MEDICAL POLICY

POLICY TITLE	**RADIOFREQUENCY ABLATION OF PRIMARY OR METASTATIC LIVER TUMORS**
POLICY NUMBER	**MP 1.055**

CLINICAL BENEFIT	☐ MINIMIZE SAFETY RISK OR CONCERN. ☐ MINIMIZE HARMFUL OR INEFFECTIVE INTERVENTIONS. ☐ ASSURE APPROPRIATE LEVEL OF CARE. ☐ ASSURE APPROPRIATE DURATION OF SERVICE FOR INTERVENTIONS. ☒ ASSURE THAT RECOMMENDED MEDICAL PREREQUISITES HAVE BEEN MET. ☐ ASSURE APPROPRIATE SITE OF TREATMENT OR SERVICE.
Effective Date:	**3/1/2024**

I. POLICY

Radiofrequency ablation of primary, inoperable (e.g., due to location of lesion[s] and/or comorbid conditions), hepatocellular carcinoma may be considered **medically necessary** under the following conditions:

- As a primary treatment of hepatocellular carcinoma meeting the Milan criteria (a single tumor of less than or equal to 5 cm or up to 3 nodules less than 3 cm)
- As a bridge to transplant, where the intent is to prevent further tumor growth and to maintain an individual's candidacy for liver transplant.

Radiofrequency ablation as a primary treatment of inoperable hepatic metastases may be considered **medically necessary** under the following conditions:

- Metastases are of colorectal origin and meet the Milan criteria (a single tumor of less than or equal to 5 cm or up to 3 nodules less than 3 cm)
- Metastases are of neuroendocrine in origin and systemic therapy has failed to control symptoms.

Radiofrequency ablation of primary, inoperable, hepatocellular carcinoma is considered **investigational** under the following conditions:

- When there are more than 3 nodules or when not all sites of tumor foci can be adequately treated.
- When used to downstage (downsize) hepatocellular carcinoma in individuals being considered for liver transplant.

Radiofrequency ablation of primary, operable hepatocellular carcinoma is **investigational**.

Radiofrequency ablation for hepatic metastasis is considered **investigational** for:

- Hepatic metastases from colorectal cancer or neuroendocrine tumors that do not meet the criteria above; and
- For hepatic metastases from other types of cancer except colorectal cancer or neuroendocrine tumors.

There is insufficient evidence to support a general conclusion concerning the health outcomes or benefits associated with this procedure for the above indications.

The National Comprehensive Cancer Network (NCCN) is a nonprofit alliance of cancer centers throughout the United States. NCCN develops the Clinical Practice Guidelines in Oncology which are recommendations aimed to help health care professionals diagnose, treat, and manage patients with cancer. Guidelines evolve continuously as new treatments and diagnostics emerge and may be used by Capital Blue Cross when determining medical necessity according to this policy.

Cross-references:

MP 1.088 Cryosurgical Ablation of Miscellaneous Solid Tumors other than Liver, Prostate, or Dermatologic Tumors
MP 1.121 Cryosurgical Ablation of Primary or Metastatic Liver Tumors
MP 1.084 Radiofrequency Ablation of Miscellaneous Solid Tumors, Excluding Liver Tumors

II. PRODUCT VARIATIONS

This policy is only applicable to certain programs and products administered by Capital Blue Cross and subject to benefit variations as discussed in Section VI. Please see additional information below.

FEP PPO - Refer to FEP Medical Policy Manual. The FEP Medical Policy manual can be found at: https://www.fepblue.org/benefit-plans/medical-policies-and-utilization-management-guidelines/medical-policies

III. DESCRIPTION/BACKGROUND

Radiofrequency ablation (RFA) is a procedure in which a probe is inserted into the center of a tumor and heated locally by a high frequency, alternating current that flows from electrodes. The local heat treats the tissue adjacent to the probe, resulting in a 3- to 5-cm sphere of dead tissue. The cells killed by RFA are not removed but are gradually replaced by fibrosis and scar tissue. If there is local recurrence, it occurs at the edge and, in some cases, may be retreated. RFA may be performed percutaneously, laparoscopically, or as an open procedure.

Hepatic and Neuroendocrine Tumors

Hepatic tumors can arise as primary liver cancer (hepatocellular cancer) or by metastasis to the liver from other tissues. Local therapy for hepatic metastasis may be indicated when there is no

extrahepatic disease, which rarely occurs for patients with primary cancers other than colorectal carcinoma or certain neuroendocrine malignancies.

Neuroendocrine tumors are tumors of cells that possess secretory granules and originate from the neuroectoderm. Neuroendocrine cells have roles both in the endocrine system and in the nervous system. They produce and secrete a variety of regulatory hormones, or neuropeptides, which include neurotransmitters and growth factors. Overproduction of the specific neuropeptides produced by the cancerous cells causes various symptoms, depending on the hormone produced. They are rare, with an incidence of 2 to 4 per 100000 per year.

