Clinical UM Guideline

Subject:	Mohs Micrographic Surgery		
Guideline #:	CG-SURG-90	**Publish Date:**	04/16/2025
Status:	Reviewed	**Last Review Date:**	02/20/2025

Description

This document addresses Mohs micrographic surgery (MMS), an outpatient procedure used in selective situations to treat malignant neoplasms of the skin. MMS consists of a precise tissue-sparing surgical technique to remove and process skin tissue in successive stages.

Clinical Indications

Medically Necessary:

Mohs micrographic surgery is considered **medically necessary** for the treatment of basal cell carcinoma, squamous cell carcinoma, melanoma in situ (Stage 0; including lentigo maligna), when the following criteria are met:

A. The lesion or tumor meets **any** of the following:
   1. **Any** of the following combinations of anatomic location and size:
      a. At least 20 mm on trunk and extremities (excluding pretibial region, hands, feet, and ankles); **or**
      b. At least 10 mm on scalp, neck and pretibial region; **or**
      c. Any size, on the face (central face, cheeks, forehead, eyelids, eyebrows, periorbital, nose, lips, chin, mandible, preauricular and postauricular skin/sulci, temple, ear), genitalia, hands or feet; **OR**
   2. **Any** of the following clinical presentations regardless of anatomic region:
      a. Deeply infiltrating lesion or difficulty estimating depth of the lesion; **or**
      b. Perineural invasion; **or**
      c. Poorly-defined borders; **or**
      d. Positive margins on recent excision; **or**
      e. Rapidly growing lesions in any anatomic area; **or**
      f. Recurrent lesion; **OR**
   3. Lesions or tumors with aggressive histologic features **or** at high-risk for recurrence; **OR**
   4. Tumors associated with a high-risk of metastasis arising in **any** of the following areas:
      a. Chronic fistulas, sinuses or ulcers (including sinuses of osteomyelitis); **or**
      b. Chronically inflamed or previously traumatized skin (such as epidermal atrophy or scars/burn scars, post-traumatic wounds, pressure sores/ulcers); **or**
      c. Site of prior radiation therapy; **OR**
   5. Individual has **either** of the following:

a. Genetic syndrome (such as basal cell nevus syndrome or xeroderma pigmentosum); **or**
b. Immunocompromised condition (such as hematologic malignancy, human immunodeficiency virus [HIV], organ transplantation, or pharmacologic immunosuppression).

Mohs micrographic surgery is considered **medically necessary** for the treatment of the following less common cutaneous tumors or lesions when the following criteria are met:

A. The lesion to be treated is known to be any of the following:
   1. Adenocystic carcinoma
   2. Adnexal carcinoma
   3. Apocrine/eccrine carcinoma
   4. Atypical fibroxanthoma
   5. Bowenoid papulosis
   6. Dermatofibrosarcoma protuberans
   7. Extramammary Paget disease
   8. Leiomyosarcoma
   9. Malignant fibrous histiocytoma/undifferentiated pleomorphic sarcoma
   10. Merkel cell carcinoma
   11. Microcystic adnexal carcinoma
   12. Mucinous carcinoma
   13. Sebaceous carcinoma

Not Medically Necessary:

Mohs micrographic surgery is considered **not medically necessary** when the criteria above have not been met.

Coding

The following codes for treatments and procedures applicable to this guideline are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement policy. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

When services may be Medically Necessary when criteria are met:

CPT	
17311-17312	Mohs micrographic technique, including removal of all gross tumor, surgical excision of tissue specimens, mapping, color coding of specimens, microscopic examination of specimens by the surgeon, and histopathologic preparation including routine stain(s) (eg, hematoxylin and eosin, toluidine blue), head, neck, hands, feet, genitalia, or any location with surgery directly involving muscle, cartilage, bone, tendon, major nerves, or vessels

	[first stage, up to 5 tissue blocks; each additional stage, up to 5 tissue blocks; includes codes 17311, 17312]
17313-17314	Mohs micrographic technique, including removal of all gross tumor, surgical excision of tissue specimens, mapping, color coding of specimens, microscopic examination of specimens by the surgeon, and histopathologic preparation including routine stain(s) (eg, hematoxylin and eosin, toluidine blue), of the trunk, arms, or legs [first stage, up to 5 tissue blocks; each additional stage, up to 5 tissue blocks; includes codes 17313, 17314]
17315	Mohs micrographic technique, including removal of all gross tumor, surgical excision of tissue specimens, mapping, color coding of specimens, microscopic examination of specimens by the surgeon, and histopathologic preparation including routine stain(s) (eg, hematoxylin and eosin, toluidine blue), each addition block after the first 5 tissue blocks, any stage

