Priority Health

MEDICAL POLICY
No. 91571-R9

OSTEOARTHRITIS OF THE KNEE

Effective Date: June 1, 2025	**Review Dates: 2/10, 2/11, 2/12, 2/13, 2/14, 2/15, 2/16, 2/17, 2/18, 2/19, 2/20, 5/20, 8/20, 8/21, 8/22, 8/23, 11/23, 5/24, 5/25**
Date Of Origin: February 10, 2010	**Status: Current**

Related Policies:

- Autologous Chondrocyte Implant/Meniscal Allograft # 91443
- Computer Assisted Surgical Navigation # 91641
- Neuroablation for Pain Management # 91647

Summary of Changes

Clarification:

- Added Related Policies section.
- Autologous cellular implant derived from adipose tissue, bone marrow aspirate concentrate, platelet rich plasma injections, and mesenchymal stem cell injections are considered E&I for the indications listed in this policy, and not prior authorized by TurningPoint.

I. POLICY/CRITERIA

A. The following procedures are medically necessary according to TurningPoint criteria:

1. Autologous chondrocyte implantation (e.g., Carticel) for the repair of articular cartilage.
2. MAKOplasty® knee resurfacing. The MAKO® device may also be used for computer assisted navigation; as with other similar devices, this is not separately payable. See Computer Assisted Surgical Navigation # 91641

B. The following treatments for osteoarthritis of the knee are considered experimental, investigational, or unproven:

1. Autologous cellular implant derived from adipose tissue, autologous adipose derived regenerative cell therapy, or autologous microfragmented adipose injection (e.g., Lipogems) for any musculoskeletal indication.
2. Bone marrow aspirate concentrate (BMAC) and platelet rich plasma (PRP) injections.
3. Coolief Cooled Radiofrequency Ablation for the treatment of hip and/or knee pain associated with osteoarthritis of the knee. See Neuroablation for Pain Management # 91647Genicular articular embolization
4. Mesenchymal stem cell injections

II. MEDICAL NECESSITY REVIEW

Prior authorization for certain drug, services, and procedures may or may not be required. In cases where prior authorization is required, providers will submit a request demonstrating that a drug, service, or procedure is medically necessary. For more information, please refer to the Priority Health Provider Manual.

III. APPLICATION TO PRODUCTS

Coverage is subject to member's specific benefits. Group specific policy will supersede this policy when applicable.

- **HMO/EPO:** ***This policy applies to insured HMO/EPO plans.***
- **POS:** ***This policy applies to insured POS plans.***
- **PPO:** ***This policy applies to insured PPO plans. Consult individual plan documents as state mandated benefits may apply. If there is a conflict between this policy and a plan document, the provisions of the plan document will govern.***
- **ASO:** ***For self-funded plans, consult individual plan documents. If there is a conflict between this policy and a self-funded plan document, the provisions of the plan document will govern.***
- **INDIVIDUAL:** ***For individual policies, consult the individual insurance policy. If there is a conflict between this medical policy and the individual insurance policy document, the provisions of the individual insurance policy will govern.***
- **MEDICARE:** ***Coverage is determined by the Centers for Medicare and Medicaid Services (CMS) and/or the Evidence of Coverage (EOC); if a coverage determination has not been adopted by CMS, this policy applies.***
- **MEDICAID/HEALTHY MICHIGAN PLAN:** ***For Medicaid/Healthy Michigan Plan members, this policy will apply. Coverage is based on medical necessity criteria being met and the appropriate code(s) from the coding section of this policy being included on the Michigan Medicaid Fee Schedule located at: http://www.michigan.gov/mdch/0,1607,7-132-2945_42542_42543_42546_42551-159815--,00.html. If there is a discrepancy between this policy and the Michigan Medicaid Provider Manual located at: http://www.michigan.gov/mdch/0,1607,7-132-2945_5100-87572--,00.html, the Michigan Medicaid Provider Manual will govern. For Medical Supplies/DME/Prosthetics and Orthotics, please refer to the Michigan Medicaid Fee Schedule to verify coverage.***

IV. DESCRIPTION

Osteoarthritis (OA) is a degenerative disorder characterized by the progressive damage of joint cartilage and bone. Symptoms of OA of the knee include joint pain, stiffness, and swelling, which ultimately impact joint function and can lead to disability. While symptoms vary among individuals, they are generally progressive and their intensity tends to worsen over time (Hsu and Siwiec, 2023).

