically digested, and the chondrocytes are separated by filtration. The isolated chondrocytes are cultured for 11 to 21 days to expand the cell population, tested, and then shipped back for implantation. With the patient under general anesthesia, an arthrotomy is performed, and the chondral lesion is excised up to the normal surrounding cartilage. Methods to improve the first-generation autologous chondrocyte implantation procedure have been developed, including the use of a scaffold or matrix-induced autologous chondrocyte implantation composed of biocompatible carbohydrates, protein polymers, or synthetics. The only FDA approved matrix-induced autologous chondrocyte implantation product to date is supplied in a sheet, which is cut to size and fixed with fibrin glue. This procedure is considered 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.

Desired features of articular cartilage repair procedures are the ability (1) to be implanted easily, (2) to reduce surgical morbidity, (3) not to require harvesting of other tissues, (4) to enhance cell proliferation and maturation, (5) to maintain the phenotype, and (6) to integrate with the surrounding articular tissue. In addition to the potential to improve the formation and distribution of hyaline cartilage, use of a scaffold with matrix-induced autologous chondrocyte implantation eliminates the need for harvesting and suture of a periosteal or collagen patch. A scaffold without cells may also support chondrocyte growth.

Summary
A variety of procedures are being developed to resurface articular cartilage defects. Autologous chondrocyte implantation involves harvesting chondrocytes from healthy tissue, expanding the cells in vitro, and implanting the expanded cells into the chondral defect. Second- and third-generation techniques include combinations of autologous chondrocytes, scaffolds, and growth factors.

For individuals who have focal articular cartilage lesion(s) of the weight-bearing surface of the femoral condyles, trochlea, or patella who receive autologous chondrocyte implantation, the evidence includes systematic reviews, randomized controlled trials (RCTs), and prospective observational studies. Relevant outcomes are symptoms, change in disease status, morbid events, functional outcomes, and quality of life. There is a large body of evidence on autologous chondrocyte implantation for the treatment of focal articular cartilage lesions of the knee. For large lesions, autologous chondrocyte implantation results in better outcomes than microfracture, particularly in the long-term. In addition, there is a limit to the size of lesions that can be treated with osteochondral autograft transfer, due to a limit on the number of osteochondral cores that can be safely harvested. As a result, autologous chondrocyte implantation has become the established treatment for large articular cartilage lesions in the knee. In 2017, first-generation autologous chondrocyte implantation with a collagen cover was phased out and replaced with an autologous chondrocyte implantation preparation that seeds the chondrocytes onto a bioresorbable collagen sponge. Although the implantation procedure for this second-generation autologous chondrocyte implantation is less technically demanding, studies to date have not shown improved outcomes compared with first-generation autologous chondrocyte implantation. Some evidence has suggested an increase in hypertrophy (overgrowth) of the new implant that may exceed that of the collagen membrane-covered implant. Long-term studies with a larger number of patients will be needed to determine whether this hypertrophy impacts graft survival. Based on mid-term outcomes that approximate those of first-

generation autologous chondrocyte implantation and the lack of alternatives, second-generation autologous chondrocyte implantation 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.

For individuals who have focal articular cartilage lesions of joints other than the knee who receive autologous chondrocyte implantation, the evidence includes systematic reviews of case series. Relevant outcomes are symptoms, change in disease status, morbid events, functional outcomes, and quality of life. The greatest amount of literature is for autologous chondrocyte implantation of the talus. Comparative trials are needed to determine whether autologous chondrocyte implantation improves outcomes for lesions in joints other than the knee. The evidence is insufficient to determine the effects of the technology on health outcomes.

Policy History

Date	Action
6/2022	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
11/2021	Clarified coding information
5/2021	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
6/2020	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
5/2019	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
5/2018	Annual policy review. New references added. Summary clarified.
2/2018	Annual policy review. New references added.
6/2017	Annual policy review. Policy statements on matrix-induced autologous chondrocyte implantation removed. 6/1/2017.
4/2017	Policy statements clarified to include matrix-induced autologous chondrocyte implantation (MACI). 4/1/2017
1/2017	Annual policy review. New references added.
3/2016	Annual policy review. Autologous chondrocyte implantation of the patella considered medically necessary; need for a prior surgical procedure removed from policy statement. Clarified coding information. Effective 3/1/2016.
8/2015	Annual policy review. New references added.
9/2014	Annual policy review. New references added.
7/2014	Updated Coding section with ICD10 procedure and diagnosis codes, effective 10/2015.
12/2013	Annual policy review. Statements on minced cartilage moved to policy No. 111, Autografts and Allografts in the Treatment of Focal Articular Cartilage Lesions. Effective 12/1/2013.
11/2011-4/2012	Medical policy ICD 10 remediation: Formatting, editing and coding updates. No changes to policy statements.
6/2011	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation and Rheumatology. No changes to policy statements.
11/1/2010	Annual policy review. Changes to policy statements.
7/2010	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation and Rheumatology. No changes to policy statements.
7/1/2010	Annual policy review. Changes to policy statements.
1/2010	Annual policy review.

