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Medical Policy

Microwave Tumor Ablation

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Policy Number: 912

BCBSA Reference Number: 7.01.133

NCD/LCD: NA

Related Policies

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Policy

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

Microwave ablation of primary or metastatic hepatic tumors may be considered **MEDICALLY NECESSARY** under the following conditions:

- The tumor is unresectable due to location of lesion[s] and/or comorbid conditions
- A single tumor of ≤ 5 cm or up to 3 nodules ≤ 3 cm each.

Microwave ablation of primary or metastatic lung tumors may be considered **MEDICALLY NECESSARY** under the following conditions:

- The tumor is unresectable due to location of lesion and/or comorbid conditions
- A single tumor of ≤ 3 cm.

Microwave ablation of more than a single primary or metastatic tumor in the lung is considered **INVESTIGATIONAL**.

Microwave ablation of primary or metastatic tumors other than liver or lung is considered **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 not required .
Commercial PPO and Indemnity	Prior authorization is not required .
Medicare HMO Blue SM	Prior authorization is not required .
Medicare PPO Blue SM	Prior authorization is not 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.

CPT Codes

There is no specific CPT code for microwave ablation.

DESCRIPTION

Microwave Ablation

MWA uses microwave energy to induce an ultra-high-speed, 915 MHz or 2.450 MHz (2.45 GHz), alternating electric field, which causes water molecule rotation and creates heat. This results in thermal coagulation and localized tissue necrosis. In MWA, a single microwave antenna or multiple antennas connected to a generator are inserted directly into the tumor or tissue to be ablated; energy from the antennas generates friction and heat. The local heat coagulates the tissue adjacent to the probe, resulting in a small, 2 cm to 3cm elliptical area (5´3 cm) of tissue ablation. In tumors greater than 2 cm in diameter, two to three antennas may be used simultaneously to increase the targeted area of MWA and shorten the operative time. Multiple antennas may also be used simultaneously to ablate multiple tumors. Tissue ablation occurs quickly, within one minute after a pulse of energy, and multiple pulses may be delivered within a treatment session, depending on tumor size. The cells killed by MWA are typically not removed but are gradually replaced by fibrosis and scar tissue. If there is a local recurrence, it occurs at the margins. Treatment may be repeated as needed. MWA may be used for the following purposes: (1) to control local tumor growth and prevent recurrence; (2) to palliate symptoms; and (3) to prolong survival.

MWA is similar to radiofrequency (RFA) and cryosurgical ablation. However, MWA has potential advantages over RFA and cryosurgical ablation. In MWA, the heating process is active, which produces higher temperatures than the passive heating of RFA and should allow for more complete thermal ablation in less time. The higher temperatures reached with MWA (>100°C) can overcome the "heat sink" effect in which tissue cooling occurs from nearby blood flow in large vessels, potentially resulting in incomplete tumor ablation. MWA does not rely on the conduction of electricity for heating and, therefore, does not flow electrical current through patients and does not require grounding pads, because there is no risk of skin burns. Additionally, MWA does not produce electric noise, which allows ultrasound guidance during the procedure without interference, unlike RFA. Finally, MWA can take less time than RFA, because multiple antennas can be used simultaneously.

Adverse Events

Complications from MWA may include pain and fever. Other complications associated with MWA include those caused by heat damage to normal tissue adjacent to the tumor (eg, intestinal damage during MWA of the kidney or liver), structural damage along the probe track (eg, pneumothorax as a consequence of procedures on the lung), liver enzyme elevation, liver abscess, ascites, pleural effusion, diaphragm injury, or secondary tumors if cells seed during probe removal. MWA should be avoided in pregnant women because potential risks to the patient and/or fetus have not been established, and in patients with implanted electronic devices (eg, implantable pacemakers) that may be adversely affected by microwave power output.

Applications

MWA was first used percutaneously in 1986 as an adjunct to liver biopsy. Since then, MWA has been used to ablate tumors and tissue to treat many conditions including hepatocellular carcinoma, breast cancer, colorectal cancer metastatic to the liver, renal cell carcinoma, renal hamartoma, adrenal malignant carcinoma, non-small-cell lung cancer, intrahepatic primary cholangiocarcinoma, secondary splenomegaly and hypersplenism, abdominal tumors, and other tumors not amenable to resection. Well-established local or systemic treatment alternatives are available for each of these malignancies. The potential advantages of MWA for these cancers include improved local control and other advantages common to any minimally invasive procedure (eg, preserving normal organ tissue, decreasing morbidity, shortening length of hospitalization). MWA also has been investigated as a treatment for unresectable hepatic tumors, as both primary and palliative treatment, and as a bridge to a liver transplant. In the latter setting, MWA is being assessed to determine whether it can reduce the incidence of tumor progression while awaiting transplantation and thus maintain a patient's candidacy while awaiting a liver transplant.