ICD-10 Diagnosis

C4A.0-C4A.9	Merkel cell carcinoma
C44.00-C44.99	Other and unspecified malignant neoplasm of skin
C49.0-C49.9	Malignant neoplasm of other connective and soft tissue
C51.0-C51.9	Malignant neoplasm of vulva
C60.0-C60.9	Malignant neoplasm of penis
C63.2	Malignant neoplasm of scrotum
C69.60-C69.62	Malignant neoplasm of orbit
C69.80-C69.82	Malignant neoplasm of overlapping sites of eye and adnexa
D03.0-D03.9	Melanoma in situ
D04.0-D04.9	Carcinoma in situ of skin [Bowen's disease]
D07.1	Carcinoma in situ of vulva
D07.4	Carcinoma in situ of penis
D07.61	Carcinoma in situ of scrotum
Q82.1	Xeroderma pigmentosum
Q87.89	Other specified congenital malformation syndromes, not elsewhere classified [specified as basal cell nevus syndrome]
Z21	Asymptomatic human immunodeficiency virus [HIV] infection status
Z85.6	Personal history of leukemia
Z85.71-Z85.79	Personal history of other malignant neoplasms of lymphoid, hematopoietic and related tissues
Z92.25	Personal history of immunosuppression therapy
Z94.0-Z94.9	Transplanted organ and tissue status

When services are Not Medically Necessary:

For the procedure and diagnosis codes listed above when criteria are not met or for all other diagnoses not listed; or when the code describes a procedure or situation designated in the Clinical Indications section as not medically necessary.

Discussion/General Information

According to the American Cancer Society (ACS,2022), skin cancer is the most common cancer diagnosis in the United States. The majority of skin cancers are basal cell carcinoma (BCC) or squamous cell carcinoma (SCC). Approximately 5.4 million basal and squamous cell skin cancers are diagnosed each year in the U.S., of which about 80% are BCC. The relative incidence of BCC and SCC may differ in other countries; for example, in Israel, the incidence of BCC decreased between 2006 and 2011, whereas the incidence of SCC increased during that time period (Sella, 2015). Mortality from BCC and SCC is uncommon and occurs primarily in individuals who are immunosuppressed or who have had organ transplants. Melanoma, on the other hand, accounts for about 1% of skin cancers, but is associated with most of the skin cancer deaths. The ACS estimates that, in 2022, about 99,780 new cases of melanoma will be diagnosed in the U.S. and about 7650 individuals will die due to melanoma.

Less common types of skin cancer include Merkel cell carcinoma (MCC) and dermatofibrosarcoma protuberans (DFSP). MCC is an aggressive and potentially fatal form of skin cancer, with approximately 1500 new cases diagnosed annually. DFSP is relatively uncommon and slow growing but is locally aggressive with a high recurrence rate.

Treatments for skin cancer include: 1) topical therapies such as creams, 2) locally destructive techniques such as cryotherapy, 3) curettage and electrodesiccation, 4) radiotherapy, 5) surgical excision with margin evaluation, and 6) Mohs micrographic surgery (MMS). Surgical excision, with or without lymph node management and/or adjuvant therapy, is standard treatment for melanoma whereas a wider variety of treatments can be used with BCC and SCC, depending on the clinical situation and patient preference (National Cancer Institute, 2018).

MMS is a technique for the removal of complex or ill-defined skin cancer with histologic examination of 100% of the surgical margins. This is in contrast to surgical excision in which surgical margins are mainly examined in random vertical sections. MMS is a combination of surgical excision and surgical pathology that requires a single physician to act in two integrated but separate and distinct capacities: surgeon and pathologist. The first stage of the procedure describes the histology of the specimens taken from the site, including the depth of invasion, pathological pattern, cell morphology, and, if present, perineural invasion or presence of scar tissue. For subsequent stages, the surgeon may note that the pattern and morphology of the tumor, if still seen, is as described for the first stage, or, if differences are found, note the changes. If residual tumor remains, additional stages of surgical excision are needed to remove the "roots" of the tumor. After the tumor is removed, reconstruction may be needed to repair the surgical defect. The procedure is generally performed on an outpatient basis under local anesthesia.