Treatment

Treatment options for hepatocellular carcinoma (HCC) range from potentially curative treatments, such as resection or liver transplantation, to nonsurgical options, which include ablative therapies (radiofrequency ablation [RFA], cryoablation, microwave ablation, percutaneous ethanol, or acetic acid injection), transarterial embolization, radiation therapy, and systemic therapy. Choice of therapy depends on the severity of the underlying liver disease, size, and distribution of tumors, vascular supply, and patient overall health. Treatment of liver metastases is undertaken to prolong survival and to reduce endocrine-related symptoms and hepatic mass-related symptoms.

At present, surgical resection with adequate margins or liver transplantation constitutes the only treatments available with demonstrated curative potential for hepatic tumors. However, most hepatic tumors are unresectable at diagnosis, due either to their anatomic location, size, number of lesions, or underlying liver reserve. Patients may also have comorbid conditions and do not qualify for surgical resection. Milan criteria can aid in determining eligibility for transplantation. Milan criteria include single tumor <5 cm, no more than 3 foci with each not exceeding 3 cm, absence of angioinvasion, and absence of extrahepatic involvement. Patients with resectable HCC are also potentially eligible for a liver transplant. However, the availability of liver donors limits its use.

Radiofrequency Ablation

RFA is a procedure in which a needle electrode is inserted into a tumor either percutaneously, through a laparoscope, or through an open incision. The electrode is heated by a high-frequency, alternating current, which destroys tissue in a 3 to 5 cm sphere of the electrode. RFA has been investigated as a treatment for unresectable hepatic tumors, both as a primary intervention and as a bridge to liver transplant. In the latter setting, RFA is being tested to determine whether it can reduce the incidence of tumor progression in patients awaiting transplantation and thus maintain patients' candidacy for liver ablation, transhepatic arterial chemoembolization, microwave coagulation, percutaneous ethanol injection, and radioembolization (yttrium-90 microspheres). Hepatic resection, liver transplantation (in carefully selected individuals), and radiofrequency ablation have a 5-year survival of >50% and are considered curative.

The National Comprehensive Cancer Network (NCCN)

The NCCN clinical practice guidelines for hepatocellular carcinoma (V1.2023) states the following with Category 2A recommendations in the Principles of Locoregional Therapy-Ablation section:

- Locoregional therapy should be considered in patients who are not candidates for surgical curative treatments, or as a part of a strategy to bridge patients for other curative therapies.
- All tumors should be amenable to ablation such that the tumor and, in the case of thermal ablation, a margin of normal tissue is treated. A margin is not expected following percutaneous ethanol injection.
- Tumors should be in a location accessible for percutaneous/laparoscopic/open approaches for ablation.
- Caution should be exercised when ablating lesions near major vessels, major bile ducts, diaphragm and other intra-abdominal organs.
- Ablation alone may be curative in treating tumors less than or equal to 3 cm. In well-selected patients with small properly located tumors, ablation should be considered as definitive treatment in the context of a multidisciplinary review. Lesions 3 to 5 cm may be treated to prolong survival using arterially directed therapies, or with combination of an arterially directed therapy and ablation as long as tumor location is accessible for ablation. Unresectable/inoperable lesions greater than 5 cm should be considered for treatment using arterially directed therapy, systemic therapy, or EBRT.

Tumor Ablation Resection is the standard approach for the local treatment of resectable metastatic colon cancer. However, patients with liver or lung oligometastases can also be considered for tumor ablation therapy, particularly in cases that may not be optimal for resection. Ablative techniques include radiofrequency ablation (RFA, microwave ablation (MWA), cryoablation, and electro-coagulation (irreversible electroporation). Per the NCCN, there is extensive evidence on the use of RFA as a reasonable treatment option for non-surgical candidates and for recurrent disease after hepatectomy with small liver metastases that can be treated with clear margins. Ablative techniques may be considered alone or in conjunction with resection. All original sites of disease need to be amenable to ablation or resection.

IV. RATIONALE

Top

SUMMARY OF EVIDENCE

Primary, Operable Hepatocellular Carcinoma

For individuals who have primary, operable hepatocellular carcinoma (HCC) who receive RFA, the evidence includes randomized controlled trials (RCTs), meta-analyses RCTs and retrospective observational studies, and additional observational studies. Relevant outcomes are overall survival (OS), disease-specific survival, change in disease status, and morbid events. The majority of data found that patients undergoing surgical resection experienced longer survival outcomes and lower recurrence rates than patients receiving RFA, though complication rates were higher with surgical resection. Results from observational studies have

suggested that RFA alone or RFA plus PEI could be as effective as a resection for small HCC tumors as OS and DFS rates were not significantly different between RFA and surgical resection. Although the exact size cutoff has not been established, current National Comprehensive Cancer Network guidelines suggest use of ablation as a treatment option when tumors are 3 cm or smaller. Some studies found that OS was similar in patients receiving RFA or resection when tumor size was 3 cm or less; however, OS was significantly longer in patients undergoing resection if the tumor size was between 3.1 cm and 5 cm. Further study in a multicenter RCT would permit greater certainty whether RFA, with or without other ablative or arterial directed therapies, is as effective as surgical resection in treating HCC tumors 3 cm or smaller. The evidence is insufficient to determine the effects of the technology RFA on health outcomes.