Autologous cellular implant derived from adipose tissue, autologous adipose derived regenerative cell therapy, bone marrow aspirate concentrate (BMAC) and platelet rich plasma (PRP) injections

Cellular-based therapies have been proposed as a treatment option for patients with osteoarthritis (OA) of the knee who are refractory to conventional medical therapies and are ineligible for joint replacement. Biologic injections, which include mesenchymal stem cells, have been marketed for the treatment of OA. Mesenchymal stem cells (MSCs) are self-renewing and multipotent cells capable of differentiating into multiple cell types. They were originally isolated from the bone marrow stroma but have recently been identified in other tissues. The American College of Rheumatology/Arthritis Foundation (Kolasinski et al., 2019) strongly recommended against stem cell injections in patients with knee and/or hip osteoarthritis. There is concern regarding the heterogeneity and lack of standardization in available reparations of stem cell injections, as well as techniques used. Osteoarthritis Research Society International (OARSI)'s guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis (Bannuru, 2019) strongly recommend against intraarticular stem cell therapy and intraarticular platelet rich plasma because the evidence in support of these treatments is of extremely low quality, and the formulations themselves have not yet been standardized. OARSI suggested that future investigation is needed to fully evaluate the appropriateness of these treatments for OA of the knee.

Bone marrow aspirate is considered to be the most accessible source and the most common place to isolate MSCs for treatment of musculoskeletal disease. Bone marrow aspirate concentrate (BMAC) can be extracted and derived from different bones in the body. For orthopedic indications, bone marrow is generally extracted from the iliac crest, though other sites may be utilized. BMAC is under investigation as an alternative to autologous bone grafting from the iliac crest, Centrifugation of bone marrow aspirate (e.g., Harvest SmartPrep centrifuge) to concentrate MSCs is being utilized to increase the concentration of osteoprogenitor cells. Some research has suggested that stem cell concentration may relate to overall effectiveness, hence the use of centrifugation to create BMAC. In addition to bone marrow, MSC can also be harvested from adipose tissue. Autologous cellular implant derived from adipose tissue, also known as autologous adipose derived regenerative cell therapy, or autologous microfragmented adipose injection (e.g., Lipogems) has been purposed for the treatment of degenerative joint disease or osteoarthritis. The system involves a minimally invasive procedure to harvest fat-derived stem cells then concentrate or microfragment, and finally transfer the tissue back to the patient after knee arthroscopy. Biologic injections are unproven or unsafe for current use in orthopedic conditions.

Cooled radiofrequency ablation is a minimally invasive procedure that uses focused energy delivered through water-cooled electrodes to destroy tissue. The

Coolief Cooled Probe and Radiofrequency Kit are indicated for creating radiofrequency lesions nervous tissue for the relief of pain, and lesions of the genicular nerves for the management of moderate-to-severe knee pain of more than 6 months with conservative therapy, including medication, in patients with radiologically confirmed osteoarthritis (grade 2-4) and a positive response (≥50% reduction in pain) to a diagnostic genicular nerve block.

Genicular or geniculate artery embolization (GAE) is a minimally invasive treatment which aims to treat OA of the knee by reducing synovial arterial hypervascularity. The procedure involves advancing a femoral catheter into the knee using x-ray imaging guidance, and an embolic agent is injected into the catheter to block the blood flow in the genicular arteries and capillaries supplying the synovium. Reducing arterial flow to the synovium reduces inflammation and nerve growth, thereby decreasing pain and possibly OA disease progression (Padia, 2021). GAE is an outpatient interventional radiology procedure performed with the patient under moderate sedation. A consensus panel from the Society of Interventional Radiologists states that while the limited published data available suggest that GAE is effective in reducing knee pain from OA, additional safety and efficacy data to confirm their role in the algorithm for management of OA (Ahmed, 2021). In a systemic review of GAE, the authors concluded that mild-to-moderate OA treated by GAE using different embolic particles could generally be considered safe. The procedure resulted in significant and sustained pain improvement as well as better functional status in the studies reviewed. However, because of the paucity of high-quality trials (available studies lacked a control group), further investigation is needed to examine GAE's long-term outcomes, its comparative efficacy with other treatment modalities, and its role in the therapeutic approach (Torkin, 2021).

