Molina Clinical Policy
Autologous Chondrocyte Implantation for Knee Cartilage Lesions: Policy No. 347

Last Approval: 10/12/2022
Next Review Due By: October 2023

OHIO MEDICAID: Molina follow ODM payment schedule on the covered codes. There will not be denial of service request based solely on BMI and age criteria. All reviews are completed using Ohio Administrative Code RULE 5160-1-1 Medical Necessity in an individualized approach.

DISCLAIMER

This Molina Clinical Policy (MCP) is intended to facilitate the Utilization Management process. Policies are not a supplementation or recommendation for treatment; Providers are solely responsible for the diagnosis, treatment and clinical recommendations for the Member. It expresses Molina's determination as to whether certain services or supplies are medically necessary, experimental, investigational, or cosmetic for purposes of determining appropriateness of payment. The conclusion that a particular service or supply is medically necessary does not constitute a representation or warranty that this service or supply is covered (e.g., will be paid for by Molina) for a particular Member. The Member's benefit plan determines coverage – each benefit plan defines which services are covered, which are excluded, and which are subject to dollar caps or other limits. Members and their Providers will need to consult the Member's benefit plan to determine if there are any exclusion(s) or other benefit limitations applicable to this service or supply. If there is a discrepancy between this policy and a Member's plan of benefits, the benefits plan will govern. In addition, coverage may be mandated by applicable legal requirements of a State, the Federal government or CMS for Medicare and Medicaid Members. CMS's Coverage Database can be found on the CMS website. The coverage directive(s) and criteria from an existing National Coverage Determination (NCD) or Local Coverage Determination (LCD) will supersede the contents of this MCP and provide the directive for all Medicare members.[1] References included were accurate at the time of policy approval and publication.

OVERVIEW

Cartilaginous Defects. The articular cartilage that covers the articulating bones in the knee, also called hyaline cartilage, is surrounded by an extracellular matrix that contains collagen and chondrocytes. Articular cartilage loss does not induce pain; however, it does result in pain in surrounding tissue, swelling, locking, and/or weakening. Articular cartilage defects can be categorized as chondral or osteochondral. Chondral defects are categorized further into partial thickness or full thickness, the latter of which extends to, but not into, the subchondral bone. Although partial-thickness defects do not typically cause noticeable symptoms, they can progress to full-thickness defects with time, increasing the risk of osteoarthritis (Hayes, UpToDate).

There is currently no standard treatment for articular cartilage defects in the knee. Treatment options for symptomatic knee chondral abnormalities include the following three approaches: (1) symptom relief, (2) surgical methods for stimulating the bone marrow, and (3) surgical restorative procedures. Knee pain or symptoms from suspected chondral abnormalities are initially treated palliatively, without addressing the underlying diseases (Hayes 2020).

- Frequent palliative treatment techniques involve physical modifications, such as weight loss, muscle strengthening, physical rehabilitation, and the use of orthotics and/or knee braces. Physiotherapy frequently employs procedures such as laser therapy, ultrasound, pulsed electromagnetic fields, thermal stimulation, and electrical stimulation. Pharmacological treatment includes oral NSAIDs or topical ointments, chondroitin sulfate, or glucosamine. Surgical loose-body removal and arthroscopic debridement and lavage are also considered palliative treatment procedures because weightbearing is permitted immediately following surgery and the injured tissue is removed but not replaced or stimulated to self-repair.
- Microfracture (MFX) is the primary surgical bone marrow stimulation technique and the most commonly used surgical intervention for treating chondral defects of the knee. Other bone marrow stimulation techniques include drilling, abrasion, microfracture and autologous matrix induced chondrogenesis (AMIC).
- Surgical restorative procedures include matrix-induced autologous chondrocyte implantation (MACI) and other techniques not addressed in this policy, such as mosaicplasty, osteochondral autograft transfer system, bone marrow aspirate concentrate, and osteochondral allograft, autologous matrix induced chondrogenesis.