An advantages of the MMS procedure is that it allows the greatest amount of surrounding healthy tissue to remain intact, potentially reducing the size of the final surgical defect and resulting scar. Thus, it is of particular interest for treating sites such as the face, nose, scalp, neck, hands, and genital area due to its capacity to minimize disfigurement. In addition, the methodical manner in which all lateral and deep tissue margins are examined enables the surgeon to detect and remove any of the remaining skin cancer that may be present, which may reduce the likelihood of recurrence.

Risks associated with MMS can include pain or tenderness, bleeding, redness, swelling, and drainage at the affected site. As with all surgical procedures, there is a risk for infection, although this rarely occurs. Some adverse effects that may occur include numbness or weakness surrounding the surgical area, which can be temporary or permanent, scarring, and itching or acute pain at the surgical site.

In 2012, the American Academy of Dermatology/American College of Mohs Surgery/American Society for Dermatologic Surgery Association/ and the American Society of Mohs Surgery jointly published appropriate use criteria for MMS. The organizations developed 270 scenarios, each of which were rated by a panel of experts as appropriate, uncertain, or inappropriate for Mohs surgery. Consensus was reached among at least 12 of 17 panel members on all scenarios. A total of 200 (75%) of scenarios were considered appropriate, 24 (9%) uncertain and 45 (17%) inappropriate. Regarding melanoma in situ and lentigo maligna, treatment with MMS was considered appropriate if lesions occurred in Area H or Area M. In addition, MMS was considered appropriate for primary lesions in Area L, but not for locally recurrent lesions. (See Definitions section for explanation of Areas H, M and L).

Basal cell carcinoma and squamous cell carcinoma

The National Comprehensive Cancer Network (NCCN) BCC guideline (V.3. 2024) listed Mohs as an option as a primary treatment for local high-risk basal cell skin cancer and local low-risk basal cell skin cancer with positive margins after standard excision. The guideline also stated that peripheral and deep en face margin assessment (PDEMA) with permanent section analysis or intraoperative frozen section analysis is an alternative to Mohs. As part of the rationale for the guideline, the authors cited the randomized controlled trial (RCT) by van Loo and colleagues, described below, and two meta-analyses from the 1980s that showed a 5-year recurrence rate after MMS of 1.0% for primary BCC and 5.6% for recurrent BCC.

High-risk BCC was defined as:

- Trunk and extremities: ≥2 cm
- Cheeks, forehead, scalp, neck and pretibia: Any size
- Head, neck, hands, feet, pretibial and anogenital: Any size

The guideline listed the following as “other” high-risk features of BCC:

- Poorly defined borders

- Recurrent
- Immunosuppressed
- Site of prior radiation treatment
- Pathology: aggressive growth pattern, defined as having "(mixed) infiltrative, micronodule, morpheaform, basosquamous, sclerosing or carcinosarcomatous differentiation features in any portion of the tumor."
- Perineural involvement

Under Principles of PDEMA technique, the NCCN guidelines mention the Tubingen torte technique and the Tubingen muffin technique as PDEMA. Surmanowicz (2021) states that, after development of the torte technique, "the technique has evolved with several published permutations, culminating in 2006 with the so-called muffin technique" (MTMS, muffin technique micrographic surgery). The Surmanowicz article also states: "The MTMS has been successfully employed in Germany but remains relatively unknown in North America."

In 2022, Lacerda and colleagues published a systematic review of studies on BCC recurrence rates after various types of micrographic surgery. They identified 18 studies; of these, 6 used the Mohs technique, 8 used the Tubingen technique, 3 used the Munich technique and 1 used the Muffin technique. The overall BCC relapse rate was 2% (95% confidence interval [CI], 1 to 3%). The relapse rate by technique was 3% for Mohs (95% CI, 1 to 5%), 3% for the Munich technique (95% CI, 2 to 5%), 1% for the Tubingen technique (95% CI, 1-2%) and the single study on the Muffin technique had a 0% recurrence rate (95% CI, 0 to 6%). The authors concluded that relapse rates appear to be similar among the techniques but noted a lack of head-to-head trials.

The NCCN SCC guideline (V.1, 2024) recommended Mohs as an option for high-risk or very high-risk SCC and that PDEMA with permanent section analysis or intraoperative frozen section analysis is an alternative to Mohs. 'Very high-risk' was defined as at least 4 cm in any location. MMS was recommended for high-risk or very-high risk SCC with positive margins on standard excision. In addition, MMS is a recommended option for local, low-risk SCC. Evidence cited in the guideline includes a 1992 meta-analysis which found local recurrence rates of 3.1% for primary cutaneous SCC and 10% for recurrent cutaneous SCC, after up to 5 years of follow-up.

