ABSTRACT, POSTER & CME INFORMATION







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ACMS 49th Annual Meeting ABSTRACT, POSTER & CME INFORMATION

CME Information and Learning Objectives

Learning Objectives

Upon completion of the Annual Meeting, participants will be able to describe the latest advances in the treatment of skin cancer, discuss recent research findings in the area of Mohs micrographic surgery and cutaneous oncology, and explain new techniques in reconstruction that promote optimal surgical outcomes.

Specific learning objectives upon completion of the ACMS Annual Meeting include:

- Design and execute routine and advanced reconstructions of the lip, nose, and ear;
- Describe current recommendations for diagnosis and treatment of melanoma, high-risk squamous cell cancer, Extramammary Paget's disease and Merkel cell cancer;
- Identify key elements of surgical and laboratory procedures to develop complete and high-quality frozen section microscopic tissue samples;
- Recall the benefits and techniques involved in utilizing immunohistochemistry in the treatment of lentigo maligna and lentigo maligna melanoma;
- Refine reconstruction techniques to improve scars post Mohs micrographic surgery;
- Identify options for treatment of nonmelanoma skin cancer when the patient is not a candidate for the initial choice of treatment;
- Identify anatomic landmarks and integrate knowledge of those landmarks into the practice of Mohs micrographic surgery;
- Recognize potential errors in frozen section examination of skin cancers and develop ways to minimize those errors;
- Describe essential principles to optimize surgery of the nail unit;
- Explain proper billing and coding practices for Mohs and reconstructive surgery;
- Maximize collaboration with surgical colleagues in other disciplines to improve patient outcomes postoperatively;
- Identify elements of the preoperative history that require management preoperatively;
- Review the most recent literature regarding solid organ transplant patients and the development of nonmelanoma skin cancer;
- Describe recent developments in the management of skin cancer in organ transplant recipients;
- Identify medications that increase nonmelanoma skin cancer risk and understand multidisciplinary approaches to modifying these medications.

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April 27, 10:00–10:07 am

Presenter: Michael Mortazie, DO

Title: Differences in Basal Cell Carcinoma Development between Hispanics and Caucasians

Authors: Michael Mortazie, DO¹; Jeffrey A. Gornbein, PhD²; Richard G. Bennett, MD^{2,3}

Institutions: 1. Bennett Surgery Center, Santa Monica, CA 2. UCLA, Los Angeles, CA

3. University of Southern California, Santa Monica, CA

Purpose: Basal cell carcinomas (BCCs) are unusual in dark skinned persons and when they do arise in these individuals they are thought to be aggressive. We sought to determine the extent of microscopic extension, age of onset, and rate of subsequent BCCs in Hispanics compared to Caucasians.

Summary: The mean age of initial BCC is 71 years in Hispanics and 67 years in Caucasians (p=0.009). Compared to Caucasians, Hispanics with BCC are statistically more likely to work outdoors (16% vs 5%, p=0.007), less likely to smoke (81% non-smokers vs 65%, p=.003) and have higher Fitzpatrick skin types (mean 3.0 vs 2.1, p<0.001). The lifetime rate of BCC development, measured by BCC rate per 100 person-years, is significantly greater in Caucasians (3.23) than in Hispanics (2.17, p < 0.001), even when adjusted for age at first BCC, smoking history and outdoor occupation (Figure 1). The unadjusted yearly rate of second BCC development is significantly greater in Hispanics (0.345) than that (0.222) in Caucasians (p=0.035); however, when adjusted for age at first BCC this difference becomes insignificant (p=0.192) (Figure 2). Microscopic extension of BCC as expressed by the ratio of postoperative wound area divided by the pre-operative lesion area is significantly larger in Caucasians than Hispanics (4.03 vs 3.1, p=0.054), and becomes more significant (4.08 vs 3.06, p=0.036) when adjusted for previous treatment and head or neck location (Figure 3).

Design: A single-nested retrospective case-control study of 110 randomly selected Hispanics (90% of which were of Mexican ancestry) and 110 randomly selected Caucasians referred for Mohs micrographic surgery were matched for gender and age within 10 year intervals. In addition to comparing extent of microscopic extension, age at first BCC and time interval to second BCC, 16 covariates were also compared between the two groups: Fitzpatrick skin type, eye color, hair color, initial BCC location, BCC histologic subtype, pre-operative lesion size, post-operative wound size, ratio of post-operative wound to pre-operative BCC size, history of outdoor occupation, average hours spent outdoors during lifetime, tanning history, smoking history, personal and family history of cutaneous and internal malignancy. Statistical analysis was done using the chi-square test for comparing categorical variables, the Wilcoxon rank sum test for ordinal and non-normal continuous variables, and the T-test for continuous variables. A multivariate linear or count regression model was used to compute covariate adjusted mean values.

Conclusion: Although Caucasians develop more BCCs during their lifetime than Hispanics, Hispanics develop BCCs later in life and at a faster rate after the initial BCC than do Caucasians.

Furthermore, BCCs microscopically extend approximately 25% further in Caucasians than in Hispanics.

BCC RATE PER 100 PERSON-YEARS



RATIO OF POSTOPERATIVE WOUND SIZE (MM²) / PREOPERATIVE LESION SIZE (MM²)



April 27, 10:08–10:15 am

Presenter: Cerrene N. Giordano, MD

Title: Determinants of Postoperative Facial and Scar Satisfaction Using the FACE-Q Skin Cancer Module

Authors: Cerrene N. Giordano, MD¹; Nina Blank, BA¹; Erica Lee, MD¹

Institution: 1. Memorial Sloan Kettering Cancer Center/Weill Cornell, New York, NY

Purpose: Patients undergoing facial skin cancer surgery may experience significant distress regarding cancer diagnosis and anticipated surgical outcome. Patients' expectations of surgical scarring and changes in facial appearance may influence postoperative aesthetic satisfaction. The FACE-Q Skin Cancer Module is a new patient-reported outcome instrument with scales assessing satisfaction with facial and scar appearance. The purpose of this study was to better elucidate determinants of aesthetic satisfaction after facial skin cancer surgery.

Summary: Ninety patients (50% female, median age 63 years, range 25-92) answered preoperative "expectations" questions. Eighty-one patients received Mohs surgery and 9 underwent staged excision for stage 0/1A melanoma. Surgical repairs were: 27 (43%) primary closure, 20 (29.9%) second intention healing, 17 (25.4%) flap repair, and 3 (4.5%) full-thickness skin graft. Sixty-six patients completed postoperative surveys at a mean of 62.4 days (median 18 days) after surgery. Seventeen (37.8%) men and 18 (40%) women reported facial appearance as "very important" at baseline. More women than men (44.4% vs. 33.3%) expected their faces to remain unchanged after treatment. Prior skin cancer surgery had no impact on patient expectations of facial change (p=0.430) or scar visibility (p=0.189). After surgery, females were significantly less satisfied with facial and scar appearance than males (p=0.019 and p=0.011, respectively)(Figure 1). Repair by second-intent yielded greater scar satisfaction (p<0.001); no other repair type predicted facial or scar satisfaction. Compared with patients who expected unchanged facial appearance, those who anticipated surgical scarring or facial disfigurement had higher facial appearance satisfaction, after controlling for gender (p=0.012) (Table 1).

Design: The FACE-Q Skin Cancer Module has multiple, independently-functioning scales for individuals with facial skin cancers. For this pilot study, patients answered 3 additional questions preoperatively assessing: (1) Importance of facial appearance (Not important/Matters but not the most important/ Very important); (2) Anticipated change in facial appearance (Unchanged/Scar/Disfigurement); (3) Expected scar visibility (No scar/Scar visible only to self/Scar noticeable to others). Postoperatively, patients filled out the FACE-Q "Satisfaction with Facial Appearance" and "Appraisal of Scar" scales (Figures).

Conclusion: In this pilot study, we showed that women were less satisfied with postoperative facial changes and scars compared to men. Although those healing by second intention were most satisfied with their scars, larger studies are warranted to further determine the relationship between repair type and long term satisfaction. Unrealistic patient expectations played a role in postoperative aesthetic satisfaction emphasizing the importance of pre-surgical counseling in scarring and potential changes in appearance. Eliciting an individual's aesthetic expectations prior to treatment may better guide preoperative clinician counseling. Appropriate management of patient expectations may in turn increase patient satisfaction, and ultimately, improve patient care.

Figure 1. Satisfaction with surgery by age, stratified by patient sex.



Table 1. Model-based estimates for postoperative face and scar satisfaction by preoperative appearance variables.

		Post	Face**	Post Scar**		
Variable	Coding	Mean value	p-value	Mean value	p-value	
Appearance	Least/moderate	50.9		71.6		
Concern	Most	53.8	0.62	63.9	0.19	
Face change	Unchanged	30.4		59		
	Scar/disfigured	46.4	0.012	63	0.54	
Scar	No scar	59.5		61.5		
	Self only	54.8	0.596	66.8	0.533	
	Noticeable	54	0.576	60.9	0.946	

**Adjusted for age, sex and days since surgery

April 27, 10:16–10:23 am

Presenter: Michael Kelly-Sell, MD

Title: The Superior-Based Bilobed Flap for Nasal Reconstruction

Authors: Michael Kelly-Sell, $MD^{1,2}$; S. Tyler Hollmig, MD^3 ; Joel Cook, MD^1

Institutions: 1. Medical University of South Carolina, Charleston, SC $\,$

2. Midwest Center for Dermatology and Dermatologic Surgery, Clinton Township, MI

3. Stanford University Medical Center, Redwood City, CA

Purpose: The bilobed flap is unsurpassed for the aesthetic and functional repair of small to medium sized nasal defects of the supratip and lateral nasal tip. The traditional design places the vascular inlet, or base, laterally, and harvests lax skin on the nasal dorsum to repair more distal defects. However, the traditional bilobed may struggle to deliver reproducible aesthetic success with larger nasal defects, defects in other locations, or patients with thick nasal skin. In these circumstances, closure of the flap's donor site can introduce inordinate risk of permanent lower nasal distortion. To circumvent this problem, we reoriented the flap's base, or pivot point, superiorly and moved the terminal donor site from the dorsal nose to the medial cheek. This novel

modification preserves the geometric advantages of the bilobed design whilst harvesting a donor site with identical aesthetic characteristics and minimal risk of anatomic distortion. The primary lobule is placed on the nasal sidewall, lateral to the surgical defect, and the secondary lobule abutting the melolabial fold. The flap is then lifted into place, jumping the nasofacial sulcus, and hiding some incision lines along the boundaries of cosmetic subunits.

Summary: Our review identified forty-two surgical defects closed with forty-one superior based bilobed flaps (one patient had two defects closed with a single flap). Tumors were most often located on the nasal dorsum (52%), tip (17%), and ala (12%). The median size of the post-operative defects was 1.4 cm. Fifteen surgical defects (36%) had a post-operative measurement greater than 1.5 centimeters, which is often considered the upper limit for reconstruction with a traditional bilobed flap. Follow-up was available for 40 flaps and complications were uncommon, with no increased frequency when compared to traditionally oriented bilobed flaps. There were no cases of infection, hematoma formation, full thickness necrosis, or nasal distortion, as expected. Two flaps showed superficial or partial distal flap necrosis-one requiring a revisionary procedure. Both patients ultimately had a good aesthetic outcome. Aesthetic outcomes were consistently excellent due to the use of adjacent nasal skin, with its similar aesthetic qualities, to close the primary defect and the flap's transposition over the nasofacial sulcus, which avoided blunting this natural concavity.

Design: We performed a retrospective review of all superiorbased bilobed flaps performed by a single surgeon after tumor extirpation by Mohs micrographic surgery at a single institution between June 2000 and August 2016. Data were collected on tumor sublocation, tumor type, tumor size at presentation, postoperative defect size, postoperative prescriptions, surgical complications (including hematoma, infection, and flap necrosis). Follow-up photos from three months or later were reviewed to judge aesthetic results.

Conclusion: The superior-based bilobed flap is a novel modification of the bilobed design and is an excellent flap for nasal reconstruction.





April 27, 10:24–10:31 am Presenter: Anne R. Zhuang, MD

Title: Use of 2-Octylcyanoacrylate versus 5-0 Fast Absorbing Gut during Cutaneous Wound Closure: A Randomized Evaluator-Blinded Split-Wound Comparative Effectiveness Trial

Authors: Anne R. Zhuang, MD¹; Baran Ho, MD¹; April W. Armstrong, MD, MPH²; Victoria Sharon, MD¹; Raja Sivamani, MD, MS¹; Daniel Eisen, MD¹

Institutions: 1. University of California Davis, Sacramento, CA 2. University of Southern California, Los Angeles, CA

Purpose: 2-Octylcyanoactylate (OCA) is a medical-grade tissue adhesive that was initially used as an alternative to sutures for superficial lacerations. More recently, cyanoacrylate tissue adhesives have been used for extensive repairs on the head and neck with comparable cosmetic results when compared to more traditional methods. However, despite its increasing popularity in other medical fields, the use of OCA and other tissue adhesives in dermatologic surgery remains limited. The purpose of this study was to investigate whether the use of OCA during primary

closure of cutaneous surgical wounds improves scar outcomes, using a split-scar model.

Summary: 37 men and 13 women, with an average age of 64.5 years (SD=13), were enrolled, and 44 patients (88%) completed the 3-month follow-up visit. 38 patients (76%) were enrolled at the time of a Mohs procedure, and most cases were located on the head and neck (n=35, 70%). The average length of repair was 5.87cm (SD=2.14). At the follow-up visit, the scar half repaired with FG was wider (2.12 mm, SD=2.35) compared to that treated with OCA (1.97 mm, SD=1.85), however, this was not statistically significant. Comparing mean observer POSAS scores, scar pigmentation was significantly worse on the side treated with OCA (p=0.05). None of the other outcome measures for blinded observers (vascularity, thickness, relief, pliability, surface area, overall opinion) or patients (pain, itching, color, stiffness, thickness, irregularity, overall opinion) were found to be significantly different between the two scar halves. The wound halves treated with OCA were associated with a significantly increased risk of wound dehiscence (p=0.02) as well as total complications (p=0.01). Two cases of hematoma and one case of wound infection also occurred and affected both sides of the wound.

Design: This was a prospective, single-center, evaluator-blinded, randomized split-scar comparison trial conducted from August to December 2015 at UC-Davis' Department of Dermatology. 50 male and female patients with postoperative defects of at least 3cm resulting from either Mohs surgery or surgical excision were enrolled. Following placement of subcuticular sutures equally throughout the entire wound, half of the wound was randomized to epidermal closure with OCA and the other to repair with 5-0 fast-absorbing gut (FG). Patients were seen 3-months postoperatively, and scars were evaluated by two blinded dermatologists and the patient using the POSAS (Patient Observer Scar Assessment Scale) tool. Scar widths, complications and adverse effects were monitored and recorded.

Conclusion: 2-octylcyanoacrylate results in aesthetically-similar scars compared to 5-0 fast absorbing gut, 3-months after surgery. However, use of OCA is associated with inferior pigmentation outcomes and an increased risk of wound dehiscence.



Figure 1: Postoperative wound and surgical scar. Representative surgical wound immediately postoperative (A) and at 3-month follow-up (B). 2octylcyanoacrylate applied to side A of this wound; fast-absorbing gut used to repair side B.

Characteristic		Value
Age, mean (SD), y		64.5 (13)
Male sex, n (%)		37 (74)
Race, n (%)	White	50 (100)
Training level, n (%)	Attending	14 (28)
	Mohs Fellow	23 (46)
	Resident	13 (26)
Location, n (%)		
	Face	20 (40)
	Scalp	2 (4)
	Neck	13 (26)
	Trunk	8 (16)
	Extremities	7 (14)
Indication, n (%)	Mohs	38 (76)
	Excision	12 (24)
Assessment time, mea	n (SD), m	3.18 (0.36)
Excision length, mean	(SD), cm	5.87 (2.14)

Table 1: Demographics. The majority of enrolled patients were white men (74%), with an average age of 64.5 years. Most were enrolled at the time of a Mohs procedure. Surgical repairs were performed by surgeons of all training levels. Most cases were located on the head and neck (n=35, 70%).



Outcome Measure		2-OCA	FG	P-value
Scar width, mean (SD), mm		1.97 (1.85)	2.12 (2.35)	0.44
Observer POSAS, mean (SD)	Vascularity	2.39 (1.37)	2.22 (1.33)	0.38
	Pigmentation	1.98 (0.91)	1.79 (0.80)	0.05
	Thickness	1.75 (1.00)	1.73 (0.95)	0.89
	Relief	1.87 (0.81)	1.73 (0.73)	0.35
	Pliability	1.92 (0.91)	1.84 (0.85)	0.64
	Surface Area	2.4 (1.28)	2.31 (1.51)	0.67
	Sum	12.3 (4.72)	11.6 (4.36)	0.40
	Overall Opinion	2.5 (1.28)	2.26 (1.37)	0.29
Patient POSAS, mean (SD)	Pain	1.32 (1.29)	1.32 (1.29)	-
	Itching	1.48 (1.37)	1.27 (0.79)	0.29
	Color	4.07 (2.71)	4.14 (2.68)	0.85
	Stiffness	2.91 (2.21)	2.59 (2.29)	0.28
	Thickness	2.48 (1.81)	2.41 (2.01)	0.81
	Irregularity	3.02 (3.17)	3.16 (2.71)	0.67
	Sum	14.9 (8.67)	14.6 (8.90)	0.70
	Overall Opinion	3.45 (2.34)	3.43 (2.36)	0.73
Complications, n	Dehiscence	7	2	-
	Hematoma	2	1	-
	Suture abscess	2	1	-
	Infection	1	0	-
	Total	12	4	-

Table 2: Scar Outcomes. The scar was wider on the side treated with FG, but this was not statistically significant. There was significantly more scar dyspigmentation on the side treated with 2-OCA compared to that treated with FG (p = 0.05). More cases of wound dehiscence and total complications occurred on the scar side treated with 2-OCA.

April 27, 10:32–10:39 am

Presenter: Thomas J. Knackstedt, MD

Title: The Differential Use of Bilobed and Trilobed Transposition Flaps in Cutaneous Reconstructive Surgery

Authors: Thomas J. Knackstedt, MD^{1,2}; Kachiu C. Lee, MD, MPH³; Nathaniel J. Jellinek, MD^{2,3,4}

Institutions: 1. Cleveland Clinic Foundation, Cleveland, OH

- 2. Dermatology Professionals, Inc., East Greenwich, RI
- 3. Brown University, Providence, RI
- 4. University of Massachusetts Medical School, Worcester, MA

Purpose: Bilobed (BTF) and trilobed transposition flaps (TTF) are random pattern flaps frequently utilized in reconstruction. We sought to study the differential use of nasal and extranasal BTF and TTF repairs following Mohs micrographic surgery (MMS).

Summary: Two hundred twenty-six patients with 152 BTF and 74 TTF were identified. Forty BTF and no TTF were extranasal. No significant differences were noted between BTF and TTF patient characteristics (Table 1). Amongst nasal cases, there was no significant difference between the mean Mohs defect size for BTF (1.36±0.69cm2) and TTF (1.32±0.69cm2). However, TTF had a significantly larger flap size (13.3±0.60cm2) than BTF (10.20±0.43cm²) (p<0.001). The most significant difference in flap utilization in nasal cases related to subunit location. BTF were more frequently employed on the inferior nasal dorsum and inferior nasal sidewall (p<0.001) (Figure 1). Conversely, TTF were more frequently employed on the nasal tip and infratip (p<0.001). There was no significant difference in flap use in other subunits. In our experience, TTF are not more effective in reconstruction of larger defects than BTF. Instead, the nasal subunit of the surgical defect is more predictive of BTF vs. TTF use. As this study will demonstrate, the angle of the dog ear (standing cone) from the primary defect to the flap pivot point is more obliquely oriented in more distal defects, a design element that lends itself to the TTF. In contrast, the more horizontal dog

ear off of the primary defect in more proximal defects tends to work best with a BTF. However, these flaps are not mutually exclusive and the experience of the surgeon is instrumental in the selection and execution of the closure. We demonstrate that BTF and TTF can be safely and reliably used after MMS. In univariate and multivariate analysis, flap type, subunit location, presence of diabetes, immunosuppression, tobacco abuse, advanced age, and the use of anticoagulants were not significantly associated with complications or the need for surgical revisions (Table 2).

Design: A retrospective chart review was performed to identify subjects treated with MMS with subsequent BTF or TTF repair between 2009-2016. All patients were included irrespective of age, demographics, immune status, comorbidities, or treatment history. Desired variables were extracted. Descriptive statistics, chi-squared, t-tests, Wilcoxen rank-sum test / Mann-Whitney test, univariate, and multivariate analysis on STATA v14 (College Station, TX) were performed.

Conclusion: BTF and TTF can be used reliably in nasal reconstruction, with BTF showing more benefit in extranasal applications. On the nose, TTF show utility in more distal tip and infratip locations, and BTF on the mid and more proximal nose. The specifics of flap design around the dog ear and total flap angle of rotation predict which flap will be executed more effectively in each individual location.

Variable	Bilobed N = 152 N $(%)$	Trilobed N = 74	p-value
	72 4+1 0	60.2+1.5	0.07
Age (years)	72.4±1.0	09.2±1.5	0.07
Sex	70	22	0.55
- M	78	33	
- r MrE Datia	/4	41	
M:F Katio	1:0.94	1:1.24	0.62
Diagnosis		(2)	0.63
- BCC	121	63	
- SCC	31	9	
- Other	0	2	
Antibiotic Prophylaxis			0.12
- Yes	120	68	
- No	32	6	
Smoking Status			0.93
- Never	99	47	
- Former	32	15	
- Current	10	5	
- Unknown	11	7	
Anticoagulation Status			0.06
- Yes: Aspirin 81 mg	54	22	
- Yes: Aspirin 325 mg	1	4	
- Yes: Coumadin	11	0	
- Yes: Plavix	2	0	
- Yes: Dabigatran	2	1	
- Yes: Dual-agent	6	1	
- None	76	46	
Immune Status			0.55
- Immunocompetent	141	71	
- Immunocompromised	11	3	
Diabetes		-	0.29
- Yes	8	9	0.07
- No	144	65	
- 110	177	0.5	

Table 1. Patient Characteristics

Variable	Bilobed	Trilobed	p-value
	N (%)	N (%)	-
Distribution			< 0.001
- Nasal	112	74	
- Extranasal	40	0	
Dimensions (cm ²)			
- Final Defect Size	1.36±0.69	1.32±0.69	0.97
- Flap Dimensions	10.20±0.43	13.3±0.60	< 0.001
Flap Pedicle Orientation			
- Medial	21	2	0.02
- Lateral	116	72	
Flap Survival			
- Full	152	74	
- Partial or Complete Flap Loss	0	0	
Complications			0.19
- No	101	45	
- Yes (not all listed below)	51	29	
- Fullness (trapdoor/pincushion)	29	19	
- Vascular (redness, bleeding)	5	5	
- Structural (alar asymmetry)	2	2	
Revisions*			0.06
-Yes	125	53	
-No	27	21	
Breathing Complications (Nasal			0.81
Cases Only)	N=111	N=74	
- Yes	2	1	
- No	109	73	

Table 2. Bilobed and trilobed flap characteristics

* intralesional kenalog, pulse dye laser, carbon dioxide (CO2) laser, surgical revision



April 27, 10:40–10:47 am

Presenter: Katherine Mercy, MD

Title: Shared Decision Making in Mohs Surgery: A Population Needs Assessment

Authors: Katherine Mercy, MD¹; Nkanyezi Ferguson, MD¹; Marta Hemmingson-Van Beek, MD, MPH¹; Hillary Johnson-Jahangir, MD, PhD¹

Institution: 1. University of Iowa Hospitals and Clinics, Iowa City, IA

Purpose: Shared decision making describes the practice whereby patients and physicians make decisions together using the best available medical evidence. It is considered to be of ethical importance, can positively impact patient care, and is a significant component of value-based healthcare. While shared decision making has already been explored in other specialties and in psoriasis management, it has not yet been examined in Mohs micrographic surgery (MMS). This study aims to lay the groundwork for the creation of a patient decision aid by conducting a population needs assessment survey at a single institution.

Summary: Preliminary results were obtained from 54 patients. Patients who completed the survey were more likely male (51.9%), were 55-74 (69.2%) years of age, and had some college education or greater (72%). Approximately 11% of patients were unsure of their diagnosis at the time of MMS. A total of 88.9% of patients were unaware of treatments options other than MMS for their skin cancer at the time of treatment. However, patients felt that they had a significant role (avg. 3.9 of 5, SD=1.3) in their decision to have surgery. Patients indicated that a dermatologist (88.9%), spouse (24.1%), and/ or other physician (16.7%) were most commonly involved in the decision to have MMS. Prior to future decisions about skin cancer treatment, patients most commonly desired to receive counseling from a dermatologist (96%), from another provider (26%), or decision support from an internet site (28.6%). Patients desired additional information about their skin cancer diagnosis (31.1%), wound care (28.9%), scarring (24.4%), and skin cancer prevention (22.2%) at the time of surgery.