Autologous chondrocyte implantation (ACI), or matrix-induced autologous chondrocyte transplantation (ACT), is a surgical technique aims to stimulate articular cartilage regeneration and fill cartilaginous defects with new hyaline tissue. MACI® (autologous cultured chondrocytes on porcine collagen membrane) is an autologous cellularized scaffold product that is indicated for the repair of single or multiple symptomatic, full-thickness cartilage defects of the adult knee, with or without bone involvement. MACI is a multistage procedure that involves the use of autologous cultured chondrocytes on porcine collagen membrane. The procedure consists of two surgeries. A biopsy of healthy cartilage is obtained during the initial arthroscopic surgery. The cartilage sample is then sent to a laboratory, where chondrocytes from the biopsy are isolated and expanded in vitro for several weeks. After achieving an appropriate chondrocyte

concentration, the chondrocytes are seeded onto a three-dimensional matrix. Then, in a subsequent surgical procedure (using an arthroscopic or mini-arthrotomy approach), surgeons debride the damaged cartilage site and glue the seeded matrix to fill the entire defect (Hayes, 2020).

Regulatory Status

ACI is a surgical procedure that is not regulated by the U.S. Food & Drug Administration (FDA). However, biological products are licensed by the FDA through the Biologics License Application (BLA) approval pathway.

First-Generation ACI

Carticel™ (Vericel Corporation) received FDA approval in 1997 for their autologous cultured chondrocytes for the repair of symptomatic cartilage defects of the femoral condyle (medial, lateral, or trochlea) caused by acute or repetitive trauma in patients who have had an inadequate response to a prior arthroscopic or other surgical repair procedure (e.g., debridement, microfracture, drilling/abrasion arthroplasty. **Carticel was phased out of the market in 2017 and was replaced by MACI, an ACI matrix-induced technique of the next generation.**

Second- and Third Generation ACI

Second- and third-generation technologies for implanting autologous chondrocytes in a biodegradable matrix are under development / testing, or accessible only outside the US. Some examples include: Atelocollagen (collagen gel; Koken)**;** BioCart II (ProChon Biotech)**;** Bioseed C (polymer scaffold; BioTissue Technologies)**;** CaReS (collagen gel; Ars Arthro)**;** Cartilix (polymer hydrogel; Biomet); Cartipatch® (agarose-alginate matrix, TBF Tissue Engineering)**;** ChondroCelect® (characterized chondrocyte implantation; TiGenix)**;** Chondron (fibrin gel; Sewon Cellontech); Hyalograft C (hyaluronic acid-based scaffold; Fidia Advanced Polymers)**;** NeoCart (ACI with a 3-dimensional chondromatrix; Histogenics); NOVOCART®3D (collagen-chondroitin sulfate scaffold; Aesculap Biologics).

Matrix-induced Autologous Chondrocyte Implantation (MACI) (Vericel Corporation, Cambridge, MA) received FDA approval via the BLA process in December 2016 and is indicated for: *the repair of symptomatic, single or multiple full-thickness cartilage defects of the knee with or without bone involvement in adults.*

In Europe and Asia, a number of second- and third generation ACI products have been reported in clinical use, however only MACI® has been FDA approved for use in the United States.

COVERAGE POLICY

Autologous chondrocyte implantation (ACI) (e.g., MACI® implant) for the treatment of articular cartilage defects of the knee **may be considered medically necessary** when **ALL** of the following clinical criteria are met:

1. Documented diagnosis of **ALL** the following:
   a. Treatment is for focal, full-thickness (Outerbridge Classification of Grade III or IV) unipolar lesions; **AND**
   b. Focal articular cartilage defect is caused by acute or repetitive trauma; **AND**
   c. Location of the defect is on the weightbearing surface of the femoral condyle (medial, lateral, trochlear); **AND**
   d. Size of the defect is at least 1.5 cm^2 in size.

