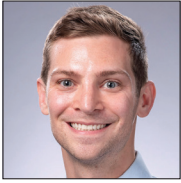


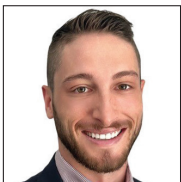
boards fodder



Michael J. Visconti, DO, is a PGY-3 dermatology resident at St. Joseph Mercy Ann Arbor.



Emily R. Davis, DO, is a PGY-5 Mohs micrographic surgery fellow at St. Joseph Mercy Ann Arbor under the training of Kent J. Krach, MD, FAAD.



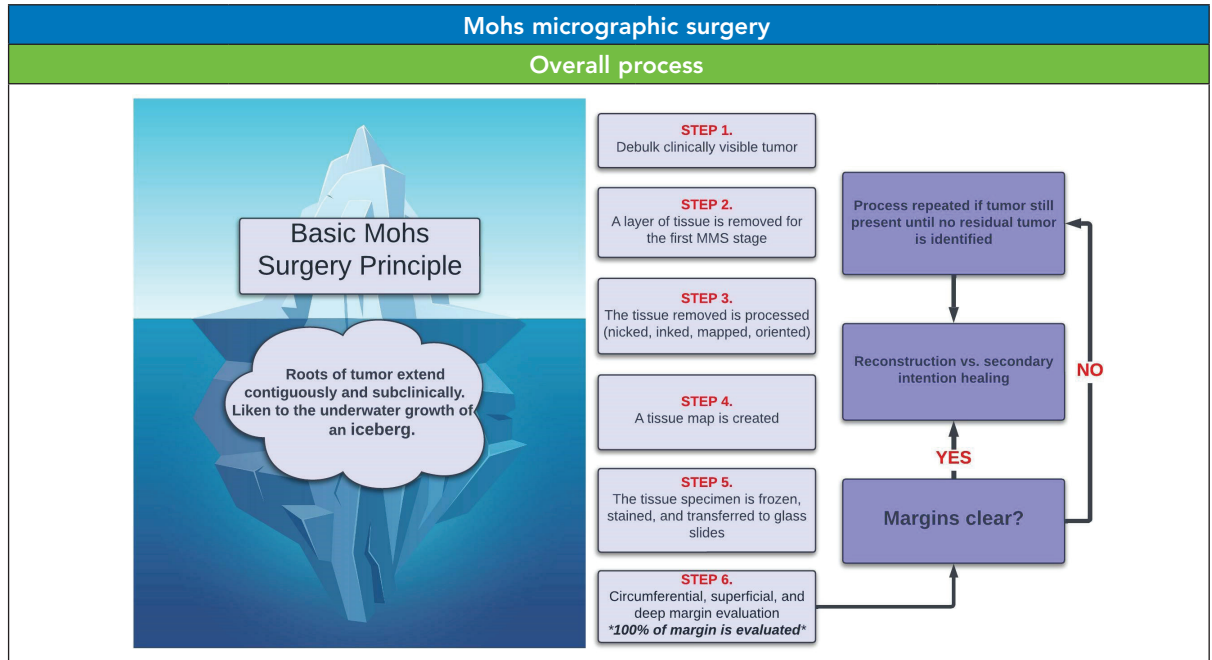
Brayden J. Healey, DO, is a PGY-4 dermatology resident and the Chief Resident at St. Joseph Mercy Ann Arbor.



Kent J. Krach, MD, FAAD, is a board-certified dermatologist, fellowship-trained Mohs Surgeon (FACMS), and the program director for the Micrographic Surgery and Dermatologic Oncology (MSDO) Fellowship at St. Joseph Mercy Ann Arbor.

Mohs micrographic surgery

By Michael J. Visconti, DO, Emily R. Davis, DO, Brayden J. Healey, DO, and Kent J. Krach, MD, FAAD



Background

- Method for precise tumor extirpation using circumferential (360°) microscopic margin control and precision mapping with immediate re-excision of remaining cancer
- Highest evidence-based cure rate for most cutaneous malignancies
- Physician must act as both the surgeon and pathologist
- Relies on the contiguous growth of tumors
 - Contiguous growth may be disrupted by prior incisional/excisional treatment
- Advantages
 - Tissue-sparing
 - Narrow margins taken because of increased confidence of clearance
 - Microscopic evaluation of ~100% of the margin (vs. 1-2% with traditional bread loaf processing)
 - Performed under local anesthesia
 - Low complication rates
 - MMS has higher cure rates and smaller defects compared to WLE
 - High patient satisfaction: 97% of patients willing to undergo future MMS if warranted at 1 month (smoking history and anticoagulation use may negatively affect these scores)