In the SCC guideline, the high-risk location and size criteria were the same as for BCC (listed above), except for an additional category of very high-risk for lesions at least 4 cm. The list of "other risk-factors" for high-risk and very high-risk SCC were somewhat different from the BCC list, as follows:

- Poorly defined borders
- Recurrent
- Immunosuppressed
- Site of prior radiation treatment or chronic inflammatory process
- Rapidly growing tumor
- Neurological symptoms
- Pathology: Poorly differentiated; acantholytic, adenosquamous, desmoplastic or metaplastic subtypes; ≥ 6 mm depth or invasion beyond subcutaneous fat; perineural, lymphatic or vascular involvement.

In 2018, the American Academy of Dermatology (AAD) published guidelines on the management of BCC (Kim, 2018a) and on management of cutaneous SCC (Kim, 2018b). MMS was recommended for high-risk BCC and high-risk cutaneous SCC. The AAD cited the NCCN's definitions of high-risk for these conditions.

Van Loo and colleagues (2014) published an RCT with long-term follow-up comparing MMS and surgical excision in individuals with BCC of the face. The study included 408 high-risk facial primary BCCs and 204 facial recurrent BCCs. Median follow-up was 79.2 months for primary BCC and 85.0 months for recurrent BCC. Disease recurrence, the primary study outcome, was significantly lower after MMS versus surgical excision in individuals with recurrent BCC, but not primary BCC. Among individuals with recurrent BCC, the 10-year cumulative probability of recurrence was 3.9% (95% CI, 1.2% to 11.7%) after MMS and 13.5% (95% CI, 7.6% to 23.2%) after surgical excision (p=0.023). In the primary BCC group, the 10-year cumulative probability of recurrence was 4.4% (95% CI, 1.9% to 9.8%) after MMS and 12.2% (95% CI, 7.3% to 19.8%) after surgical excision (p=0.10).

A Cochrane systematic review of the literature on interventions for BCC (Thomson, 2020) identified a total of 52 RCTs, only 1 of which compared MMS and surgical excision. They commented that there may be slightly fewer recurrences with MMS than surgical excision but that the certainty of evidence was low. Other Cochrane reviews, on cutaneous Bowen's disease (Bath-Hextall, 2016) and periocular BCC (Narayanan, 2014) searched for but did not identify any RCTs evaluating MMS.

Several systematic reviews that included observational studies have been published. In 2013, Lansbury and colleagues examined interventions for non-metastatic SCC. The authors identified 16 uncontrolled studies reporting outcomes after MMS. A pooled analysis of data on cure rates at 5 years in 2133 SCCs treated with MMS was 97.4% (95% CI, 96.2% to 98.3%). Pooled 5-year cure rates by lesion location were trunk and extremities (95.7%), ear (96.6%), face scalp and neck (97.8%), eyelid (98.5%) and nose (98.8%). Ten studies reported local recurrence rates. A pooled analysis of these studies found an average local recurrence rate of 3% after MMS (95% CI, 2.2% to 3.9%).

A systematic review of observational studies on periocular BCC was published by Phan and colleagues (2019). The authors identified 35 studies reporting recurrence rates after one or more types of surgical excision. Of these, 10 studies evaluated MMS, 12 studies evaluated frozen section evaluation (FSE) and 14 studies evaluated wide local excision (WLE). The pooled recurrence rate was 2.9% (95% CI, 1.9 to 4.4%) after MMS, 1.9% (95% CI, 1.9-2.4%) after FSE and 5.9% (95% CI, 3.9-8.9%) after WLE. The recurrence rate was significantly higher after WLE than either MMS or FSE (p<0.001) but not significantly different between MMS and FSE (p=0.65). A limitation of this analysis is that individuals were not randomized to treatment group and most studies were not head-to-head comparisons, so treatment groups may have differed in ways that affected outcomes.

Lee and colleagues (2019) published a systematic review of studies comparing outcomes after surgical excision, MMS, external-beam radiotherapy (EBRT) or brachytherapy (BT) in individuals with indolent BCC or SCC. The

authors identified 58 eligible studies (single-arm or comparative study design, at least 10 subjects and 10 or more months of follow-up) with a total of 21,371 individuals. Only a single MMS study reported cosmesis, so data on this outcome could not be pooled for MMS. For local recurrence rates at 5 years, MMS studies showed a recurrence rate of 2.1%, comparable to that of surgical excision (1.8%) and BT (2.5%). The 5-year local recurrence rate of EBRT was 6.7%, significantly higher than other treatment modalities.