MAKOplasty (Stryker) is a robotic-assisted and computer-navigated procedure for the partial resurfacing of the knee (PKR). PKR involves the surgical removal and replacement of only the damaged surface of the knee joint with the intent of minimizing trauma to surrounding healthy bone and tissue. In a pilot study, Lonner et al (2010) compared the post-operative radiographical alignment of the tibial component with the preoperatively planned position in 31 knees in 31 consecutive patients undergoing unicompartmental knee arthroplasty (UKA) using robotic arm-assisted bone preparation and in 27 consecutive patients who underwent unilateral UKA using conventional manual instrumentation. There is insufficient published evidence to assess the safety and/or impact on health outcomes or patient management of Makoplasty for osteoarthritis of the knee.

V. CODING INFORMATION

CPT/HCPCS:
Codes Not Covered for the indications in the policy:

0232T Injection(s), platelet rich plasma, any tissue, including image guidance, harvesting and preparation when performed
0481T Injection(s), autologous white blood cell concentrate (autologous protein solution), any site, including image guidance, harvesting and preparation, when performed
0565T Autologous cellular implant derived from adipose tissue for the treatment of osteoarthritis of the knees; tissue harvesting and cellular implant creation
0566T Autologous cellular implant derived from adipose tissue for the treatment of osteoarthritis of the knees; injection of cellular implant into knee joint including ultrasound guidance, unilateral
20999 Unlisted procedure, musculoskeletal system, general
27599 Unlisted procedure, femur or knee
37242 Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; arterial, other than hemorrhage or tumor (eg, congenital or acquired arterial malformations, arteriovenous malformations, arteriovenous fistulas, aneurysms, pseudoaneurysms)
64454 Injection(s), anesthetic agent(s) and/or steroid; genicular nerve branches, including imaging guidance, when performed *(Not covered if billed for Coolief for any product)*
64624 Destruction by neurolytic agent, genicular nerve branches including imaging guidance, when performed *(Prior authorization required for Medicare; Not covered if billed for Coolief for any product)*C9809 Cryoablation needle (e.g., iovera system), including needle/tip and all disposable system components, non-opioid medical device (must be a qualifying medicare non-opioid medical device for post-surgical pain relief in accordance with section 4135 of the caa, 2023) *(Covered for Medicare and Medicaid)*

Prior Authorization Required:
27412 Autologous chondrocyte implantation, knee
J7330 Autologous cultured chondrocytes, implant

VI. REFERENCES

For references on procedures reviewed according to TurningPoint guidelines see the applicable policy.

1. Ahmed O, Block J, Mautner K, Plancher K, Anitescu M, Isaacson A, Filippiadis DK, Epelboym Y, Bercu Z, Mitchell JW, Cristescu M, White SB, Prologo JD. Percutaneous Management of Osteoarthritis in the Knee: Proceedings from the Society of Interventional Radiology Research Consensus Panel. J Vasc Interv Radiol. 2021; 32(6):919.e1-919.e6. doi: 10.1016/j.jvir.2021.03.409. Epub 2021 Mar 6. PMID: 33689834.
2. American Academy of Orthopaedic Surgeons (AAOS). Treatment of osteoarthritis of the knee (non-arthroplasty). Rosemont (IL): American Academy of Orthopaedic Surgeons; 2008. Available at: http://www.aaos.org/Research/guidelines/OAKguideline.pdf.

3. American Academy of Orthopaedic Surgeons. Appropriate Use Criteria for Non-Arthroplasty Treatment of Osteoarthritis of the Knee.; 2022. . (Accessed April 1, 2025).
4. Bannuru RR, Osani MC, Vaysbrot EE, et al. OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis. Osteoarthritis Cartilage. 2019 Nov;27(11):1578-1589. Epub 2019 Jul 3. PMID: 31278997.
5. Hsu H, Siwiec RM. Knee osteoarthritis. In: StatPearls. StatPearls Publishing; 2025 Jan. Updated June 26, 2023. Accessed April 1, 2025.
6. Jevsevar DS. Treatment of osteoarthritis of the knee: evidence-based guideline, 2nd edition. J Am Acad Orthop Surg. 2013 Sep;21(9):571-6. doi: 10.5435/JAAOS-21-09-571. PMID: 23996988.
7. Katz JN, Arant KR, Loeser RF. Diagnosis and Treatment of Hip and Knee Osteoarthritis: A Review. JAMA. 2021 Feb 9;325(6):568-578. doi: 10.1001/jama.2020.22171. PMID: 33560326; PMCID: PMC8225295.