Design: A prospective, single-institution cohort survey study was conducted from November, 2016 to January, 2017. A 20-item survey was designed and offered to patients who consented for MMS. Survey items were modeled from similar published surveys, but the instrument was not previously validated. Survey questions assessed demographic information, decision support prior to MMS, confidence in the decision to undergo MMS, and information desired to support future skin cancer treatment decisions. Limitations included selection bias and a small sample size.

Conclusion: Patients reported a significant role in their decision to have MMS, but may not have been aware of their diagnosis or other treatment options at the time of surgery. Dermatologists and other physicians were the source of information used by patients most commonly to make the decision to have MMS. Moreover, patients prefer counseling from dermatologists or other physicians rather than information from ancillary staff, internet sites, mobile applications or other modalities prior to making future decisions about skin cancer treatment. The results of this study highlight the importance of health care professionals engaging patients in skin cancer treatment decisions and the need for broader investigation of this subject.

Patient Demographics, n=54							
Previous Mohs surgery	Yes	No					
	29 (54.7%)	24 (45.3%)					
Type of skin cancer (%)	BCC	37 (69.8%)					
	SCC	9 (17.0%)					
	Other	1 (1.9%)					
	Unsure	6 (11.1%)					
Gender	Male	Female					
	28 (51.9%)	26 (48.1%)					
Age (years)	18-24	0 (0%)					
	25-34	0 (0%)					
	35-44	3 (5.6%)					
	45-54	7 (18.5%)					
	55-64	20 (37%)					
	65-74	16 (29.6%)					
	75-84	4 (7.4%)					
	85 and over	4 (7.4%)					
Highest level education	8th grade	2 (3.7%)					
	Some HS	1 (1.9%)					
	HS diploma	8 (14.8%)					
	Trade degree	4 (7.4%)					
	Some college	14 (25.9%)					
	College	8 (14.8%)					
	degree						
	Grad school	17 (31.5%)					

Figure 1.



What type of information was used by patients to make the decision to have Mohs surgery?



Figure 2. Patient decision making process prior to Mohs surgery



If you had to make decision again, which of the following ways would you prefer to learn about treatments for skin cancer?

Figure 3. Patient preferences for decision making process for future skin cancer treatment decisions

April 27, 10:48–10:55 am

Presenter: Milene K. Crispin, MD

Title: Use of 5-0 Prolene vs 5-0 Fast Absorbing Gut during Cutaneous Wound Closure: A Randomized Evaluator-Blinded Split-Wound Comparative Effectiveness Trial

Authors: Milene K. Crispin, MD¹; Anne R. Zhuang, MD¹; Daniel B. Eisen, MD¹

Institution: 1. University of California-Davis, Sacramento, CA

Purpose: The purpose of this study was to determine whether the use of 5-0 prolene during repair of linear cutaneous surgery wounds improves scar cosmesis compared to wound closure with 5-0 fast absorbing gut. We used a split wound model, where

half of the wound was treated with 5-0 prolene and the other half was repaired with 5-0 fast absorbing gut. Three-months postsurgery, the scar was measured via the Physician Observer Scar Assessment Scale (POSAS), a validated scar instrument. The scar width and adverse events were recorded.

Summary: Fifty patients undergoing surgical wound closure with linear repair were enrolled in the study. At 3 month follow-up, the patient and 2 blinded observers evaluated the wound using the Patient Observer Self-Assessment Scale (POSAS). Forty-four patients were available for follow up. The observer POSAS score for the prolene (10.26) was more favorable than the POSAS score for fast-absorbing gut (12.74), and the difference was statistically significant (p<0.001). Similarly the observer "overall opinion" rating was superior for prolene (1.88) compared to fast-absorbing gut (2.52) and the difference was statistically significant (p=0.006). The patient POSAS score for prolene (12.30) was also superior to the POSAS score for fast-absorbing gut (14.34), as was the patient overall opinion score for prolene (2.41) compared to fast-absorbing gut (3.14) but only the patient overall opinion score was statistically significant (p=0.043). Finally, there was no significant difference between the 2 closure methods in terms of width or adverse events.

Design: This was a prospective, randomized, split-scar intervention in patients undergoing repair of linear cutaneous surgery. After buried vertical mattress sutures were placed with vicryl sutures, half of the wound was randomized to receive running cuticular sutures with 5-0 prolene or 5-0 fast absorbing gut; the other size received the opposite. Three months postsurgery, the patient and 2 blinded observers evaluated the wound using the Patient Observer Self-Assessment Scale (POSAS), a validated scar instrument in which a score of 6 represents "normal skin" and 60 represents "the worst scar imaginable." In the "overall opinion" component, a score of 1 represents "normal skin" and a score of 10 represents "worst scar imaginable." The scar width and adverse events were recorded.

Conclusion: For the linear repair of linear cutaneous wounds, 5-0 prolene was aesthetically superior to fast-absorbing gut, with improved overall scar assessments by blinded observers and patient assessment. There was no difference in scar width or complications.

Table I. Demographics and Surgery Data							
Characteristic		Value					
Age, median		64.5					
Male sex, n (%)		31 (62)					
Race, n (%)	White	48 (96)					
	Asian	2 (4)					
Location, n (%)	Face	28 (56)					
	Trunk	10 (20)					
	Extremities	6 (12)					
	Neck	4 (8)					
	Scalp	2 (4)					
Closure length, mean cm		5.8					
Surgeon experience, n (%)	Fellow	24 (48)					
	Attending	17 (34)					
	Resident	9 (18)					
Indication, n (%)	Mohs	34 (68)					
	Excision	16 (32)					

Outcome Measure		Prolene	F. A. Gut	P-value
Observer POSAS,	Vascularity	2 (1.23)	2.47 +(1.62)	
mean (SD)	Pigmentation	1.61 (0.83)	1.91 (1.33)	
	Thickness	1.61 (1.06)	1.96 (1.310	
	Relief	1.56 (0.85)	2.08 (1.33)	
	Pliability	1.72 (1.04)	2.09 (1.37)	
	Surface area	1.79 (1.12)	2.38 (1.59)	
	Sum of POSAS	10.26 (4.16)	12.74 (5.82)	0.0009
	Overall opinion	1.88 (1.13)	2.52 (1.62)	0.006
Patient POSAS	Pain	1 (0)	1.02 (0.15)	
mean (SD)	Itching	1.09 (0.36)	1.11 (0.44)	
	Color	3.25 (2.43)	3.55 (2.42)	
	Stiffness	2.57 (2.29)	2.95 (2.27)	
	Thickness	2.20 (1.73)	2.86 (2.26)	
	Irregularity	2.18 (1.77)	2.84 (1.96)	
	Sum of POSAS	12.3 (7.63)	14.34 (8.14)	0.105
	Overall opinion	2.41 (1.66)	3.14 (2.01)	0.043
Scar width, mean		1.25	1.47	0.171
Complications, n		13	9	0.356

April 27, 3:15–3:21 pm

Presenter: Walayat Hussain, MD, FACMS

Title: The Utility of the OMEGA Graft in Full Thickness Defects of the Distal Nose

Author: Walayat Hussain, MD, FACMS¹

Institution: 1. Leeds Centre for Dermatology, Chapel Allerton Hospital, Leeds, United Kingdom

Purpose: Full-thickness defects of the distal nose are challenging to reconstruct. Recreating the inner mucosal nasal lining can be achieved in a number of ways including skin grafting, subcutaneous or mucosal perichondrial hinge flaps or interpolated, 2 or 3 stage turnover flaps. We describe the utility of the Omega graft (OmG) to reliably recreate the inner nasal lining whilst also providing structural integrity to the alar rim & distal nose.

Summary: The OmG is a composite graft harvested from the anti-helix and concha of the ear. The anti-helical component of the graft is sized to match the native missing alar rim & provides a chondro-cutaneous batten upon which to place a local single stage flap or an interpolated flap. The central portion of the OmG comprises a dome-shaped perichondrial-cutaneous segment which approximates to the dimensions of the missing nasal lining, but may also be harvested to include some conchal cartilage if additional structural support is required. The graft is turned over & sutured into place, ensuring the cutaneous aspect of the 'dome' forms the inner nasal lining & that the graft's inferior-most batten is sutured into pockets to recreate the natural convexity of the alar rim. The anti-helical donor site is repaired primarily & the conchal bowl left to heal by secondary intent. A single stage local flap or an interpolated flap is then performed to provide skin coverage & a robust vascular supply over the OmG.

Design: We have performed the OmG in seven patients (5 female, 2 male; mean age 77 years; 6 BCCs, 1 SCC). The size of the defect has ranged from small full-thickness defects of the nasal ala to complete loss of the ala sub-unit extending onto the nasal sidewall. There have been no cases of graft failure, contraction, or nasal airway obstruction and no cases of prolonged donor site morbidity, discomfort or perichondritis. Patient reported outcome measures were rated as good or excellent in all cases.

Conclusion: The OmG is a highly versatile & reproducible method of recreating the nasal lining & providing structural integrity to the distal nose in full thickness nasal defects. It mitigates the need for prolonged interpolated 3-stage flaps & enables the contour & integrity of the alar rim to be recreated. The graft also enables the inner aspect of the surgical defect to be addressed entirely separately from the cutaneous aspect, thus avoiding the need for bulky turnover flaps where accessing the nasal vestibule when suturing is always technically challenging. By utilising the anti-helix & conchal bowl as the donor site for the graft rather than the helical root, the OmG can be used for large nasal defects & is limited in its application only by the the size of the patient's concha.







April 27, 3:23–3:29 pm Presenter: Kathleen C. Suozzi, MD

Title: Second Intent Healing of Periocular Defects in Select Patients as an Alternative to Surgical Reconstruction

Authors: Kathleen C. Suozzi, MD¹; Yulia Khan, MD²; Sean R. Christensen, MD, PhD¹; Samuel Book, MD¹; David J. Leffell, MD¹

Institutions: 1. Yale University School of Medicine, New Haven, CT

2. Arizona Advanced Dermatology, Phoenix, AZ

Purpose: Surgical defects secondary to Mohs micrographic surgery (MMS) for treatment of periocular non-melanoma skin cancer can represent a reconstruction challenge. This study reviews the outcomes of all the periocular tumors treated with MMS in which the decision was made to allow defects to heal by second intent. It is a one-year single institution study.

Summary: A total of 22 tumors were identified for analysis. Basal cell carcinoma (BCC) represented 72.7% (16) of the lesions treated, with squamous cell carcinoma comprising 22.7% (5), and 4.5% (1) other tumor type. Nineteen cases (86.4%) involved the lower eyelid and 3 (13.6%) involved the upper eyelid. Involvement of the eyelid margin was seen in 36.4% (8) cases. The mean defect area was 0.92 cm2 and ranged from 0.07 - 2.83 cm2. The mean maximum linear defect dimension was 1.0 cm and ranged from 0.3 - 2.5 cm. Outcomes were assessed at scheduled clinical follow-up in 63.6% (14) of cases. An additional 18.2% (4) of cases were assessed by telephone interview and 18.2% (4) of cases had no follow up information available. Of the cases with follow-up data, two patients

reported mild tearing and two patients had mild notching noted on exam. No significant functional or cosmetic deficits were reported.

Design: Retrospective analysis was performed of all periocular lesions treated with MMS and allowed to heal by second intent from a single surgical center over a one-year period. Chart review was performed and data was collected including specific site location, assessment of involvement of eyelid margin, preand post-MMS lesion size, and tumor type. Follow-up data regarding post-operative complications and patient satisfaction with scar appearance was recorded for the cases that were seen in clinical follow-up. Telephone interviews were attempted to assess outcomes and complications for the cases that did not have clinical follow-up. Length of follow-up was recorded. Photographs immediately following MMS were evaluated in all cases. Post-op follow-up photos were available for 54.5% (12) of cases.

Conclusion: Second intent healing represents a viable option for managing periocular defects resulting from MMS. The results of this small retrospective study suggest that defects ranging in size from 0.07 – 2.83 cm2 healed with excellent to acceptable cosmesis and minimal functional impairment. Specifically, we observed that post-MMS defects of the lateral lower eyelid healed with the best aesthetic outcome and least functional impairment. In contrast, medially based lower eyelid defects were more prone to unpredictable second intent healing due scar contracture in a vertical dimension. Judicious use of second intention healing for periocular defects following MMS may improve patient satisfaction and decrease the cost of skin cancer treatment. Additional research can help define which patients are most likely to benefit from this approach.

					Eyelid	Defect Size	Follow-	
Case	Age	Sex.	Tumor Type	Locatient	Margie	(mun2)	up days	Complications
1	55	24	BCC	R upper eyelid	N	28	606	tione
2	-92	F	SCCIS	R lower cyclid.	N	55	666	none
3	- 58	F	BCC	R lower cyclid	N	12	11/0	no follow-up
- 4	-61	2.4	BCC	R lower eyelid	N	71	28	none
5	78	E.	BCC	L fower eyelid	Y	19	27	none
- 6	- 68	34	SCC	R lateral upper eyelid	N	77	306	none
7	68	M	SCCIS	L-lower eyelid	Y	52	nia	no fellow-up
8	. 83	F	BCC	R lower cyclid	Y	44	430	none
- 9	55	F	BCC	R upper cyclid	Y	7	513	none
10	81	F.	BOC	R lower eyelid	N	254		DODE
- 11	81	M	BCC	L lower cyclid	Y	275	63	mild octching
12	84	3.4	ASProf	L3ower cyclid	N	156	79	mild tearing
13	66	54	BCC	R lower eyelid	N	55	-429	DODE
14	-46	M	BCC	R lower inner cyclid	N	9	n'a	no follow-up
15	67	м	BCC	R lower lateral cyclid	N	106	133	none mild Tearing and
16	.90	7.6	BCC	L lower eyelid	N	71	64	mild lid sagging mild foreign body
37	87	F	SCCIS	R medial inferior cyclid	N	42	35	sensation
18	71	F	BCC	R lateral lower cyclid	Y	63	56	mild notching
19	- 83	M	SCC	L lateral lower eyelid	N	112	238	none
20	87	34	BCC	R lower cyclid	N	283	42	none
				eren Sara -				post-op pain at 9
21	62	F	BOC	R lower eyelid	Y	38	9	days
33	180	(F)	BOC	1. Jower evelut	Y	24	142	none



Figure 1. Results of second intent healing for post-MMS delects of the lower lid

(A) Case 8 - Laterally based post-MMS defect involving the lid margin and (8) result of second intent healing at 4mo follow-up. (C) Case 12 - Medially based post-MMS defect and (D) results of second intent healing at 3 mo follow-up.

Table 1. Case summary

April 27, 3:31–3:37 pm

Presenter: Joseph Diehl, MD

Title: An Ace in the Hole: Management of Surgical Wounds with Persistent Bleeding Following Mohs Surgery Using Tie-Over Bolster Dressings and Xenografts

Authors: Joseph Diehl, MD¹; Cory Trickett, MD¹; Steven Kent, MD¹; David Kent, MD, FACMS¹

Institution: 1. Dermatologic Surgery Specialists, Macon, GA

Purpose: To describe a novel technique for achieving durable hemostasis with second intention healing wounds in patients with postoperative oozing following surgery.

Summary: Management of perioperative bleeding during Mohs micrographic surgery (MMS) may be challenging due to a variety of reasons. These include medical comorbidities, advanced age, impaired platelet or coagulation factor function and production, nutritional supplements, NSAIDS, and an ever increasing number of anticoagulants of impressive potency. Often, these anticoagulants are used in combination with synergistic effects. Given the increased bleeding risks, surgeons may prefer second intention healing to elevating a flap or placing a skin graft and creating additional potential bleeding. Although various bandaging techniques are available to apply pressure and aid hemostasis, these may be insufficient and result return trips the operating room or ER.

Design: We describe a technique used on a series of patients with persisten oozing, employing the use of a traditional tieover bolster combined with a porcine xenograft left in place for 7 days. When there is concern for persistent bleeding, the pro-thrombotic xenograft combined with precise and persistent

pressure of a tie over bolster dressing can ease patient and physician anxiety regarding continued bleeding.

Conclusion: An effective technique utilizing a tie-over bolster over a porcine xenograft is presented in a series of patients to aid in hemostasis for wounds left to heal by secondary intention where persistent oozing or high risk for postoperative bleeding exists following Mohs surgery.

April 27, 3:39–3:45 pm

Presenter: Elizabeth Chao, MD, PhD

Title: Malignant Transformation of a Solitary Cylindroma

Authors: Elizabeth Chao, MD, PhD¹; Joyce Hoot, MD¹; Joshua Hagen, MD, PhD¹; Melissa Pugliano-Mauro, MD¹; Diane Cosner, MD¹; Jaroslaw Jedrych, MD¹; Timothy Patton, DO¹

Institution: 1. University of Pittsburgh Medical Center, Pittsburgh, PA

Purpose: To describe a rare case of a solitary malignant cylindroma treated successfully with Mohs micrographic surgery. We also review the etiology, diagnosis, histological features, and current management recommendations of this rare clinical entity.

Summary: Malignant transformation of a solitary cylindroma is extremely rare, with only a few reported cases in the medical literature. We present a case of a patient with an atypical adnexal neoplasm with cylindromatous differentiation and features concerning for malignant transformation. Given the locally aggressive nature of these lesions and potential for metastasis, prompt surgical excision with clear margins and careful follow-up surveillance is recommended. Our patient underwent tumor extirpation by Mohs micrographic surgery to achieve the highest cure rate with maximum tissue preservation. To date, the patient is alive and well with no recurrence or evidence of metastasis.

Design: A 64-year-old male was referred for evaluation of a longstanding, asymptomatic "cyst" on his scalp, with progressive growth over the past year. Clinical examination revealed a 2.0 cm x 1.3 cm, salmon-pink, well-circumscribed, firm dermal nodule with overlying alopecia and a smooth lobulated surface on the left vertex scalp. No lymphadenopathy was appreciated. Dermatoscopic evaluation of the nodule showed numerous arborizing telangiectasias. The lesion was biopsied for pathologic evaluation. Histopathologic evaluation revealed an atypical adnexal neoplasm with cylindromatous differentiation. There was prominent cellular and nuclear pleomorphism as well as a loss of the classic "jigsaw-mosaic" configuration of round to polygonal basaloid nests, loss of eosinophilic hyaline sheath, and loss of bimorphic cell composition and distribution, consistent with malignant transformation. Given concern for an evolving malignant cylindroma, complete surgical excision was recommended. The patient underwent Mohs micrographic surgery, during which the tumor was cleared in one stage and the postoperative wound defect was repaired in a complex linear closure. Whole-body PET/CT was negative for metastasis, but did show a focal area of increased isotope uptake within the soft tissue nodules and subcutaneous fat over the left vertex skull

but no uptake was visualized within the brain, osseous structures, or lymph nodes. At 6-month follow-up, the patient was disease free with no evidence of recurrence.

Conclusion: This case underscores the importance of considering malignant transformation of a solitary cylindroma and supports the growing evidence that this entity does in fact harbor malignant potential. Prompt recognition of this neoplasm is critical as malignant cylindromas have aggressive, metastatic potential, and early diagnosis and surgical management can offer patients the best possibility of a cure. However, given the rarity of this entity, no evidence-based guidelines exist and the majority of our knowledge is based on results from a few case reports and small case series.



Figure 1. (A, C) A 2.0 cm x 1.3 cm, salmon-pink, firm nodule with overlying alopecia and lobulated surface on the left vertex scalp (B) Characteristic adnexal tumor architecture: an asymmetric nonencapsulated neoplasm composed of parts resembling cylindroma on two cross-sections (H&E, x 1)



Figure 2. (A) A roughly well-delineated nodular dermal proliferation distributed in irregular lobules of basaloid cells outlined by a rim of eosinophilic hyaline membrane (hematoxylin and eosin (H&E), x 2). (B) An area of malignant transformation is shown here, including loss of the jigsaw-mosaic pattern, loss of delicate hyaline sheaths, and loss of peripheral palisading. There are hypercellular lobules and nests of crowded basaloid cells displaying nuclear enlargement, discernible nucleoli, and scant cytoplasm. Isolated mitotic figures are visible (H&E, x 40). (C) An area of typical cylindroma, composed of two cell populations: smaller cells with round hyperchromatic nuclei tagging the periphery of the lobule and cells with slightly enlarged vesicular nuclei occupying the center of the lobule. Ductal differentiation and scattered hyaline globules are evident within the tumor nest. (H&E, x 20). (D) KI-67 expression does not exceed 5% within the lesion.



April 27, 3:47–3:53 pm

Presenter: Leigh Sutton, MD

Title: HIPAA Compliant Text & Photographs

Authors: Elizabeth Sutton¹; Leigh Sutton, MD²; Ikue Shimizu²

Institutions: 1. University of Nebraska College of Medicine, Omaha, NE

2. Baylor College of Medicine, Houston, TX

Purpose: Dermatology has a need to transfer photographs that frequently include patient information. Eighty-nine percent of Mohs surgeons report a high-quality photograph would be the most accurate method of identifying a previous biopsy site. 1 Although the demand to transfer photographs and protected health information (PHI) is present, it doesn't always transpire in a secure form. Twenty-seven percent of residents and 19% of attending physicians use unsecured text on a regular basis to communicate regarding patients including PHI.2 Some physicians try to circumvent the unsecured transfer of photographs by using the patient's phone to store a picture.

Summary: Protected health information is used by HIPAA to define the type of patient information that is under jurisdiction of the law. This information includes photographs with identifying information such as head and face photographs, initials, birthdates, etc. Photographs are frequently sent with PHI so receiving physician can identify the patient. HIPAA compliant methods to transmit photographs include encrypted text messaging and secure email. Secure text messaging requires logging-in each session, messages are automatically deleted after period of time, and PIN-lock app if device is stolen. This application can be integrated into a desktop computer. Often companies that provide this service for a fee are willing to sign a Business Associate Agreement that assures their product is HIPAA compliant. Secure email requires end-to-end encryption. The benefits of secure email include that it is not hosted on own infrastructure & photographs can easily be added to patient's chart. Downsides include that one can only ensure HIPAA compliant email on own end and potential for a monthly fee. Some physicians use the patients' phones to document biopsy sites or lesions. It is assumed that a patient's phone is outside

of HIPAA regulations. However, it is unclear if this assumption is true if the patient is instructed by physician to take a picture and even more uncertain if the physician's employee takes a medical photograph with the patient's phone. HIPAA considers mobile devices to be at-risk. There is limited ability to transfer photographs from a patient's phone to the physician's EHR.

Design: None.

Conclusion: The importance of HIPAA compliant transfer patient photographs to assist with documentation and correct-site surgery is only going to increase. Today, there are readily available options such as encrypted text messaging and secure email that meets HIPAA standards for secure transfer of photographs that do not involve patients' phones. (1. Nemeth SA, Lawrence N. Site identification challenges in dermatologic surgery: A physician study. J Am Acad Dermatol 2012;67:262-8. 2. McKnight R, Franko O. HIPAA compliance with mobile devices among ACGME programs. J Med Syst. 2016;40(5):129.)

April 27, 3:55–4:01 pm

Presenter: Jessica M. Donigan, MD

Title: Cosmetic and Functional Outcomes of Second Intention Healing for Mohs Defects of the Lips

Authors: Jessica M. Donigan, MD¹; Eric Millican, MD¹

Institution: 1. University of Utah, Salt Lake City, UT

Purpose: The lips play a critical role in speaking, eating, emotional expression, and cosmetic appearance. Unfortunately, the lips are also a common location for skin cancer, and therefore, a common site for Mohs micrographic surgery (MMS). Reconstruction of surgical defects on the lips can be challenging and may have associated complications including bleeding, infection, and functional and cosmetic impairment. Wound healing by secondary intention is associated with a lower risk of some post-operative complications, and can have excellent cosmetic results. However, few studies have examined second intention healing of the lip, and none to date have evaluated outcomes using a specific scar assessment scale. This study aimed to evaluate second intention healing of the upper and lower vermillion lips following MMS using the Patient and Observer Assessment Scale (POSAS).

Summary: Seventeen phone interviews and five clinic assessments were performed (n=22). Patients included 14 males and 8 females with a mean age of 67 years. Mean follow-up time was 1.5 years. Mean surgical defect size was 1.5 cm. Three patients had extension of the defect onto the cutaneous lip. Overall, patients noted excellent functional and good to excellent cosmetic outcomes, and were satisfied with healing time. Eighty-six percent of patients would choose second intention healing again. The most common post-operative complication was difficulty eating. The average total score on the patient POSAS was 15.9 with an average overall opinion of 3.1. For the five patients who also underwent the observer assessment, the average total score on the observer POSAS was 14.4 with an average overall opinion of 2.6.