AND

2. Body Mass Index (BMI) of ≤ 35
   *NIH Body Mass Index Calculator

AND

3. Adolescent age 15 or older with documented closure of growth plates, or adult up to age 55 who is not a candidate for total knee arthroplasty or other reconstructive knee surgery; **AND**

AND

Documentation of ALL of the following (#4-9 as follows):

4. Member is experiencing function-limiting pain including, but not limited to, loss of knee function which interferes with activities of daily living; **AND**

5. Physical examination findings include **ALL** of the following:
   a. A stable knee with intact or reconstructed ligaments (ACL or PCL); **AND**
   b. Normal tibial-femoral and/or patella-femoral alignment; **OR**
   c. History of malalignment for deformity of the tibial femoral joint and/or patella maltracking that has been corrected and fixed.

AND

6. Failure of provider-directed, non-surgical medical management for at least three (3) months, as appropriate (e.g., weight reduction, physical therapy, braces and orthotics, intraarticular injection of hyaluronic acid derivatives, and nonsteroidal anti-inflammatory agents); **AND**

7. Inadequate response to a prior arthroscopic or other surgical repair procedure (e.g., debridement, microfracture, drilling/abrasion arthroplasty, or osteochondral allograft/autograft); **AND**

8. 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; **AND**

9. Absence of osteoarthritis, generalized tibial chondromalacia, and inflammatory arthritis or other systemic disease affecting the joints; **AND**

10. Member is capable of cooperating with post-operative weight bearing restrictions and completion of post-operative rehabilitation.

Limitations and Exclusions

ACI is **considered experimental, investigational, and unproven** for the following based on insufficient evidence.

1. For any indication not listed above.
2. Treatment of joints other than the knee (e.g., shoulder, hip, tibia, talus, glenohumeral)[Hu, 2021; Robinson, 2019]
3. As an initial or first-line of surgical therapy[Gou, 2020; Schuette, 2021]
4. History of total meniscectomy
5. A cartilaginous defect (related to osteoarthritis, rheumatoid arthritis or inflammatory diseases) or where an osteoarthritic or inflammatory process unfavorably affects peri lesional cartilage quality
6. Osteochondritis dissecans[AAOS 2015]

Combination procedures, including but not limited to:

7. Meniscal allograft and ACI of the knee (evidence of efficacy has not been proven)
8. ACI and osteochondral autograft transfer system for repair of cartilage defects of the knee
9. ACI and meniscus reconstruction for large chondral defect due to discoid lateral meniscus tear (long-term outcomes have not been established)
10. Combined ACI and osteochondral autograft transfer for large knee osteochondral lesion (long-term outcomes have not been established)
11. Autologous matrix-induced chondrogenesis (AMIC) for articular cartilage defects of the talus, patella-femoral lesions and other osteochondral defects / lesions (lack of established evidence)
12. Two-stage bone and meniscus allograft and ACI for the treatment of unicompartmental osteoarthritis of the knee (evidence of efficacy has not been proven).

ACI is considered a **contraindication/exclusion** for the following

1. Known history of hypersensitivity to gentamicin, other aminoglycosides, or products of porcine or bovine origin.
2. Severe osteoarthritis of the knee, inflammatory arthritis, inflammatory joint disease
3. Uncorrected congenital blood coagulation disorders.
4. Prior knee surgery in the past 6 months, excluding surgery to procure a biopsy or a concomitant procedure to

prepare the knee for a MACI implant.

5. Individual is unable to follow a physician-prescribed post-surgical rehabilitation program.

DOCUMENTATION REQUIREMENTS. Molina Healthcare reserves the right to require that additional documentation be made available as part of its coverage determination; quality improvement; and fraud; waste and abuse prevention processes. Documentation required may include, but is not limited to, patient records, test results and credentials of the provider ordering or performing a drug or service. Molina Healthcare may deny reimbursement or take additional appropriate action if the documentation provided does not support the initial determination that the drugs or services were medically necessary, not investigational or experimental, and otherwise within the scope of benefits afforded to the member, and/or the documentation demonstrates a pattern of billing or other practice that is inappropriate or excessive.