Autologous cellular implant derived from adipose tissue, autologous adipose derived regenerative cell therapy, or autologous

1. Chen CF, Hu CC, Wu CT, et al. Treatment of knee osteoarthritis with intra-articular injection of allogeneic adipose-derived stem cells (ADSCs) ELIXCYTE®: a phase I/II, randomized, active-control, single-blind, multiple-center clinical trial. Stem Cell Res Ther. 2021 Oct 30;12(1):562. doi: 10.1186/s13287-021-02631-z. PMID: 34717765; PMCID: PMC8557559.
2. Food and Drug Administration. 510(k) Premarket Notification. The Lipogems System. K161636. https://www.accessdata.fda.gov/cdrh_docs/pdf16/K161636.pdf (Accessed April 1, 2025)
3. Kim KI, Lee MC, Lee JH, et al. Clinical efficacy and safety of the intra-articular injection of autologous adipose-derived mesenchymal stem cells for knee osteoarthritis: A phase III, randomized, double-blind, placebo-controlled trial. Am J Sports Med. 2023;51(9):2243-2253. PMID: 37345256.
4. Lu L, Dai C, Zhang Z, et al. Treatment of knee osteoarthritis with intra-articular injection of autologous adipose-derived mesenchymal progenitor cells: A prospective, randomized, double-blind, active-controlled, phase IIb clinical trial. Stem Cell Res Ther. 2019;10(1):143. PMID: 31113476; PMCID: PMC6528322.
5. Panchal J, Malanga G, Sheinkop M. Safety and Efficacy of Percutaneous Injection of Lipogems Micro-Fractured Adipose Tissue for Osteoarthritic Knees. Am J Orthop (Belle Mead NJ). 2018 Nov;47(11). doi: 10.12788/ajo.2018.0098. PMID: 30517209.
6. Russo A, Condello V, Madonna V, Guerriero M, Zorzi C. Autologous and micro-fragmented adipose tissue for the treatment of diffuse degenerative knee osteoarthritis. J Exp Orthop. 2017 Oct 3;4(1):33. doi: 10.1186/s40634-017-0108-2. PMID: 28975547; PMCID: PMC5626678.
7. Russo A, Screpis D, Di Donato SL, Bonetti S, Piovan G, Zorzi C. Autologous micro-fragmented adipose tissue for the treatment of diffuse degenerative knee osteoarthritis: an update at 3 year follow-up. J Exp Orthop. 2018 Dec 19;5(1):52. doi: 10.1186/s40634-018-0169-x. PMID: 30569417; PMCID: PMC6300453.

8. Schiavone Panni A, Vasso M, Braile A, Toro G, De Cicco A, Viggiano D, Lepore F. Preliminary results of autologous adipose-derived stem cells in early knee osteoarthritis: identification of a subpopulation with greater response. Int Orthop. 2019 Jan;43(1):7-13. doi: 10.1007/s00264-018-4182-6. Epub 2018 Oct 3. PMID: 30280218.
9. Turajane T, Chaveewanakorn U, Fongsarun W, Aojanepong J, Papadopoulos KI. Avoidance of total knee arthroplasty in early osteoarthritis of the knee with intra-articular implantation of autologous activated peripheral blood stem cells versus hyaluronic acid: a randomized controlled trial with differential effects of growth factor addition. Stem Cells Int. 2017;2017:8925132. PMID: 29056974; PMCID: PMC5625803.
10. Vega A, Martín-Ferrero MA, Del Canto F, Alberca M, García V, Munar A, Orozco L, Soler R, Fuertes JJ, Huguet M, Sánchez A, García-Sancho J. Treatment of Knee Osteoarthritis With Allogeneic Bone Marrow Mesenchymal Stem Cells: A Randomized Controlled Trial. Transplantation. 2015 Aug;99(8):1681-90. PMID: 25822648.