Melanoma in situ (including lentigo maligna)

A Cochrane systematic review on interventions for melanoma in situ (Tzellos 2016) did not identify any RCTs evaluating MMS.

A 2019 study by Phan and Loya conducted a retrospective analysis of cases of melanoma in situ from the Surveillance, Epidemiology and End Results (SEER) cancer registry and identified 24,515 individuals treated with WLE and 4122 individuals treated with MMS. After adjusting for confounding factors, there were no significant differences between groups in disease-specific survival (Hazard Ratio [HR], 0.98; 95% CI, 0.60-1.45; p=0.74) or overall survival (OS) (HR, 1.01; 95% CI, 0.90-1.23; p=0.92). The study did not report recurrence rates.

A 2017 study by Nosrati and colleagues evaluated outcomes in individuals with melanoma in situ who were treated with MMS (n=277) or WLE (n=385). The study was retrospective and non-randomized. Median follow-up was 8.6 years (range, 0.2 to 37 years). MMS was used more frequently in lesions on the face and scalp/neck whereas wide local excision was more common in lesions on the trunk and extremities. The rate of tumor recurrence was 1.8% after MMS and 5.7% after WLE, p=0.07. The calculated 15-year recurrence rate was 5.0% (95% CI, 1.4% to 17.3%) in the MMS group and 7.3% (95% CI, 4.8% to 11.0%) in the WLE group. There was not a statistically significant difference in the OS rate for individuals treated with WLE or MMS. A 2015 study by Hou and colleagues also evaluated outcomes after MMS (n=154) or wide excision (n=269) for lentigo maligna. Recurrence rates after 5 years were 1.9% in the MMS group and 5.9% in the wide excision group. Treatments were not compared due to the retrospective nature of the study design.

A 2021 systematic review by Sharma and colleagues identified 27 studies examining the effectiveness of MMS for treating lentigo maligna. All of the studies were observational; no RCTs were identified. Sample size in individual studies ranged from 12 to 1506 individuals. When reported recurrence rates were pooled, recurrence was observed in 41 cases out of a total of 3033 excisions (1.35%). Mean follow-up in the studies ranged from 3 months to 5 years.

Less common cutaneous skin cancers

The NCCN also addressed less common skin cancers. The Merkel Cell Carcinoma guideline (V.1. 2024) stated:

> It is recommended, regardless of the surgical approach, that every effort be made to coordinate surgical management such that SLNB is performed at the time of definitive excision. Excision options include:

- If adjuvant RT [radiotherapy] is planned, narrow excision margins are likely sufficient.
- If adjuvant RT may not be indicated, wide local excision with 1- to 2-cm margins to the investing fascia layer of muscle or pericranium when clinically feasible and consistent with reconstruction and radiation goals…
- Techniques for more exhaustive histologic margin assessment may be considered (Mohs or other forms of PDEMA [peripheral and deep en face margin assessment]), provided they do not interfere with SLNB when indicated.
- If SLNB is not performed concurrently, it is recommended that SLNB is performed prior to definitive excision with exhaustive histologic margin assessment (i.e., Mohs).

The Dermatofibroscarcoma Protuberans (V.1, 2025) guideline stated:

> Because of its proclivity for irregular and frequently deep subclinical extensions, every effort should be made to completely remove this tumor at the time of initial therapy. Excision with Mohs micrographic surgery (Mohs) or other forms of peripheral and deep en face margin assessment (PDEMA) is recommended over WLE.

Several systematic reviews of the literature on some of these less common cancers have been published. The published literature on these cancers is limited by the small number of comparative studies, especially RCTs. In 2022, St. Martin and colleagues published a systematic review and meta-analysis of comparative and non-comparative studies on individuals with dermatofibrosarcoma protuberans who were treated with MMS and/or WLE. Studies were included if they had at least 5 participants and reported recurrence rates. A total of 88 studies met eligibility criteria, 12 comparative studies and 76 single-arm studies. A pooled analysis of the 76 single-arm studies found a significantly lower rate of local recurrence after MMS (1.5%) than after WLE (9.4%), $p<0.001$. However, a pooled analysis of data from the 12 comparative studies found a non-significant odds ratio (OR) of 1.55 (95% CI, 0.71 to 3.38, $p=0.27$) for local recurrence after treatment with WLE versus MMS.