Inoperable Hepatocellular Carcinoma

For individuals who have inoperable HCC who receive RFA, the evidence includes randomized trials and several systematic reviews and meta-analyses. Relevant outcomes are OS, disease-specific survival, change in disease status, and morbid events. Surgical resection of HCC, compared with RFA, has shown superior survival, supporting the use of RFA for unresectable HCC and for those who are not candidates for surgical resection. Response rates have demonstrated that, in patients with small foci of HCC (less than or equal to 3 lesions), RFA appears to be better than ethanol injection in achieving complete ablation and preventing local recurrence. Three-year survival rates of 80% have been reported. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Inoperable Hepatocellular Carcinoma Awaiting Liver Transplant

For individuals who have inoperable HCC awaiting liver transplant who receive RFA, the evidence includes small case series. Relevant outcomes are OS, disease-specific survival, and change in disease status. A number of approaches are used in this patient population, including RFA and other locoregional therapies, particularly transarterial chemoembolization. Locoregional therapy has reduced the dropout rate of patients with HCC awaiting a liver transplant. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Inoperable Hepatic Metastases of Colorectal Origin

For individuals who have inoperable hepatic metastases of colorectal origin who receive RFA, the evidence includes an RCT, systematic reviews and meta-analyses, prospective cohort series, and retrospective case series. Relevant outcomes are OS, disease-specific survival, symptoms, change in disease status, morbid events, quality of life, and treatment-related morbidity. There are no RCTs comparing RFA with alternative treatments for patients with unresectable colorectal liver metastases. However, an RCT assessing RFA combined with chemotherapy found improved survival at 8 years compared with chemotherapy alone. In addition, prospective studies have demonstrated that OS following RFA is at least equivalent to and likely better than that for currently accepted systemic chemotherapy in well-matched patients with unresectable hepatic metastatic colorectal cancer who do not have extrahepatic

disease. Results from a number of uncontrolled case series also have suggested RFA of hepatic colorectal cancer metastases produces long-term survival that is at minimum equivalent to but likely superior to historical outcomes achieved with systemic chemotherapy. Evidence from a comparative study has indicated RFA has fewer deleterious effects on quality of life than chemotherapy and that RFA patients recover quality of life significantly faster than chemotherapy recipients. It should be noted that patients treated with RFA in different series might have had better prognoses than those who had chemotherapy, suggesting patient selection bias might at least partially explain the better outcomes observed following RFA. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Inoperable Hepatic Metastases of Neuroendocrine Origin

For individuals who have inoperable hepatic metastases of neuroendocrine origin who receive RFA, the evidence includes case series and a systematic review of case series. Relevant outcomes are OS, disease-specific survival, symptoms, change in disease status, morbid events, quality of life, and treatment-related morbidity. Most reports of RFA treatment for neuroendocrine liver metastases have assessed small numbers of patients or subsets of patients in reports of multiple ablative methods or very small subsets of larger case series of patients with various diagnoses. The available evidence has indicated that durable tumor and symptom control of neuroendocrine liver metastases can be achieved using RFA in individuals whose symptoms are not controlled by systemic therapy or who are ineligible for resection. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Hepatic Metastases Not of Colorectal or Neuroendocrine Origin

For individuals who have hepatic metastases, not of colorectal or neuroendocrine origin who receive RFA, the evidence includes small nonrandomized comparative studies and small case series. Relevant outcomes are OS, disease-specific survival, symptoms, change in disease status, morbid events, quality of life, and treatment-related morbidity. Similar to primary HCC, resection appears to have the most favorable outcomes. For patients who are ineligible for resection, RFA may provide a survival benefit. However, the evidence is limited by study designs with a high-risk of bias and small sample sizes. The evidence is insufficient to determine the effects of the technology RFA on health outcomes.

V. DEFINITIONS

Top

DENATURATION refers to a change in conditions (temperature, addition of a substance) that causes irreversible change in a protein's structure, usually resulting in precipitation of the protein.

EXTRAHEPATIC refers to outside or unrelated to the liver.

HEPATIC pertains to the liver.

HYPERTHERMIA refers to the use of microwave or radiofrequency energy to increase body temperature.

METASTASIS is the movement of body cells (esp. cancer cells) from one part of the body to another.

