Molina Clinical Policy
Microwave Ablation Thermotherapy for Breast Cancer
Policy No. 381

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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. References included were accurate at the time of policy approval and publication.

OVERVIEW

Breast cancer accounts for over two million malignancy cases a year globally and is the second leading cause of cancer death in women of the United States. Between 1975 and 2019, breast cancer mortality in the U.S. declined by approximately 58%, largely due to screening, early-stage treatment, and advances in metastatic therapies (Caswell-Jin et al. 2024). Screening and early recognition is imperative in the prognosis of breast cancer patients. as early-stage cancers are more treatable and associated with better survival outcomes. There are a myriad of ways to treat breast cancer that include surgery, chemotherapy, radiation, and ablative therapies (Joe 2026; Taghian and Merajver 2026).

Microwave ablation (MWA), sometimes referred to as focused microwave thermotherapy, is a local hyperthermic ablative therapy that treats primary breast cancer with focused microwaves based on the theory that heat can destroy microscopic carcinoma cells in the breast and reduce cancer recurrence. MWA utilizes electromagnetic waves to induce localized heating caused by the movement of water molecules. Given that tumor cells have higher water content than the surrounding adipose and breast glandular tissue, this allows the MWA technique to heat and kill the tumor cells while leaving the surrounding healthy tissue largely intact. Inducing tumor necrosis via MWA prior to surgery may improve surgical outcomes and reduce the possibility of inadvertently seeding viable cancer cells during the surgical procedure thus resulting in fewer local recurrences in the breast. In patients with locally advanced primary breast cancer, MWA may sufficiently reduce the size of the tumor to allow a less invasive surgical procedure. Furthermore, if a sufficient thermal dose is applied, thermotherapy treatment of early-stage breast cancer may destroy the tumor and eliminate the need for any further breast surgery or radiation therapy. MWA has been investigated in multiple settings, including as a treatment for primary breast cancer in conjunction with lumpectomy for early-stage breast cancer, and as a cytoreductive technique in conjunction with preoperative chemotherapy in locally advanced breast cancer.

Regulatory Status

At this time, there are no FDA approved microwave thermotherapy devices indicated for the treatment of breast cancer on the market.

COVERAGE POLICY

Microwave ablation thermotherapy/Focused microwave thermotherapy as a treatment for breast cancer is considered **experimental, investigational, or unproven** due to insufficient evidence in the peer-reviewed medical literature to establish long-term safety, efficacy, and effect on net health outcomes.

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.

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SUMMARY OF MEDICAL EVIDENCE

Randomized Controlled Trials

van de Voort et al. (2021) introduced the THERMAC Trial, an open-label, randomized phase 2 screening study conducted in the Netherlands to assess the efficacy and safety of MWA, radiofrequency ablation, and cryoablation, with the goal of selecting the most promising modality for phase 3 evaluation. To qualify as optimal, a technique was required to achieve a complete tumor ablation rate of at least 85%, a complication rate of no more than 15%, and uninterrupted treatment in at least 80% of patients. Eligible participants were postmenopausal women aged 45 or older with a diagnosis of early-stage invasive ductal breast cancer (cT1N0M0) with no specific subtype, and an intraductal component comprising less than 25% of the tumor. A total of 41 patients were enrolled, each undergoing surgical resection three months after thermal ablation to assess complete pathological response. Riks et al. (2025) reported the trial outcomes: cryoablation met all efficacy and safety thresholds, achieving a 94% complete ablation rate with no serious adverse events. MWA showed a 72% ablation rate and a 44% adverse event rate, while the radiofrequency ablation arm was discontinued early due to a protocol-defined stopping rule. Based on these results, cryoablation was selected to proceed to a randomized phase 3 trial comparing thermal ablation with standard breast-conserving surgery.

Systematic Reviews and Meta-Analyses

Erdos et al. (2026) completed a systematic review of thermal ablation for early-stage breast cancer. Studies were included if the study included participants ≥ 18 years of age with early-stage breast cancer that were treated with cryoablation, MWA, radiofrequency ablation, high-intensity focused ultrasound ablation, and/or laser ablation. A total of 22 studies were included with only 5 studies (one prospective propensity score matched study and four single-arm trials) assessing the use of MWA. The prospective propensity score matched study included 132 participants that were all > 70 years of age and had tumors ≤ 3 cm in size. Of the 132 participants, 33 received MWA with endocrine therapy and 99 underwent standard surgery with standard adjuvant therapies. Overall survival at 1-year was 97% in the MWA group and 100% in the control group and overall survival at 3-years was 93% in the MWA group and 96% in the control group. Complete ablation was 97% and both the MWA and control groups had a 3% tumor progression rate while the local recurrence rate was 3% in the MWA group and 1% in the control group. The single-arm trials included a total of 119 participants with mean ages from 50-66 years and maximum tumor sizes ≤ 2-3 cm across all studies. No deaths were reported in any of the single-arm trials. Complete ablation rates across all follow-up periods ranged from 72-100% “with lower rates observed in the study assessing complete ablation histopathologically three months after MWA.” Complete ablation rates immediately or one week after ablation ranged from 85-100%. Only one single-arm trial reported recurrence rates with no recurrence noted in follow-up periods ranging from 13-47 months in participants who received MWA without subsequent resection. No serious adverse events were reported in any of the studies, two studies reported local skin burns in 10% and 33% of participants with skin necrosis occurring in 2.5% of participants, and two studies reported swelling occurring in 42% and 100% of participants. The propensity score matched study was determined to have a serious risk of bias and all four single-arm trials had a high-risk of bias. The authors concluded that MWA demonstrated a favorable safety profile with generally high complete ablation rates but noted that the overall evidence is based on single-arm trials with small sample sizes that limit the generalizability of the results.