Carrasquillo and colleagues (2022) reviewed data on MMS versus WLE in individuals with merkel cell carcinoma. The authors identified 31 studies on WLE, 3 studies on MMS and 6 studies that included some cases treated with each approach. A total of 1996 individuals were treated with WLE; outcomes were not reported for all individuals. Studies reported 194 local recurrences in 1967 individuals (9.9%) and regional recurrence in 257 of 1332 (19.3%) individuals. For MMS, 10 of 112 individuals (8.9%) had local recurrences and 18 of 103 (17.5%) had regional recurrences. Less data was available for other outcomes, including distant recurrence and mortality.

A systematic review and meta-analysis on another less common type of skin cancer, atypical fibroxanthoma, was published in 2018 by Tolkachjov. The authors identified 23 studies evaluating individuals with a diagnosis of atypical fibroxanthoma who were treated with MMS or WLE. Two of the studies were non-randomized comparative studies and the other 21 studies were noncomparative. There were 175 individuals treated with MMS; the local recurrence rate was 2% (95% CI, 0% to 4.1%) and 8.7% (95% CI, 55 to 12.3%). There were a total of 22 metastases, 1.9% in the MMS group and 1.0% in the WLE group.

Melanoma (other than melanoma in situ)

The NCCN Cutaneous Melanoma guideline (V.3, 2024) stated:

> MMS is not recommended for primary treatment of invasive cutaneous melanoma when standard clinical margins can be obtained. It may be considered selectively for minimally invasive (T1a) melanomas in anatomically constrained areas (ie face, ears, acral sites), along with other surgical methods that provide comprehensive histologic assessment, such as staged excision with permanent sections for dermatopathology review.

In 2019, Cheraghlou and colleagues published an analysis of data from the National Cancer Database on outcomes after treatment with wide margin excision (WME) or MMS. The analysis included 70,319 individuals, 67,085 treated with WME and 3234 treated with MMS. In univariate Kaplan-Meier analysis, rates of OS were similar in individuals treated with MMS or WME (HR, 1.01; 95% CI, 0.90-1.14). In a multivariate regression model using propensity-score matching, MMS was associated with a statistically significant improvement in OS compared with WME (HR, 0.86, 95% CI, 0.76 to 0.97). A subgroup analysis by lesion location did not find a statistically significant difference in OS in the two groups for primary lesions that were not on the head or neck (HR, 0.92; 95% CI, 0.77-1.11). An analysis limited to primary lesions located on the head and neck found significantly improved overall survival in individuals treated with MMS compared with WME (HR, 0.81; 95% CI, 0.69-0.96). Despite the large number of individuals included in the overall study, after propensity score matching, there were only 2589 individuals treated with MMS, 758 with lesions on the head or neck.

A 2021 analysis of the National Cancer Database by Demer and colleagues did not find a statistically significant difference in 5-year OS rates between individuals with trunk and extremity melanoma who were treated with WLE versus MMS. Out of 188,862 individuals in the analysis, only 2.3% (4413) were treated with MMS. In multivariate analysis, factors associated with increased risk of 5-year OS included increasing age (HR, 1.043, 95% CI, 1.042-1.044), tumor ulceration (HR, 2.175; 95% CI, 2.114-2.238), superficial spreading tumor (HR, 0.739, 95% CI, 0.710-0.769) and lentigo maligna melanoma (2.9% of cases) (HR, 0.743, 95% CI, 0.686-0.805).

A systematic review (Williams, 2024) evaluated the literature on MMS for invasive melanoma. A total of 35 studies met their eligibility criteria. None of the studies were RCTs and 16 were observational studies comparing outcomes after MMS and WLE. Due to heterogeneity among studies identified by the authors, only a limited number of quantitative meta-analyses were performed. A pooled analysis of data from 4 studies reporting multivariate analysis of all-cause mortality found no significant difference in this outcome in those treated with MMS or WLE (HR, 0.97, 95% CI, 0.91 to 1.04). Another pooled analysis, this one of 6 studies reporting rates of local recurrence, did not find a statistically significant difference in Mohs and WLE-treated individuals (RR, 0.46, 95% C, 0.14 to 1.51).

Definitions

Basal cell carcinoma: A type of cutaneous skin cancer that begins in the basal cells (the innermost layer of the epidermis).