Design: All patients with second intention healing of MMS defects on the vermillion lips between January 2013 and

November 2016 were identified via retrospective chart review. Those who were unable to come to clinic for an observer assessment were interviewed over the phone. Complication rates, patient satisfaction with functional and cosmetic results, and time to healing were assessed. The patient scale of the POSAS was performed for all patients. The observer scale of the POSAS was also completed for patients who were able to come to clinic.

Conclusion: Second intention healing has satisfactory functional and cosmetic outcomes, and healing times with few complications and should be considered for surgical defects on the vermillion lips as large as 3.5cm. The major limitations of this study are recall bias and lack of randomized comparison with surgical repair. Future work will include the assessment of additional patients to obtain a larger sample size as well as a higher number of observer assessments.





	1					2				5	Patier	t POSAS	Observ	er POSAS
Patient No./Sex/ Age (y)	Follow- up (m)	Tumor type	Tumor location	Post-op defect (cm)	Functional satisfaction score (1-4)	Cosmetic satisfaction score (1-4)	Healing satisfacti on score (1-5)	Post-op compli- cations	Would repeat	Total score (6-60)	Overall opinion (1-10)	Total score (6-60)	Overall opinior (1-10)	
1/F/71	30	BCC	L upper	0.9x0.8	4	4	4		Y	7	2			
2/M/45	5	SCC	Central lower	2.2x1.0	4	4	5		Y	14	3			
3/M/71	42	SCC	Llower	1.8x1.4	4	3	3	B,E	N	24	3			
4/F/79	16	SCC	R lower	2.8x1.5	3	3	4	P	N	23	3			
5/M/37	7	SCC	R lower	2.0x1.3	4	3	4		Y	15	3			
6/F/63	2	SCC	L lower	0.7x0.6	4	3	5		Y	27	4		***	
7/M/67	3	SCC	Central lower	1.0x0.7	4	3	5		Y	32	4			
8/F/59	15	SCC	Central upper	1.1x0.8	4	2	5		Y	37	10			
9/M/90	27	SCC	L upper	2.0x1.3*	4	4	5		Y	6	1		***	
LO/M/81	41	SCC	Llower	1.5x1.5	3	2	5		Y	14	5			
11/F/70	14	BCC	R upper	0.9x0.5*	4	4	5		Y	6	1			
12/M/65	17	SCC	Llower	1.2x1.2	3	4	5		N	6	1			
13/M/82	22	BCC	L upper	1.0x0.8	4	4	5		Y	6	1			
14/M/74	21	BCC	Central upper	0.8x0.8	3	2	5		Y	23	5			
15/M/73	24	SCC	R upper	0.9x0.8*	4	4	5		Y	6	1			
16/M/71	22	SCC	R lower	1.6x1.2	4	3	5		Y	6	1			
17/M/87	6	SCC	L upper	1.5x1.0	3	3	4		Y	6	1			
18/F/56	14	SCC	Central	0.5x0.5	4	4	5		Y	18	4	19	4	
19/M/59	46	SCC	Central lower	2.1x1.2	4	4	3	P.E	Y	14	2	14	2	
20/F/53	10	SCC	Central lower	3.5x1.0	3	4	5	Е	Y	22	5	18	3	
21/M/64	2	SCC	R lower	2.0x1.3	4	3	5	E	Y	16	3	11	2	
22/F/58	14	SCC	Central lower	1.6x1.1	4	4	5	E	Y	21	4	10	2	

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April 28, 8:30–8:37 am

Presenter: Kathleen M. Nemer, MD

Title: Complications following Mohs Micrographic Surgery in Patients Aged 85 and Older: A 9-Year Single Institution Retrospective Review

Authors: Kathleen M. Nemer, MD¹; James J. Ko, BA¹; Eva A. Hurst, MD, FAAD, FACMS¹

Institution: 1. Washington University School of Medicine, St. Louis, MO

Purpose: By the year 2050, 25% of Americans will be older than age 85. As the U.S. population ages, there is increased incidence of non-melanoma skin cancer (NMSC) and a sustained rise in the surgical procedures necessary for treatment. Recently, there has been significant interest in the medical literature and lay press regarding the safety of Mohs Micrographic Surgery (MMS) in the elderly. A landmark study by Cook and Perone in 2003 reported a MMS complication incidence of 1.64% in the general population, with most surgical complications involving hemostasis. While prior studies have documented the safety of cutaneous surgery in older patients, none have reported the complication incidence associated with MMS in the very elderly. With this study, we aimed to determine the incidence of complications associated with MMS in patients aged 85 and older, and the factors that predispose to increased complications.

Summary: A total of 949 patients were included (47% female, 53% male) resulting in 1683 MMS cases. The mean patient age was 88 years. Most tumors were located on the head and neck (81%). The most common tumors treated were basal cell carcinoma (54%), squamous cell carcinoma (32%), and squamous cell carcinoma in-situ (12%). The average tumor measured 1.34cm2, required 1.8 stages of MMS, and resulted in a defect measuring 3.76cm2. Linear closures (49%), flaps (20%), grafts (6%), second intention healing (16%), and outside referral (6%) were utilized for repair. Complication incidences were as follows: hematoma formation (0.4%), postoperative hemorrhage (0.3%), postoperative infection (0.7%), wound dehiscence (0.4%), graft necrosis (0.9%), and flap necrosis (0.3%), with a total complication rate of 1.78%. There were no major complications as a result of surgery including hospitalization, functional loss, death, or other major sequelae. Patients with complications had a higher likelihood of anticoagulant use (37% vs. 17%) and a higher incidence of diabetes (27% vs. 15%). The results of this large retrospective study support that MMS is a safe treatment option for NMSC in the elderly.

Design: A retrospective review was conducted of patients 85 and older who underwent MMS from 07/01/2007 to 11/01/2016 at a large academic medical center. The study was approved by the university's Institutional Review Board. Documented data points included patient age, gender, other patient characteristics and lifestyle factors, tumor characteristics (histologic type, location, size), number of stages, repair size and type, and surgical defect size. Data collection was standardized using well-defined postoperative complications: hematoma formation, postoperative hemorrhage, postoperative infection, wound dehiscence, graft necrosis, and flap necrosis.

Conclusion: Mohs micrographic surgery and repair of associated defects is a safe and effective means of treating skin cancer in patients aged 85 and older, with an overall complication rate of 1.78%.

Table 1: Locations and Types of Treated Tumors

Location	Number of cases			
Face (not nose, ear, lip, eyelid)	596			
Nose	285			
Ear	165			
Lip	45			
Eyelid	91			
Scalp	144			
Neck	45			
Trunk	44			
Extremity (not hand or foot)	184			
Hand	75			
Foot	9			

Type of Tumor	Number
	of cases
Basal cell carcinoma	905
Squamous cell carcinoma	543
Squamous cell carcinoma in-situ	209
Atypical fibroxanthoma	5
Sebaceous carcinoma	5
Squamous/basal cell carcinoma overlap	5
Porocarcinoma	3
Atypical Squamous Proliferation	3
Carcinoma unspecified	2
Microcystic adnexal carcinoma	1
Malignant melanoma	1
Malignant peripheral nerve sheath tumor	1

Table 2: Types of repairs performed

Type of Repair Performed	Number of cases
Complex layered linear closure	826
Flap	347
None (second intention)	277
Outside referral	97
Graft	95
Graft and flap	14
Purse string	14
Intermediate layered linear closure	13

Table 3:	Types and	Incidence of	Complications
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All complications	30/1683	1.78%
Hematoma formation	6/1683	0.4%
Postoperative hemorrhage	5/1683	0.3%
Postoperative infection	11/1683	0.7%
Wound dehiscence	6/1406	0.4%
Graft necrosis	1/109	0.9%
Flap necrosis	1/361	0.3%

April 28, 8:38–8:45 am

Presenter: Tiffany L. Tello, MD

Title: Predictors of Adverse Outcomes in Undifferentiated Pleomorphic Sarcoma

Authors: Tiffany L. Tello, MD¹; Daniel Winchester, MD²; Julia Lehman, MD²; Thaddeus Mully, MD¹; David O. Hodge¹; Nicolette Chimato³; Clark Otley, MD²; Sarah Arron, MD, PhD^{1,4}

Institutions: 1. University of California-San Francisco, San Francisco, CA

2. Mayo Clinic, Rochester, MN

3. Mayo Clinic, Jacksonville, FL

4. San Francisco VA Medical Center, San Francisco, CA

Purpose: The term undifferentiated pleomorphic sarcoma (UPS) has been proposed to encompass pleomorphic dermal sarcoma, atypical fibroxanthoma (AFX), and the deeper bone/soft tissue malignant fibrous histiocytoma (MFH). These rare spindle cell neoplasms histopathologically appear identical, but have considerably different outcomes. The clinical and histopathologic characteristics associated with a poorer prognosis in these tumors are undefined; therefore, we sought to identify predictors of local recurrence, metastasis, and death in UPS.

Summary: Among 319 patients studied, 45 (14.1%) developed a local recurrence, 24 (7.5%) developed regional recurrence, 33 patients (10.3%) had metastatic disease, and 96 subjects (30.1%) died. Tumor location on the trunk or extremities had a significantly increased risk for metastasis when compared to head and neck. Preoperative tumor size greater than 2 cm had a significantly increased risk of local recurrence, metastasis, and death. Clinical predictors of all-cause mortality were older age and immunosuppression (Table I). Histopathologically, depth of invasion beyond the subcutaneous fat was associated with a significantly increased risk of local recurrence and metastatic disease. The presence of lymphatic or intravascular invasion (LVI) was associated with a significantly higher rate of metastatic disease and death. The predominant cytomorphology did not significantly impact the rate of local

Design: All cases with diagnostic terminology of AFX, PDS, MFH, and UPS between 1980-2013 at three large tertiary care medical centers were included in this study. The existing histopathology slides were reviewed by a dermatopathologist; characteristics evaluated were depth of invasion, LVI, and predominant cytomorphology (pleomorphic/anaplastic, epithelioid, or spindled). Clinical variables assessed were tumor location, tumor size, age, immunosuppression, and history of skin cancer. The primary outcomes were local recurrence, regional recurrence, metastasis, and death. The cumulative probability of each endpoint was estimated using the Kaplan-Meier method. Potential risk factors were evaluated using Cox proportional hazards models, including univariate and multivariate models. Multivariate modeling was performed using forward selection for univariate p value <=0.05.rformed using forward selection for univariate p value <=0.05.

Conclusion: The results of this study help to define clinical and histopathologic predictors of adverse outcomes in patients with UPS. Depth of invasion beyond the subcutaneous fat and larger tumor diameter were identified as the most consistent high-risk features. Other poor prognostic indicators were LVI, location on the trunk or extremities, immunosuppression, and older age at diagnosis. Future studies to delineate optimal therapeutic and surveillance strategies for high-risk patients should be undertaken.

	Local		All cause
	Recurrence	Metastasis	mortality
Clinical variables			
Age	NS	NS	1.07(1.05-1.10)*
Immunosuppression	NS	NS	2.58(1.65-4.02)*
Treatment site	NC	E 1E/0 E0 10 E0*	NO
(trunk/extremities)	NS	5.15(2.53-10.50)	INS
Tumor size 2-5cm ¹	1.40 (0.55-3.55)*	5.77 (1.49-22.32)*	2.31(1.37-3.91)*
Tumor size >5cm1	5.5 (2.07-14.79)*	29.02 (7.67-109.8)*	2.89(1.42-5.89)*
Histopathologic variables			
Depth of invasion beyond			
subcutaneous fat	3.3(1.55-7.10)*	24.90(5.85-106.0)*	NS
Lymphatic or vascular invasion	NS	8.22(2.48-27.22)*	5.59(2.03-15.35)*
Cytomorphology	NS	NS	NS

Table 1. Hazard ratios (HR) and 95% confidence interval (CI) for clinical and histopathologic variables in UPS. Results listed as HR(CI). NS=not statistically significant. *p-value <0.05. ¹: Compared to tumors <2cm in size.

April 28, 8:46–8:53 am

Presenter: Emily S. Ruiz, MD, MPH

Title: National and Regional Skin Cancer Expenditure Analysis in the United States Medicare Population, 2013

Authors: Emily S. Ruiz, MD, MPH¹; Frederick Morgan, BS¹; Robert Besaw, MPH¹; Corwin Zigler, PhD²; Chrysalyne Schmults, MD, MSCE¹

Institutions: 1. Brigham & Women's Hospital, Boston, MA 2. Harvard T.H. Chan School of Public Health, Boston, MA

Purpose: Little has been done to evaluate skin cancer care delivery in the United States. Prior studies have primarily focused on estimating overall cost of skin cancer care, but have not evaluated regional variations in spending or cancer expenditure on a disease-specific level. This study evaluates the total cost of skin cancer surveillance and treatment on a national and state level as well as allocation of funds by diagnosis and procedure for Medicare beneficiaries.

Summary: The total cost of skin cancer care in 2013 for Medicare beneficiaries was \$2.6 billion of which 23.6% was allocated to surveillance costs and 55.1% and 23.1% were allocated to treatment of malignant tumors and benign/ pre-cancerous lesions, respectively. The overall mean cost per patient was \$73.85 with melanoma representing the most

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costly diagnosis to treat per patient (\$1,200.49) followed by BCC (\$619.45) and SCC (\$588.91) (Table 1). Of the \$178 million spent on melanoma treatment, 40% was allocated toward ipilimumab for 920 patients (\$80 thousand per patient treated). For both BCC and SCC treatment, approximately 40% and 30% of spending was allocated toward surgical removal (Mohs micrographic surgery and standard surgical excision) and repairs (primary repairs, flaps, and grafts), respectively. Geographic variation was identified for the total cost per Medicare beneficiary (figure 1) and the mean cost per patient treated (figure 2).

Design: Data from the 2013 5% sample Medicare claims set were gueried for International Classification of Disease, ninth revision (ICD-9) codes pertaining to cancer related diagnoses (melanoma, basal cell carcinoma [BCC], squamous cell carcinoma [SCC], carcinoma in situ, actinic keratosis, other malignant neoplasms of skin, and neoplasm uncertain behavior of skin) to generate treatment costs. Screening procedures (evaluation & management [E&M] visits associated with ICD-9 codes for benign neoplasms, neoplasm uncertain behavior of skin, and actinic keratoses, and biopsies) were identified through associated Current Procedure Terminology (CPT) codes. The total cost, total number of patients treated, and mean cost per person treated for skin cancer care was determined on a national and state level and for each treatment and screening category. Claims associated with the cancer related ICD-9 codes were analyzed by CPT code to determine how resources were allocated.

Conclusion: Skin cancer expenditures for Medicare beneficiaries are substantial with approximately a quarter of funds being allocated to surveillance and treatment of benign/precancerous lesions and just over half being used for treatment of malignant lesions. The overall mean cost per patient to treat melanoma was approximately double that of nonmelanoma skin cancer, which is most likely due to the high costs of ipilimumab in a small subset of patients. Further analyses on geographic variations in spending on specific procedures could help identify whether access to care contributes to discrepancies in spending.

Table 1. Costs of skin cancer screening an	treatment among Medicare beneficiaries
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	Total Annual Cost, \$ (%)	# Patients Treated	Mean Cost Per Patient
Overall Total Cost	\$2,615,704,794.00	35,419,160	\$73.85
Surveillance Costs	\$617,356,966.60 (23.6)	7,130,160	\$86.58
E&M	\$164,377,780.20 (6.3)	2,512,840	\$65.42
Biopsies	\$452,979,186.40 (17.3)	4,617,320	\$98.10
Treatment of Malignant Tumors Costs	\$1,441,869,561.60 (55.1)	2,606,040	\$553.28
Melanoma	\$177,601,187.00 (6.8)	147,940	\$1,200.49
Basal Cell Carcinoma	\$642,992,784.60 (24.6)	1,038,000	\$619.45
Squamous Cell Carcinoma	\$477,286,873.60 (18.2)	810,460	\$588.91
Other Malignant Neoplasm	\$81,773,891.80 (3.1)	249,080	\$328.30
In Situ Carcinoma	\$62,214,824.60 (2.4)	360,560	\$172.55
Treatment of Benign and Pre-Cancerous Lesion Costs	\$556,478,265.80 (21.3)	6,390,320	\$87.08
Actinic Keratosis	\$452,211,967.60 (17.3)	3,974,280	\$113.78
Neoplasm Uncertain Behavior/ Dysplastic Nevus	\$104,266,298.20 (4.0)	2,416,040	\$43.16

Figure 1. Mean cost per Medicare beneficiary by state



Figure 2. Mean cost per person treated by state



April 28, 8:54–9:01 am

Presenter: Erica H. Lee, MD, FACMS

Title: Survival Trends and Comorbidities in Patients 85 Years and Older with Nonmelanoma Skin Cancer Presenting for Mohs Surgery

Authors: Erica H. Lee, MD, FACMS¹; Emma Rogers¹; Stephen Dusza, PhD¹; Karen Connolly, MD¹; Anthony Rossi, MD¹; Kishwer Nehal, MD¹;

Institution: 1. Memorial Sloan Kettering Cancer Center, New York, NY

Purpose: There is controversy regarding treatment of Nonmelanoma skin cancers (NMSC) in the very elderly. Treatment options range from nonsurgical management to Mohs Micrographic surgery (MMS); however, some have suggested that the very elderly population may not live long enough to benefit from more invasive treatment. To help guide management decisions, a shared decision making approach, which includes the assessment of comorbidities, has been proposed. The objectives of this study were (1) identify patient and tumor characteristics in very elderly individuals presenting with NMSC, (2) grade comorbidities using the Adult Comorbidity Evaluation (ACE-27) and the Charlson Comorbidity Index (CCI), (3) examine long-term survival outcomes.

Summary: Ten thousand one hundred three patients presented for Mohs surgery, and 371 patients were aged 85 years or older. One hundred seventeen patients aged 85 years or older were seen for Mohs consultation, however did not pursue MMS. The mean age was 87.9 years for MMS patients and 88.8 years for non-MMS patients. The Kaplan Meier survival curves for MMS and non-MMS patients are presented in Figure 1. Patients who underwent MMS had a median survival of 67 months compared with 47 months in non-MMS patients, p=0.004. Ten-year survival was below 20% for both groups. No significant differences in the distribution of comorbidities were observed between the two groups. Both the CCI and the ACE-27 scores were significantly associated with overall survival.

Design: Single-center study of patients aged 85 years or older who presented for NMSC management to a dermatologic surgery service from July 1999 to December 2014. In addition, an institutional database was searched under IRB approval to identify patients who presented to the service but did not undergo MMS. Patient demographics, tumor characteristics, and surgical details were recorded; for those patients who did not have Mohs surgery, reason for treatment choice was noted. Comorbidities were scored using the ACE-27 and the CCI. Dates of last follow-up or death were obtained from the institutional database to determine overall survival. For univariate assessments of overall survival, Kaplan-Meier survival curves, stratified by Mohs status, were created.

Conclusion: Patients aged 85 years and older who had MMS had improved survival compared to the non-MMS group. While both the ACE-27 and CCI predicted survival in these cohorts, MMS was also a strong predictor of survival. This suggests that additional factors such as functional status contribute to survival in this group. Age alone is inadequate for making NMSC treatment decisions in the very elderly, and a comprehensive management approach should include comorbidities, functional status, and anticipated life expectancy.



April 28, 9:02–9:09 am

Presenter: Kelly M. MacArthur, MD

Title: Unnecessary Cost of Post-Mohs Permanent Pathology

Authors: Kelly M. MacArthur, MD¹; Nikki Tang, MD¹; George J. Hruza, MD, MBA²; Timothy S. Wang, MD^{1,3}; Robert G. Egbers, MD, MS¹

Institutions: 1. Johns Hopkins University, Baltimore, MD 2. Laser & Dermatologic Surgery Center, Inc., St. Louis, MO 3. MetroDerm, P.C., Atlanta, GA

Purpose: By providing tumorfree margins, Mohs micrographic surgery (MMS) results in high cure rates in the treatment of nonmelanoma skin cancers (NSMCs). However, when closure of the post-MMS defect is coordinated with colleagues in reconstructive surgery, redundant tissue is sometimes submitted to Pathology for permanent section evaluation. We investigated the frequency of this practice at our institution and the incidence of tumor in the submitted redundant tissue.

Summary: Based on published cure rates for MMS, we expected that submitting the redundant tissue would result in few positive findings and have a negligible impact on the patient while additionally increasing costs.

Design: Pediatric and adult male and female patients (12 years of age and older) with non-melanoma skin cancers meeting American Academy of Dermatology (AAD)'s appropriate use criteria (AUC) who underwent MMS with coordinated post-MMS closures from 2014 to 2016 were identified. The cost analysis portion of this study was performed utilizing the American Medical Association 2016 Current Procedural Terminology (CPT) codes. During the study period, 408 MMS cases were coordinated with reconstructive surgeons post-MMS. Of these, 125 had specimens submitted for permanent section evaluation, with an average of 1.6 specimens per case (range of 1-7 total specimens submitted per case). After evaluation by Pathology, none of these specimens showed residual malignancy and there was thus no change in patient management post-operatively. There were no significant differences between the 125 cases with pathology sent for permanent section and the remaining coordinated MMS cases, with respect to patient age, to basal cell and squamous cell carcinoma tumor histology, or to defect size (p>0.05). Based on CPT code-based Medicare reimbursement, the marginal cost associated with sending specimens for permanent section was approximately \$121 per case.

Conclusion: To our knowledge, this is the first analysis of the practice of submitting post MMS specimens and the associated costs. In our series, the lack of positive findings and negligible impact on patient care suggest that sending post-MMS redundant tissue for permanent sections may be of limited utility, should not be performed routinely, and is indicated in select cases only. Additional work is warranted to determine what role, if any, this practice should have in conjunction with MMS.

Table 1: Patient characteristics

Characteristics	
Patient age	
Mean	62
Median	63 (12-96)
Sex	
Male	43
Female	82
Tumor site – High risk *	
Superior eyebrow	4
Eyelid	8
Cheek – preauricular	4
Nose	49
Upper lip and philtrum	10
Lower lip	1
Ear	4
Temple	2
Chin	2
Genitalia	2
Tumor site – Medium risk *	
Forehead	7
Cheek - non-preauricular	17
Scalp	3
Leg – pretibial	3
Tumor site - Low risk *	
Back	2
Chest	1
Leg – non-pretibial	6
Tumor type	
BCC - aggressive features *	25
BCC - nodular and/or superficial	61
SCC	15
SCCIS	15
DFSP	7
Sebaceous carcinoma	1
Atypical squamous/basaloid proliferation	1

*As defined by the Mohs Surgery Appropriate Use Criteria

April 28, 9:10–9:17 am

Presenter: Evan Stiegel, MD

Title: Prognostic value of sentinel lymph node biopsy according to Breslow thickness for cutaneous melanoma

Authors: Evan Stiegel, MD¹; David Xiong¹; Jason Ya¹; Alok Vij, MD¹

Institution: 1. Cleveland Clinic Foundation, Cleveland, OH

Purpose: To evaluate prognostic significance of sentinel node status according to Breslow thickness (BT) for patients who have undergone sentinel node biopsy for cutaneous melanoma.

Summary: The Multicenter Selective Lymphadenectomy Trial (MSLT-1), the only randomized trial of sentinel lymph node biopsy (SLNB) ever conducted, failed to meet its primary endpoint to detect a melanoma-specific survival benefit for SLNB versus observation. Despite these findings, the authors note that sentinel lymph node (SLN) status is the most important prognostic indicator for melanoma (hazard ratio of 3.09; P<0.001). For this reason, SLNB is widely performed on the grounds that it provides important staging information. BT alone has been proven to be an important prognostic indicator as demonstrated by the many studies that have confirmed the direct relationship between BT and survival. A criticism of the claim from the MSLT-1 authors regarding the powerful prognostic value of SLNB is that they fail to segregate patients based on depth of their tumor. There are limited studies examining differences in survival

according to SLN status and BT. Thus, we hope to answer the question as to whether SLNB results, when compared to BT alone, afford an advantage in predicting death from melanoma, providing important prognostic information for patients and clinicians justifying the use of the procedure.

Design: We performed a retrospective review of 896 patients who underwent SLNB for cutaneous melanoma. Statistical analysis was performed to determine if SLN improves predictive ability over BT. Stratified analysis of SLN status impact within BT groups (0.01-1mm, 1.01 - 2.00 mm, 2.01-4.00 mm, and > 4.00 mm) was then performed.

Conclusion: Having a negative SLN did not confer a statistically significant survival advantage for any Breslow thickness subgroup (P= 0.54, 0.075, 0.17, and 0.95 for subgroups 0.01-1mm, 1.01 - 2.00 mm, 2.01-4.00 mm, and > 4.00 mm, respectively; Table I). In multivariable analysis, SLN status did not demonstrate improved prognostic ability over Breslow thickness alone (P=0.067). In the absence of a therapeutic benefit to SLNB, lack of a prognostic advantage of SLN status over BT, suggested by our results, should be considered when justifying the risks of the SLNB, including morbidity of complete lymph node dissection, cost, and the necessity of deciding whether or not to pursue adjuvant therapy for a positive nodal status.