Bone marrow aspirate concentrate (BMAC) and platelet rich plasma (PRP) injections

11. Emadedin M, Labibzadeh N, Liastani MG, et al. Intra-articular implantation of autologous bone marrow-derived mesenchymal stromal cells to treat knee osteoarthritis: A randomized, triple-blind, placebo-controlled phase 1/2 clinical trial. Cytotherapy. 2018;20(10):1238-1246. PMID: 30318332.
12. Shapiro SA, Arthurs JR, Heckman MG, Bestic JM, et al. Quantitative T2 MRI Mapping and 12-Month Follow-up in a Randomized, Blinded, Placebo Controlled Trial of Bone Marrow Aspiration and Concentration for Osteoarthritis of the Knees. Cartilage. 2019 Oct;10(4):432-443. Epub 2018 Aug 30. PMID: 30160168; PMCID: PMC6755869.
13. Shapiro SA, Kazmerchak SE, Heckman MG, Zubair AC, O'Connor MI. A Prospective, Single-Blind, Placebo-Controlled Trial of Bone Marrow Aspirate Concentrate for Knee Osteoarthritis. Am J Sports Med. 2017 Jan;45(1):82-90. Epub 2016 Sep 30. PMID: 27566242.

Cooled Radiofrequency Ablation

14. Davis T, Loudermilk E, DePalma M, Hunter C, Lindley D, Patel N, Choi D, Soloman M, Gupta A, Desai M, Buvanendran A, Kapural L. Prospective, Multicenter, Randomized, Crossover Clinical Trial Comparing the Safety and Effectiveness of Cooled Radiofrequency Ablation With Corticosteroid Injection in the Management of Knee Pain From Osteoarthritis. Reg Anesth Pain Med. 2018 Jan;43(1):84-91. doi: 10.1097/AAP.0000000000000690. PMID: 29095245; PMCID: PMC5768219.
15. Desai MJ, Bentley A, Keck WA. Cooled radiofrequency ablation of the genicular nerves for chronic pain due to osteoarthritis of the knee: a cost-effectiveness analysis compared with intra-articular hyaluronan injections based on trial data. BMC Musculoskelet Disord. 2022 May 24;23(1):491. doi: 10.1186/s12891-022-05445-z. PMID: 35610642; PMCID: PMC9128114.

16. Food and Drug Administration. 510 (K) Premarket Notification.K163236. Coolief Cooled Radiofrequency Kit. Available at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm?ID=K163236 (Accessed April 1, 2025).
17. Food and Drug Administration. 510(k) Premarket Notification. K163461. Coolief Cooled RF Probe. Available at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm?ID=K163461 (Accessed April 1, 2025).
18. Gupta A, Huettner DP, Dukewich M. Comparative Effectiveness Review of Cooled Versus Pulsed Radiofrequency Ablation for the Treatment of Knee Osteoarthritis: A Systematic Review. Pain Physician. 2017 Mar;20(3):155-171. PMID: 28339430.
19. Hunter C, Davis T, Loudermilk E, Kapural L, DePalma M. Cooled Radiofrequency Ablation Treatment of the Genicular Nerves in the Treatment of Osteoarthritic Knee Pain: 18- and 24-Month Results. Pain Pract. 2020 Mar;20(3):238-246. doi: 10.1111/papr.12844. Epub 2019 Nov 14. PMID: 31605667; PMCID: PMC7078815.
20. McCormick ZL, Reddy R, Korn M, Dayanim D, Syed RH, Bhave M, Zhukalin M, Choxi S, Ebrahimi A, Kendall MC, McCarthy RJ, Khan D, Nagpal G, Bouffard K, Walega DR. A Prospective Randomized Trial of Prognostic Genicular Nerve Blocks to Determine the Predictive Value for the Outcome of Cooled Radiofrequency Ablation for Chronic Knee Pain Due to Osteoarthritis. Pain Med. 2018 Aug 1;19(8):1628-1638. doi: 10.1093/pm/pnx286. PMID: 29300971.
21. Oladeji LO, Cook JL. Cooled Radio Frequency Ablation for the Treatment of Osteoarthritis-Related Knee Pain: Evidence, Indications, and Outcomes. J Knee Surg. 2019 Jan;32(1):65-71. doi: 10.1055/s-0038-1675418. Epub 2018 Nov 5. PMID: 30396206.
22. Reddy RD, McCormick ZL, Marshall B, Mattie R, Walega DR. Cooled Radiofrequency Ablation of Genicular Nerves for Knee Osteoarthritis Pain: A Protocol for Patient Selection and Case Series. Anesth Pain Med. 2016 Aug 24;6(6):e39696. doi: 10.5812/aapm.39696. PMID: 28975074; PMCID: PMC5560582.
23. Walega D, McCormick Z, Manning D, Avram M. Radiofrequency ablation of genicular nerves prior to total knee replacement has no effect on postoperative pain outcomes: a prospective randomized sham-controlled trial with 6-month follow-up. Reg Anesth Pain Med. 2019 Apr 25:rapm-2018-100094. doi: 10.1136/rapm-2018-100094. Epub ahead of print. PMID: 31023931.