NEUROENDOCRINE MALIGNANCIES refer to a diverse group of tumors, such as carcinoid, islet cell tumors, neuroblastoma, and small-cell carcinomas of the lung.

PERCUTANEOUS refers to that which is passed or effected through the skin.

VI. BENEFIT VARIATIONS

Top

The existence of this medical policy does not mean that this service is a covered benefit under the member's health benefit plan. Benefit determinations should be based in all cases on the applicable health benefit plan language. Medical policies do not constitute a description of benefits. A member's health benefit plan governs which services are covered, which are excluded, which are subject to benefit limits, and which require preauthorization. There are different benefit plan designs in each product administered by Capital Blue Cross. Members and providers should consult the member's health benefit plan for information or contact Capital Blue Cross for benefit information.

VII. DISCLAIMER

Top

Capital Blue Cross's medical policies are developed to assist in administering a member's benefits, do not constitute medical advice and are subject to change. Treating providers are solely responsible for medical advice and treatment of members. Members should discuss any medical policy related to their coverage or condition with their provider and consult their benefit information to determine if the service is covered. If there is a discrepancy between this medical policy and a member's benefit information, the benefit information will govern. If a provider or a member has a question concerning the application of this medical policy to a specific member's plan of benefits, please contact Capital Blue Cross' Provider Services or Member Services. Capital Blue Cross considers the information contained in this medical policy to be proprietary and it may only be disseminated as permitted by law.

VIII. CODING INFORMATION

Top

Note: This list of codes may not be all-inclusive, and codes are subject to change at any time. The identification of a code in this section does not denote coverage as coverage is determined by the terms of member benefit information. In addition, not all covered services are eligible for separate reimbursement.

Covered when medically necessary:

Procedure Codes								
47370	47380	47382						

ICD-10-CM Diagnosis Code	Description
C22.0	Liver cell carcinoma
C22.9	Malignant neoplasm of liver, not specified as primary or secondary
C78.7	Secondary malignant neoplasm of liver and intrahepatic bile duct
C7B.02	Secondary carcinoid tumors of liver

IX. REFERENCES

Top

1. *Yu C, Wu S, Zhao J, et al. Evaluation of efficacy, safety, and treatment-related outcomes of percutaneous radiofrequency ablation versus partial hepatectomy for small primary liver cancer meeting the Milan criteria: A systematic review and meta-analysis of randomized controlled trials. Clin Res Hepatol Gastroenterol. Jan 17, 2020. PMID 31959566*
2. *Li JK, Liu XH, Cui H, et al. Radiofrequency ablation vs. surgical resection for resectable hepatocellular carcinoma: A systematic review and meta-analysis. Mol Clin Oncol. Jan 2020; 12(1): 15-22. PMID 31814972*
3. *Zhu GQ, Sun M, Liao WT, et al. Comparative efficacy and safety between ablative therapies or surgery for small hepatocellular carcinoma: a network meta-analysis. Expert Rev Gastroenterol Hepatol. Sep 2018; 12(9): 935-945. PMID 30025486*
4. *Jia JB, Zhang D, Ludwig JM, et al. Radiofrequency ablation versus resection for hepatocellular carcinoma in patients with Child-Pugh A liver cirrhosis: a meta-analysis. Clin Radiol. Dec 2017; 72(12): 1066-1075. PMID 28851491*
5. *Feng Q, Chi Y, Liu Y, et al. Efficacy and safety of percutaneous radiofrequency ablation versus surgical resection for small hepatocellular carcinoma: a meta-analysis of 23 studies. J Cancer Res Clin Oncol. Jan 2015; 141(1): 1-9. PMID 24889505*
6. *Ng KKC, Chok KSH, Chan ACY, et al. Randomized clinical trial of hepatic resection versus radiofrequency ablation for early-stage hepatocellular carcinoma. Br J Surg. Dec 2017; 104(13): 1775-1784. PMID 29091283*
7. *Liu H, Wang ZG, Fu SY, et al. Randomized clinical trial of chemoembolization plus radiofrequency ablation versus partial hepatectomy for hepatocellular carcinoma within the Milan criteria. Br J Surg. Mar 2016; 103(4): 348-56. PMID 26780107*
8. *Chen S, Peng Z, Lin M, et al. Combined percutaneous radiofrequency ablation and ethanol injection versus hepatic resection for 2.1-5.0 cm solitary hepatocellular carcinoma: a retrospective comparative multicentre study. Eur Radiol. Sep 2018; 28(9): 3651-3660. PMID 29600474*
9. *Zhao WJ, Zhu GQ, Wu YM, et al. Comparative Effectiveness of Radiofrequency Ablation, Surgical Resection and Transplantation for Early Hepatocellular Carcinoma by Cancer Risk Groups: Results of Propensity Score-Weighted Analysis. Onco Targets Ther. 2019; 12: 10389-10400. PMID 31819521*