Summary

Microwave ablation (MWA) is a technique to destroy tumors and soft tissue using microwave energy to create thermal coagulation and localized tissue necrosis. MWA is used to treat tumors not amenable to resection and to treat patients ineligible for surgery due to age, comorbidities, or poor general health. MWA may be performed as an open procedure, laparoscopically, percutaneously, or thoracoscopically under image guidance (eg, ultrasound, computed tomography, magnetic resonance imaging) with sedation, or local or general anesthesia. This technique is also referred to as microwave coagulation therapy.

For individuals who have unresectable primary or metastatic breast cancer who receive MWA, the evidence includes case series and a systematic review of feasibility and pilot studies conducted prior to 2010. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have an unresectable primary or metastatic hepatic tumor who receive MWA, the evidence includes randomized controlled trials (RCTs), comparative observational studies, case series, and systematic reviews comparing MWA to radiofrequency ablation (RFA) and to surgical resection. The relevant outcomes are overall survival (OS), disease-specific survival, symptoms, quality of life, and treatment-related mortality and morbidity. The body of evidence indicates that MWA is an effective option in patients for whom resection is not an option. Although studies had methodological limitations, they consistently showed that that MWA and RFA had similar survival outcomes with up to five years of follow-up in patients with a single tumor <5 cm or up to three nodules <3 cm each. In meta-analyses of observational studies, patients receiving MWA had higher local recurrence rates and lower survival than those who received resection, but the patient populations were not limited to those who had unresectable tumors. MWA was associated with lower complications, intraoperative blood loss, and hospital length of stay. The evidence is sufficient to determine the effects of the technology on health outcomes.

For individuals who have an unresectable primary or metastatic lung tumor who receive MWA, the evidence includes one RCT, retrospective observational studies, and systematic reviews of these studies. The relevant outcomes are OS, disease-specific survival, symptoms, quality of life, and treatment-related mortality and morbidity. The body of evidence indicates that MWA is an effective option in patients for whom resection is not an option. In the RCT, direct comparison of MWA and RFA in patients with primary or metastatic lung cancer (mean tumor size 1.90 cm [\pm 0.89] at baseline) found similar mortality rates up to 12 months of follow-up. In the first of three systematic reviews that included 12 retrospective

observational studies, local recurrence rates were similar for MWA and RFA at a range of 9 to 47 months of follow-up. In the second systematic review with a meta-analysis, there was lower OS with MWA compared to RFA but studies were not directly comparable due to clinical and methodological heterogeneity. However, the authors concluded that percutaneous RFA and MWA were both effective with a high safety profile. In the third systematic review using a network meta-analysis, the weighted average OS rates for MWA were 82.5%, 54.6%, 35.7% 29.6%, and 16.6% at 1, 2, 3, 4, and 5 years, respectively. Limitations of the body of evidence included a lack of controlled studies and heterogeneity across studies. The RCT did not report results by tumor size or the number of metastases. The observational studies included in the systematic reviews did not report sufficient information to assess the effectiveness or safety of MWA in subgroups based on the presence of multiple tumors or total tumor burden. Therefore, conclusions about the evidence sufficiency can only be made about patients with single tumors. For this population, the evidence is sufficient to determine the effects of the technology on health outcomes.

For individuals who have an unresectable primary or metastatic renal tumor who receive MWA, the evidence includes one RCT that compared MWA to partial nephrectomy and case series. The relevant outcomes are OS, disease-specific survival, symptoms, quality of life, and treatment-related mortality and morbidity. In the RCT, overall local recurrence-free survival at 3 years was 91.3% for MWA and 96.0% for partial nephrectomy (p=0.54). This positive outcome should be replicated in additional RCTs. There are also no controlled studies comparing MWA to other ablation techniques in patients with renal tumors. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have unresectable primary or metastatic solid tumors other than breast, hepatic, lung, or renal who receive MWA, the evidence includes case series. The evidence is insufficient to determine the effects of the technology on health outcomes.

Policy History

Date	Action
2/2020	Policy statements changed to medically necessary for lung and liver tumors; statements for other tumor types unchanged. Effective 2/1/2020
10/2018	BCBSA National medical policy review. Description, summary and references updated. Policy statement unchanged.
1/2018	Clarified coding information.
10/2017	New references added from BCBSA National medical policy.
4/2016	New references added from BCBSA National medical policy.
12/2014	New references added from BCBSA National medical policy.
1/2014	New references added from BCBSA National medical policy.
4/2013	New references from BCBSA National medical policy.
2/2013	New policy describing non-coverage.