SUMMARY OF MEDICAL EVIDENCE

A large body of evidence suggests that ACI may be an efficacious and a reasonably safe treatment for symptomatic articular cartilage defects of the knee. Treatment may improve symptoms in some patients over short- and intermediate-term follow-up. MACI appears to be generally safe with few safety concerns reported in the majority of the studies and complications occurring at rates comparable to other surgical interventions; however additional studies are needed to further evaluate the comparative safety of MACI. Furthermore, definitive patient selection criteria have not been fully defined, and its optimal place of therapy in the hierarchy of chondral defect treatments remains unclear.

MACI was approved by the FDA based on the findings of the **SUMMIT Study** and **the SUMMIT Study Extension.** The Summit Study was a prospective, Phase 3, multicenter, randomized, open-label comparison of MACI (n=72) and microfracture (n=72) over a two-year period. Saris et al. (2014) published the SUMMIT Study findings. From July 2008 to March 2012, the SUMMIT Study (NCT00719576) was conducted at 16 sites in 7 European countries. SUMMIT enrolled subjects ages 18 to 55 years (mean age 33.8 years and a mean BMI of 26 kg/m2) with at least one symptomatic Outerbridge grade III or IV focal cartilage defect on the medial femoral condyle, lateral femoral condyle, and/or the trochlea of at least 3 cm^2 in size and a baseline Knee Injury and Osteoarthritis Outcome Score (KOOS) pain score less than 55. Exclusion criteria included knee surgery within the previous six months (excluding diagnostic arthroscopy); modified Outerbridge Grade III or IV patellar or tibial defect(s); symptomatic musculoskeletal disorder in the lower limbs that could interfere with efficacy measurements in the target knee joint; total meniscectomy, meniscal allograft, or bucket handle tear or displaced tear requiring >50% meniscus removal in the target knee; malalignment necessitating osteotomy to correct tibiofemoral or patellofemoral alignment; Kellgren-Lawrence grade 3 or 4 osteoarthritis; inflammatory disease or other condition affecting the joints; or septic arthritis within one year prior to screening. At 104 weeks, the improvement with the MACI implant over microfracture in the co-primary endpoint subscores (pain and function) was clinically and statistically significant. The percentage of patients who responded to therapy at 104 weeks with at least a 10-point improvement in KOOS pain and function scores was substantially higher for the MACI group (87.5%) than the microfracture group (68.1%). Treatment failures (non-responders) were 12.5% for MACI and 31.9% for microfracture. MRI structural repair evaluations were done on 134 patients after 52 weeks and 139 patients after 104 weeks. MRI study of structural healing at both time points revealed that both treatment groups improved in defect filling, but there were no statistically significant differences. Two years following treatment, 83% of patients in the MACI group and 77% of patients in the microfracture group had greater than 50% of the defect depth filled. A second look arthroscopy and biopsy were performed on 116 patients (MACI implant n = 60; microfracture n = 56). The structural repair tissue was very good overall; nevertheless, the mean microscopic ICRS II overall assessment score of the 2 groups (63.8 versus 62.3) was not significantly different from one another.

The most frequently occurring adverse reactions (≥5%) reported for MACI were arthralgia, tendonitis, back pain, joint swelling, and joint effusion. Serious adverse reactions reported for MACI were arthralgia, cartilage injury, meniscus injury, treatment failure, and osteoarthritis (MACI Prescribing Information).