Table I Results from Cox proportional hazard models looking at the impact of Breslow thickness on survival alone, and by SLN Status are shown.

Variable N		Overall		SLN Positive		SLN Negative	Positive vs. Negative	
		5-Year Survival % (95% CI)	N	5-Y ear Survival % (95% C1)	N	5-Year Survival % (95% CI)	Cox Univariate Hazard Ratio (95% CI)]	
Breslow Thickness Gro								
up								
0.01 - 1.00	326	90.3(85.6,95.1)	25	85.7 (67.4,100.0)	301	90.8(85.8,95.7)	1.59(0.37,6.88)	
1.01 - 2.00	303	87.2(82.1,92.3)	44	82.0 (64.8,99.3)	259	88.1(82.8,93.4)	2.14(0.93,4.97)	
2.01 - 4.00	172	76.5(67.7,85.2)	56	68.9 (52.3,85.4)	116	79.5(69.3,89.8)	1.69(0.80,3.59)	
4.01+	95	73.5(62.0,85.1)	45	72.2 (56.2,88.2)	50	75.3(59.1,91.4)	0.97(0.43,2.18)	

April 28, 9:18–9:25 am

Presenter: Jacob J. Inda, MD

Title: Comparison of Brigham and Women's Hospital and American Joint Committee on Cancer Tumor Staging Systems for Cutaneous Squamous Cell Carcinoma in Patients with Chronic Lymphocytic Leukemia

Authors: Jacob J. Inda, MD¹; Nahid Vidal, MD¹; Brian Kabat¹; Melissa Larson¹; Susan Slager, PhD¹; Tait Shanafelt, MD¹; Christian Baum, MD¹

Institution: 1. Mayo Clinic, Rochester, MN

Purpose: Cutaneous squamous cell carcinoma is known to occur with increased frequency and to take a more aggressive clinical course in patients with chronic lymphocytic leukemia. Specifically, this patient population is at relatively high risk for adverse outcomes such as local recurrence, nodal metastasis, and disease-specific death. The objective of this study is to evaluate the performance of the Brigham and Women's Hospital and American Joint Committee on Cancer (AJCC) tumor staging

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systems for primary cutaneous squamous cell carcinoma in patients with chronic lymphocytic leukemia.

Summary: Among the 362 primary cutaneous squamous cell carcinoma tumors present in this patient cohort, 9 tumors were considered high-stage by BWH criteria (T2b or T3) and no tumors were classified as high-stage by AJCC criteria (T3 or T4). As a result, no cases of local recurrence, nodal metastasis, or disease-specific death occurred in high-stage AJCC tumor categories. The BWH system outperformed AJCC criteria by upstaging tumors in 3 of 11 cases of local recurrence, 2 of 3 cases of nodal metastasis, and in all 3 cases of diseasespecific death. AJCC criteria did not outperform BWH criteria through tumor upstaging in any case of local recurrence, nodal metastasis, or disease-specific death. The BWH criteria demonstrated superior homogeneity (fewer poor outcomes in low T stages) and monotonicity (proportion of poor outcomes occurring in high stages) relative to AJCC criteria, particularly for the outcomes of nodal metastasis and disease-specific death.

Design: An electronic database of patients diagnosed with chronic lymphocytic leukemia between January 1, 1995 and December 31, 2006 at a single academic institution was queried for cases of primary cutaneous squamous cell carcinoma (SCC). Exclusion criteria included SCC that developed prior to the diagnosis of chronic lymphocytic leukemia, SCC in situ, noncutaneous SCC, nonprimary SCC, and eyelid or anogenital primary tumor sites. After applying these exclusion criteria, 362 SCC tumors among 105 patients with chronic lymphocytic leukemia were present in the study. The chart of each patient was reviewed, and each SCC tumor was staged according to BWH and AJCC staging criteria. The chart of each patient was also reviewed for information regarding the outcomes of local recurrence, nodal metastasis, and disease-specific death.

Conclusion: In patients with chronic lymphocytic leukemia who subsequently develop primary cutaneous squamous cell carcinoma, the BWH tumor staging system outperforms the AJCC criteria by upstaging many cases of local recurrence, nodal metastasis, and disease-specific death. The BWH tumor staging system also demonstrates superior homogeneity and monotonicity relative to the AJCC staging criteria in this patient population.



Rapid Pearl Abstract Session – Saturday, April 29, 3:15–4:15 pm

April 29, 3:15–3:17 pm

Presenter: Kurtis B. Reed, MD

Title: Enhancing Patient Experience and Office Efficiency with a Digital Assistant

Author: Kurtis B. Reed, MD¹ Institution: 1. St. Luke's Clinic, Twin Falls, ID

April 29, 3:18–3:20 pm

Presenter: Hakeem Sam, MD, PhD, FACMS

Title: Topical Lidocaine 5% Ointment versus Petrolatum plus Occlusive Dressings after Mohs Layers

Author: Hakeem Sam, MD, PhD, FACMS^{1,2}

Institutions: 1. Meadville Dermatology and Skin Surgery Institute, Meadville, PA 2. University of Pittsburgh, Pittsburgh, PA

April 29, 3:21–3:23 pm

Presenter: Ethan Levin, MD

Title: A Simple Technique to Optimize Second Intention Healing of Nasal Alar and Tip Defects

Authors: Ethan Levin, MD¹; Bryan Sofen¹; Isaac Neuhaus, MD¹; Siegrid Yu, MD¹

Institution: 1. University of California-San Francisco, San Francisco, CA

April 29, 3:24–3:26 pm

Presenter: Melanie A. Clark, MD

Title: The Use of a Hair Transplant Blade for Peripheral Margin Assessment of Locally Advanced Squamous Cell Carcinoma of the Face Requiring Orbital Exenteration: A Collaborative Tumor Extirpation Technique

Authors: Melanie A. Clark, MD¹; Allison T. Vidimos, MD, RPh¹

Institution: 1. Cleveland Clinic Foundation, Cleveland, OH

April 29, 3:27–3:29 pm

Presenter: Sarah E. Schram, MD, FACMS

Title: Foot Drop Following Mohs Surgery

Authors: Sarah E. Schram, MD, FACMS¹; Elizabeth H. Beck, MD^2

Institutions: 1. Pima Dermatology, Tucson, AZ 2. Allina Healthcare, Minneapolis, MN

April 29, 3:30-3:32 pm Presenter: Geoffrey F.S. Lim, MD

Title: The Slip Knot: A Novel Technique for Closing **High-Tension Surgical Defects**

Authors: Geoffrey F.S. Lim, MD¹; David L.K. Chen, MD²; Melissa Pugliano-Mauro, MD¹; Glenn Goldman, MD²

Institutions: 1. University of Pittsburgh Medical Center, Pittsburgh, PA

2. University of Vermont, Burlington, VT

April 29, 3:33–3:35 pm

Presenter: Sreya Talasila, MD

Title: Online Patient-Reported Reviews of Mohs Micrographic Surgery: Qualitative Analysis of Positive and Negative Experiences

Authors: Sreya Talasila, MD¹; Michael Pelster, MD¹; Shuai Xu, MD¹; Zaza Atanelov²; Ashish C. Bhatia, MD^{1,3}

Institutions: 1. Northwestern University, Chicago, IL 2. New York Medical College, Valhalla, NY 3. The Dermatology Institute, Naperville, IL

April 29, 3:36–3:38 pm

Presenter: Ravi S. Krishnan, MD, FACMS

Title: Composite "Drumhead" Grafts for Deep Alar Defects

Author: Ravi S. Krishnan, MD, FACMS¹ Institution: 1. Virginia Mason Medical Center, Seattle, WA

April 29, 3:39–3:41 pm Presenter: Leigh Sutton, MD

Title: Does your Practice Need a Picture Archiving and Communication (PAC) System for Medical Images?

Author: Leigh Sutton, MD¹

Institution: 1. Baylor College of Medicine, Houston, TX

April 29, 3:42–3:44 pm

Presenter: Walayat Hussain, MD, FACMS

Title: The 'Staple Sandwich' - An Efficient and Reliable Method of Dressing Wounds on the Scalp

Author: Walayat Hussain, MD, FACMS¹

Institution: 1. Leeds Centre for Dermatology, Leeds, United Kingdom



Rapid Pearl Abstract Session – Saturday, April 29, 3:15–4:15 pm

April 29, 3:45–3:47 pm Presenter: Sweta Rai, MD, MRCP

Title: How to Optimize Reconstruction of Large Eyelid Cheek Junction Defects with the Use of Periosteal Anchoring Sutures

Author: Sweta Rai, MD, MRCP1

Institution: 1. Kings College Hospital NHS Foundation Trust, London, United Kingdom

April 29, 3:48–3:50 pm

Presenter: Matthew Q. Hand, MD

Title: How to Build a Cheap Cross-Polarized Dermatoscope

Author: Matthew Q. Hand, MD¹ Institution: 1. University of Utah, Salt Lake City, UT April 29, 3:51–3:53 pm Presenter: Jerry Smith, MD

Title: Bilateral Crescentic Advancement Flap for Larger Midline Nasal Defects

Authors: Jerry Smith, MD¹; Rajiv Nijhawan, MD¹ Institution: 1. UT Southwestern Medical Center, Dallas, TX

April 29, 3:54–3:56 pm Presenter: Chih-Shan J. Chen, MD, PhD, FACMS

Title: Non-Staining Artifact in Toluidine Blue-Stained Mohs Sections caused by Common Topical Hemostatic Agents - Mechanism and Solution

Authors: Curtis Chen¹; Steve Willson²; Chih-Shan J. Chen, MD, PhD, FACMS²

Institutions: 1. University of Miami Miller School of Medicine, Miami, FL

2. Memorial Sloan Kettering Cancer Center, Hauppauge, NY



Posters will be displayed outside the General Session room (Salon B). Posters will be displayed from 11:00 am Thursday, April 27 through 2:00 pm Saturday, April 29.

Authors have been requested to stand by their poster to answer any questions during the following timeframes:

Even Number Posters (2-40):

Thursday, April 27 from 12:00–1:00 pm

Odd Number Posters (1-39):

Saturday, April 29 from 12:00–1:00 pm

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CMS Voluntary Pre-Payment Review Pilot

Sidney P. Smith, III, MD, FACMS

1. Georgia Skin & Cancer Clinic, Savannah, GA

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Efficacy of Mohs Micrographic Surgery and Wide Local Excision for the Treatment of Atypical Fibroxanthoma: A Systematic Review

<u>Benjamin F. Kelley, MD</u>¹; Stanislav N. Tolkachjov, MD²; Fares Alahdab, MD¹; Jerry D. Brewer, MD¹

1. Mayo Clinic, Rochester, MN

2. Surgical Dermatology Group, Birmingham, AL

3

Comparison of Tumor Stage Dependent Outcomes for Cutaneous Squamous Cell Carcinoma in Immunosuppressed and Immunocompetent Patients: A Case-Control Study

Jessica L. Gonzalez, BS¹; Kiera Cunningham, BS, MBS¹; Rebecca Silverman, BA¹; Elena Madan, BA¹; Melanie Chen¹; Maggie Feng¹; Gwendolyn Towers¹; Ronghao Zhou¹; Chia-ling Liu, RN, MPH, ScD²; Bichchau Michelle Nguyen, MD, MPH¹;

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2. Evalogic Services, Newton, MA

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Hemostatic-Anesthetic Solution Containing Tranexamic Acid Can be Used Subcutaneously to Reduce Bleeding During Dermatologic Surgery - A Double Blind Randomized, Prospective Clinical Study

<u>Tami Brutman Barazani, PhD</u>¹; Uriel Martinowitz, MD¹; Prof. Josef Haik²; Lili Cohen, RN¹; Isaac Zilinsky, MD¹

The Chaim Sheba Medical Center, Ramat Gan, Israel
Sackler School of Medicine, Tel Aviv University, Israel

5

Comparative Analysis of Outcomes Prediction Between a Prognostic 31-Gene Expression Profile and Sentinel Lymph Node Biopsy in a Cohort of 690 Cutaneous Melanoma Subjects

<u>Kyle R. Covington, PhD</u>¹; Brooke M. Middlebrook¹; Robert W. Cook, PhD¹

1. Castle Biosciences, Inc., Friendswood, TX

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A Rapid Method for Detecting Non-Melanoma Skin Cancer in Mohs Micrographic Surgery

<u>Manish J. Gharia, MD, FAAD, FACMS</u>¹; William D. Gregory, PhD, PE¹; John R. Shell,PhD¹

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Prospective Histologic Evaluation of Cutaneous SCC Debulk Specimens Prior to MMS for Accurate Staging

<u>Marc Stees, MD</u>¹; B. Jack Longley, MD¹; Jens Eickhoff, PhD¹; Yaohui Xu, MD, PhD¹

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Physicians Rate Mohs Surgery Scars more Favorably than Patients at Short- and Longer-Term Postoperative Assessments

Kimberly Shao, BS¹; Christopher J. Miller, MD¹; Thuzar M. Shin, MD, PhD¹; Jeremy Etzkorn, MD¹; Junqian Zhang, BS¹; <u>Joseph</u> <u>Sobanko, MD¹</u>

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Retro-Bulbar Orbital Pain Heralding the Diagnosis of Recurrent Cutaneous Squamous Cell Carcinoma Tracking Along the Trigeminal Nerve

<u>Alex Holliday</u>¹; Nicholas Ramey²; Douglas Grider¹; Mariana Phillips¹

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2. Vistar Eye Center, Roanoke, VA

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Prognostic Accuracy of a 31-Gene Expression Profile (GEP) in a Cohort of Patients with Invasive Cutaneous Melanoma of the Head and Neck

 $\underline{Robert \ W. \ Cook, \ PhD^1}; \ Brooke \ S. \ Middlebrook^1; \ Kyle \ Covington, \ PhD^1$

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The Frequency of Auricular Cartilage Invasion by NMSC

Rebecca K. Jacobson, MD¹; Hugh M. Gloster, Jr., MD¹

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IPad and Cell Phone Use and Disinfection Procedures in Mohs Surgery Practices

Joseph Diehl, MD¹; David Kent, MD¹

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Impact of Early Head and Neck Melanoma Diagnosis on Health-Related Quality of Life: A Prospective Study

<u>Nina Blank, BA</u>¹; Erica Lee, MD¹; Karen Connolly, MD¹; Kishwer Nehal, MD¹

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Smooth Muscle Induction in Basal Cell and Squamous Cell Carcinomas: A Rare Phenomenon

<u>Kelly L. Reed, DO</u>¹; Jessica Riley, DO¹; James Ramirez, MD¹; Kent Krach, MD¹

1. St. Joseph Mercy Hospital, Ypsilanti, MI

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Mass Spectrometry Imaging for Delineating Basal Cell Carcinoma in Ex-Vivo Mohs Tissue Sections

<u>Albert S. Chiou</u>¹; Katy Margulis-Goshen, PhD¹; Livia S. Eberlin²; Jean Y. Tang¹; Richard N. Zare¹; Sumaira Z. Aasi, MD¹

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2. University of Texas-Austin, Austin, TX

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Comparison of Ipsilateral and Contralateral Paramedian Forehead Flaps to Reconstruct Lateral Nasal Subunits

<u>Adam R. Mattox, DO</u>¹; Ashley McGuinness, BS¹; Eric S. Armbrecht, PhD¹; Ian A. Maher, MD¹

1. Saint Louis University School of Medicine, St. Louis, MO

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Massive Rapid Hematoma Formation after Simple Anesthetic Puncture - The Importance of Clinically Recognizing Undiagnosed and Potentially Dangerous Coagulopathies in Surgical Patients

Andrew Hankinson, MD¹; Todd Holmes, MD¹

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Lichenoid Cutaneous Eruption Secondary to PD-1 Inhibitor Mimicking Squamous Cell Carcinoma Clinically and Histologically

<u>Geoffrey F.S. Lim, MD</u>¹; Jenna R. Bordelon, MD²; Stephanie Dietz, MD¹; Melissa Pugliano-Mauro, MD¹

University of Pittsburgh Medical Center, Pittsburgh, PA
University of Connecticut, Farmington, CT

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Adverse Events in Mohs Micrographic Surgery

Rebecca K. Jacobson, MD¹; Hugh M. Gloster, Jr., MD¹

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Emerging Resistance Patterns Among Methicillin sensitive Staphylococcus Aureus Cultured in an Academic Mohs Surgery Practice

Alex Holliday¹; Mariana Phillips¹

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Automated 5-minute Mohs Micrographic Surgery Immunohistochemistry

<u>Alfonso Heras, DVM, PhD</u>1

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Creating Animations of Dermatologic Surgeries Using Adobe Animate CC

<u>Miaoyuan Wang, MD</u>¹; Satori Iwamoto, MD, PhD¹; Robert Fischer, MD, MS¹

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The Nasal Tip Rotation Flap for Reconstruction of the Lateral Nasal Tip, Anterior Ala and Soft Triangle: Our Experience with 55 Patients

<u>Anastasia Benoit, MD</u>¹; S. Tyler Hollmig, MD²; Brian C. Leach, MD³

- 1. Dermatology Specialists, Westminster, CO
- 2. Stanford University School of Medicine, Redwood City, CA
- 3. Medical University of South Carolina, Charleston, SC



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What do Mohs Surgery Patients Value? A Prospective Survey Study

<u>Paul R. Massey, MD</u>¹; Katherine R. Sebastian, RN, MPH¹; Vinay Prasad, MD, MPH²; Simi D. Cadmus, MS¹; Matthew C. Fox, MD¹

University of Texas at Austin, Austin, Texas
Knight Cancer Institute, Portland, OR

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Correlation Between Original Biopsy Pathology and Mohs Intraoperative Pathology

<u>Evan Stiegel, MD</u>¹; Charlene Lam, MD, MPH²; Christina Wong, MD¹; Ally-Khan Somani, MD, PhD³; Jennifer Lucas, MD¹; Christine Poblete-Lopez, MD¹;

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2. Penn State College of Medicine, Hershey, PA

3. Indiana University School of Medicine, Indianapolis, IN

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Concordance Between Mohs Micrographic Surgeon and Dermatopathologist Interpretation of Slides during Mohs Micrographic Surgery in Management of Squamous Cell Carcinoma: A Prospective Observational Study

Anne Truitt¹; Jack Mann²; Blanca Martin²; Raj Mallipeddi, MD²

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2. St. John's Institute of Dermatology, London, United Kingdom

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Incidence, Treatment, and Clinical Behavior of Cutaneous Malignancy in a Group of Solid Organ Transplant (Lung) Recipients, A Single Institution's Experience

Ramin Fathi, MD1; Anne Maxwell, MD1; Adam Terella, MD1

1. University of Colorado Denver, Aurora, CO

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Smoke Evacuation during Mohs Surgery

Yousif Yonan, MD¹; Shari Ochoa, MD¹

1. Mayo Clinic Arizona, Scottsdale, AZ

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Follicular Involvement in Lentigo Maligna: Frequency and Treatment Implications

<u>Karen L. Connolly, MD</u>^{1,2}; Cerrene Giordano, MD¹; Klaus Busam¹; Kishwer Nehal, MD¹

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2. Lincoln Hospital, Bronx, NY

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Number of Mohs Stages for Mohs Micrographic Surgery Fellows and Experienced Mohs Surgeons in Cosmetically Sensitive versus Other Areas of the Face

<u>Elizabeth Chase, MD</u>¹; Nicole Warner¹; Victor Marks, MD¹; Mary Petrick, MD¹; Michael Ramsey, MD¹

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Closure of Mohs Micrographic Surgery Lower Extremity Wounds: Are We Wasting our Time?

<u>Sean Condon, MD</u>¹; Janet Adegboye¹; Ann Kim¹; Alok Vij, MD¹ 1. Cleveland Clinic, Cleveland, OH

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Microcystic Adnexal Carcinoma Treatment and Outcomes: A Retrospective Analysis of 40 Cases

Sean Condon, MD¹; Allison Vidimos, MD, RPh¹

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Complications with Novel Oral Anticoagulants Dabigatran, Apixaban and Rivaroxaban in Mohs Micrographic Surgery

Natalie L. Hone¹; Camila Antia¹; Hugh M. Gloster, Jr., MD¹

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Residual Squamous Cell Carcinoma after Shave Biopsy in Solid Organ Transplant Recipients

<u>Muneeb Ilyas, BSc</u>¹; Nan Zhang¹, MS; Amit Sharma, MD¹ 1. Mayo Clinic Arizona, Scottsdale, AZ

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A 10-Minute Method to Animate Suture Techniques Using Adobe Software

 $\underline{Robert\ Fischer,\ MD^1};\ Miaoyuan\ Wang,\ MD^1;\ Satori\ Iwamoto,\ MD,\ PhD^1$

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Defining Skin Cancer as a Chronic Disease

<u>Adam Sutton, MD, MBA</u>¹; Ashley Crew, MD¹; Alexandre Ly, RN, BSN¹; Shauna Higgins, MD¹; Ashley Wysong, MD, MS¹

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Mohs Micrographic Surgery in the Veterans' Health Administration

Andrew Tam, MD¹; Joyce Yuan, MD¹; Theodora Mauro, MD^{1,2}; Robert Dellavalle, MD, PhD, MSPH³; <u>Sarah Arron, MD, PhD, MD²</u>

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- 2. San Francisco VA Medical Center, San Francisco, CA
- 3. University of Colorado, Denver VA Medical Center, Denver, CO

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Atypical Fibroxanthoma Treated with Mohs Micrographic Surgery vs. Conventional Excision: A Single Institution Experience

Patrick Phelan¹; <u>Martha Council, MD¹</u>

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Scar Appearance Improves with Time but Favorable or Unfavorable Short-Term Appearance Persists at Longer-Term Follow-Up

Kimberly Shao, BS¹; Christopher J. Miller, MD¹; Thuzar M. Shin, MD, PhD¹; Jeremy Etzkorn, MD¹; Joseph Sobanko, MD¹

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I

Presenter: Sidney P. Smith, III, MD, FACMS

Title: CMS Voluntary Pre-Payment Review Pilot

Author: Sidney P. Smith, III, MD, FACMS¹

Institution: 1. Georgia Skin & Cancer Clinic, Savannah, GA

Purpose: The Center for Medicare and Medicaid Services Center for Program Integrity (CMS/CPI) is responsible for the Federal program's Waste, Fraud and Abuse. The CMS/ CPI and the practicing Mohs surgeon share identical goals of demonstrating adherence to evidence based utilization of Mohs surgery and elimination of Fraud, Waste, and Abuse. Programs that can unify our goals would save CMS money and improve care throughout the country. We are developing the first CMS integrated Palmetto Medicare Administrative Contractor (MAC) Pilot for Mohs surgery.

Summary: Our team has collaborated with Melanie Coombs-Dyer, Director of CMS Center for Program Integrity to develop a process through which a Mohs surgeon utilizing the AAD/ ACMS/ASDSA/ASMS 2012 appropriate use criteria for Mohs micrographic surgery can electronically submit Mohs surgery claims and linked pathology reports to CMS through a Rules Engine. The Rules Engine software utilizing the Mohs appropriate use criteria, the Mohs surgical note, and the pathology report would confirm compliance with these guidelines.

Design: This pilot involves software integration of the Mohs operative note, pathology note, claims clearing house, electronic submission of medical documentation Health Information Handlers, MAC, CMS, development of Rules Engine software, and pathology tracking software. As no current software exists to enable this pilot, our team has created the entire platform. Unique aspects of the pilot enable Mohs surgeons to send digital operative reports with distinct data for tumor location, size, histology, and Mohs indication. The Mohs note is linked to the pathology report with a "Unique Biopsy Confirmation Number" assigned by pathology tracking software utilized by the anatomical pathology lab and the original physician who biopsied the patient.

Conclusion: The pilot will benefit the Mohs surgeon, CMS, pathologist, and most importantly the patient. Mohs surgeons will have a process to prospectively demonstrate adherence to ACMS evidence based Mohs guidelines, receive recognition of their compliance, receive compensation for their services, and virtually eliminate the post payment audit. CMS benefits from the pilot through reducing waste, fraud, abuse, and decreasing the need or expense of post payment audits. Benefiting the most, patients receive evidence based treatment from the Mohs surgeons who daily demonstrate their excellent care.



2

Presenter: Benjamin F. Kelley, MD

Title: Efficacy of Mohs Micrographic Surgery and Wide Local Excision for the Treatment of Atypical Fibroxanthoma: A Systematic Review

Authors: Benjamin F. Kelly, MD¹; Stanislav N. Tolkachjov, MD²; Fares Alahdab, MD¹; Jerry D. Brewer, MD¹

Institutions: 1. Mayo Clinic, Rochester, MN 2. Surgical Dermatology Group, Birmingham, AL

Purpose: To systematically review and summarize the evidence about the recurrence and metastatic rate of AFX following treatment with MMS or WLE.

Summary: AFX is an uncommon fibrohistiocytic tumor typically found primarily on the head and neck of elderly white men.