Genicular articular embolization

24. Bagla S, Piechowiak R, Hartman T, Orlando J, et al. Genicular Artery Embolization for the Treatment of Knee Pain Secondary to Osteoarthritis. J Vasc Interv Radiol. 2020 Jul;31(7):1096-1102. doi: 10.1016/j.jvir.2019.09.018. Epub 2019 Dec 16. PMID: 31837946.
25. Chau Y, Roux C, Gonzalez JF, Breuil V, et al. Effectiveness of Geniculate Artery Embolization for Chronic Pain after Total Knee Replacement-A Pilot Study. J Vasc Interv Radiol. 2023 Oct;34(10):1725-1733. doi: 10.1016/j.jvir.2023.06.026. Epub 2023 Jun 28. PMID: 37391071.

26. Hunter CW, Deer TR, Jones MR, et al. Consensus Guidelines on Interventional Therapies for Knee Pain (STEP Guidelines) from the American Society of Pain and Neuroscience. J Pain Res. 2022 Sep 8;15:2683-2745. doi: 10.2147/JPR.S370469. PMID: 36132996; PMCID: PMC9484571.
27. Little MW, Harrison R, MacGill S, Speirs A, et al. Genicular Artery Embolisation in Patients with Osteoarthritis of the Knee (GENESIS 2): Protocol for a Double-Blind Randomised Sham-Controlled Trial. Cardiovasc Intervent Radiol. 2023 Sep;46(9):1276-1282. doi: 10.1007/s00270-023-03477-z. Epub 2023 Jun 19. PMID: 37337060; PMCID: PMC10471661.
28. Padia SA, Genshaft S, Blumstein G, Plotnik A, Kim GHJ, Gilbert SJ, Lauko K, Stavrakis AI. Genicular Artery Embolization for the Treatment of Symptomatic Knee Osteoarthritis. JB JS Open Access. 2021;6(4):e21.00085. doi: 10.2106/JBJS.OA.21.00085. PMID: 34703964; PMCID: PMC8542160.
29. Sterbis E, Casadaban L. Genicular Artery Embolization Technique. Tech Vasc Interv Radiol. 2023 Mar;26(1):100878. doi: 10.1016/j.tvir.2022.100878. Epub 2022 Dec 22. PMID: 36889843.
30. Torkian P, Golzarian J, Chalian M, Clayton A, Rahimi-Dehgolan S, Tabibian E, Talaie R. Osteoarthritis-Related Knee Pain Treated With Genicular Artery Embolization: A Systematic Review and Meta-analysis. Orthop J Sports Med. 2021 Jul 14;9(7):23259671211021356. doi: 10.1177/23259671211021356. PMID: 34350303; PMCID: PMC8287378.

Mesenchymal stem cell injections

31. Coughlin RP, Oldweiler A, Mickelson DT, Moorman CT 3rd. Adipose-Derived Stem Cell Transplant Technique for Degenerative Joint Disease. Arthrosc Tech. 2017 Oct 2;6(5):e1761-e1766. doi: 10.1016/j.eats.2017.06.048. PMID: 29399463; PMCID: PMC5795060.
32. Kolasinski SL, Neogi T, Hochberg MC, et al. 2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee. Arthritis Care Res (Hoboken). 2020 Feb;72(2):149-162. doi: 10.1002/acr.24131. Epub 2020 Jan 6. Erratum in: Arthritis Care Res (Hoboken). 2021 May;73(5):764. doi: 10.1002/acr.24615. PMID: 31908149; PMCID: PMC11488261.
33. Hayes, Inc. Autologous Microfragmented Adipose Tissue Injection for Treatment of Osteoarthritis. Health Technology Assessment, March 11, 2020.