Peek et al. (2017) conducted a systematic reviews and meta-analysis of literature exploring minimally invasive ablative techniques in the treatment of breast cancer. A total of sixty-three studies were included, totaling 1608 patients. The studies included evaluating the role of ablative techniques in the treatment of breast cancer and included ten patients or more. Minimally invasive ablative techniques included were radiofrequency ablation, high intensity focused ultrasound ablation, cryoablation, laser ablation, or MWA. Fifty studies reported on the number of patients with complete ablation as found on histopathology. The top performing ablative techniques with the highest rate of complete ablation achieved were radiofrequency ablation (87.1%, 491/564) and MWA (83.2%, 89/107). MWA had the most often reported short-term complications (14.6%, 21/144). Laser ablation had the highest rate of recurrence (10.7%, 11/103). The authors concluded that minimally invasive ablative techniques appear to successfully induce coagulative necrosis in breast cancer with a low side effect profile; however, larger RCTs are needed to confirm these findings.

Dooley et al. (2010) conducted a review of four clinical studies that evaluated MWA for preoperative treatment of breast tumors ranging in ultrasound-measured size from 0.8 to 7.8 cm. The authors found the initial phase 1 study, 8 of 10 (80%) participants receiving one low dose of MWA prior to mastectomy had a partial tumor response. Partial tumor response was identified by ultrasound measurements of tumor volume reduction or by pathologic cell kill. In the phase

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2 study, the MWA dose was increased to stimulate 100% pathologic tumor cell kill for invasive carcinoma prior to breast-conserving surgery. The first RCT the authors analyzed comprised of participants with early-stage invasive breast cancer, 34 patients received MWA before surgery and 41 received only surgery. Positive margins were found in 10% (4 of 41 controls) compared with 0% (0 of 34) in the experimental group (p=0.13). The second RCT the authors analyzed consisted of participants with large breast tumors that resulted in a median reduction of tumor volume based on ultrasound measurements was 88.4% (n=14) for those who received MWA and chemotherapy, compared to 58.8% (n=10) reduction in those who received chemotherapy alone. The limitations of all studies analyzed include small numbers of participants. The authors concluded that wide-field adaptive phased-array MWA can be safely administered in a preoperative setting, and data from randomized studies suggest both a reduction in positive tumor margins as a heat-alone treatment for early-stage breast cancer, and a reduction in tumor volume when used in combination with anthracycline-based chemotherapy for patients with large breast cancer tumors. Larger randomized studies are required to verify these conclusions.

Non-randomized Studies, Retrospective Reviews and Other Evidence
Yu et al. (2025) completed a prospective clinical study comparing MWA and radiofrequency ablation in 60 patients with early-stage invasive breast cancer enrolled across two registry trials in China. Eligible tumors were ≤3.0 cm and matched by hormone receptor status, HER2 expression (human epidermal growth factor receptor 2), and Ki-67 index—a marker of tumor proliferation and aggressiveness. MWA achieved higher complete tumor ablation rates than radiofrequency ablation and induced stronger systemic immune responses, including enhanced $CD8^+$ cytolytic activity, increased memory $CD4^+$ T cells, and dendritic cell activation. Single-cell RNA sequencing revealed upregulated fatty acid metabolism and identified dendritic cells as the key antigen-presenting cells. The study also highlighted a potential role for S100A8/A9—a heterodimer of calcium-binding proteins involved in dendritic cell regulation—although specific mechanisms were limited by sample availability. Despite these promising results, limitations include a small sample size, unclear survival impact, and uncertain applicability to other solid tumors beyond breast cancer.