Brittberg et al. (2018) presented the results of the SUMMIT Extension Study (NCT01251588), which evaluated 5-year clinical effectiveness and safety of the 144 patients in the SUMMIT study: 65 MACI patients (90.3%) and 63 microfracture patients (87.5%). At the 5-year follow-up, 65 participants (65/65) in the MACI group and 59 subjects (59/63) in the microfracture group were still alive (total retention = 97%). The mean scores in KOOS pain and KOOS function were relatively steady in both therapy groups for an additional three years. The improvement of MACI over microfracture in the co-primary outcome of KOOS pain and function was clinically and statistically significant 5 years following therapy. Similar to the 2-year SUMMIT results, the MRI examination demonstrated an improvement in defect filling for both treatment groups; however, there were no statistically significant differences between treatment groups.

Systematic Reviews

There is insufficient evidence to support ACI for other joints (Robinson, 2019) or as a primary treatment for knee cartilage lesions (Gou, 2020; Schuette, 2021).

Hu, et al. (2021) conducted a meta-analysis to report various effects of ACI on osteochondral defects of the talus; this included 23 case series studies (458 patients) with osteochondral defects of the talus. Following ACI, the overall success rate for patients with talus osteochondral defects was 89%. The AOFAS score for patients with talus osteochondral defects after ACI was 86.33. The AOFAS score after ACI was significantly different when stratified by patient age. The study found that ACI has a relatively high success rate and improves the AOFAS score for those with talar osteochondral defects. It is recommended for clinical use.

Migliorini (2020) performed a systematic analysis comparing the clinical outcomes of ACI and Mesenchymal Stem Cell (MSC) injections for treating focal chondral defects of the knee. The analysis comprised 43 articles (11 RCTs and 32 cohort studies) and data pooled from 3,340 procedures for analysis. First-generation (p-ACI) uses a periosteal patch harvested from the proximal tibia, second-generation (c-ACI) uses a graft containing type I/III collagen membrane, and third generation (m-ACI) uses autologous chondrocytes cultivated on type I and III collagen membranes. Twelve studies reported p-ACI, eight c-ACI, and 13 m-ACI. The authors conclude that ACI procedures are a viable way to treat focal chondral defects of the knee, with considerable improvements from the first to third generation. This systematic review has limitations because the majority of included studies are retrospective or prospective, limiting the review to this level of evidence.

There were eight systematic reviews and meta-analyses reviewed, as well as one longitudinal study, two cost-effectiveness analyses, and one evidence-based guideline. ACI of the knee was assessed in adult populations (DiBartola, 2016a; Goyal, 2013; Mistry, 2017; Mundi, 2016; Sacolick, 2019) and in adolescent knees (DiBartola, 2016b); and of the talus joint (DiBartola, 2016c). One longitudinal study presented long-term outcome data (follow-up of more than 10 years) for knee procedures performed at a single site.

Mandl and Martin, in a peer-reviewed article titled ‘Overview of surgical therapy for knee and hip osteoarthritis,’ advises against ACI for OA. The review notes that patients with severe OA are unlikely to benefit from this procedure, in which isolated sections of degenerated cartilage are replaced with chondrocyte grafts, due to the vast surface area that must be grafted. The authors suggest that chondrocyte grafts may be beneficial for certain patients with severe but limited localized articular cartilage defects, and that MRI findings indicate that chondrocyte grafts achieve a more uniform fill of the chondral defect and are less likely to produce osteophytes than microfracture procedures for stimulating cartilage formation. The review concludes that while short- to medium-term benefits may be seen in selected patients, more research is needed to determine long-term effectiveness, including preventing the progression of OA (UpToDate 2022).

A Health Technology Assessment (HTA), ‘Matrix-Induced Autologous Chondrocyte Implantation (MACI) Procedure for Repair of Articular Cartilage of the Knee,’ reviewed a considerable body of evidence of moderate-quality concluding that MACI is associated with a therapeutic benefit with a durability of least five years. The HTA notes the consistent evidence that MACI is preferable to microfracture, as well as more limited evidence that MACI is comparable to older-generation ACI procedures. The report also concludes that there is still uncertainty about the best patient selection criteria, long-term outcomes beyond ten years, and the relative benefit of MACI versus other types of restorative surgical procedures. However, MACI appears to be generally safe, with complications occurring at rates comparable to other surgical interventions (Hayes, 2020).