8/2009	Changes to policy statements.
8/1/2009	New policy, effective 08/01/2009, describing covered and non-covered indication.
7/2009	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation and Rheumatology. No changes to policy statements.
7/2008	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation and Rheumatology. No changes to policy statements.
4/2008	Annual policy review. Changes to policy statements.
7/2007	Reviewed - Medical Policy Group - Orthopedics, Rehabilitation and Rheumatology. No changes to policy statements.

Information Pertaining to All Blue Cross Blue Shield Medical Policies

Click on any of the following terms to access the relevant information:

Medical Policy Terms of Use
Managed Care Guidelines
Indemnity/PPO Guidelines
Clinical Exception Process
Medical Technology Assessment Guidelines

References

1. Niemeyer P, Pestka JM, Kreuz PC, et al. Characteristic complications after autologous chondrocyte implantation for cartilage defects of the knee joint. Am J Sports Med. Nov 2008; 36(11): 2091-9. PMID 18801942
2. Free online Modified Cincinnati Knee Rating System calculator. OrthoToolKit. https://www.orthotoolkit.com/cincinnati/. Accessed February 16, 2022.
3. Greco NJ, Anderson AF, Mann BJ, et al. Responsiveness of the International Knee Documentation Committee Subjective Knee Form in comparison to the Western Ontario and McMaster Universities Osteoarthritis Index, modified Cincinnati Knee Rating System, and Short Form 36 in patients with focal articular cartilage defects. Am J Sports Med. May 2010; 38(5): 891-902. PMID 20044494
4. Gusi N, Olivares PR, Rajendram R. The EQ-5D Health-Related Quality of Life Questionnaire [Abstract]. In: Preedy VR, Watson RR, eds. Handbook of Disease Burdens and Quality of Life Measures. New York: Springer; 2010:87-89.
5. Roos EM, Engelhart L, Ranstam J, et al. ICRS Recommendation Document: Patient-Reported Outcome Instruments for Use in Patients with Articular Cartilage Defects. Cartilage. Apr 2011; 2(2): 122-36. PMID 26069575
6. Roos EM, Lohmander LS. The Knee injury and Osteoarthritis Outcome Score (KOOS): from joint injury to osteoarthritis. Health Qual Life Outcomes. Nov 03 2003; 1: 64. PMID 14613558
7. Collins NJ, Misra D, Felson DT, et al. Measures of knee function: International Knee Documentation Committee (IKDC) Subjective Knee Evaluation Form, Knee Injury and Osteoarthritis Outcome Score (KOOS), Knee Injury and Osteoarthritis Outcome Score Physical Function Short Form (KOOS-PS), Knee Outcome Survey Activities of Daily Living Scale (KOS-ADL), Lysholm Knee Scoring Scale, Oxford Knee Score (OKS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Activity Rating Scale (ARS), and Tegner Activity Score (TAS). Arthritis Care Res (Hoboken). Nov 2011; 63 Suppl 11: S208-28. PMID 22588746
8. Lee WC, Kwan YH, Chong HC, et al. The minimal clinically important difference for Knee Society Clinical Rating System after total knee arthroplasty for primary osteoarthritis. Knee Surg Sports Traumatol Arthrosc. Nov 2017; 25(11): 3354-3359. PMID 27324635
9. Clement ND, MacDonald D, Simpson AH. The minimal clinically important difference in the Oxford knee score and Short Form 12 score after total knee arthroplasty. Knee Surg Sports Traumatol Arthrosc. Aug 2014; 22(8): 1933-9. PMID 24253376
10. Copay AG, Eyberg B, Chung AS, et al. Minimum Clinically Important Difference: Current Trends in the Orthopaedic Literature, Part II: Lower Extremity: A Systematic Review. JBJS Rev. Sep 2018; 6(9): e2. PMID 30179898