Areas of the body per National Comprehensive Cancer Network:

- Area H: "mask areas" of face (central face, eyelids, eyebrows, periorbital, nose lips [cutaneous and vermilion], chin, mandible, preauricular and postuaricular skin/sulci, temple, ear-- genitalia, hands and feet;
- Area L: trunk and extremities (excluding pretibia, hands, feet, nail units and ankles);
- Area M: cheeks, forehead, scalp, neck and pretibial.

Cutaneous: Of or related to the skin.

Lentigo maligna: A type of melanoma in situ. Slow-growing lesion that remains close to the skin surface for a long time. Generally occurs in chronically sun-exposed skin. When it becomes invasive, it is known as lentigo maligna melanoma.

Melanoma in situ: Also known as Stage 0 melanoma. The tumor is confined to the epidermis.

Squamous cell carcinoma: A type of skin cancer that develops in squamous cells in the epidermis, the skin's outermost layer.

References

Peer Reviewed Publications:

1. Carrasquillo OY, Cancel-Artau KJ, Ramos-Rodriguez AJ et al. Mohs micrographic surgery versus wide local excision in the treatment of merkel cell carcinoma: a systematic review. Dermatol Surg. 2022; 48(2):176-180.
2. Cheraghlou S, Christensen SR, Agogo GO et al. Comparison of survival after Mohs micrographic surgery vs wide margin excision for early-stage invasive melanoma. JAMA Dermatol. 2019; 155(11):1252-1259.
3. Demer AM, Hanson JL, Maher IA et al. Association of Mohs micrographic surgery vs wide local excision with overall survival outcomes for patients with melanoma of the trunk and extremities. JAMA Dermatol. 2021; 157(1):84-89.
4. Hou JL, Reed KB, Knudson RM et al. Five-year outcomes of wide excision and Mohs micrographic surgery for primary lentigo maligna in an academic practice cohort. Dermatol Surg. 2015; 41(2):211-8.
5. Lacerda PN, Lange EP, Luna NM et al. Recurrence rate of basal cell carcinoma among different micrographic surgery techniques: systematic review with meta-analysis. J Eur Acad Dermatol Venereol. 2022; 36(8):1178-1190.
6. Lansbury L, Bath-Hextall F, Perkins W, et al. Interventions for non-metastatic squamous cell carcinoma of the skin: systematic review and pooled analysis of observational studies. BMJ. 2013; 347:1-46.

7. Lee CT, Lehrer EJ, Aphale A et al. Surgical excision, Mohs micrographic surgery, external-beam radiotherapy, or brachytherapy for indolent skin cancer: An international meta-analysis of 58 studies with 21,000 patients. Cancer. 2019; 125(20):3582-3594.
8. Martin ECS, Vyas KS, Batbold S et al. Dermatofibrosarcoma protuberans recurrence after wide local excision versus Mohs micrographic surgery: a systematic review and meta-analysis. Dermatol Surg. 2022; 48(5):479-485.
9. Narayanan K, Hadid OH, Barnes EA. Mohs micrographic surgery versus surgical excision for periocular basal cell carcinoma. Cochrane Database Syst Rev. 2014; (12):CD007041.
10. Nosrati A, Berliner JG, Goel S, et al. Outcomes of melanoma in situ treated with Mohs micrographic surgery compared with wide local excision. JAMA Dermatol 2017; 153: 436-441.
11. Phan K, Loya A. Mohs micrographic surgery versus wide local excision for melanoma in situ: analysis of a nationwide database. Int J Dermatol. 2019; 58(6):697-702.
12. Phan K, Oh LJ, Goyal S et al. Recurrence rates following surgical excision of periocular basal cell carcinomas: systematic review and meta-analysis. J Dermatolog Treat. 2019; 1-5.
13. Sella T, Goren I, Shalev V et al. Incidence trends of keratinocytic skin cancers and melanoma in Israel 2006-11. Br J Dermatol. 2015; 172(1):202-207.
14. Sharma AN, Foulad DP, Doan L et al. Mohs surgery for the treatment of lentigo maligna and lentigo maligna melanoma - a systematic review. J Dermatolog Treat. 2021; 32(2):157-163.
15. Surmanowicz P, Sivanand A, Du AX et al. Muffin technique micrographic surgery for non-melanoma skin cancer. Front Med (Lausanne). 2021 21; 7:637223.
16. Tolkachjov SN, Kelley BF, Alahdab F et al. Atypical fibroxanthoma: Systematic review and meta-analysis of treatment with Mohs micrographic surgery or excision. J Am Acad Dermatol. 2018; 79(5):929-934.
17. Tzellos T, Kyrgidis A, Mocellin S, et al. Interventions for melanoma in situ, including lentigo maligna. Cochrane Database Syst Rev. 2014; (12):CD010308.
18. van Loo E, Mosterd K, Krekels GA et al. Surgical excision versus Mohs' micrographic surgery for basal cell carcinoma of the face: A randomised clinical trial with 10 year follow-up. Eur J Cancer. 2014; 50(17):3011-3020.
19. Williams GJ, Quinn T, Lo S et al. Mohs micrographic surgery for the treatment of invasive melanoma: A systematic review with meta-analyses. J Eur Acad Dermatol Venereol. 2024 Jun 6. Epub ahead of print.