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. Zhao Z, Wu F. Minimally-invasive thermal ablation of early-stage breast cancer: a systematic review. *Eur J Surg Oncol.* Dec 2010;36(12):1149-1155. PMID 20889281.
2. Zhou W, Zha X, Liu X, et al. US-guided percutaneous microwave coagulation of small breast cancers: a clinical study. *Radiology.* May 2012;263(2):364-373. PMID 22438362.

3. Chinnaratha MA, Chuang MY, Fraser RJ, et al. Percutaneous thermal ablation for primary hepatocellular carcinoma: A systematic review and meta-analysis. *J Gastroenterol Hepatol*. Feb 2016;31(2):294-301. PMID 26114968.
4. Bertot LC, Sato M, Tateishi R, et al. Mortality and complication rates of percutaneous ablative techniques for the treatment of liver tumors: a systematic review. *Eur Radiol*. Dec 2011;21(12):2584-2596. PMID 21858539.
5. Ong SL, Gravante G, Metcalfe MS, et al. Efficacy and safety of microwave ablation for primary and secondary liver malignancies: a systematic review. *Eur J Gastroenterol Hepatol*. Jun 2009;21(6):599-605. PMID 19282763.
6. Glassberg MB, Ghosh S, Clymer JW et al. Microwave ablation compared with hepatic resection for the treatment of hepatocellular carcinoma and liver metastases: a systematic review and meta-analysis. *World J Surg Oncol*, 2019 Jun 12;17(1). PMID 31182102.
7. Shibata T, Imuro Y, Yamamoto Y, et al. Small hepatocellular carcinoma: comparison of radiofrequency ablation and percutaneous microwave coagulation therapy. *Radiology*. May 2002;223(2):331-337. PMID 11997534.
8. Xu J, Zhao Y. Comparison of percutaneous microwave ablation and laparoscopic resection in the prognosis of liver cancer. *Int J Clin Exp Pathol*, 2015 Dec 1;8(9). PMID 26617907.
9. Vietti Violi N, Duran R, Guiu B et al. Efficacy of microwave ablation versus radiofrequency ablation for the treatment of hepatocellular carcinoma in patients with chronic liver disease: a randomised controlled phase 2 trial. *Lancet Gastroenterol Hepatol*, 2018 Mar 6;3(5). PMID 29503247.
10. Shibata T, Imuro Y, Yamamoto Y et al. Small hepatocellular carcinoma: comparison of radiofrequency ablation and percutaneous microwave coagulation therapy. *Radiology*, 2002 May 9;223(2). PMID 11997534.
11. Yu J, Yu XL, Han ZY et al. Percutaneous cooled-probe microwave versus radiofrequency ablation in early-stage hepatocellular carcinoma: a phase III randomised controlled trial. *Gut*, 2016 Nov 26;66(6). PMID 27884919.
12. Yu J, Liang P, Yu XL, et al. Needle track seeding after percutaneous microwave ablation of malignant liver tumors under ultrasound guidance: analysis of 14-year experience with 1462 patients at a single center. *Eur J Radiol*. Oct 2012;81(10):2495-2499. PMID 22137097.
13. Zhou P, Liang P, Dong B, et al. Long-term results of a phase II clinical trial of superantigen therapy with staphylococcal enterotoxin C after microwave ablation in hepatocellular carcinoma. *Int J Hyperthermia*. Dec 2011;27(2):132-139. PMID 21117923.
14. Zhou P, Liang P, Yu X, et al. Percutaneous microwave ablation of liver cancer adjacent to the gastrointestinal tract. *J Gastrointest Surg*. Feb 2009;13(2):318-324. PMID 18825464.
15. Lu MD, Xu HX, Xie XY, et al. Percutaneous microwave and radiofrequency ablation for hepatocellular carcinoma: a retrospective comparative study. *J Gastroenterol*. Nov 2005;40(11):1054-1060. PMID 16322950.
16. Swietlik JF, Longo KC, Knott EA et al. Percutaneous Microwave Tumor Ablation Is Safe in Patients with Cardiovascular Implantable Electronic Devices: A Single-Institutional Retrospective Review. *J Vasc Interv Radiol*, 2019 Mar 2;30(3). PMID 30819482.
17. Soliman AF, Abouelkhair MM, Hasab Allah MS et al. Efficacy and Safety of Microwave Ablation (MWA) for Hepatocellular Carcinoma (HCC) in Difficult Anatomical Sites in Egyptian Patients with Liver Cirrhosis. *Asian Pac. J. Cancer Prev.*, 2019 Jan 27;20(1). PMID 30678453.
18. Qin S, Liu GJ, Huang M et al. The local efficacy and influencing factors of ultrasound-guided percutaneous microwave ablation in colorectal liver metastases: a review of a 4-year experience at a single center. *Int J Hyperthermia*, 2018 Nov 30;36(1). PMID 30489175.
19. Giorgio A, Gatti P, Montesarchio L et al. Microwave Ablation in Intermediate Hepatocellular Carcinoma in Cirrhosis: An Italian Multicenter Prospective Study. *J Clin Transl Hepatol*, 2018 Oct 3;6(3). PMID 30271736.
20. Shen X, Ma S, Tang X et al. Clinical outcome in elderly Chinese patients with primary hepatocellular carcinoma treated with percutaneous microwave coagulation therapy (PMCT): A Strobe-compliant observational study. *Medicine (Baltimore)*, 2018 Sep 2;97(35). PMID 30170369.
21. Carberry GA, Smolock AR, Cristescu M et al. Safety and Efficacy of Percutaneous Microwave Hepatic Ablation Near the Heart. *J Vasc Interv Radiol*, 2017 Feb 14;28(4). PMID 28190707.