Recent systematic reviews focusing on ACI comparative studies have concluded similar findings to the HTA about the safety and efficacy of first-generation ACI (Mundi et al. 2016; Richter et al. 2016). Systematic reviews evaluating both first- and second-generation products together also shows comparable outcomes independent of the ACI product/technique used (Riboh et al. 2017; Andrade et al. 2016; DiBartola et al. 2016; Gou et al. 2020; Na et al. 2019).

National and Specialty Organizations

The **American Academy of Orthopaedic Surgeons (AAOS)** published the *The Management of Osteochondritis Dissecans of the Femoral Condyle* (2015) which indicates that ACI may be 'appropriate' for the treatment of osteochondritis dissecans (OCD) of the femoral condyles in patients presenting with pain, no mechanical symptoms (catching or locking), effusion, partially or totally closed growth plates, and imaging suggestive of stable and irreparable OCD fragments. It should be noted that while these guidelines stated that ACI "*may be appropriate*" for some patients with OCD but considers it "*rarely appropriate*" for most patients and these guidelines were not based on a systematic review of the evidence.

The **National Institute for Health and Care Excellence (NICE)** (2017) released the Technology appraisal guidance [TA477] for ACI for the treatment of symptomatic articular cartilage defects of the knee, including MACI and earlier-generation procedures. The panel suggested ACI as a therapy option for symptomatic patients who:

- Have not undergone prior surgery to address the chondral defect,
- Have limited osteoarthritic involvement (as assessed by clinicians experienced in investigating knee cartilage damage using a validated measure for knee osteoarthritis), and
- Whose lesion exceeds 2 cubic centimeters (cm^2).

SUPPLEMENTAL INFORMATION

Scales Used to Determine Severity of Cartilage Defects of the Knee

International Cartilage Repair Society (ICRS)

- Grade 0: Normal.
- Grade 1: Nearly Normal. Superficial lesions. Soft indentation and/or superficial fissures and cracks.
- Grade 2: Abnormal. Lesions extending down to <50% of cartilage depth.
- Grade 3: Severely Abnormal. Cartilage defects extending down >50% of cartilage depth as well as down to calcified layer and down to but not through the subchondral bone. Blisters are included in this Grade.
- Grade 4: Severely Abnormal. Defects of the full thickness of cartilage involving the subchondral bone.

Reference: International Cartilage Repair Society (ICRS). Clinical Cartilage Injury Evaluation System. Available at: ICRS.

Outerbridge Scale

The Outerbridge Scale was originally developed to classify the macroscopic changes of patellar chondromalacia. The scale was later slightly modified to allow for the grading of all cartilage lesions. Studies that have evaluated the reliability of Outerbridge's classification system have used either arthroscopic video or another imaging comparison modality.

- Grade 1: Softening and swelling of the cartilage.
- Grade 2: Fragmentation and fissuring in an area half an inch or less in diameter.
- Grade 3: Fragmentation and fissuring in an area more than half an inch in diameter.
- Grade 4: Erosion of cartilage down to the bone.

Reference: Slattery C, Kweon CY. Classifications in Brief: Outerbridge Classification of Chondral Lesions. Clin Orthop Relat Res. 2018 Oct;476(10):2101-2104. doi: 10.1007/s11999.0000000000000255. PMID: 29533246; PMCID: PMC6259817.