11. Bin Abd Razak HR, Acharyya S, Tan SM, et al. Predictors of Midterm Outcomes after Medial Unicompartmental Knee Arthroplasty in Asians. Clin Orthop Surg. Dec 2017; 9(4): 432-438. PMID 29201296
12. Lee WC, Bin Abd Razak HR, Allen JC, et al. Achieving Minimum Clinically Important Difference in Oxford Knee Score and Short Form-36 Physical Component Summary Is Less Likely with Single-Radius Compared with Multiradius Total Knee Arthroplasty in Asians. J Knee Surg. Mar 2019; 32(3): 227-232. PMID 29635649
13. Abraamyan T, Johnson AJ, Wiedrick J, et al. Marrow Stimulation Has Relatively Inferior Patient-Reported Outcomes in Cartilage Restoration Surgery of the Knee: A Systematic Review and Meta-analysis of Randomized Controlled Trials. Am J Sports Med. Apr 23 2021: 3635465211003595. PMID 33890799
14. Zamborsky R, Danisovic L. Surgical Techniques for Knee Cartilage Repair: An Updated Large-Scale Systematic Review and Network Meta-analysis of Randomized Controlled Trials. Arthroscopy. Mar 2020; 36(3): 845-858. PMID 32139062
15. Riboh JC, Cvetanovich GL, Cole BJ, et al. Comparative efficacy of cartilage repair procedures in the knee: a network meta-analysis. Knee Surg Sports Traumatol Arthrosc. Dec 2017; 25(12): 3786-3799. PMID 27605128
16. Devitt BM, Bell SW, Webster KE, et al. Surgical treatments of cartilage defects of the knee: Systematic review of randomised controlled trials. Knee. Jun 2017; 24(3): 508-517. PMID 28189406
17. Mundi R, Bedi A, Chow L, et al. Cartilage Restoration of the Knee: A Systematic Review and Meta-analysis of Level 1 Studies. Am J Sports Med. Jul 2016; 44(7): 1888-95. PMID 26138733
18. Gou GH, Tseng FJ, Wang SH, et al. Autologous Chondrocyte Implantation Versus Microfracture in the Knee: A Meta-analysis and Systematic Review. Arthroscopy. Jan 2020; 36(1): 289-303. PMID 31708355
19. Mistry H, Connock M, Pink J, et al. Autologous chondrocyte implantation in the knee: systematic review and economic evaluation. Health Technol Assess. Feb 2017; 21(6): 1-294. PMID 28244303
20. Harris JD, Siston RA, Pan X, et al. Autologous chondrocyte implantation: a systematic review. J Bone Joint Surg Am. Sep 15 2010; 92(12): 2220-33. PMID 20844166
21. Sacolick DA, Kirven JC, Abouljoud MM, et al. The Treatment of Adult Osteochondritis Dissecans with Autologous Cartilage Implantation: A Systematic Review. J Knee Surg. Nov 2019; 32(11): 1102-1110. PMID 30396204
22. Bartlett W, Skinner JA, Gooding CR, et al. Autologous chondrocyte implantation versus matrix-induced autologous chondrocyte implantation for osteochondral defects of the knee: a prospective, randomised study. J Bone Joint Surg Br. May 2005; 87(5): 640-5. PMID 15855365
23. Saris D, Price A, Widuchowski W, et al. Matrix-Applied Characterized Autologous Cultured Chondrocytes Versus Microfracture: Two-Year Follow-up of a Prospective Randomized Trial. Am J Sports Med. Jun 2014; 42(6): 1384-94. PMID 24714783
24. Brittberg M, Recker D, Ilgenfritz J, et al. Matrix-Applied Characterized Autologous Cultured Chondrocytes Versus Microfracture: Five-Year Follow-up of a Prospective Randomized Trial. Am J Sports Med. May 2018; 46(6): 1343-1351. PMID 29565642
25. Basad E, Ishaque B, Bachmann G, et al. Matrix-induced autologous chondrocyte implantation versus microfracture in the treatment of cartilage defects of the knee: a 2-year randomised study. Knee Surg Sports Traumatol Arthrosc. Apr 2010; 18(4): 519-27. PMID 20062969
26. Basad E, Wissing FR, Fehrenbach P, et al. Matrix-induced autologous chondrocyte implantation (MACI) in the knee: clinical outcomes and challenges. Knee Surg Sports Traumatol Arthrosc. Dec 2015; 23(12): 3729-35. PMID 25218576
27. Schuette HB, Kraeutler MJ, McCarty EC. Matrix-Assisted Autologous Chondrocyte Transplantation in the Knee: A Systematic Review of Mid- to Long-Term Clinical Outcomes. Orthop J Sports Med. Jun 2017; 5(6): 2325967117709250. PMID 28620621
28. Meyerkort D, Ebert JR, Ackland TR, et al. Matrix-induced autologous chondrocyte implantation (MACI) for chondral defects in the patellofemoral joint. Knee Surg Sports Traumatol Arthrosc. Oct 2014; 22(10): 2522-30. PMID 24817164
29. Zak L, Aldrian S, Wondrasch B, et al. Ability to return to sports 5 years after matrix-associated autologous chondrocyte transplantation in an average population of active patients. Am J Sports Med. Dec 2012; 40(12): 2815-21. PMID 23108635