It is thought to have an intermediate malignant potential with infrequent metastasis. The most utilized treatment modalities for AFX are wide local excision (WLE) and Mohs micrographic surgery (MMS). Unfortunately, there is a limited amount of data available comparing these treatment options.

Design: Methods: A comprehensive search of Ovid MEDLINE In-Process & Other Non-Indexed Citations, MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, and Scopus, from 1946 or the inception of the database to March 20th, 2017. Two investigators independently screened the studies. Data Extraction: Initial screening of 335 abstracts resulted in a full review of 23 articles (Figure 1). No randomized studies were available (Table 1). Two of the 23 were comparative and 19 non-comparative. One of the non-comparative studies contained duplicate data, and was used only for the immunocompromised subgroup analysis. Individual cases with incomplete data were excluded. The methodological quality was assessed using the Cochrane tool for risk of bias assessment as well as the Newcastle-Ottawa Scale. Results: The 23 publications included 914 patients with 927 tumors. Recurrence for those treated by WLE was 8.7% (95% CI 5% to 12.3%), shown in Figure 2. The metastatic rate of MMS was 1.9% (95% CI 0.1% to 3.8%), with four of these metastases coming from one article. The metastatic rate for WLE was 1.0% (95% CI 0.2% to 1.9%). There were no recurrences or metastases in the immunocompromised MMS subgroup (0/11), while 4/10(40%) recurred and one metastasized 1/10 (10%) in the WLE subgroup. A quality assessment of the articles was performed showing a low risk of bias.

Conclusion: Given the low quality studies available in the literature, a weak recommendation is given in favor of MMS as the first-line therapy for AFX based on the GRADE guidelines. Careful margin control made possible by MMS provides the ideal treatment modality for AFX, with the impression gained from the literature of a lower recurrence rate compared to WLE (2.85% vs. 10.04%). In particular, immunocompromised patients appear to be at a higher risk for recurrence and can benefit the most from MMS. While the metastatic potential of AFX is controversial, there appears to be a higher rate of reported metastases in those tumors that have previously recurred. This highlights the importance of tumor clearance during the first surgical procedure, a task that can be more adequately accomplished with MMS.

Study	Enrollment Years	No. of Patients	No. of Tumors	Location H&N/T/E	Technique	F/U mo	No. excluded	Recurrence	Metastasis
						(range)			
Anderson						(1 ange)			
2001 ²⁵	1989 -1999	10	10	10/0/0	WLE	60)	0	0	0
Ang, 20091	1980 - 2004	80	81	79/2/10	WLE (22 pts); FF (58 pts)	72 (20- 315)	13	WLE (1); FF (0)	WLE (0); FF (0)
Calonje, 1993 ²⁵	N/R	8	8	8/0/0	WLE	19 (6-48)	2	1	0
Clover, 2008 ⁸	1992 - 2002	28	28	26/0/2	WLE	N/R	0	8	0
Dahl,197627 Davidson	1958 - 1963	43	43	11/11/33	WLE	312)	14	1	0
20113	1989 - 2008	29	29	67/0/0	WLE	N/R	0	10	3
Eke, 20149	2007 - 2012	16	15	16:0/0	SM	23 (6-60)	1	0	1
Fretzin, 197211 Gemes da la	N/R	101	101	109/4/26	WLE	183)	38	8	0
Fuente, 2005 ²⁸	N/R	10	10	9/1/0	WLE	74)	0	1	0
Garcia, 200729	1994 - 2004	5	5	5/0/0	WLE	120)	0	1	0
Huether,200130	1980 - 1998	29	29	26/0/3	FF	125)	4	2	0
Koch, 2015 Leibenitch	1962-2014	17	20	19/1/0	WLE	94)	1	5	1
2006 ³¹	1993 - 2002	2	2	2/0/0	FF	60 (N/R) 23 5 (7)	3	0	0
1997 ³²	N/R	6	6	5/0/1	FF	32)	0	0	0
Mirza, 2005 ³³	1996 - 1999	76	77	55/22/12	WLE	80)	12	0	0
McCoppin, 2012 ³⁴ Seconds	N/R	11	11	11/0/0	WLE (5 pts); FF (6 pts)	26 (12- 72)	0	WLE (3); FF (0)	WLE (1); FF (0)
200615	1995 - 2004	8	8	8.0.0	FF	83)	5	0	0
Sloane, 2015	N/R	110	110	110/0/0	WLE	36 (N/R)	0	11	0
Thum, 201336	Since 2000	8	8	8.0.0	WLE	100)	3	0	0
Wang, 2015 Withore	2000-2011	152	152	152/0/0	WLE	145)	0	5	11
2011 ³⁷ Wolling	1996 - 2007	94	94	96/2/3	WLE	8.9 (1-23)	7	12	0
201510	2001 - 2012	50	53	52/0/1	FF	13 (2-60)	3	3	4
Wyfie, 201038	N/R	14	14	14:0/0	WLE	72)	2	1	0





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Presenter: Jessica L. Gonzalez, BS

Title: Comparison of Tumor Stage Dependent Outcomes for Cutaneous Squamous Cell Carcinoma in Immunosuppressed and Immunocompetent Patients: A Case-Control Study

Authors: Jessica L. Gonzalez, BS¹; Kiera Cunningham, BS, MBS¹; Rebecca Silverman, BA¹; Elena Madan, BA¹; Melanie Chen¹; Maggie Feng¹; Gwendolyn Towers¹; Ronghao Zhou¹; Chia-ling Liu, RN, MPH, ScD²; Bichchau Michelle Nguyen, MD, MPH¹

Institutions: 1. Tufts Medical Center, Boston, MA 2. Evalogic Services, Newton, MA

Purpose: Immunosuppressed (IS) patients have worse outcomes from cutaneous squamous cell carcinomas (cSCC) compared to the general population. However, it is unclear whether this is due to the development of higher stage tumors or worse outcomes for a given tumor stage. Our study is the first to quantify the increased risk of poor outcomes from cSCCs in IS patients and race, gender and age matched immunocompetent controls based on multiple tumor staging systems, including the latest AJCC 8th edition (AJCC-8).

Summary: 412 primary invasive cSCCs from 106 immunosuppressed patients, and 291 tumors from 212 matched immunocompetent controls were included. Immunosuppressed patients had similar proportions of high T stage tumors compared to immunocompetent controls: 0% vs. 0.3% AJCC-7 T3, 2.9% vs. 4.5% AJCC-8 T3, 1.0% vs. 1.7% BWH T2b, 0.2% vs. 0.3% BWH T3 (Table 1). However, immunosuppression was associated with increased risk of SCC-related poor outcomes for low-stage tumors i.e. AJCC-7 T1 [OR 4.29 (CI 1.98-9.27)], AJCC-8 T1 [OR 3.45 (CI 1.64-7.23)], AJCC-8 T2 [OR 3.75 (CI 1.15-12.20)], BWH T1 [OR 3.53(CI 1.61-7.71)] and BWH T2a tumors [OR 3.41 (CI 1.18-9.83)] (Table 2). Immunosuppression did not impact the risk of poor outcomes in high-stage AJCC-7 T2, AJCC-8 T3, BWH T2b/T3 tumors.

Design: Single institution 1:2 case control study of primary invasive cSCCs in mixed cause immunosuppressed patients and age, gender, and race matched immunocompetent controls. Tumors were stratified based on tumor T stage using AJCC-7, AJCC-8 and BWH criteria. Risks of local and nodal recurrence, and overall disease-specific poor outcomes were analyzed.

Conclusion: Immunosuppressed patients did not have a higher proportion of high-stage cSCCs compared to age, gender, and race matched immunocompetent patients. However, immunosuppression was associated with 3-4-fold increase in disease-specific poor outcomes from low-stage cSCCs (i.e. AJCC-7 T1, AJCC-8 T1/T2, and BWH T1/T2a). There was no significant difference in risk of poor outcomes for high-stage cSCCs (i.e. AJCC-7 T2, AJCC-8 T3, and BWH T2b). This may be due to i) a lack of power to detect differences due to the small proportion of high stage cSCCs in this cohort and/or ii) that there may be a higher incidence of overall poor outcomes for high-stage cSCCs regardless of immune status.

Table 1. Tumor staging distribution

A	Number of Tumors						
Tumor Staging System	Cases		Controls			arison*	
	N	%	N	N %		OR	95% CI
AJCC-7							
T1	352	85.4	242	83.2	0.4	1.2	0.79-1.79
T2	60	14.6	48	16.5	0.5	0.9	0.57-1.30
T3	0	0.0	1	0.3	0.4		-
T4	0	0.0	0	0.0	-		-
AJCC-8							
T1	341	82.8	230	79.0	0.2	1.3	0.87-1.86
T2	59	14.3	48	16.5	0.4	0.9	0.56-1.28
T3	12	2.9	13	4.5	0.3	0.6	0.29-1.43
T4a	0	0.0	0	0.0			
T4b	0	0.0	0	0.0	-		-
BWH							
T1	333	80.8	227	78.0	0.4	1.2	0.82-1.72
T2a	74	18.0	58	19.9	0.5	0.9	0.60-1.29
T2b	4	1.0	5	1.7	0.4	0.6	0.15-2.11
T3	1	0.2	1	0.3	1.0	0.7	0.04-11.33

* = Control used as reference for chi-square statistics. Fisher's Exact statistics were used when cell sample size < 5.

Table 2. Tumor staging cases versus controls

	Overall Disease-Specific Poor Outcomes						
Tumor Staging System	C	ases	Controls		C	Comparison*	
	N	%*	Ν	%†	Р	OR	95% CI
AJCC-7							
T1	45	12.8	8	3.3	< 0.001	4.29	1.98-9.27
T2	14	23.3	7	14.6	0.3	1.78	0.66-4.85
AJCC-8							
T1	42	12.3	9	3.9	< 0.001	3.45	1.64-7.23
T2	15	25.4	4	8.3	< 0.05	3.75	1.15-12.20
T3	2	16.7	2	15.4	1.0	1.10	0.08-27.61
BWH							
T1	38	11.4	8	3.5	< 0.001	3.53	1.61-7.71
T2a	18	24.3	5	8.6	< 0.05	3.41	1.18-9.83
T2b	2	50.0	2	40.0	1.0	1.50	0.13-9.34
T3	1	100.0	0	0.0	1.0	-	-
No poor outcomes occurred for	the AJ	CC-7 T3	tumo	r, there v	were no AJC	C-7 or /	JCC-8 T4

No pool outcome decurred to the ACC-715 tunior, there were no ACC-757 to tunior, s = Control used as reference for chi-square statistics. Fisher's Eact statistics were used when cell sample size < 5. \uparrow = Percentage of tuniors in each stage for cases and controls.

4

Presenter: Tami Brutman Barazani, PhD

Title: Hemostatic-Anesthetic Solution Containing Tranexamic Acid Can be Used Subcutaneously to Reduce Bleeding During Dermatologic Surgery - A Double Blind Randomized, Prospective Clinical Study

Authors: Tami Brutman Barazani, PhD¹; Uriel Martinowitz, MD¹; Prof. Josef Haik²; Lili Cohen, RN¹; Isaac Zilinsky, MD¹

Institutions: 1. The Chaim Sheba Medical Center, Ramat Gan, Israel

2. Sackler School of Medicine, Tel Aviv University, Israel

Purpose: To evaluate the safety and efficacy of Tranexamic acid injected subcutaneously together with anesthetic solution to reduce bleeding during Dermatologic surgery.

Summary: Tranexamic acid (TXA) is commonly used in various procedures to stop bleeding by topical application, oral consumption and IV injection. Its safety was described in numerous articles. As far as we know, TXA has never been used via subcutaneous injection during dermatologic surgery. In previous study we have shown that application of gause impregnated with TXA, adrenaline and lidocaine on a surgical wound may be effective in reducing bleeding between Mohs stages.

Design: In this double-blinded, randomized controlled trial, 124 subjects were randomized to 1:1 Tranexamic acid 100mg/1ml or saline, mixed with Lidocaine 2% and injected subcutaneously prior to Mohs Surgery procedures. At the second Mohs stage, size measurements of the blood stain on a Telfa pad and the defect were recorded. Subjective evaluation of hemostasis was performed by a single surgeon using 4 scale grading (excellent, good, moderate or none). The results showed that the mean ratio of blood stain size to Mohs defect size in the injected hemostatic anesthetic solution group was 1.9, whereas the mean ratio in the control saline group was 2.5 (P=0.026). 82% of the hemostatic anesthetic solution group were graded as excellent or good whereas 71% in the control saline group. Analysis of patients receiving antiaggregation/anticoagulation treatment demonstrated statistically significant less bleeding. The mean ratio of blood stain size to Mohs defect size was 1.6 for the injected hemostatic anesthetic solution group versus 2.4 for the saline control group (p=0.001). 92% of the hemostatic anesthetic solution group were graded as excellent or good whereas only 62% in the saline control group.

Conclusion: Subcutaneous injection of an anesthetic hemostatic solution of TXA and Lidocaine was found to be safe and effective in reducing blood loss during Mohs surgery. The anesthetic hemostatic solution can be also used for patients receiving antiaggregation/anticoagulation drugs, hence there is no need to discontinue their use before surgery and endanger the patients with severe complications.

5

Presenter: Kyle R. Covington, PhD

Title: Comparative Analysis of Outcomes Prediction Between a Prognostic 31-Gene Expression Profile and Sentinel Lymph Node Biopsy in a Cohort of 690 Cutaneous Melanoma Subjects

Authors: Kyle R. Covington, PhD¹; Brooke M. Middlebrook¹; Robert W. Cook, PhD¹

Institution: 1. Castle Biosciences, Inc., Friendswood, TX

Purpose: Staging of patients with cutaneous melanoma includes determination of tumor thickness, ulceration status, mitotic rate and nodal status. Sentinel lymph node biopsy (SLNBx) is recommended for consideration in patients with Breslow thickness >0.75mm, presence of ulceration or mitotic rate >1/mm2; however, two of three patients that die from melanoma are clinically or pathologically node negative at the time of initial diagnosis. We previously validated a 31-gene expression profile (GEP) test that accurately predicts risk of metastasis within 5 years of diagnosis. Herein, we use Net Reclassification Improvement (NRI) analysis to assess the value added to standard of care management in a cohort of 690 melanoma patients.

Summary: Stage I-III subjects were examined (stage I: n=333, 48%; stage II: n=150, 22%; stage III: n=207, 30%). Median age=59 (range: 18-94), Median Breslow thickness=1.3mm (range: 0.1-29mm), median follow-up was 6.5 years (0-16.5 years; all subjects without recurrence had follow-up > 5 years). 217 (31%) subjects had a recurrence of melanoma, 164 (24%) had a distant metastasis, and 58 (8%) experienced a documented melanoma-specific death,). 44% were SLNBxpositive. Based on GEP, 298 (43%) subjects were high risk, Class 2, category. Performance statistics of node status and node status plus GEP class are shown in Table 1. NRI analysis, which examines performance by evaluating sensitivity and specificity individually and combined, showed that combining the GEP test with clinical or pathological nodal status generated a significantly improved test compared to nodal status alone for predicting recurrence (p=0.000089) and distant metastasis (p=0.019). The GEP test plus nodal status was consistently more sensitive (p<0.0001).

Design: Primary tumor samples and associated clinical data were collected under an IRB-approved, multicenter protocol. qPCR analysis was performed to assess expression of 28 prognostic and three control genes, and Radial Basis Machine predictive modeling was used to predict risk (Class 1 vs. Class 2) based on comparison of the 690 cases to an established training set. Analysis used the Hmisc, pROC, and survival packages in R.

Conclusion: Our results found a significant net improvement of risk prediction when the GEP test is used in combination with clinical melanoma staging. While node status has traditionally been viewed as the most accurate prognostic factor, the addition of GEP testing with standard of care management improved the identification of high risk melanoma patients who should be considered for risk-appropriate increased surveillance.

Measure	Outcome	Sensitivity	Specificity	PPV	NPV
Node Status	Recurrence	0.54 (0.47, 0.61)	0.82 (0.79, 0.86)	0.58 (0.51, 0.65)	0.80 (0.76, 0.83)
(clinical or	Distant Met	0.57 (0.49, 0.65)	0.80 (0.76, 0.83)	0.47 (0.40, 0.54)	0.86 (0.82, 0.89)
patriologic)	MSS	0.67 (0.54, 0.79)	0.75 (0.71, 0.78)	0.20 (0.14, 0.26)	0.96 (0.94, 0.98)
Node Status +	Recurrence	0.87 (0.82, 0.91)	0.64 (0.59, 0.68)	0.52 (0.47, 0.58)	0.91 (0.88, 0.94)
GEP	Distant Met	0.88 (0.82, 0.92)	0.59 (0.54, 0.63)	0.40 (0.35, 0.45)	0.94 (0.91, 0.96)
	MSS	0.95 (0.86, 0.99)	0.52 (0.48, 0.56)	0.15 (0.12, 0.19)	0.99 (0.97, 1.00)
Table 1: Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) for the					

under the ROC curve, GEP: gene expression profiling test result.

6

Presenter: Manish J. Gharia, MD

Title: A Rapid Method for Detecting Non-Melanoma Skin Cancer in Mohs Micrographic Surgery

Author: <u>Manish J. Gharia, MD, FAAD, FACMS</u>¹; William D. Gregory, PhD, PE¹; John R. Shell, PhD¹

Institution: 1. Madison Medical Affiliates, Brookfield, WI

Purpose: See summary.

Summary: The quality and speed with which tissue is evaluated in Mohs Micrographic Surgery (MMS) is critical to the Mohs process and the patient's overall care and experience. We report a study using a novel new device for rapidly detecting the presence or absence of non-melanoma skin cancer in tissue excised during MMS. The device (Figure 1) uses an electrical property of the tissue to discern malignant tissue from nonmalignant tissue. This device is loosely based on the concept of impedance, which has a long history in cancer detection-with decidedly mixed results. In contrast, the study device measures the rate at which cells store and discharge electricity called the Cole relaxation frequency (Fc) expressed in Hz (discharges/ second). This is a whole cell parameter that is independent of the sample geometry, mass and other non-cellular effects. Moreover, it is up to a thousand-fold different for cancerous vs. non-cancerous tissue, producing a highly accurate classification of the tissue. An array of electrodes shown in Figure 1 (expanded view) is used to deliver electrical currents to the specimen. A sophisticated software algorithm is used to extract the Cole frequency from the data. Figure 2 is a plot of a portion of the electrical data for two cases, one showing that cancer is present in the tissue and the other showing the lack of cancer in the tissue. Fc is seen as the peak in the curve. For non-cancer Fc falls below 100 kHz, while cancer is more probable the higher the frequency is above that value. The result can be expressed as a probability that the physician can use to decide to proceed to another MMS Stage. A table of the preliminary results (Figure 3) from fifty patients enrolled in the study shows the two-level diagnostic statistics for Squamous Cell Carcinoma (SCC) and Basal Cell Carcinoma (BCC), combined and individually. Note that the sensitivity and specificity approached 100% for BCC and was exactly 100% for SCC. Additionally, a map of the position of the cancer cells within the excised tissue can also be obtained autonomously using the electrode array in Figure 1 with a spatial resolution of 0.5 mm. Further testing of the device will hopefully support and improve upon our recent results and yield a commercially available device for Mohs surgeons to continue to provide high quality care and expedite their treatment of patients with non-melanoma skin cancer.

Design: See summary.

Conclusion: See summary.

Figure 1: Overhead view of device with expanded view of electrode array and sample



Figure 2: Device Scanned Tissue Control Results,

Top Scan: Probable CA - (Positive);

Bottom Scan: Unlikely CA (Benign)







Presenter: Marc Stees, MD

7

Title: Prospective Histologic Evaluation of Cutaneous SCC Debulk Specimens Prior to MMS for Accurate Staging

Authors: Marc Stees, MD¹; B. Jack Longley, MD¹; Jens Eickhoff, PhD¹; Yaohui Xu, MD, PhD¹

Institution: 1. University of Wisconsin-Madison, Madison, WI

Purpose: Metastasis and mortality of cutaneous squamous cell carcinoma (SCC) correlate with its staging. It is difficult to ascertain accurate staging of SCC from partial skin biopsy or enface sectioned Mohs layers. Therefore, 2017 NCCN guidelines recommend submission of the central tumor for permanent vertical sections if it is deemed that initial biopsy did not yield sufficient information for proper treatment. There is a paucity of published data on this topic. We performed histologic evaluation of debulk specimens obtained prior to Mohs micrographic surgery (MMS) of high-risk SCCs in which tumor upstaging was suspected based on their clinical or pathological characteristics. Our study may help establish guidelines to stage SCCs more consistently in Mohs practice.

Summary: From 3/1/2016 to 12/8/2016, a total of 237 SCC and SCC in situ were treated. Of these, 10 lesions were concerning for high risk tumors and submitted for debulk histology (237/10 = 23.7). Nine tumors (90%) were larger than 2cm; the mean tumor size was 2.5 ± 0.6 cm. Tumors were clinically indurated or ulcerated, and initial biopsy revealed an infiltrative growth pattern. 5 SCCs (5/10 = 50%) were upstaged as compared to the partial biopsy based on the Brigham and Women's Hospital and AJCC 8th staging systems, and 1 was upstaged based on the AJCC 7th staging system (Tables 1-3). Tumors were upgraded primarily due to invasion beyond subcutaneous fat or extension >6mm from the granular layer of adjacent normal epidermis to the base of the tumor, indicating the importance of depth evaluation.

Design: This is a prospective one-year study (March 2016 - March 2017) from the practice of a single surgeon to histologically analyze the central debulk of selected high-risk SCCs prior to MMS. The study was approved by our Institutional Review Board. Patient demographic information, tumor size, and the anatomic location were recorded. Histologic slides from both the original biopsies and the debulk specimens were reviewed by our dermatopathologist. Tumor depth, margin involvement, perineural invasion, cell differentiation, other features (e.g., angiolymphatic invasion), and tumor stage were also recorded. The number needed to debulk was calculated by dividing the total number of patients with SCC and SCC in situ by the number of patients undergoing debulk. The percentage of tumors being upgraded was calculated by dividing the total number of tumors undergoing debulk.

Conclusion: Our study showed that the number needed to debulk was approximately 24 (237/10 = 23.7). 50% (5/10) of SCC lesions were upstaged upon review of their debulk specimens as compared to initial partial biopsy based on the BWH and AJCC 8th staging systems. We propose performing debulk histology

for SCCs that are large, indurated, ulcerated, and possess an infiltrative growth pattern.

				Debull	ĸ	
		TO	T1	T2a	T2b	T3
	T0					
Partial	T1		1			
Biopsy	T2a			3	5	
	T2b				1	
	T3					
	Table 2: Nu	mber of Case	s Staged Base	d on the 8 th AJ	CC Staging S	ystem
				Debull	k	
		Tis	T1	T2	T3	T4
	Tis					
Partial	T1		1			
Biopsy	T2			4	5	
	T3					
	T4					
	Table 3: Nu	mber of Case	s Staged Base	d on the 7 th AJ	CC Staging S	ystem
			Debulk			
		Tis	T1	T2	T3	T4
	Tis					
Partial	T1			1		
Biopsy	T2			9		
	T3					
	T4					

Presenter: Joseph Sobanko, MD

8

Title: Physicians Rate Mohs Surgery Scars More Favorably than Patients at Short- and Longer-Term Postoperative Assessments

Authors: Kimberly Shao, BS¹; Christopher J. Miller, MD¹; Thuzar M. Shin, MD, PhD¹; Jeremy Etzkorn, MD¹; Junqian Zhang, BS¹; Joseph Sobanko, MD¹

Institution: 1. Perelman Center for Advanced Medicine, Philadelphia, PA

Purpose: Patients' opinions of their scars can impact psychosocial health, and physician assessment of scars can influence patient counseling and decisions for scar revisions. This study compared patient and physician assessment of postoperative surgical scars.

Summary: Physicians rated all scar characteristics more favorably than patients at both short- and longer-term postoperative visits (p<0.05) (Figure 1). Scar ratings from patients and physicians had minimal agreement (Kw=0.0001 to 0.1294). Differences in ratings between physicians and patients decreased at the longer-term assessment; however, weighted kappa and concordance correlation coefficients remained low (Table 1). Patients placed greatest value on thickness in early scars and irregularity in later scars; while physicians accorded prime importance to surface area at both time-points (Figure 2). Female gender of the patient resulted in greater discrepancy between patient and physician (p<0.001). The validity of the assessment method was supported by the fact that physicians' overall opinion of scar appearance had high interrater reliability and internal consistency (ICC 0.80 p<0.001, Cronbach's alpha >0.84).