Zhou et al. (2021) conducted a single arm multicenter clinical study that enrolled 35 participants with early-stage breast cancer. All 35 patients underwent MWA therapy prior to surgical resection. Thirteen patients who underwent surgery alone with a diagnosis of breast cancer at a similar stage to the 35 participants were used at the control group. Blood samples were collected before and after MWA or surgery to analyze immune cell populations, serum cytokines, secretory immune checkpoint molecules, and T-cell receptor sequencing. Of the 35 participants, 32 achieved complete tumor ablation. In addition to the ablation, those treated with MWA achieved a significant antitumor immune response that was still present post-surgery.

Yu et al. (2020) conducted a single institution retrospective study comparing nipple sparing mastectomy versus MWA. Twenty-one patients were included in the MWA group, and forty-three patients were in the nipple sparking mastectomy group. All participants in both groups achieved technique effectiveness and there was no significant difference in tumor progression between the two groups. In the MWA group there was one local tumor progression at 42 months post treatment, and one ipsilateral breast recurrence at 28 months post treatment. In the nipple sparing mastectomy group there was one ipsilateral breast recurrence at 31 months post-surgery, and two bone metastases at 30- and 34-months post treatment. Neither group had any cancer related deaths or major complications. The MWA group required less hospital time and achieved better cosmetic results. This study revealed MWA could achieve similar short-term results as nipple sparing mastectomy, and further research is needed to discover if it can be a viable alternative for patients who are not appropriate surgical candidates.

Vargas et al. (2004) reported a dose-finding study conducted as part of an Investigational Device Exemption (IDE) trial on 25 subjects with a mean tumor diameter of 1.8 cm. Study subjects underwent microwave thermotherapy at various doses before undergoing surgical resection of breast cancer to determine whether the use of thermotherapy before breast conserving surgery could potentially reduce the incidence of positive surgical margins, and thus the need for re-excision. Tumoricidal temperatures (> 43°C) were reached in 23 patients (92%), resulting in pathologic necrosis achieved in 17 (68%) patients and complete necrosis in two patients. Univariate linear regression predicts that peak tumor temperatures of 47.4°C and 49.7°C cause a 50% tumor response and a 100% tumor response, respectively. The authors concluded that thermotherapy causes tumor necrosis and can be performed safely with minimal morbidity, with the degree of tumor necrosis as a function of the thermal dose. Future studies need to evaluate the impact of high doses of thermotherapy on margin status and complete tumor ablation.

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Gardner et al. (2002) published on the results of a pilot study of focused microwave phased array thermotherapy in the treatment of 10 patients with primary breast carcinomas beneath the skin ranging from 1 to 8 cm in maximum clinical size. After focused microwave phased array treatment with a mean peak tumor temperature was 44.9 °C, all patients underwent mastectomy. Five to eighteen days after MWA the participants' tumors were measured via ultrasound to reveal a significant reduction in tumor size (mean 41%) in 6 (60%) of 10 patients, and a significant tumor response based on necrosis and apoptosis measurements in 2 (20%) of 10 patients. The authors concluded that MWA can be safely administered with sufficient skin cooling techniques and that larger RCTs focusing on increased tumor thermal dose efficacy studies should be investigated.

National and Specialty Organizations

The American Society of Breast Surgeons (ASBS) (2018) published a consensus guideline on transcutaneous and percutaneous methods of treating breast cancer. The guidelines indicated that these treatments are investigational, are not currently FDA approved, and are therefore not recommended except in clinical trials.

The National Comprehensive Cancer Network (NCCN) (v 4.2026) Breast Cancer Clinical Practice Guidelines in Oncology state the following regarding the use of ablative treatment for oligometastatic stage IV breast cancer: "Routine utilization of locoregional treatment of the primary tumor and ablative treatment for metastatic sites have not been demonstrated to improve survival outcomes in prospective trials, however, may reduce the risk of local progression and palliate symptoms."

The National Cancer Institute (NCI) (2025) does not mention microwave thermotherapy as a treatment option for breast cancer in the NCI Breast Cancer Treatment PDQ Health Professional Version.

CODING & BILLING INFORMATION

CPT (Current Procedural Terminology)

Code	Description
19499	Unlisted procedure, breast [when specified as focused microwave thermotherapy for breast cancer]

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APPROVAL HISTORY

08/12/2026	Policy reviewed. No changes to coverage criteria.
08/13/2025	Policy reviewed. No changes to coverage criteria. Updated Summary of Medical Evidence and References.
08/14/2024	Policy reviewed and updated. No changes in coverage criteria. Updated references. IRO reviewed by a practicing physician board certified in Hematology/Oncology July 2024.
08/09/2023	Policy reviewed and updated. No changes in coverage criteria. Updated references.
08/10/2022	Policy reviewed and updated. No changes in coverage criteria. Updated references.
08/11/2021	Policy reviewed and updated. No changes in coverage criteria. Updated references.
09/16/2020	New Policy. IRO Peer Review by practicing physician board-certified in Oncology/Hematology September 2020.

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