30. Ebert JR, Fallon M, Wood DJ, et al. A Prospective Clinical and Radiological Evaluation at 5 Years After Arthroscopic Matrix-Induced Autologous Chondrocyte Implantation. Am J Sports Med. Jan 2017; 45(1): 59-69. PMID 27587741
31. Ebert JR, Fallon M, Zheng MH, et al. A randomized trial comparing accelerated and traditional approaches to postoperative weightbearing rehabilitation after matrix-induced autologous chondrocyte implantation: findings at 5 years. Am J Sports Med. Jul 2012; 40(7): 1527-37. PMID 22539536
32. Ebert JR, Smith A, Edwards PK, et al. Factors predictive of outcome 5 years after matrix-induced autologous chondrocyte implantation in the tibiofemoral joint. Am J Sports Med. Jun 2013; 41(6): 1245-54. PMID 23618699
33. Ebert JR, Schneider A, Fallon M, et al. A Comparison of 2-Year Outcomes in Patients Undergoing Tibiofemoral or Patellofemoral Matrix-Induced Autologous Chondrocyte Implantation. Am J Sports Med. Dec 2017; 45(14): 3243-3253. PMID 28910133
34. Harris JD, Cavo M, Brophy R, et al. Biological knee reconstruction: a systematic review of combined meniscal allograft transplantation and cartilage repair or restoration. Arthroscopy. Mar 2011; 27(3): 409-18. PMID 21030203
35. Andriolo L, Merli G, Filardo G, et al. Failure of Autologous Chondrocyte Implantation. Sports Med Arthrosc Rev. Mar 2017; 25(1): 10-18. PMID 28045868
36. Nawaz SZ, Bentley G, Briggs TW, et al. Autologous chondrocyte implantation in the knee: mid-term to long-term results. J Bone Joint Surg Am. May 21 2014; 96(10): 824-30. PMID 24875023
37. Minas T, Von Keudell A, Bryant T, et al. The John Insall Award: A minimum 10-year outcome study of autologous chondrocyte implantation. Clin Orthop Relat Res. Jan 2014; 472(1): 41-51. PMID 23979923
38. Minas T, Gomoll AH, Rosenberger R, et al. Increased failure rate of autologous chondrocyte implantation after previous treatment with marrow stimulation techniques. Am J Sports Med. May 2009; 37(5): 902-8. PMID 19261905
39. Ebert JR, Smith A, Fallon M, 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. Sep 2015; 43(9): 2208-15. PMID 26163536
40. Niemeyer P, Salzmann G, Schmal H, et al. Autologous chondrocyte implantation for the treatment of chondral and osteochondral defects of the talus: a meta-analysis of available evidence. Knee Surg Sports Traumatol Arthrosc. Sep 2012; 20(9): 1696-703. PMID 22037894
41. Hu M, Li X, Xu X. Efficacy and safety of autologous chondrocyte implantation for osteochondral defects of the talus: a systematic review and meta-analysis. Arch Orthop Trauma Surg. Jun 14 2021. PMID 34128117
42. Shimozono Y, Yasui Y, Ross AW, et al. Scaffolds based therapy for osteochondral lesions of the talus: A systematic review. World J Orthop. Oct 18 2017; 8(10): 798-808. PMID 29094011
43. American Academy of Orthopaedic Surgeons. Clinical Practice Guideline on the Diagnosis and Treatment of Osteochondritis Dissecans. Rosemont, IL: AAOS; 2010.
44. National Institute for Health and Care Excellence (NICE). Autologous chondrocyte implantation for treating symptomatic articular cartilage defects of the knee [TA508]. 2018; https://www.nice.org.uk/guidance/TA508/chapter/1-Recommendations. Accessed February 16, 2022.