10. *Lee HJ, Kim JW, Hur YH, et al. Combined Therapy of Transcatheter Arterial Chemoembolization and Radiofrequency Ablation versus Surgical Resection for Single 2-3 cm Hepatocellular Carcinoma: A Propensity-Score Matching Analysis. J Vasc Interv Radiol. Sep 2017; 28(9): 1240-1247.e3. PMID 28688816*
11. *Cucchetti A, Mazzaferro V, Pinna AD, et al. Average treatment effect of hepatic resection versus locoregional therapies for hepatocellular carcinoma. Br J Surg. Nov 2017; 104(12): 1704-1712. PMID 28745399*
12. *Lee SH, Jin YJ, Lee JW. Survival benefit of radiofrequency ablation for solitary (3-5 cm) hepatocellular carcinoma: An analysis for nationwide cancer registry. Medicine (Baltimore). Nov 2017; 96(44): e8486. PMID 29095307*
13. *Min JH, Kang TW, Cha DI, et al. Radiofrequency ablation versus surgical resection for multiple HCCs meeting the Milan criteria: propensity score analyses of 10-year therapeutic outcomes. Clin Radiol. Jul 2018; 73(7): 676.e15-676.e24. PMID 29709236*
14. *Lin Y, Pan XB. Differences in Survival Between First-Line Radiofrequency Ablation versus Surgery for Early-Stage Hepatocellular Carcinoma: A Population Study Using the Surveillance, Epidemiology, and End Results Database. Med Sci Monit. May 28, 2020; 26: e921782. PMID 32461542*
15. *Zheng L, Zhang CH, Lin JY, et al. Comparative Effectiveness of Radiofrequency Ablation vs. Surgical Resection for Patients With Solitary Hepatocellular Carcinoma Smaller Than 5 cm. Front Oncol. 2020; 10: 399. PMID 32296638*
16. *Chu HH, Kim JH, Kim PN, et al. Surgical resection versus radiofrequency ablation very early-stage HCC (2 cm Single HCC): A propensity score analysis. Liver Int. Dec 2019; 39(12): 2397-2407. PMID 31549771*
17. *Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Radiofrequency ablation of unresectable hepatic tumors. TEC Assessments. 2003;Volume 18:Tab 13.*
18. *Majumdar A, Roccarina D, Thorburn D, et al. Management of people with early- or very early-stage hepatocellular carcinoma: an attempted network meta-analysis. Cochrane Database Syst Rev. Mar 28, 2017; 3: CD011650. PMID 28351116*
19. *Shen A, Zhang H, Tang C, et al. Systematic review of radiofrequency ablation versus percutaneous ethanol injection for small hepatocellular carcinoma up to 3 cm. J Gastroenterol Hepatol. May 2013; 28(5): 793-800. PMID 23432154*
20. *Tiong L, Maddern GJ. Systematic review and meta-analysis of survival and disease recurrence after radiofrequency ablation for hepatocellular carcinoma. Br J Surg. Sep 2011; 98(9): 1210-24. PMID 21766289*
21. *Huang YZ, Zhou SC, Zhou H, et al. Radiofrequency ablation versus cryosurgery ablation for hepatocellular carcinoma: a meta-analysis. Hepatogastroenterology. Jul-Aug 2013; 60(125): 1131-5. PMID 23321123*
22. *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. May 2018; 3(5): 317-325. PMID 29503247*
23. *Giorgio A, Merola MG, Montesarchio L, et al. Sorafenib Combined with Radio-frequency Ablation Compared with Sorafenib Alone in Treatment of Hepatocellular Carcinoma*

Invading Portal Vein: A Western Randomized Controlled Trial. Anticancer Res. Nov 2016; 36(11): 6179-6183. PMID 27793949