Design: Retrospective, analytic study of 113 adult patients with biopsy-proven, facial skin cancers treated with Mohs micrographic surgery at a single institution. Physicians and patients each rated



scars at short-term (1-2 weeks) and longer-term (≥3 months) postoperative assessments using the Patient and Observer Scar Assessment Scale (POSAS). Patients completed the 'patient scale' at each postoperative visit. Four physicians independently assessed the scars on high-resolution (minimum 475x424 pixels), de-identified photographs from the patients' medical records (Mirror, Canfield Scientific Inc), and rated the scars with the 'observer scale.' Each item on the patient scale (pain, itching, color, thickness, stiffness, irregularity, and overall opinion) and the observer scale (vascularity, pigmentation, thickness, relief, surface area, and overall opinion) were graded from 1 (="normal skin") to 10 (="worst imaginable scar"). Weighted kappa, percent agreement, regression, and concordance correlation coefficients were examined. Standardized beta coefficients were compared to determine the factor that contributed most to overall score. Intraclass correlation and Cronbach's alpha were assessed for physician interrater reliability.

Conclusion: Physicians value different characteristics and rate scar appearance more favorably than patients at short- and longerterm follow-up. The low agreement between physician and patient scar assessment suggests that physicians underestimate the psychosocial impact of scarring, and have opportunities to improve perioperative counseling and support.



Figure 1: Comparison of mean POSAS item scores between patient and physician by t-test analysis. POSAS items rated from 1 to 10 (1= "normal skin"). "Physicians' score of 'color' was calculated by averaging physicians' vascularity and pigmentation scores. Patients' item 'stiffness' and physicians' item 'surface area' did not have comparable variables. *p<0.05.

Table 1. Fatient and Filysician Agreemen	Table 1	: Patient	and Physician	Agreement
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		Kappa		r	Line	ear Re	gress	ion	Concore	dance
Overall opinion	% agree	Weighted ĸ	p value		R ²	a	b	p value	$\rho_{\rm c}$	p value
Short- term	71.33	Slight (0.0519)	0.083	0.1020	0.0104	4.66	0.04	0.331	Poor (0.102)	0.329
Longer- term	78.32	Slight (0.1252)	0.002	0.3179	0.1011	2.60	0.14	0.001	Poor (0.318)	0.001

 κ =Kappa, r=Pearson's Correlation Coefficient, R²=coefficient of determination, a=regression constant, b=regression coefficient, ρ_c =Concordance correlation coefficient

By κ levels, strength of agreement is considered 'poor' if κ <0, 'slight' if κ =0.0.20, 'fair' if κ =0.21-0.40, 'moderate' if κ =0.41-0.60, 'substantial' if κ =0.61-0.80, and 'almost perfect' if κ =0.81-1.00.¹

By ρ_c levels, strength of agreement is considered 'poor' if ρ_c =0.90, 'moderate' if ρ_c =0.90-0.95, 'substantial' if ρ_c =0.95-0.99, and 'almost perfect' if ρ_c >0.99.²

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Most Predictive POSAS Item of Overall Opinion



Figure 2: Standardized beta coefficients were compared to determine which POSAS item contributed most to the prediction of overall opinion for patient and for physician. For physicians, surface area had the highest Beta at both time-points. For patients, thickness in short-term scars and irregularity in longer-term scars had the highest Beta.

9

Presenter: Alex Holliday

Title: Retro-Bulbar Orbital Pain Heralding the Diagnosis of Recurrent Cutaneous Squamous Cell Carcinoma Tracking Along the Trigeminal Nerve

Authors: Alex Holliday¹; Nicholas Ramey²; Douglas Grider¹; Mariana Phillips¹

Institution: 1. Virginia Tech Carilion, Roanoke, VA 2. Vistar Eye Center, Roanoke, VA

Purpose: To describe a case of retro-bulbar orbital pain signaling recurrent squamous cell carcinoma that accessed the orbit via perineural tracking along the zygomaticotemporal nerve.

Summary: A 79-year-old man underwent Mohs Micrographic Surgery (MMS) for a recurrent, infiltrative, poorly-differentiated squamous cell carcinoma (SCC) measuring 3.0 x 1.7 cm located on the right temple. Over the prior 3 years, the patient's right temple was treated with multiple electrodessication and curettage procedures by a non-dermatologist. During MMS, perineural involvement (PNI) of cutaneous nerves was noted, with a maximum nerve diameter of 1.3 mm. The tumor was cleared after 2 MMS stages, with the final defect measuring 5.5 x 4.5 cm. To allow for tumor bed surveillance, the defect was repaired with a full thickness skin graft. Given the tumor size, poor differentiation, and PNI of large caliber nerves, the patient received adjuvant radiation (XRT) to the primary tumor bed and first echelon lymph nodes. Eight months after MMS, the patient reported residual skin tightness of the right temple and intermittent mild retro-bulbar pressure and pain. Magnetic resonance imaging of the brain and orbits refuted tumor recurrence, and these symptoms were attributed to intraoperative sensory nerve damage and post-radiation neuralgia. Repeat examinations were benign, with no clinical evidence of orbital pathology, no recurrence in the primary tumor bed, and no palpable lymphadenopathy. Eighteen months after MMS, the pain became refractory and accompanied by right facial numbness. Computed tomography imaging demonstrated right sub-temporalis tumor invasion through the lateral orbital wall, posterior maxillary sinus, cavernous sinus, lateral and inferior



rectus muscles, and skull base. Anterior orbitotomy for lesional biopsy revealed invasive poorly differentiated SCC. The recurrent tumor was unresectable and palliative XRT failed to reduce the patient's pain. Follow up imaging 4 months later confirmed progression along the trigeminal nerve, extending to the right cerebral cortex, cerebellum, and brainstem, with likely metastasis to the first cervical vertebra. Ultimately, the patient and his family decided to transition to comfort care through hospice.

Design: Case report.

Conclusion: Retro-bulbar orbital pain is rarely encountered following MMS, but important and may be the initial symptom of tumor recurrence. Our patient's lesion progressed over 10 months, despite normal initial radiographic and repeated dermatologic, ophthalmic, and neurologic examinations. Retro-bulbar orbital pain after resection of cutaneous SCC of the temple is rare, and may result from direct tumor invasion or perineural spread into the orbit. We believe this SCC accessed the posterolateral orbit via the zygomaticotemporal nerve, representing the fourth such case reported to our knowledge. We recommend a multidisciplinary approach to management, including dermatology, ophthalmology/oculoplastics, and radiation oncology. We also recommend repeating contrasted neuro-orbital imaging at least every 3 months for patients with persistent, progressive retro-bulbar pain after resection of invasive temporal cutaneous malignancies.

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Presenter: Robert W. Cook, PhD

Title: Prognostic Accuracy of a 31-Gene Expression Profile (GEP) in a Cohort of Patients with Invasive Cutaneous Melanoma of the Head and Neck

Authors: Robert W. Cook, PhD^1 ; Brooke S. Middlebrook¹; Kyle Covington, PhD^1

Institution: 1. Castle Biosciences, Inc., Friendswood, TX

Purpose: Accurate prognostication of metastatic risk using sentinel lymph node (SLN) biopsy can prove challenging in cutaneous melanomas of the head and neck, given the higher rates of false negative outcomes found in head and neck tumors when compared to other regions. We have previously validated a 31-gene expression profile (GEP) test that accurately predicts metastatic risk in melanoma patients, providing a binary outcome of Class 1 (low risk of metastasis) or Class 2 (high risk). Here we assess the GEP independently and in combination with SLN status in a cohort of patients with invasive head and neck melanoma.

Summary: A total of 178 subjects with Stage I (42%), II (34%) or III (24%) primary melanoma tumors in the head and neck region were identified. Median age was 65 years (range 25-94), median Breslow thickness was 1.6mm (range 0.2-15.0mm), 66% were ulcerated, 22% were SLN-positive and 48% were Class 2. Median tumor thickness in SLN-negative and SLN-positive subjects was 1.7mm and 2.5mm, respectively, compared to 1.0mm for Class 1 and 2.5mm for Class 2. Kaplan-Meier (K-M) analysis of 5-year recurrence free-survival (RFS) outcomes showed 62% and 20% for SLN-negative and SLN-positive status, respectively, compared to 81% and 34% for Class 1 and Class 2, respectively. K-M 5-year distant metastasis-

free survival (DMFS) outcomes were 76% and 37% for SLNnegative and SLN-positive cases, respectively, compared to 83% and 41% for Class 1 and Class 2 cases, respectively. Only SLN status (HR=2.5) and Class (HR=3.3) were significant for RFS (Cox multivariate, p<0.05). Only Class (HR=2.7) was significant for DMFS (Cox multivariate, p=0.04). K-M analysis for combined Class 1/SLN-negative predicted risk resulted in 5-year RFS and DMFS outcomes of 79% and 81%. K-M analysis for combined Class 2 / SLN-positive predicted risk resulted in 5-year RFS and DMFS outcomes of 19% and 24%. Of 30 SLN-negative patients with a recurrence, 20 (67%) were Class 2 (5-year RFS=40%); 27 developed distant metastases, of which 18 (67%) were called Class 2 (5-year DMFS=48%). Median thickness was 2.4mm in this subgroup and 11 presented with ulceration.

Design: Primary tumor samples and associated clinical data were collected under an IRB-approved, multicenter protocol. qPCR analysis was performed to assess expression of the 31gene signature and Radial Basis Machine predictive modeling was used to predict risk (Class 1 vs. Class 2). RFS (time to regional or distant metastasis) and DMFS (time to any metastatic event beyond the regional nodal basin) were assessed.

Conclusion: GEP testing is a clinically useful tool for identifying patients with head and neck melanoma who have a high risk of recurrence.

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Presenter: Rebecca K. Jacobson, MD

Title: The Frequency of Auricular Cartilage Invasion by NMSC

Authors: Rebecca K. Jacobson, MD¹; Hugh M. Gloster, Jr., MD¹

Institution: 1. University of Cincinnati, Cincinnati, OH

Purpose: Auricular cartilage typically forms a barrier to invasion by non-melanoma skin cancer (NMSC). These tumors tend to grow along planes of least resistance and preferentially spread along the surface of cartilage instead of invading through cartilage. A single prospective trial found that in the majority of cases, basal cell carcinomas (BCC) did not invade cartilage with an invasion rate of 1.7%. There are no other studies to our knowledge examining how frequently NMSC invades cartilage during Mohs micrographic surgery (MMS) and how these tumors are different from those that do not invade cartilage.

Summary: Of the 31 tumors included in this study, 30 patients had no involvement from the anterior surface of the cartilage, and all 31 patients did not have involvement from the posterior surface of the cartilage. Only one patient had a nodular BCC in the conchal bowl that invaded the anterior surface of the cartilage. This tumor required 2 stages of NMS with a post-operative defect through cartilage measuring 1.5×1 cm. Of the patients without cartilage involvement, there was no predilection for the type of tumor or histological pattern. Fourteen of 27 patients without cartilage involvement had BCC's, including nodular (6/14), infiltrating (3/14), and morpheaform (1/14) histopathology; there was only one recurrent tumor. The remaining 13 patients presented with squamous cell carcinoma (SCC) including SCC in situ (2/13), superficial SCC (6/13), and invasive SCC (3/13). The majority of the patients without

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cartilage involvement also had larger pre-operative tumors sizes and post-operative defect sizes largely between 2-2.9 cm. An average of 2 stages was required to clear the tumor in 26/28 cases that either involved or spared cartilage.

Design: This was a prospective study of 31 patients in a single Mohs practice who underwent Mohs micrographic surgery on the ear and were found to have deep invasion of tumor through the subcutaneous fat after the first stage of MMS requiring excision of auricular cartilage on the second stage of MMS. During the second stage of MMS, sections from the anterior surface of the auricular cartilage were examined to determine if there was invasion of cartilage by tumor. In addition, sections from posterior surface of the cartilage were examined to confirm that the deep margin was clear.

Conclusion: In this study, BCC's and SCC's rarely invaded auricular cartilage regardless of tumor type, histological pattern, tumor size, post-operative defect size, or number of stages of MMS. This study confirms the significant barrier that auricular cartilage presents to invading tumor cells. Based on these results, Mohs surgeons should consider an initial conservative approach by removing only a thin layer of cartilage instead of a fullthickness layer of cartilage if the deep margin on the first stage of MMS is involved with tumor.

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Presenter: Joseph Diehl, MD

Title: IPad and Cell Phone Use and Disinfection Procedures in Mohs Surgery Practices

Authors: Joseph Diehl, MD1; David Kent, MD1

Institution: 1. Dermatologic Surgery Specialists, Macon, GA

Purpose: To determine how often iPads (or other tablet-type computing devices) are used in Mohs surgery practices; to determine if, how often, and how iPads, cell phones, and computer keyboards are sterilized; and to review the literature concerning pathogen spread from such devices and preferred methods of disinfection and cleaning.

Summary: The use of electronic health records has required data input in areas of patient care, and evidence suggests these electronic devices can harbor many pathogens. However, to our knowledge, most practices do not have a standardized written disinfection process for these devices. We developed an online survey to determine current usage of iPads and cell phones in Mohs surgery practices, as well as current steps taken by ACMS members to limit pathogen spread from these devices. We will describe our findings from the online survey, as well as evidence behind disinfection techniques, with the goal of educating other physicians on steps to limit surgical infections in their practice.

Design: After IRB approval from Mercer University in December 2016, an anonymous online survey was submitted to the ACMS in January 2017 for distribution to its email listserv members (these results are not yet available). Literature review on the use of electronic devices in areas of patient care, pathogen spread from such devices, and effectiveness of various disinfection techniques was conducted.

Conclusion: The introduction of electronic health records has made the use of iPads and similar devices in Mohs surgery practices increasingly common. These devices present potential sources of pathogen spread; however evidence exists in the literature from other fields to successfully disinfect these devices. These steps can be applied to Mohs surgery practices as well.

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Presenter: Nina Blank, BA

Title: Impact of Early Head and Neck Melanoma Diagnosis on Health-Related Quality of Life: A Prospective Study

Authors: Nina Blank, BA¹; Erica Lee, MD¹; Karen Connolly, MD¹; Kishwer Nehal, MD¹

Institution: 1. Memorial Sloan Kettering Cancer Center, New York, NY

Purpose: A melanoma diagnosis has the potential to impact several aspects of an individual's well-being. The head and neck (H&N) region is uniquely susceptible to health-related quality of life (HR-QOL) concerns before and after cancer treatment given its cosmetic sensitivity and vital anatomy. Because the vast majority of early (Stage 0, 1A) melanoma is nonfatal, HR-QOL may be a superior outcome measure to survival, warranting collection of HR-QOL data both prior to and following management. This study aimed to measure pre-treatment HR-QOL in early H&N melanoma patients to determine baseline domains most affected by melanoma diagnosis.

Summary: Fifty-three patients (average age 67.5 years; 58.5% male; 75.5% with tumors on the cheek, nose, and scalp) completed HR-QOL questionnaires from May-December 2016. Thirty were diagnosed with malignant melanoma in-situ (MMIS), 14 with invasive malignant melanoma (mean depth 0.33mm), and 9 with atypical melanocytic proliferations deemed clinically and histologically consistent with MMIS. Across 3 surveys, scores in emotional and appearance domains were worse than scores reflecting physical symptoms and general/social functioning (see figures). Worse HR-QOL is reflected by higher Skindex-16 scores and by lower Skin Cancer Index (SCI) and Functional Assessment of Cancer Therapy-General (FACT-G) scores. Skindex-16 showed higher (worse) emotional (24.1) compared with physical (7.1, p<0.00001) and functional (8.3, p<0.00001) scores. SCI, which specifically elicits responses to skin cancer, showed lower (worse) emotional (58.9) than social (83.2, p<0.00001) score, and lower (worse) appearance (63.5) than social (83.2, p<0.00001) score. FACT-G, a universal cancer tool, showed lower (worse) emotional (81.6) vs. physical (94.3, p<0.00001) and social (88.8, p=0.007) scores. Worry emerged as the predominant emotion negatively affecting HR-QOL. Survey items with lowest scores were "worry about skin condition" in Skindex-16 and "feeling nervous" in FACT-G. Lowest SCI scores were "worry about future cancers" and "worry about cancer spread." "Worry about scar size" scored lowest amongst the 3 SCI appearance-related questions.

Design: Patients presenting with stage 0 and 1A H&N melanoma to a dermatologic surgery service were enrolled in an IRB-approved prospective study. Three validated HR-QOL surveys (Skindex-16, SCI, FACT-G) were administered before treatment.

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Raw survey subscale scores were transformed to values out of 100 to facilitate intra-survey subscale comparisons.

Conclusion: Patients recently diagnosed with early-stage H&N melanoma score lower in emotional and appearance-related HR-QOL domains than in physical, functional, and social spheres. HR-QOL surveys address several emotions, including worry, frustration, hopelessness, and depression. Worry – specifically with respect to cancer prognosis/recurrence and post-treatment appearance – appears to exert greatest negative influence on HR-QOL. Clinicians cognizant of this information can better anticipate and address targeted patient concerns at consultation. Furthermore, studies of post-treatment changes from these baseline values will allow greater insight into the patient experience and, ultimately, more meaningful engagement in shared decision-making.





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Presenter: Kelly L. Reed, DO

Title: Smooth Muscle Induction in Basal Cell and Squamous Cell Carcinomas: A Rare Phenomenon

Authors: Kelly L. Reed, DO1; Jessica Riley, DO1; James Ramirez, MD1; Kent Krach, MD1

Institution: 1. St. Joseph Mercy Hospital; Ypsilanti, MI

Purpose: Abundant smooth muscle proliferation in the vicinity of basal cell and squamous cell carcinomas is a rare finding we have noted during Mohs surgery of facial non-melanoma skin cancers (NMSC). We present 4 cases noted during Mohs surgery on fresh frozen tissue sections and confirmed with paraffin sections. Here we review the underlying mechanism of non-melanoma skin cancers in an attempt to explain the cause of this unusual phenomenon.

Summary: Abundant well differentiated, haphazardly arranged smooth muscle proliferation was seen in areas where a basal cell carcinoma was present (Fig 1), both in the Mohs section and in the laboratory-fixed specimen. Smooth muscle actin staining on the laboratory-fixed, paraffin-embedded specimen showed smooth muscle proliferation near the tumor itself (Fig 3). There was an absence of smooth muscle proliferation in skin unaffected by the tumor. Smooth muscle proliferation was also seen in a case of squamous cell carcinoma (Fig 2) The finding of hamartomatous smooth muscle proliferation only seen in the vicinity of tumor, suggests an inductive phenomenon of NMSCs for multiple adnexal neoplasms. Basal cell carcinomas are thought to arise from the interfollicular epidermis, the follicular infundibulum, or the hair bulge. The hair bulge contains stem cells, and is located near the follicular infundibulum and the insertion of the arrector pili muscle, the latter of which is one of the only consistent areas to find smooth muscle on hair-bearing areas of the skin. We theorize that certain growth factors, for example platelet-derived growth factor (PDGF), that are involved in generating both BCC and SCC may simultaneously stimulate adnexal proliferation of the arrector pili muscle. Furthermore, it has been shown that the bulge of the hair follicle evades some immune responses through the theory of immune privilege. Release of IL-10, TGF-β1, and a-MSH may evade host immunity and responses, thus allowing proliferation of basal cell carcinomas and occasionally associated smooth muscle proliferation. In squamous cell carcinoma, it has been shown that epidermal growth factor receptors and TGF-B1 signal development of cutaneous SCCs. There has been no relation found between the clinical characteristics of the tumor and these histopathological findings.

Design: Fresh tissue was obtained and processed during the Mohs procedure via frozen sections and stained with H&E. The remaining unprocessed tissue was placed into formalin and then routinely processed off a paraffin-embedded block. It was stained with H&E and smooth muscle actin (SMA).

Conclusion: Growth factors and cytokines involved in proliferation of basal cell carcinoma, squamous cell carcinoma, and adnexal structures may explain the rare finding of abundant hamartomatous smooth muscle proliferation in association with basal cell and squamous cell carcinoma.

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Presenter: Albert S. Chiou

Title: Mass Spectrometry Imaging for Delineating Basal Cell Carcinoma in Ex-Vivo Mohs Tissue Sections

Authors: Albert S. Chiou¹; Katy Margulis-Goshen, PhD¹; Livia S. Eberlin²; Jean Y. Tang¹; Richard N. Zare¹; Sumaira Z. Aasi, MD¹

Institutions: 1. Stanford University, Redwood City, CA 2. University of Texas-Austin, Austin, TX

Purpose: The purpose of this pilot study was to evaluate the application of a non-destructive mass spectrometry imaging (MSI) approach for ex-vivo tumor margin assessment in Mohs surgery for basal cell carcinoma (BCC). Cutaneous neoplasms exhibit aberrant metabolic processes, resulting in unique expression patterns of lipids and other metabolites compared to normal tissue. Desorption electrospray ionization mass spectrometry (DESI-MS) is a recent advance in mass spectrometry imaging that allows for rapid, non-destructive visualization of the spatial distribution of hundreds of small molecules present in human tissue specimens with a typical resolution of 200 µm. The technique is capable of rapidly generating detailed molecular maps of the surface of ex-vivo tissue sections with minimal specimen preparation, and it can be paired with algorithmic approaches to delineate regions with aberrant "lipidomic" signatures suspicious for tumor involvement. Using this approach, DESI-MS has recently been shown to accurately differentiate various malignant tumors, ranging from gastric adenocarcinoma to central nervous system gliomas, from normal tissue in intraoperative settings. Its potential applications in dermatologic surgery have not been previously investigated.

Summary: We obtained 104 de-identified Mohs tissue sections from patients treated for basal cell carcinoma (BCC). All major histologic types of BCC were represented including superficial, nodular, and infiltrative types. Unique metabolic signatures overrepresented in BCC were identified, including arachidonic acid and the lipids glycerophosphoglycerol(36:4) and glycerophosphoserine(34:1). We show that 2-D images generated based on signal intensities of these species show good qualitative agreement with areas of tumor involvement identified on H&E for all BCC subtypes.

Design: De-identified tissue sections were obtained from Mohs stages taken from patients with a prior biopsy-proven diagnosis of basal cell carcinoma. Tissue specimens were sectioned into thin tissue layers via routine Mohs lab processing and affixed to glass slides, followed by DESI-MS imaging. The tissue sections were then hematoxylin and eosin (H&E) stained to allow for direct comparison of DESI-MS images to gold standard H&E. Signal intensities of various metabolites were utilized to generate 2-D heat maps and qualitatively correlated to regions of tumor involvement seen within the same tissue section on H&E.

Conclusion: The results of this initial study suggest that mass spectrometry imaging is a promising modality for delineating cutaneous neoplasms such as BCC from normal skin structures. We anticipate that this imaging approach may have useful clinical applications in assessing tumor margins in an exvivo setting, along with potential future non-invasive, in-vivo

applications for delineating tumor margins given the technique's non-destructive nature.



Figure 1. Schematic and optical images of DESI-MS imaging set-up



Figure 2. Representative DESI-MS ion images compared to H&E.

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Presenter: Adam R. Mattox, DO

Title: Comparison of Ipsilateral and Contralateral Paramedian Forehead Flaps to Reconstruct Lateral Nasal Subunits

Authors: Adam R. Mattox, DO¹; Ashley McGuinness, BS¹; Eric S. Armbrecht, PhD¹; Ian A. Maher, MD¹

Institution: 1. Saint Louis University School of Medicine, St. Louis, $\ensuremath{\mathsf{MO}}$

Purpose: To repair large wounds on the nose, the paramedian forehead flap (PMFF) can be considered. The PMFF can be customized to repair wounds affecting every cosmetic subunit of the nose. For sufficient length and pivot position, the PMFF pedicle is positioned to include the right or left supratrochlear vessels. A vertical line passing through the medial canthus will

intersect the orbital rim at the location of the supratrochlear artery ±3mm. Wounds off midline introduce asymmetry. An ipsilateral pedicle is closer, but incurs more rotational shortening navigating a longer arc of rotation. A contralateral pedicle is farther away, but requires less rotation to reach the wound. The objective of this study was to evaluate the theory that the distance added in the ipsilateral angle of rotation is less than the distance added by a contralateral position (i.e. ipsilateral PMFFs are shorter). The difference in the percentage of ipsilateral and contralateral flaps requiring hair bearing skin is a secondary measure.

Summary: Ipsilateral flaps are shorter 90% of the time, but the difference in length is more significant for lateral subunits. When a 2mm margin of error is assumed, the trend is maintained. Ipsilateral flaps also more frequently avoid scalp hair. Undermining the pedicle 5mm below the orbital rim may add an additional 1cm. Undermining resolves a majority of the hair involvement on ipsilateral flaps, but not necessarily contralateral.

Design: Healthy volunteers were recruited. See Table 1 for demographic information. A washable ink marker was used to mark each pedicle position at the orbital rim and the center of each of the following cosmetic subunits bilaterally. A flexible tape measure was used to measure the following distances: interbrow distance, maximal vertical pedicle length (to hairline), and from each cosmetic subunit to an ipsilateral and contralateral pedicle. Bilateral measurements were performed on each subject.

Conclusion: For wounds off the midline, the ipsilateral flap is predominantly shorter. Ipsilateral flaps more often avoid hair bearing skin (scalp). Undermining the pedicle can add enough length to avoid hair on the majority of flaps, but more so for ipsilateral than contralateral.