CODING & BILLING INFORMATION

CPT	Description
27412	Autologous chondrocyte implantation, knee

HCPCS	Description
J7330	Autologous cultured chondrocytes, implant
S2112	Arthroscopy, knee, surgical for harvesting of cartilage (chondrocyte cells)

CODING DISCLAIMER. Codes listed in this policy are for reference purposes only and may not be all-inclusive. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement. Listing of a service or device code in this policy does not guarantee coverage. Coverage is determined by the benefit document. Molina adheres to Current Procedural Terminology (CPT®), a registered trademark of the American Medical Association (AMA). All CPT codes and descriptions are copyrighted by the AMA; this information is included for informational purposes only. Providers and facilities are expected to utilize industry standard coding practices for all submissions. When improper billing and coding is not followed, Molina has the right to reject/deny the claim and recover claim payment(s). Due to changing industry practices, Molina reserves the right to revise this policy as needed.

APPROVAL HISTORY

10/12/2022 Policy revised. Literature reviewed and references updated. IRO Peer Review. 9/1/2022. Practicing Physician. Board-certified in Orthopedics. Notable revision include:
- Addition of criterion: Inadequate response to a prior arthroscopic or other surgical repair procedure (e.g., debridement, microfracture, drilling/abrasion arthroplasty, or osteochondral allograft/autograft);
- Addition of criterion: Member is capable of cooperating with post-operative weight bearing restrictions and completion of post-operative rehabilitation.
- Addition to 'Limitations and Exclusions' section in the 'Contraindications' list (per MACI labeling): Known history of hypersensitivity to gentamicin, other aminoglycosides, or products of porcine or bovine origin; Severe osteoarthritis of the knee, inflammatory arthritis, inflammatory joint disease; Uncorrected congenital blood coagulation disorders; Prior knee surgery in the past 6 months, excluding surgery to procure a biopsy or a concomitant procedure to prepare the knee for a MACI implant; Individual is unable to follow a physician-prescribed post-surgical rehabilitation program.
- Addition to 'Limitation and Exclusions' section in the 'experimental, investigational, and unproven' section: Osteochondritis dissecans (OCD)

10/13/2021 Policy reviewed, no changes to coverage criteria, updated Limitations & Exclusions, added 2021 literature review updates.
9/16/2020 Policy reviewed, no changes, updated references.
9/18/2019 New policy.

REFERENCES

Government Agencies

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Peer Reviewed Publications

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National and Specialty Organizations

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4. Mandl L, Martin G. Overview of surgical therapy of knee and hip osteoarthritis. Available from UpToDate. Updated August 1, 2022. Accessed August 2022. Registration and login required.

Other Peer Reviewed and Professional Organization Publications (used in the development of this policy)

1. Kraeutler MJ, Belk JW, et al. Microfracture versus autologous chondrocyte implantation for articular cartilage lesions in the knee: A systematic review of 5-year outcomes. Am J Sports Med. 2018 Mar;46(4):995-999. doi: 10.1177/0363546517701912. Epub 2017 Apr 19. PMID: 28423287.
2. Lamplot JD, Schafer KA, Matava MJ. Treatment of failed articular cartilage reconstructive procedures of the knee: A systematic review. Orthop J Sports Med. 2018;6(3):2325967118761871. Doi: 10.1177/2325967118761871.
3. Salzmann GM, Niemeyer P, Hochrein A, Stoddart MJ, Angele P. Articular cartilage repair of the knee in children and adolescents. Orthop J Sports Med. 2018;6(3):2325967118760190. Doi:10.1177/2325967118760190.
4. Valtanen RS, Arshi A, Kelley BV, et al. Articular cartilage repair of the pediatric and adolescent knee with regard to minimal clinically important difference: A systematic review. Cartilage.2018:1947603518783503. Doi: 10.1177/1947603518783503.

APPENDIX

Reserved for State specific information. *Information includes, but is not limited to, State contract language, Medicaid criteria and other mandated criteria.*

OHIO MEDICAID: Molina follow ODM payment schedule on the covered codes. There will not be denial of service request based solely on BMI and age criteria. All reviews are completed using Ohio Administrative Code RULE 5160-1-1 Medical Necessity in an individualized approach.