24. *Organ Procurement and Transplant Network. Policy 9: Allocation of Livers and Liver-Intestines. 2018*
25. *Mazzaferro V, Regalia E, Doci R, et al. Liver transplantation for the treatment of small hepatocellular carcinomas in patients with cirrhosis. N Engl J Med. Mar 14, 1996; 334(11): 693-9. PMID 8594428*
26. *Pomfret EA, Washburn K, Wald C, et al. Report of a national conference on liver allocation in patients with hepatocellular carcinoma in the United States. Liver Transpl. Mar 2010; 16(3): 262-78. PMID 20209641*
27. *Lee MW, Raman SS, Asvadi NH, et al. Radiofrequency ablation of hepatocellular carcinoma as bridge therapy to liver transplantation: A 10-year intention-to-treat analysis. Hepatology. Jun 2017; 65(6): 1979-1990. PMID 28170115*
28. *Mazzaferro V, Battiston C, Perrone S, et al. Radiofrequency ablation of small hepatocellular carcinoma in cirrhotic patients awaiting liver transplantation: a prospective study. Ann Surg. Nov 2004; 240(5): 900-9. PMID 15492574*
29. *Lu DS, Yu NC, Raman SS, et al. Percutaneous radiofrequency ablation of hepatocellular carcinoma as a bridge to liver transplantation. Hepatology. May 2005; 41(5): 1130-7. PMID 15841454*
30. *Porrett PM, Peterman H, Rosen M, et al. Lack of benefit of pre-transplant locoregional hepatic therapy for hepatocellular cancer in the current MELD era. Liver Transpl. Apr 2006; 12(4): 665-73. PMID 16482577*
31. *Yao FY, Kerlan RK, Hirose R, et al. Excellent outcome following down-staging of hepatocellular carcinoma prior to liver transplantation: an intention-to-treat analysis. Hepatology. Sep 2008; 48(3): 819-27. PMID 18688876*
32. *Yao FY, Hirose R, LaBerge JM, et al. A prospective study on downstaging of hepatocellular carcinoma prior to liver transplantation. Liver Transpl. Dec 2005; 11(12): 1505-14. PMID 16315294*
33. *Sauer P, Kraus TW, Schemmer P, et al. Liver transplantation for hepatocellular carcinoma: is there evidence for expanding the selection criteria? Transplantation. Sep 27, 2005; 80(1 Suppl): S105-8. PMID 16286885*
34. *Fernandez JA, Robles R, Marin C, et al. Can we expand the indications for liver transplantation among hepatocellular carcinoma patients with increased tumor size? Transplant Proc. Aug 2003; 35(5): 1818-20. PMID 12962807*
35. *Yao FY, Ferrell L, Bass NM, et al. Liver transplantation for hepatocellular carcinoma: comparison of the proposed UCSF criteria with the Milan criteria and the Pittsburgh modified TNM criteria. Liver Transpl. Sep 2002; 8(9): 765-74. PMID 12200775*
36. *Yao FY, Ferrell L, Bass NM, et al. Liver transplantation for hepatocellular carcinoma: expansion of the tumor size limits does not adversely impact survival. Hepatology. Jun 2001; 33(6): 1394-403. PMID 11391528*
37. *Merli M, Nicolini G, Gentili F, et al. Predictive factors of outcome after liver transplantation in patients with cirrhosis and hepatocellular carcinoma. Transplant Proc. Jul-Aug 2005; 37(6): 2535-40. PMID 16182736*

38. *Kemeny N. Management of liver metastases from colorectal cancer. Oncology (Williston Park, N Y). Sep 2006; 20(10): 1161-76, 1179; discussion 1179-80, 1185-6. PMID 17024869*
39. *McKay A, Dixon E, Taylor M. Current role of radiofrequency ablation for the treatment of colorectal liver metastases. Br J Surg. Oct 2006; 93(10): 1192-201. PMID 16983740*
40. *Lencioni R, Crocetti L, Cioni D, et al. Percutaneous radiofrequency ablation of hepatic colorectal metastases: technique, indications, results, and new promises. Invest Radiol. Nov 2004; 39(11): 689-97. PMID 15486530*
41. *Meijerink MR, Puijk RS, van Tilborg AAJM, et al. Radiofrequency and Microwave Ablation Compared to Systemic Chemotherapy and to Partial Hepatectomy in the Treatment of Colorectal Liver Metastases: A Systematic Review and Meta-Analysis. Cardiovasc Intervent Radiol. Aug 2018; 41(8): 1189-1204. PMID 29666906*
42. *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*
43. *Weng M, Zhang Y, Zhou D, et al. Radiofrequency ablation versus resection for colorectal cancer liver metastases: a meta-analysis. PLoS ONE. 2012; 7(9): e45493. PMID 23029051*
44. *Pathak S, Jones R, Tang JM, et al. Ablative therapies for colorectal liver metastases: a systematic review. Colorectal Dis. Sep 2011; 13(9): e252-65. PMID 21689362*
45. *Guenette JP, Dupuy DE. Radiofrequency ablation of colorectal hepatic metastases. J Surg Oncol. Dec 15, 2010; 102(8): 978-87. PMID 21166002*
46. *Ruers T, Punt C, Van Coevorden F, et al. Radiofrequency ablation combined with systemic treatment versus systemic treatment alone in patients with non-resectable colorectal liver metastases: a randomized EORTC Intergroup phase II study (EORTC 40004). Ann Oncol. Oct 2012; 23(10): 2619-26. PMID 22431703*
47. *Ruers T, Van Coevorden F, Punt CJ, et al. Local Treatment of Unresectable Colorectal Liver Metastases: Results of a Randomized Phase II Trial. J Natl Cancer Inst. Sep 01, 2017; 109(9). PMID 28376151*
48. *Hof J, Wertenbroek MW, Peeters PM, et al. Outcomes after resection and/or radiofrequency ablation for recurrence after treatment of colorectal liver metastases. Br J Surg. Jul 2016; 103(8): 1055-62. PMID 27193207*
49. *Abdalla EK, Vauthey JN, Ellis LM, et al. Recurrence and outcomes following hepatic resection, radiofrequency ablation, and combined resection/ablation for colorectal liver metastases. Ann Surg. Jun 2004; 239(6): 818-25; discussion 825-7. PMID 15166961*
50. *Ruers TJ, Joosten JJ, Wiering B, et al. Comparison between local ablative therapy and chemotherapy for non-resectable colorectal liver metastases: a prospective study. Ann Surg Oncol. Mar 2007; 14(3): 1161-9. PMID 17195903*
51. *Van Tilborg AA, Meijerink MR, Sietses C, et al. Long-term results of radiofrequency ablation for unresectable colorectal liver metastases: a potentially curative intervention. Br J Radiol. Jun 2011; 84(1002): 556-65. PMID 21159807*