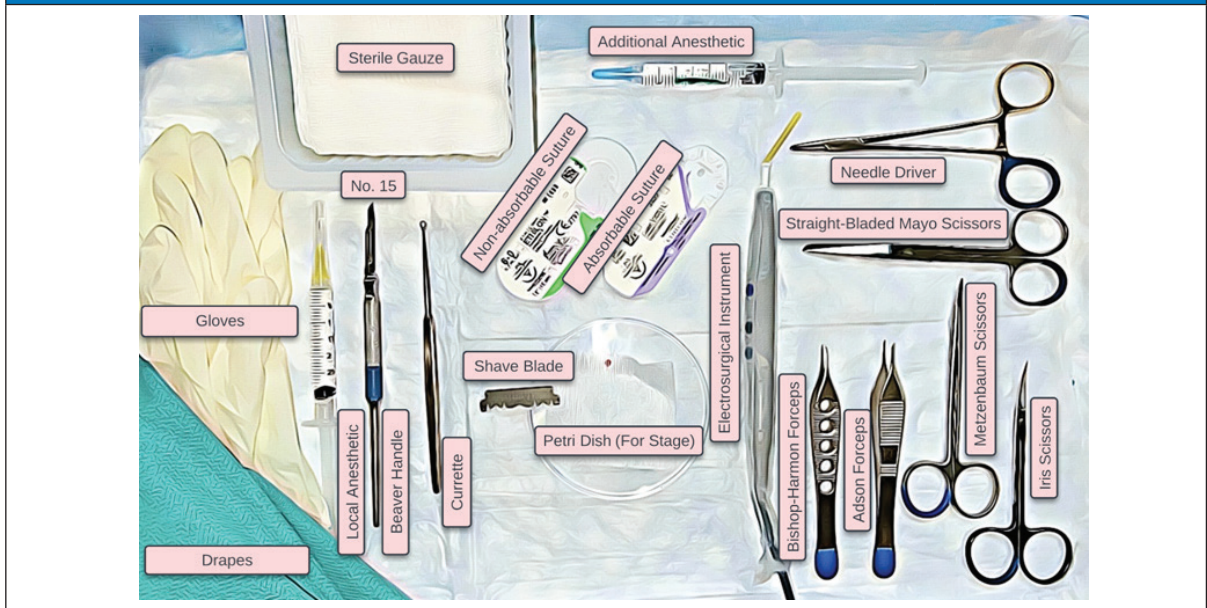
Indications for MMS	Tumor features	Background skin features
	<ul style="list-style-type: none"> • Recurrent tumors • Incompletely excised tumors • Tumors located in high-risk anatomic locations <ul style="list-style-type: none"> - Area H: Central face, eyelids, eyebrows, nose, lips, chin, ear, periauricular, temple - Area M: Cheeks, forehead, scalp, neck, jawline, pretibial surface - Special sites: Hands, feet, nails, genitals • Aggressive histologic subtype • Perineural invasion • Large size (>2 cm) • Poorly defined clinical borders (lateral and/or deep) • Rapid growth 	<ul style="list-style-type: none"> • Chronic scar (Marjolin ulcer) • Within field of prior ionizing radiation
		Patient features
	<ul style="list-style-type: none"> • Immunocompromised: solid organ transplant (heart is #1 risk), CLL, HIV, pharmacologic • Underlying genetic syndrome <ul style="list-style-type: none"> - XP - Gorlin Syndrome 	



Mohs micrographic surgery

By Michael J. Visconti, DO, Emily R. Davis, DO, Brayden J. Healey, DO, and Kent J. Krach, MD, FAAD

Example of MMS surgical tray setup

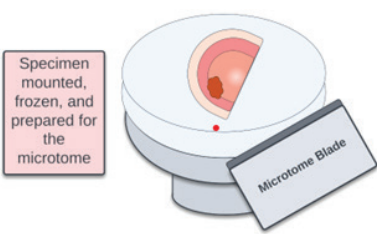
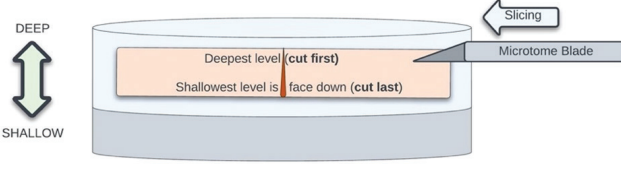
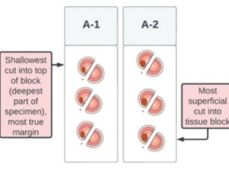
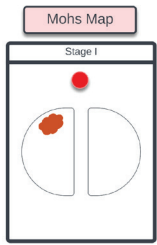
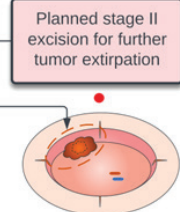
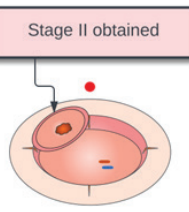
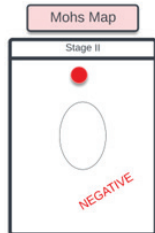
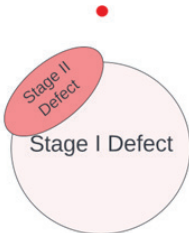
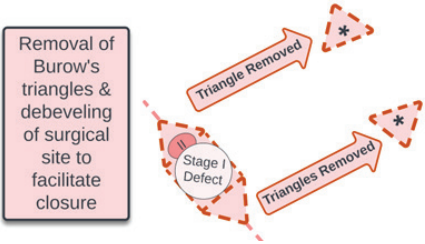