Government Agency, Medical Society, and Other Authoritative Publications:

1. American Cancer Society. Melanoma skin cancer. Available at: https://www.cancer.org/cancer/melanoma-skin-cancer.html. Accessed on December 11, 2024.
2. Bath-Hextall FJ, Matin RN, Wilkinson D, et al. Interventions for cutaneous Bowen's disease. Cochrane Database Syst Rev. 2013; (6):CD007281.
3. Centers for Disease Control. Skin Cancer. Available at: https://www.cdc.gov/cancer/skin/index.htm. Accessed on December 11, 2024.
4. Connolly SM, Baker DR, Coldiron BM et al. AAD/ACMS/ASDSA/ASMS 2012 appropriate use criteria for Mohs micrographic surgery: a report of the American Academy of Dermatology, American College of Mohs

Surgery, American Society for Dermatologic Surgery Association, and the American Society for Mohs Surgery. Dermatol Surg. 2012; 38(10):1582-603.
5. Kim JYS, Kozlow JH, Mittal B, et al. Guidelines of care for the management of basal cell carcinoma. J Am Acad Dermatol. 2018a Mar; 78(3):540-559.
6. Kim JYS, Kozlow JH, Mittal B, et al. Guidelines of care for the management of cutaneous squamous cell carcinoma. J Am Acad Dermatol. 2018b Mar; 78(3):560-578.
7. National Cancer Institute (NCI). Skin Cancer Treatment (PDQ®)–Health Professional Version. Available at: https://www.cancer.gov/types/skin/hp/skin-treatment-pdq. Accessed on December 12, 2024.
8. NCCN Clinical Practice Guidelines in Oncology®. © 2023 National Comprehensive Cancer Network, Inc. For additional information visit the NCCN website: http://www.nccn.org/index.asp. Accessed on December 11, 2024.
    - Basal Cell Carcinoma (V.3.2024). March 1, 2024
    - Cutaneous Melanoma (V.3.2024). September 23, 2024
    - Dermatofibrosarcoma Protuberans (V.1.2025). October 11, 2024
    - Merkel Cell Carcinoma (V.1.2024). November 22, 2023
    - Squamous Cell Carcinoma (V.1.2024). November 9, 2023
9. Thomson J, Hogan S, Leonardi-Bee J, Williams HC, Bath-Hextall FJ. Interventions for basal cell carcinoma of the skin. Cochrane Database Syst Rev. 2020 Nov 17; 11:CD003412.

Websites for Additional Information

1. Medline Plus. Skin Cancer. Available at: https://medlineplus.gov/skincancer.html. Accessed on December 11, 2024.

History

Status	Date	Action
Reviewed	02/20/2025	Medical Policy & Technology Assessment Committee (MPTAC) review. Revised Discussion/General Information and References sections.
Reviewed	02/15/2024	MPTAC review. Discussion/General Information and References sections updated.
Reviewed	02/16/2023	MPTAC review. Discussion/General Information and References sections updated.
Revised	08/11/2022	MPTAC review. Fixed typographical error in first MN statement. Discussion/General Information and References sections updated.
Revised	08/12/2021	MPTAC review. In first medically necessary statement 4.c., changed “treatment of radiation injury” to “site of prior radiation therapy”. Discussion/General Information and References sections updated.

Reviewed	08/13/2020	MPTAC review. Discussion/General Information and References sections updated. Reformatted Coding section and updated with additional diagnosis codes.
Reviewed	08/22/2019	MPTAC review. Discussion/General Information and References sections updated.
New	09/13/2018	MPTAC review. Initial document development.