52. *Mohan H, Nicholson P, Winter DC, et al. Radiofrequency ablation for neuroendocrine liver metastases: a systematic review. J Vasc Interv Radiol. Jul 2015; 26(7): 935-942.e1. PMID 25840836*
53. *Fairweather M, Swanson R, Wang J, et al. Management of Neuroendocrine Tumor Liver Metastases: Long-Term Outcomes and Prognostic Factors from a Large Prospective Database. Ann Surg Oncol. Aug 2017; 24(8): 2319-2325. PMID 28303430*
54. *Berber E, Siperstein A. Local recurrence after laparoscopic radiofrequency ablation of liver tumors: an analysis of 1032 tumors. Ann Surg Oncol. Oct 2008; 15(10): 2757-64. PMID 18618182*
55. *Mazzaglia PJ, Berber E, Milas M, et al. Laparoscopic radiofrequency ablation of neuroendocrine liver metastases: a 10-year experience evaluating predictors of survival. Surgery. Jul 2007; 142(1): 10-9. PMID 17629995*
56. *Veltri A, Gazzera C, Barrera M, et al. Radiofrequency thermal ablation (RFA) of hepatic metastases (METS) from breast cancer (BC): an adjunctive tool in the multimodal treatment of advanced disease. Radiol Med. May 2014; 119(5): 327-33. PMID 24297589*
57. *Meloni MF, Andreano A, Laeseke PF, et al. Breast cancer liver metastases: US-guided percutaneous radiofrequency ablation--intermediate and long-term survival rates. Radiology. Dec 2009; 253(3): 861-9. PMID 19709994*
58. *Jakobs TF, Hoffmann RT, Schrader A, et al. CT-guided radiofrequency ablation in patients with hepatic metastases from breast cancer. Cardiovasc Intervent Radiol. Jan 2009; 32(1): 38-46. PMID 18575933*
59. *Li J, Zhang K, Gao Y, et al. Evaluation of hepatectomy and palliative local treatments for gastric cancer patients with liver metastases: a propensity score matching analysis. Oncotarget. Sep 22, 2017; 8(37): 61861-61875. PMID 28977910*
60. *Li W, Bai Y, Wu M, et al. Combined CT-guided radiofrequency ablation with systemic chemotherapy improves the survival for nasopharyngeal carcinoma with oligometastasis in liver: Propensity score matching analysis. Oncotarget. Aug 08, 2017; 8(32): 52132-52141. PMID 28881719*
61. *Liu B, Huang G, Jiang C, et al. Ultrasound-Guided Percutaneous Radiofrequency Ablation of Liver Metastasis From Ovarian Cancer: A Single-Center Initial Experience. Int J Gynecol Cancer. Jul 2017; 27(6): 1261-1267. PMID 28640176*
62. *Hua YQ, Wang P, Zhu XY, et al. Radiofrequency ablation for hepatic oligometastatic pancreatic cancer: An analysis of safety and efficacy. Pancreatology. Nov 2017; 17(6): 967-973. PMID 29129384*
63. *Jones RL, McCall J, Adam A, et al. Radiofrequency ablation is a feasible therapeutic option in the multi-modality management of sarcoma. Eur J Surg Oncol. May 2010; 36(5): 477-82. PMID 20060679*
64. *Pawlik TM, Vauthey JN, Abdalla EK, et al. Results of a single-center experience with resection and ablation for sarcoma metastatic to the liver. Arch Surg. Jun 2006; 141(6): 537-43; discussion 543-4. PMID 16785353*
65. *Gervais DA, Goldberg SN, Brown DB, et al. Society of Interventional Radiology position statement on percutaneous radiofrequency ablation for the treatment of liver tumors. J Vasc Interv Radiol. Jul 2009; 20(7 Suppl): S342-7. PMID 19560023*