Essential steps in Mohs micrographic surgery: Case example

<p>Post-Debulking Tumor View</p> <p>Residual Tumor</p> <p>Debulked Tumor Specimen</p> <p>*May be processed for frozen or permanent sections</p>	<p>Hash marks placed for orientation</p>	<p>Excision of Stage One</p> <p>Removed</p>	
<p>Step 1. The tumor is debulked (Gillette blade and/or curette) to allow for a more precise first stage tissue specimen. The red dot indicates 12 o'clock directionality for ex-vivo mapping. The tumor in the 11 o'clock position indicates sub-clinical spread of tumor (residual tumor).</p>	<p>Step 2. Epidermis is scored for orientation. 1-2 mm margins of clinically normal skin surrounding the tumor are identified.</p>	<p>Step 3. The dashed circular red line represents the chosen 1 mm excisional margins for the first stage. A 30-45° beveled excision is performed for stage I, removing a bowl-shaped tissue specimen for frozen section processing.</p>	
<p>Post-Extirpation Tissue Orientation</p>	<p>Bisection of Specimen</p>	<p>Flattening of Specimen for 360° Margin Evaluation</p> <p>Epidermis Papilla Reticular Dermis</p>	<p>Specimen is Inverted</p> <p>TOP (Superficial)</p> <p>BOTTOM (Deep)</p>
<p>Step 4. The beveled, bowl-shaped specimen is oriented on the tissue map.</p>	<p>Step 5. The specimen may be bisected for easier processing and inked on the inner edges to aid with mapping orientation.</p>	<p>Step 6. The specimen is flattened, allowing for epidermis and deep dermis to lay in the same plane and thus 360° margin evaluation.</p>	<p>Step 7. The specimen is inverted to reveal the deep margin at the top of the block of tissue.</p>

Mohs micrographic surgery

By Michael J. Visconti, DO, Emily R. Davis, DO, Brayden J. Healey, DO, and Kent J. Krach, MD, FAAD

Essential steps in Mohs micrographic surgery: Case example				
				
<p>Step 8. The specimen is placed in a mounting medium, frozen via heat extraction, and prepared for microtome slicing to generate slides.</p>		<p>Step 9. Within the mounting medium, the deepest margin sits most superficially in the tissue block. The microtome is used to slice the tissue into sections for slide generation.</p>		
		<p>Step 11. First stage is analyzed microscopically. Residual tumor is identified within the epidermal and deep margins of the stage I specimen.</p>		
<p>Step 10. Example of how slides are generated with the "truest margin" closest to the frost of the slide in A-1. Further cuts into the block generate the remainder of specimens on the A-1 and A-2 slides.</p>		 <p>Step 12. The residual tumor is marked on the surgeon's map to direct the stage II excision.</p>	 <p>Step 13. Local anesthesia is repeated. The second stage is obtained utilizing the surgeon's map generated in step 14.</p>	 <p>Step 14. Although not clinically visible, after removal of the second stage a residual area of tumor remains within the stage II defect.</p>
<p>Step 15. Second stage is analyzed microscopically.</p> <p>No residual tumor is identified</p>		 <p>Step 16. The surgeon's map is completed with denotation of microscopically negative margins.</p>	 <p>Step 17. Two stages were performed, resulting in a primary defect with extension in the northwest direction.</p>	<p>Step 18. The resulting defect after two stages. In this situation, linear closure is planned. Debeveling is performed and Burrow's triangles are removed along the line of closure to assist with reapproximation.</p> 

References:

1. Alikhan A, Hocker TL. *Review of Dermatology*. Elsevier; 2017.
2. Bologna J, Jorizzo J, Schaffer I. *Dermatology*. Philadelphia: Elsevier; 2017.
3. Robinson JK, Hanke CW, Siegal DM, Fratila A. *Surgery of the Skin*. Philadelphia: Elsevier; 2015.
4. Ad Hoc Task Force, Connolly SM, Baker DR, 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 [published correction appears in J Am Acad Dermatol. 2015 Apr;72(4):748]. J Am Acad Dermatol. 2012;67(4):531-550. doi:10.1016/j.jaad.2012.06.009.