22. Chiang J, Cristescu M, Lee MH et al. Effects of Microwave Ablation on Arterial and Venous Vasculature after Treatment of Hepatocellular Carcinoma. *Radiology*, 2016 Oct 19;281(2). PMID 27257951.
23. Thamtorawat S, Hicks RM, Yu J et al. Preliminary Outcome of Microwave Ablation of Hepatocellular Carcinoma: Breaking the 3-cm Barrier?. *J Vasc Interv Radiol*, 2016 Mar 26;27(5). PMID 27013403.
24. Smolock AR, Lubner MG, Ziemlewicz TJ et al. Microwave ablation of hepatic tumors abutting the diaphragm is safe and effective. *AJR Am J Roentgenol*, 2014 Dec 30;204(1). PMID 25539257.
25. Ziemlewicz TJ, Hinshaw JL, Lubner MG et al. Percutaneous microwave ablation of hepatocellular carcinoma with a gas-cooled system: initial clinical results with 107 tumors. *J Vasc Interv Radiol*, 2014 Dec 3;26(1). PMID 25446425.
26. Kitchin D, Lubner M, Ziemlewicz T et al. Microwave ablation of malignant hepatic tumours: intraperitoneal fluid instillation prevents collateral damage and allows more aggressive case selection. *Int J Hyperthermia*, 2014 Aug 22;30(5). PMID 25144819.
27. Groeschl RT, Pilgrim CH, Hanna EM et al. Microwave ablation for hepatic malignancies: a multiinstitutional analysis. *Ann. Surg.*, 2013 Oct 8;259(6). PMID 24096760.
28. Liang P, Wang Y, Yu X et al. Malignant liver tumors: treatment with percutaneous microwave ablation--complications among cohort of 1136 patients. *Radiology*, 2009 Mar 24;251(3). PMID 19304921.
29. Iannitti DA, Martin RC, Simon CJ et al. Hepatic tumor ablation with clustered microwave antennae: the US Phase II trial. *HPB (Oxford)*, 2008 Mar 12;9(2). PMID 18333126.
30. Loveman E, Jones J, Clegg AJ, et al. The clinical effectiveness and cost-effectiveness of ablative therapies in the management of liver metastases: systematic review and economic evaluation. *Health Technol Assess*. Jan 2014;18(7):vii-viii, 1-283. PMID 24484609.
31. Bala MM, Riemsma RP, Wolff R, et al. Microwave coagulation for liver metastases. *Cochrane Database Syst Rev*. Oct 13 2013;10(10):CD010163. PMID 24122576.
32. Pathak S, Jones R, Tang JM, et al. Ablative therapies for colorectal liver metastases: a systematic review. *Colorectal Dis*. Sep 2011;13(9):e252-265. PMID 21689362.
33. Yuan Z, Wang Y, Zhang J et al. A Meta-Analysis of Clinical Outcomes After Radiofrequency Ablation and Microwave Ablation for Lung Cancer and Pulmonary Metastases. *J Am Coll Radiol*, 2019 Jan 16;16(3). PMID 30642784.
34. Jiang B, McClure MA, Chen T et al. Efficacy and safety of thermal ablation of lung malignancies: A Network meta-analysis. *Ann Thorac Med*, 2018 Nov 13;13(4). PMID 30416597.
35. Nelson DB, Tam AL, Mitchell KG et al. Local Recurrence After Microwave Ablation of Lung Malignancies: A Systematic Review. *Ann. Thorac. Surg.*, 2018 Dec 7;107(6). PMID 30508527.
36. Macchi M, Belfiore MP, Floridi C et al. Radiofrequency versus microwave ablation for treatment of the lung tumours: LUMIRA (lung microwave radiofrequency) randomized trial. *Med. Oncol.*, 2017 Apr 19;34(5). PMID 28417355.
37. Katsanos K, Mailli L, Krokidis M, et al. Systematic review and meta-analysis of thermal ablation versus surgical nephrectomy for small renal tumours. *Cardiovasc Intervent Radiol*. Apr 2014;37(2):427-437. PMID 24482030.
38. Guan W, Bai J, Liu J, et al. Microwave ablation versus partial nephrectomy for small renal tumors: intermediate- term results. *J Surg Oncol*. Sep 1 2012;106(3):316-321. PMID 22488716.
39. Martin J, Athreya S. Meta-analysis of cryoablation versus microwave ablation for small renal masses: is there a difference in outcome? *Diagn Interv Radiol*. Nov-Dec 2013;19(6):501-507. PMID 24084196.
40. Yu J, Liang P, Yu XL, et al. US-guided percutaneous microwave ablation of renal cell carcinoma: intermediate- term results. *Radiology*. Jun 2012;263(3):900-908. PMID 22495684.
41. Muto G, Castelli E, Migliari R, et al. Laparoscopic microwave ablation and enucleation of small renal masses: preliminary experience. *Eur Urol*. Jul 2011;60(1):173-176. PMID 21531501.
42. Bai J, Hu Z, Guan W, et al. Initial experience with retroperitoneoscopic microwave ablation of clinical T(1a) renal tumors. *J Endourol*. Dec 2010;24(12):2017-2022. PMID 20932080.
43. Castle SM, Salas N, Leveillee RJ. Initial experience using microwave ablation therapy for renal tumor treatment: 18-month follow-up. *Urology*. Apr 2011;77(4):792-797. PMID 21324512.
44. Guan W, Bai J, Hu Z, et al. Retroperitoneoscopic microwave ablation of renal hamartoma: middle-term results. *J Huazhong Univ Sci Technol Med Sci*. Oct 2010;30(5):669-671. PMID 21063854.
45. Keane MG, Bramis K, Pereira SP, et al. Systematic review of novel ablative methods in locally advanced pancreatic cancer. *World J Gastroenterol*. Mar 7 2014;20(9):2267-2278. PMID 24605026.