Number of patients	21
Average age, years	39.8
Gender	
Women	13 (62%)
Men	8 (38%)
Facial asymmetry	2
Prior facial surgery	4
History of cosmetic filler or chemodenervation	5
Hairline	
Symmetrical	21
Receding	5

Table 1. Patient Demographics

	Ipsilateral Shorter	Contralateral Shorter	No Difference
Root	95%	2%	2%
Dorsum	71%	7%	21%
Sidewall	95%	0%	5%
Tip	88%	2%	10%
Alar Lobule	98%	0%	2%
All Sites	90%	2%	8%

Table 2. Comparing ipsilateral and contralateral flap lengths (error 2 mm)



	Ipsilateral Flap	Contralateral Flap
As measured		
Root	0.0%	4.8%
Dorsum	2.4%	4.8%
Sidewall	4.8%	16.7%
Tip	47.6%	64.3%
Alar Lobule	38.1%	69.0%
All Sites	18.6%	33.3%
Pedicle extended b	eneath the brow	
Root	0.0%	0.0%
Dorsum	0.0%	0.0%
Sidewall	0.0%	4.8%
Tip	9.5%	16.7%
Alar Lobule	4.8%	35.7%
All Sites	2.9%	11.4%

Table 3. Presence of hair on ipsilateral and contralateral flaps

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Presenter: Andrew Hankinson, MD

Title: Massive Rapid Hematoma Formation after Simple Anesthetic Puncture - The Importance of Clinically Recognizing Undiagnosed and Potentially Dangerous Coagulopathies in Surgical Patients

Authors: Andrew Hankinson, MD1; Todd Holmes, MD1

Institution: 1. University of Vermont, Burlington, VT

Purpose: To present the importance of recognizing that when a hematoma forms in surgical patients in an unusually rapid and atypical manner, a coagulopathy must be considered. To discuss that attempting drainage on such patients may lead to dangerous adverse outcomes, and appropriate coagulopathy workup should be considered first.

Summary: The patient is an 83 year old female who is 8 months status-post Mohs surgery for a large SCC of the scalp, with unilateral rotation flap repair. On follow up the scalp was well healed, with a small area of erosive pustular dermatosis. The patient complained of pain with debridement so local anesthesia was administered via two small dermal punctures. The crusting was gently removed and the patient was sent home. Three days later the patient returned to clinic complaining of pain, bleeding and tremendous swelling from the site. Examination revealed a large approximately 12cm x10cm x2cm boggy, fluctuant subcutaneous swelling along the entire frontal, superior, and parietal scalp (Figure 1). The entire forehead and scalp felt doughy and boggy to palpation. The initial inclination of the evaluating Mohs surgeons was to evacuate the hematoma and identify any bleeding vessels for ligation and hemostasis. However this was an unusually rapid and large hematoma to be caused from simple local anesthesia puncture 72 hours prior. Given this, it was ultimately decided to first proceed with a head CT and coagulopathy workup prior to any manipulation. CT scan revealed a large hematoma over the frontal scalp with overlying extensive soft tissue edema (Figure 2). Lab work revealed extremely elevated platelets of 2033K/Cm2 (normal 140-377) with a mildly elevated Pro Time and INR. Hematology/oncology was urgently consulted.

The patient had developed an undiagnosed myeloproliferative syndrome resulting in an extreme thrombocytosis with platelets ~10x normal value. This resulted in completely nonfunctional platelets with zero clotting ability. Hematology informed us that patients in this scenario can often exsanguinate quickly from atraumatic intracranial or GI hemorrhage alone. If evacuation of the hematoma had been attempted at the time of presentation, hemostasis may not have been possible. Hematology admitted the patient and treated urgently with anagrelide, a platelet lowering agent. Within 72 hours her platelets had normalized and clotting function had returned. Mechanical pressure from the hematoma resulted in pressure necrosis of the dermis and subcutaneous tissue resulting in full thickness ulceration to cranium (Figure 3). The hematoma had clotted with normalization of platelets, and evacuation was performed without complication.

Design: Not applicable to abstract.

Conclusion: Hematomas are a common post-operative complication in Mohs surgery. One must recognize when a hematoma formation is atypical as in this case of myeloproliferative induced coagulopathy and proceed cautiously. Without considering and identifying underlying coagulopathies, further potentially life threatening complications could result.





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Presenter: Geoffrey F.S. Lim, MD

Title: Lichenoid Cutaneous Eruption Secondary to PD-1 Inhibitor Mimicking Squamous Cell Carcinoma Clinically and Histologically

Authors: Geoffrey F.S. Lim, MD¹; Jenna R. Bordelon, MD²; Stephanie Dietz, MD¹; Melissa Pugliano-Mauro, MD¹

Institutions: 1. University of Pittsburgh Medical Center, Pittsburgh, PA

2. University of Connecticut, Farmington, CT

Purpose: To illustrate pitfalls in the diagnosis and management of an otherwise treatable acquired adverse effect of a novel oncologic therapy.

Summary: Antagonist antibodies to programmed cell death 1 (PD-1) and programmed cell death ligand 1 (PD-L1) have shown promising activity against several malignancies, including advanced melanoma, non-small cell lung cancer, and renal cell carcinoma. Among the cutaneous side effects of these immunotherapies, lichenoid eruptions are the most common and vary from discrete pink scaly papules to disseminated papules coalescing into plaques. Interestingly, cutaneous squamous cell carcinoma has been reported as a rare side effect of anti-PD-1/ PD-L1 agents, which is counterintuitive to our understanding of their mechanism of action and FDA indication to treat such malignancies.

Design: We report a case of a patient with metastatic nonsmall cell lung cancer (NSCLC) treated with nivolumab, a PD-1 inhibitor, who developed a diffuse cutaneous lichenoid eruption on his upper and lower extremities, the latter of which mimicked well-differentiated squamous cell carcinoma both clinically and histologically. The patient was successfully treated with a combination of intralesional 5-fluorouracil as well as intralesional and topical corticosteroids, curbing the need for surgical intervention in addition to early discontinuation of nivolumab. Meanwhile, the patient's NSCLC experienced a positive tumor response to nivolumab.

Conclusion: PD-1 inhibitor-induced lichenoid cutaneous eruptions may mimic squamous cell carcinoma both clinically and histologically. These are generally manageable with nonsurgical

methods including but not limited to topical and intralesional corticosteroids, and they have been associated with a positive tumor response.







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Presenter: Rebecca K. Jacobson, MD

Title: Adverse Events in Mohs Micrographic Surgery

Authors: Rebecca K. Jacobson, MD¹; Hugh M. Gloster, Jr., MD¹

Institution: 1. University of Cincinnati, Cincinnati, OH

Purpose: Mohs micrographic surgery is considered a safe procedure with a low complication rate. There have been an increasing number of studies evaluating the safety of Mohs micrographic surgery. Adverse events of all dermatologic procedures have been reported as 2% with studies limited to Mohs micrographic surgery reporting adverse event rates of 0.72% and 1.64%. The most common complications in prior studies limited to Mohs surgery have included infection, bleeding, and dehiscence. The goal of this study was to add to the growing body of literature evaluating the rate of adverse events in Mohs micrographic surgery including the frequency of infections, bleeding, wound dehiscence, and tumor recurrence.

Summary: Of the 2,012 patients who underwent Mohs micrographic surgery, the overall adverse event rate was 2% (43/2,012) with infections being the most common adverse event with a rate of 0.7% (15/2,012). Bleeding complicated 0.6% of patients' procedures as the second most common adverse event. In addition, 0.4% (9/2,2012) had dehiscence of their wounds. Of the patients who experienced dehiscence, 44% (4/9) occurred on the nose and 44% occurred on the cheek. The majority of dehiscences were closed primarily (66%, 6/9), and occurred after suture removal (89%, 8/9). In addition, approximately half were resutured (55%, 5/9) with no known infection in any of the cases. Tumor recurrence occurred in 0.3% (7/2,012) patients.

Design: This was a prospective study of 2,012 patients, between December 2015-December 2016, in a single Mohs practice. Post-operative adverse events recorded included bleeding, infection, wound dehiscence, and tumor recurrence. In addition, wound dehiscence was further characterized by site, closure type, timing of dehiscence, whether the wound was resutured, and whether infection was suspected.

Conclusion: This study indicates that wound infection and bleeding are the two most common adverse events followed by wound dehiscence and tumor recurrence. Of the cases of dehiscence, the majority occurred in cases that were closed primarily on the face where dehiscence occurred after suture removal and was not complicated by infection even when resutured. Our overall adverse event rates were similar to what has been reported in studies evaluating all dermatologic procedures and similar or slightly higher than what has been reported in a prospective study limited to Mohs surgery; prior studies have also confirmed that infection, bleeding, and wound dehiscence are the most common adverse events. Based on these results, our data confirms that Mohs micrographic surgery is a safe procedure with low complications rates. As outpatient surgery is becoming more scrutinized, it is important to have a growing body of literature that confirms the low complication rate of Mohs micrographic surgery.

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Presenter: Alex Holliday

Title: Emerging Resistance Patterns Among Methicillin-Sensitive Staphylococcus Aureus Cultured in an Academic Mohs Surgery Practice

Authors: Alex Holliday¹; Mariana Phillips¹

Institution: 1. Virginia Tech Carilion, Roanoke, VA

Purpose: Antimicrobial resistance among bacteria commonly implicated in skin infections is increasing. Regional familiarity with these trends affects antibiotic selection before culture speciation and antibiotic susceptibility results are available. As a quality improvement project, we prospectively logged every skin culture performed post-operatively in a single surgeon academic Mohs practice in one calendar year.

Summary: Of 1022 Mohs cases and 95 excisions performed, 32 patients were cultured for presumed surgical site infection, 26 after a Mohs procedure and 6 after a standard excision. A 2.9% (32/1117) infection rate was observed. Causative organisms included methicillin sensitive Staphylococcus aureus (MSSA) (12), methicillin resistant S. aureus (4), Pseudomonas aeruginosa (3), and combined Serratia marcescens and Klebsiella ornithinolytica (1). Resident skin flora including coagulase negative Staphylococcus or nonhemolytic diptheroids or no growth represented the remaining 12 culture results. Cultured sites included the nose (6), ear (5), cheek (4), chin (4), forehead (2), scalp (2), shin (2), forearm (2), trunk (2), lip (1), hand (1), and arm (1). Five of these patients received perioperative antibiotics prior to obtaining wound culture. In the last 2 months of the year, 2 patients' MSSA demonstrated tetracycline resistance. One severe adverse event occurred in a patient receiving antibiotics for a MSSA infection at the site of a right chest excision. The patient was hospitalized 6 weeks after his excision for a severe Clostridium difficile colitis that resulted in total colectomy.

Design: A chart review of all patients whose surgical site was cultured after a dermatological surgery procedure was performed. Tumor location, defect size, repair type, use of perioperative antibiotics, culture results including organism susceptibilities, treatment, and post-operative complications were noted.

Conclusion: Given the regional variation and evolving nature of antimicrobial resistance, Mohs surgeons should have a low threshold for wound culture of suspected surgical site infections. Our study confirmed that tetracycline resistant MSSA has emerged as a pathogen in our academic dermatological surgery practice. Knowledge of this trend will affect our antibiotic selection for early management of surgical site infections while awaiting wound culture results. The judicious use of antibiotics cannot be overemphasized given that one patient in our case series experienced life threatening complications attributed to perioperative antibiotics.

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Presenter: Alfonso Heras, DVM, PhD

Title: Automated 5-Minute Mohs Micrographic Surgery Immunohistochemistry

Author: Alfonso Heras, DVM, PhD

Institution: 1. Bio SB, Inc., Santa Barbara, CA

Purpose: The most common reason for recurrence of skin cancers after Mohs micrographic surgery (MMS) is residual undetected tumor. Frozen tissue Immunohistochemistry (IHC) has demonstrated greater sensitivity than routine H&E stains, which are difficult to interpret. The automated protocol allows fast and reproducible IHC staining with minimal labor, which increases the precision and efficiency of the Mohs procedure.

Summary: We report the use of a highly sensitive monovalent Fab anti-mouse and anti-rabbit micropolymer IHC detection system for the detection of IVD rabbit and mouse monoclonal antibodies for melanoma (Melanoma cocktail, MART-1, SOX-10, MiTF, Mel-5, and S-100), BCC and SCC (CK AE1/AE3, EpCAM BerEP4 and CK MNF116) using a compact, easy to program and operate 5-slide (simultaneously or independently) automated IHC stainer.

Design: A total of 14 cases (5 melanomas, 4 BCC and 5 SCC) frozen MMS biopsies were serially cut at 4-5 µm, mounted on Hydrophilic Plus slides and fixed for 2 min in 100% acetone. The remaining frozen tissues were formalin-fixed, paraffin-embedded (FFPE) and used as a gold standard control. IHC and H&E results were blindly evaluated in each section, by qualified personnel. Statistical analysis was performed using P-value. The following was the 5 or 10 minute IHC protocol used for both frozen and FFPE tissues (subjected to prior deparaffinization and HIER) using the 5-slide automated IHC stainer:

Step	5 min Protocol	10 Min Protocol
Peroxidase Block	l min	2 min
Antibody	l min	2 min
Fab Micropolymer HRP or AP	l min	2 min
Brown, Green, Red, Magenta or Blue Chromogen	1 min	2 min
Counterstain	0.5 min	1.5 min
Washes between steps	0.5 min	0.5 min

Conclusion: No statistical differences (p>0.05) were observed in the tumor cell density and signal distribution in the 5 or 10 min Mohs IHC for all the IHC markers tested on frozen sections compared to the FFPE paraffin sections. The automated 5 or 10 min Mohs IHC in frozen and paraffin sections correlated with the H&E staining of normal and tumoral cells in paraffin sections. Automated 5 or 10 min Mohs IHC stain is a reproducible, specific, sensitive and reliable adjunctive diagnostic method to aid in the interpretation of surgical margins during MMS for melanoma, BCC and SCC. The technique is superior to frozen or permanent H&E sections alone, and is equivalent to the IHC of equivalent FFPE tissue sections. The automated protocol allows fast and reproducible IHC staining with minimal labor, which increases the precision and efficiency of the Mohs procedure.



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Presenter: Miaoyuan Wang, MD

Title: Creating Animations of Dermatologic Surgeries Using Adobe Animate CC

Authors: Miaoyuan Wang, MD¹; Satori Iwamoto, MD, PhD¹; Robert Fischer, MD, MS¹

Institution: 1. Roger Williams Medical Center, Providence, RI

Purpose: To present the basic methods for creating animations of surgical procedures in dermatology using Adobe Animate CC.

Summary: Procedural training is a crucial part of the dermatology residency curriculum. The current modalities of surgical training in dermatology consist mainly of traditional apprenticeship supplemented by textbooks and on-line videos. While step-by-step diagrams from textbooks and articles highlight the key steps of procedures, they do not adequately illustrate movements of the skin or instruments. The lack of continuity also results in confusion when it comes to difficult concepts. Observation of live procedures and videos can be challenging in dermatology due to the intricacy of the procedures. Furthermore, videos may be unable to adequately emphasize the key steps of a procedure. Alternatively, animation is a tool that combines the benefits of diagrams and videos. We present two simple methods for surgeons to create animations of procedures in dermatology using Adobe Animate CC. This software is widely available, with ample free and paid resources to learn how to use it. The two methods we describe include the traditional frame-by-frame method and the tweening method. These two methods can be combined to create more advanced animations. Animations can be used to depict a wide variety of surgical concepts, including Mohs micrographic surgery, suture techniques, flaps and grafts, and cosmetic procedures. These animations may enrich the existing surgical training curriculum and can also be utilized to demonstrate new techniques.

Design: Animations of various dermatologic procedures were created using Adobe Animate CC (previously known as Adobe Flash). Animations can be created using the traditional frame-by-frame method, where each frame is modified slightly compared to the previous frame to create movements. Tweening is another method to create movements, where the software generates the in-between frames based on two distinct beginning and end keyframes. These two methods can be combined to create more advanced animations. Sample animations were created using both of these methods to illustrate a buried vertical mattress suture and a Z-plasty.

Conclusion: Animation is an effective yet underutilized tool in the training of dermatologic procedures. By becoming familiar with the frame-by-frame and the tweening methods of animation software such as Adobe Animate CC, dermatologists can create visuals that will better demonstrate difficult concepts in dermatologic surgery. This could be a great addition to the existing dermatologic surgical curriculum.







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Presenter: Anastasia Benoit, MD

Title: The Nasal Tip Rotation Flap for Reconstruction of the Lateral Nasal Tip, Anterior Ala and Soft Triangle: Our Experience with 55 Patients

Authors: Anastasia Benoit, MD^1 ; S. Tyler Hollmig, MD^2 ; Brian C. Leach, MD^3

Institutions: 1. Dermatology Specialists, Westminster, CO 2. Stanford University School of Medicine, Redwood City, CA

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Purpose: Repair of the distal third of the nose after tumor extirpation with Mohs micrographic surgery presents multiple challenges. Managing complex nasal topography, mobile alar margins, and patency of the external nasal valve, all while



preserving the delicate soft triangle, are some of the hurdles that must be overcome in order to achieve an aesthetic and functional repair. Reconstruction of defects of the lateral nasal tip, anterior ala and soft triangle commonly involves skin grafts or local flaps. Skin grafting provides inconsistent color and texture match and may result in notching. The utility of local flaps is limited when the defect is located more inferiorly as the intervening alar groove limits recruitment of nasal sidewall skin without effacement of this prominent aesthetic subunit. Two-stage interpolation flaps circumvent these limitations, but at the cost of added morbidity and the inherent complexity of a two-stage repair. We present a novel repair for these challenging defects that compliments and preserves the local anatomy while hiding incision lines within subunit junctions: the medially based nasal tip rotation flap. We describe our experience with this flap, including patient selection and design modifications to enhance aesthetic success.

Summary: Fifty-five patients (15 female) had reconstruction of the lateral nasal tip, anterior ala, and/or soft triangle using the nasal tip rotation flap. Defects ranged in diameter from 4 to 21 mm. Of the 55 flaps performed, 45 utilized ipsilateral rotation and 10 contralateral rotation across the nasal tip subunit. No major complications were noted. Minor complications included eight cases of minimal step-off, five of whom agreed to dermabrasion, which resolved any visible step-off. The design of our rotation flap varies significantly from rotational repairs described previously in several aspects: the medial base of the flap, incision along the nasal supratip/dorsal junction, preservation of the alar rim margin and alar groove, and broader application to defects of the soft triangle.

Design: A retrospective review of patients undergoing Mohs micrographic surgery with subsequent nasal tip rotation repair from May 2012 to November 2016 was performed. Demographics, clinical features, reconstruction details, and any complications were extracted. Photographs demonstrating the design and execution, as well as long-term results, were reviewed.

Conclusion: The nasal tip rotation is a single-stage, local flap that provides optimal tissue match with recapitulation of the native topography of the nasal tip and incision lines that are well hidden at the junction of cosmetic subunits. The mechanics of the flap distribute closure tension widely across the alar rim without focal notching or airway compromise. The nasal tip rotation flap is a reliable, cosmetically elegant repair that fills a gap in the reconstructive options for anterior ala and soft triangle defects on the nose.



Figure 1. Schematic of the ipsilateral nasal tip rotation flap illustrating three key design elements: standing cutaneous deformity (SCD), arc of rotation, and equalizing Burow's triangle (EBT). Point A is the SCD, which parallels the line connecting the inferior nasal tip to the mid alar rim to prevent alar notching. Point B designates the arc of rotation, which increases for defects of larger vertical dimensions, inelastic nasal tissue, and bulbous nasal topographies in order to facilitate tension-free tissue draping. Point C is the EBT, which is directly proportional in size and perpendicular to the arc of rotation. This design prevents alar displacement upon closure. The EBT is optimally camouflaged within the ipsi- or contralateral nasal sidewall.



Figure 2. Surgical execution of the nasal tip rotation flap. (B,G) Flap is designed and incised to the submuscular plane. The SCD and EBT are discarded. (C,H) The flap and defect margins are widely undermined immediately above the perichondrium in all directions. (D-E, I-I) Flap sutured in place. EBT is closed first with a buried vertical mattress suture, which rotates the flap downward into position. The second suture is a buried vertical mattress approximating the leading flap edge with the inferior portion of the defect. Subsequent buried and cuticular sutures are placed as necessary to close the defect.





Figure 3. Versatility of the nasal tip rotation flap for various nasal topographies and defect locations. (A-D) Defect of the lateral nasal tip repaired with an ipsilateral rotation. Vestibular edema noted upon repair resolved at follow-up. (E-H) Defect of the anterior ala in a patient with heavily sebaccous nasal tip skin repaired with an ipsilateral rotation. Patient completed dermabrasion for mild step-off deformity with excellent cosmesis post dermabrasion. (I-L) Defect of the soft triangle repaired with ipsilateral rotation with excellent cosmesis on oblique and swimmer's views.

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Presenter: Paul R. Massey, MD

Title: What do Mohs Surgery Patients Value? A Prospective Survey Study

Authors: Paul R. Massey, MD¹; Katherine R. Sebastian, RN, MPH¹; Vinay Prasad, MD, MPH²; Simi D. Cadmus, MS¹; Matthew C. Fox, MD¹

Institutions: 1. University of Texas at Austin, Austin, Texas 2. Knight Cancer Institute, Portland, OR

Purpose: As trends towards value-based health care purchasing continue, hospitals and physicians will increasingly be judged by patient satisfaction scores. The Center for Medicare and Medicaid Services is empowered to adjust hospital reimbursements based on responses to federal Hospital Consumer Assessment of Healthcare Providers and Systems (H-CAHPS) surveys. It is possible that Mohs surgeons will at some point be included in this paradigm shift. Previous work in dermatologic surgery regarding patient satisfaction typically associated satisfaction with technical aspects of care. We sought, instead, to query patients about what they deemed important in their Mohs Micrographic Surgery (MMS) experience. To do so, we modified a (currently voluntary) federal patient satisfaction survey designed to evaluate care in ambulatory surgical centers, the Outpatient and Ambulatory Surgery Consumer Assessment of Healthcare Providers and Systems (OAS CAHPS). Understanding what patients value can help Mohs surgeons improve patient experience in an increasingly patient-centered environment.

Summary: An early interval analysis of the first 51 patient surveys conducted to date revealed several interesting observations. Fourteen women and 37 men, ranging from 25 to 85 years of age completed surveys. Questions from the modified OAS CAHPS survey were classified into four categories: Communication, Complications, Comfort, and Facility/Technology. Patients rated statements relating to communication as most important. Patients rated communication about complications to be significantly more important (for example, understanding what they should do should they experience pain or bleeding in the postoperative period) than the occurrence of complications themselves related to MMS (p < 0.001). This association persisted across differences in age, gender, education, or overall health. Facility cleanliness was more important to patients than the facility setting (p < 0.001). Unexpectedly we did not find younger patients more concerned about the incorporation of technology into their care than older patients; rather we saw a trend toward more concern among those over 54 (< or > age 54; p=0.071).

Design: Patients over 18 years of age are enrolled at their first postoperative visit and complete the modified OAS CAHPS survey as part of a prospective IRB-approved study. Our enrollment goal is 100 patients. The survey queries recent surgical experience, including questions regarding preoperative preparation, facility, staff, communication, recovery and demographics. We converted the retrospective OAS CAHPS questions to a prospective statement beginning with the words "It is important to me that....." A Likert scale from 1 to 5 was then applied to the statement. Results were analyzed using Stata version 13.

Conclusion: At this early interval analysis, irrespective of age, gender, education or overall health, patients undergoing MMS rated communication regarding their procedure and perioperative care as more important than whether or not they experienced complications following MMS. The cleanliness of the facility was more important to patients than the facility setting. Enrollment is ongoing to reach a planned 100 patient surveys.

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Presenter: Evan Stiegel, MD

Title: Correlation Between Original Biopsy Pathology and Mohs Intraoperative Pathology

Authors: Evan Stiegel, MD¹; Charlene Lam, MD, MPH²; Christina Wong, MD¹; Ally-Khan Somani, MD, PhD³; Jennifer Lucas, MD¹; Christine Poblete-Lopez, MD¹

Institutions: 1. Cleveland Clinic Foundation, Cleveland, OH 2. Penn State College of Medicine, Hershey, PA 3. Indiana University School of Medicine, Indianapolis, IN

Purpose: To investigate the frequency and nature of incongruity between the pathology seen in initial biopsies and intraoperative Mohs sections, which would potentially impact biopsy techniques, skin cancer treatment recommendations, patient expectations, and cure rates.

Summary: The reported pathology of initial biopsy specimens for non-melanoma skin cancer (NMSC), specifically the tumor subtype, weighs heavily into the selection of the treatment

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modality. Identifying aggressive features on intraoperative Mohs Micrographic Surgery (MMS) frozen histology sections that were not indicated on initial biopsy reports is not uncommon. To date, there is limited data describing this discrepancy. We sought to investigate the frequency and nature of incongruity between the pathology seen in initial biopsies and intraoperative Mohs sections, providing information that will potentially impact skin cancer treatment and biopsy recommendations.