66. *National Comprehensive Cancer Network. Hepatocellular Carcinoma. Version 1.2023. Updated March 10, 2023.*
67. *National Comprehensive Cancer Network. Colon Cancer. Version 2.2022. Updated April 25, 2023*
68. *National Comprehensive Cancer Network. Neuroendocrine and Adrenal Tumors. Version 2.2022. Updated December 21, 2022*
69. *Izzo F, Granata V, Grassi R, et al. Radiofrequency Ablation and Microwave Ablation in Liver Tumors: An Update. Oncologist. 2019;24(10):e990-e1005. doi:10.1634/theoncologist.2018-0337*
70. *Marrero, Jorge A MD1; Ahn, Joseph MD, FACG2; Reddy, Rajender K MD, FACG3 on behalf of the Practice Parameters Committee of the American College of Gastroenterology. ACG Clinical Guideline: The Diagnosis and Management of Focal Liver Lesions. American Journal of Gastroenterology: September 2014 - Volume 109 - Issue 9 - p 1328-1347doi: 10.1038/ajg.2014.213*
71. *Liu CY, Chen KF, Chen PJ. Treatment of Liver Cancer. Cold Spring Harb Perspect Med. 2015;5(9):a021535. Published 2015 Jul 17. doi:10.1101/cshperspect.a021535*
72. *Adult Primary Liver Cancer Treatment (PDQ) – Health Professional Version, National Cancer Institute, Updated January 20, 2023*
73. *Liver Cancer Treatment, National Cancer Institute, Updated January 20, 2023*
74. *Advances in Liver Cancer Research, National Cancer Institute, Updated September 12, 2022*
75. *Nieuwenhuizen S, Dijkstra M, Puijk RS, et al. Microwave Ablation, Radiofrequency Ablation, Irreversible Electroporation, and Stereotactic Ablative Body Radiotherapy for Intermediate Size (3-5 cm) Unresectable Colorectal Liver Metastases: a Systematic Review and Meta-analysis. Curr Oncol Rep. 2022;24(6):793-808. doi:10.1007/s11912-022-01248-6 PMID 35298796*
76. *Prater S, Zayas JO. Percutaneous Radiofrequency Ablation of Liver Tumors. [Updated 2023 May 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-*
77. *Blue Cross Blue Shield Association Medical Policy Reference Manual. 7.01.91, Radiofrequency Ablation of Primary or Metastatic Liver Tumors. August 2023.*

X. *POLICY HISTORY* *Top*

MP 1.055	**CAC 10/29/02**
	CAC 2/22/05
	CAC 3/28/06
	CAC 3/27/07
	CAC 11/27/07
	CAC 11/25/08
	CAC 9/29/09 Consensus Review
	CAC 4/26/11 Adopt BCBSA. Extracted information regarding cryosurgical ablation and created a separate policy titled Cryosurgical Ablation of Primary or metastatic

POLICY TITLE	RADIOFREQUENCY ABLATION OF PRIMARY OR METASTATIC LIVER TUMORS
POLICY NUMBER	MP 1.055

	Liver Tumors 1.121. Changed cryosurgical ablation policy statement from medically necessary to investigational. Treatment of Hepatocellular Cancer (HCC) coverage indication was modified to include those patients who cannot undergo a curative procedure and have no more than 3 nodules. Coverage also expanded to include use as a bridge to transplant and selective use in metastatic neuroendocrine tumors.
	CAC 6/26/12 Consensus. FEP variation changed to reference FEP Medical Policy Manual MP-7.01.91. No change to policy statements.
	7/24/13 Admin coding review complete
	CAC 9/24/13 Consensus. No change to policy statements. Added Rationale section. References updated. Guidelines moved out of Background/Description into Policy Guidelines section.
	CAC 11/25/14 Consensus. No change to policy statements. References and rationale updated. Codes reviewed, no changes
	CAC 11/24/15 Consensus review. No change to the policy statements. Reference and rationale update**.** Coding updated**.**
	CAC 11/29/16 Consensus review. No change to the policy statements. Reference and rationale update**.** Coding updated. Variation reformatting.
	CAC 1/30/18 Minor revision. Policy statements edited for clarity and specificity, including the distinction between operable and non-operable tumors and the Milan criteria. Statement added that RFA for operable HCC is considered investigational. Cross-Reference, Description/Background, Rationale and Reference sections updated. Coding Updated
	1/25/19 Consensus review. No change to the policy statements. Rationale condensed and References updated.
	2/12/20 Consensus review. No change to policy statements. Coding reviewed.
	1/4/21 Consensus review. No change to policy statement. Update to references and background.
	08/19/2022 Consensus review. No change to policy statement. Added NCCN statement to policy and NCCN recommendations to background. Added information about the Milan criteria. Updated references.
	08/07/2023 Consensus review. No change to policy statement. Updated background and references.
	1/19/2024 Administrative update. Clinical benefit added.

TOP