46. Li X, Fan W, Zhang L, et al. CT-guided percutaneous microwave ablation of adrenal malignant carcinoma: Preliminary results. *Cancer*. Nov 15 2011;117(22):5182-5188. PMID 21523760.
47. Pusceddu C, Sotgia B, Fele RM, et al. Treatment of bone metastases with microwave thermal ablation. *J Vasc Interv Radiol*. Feb 2013;24(2):229-233. PMID 23200605.
48. Yu MA, Liang P, Yu XL, et al. Sonography-guided percutaneous microwave ablation of intrahepatic primary cholangiocarcinoma. *Eur J Radiol*. Nov 2011;80(2):548-552. PMID 21300500.
49. Yue W, Wang S, Wang B, et al. Ultrasound guided percutaneous microwave ablation of benign thyroid nodules: safety and imaging follow-up in 222 patients. *Eur J Radiol*. Jan 2013;82(1):e11-16. PMID 22940229.
50. National Comprehensive Cancer Network (NCCN). NCCN Clinical Practice Guidelines in Oncology: Hepatobiliary Cancers. Version 3.2019. https://www.nccn.org/professionals/physician_gls/pdf/hepatobiliary.pdf. Accessed August 26, 2019.
51. National Comprehensive Cancer Network (NCCN). NCCN Clinical Practice Guidelines in Oncology: Neuroendocrine and Adrenal Tumors. Version 1.2019. https://www.nccn.org/professionals/physician_gls/pdf/neuroendocrine.pdf. Accessed August 26, 2019.
52. National Institute for Health and Care Excellence (NICE). Microwave ablation for treating liver metastases [IPG553]. 2016; <https://www.nice.org.uk/guidance/ipg553> Accessed August 26, 2019.
53. National Institute for Health and Care Excellence (NICE). Microwave Ablation of Hepatocellular Carcinoma [IPG214]. 2007; <https://www.nice.org.uk/guidance/ipg214>. Accessed August 26, 2019.
54. Howington JA, Blum MG, Chang AC, et al. Treatment of stage I and II non-small cell lung cancer: Diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. May 2013;143(5 Suppl):e278S-313S. PMID 23649443.