Design: We performed a retrospective chart review of cases of NMSC referred for MMS at our institution over a one-year period, recording changes between tumor subtypes observed at biopsy and those observed during MMS.

Conclusion: Our results demonstrated that 50.5% of cases (n = 163) changed aggressiveness (Table 1). Of these, 33% (n = 108) were more aggressive, while 17% (n = 55) were less aggressive. A substantial discrepancy was observed between preoperative biopsy and intraoperative pathology, including a significant portion of tumors that became more aggressive. These results suggest that treatment modalities without margin control may not provide adequate treatment for a certain NMSC based on the reported pathology of the initial biopsy alone.

Table 1. Histologic discrepancy between tissue diagnosis on initial biopsy and intraoperative <u>Mohs</u> sections

	Total (n=323)		
Factor	n	%	
BCC	246	76.1	
scc	77	23.8	
Overall discrepancy	163	50.5	
More aggressive histology	108	33.4	
Less aggressive histology	55	17.0	
SCC – Total discrepancy	32	41.6	
More aggressive histology	19	24.7	
Less aggressive histology	13	16.9	
BCC Type – Total discrepancy	131	53.3	
More aggressive histology	89	36.2	
Less aggressive histology	42	17.1	

BCC, basalcalicancinoma, SCC, squamous calicancinoma

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Presenter: Anne Truitt

Title: Concordance Between Mohs Micrographic Surgeon and Dermatopathologist Interpretation of Slides during Mohs Micrographic Surgery in Management of Squamous Cell Carcinoma: A Prospective Observational Study

Authors: Anne Truitt; Jack Mann²; Blanca Martin²; Raj Mallipeddi, MD²

Institutions: 1. Skin Surgery Medical Group, San Diego, CA 2. St. John's Institute of Dermatology, London, United Kingdom

Purpose: Currently, there are no known studies evaluating the concordance rate of hematoxylin and eosin (H&E) histologic stains versus cytokeratin AE1/AE3 stains by the Mohs surgeon and the dermatopathologist when treating Squamous Cell

Carcinoma (SCC) while also evaluating the concordance rate of the Mohs surgeon versus the dermatopathologist using both histologic stains. This study concurrently evaluates two topics involving SCC treated by MMS: 1) the concordance rate of diagnosis using H&E and AE1/AE3 stains when interpreted by both the Mohs surgeon and the dermatopathologist individually, and 2) the concordance rate of the Mohs surgeon and dermatopathologist interpretations while using both histologic stains.

Summary: Mean age was 62 years with 79% male and 21% female. All patients were Caucasian. The mean number of stages was 3.8 to include the debulk. A total of 520 slides were read. The mean concordance rate of the Mohs surgeon comparing H&E versus AE1/AE3 for the debulk and successive stages was 93.4%, while the mean concordance rate of the dermatopathologist was 85.8% (p=0.03). The mean concordance rate of the Mohs surgeon between the dermatopathologist comparing H&E for the debulk and successive stages was 82.4%, while the mean concordance rate of the AE1/AE3 was 87.2 (p=0.27).

Design: Single center prospective study of patients undergoing MMS for SCC of the skin between April 2013 and September 2014 at a major referral center in the United Kingdom. A Mohs surgeon read the slides of both H&E and AE1/AE3 from 36 Mohs cases to include the debulk and successive stages, and then a dermatopathologist blindly read the same slides at a separate time. Absence or presence of tumor or suspicion of tumor was recorded for each slide. The main outcome was concordance rate between Mohs surgeon and dermatopathologic interpretation of slides overall and in the setting of each different layer.

Conclusion: The high rate of concordance in agreement between H&E and immunostains by both the Mohs surgeon and the dermatopathologist suggests that H&E is sufficient for Mohs Micrographic Surgery when treating SCC and further staining may not be required in most circumstances. The high concordance rate between interpretation by the Mohs surgeon and the dermatopathologist confirms that adequately trained Mohs surgeons have the expertise required for accurate interpretation.

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Presenter: Ramin Fathi, MD

Title: Incidence, Treatment, and Clinical Behavior of Cutaneous Malignancy in a Group of Solid Organ Transplant (Lung) Recipients, A Single Institution's Experience

Authors: Ramin Fathi, MD $^{\rm 1};$ Anne Maxwell, MD $^{\rm 1};$ Adam Terella, MD $^{\rm 1}$

Institution: 1. University of Colorado Denver, Aurora, CO

Purpose: Our aim was to assess the incidence, treatment, and clinical behavior of cutaneous squamous cell carcinoma (SCC) in a group of solid organ transplant (lung) recipients as a single institution.



Summary: The lung transplant group experienced a much higher number of SCCs (mean = 12.44) than the control population (mean = 3.80). The range of total SCCs in the transplant patients was 48 whereas the range in the control patients was 12 malignancies. The difference in total number of SCCs between the transplant patients and control patients was statistically significant after adjusting for the number of prior SCCs (β = 1.23, t = 3.05, p = 0.005). On average, the number of total SCCs in the transplant patients was 3.42 (1.55, 7.56) times the number in the control group. The transplant patients exhibited a larger increase in the number of SCCs than do non-transplant patients. On average, the absolute error of the pre-Mohs measurement was 3.31 cm2 and ranged from between 0.08 and 64.22 cm2. The difference between pre-Mohs and final defect area was significantly different from zero (Diff = 3.3, 95% CI = (1.94, 4.66), t = 4.81, df = 130, p < 0.001). In all but one instance, pre-Mohs measurement underestimated the final defect size in the lung transplant group. A comparison of means would suggest that pre-Mohs measurement error is higher for transplants (3.83 cm2) than for controls (2.01 cm2). A statistically significant association between the rate of metastasis and lung transplantation (p = 0.02) was found. Control patients experienced no metastatic events, whereas 5 (26.3%) of the transplant patients experienced at least one metastatic event. Also, there was a significant association between the rate of loss of local-regional control (LRC) and lung transplantation (p = 0.031). Only 2 patients experienced a loss of LRC in the control group (10.0%) versus 8 in the transplant group (42.1%).

Design: This study is a retrospective chart review of all patients who have received lung transplants from the years 1994 to 2014. We identified patients who were referred for Mohs surgery for SCCs with a history of lung transplantation over the last decade (n=19). We compared this population to patients referred for Mohs surgery for cutaneous malignancies with no history of solid-organ transplantation over the same time frame (n=20).

Conclusion: Immunosuppression for organ transplantation can increase the incidence of SCCs. However, the literature on lung transplantation specifically is lacking. With the knowledge now that lung transplantation predisposes individuals to aggressive SCCs we can consider closer monitoring, more aggressive chemoprevention and potential use of imaging to delineate tumors preoperatively. Although a small study, this data supports the potential benefit of these interventions in transplant patients and larger scale studies regarding this particular patient population.



Figure 1: Relationship of starting tumor area to final defect area. The line represents the point at which starting tumor area is equal to final defect area. Points above the line represent tumors whose final defect area was underestimated by the starting tumor area. To make the graph more readable, two observations were removed. These two observations belonged to two separate individuals who had final defect areas of 78.54 cm² and 66.76 cm².

Summary of aggressive cutaneous malignancies (Patient dataset)

	Control (N= 20)	Transplant (N=19)	Total (N = 39)
Angiolymphatic invasion			
N	20	18	38
Yes	0 (0%)	3 (15.8%)	3 (7.7%)
No	20 (100.0%)	15 (78.9%)	35 (89.7%)
Missing	0 (0%)	1 (5.2%)	1 (2.6%)
Perineural			
invasion			
N	20	18	38
Yes	0 (0%)	3 (15.8%)	3 (7.7%)
No	20 (100.0%)	15 (78.9%)	35 (89.7%)
Missing	0 (0%)	1 (5.2%)	1 (2.6%)
Greater than 1 non-negative			
surgical tumor			
margin			
N	20	19	39
Yes	0 (0%)	6 (31.6%)	6 (15.4%)
No	20 (100%)	13 (68.4%)	33 (84.6%)
Missing	0 (0%)	0 (0%)	0 (0%)
Lymph node			
status			
N	20	18	38
Positive	0 (0%)	3 (15.8%)	3 (7.7%)
Negative	20 (100.0%)	15 (78.9%)	35 (89.7%)
Missing	0 (0%)	1 (5.2%)	1 (2.6%)

Table 1: Angiolymphatic invasion, perineural invasion and greater than 1 non-negative surgical tumor margin were all more frequent in the transplant patients than in the controls. In addition, there were a higher proportion of positive lymph nodes in the transplant patients (15.8%).

Summary of tumor metastasis

	Control (N= 20)	Transplant (N=19)	Total (N=39)
At least one metastatic event			
N	20	19	39
No metastasis	20 (100%)	14 (73.3%)	34 (87.2%)
Metastasis	0 (0%)	5 (26.3%)	5 (12.8%)
Missing	0 (0%)	0 (0%)	0 (0%)

Summary of loss of local regional control

	Control (N=20)	Transplant (N=19)	Total (N=39)
Loss of local regional control			
N	20	19	39
No loss of LRC	18 (90.0%)	11 (57.9%)	29 (74.4%)
Loss of LRC Missing	2 (10.0%) 0 (0%)	8 (42.1%) 0 (0%)	10 (25.6%) 0 (0%)

Table 2: There is a statistically significant association between the rate of metastasis and lung transplantation (p = 0.02). No metastatic events were experienced by control patients, whereas 5 (26.3%) of the transplant patients experienced at least one metastatic event. In addition, there was a significant association between the rate of loss of local regional control (LRC) and lung transplantation (p = 0.031). Only 2 patients experienced a loss of LRC in the control group (10.0%) versus 8 in the transplant group (42.1%).

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Presenter: Yousif Yonan, MD

Title: Smoke Evacuation During Mohs Surgery

Authors: Yousif Yonan, MD1; Shari Ochoa, MD1

Institution: 1. Mayo Clinic Arizona, Scottsdale, AZ

Purpose: Patients in our practice have expressed that the odor from the surgical plume created by electrosurgical equipment is unpleasant. We sought to determine if smoke evacuation decreases patient perception of smoke plume created by electrosurgery used during Mohs surgery, and if it subsequently improves patient satisfaction with their surgical experience by minimizing the odor associated with the smoke plume.

Summary: Smoke evacuation was used during closure but not during Mohs stages. 100% of patients reported the perception of a burning odor during removal of Mohs stages, compared to 40% reporting the perception of a burning odor during the closure (p < 0.0001). During the Mohs stages, 66.6% of patients reported the odor as unpleasant compared to 16.6% of patients reporting the odor as unpleasant during the closure (p < 0.0001). Only 2 patients (6.67%) reported the Mohs removal stage as more pleasant than the closure stage (p < 0.0001). There were no statistically significant differences in patient perceptions when stratified by age, gender, or surgical site.

Design: We enrolled 30 patients who presented for Mohs surgery to participate in this comparison study. Tumor extirpation requires only the brief use of electrosurgery, resulting in minimal production of surgical smoke plume. During this phase, smoke evacuation was not used. Once tumor clearance was achieved, repair of the surgical wound was performed. During this second phase, electrosurgery is used more extensively to achieve hemostasis, resulting in a greater amount of surgical smoke plume. During this phase, we used smoke evacuation. Smoke evacuation was accomplished utilizing standard wall suction. Patients were blinded as to which phase smoke evacuation was used, as the wall suction was turned on during both phases of the surgical procedure, but was only used in the surgical field during the repair of the surgical defect. The surgical field was prepped and draped in a standard fashion such that during both the Mohs and the repair phases patients were unable to see if the smoke evacuator was in the surgical field or not. Patients were queried at the end of their first Mohs stage and at the end of their repair about the perception of smoke plume/odor and intensity. At the end of the procedure patients were unblinded and informed that the smoke evacuation was not used during the Mohs layer, but used during the closure and then asked about their preference.

Conclusion: We believe that the use of a wall suction smoke evacuation system is simple and can result in a more pleasant experience for patients undergoing Mohs surgery. More studies are required to get a broader understanding of both staff and patient perceptions of surgical smoke.







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Presenter: Karen L. Connolly, MD

Title: Follicular Involvement in Lentigo Maligna: Frequency and Treatment Implications

Authors: Karen L. Connolly, MD^{1,2}; Cerrene Giordano, MD¹; Klaus Busam¹; Kishwer Nehal, MD¹

 $\ensuremath{\mathsf{Institutions:}}\xspace$ 1. Memorial Sloan Kettering Cancer Center, New York, NY

2. Lincoln Hospital, Bronx, NY

Purpose: Standard guidelines for melanoma histopathologic reporting exist; however, the presence, absence, and extent of follicular involvement is not routinely reported. Follicular involvement, particularly depth of atypical adnexal melanocytes may have clinical significance in lentigo maligna (LM) and lentigo maligna melanoma (LMM), which are predominantly located on the head and neck. Depth of atypical adnexal melanocytes may affect surgical excision in these cosmetically and functionally important areas and depth-dependant therapies such as radiation. The purpose of this study is (1) to characterize the incidence of follicular involvement in LM, (2) to define the extent of follicular involvement seen, including the depth of atypical melanocytes.

Summary: Seventy of 154 total pathology specimens met inclusion criteria of residual melanoma in situ in the excision debulking specimen. Slide review revealed follicular involvement in 65/70 specimens (92.9%). The mean percentage of follicles involved in a single high power field was 69%. The mean depth of atypical melanocytes within the adnexa was 0.52mm (range 0.2 to 1.1mm), corresponding to infundibular involvement in 41/65 (63%) of specimens. Tumor location was the cheek in the majority of cases (25), followed by the nose (9), forehead (9), and scalp (9). There were 5 cases on the ear, 2 cases each involving the arm, chin, leg, lip, and neck, followed by 1 case each involving the eyebrow, eyelid and glabella.

Design: Following Institutional Review Board approval, a prospectively collected database of consecutive biopsy-proven LM/LMM presenting to a dermatologic surgery practice at a cancer center between 2013 and 2015 was retrospectively reviewed. Pathology slides from all lesions with residual LM on the excision debulking specimen were reviewed. Follicular involvement was characterized by a board-certified dermatopathologist and fellowship-trained Mohs surgeon.

Conclusion: Follicular involvement in LM/LMM is ubiquitous and not consistently reported. The presence and depth of follicular involvement may have clinical implications for depth-dependent treatment modalities such as tissue-sparing surgery and radiation therapy. Further study is needed to assess the impact of follicular involvement on treatment efficacy for LM.

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Presenter: Elizabeth Chase, MD

Title: Number of Mohs Stages for Mohs Micrographic Surgery Fellows and Experienced Mohs Surgeons in Cosmetically Sensitive versus Other Areas of the Face

Authors: Elizabeth Chase, MD¹; Nicole Warner¹; Victor Marks, MD¹; Mary Petrick, MD¹; Michael Ramsey, MD¹

Institution: 1. Geisinger Health System, Danville, PA

Purpose: One quality measure in Mohs micrographic surgery (MMS) is the number of stages required to remove a tumor. This value may be influenced in part by body location, surgical technique, and surgeon experience level. To determine whether MMS fellows' average number of Mohs stages changes during fellowship training and to explore whether this average is influenced by specific face locations, we retrospectively examined fellow and experienced Mohs surgeon data from our institution's database from 2006 to 2016.

Summary: The average number of stages on all face and ear locations among experienced surgeons was 1.652; the median number of stages taken by experienced surgeons did not vary significantly between July-September and April-June cases. The overall mean number of stages among fellows in the first three months of fellowship was 1.772, and the mean number during the last three months was 1.732, a difference which is statistically insignificant (Mann-Whitney U=1760642, P=0.1738). In cosmetically sensitive facial locations, all cohorts including experienced surgeons, fellows at the beginning of their training, and fellows at the end of their training took significantly more stages than when performing MMS on less-cosmeticallysensitive face locations (p < 0.0001 in all cohorts). MMS fellows required a significantly greater number of layers in the cosmetically sensitive face locations at the end of their fellowship when compared to experienced surgeons (mean =1.867stages versus 1.737 stages, respectively; p = 0.0005). For less-cosmetically-sensitive facial locations, statistically significant differences in number of layers taken at the beginning and the end of the academic year were found among experienced surgeons and among the fellow cohort. However, by the end of the fellowship year, the average number of stages obtained by experienced Mohs surgeons and by fellows converged (1.561 versus 1.567, respectively) such that there was no statistically significant difference in number of stages between the two groups (p = 0.33).

Design: We reviewed the ten most recent academic years of Mohs cases involving the face or ear to determine the number of stages required for tumor removal by fellows in their first three months compared to their last three, and we compared this to the number of stages required by experienced Mohs surgeons (13 to 28 years of Mohs practice) during the same time periods. Additionally, we divided cases into two locations: (A) those involving cosmetically sensitive facial areas including the periocular area, nose, lips, and ears; (B) all other facial skin areas. Mann-Whitney U tests were employed to determine statistical significance (p values).



Conclusion: Our study demonstrates a difference in average number of stages required for tumor extirpation between surgeons with minimal training and experienced surgeons on less-cosmetically-sensitive facial areas. This difference becomes negligible by the end of training, which suggests that critical learning occurs during fellowship.

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Presenter: Sean Condon, MD

Title: Closure of Mohs Micrographic Surgery Lower Extremity Wounds: Are We Wasting our Time?

Authors: Sean Condon, MD¹; Janet Adegboye¹; Ann Kim¹; Alok Vij, MD¹

Institution: 1. Cleveland Clinic, Cleveland, OH

Purpose: To compare the complication rates from primary closure, secondary intention healing, purse-string, full-thickness skin graft (FTSG), split-thickness skin graft (STSG) and flap repair for lower extremity wound closure following Mohs micrographic surgery (MMS).

Summary: Lower extremity wound repair is challenging for physicians and patients and may result in significant patient morbidity and increased health care expenditure. While most surgeons prefer primary closures, there is limited data and no common practice guidelines for management of lower extremity wounds that are not candidates for primary closure. A recent published survey study noted broader indications for secondary intention healing after MMS including the lower extremities. Given the significant variability in time and resources required for each closure method, the primary aim of this study was to determine the difference in complication rates among the major methods of repair. Data was collected from 295 tumors at a tertiary center. The mean patient age was 73 years with 65% female and 35% male. 69% were squamous cell carcinomas (SCC), 29% basal cell carcinomas (BCC), and 1.4% melanoma. 70% of SCC were invasive and well-differentiated and 53% of BCC were aggressive subtypes. 70% were located on the anterior shin. There was no difference in laterality between SCC and BCC (p=0.88). The mean area of post-operative defects was 5.5cm2 requiring a mean 1.2 layers and 1.4 postoperative visits within 90 days. The mean post-operative defect area of purse-string (4.9cm2) and secondary intention (4.6cm2) was larger than primary closure (2.7cm2), although not statistically significant. 106 (36%) were repaired with primary closure. Other modalities utilized included purse-string closure (100 (33.8%)), secondary intention healing (78 (26.4%)), STSG (8 (2.7%)), FTSG (2 (0.7%)), and flap closure (1 (0.3%)). 29 patients (9.8%) experienced a surgical complication and required intervention. No significant difference in complication rates was found among closure methods (p=0.70). There was also no difference in number of interventions required (p=0.35). Wound size and number of post-operative visits was not significantly different between primary, secondary intention, and purse-string closures. Additional findings revealed that women were more likely to require MMS than men (p < 0.001), patients on anticoagulation were 2.3 times more likely to have BCC than SCC (p=0.0014) and patients on chronic immunosuppression

were 5 times more likely to have a SCC rather than a BCC (p=0.001).

Design: This single-center retrospective cohort study included consecutive patients that underwent MMS on the lower extremity at a tertiary center between September 2014 and September 2016. The lower extremity was defined as the area below the knee. Ongoing analysis of this cohort is examining risk factors for complication rates.

Conclusion: There is no difference in complication rates among closure methods for repair of lower extremity wounds after MMS.

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Presenter: Sean Condon, MD

Title: Microcystic Adnexal Carcinoma Treatment and Outcomes: A Retrospective Analysis of 40 Cases

Authors: Sean Condon, MD¹; Allison Vidimos, MD, RPh¹

Institution: 1. Cleveland Clinic, Cleveland, OH

Purpose: To report experience, demographics and outcomes of 40 cases with Microcystic Adnexal Carcinoma (MAC) and to reaffirm that Mohs Micrographic surgery (MMS) is superior to Wide Local Excision (WLE) for MAC.

Summary: MAC is a rare cutaneous neoplasm of follicular and sweat gland differentiation. Although indolent and clinically subtle, MAC may be locally aggressive with unpredictable subclinical growth. While consensus is that MMS is the preferred treatment modality by most, the 2010 SEER database for MAC noted that the majority were treated with WLE (87%). In our cohort, WLE was performed on seven with a median and average follow up of 81 and 90 months, respectively; four (57%) had recurrence or positive margins. 32 were treated with MMS with a median and average follow up of 21 and 50 months, respectively with one recurrence (3%). The average age was 61 and more than two-thirds of patients were female. All patients were Caucasian. 11 cases were not initially diagnosed as MAC (27 %), four of which were misdiagnosed as benign (10%). 98% were located on the head and neck, most commonly on the cheek (28%). Seven MACs were recurrent (18%), 12 had perineural invasion (30%) and none had evidence of lymphovascular invasion. MACs treated with MMS had an average preoperative size 3.75 times larger than apparent clinical size. The average number of Mohs layers needed to obtain tumor free tissue was 2.2 with a range from 1 to 6 layers.

Design: A retrospective review of 40 patients diagnosed with MAC between 1987 and 2015 was performed.

Conclusion: We report a 3% recurrence rate with MMS and 57% recurrence with WLE. The recurrence rate data on MMS as a treatment of MAC presented in our study and past studies highlight its superiority to WLE and the importance to treat MAC with MMS. MMS should be the standard of care for MAC as it allows for better outcome, fewer procedures and tissue conservation.

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Presenter: Natalie L. Hone

Title: Complications with Novel Oral Anticoagulants Dabigatran, Apixaban and Rivaroxaban in Mohs Micrographic Surgery

Authors: Natalie L. Hone¹; Camila Antia¹; Hugh M. Gloster, Jr., MD¹

Institution: 1. University of Cincinnati, Cincinnati, OH

Purpose: Approximately 25-38% of patients that undergo cutaneous surgery are taking an antithrombotic agent that puts them at a slightly higher risk of bleeding. Patients on novel oral anticoagulants (NOACs) are an increasing presence in the dermatologist's office. These new medications have the advantage of not requiring coagulation monitoring given that they have a more predicable dose-dependent effect and have been shown to result in fewer severe life-threatening hemorrhagic complications. Perioperative management data of this subgroup of patients is scant and recommendations have mostly been extrapolated from previous studies on other anticoagulants. The purpose of this study is to determine the perioperative complication of Mohs micrographic surgery associated with novel oral anticoagulants (NOACs) dabigatran, apixaban or rivaroxaban.

Summary: The rate of bleeding and infection complications associated with Mohs micrographic surgery on patients taking NOACs dabigatran, apixaban or rivaroxaban was low at 1.3% and 2.6% respectively. There were no severe hemorrhagic complications. This is the largest study to date of patients of NOACs undergoing Mohs micrographic surgery and is consistent with previous perioperative anticoagulant recommendations. Continuing medically necessary anticoagulation with NOACs during Mohs micrographic surgery is recommended.

Design: A retrospective chart review was performed of patients who were taking dabigatran, apixaban or rivaroxaban and underwent Mohs micrographic surgery between October 1st, 2011 and September 15th, 2016 at a large academic institution.

Conclusion: Continuing medically necessary anticoagulation with NOACs during Mohs micrographic surgery is recommended.

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Presenter: Muneeb Ilyas, BSc

Title: Residual Squamous Cell Carcinoma after Shave Biopsy in Solid Organ Transplant Recipients

Authors: Muneeb Ilyas, BSc¹; Nan Zhang¹, MS; Amit Sharma, MD¹

Institution: 1. Mayo Clinic Arizona, Scottsdale, AZ

Purpose: The immune system and wound healing are both thought to contribute to regression of cutaneous squamous cell carcinoma (cSCC) following shave biopsy. Residual cSCC following biopsy has not been studied in solid organ transplant recipients (SOTRs). We conducted a retrospective review comparing the prevalence of residual cSCC detected at re-

excision in SOTRs and an age-matched non-immunosuppressed control group.

Summary: Of the 117 SOTRs, *57* (48.7%) had residual tumor within the excision. Of the 117 non-transplant patients, 31 (26.5%) had evidence of residual cancer. Residual tumor rates were significantly higher in SOTRs compared to their age matched controls (p=0.0045). Although SOTRs had longer time periods between biopsy and excision (p=0.0432), when the data was adjusted for this, gender, and tumor location, SOTRs were still more likely to have residual cSCC (p=0.0076). Additionally, the transplant group had higher rates of cSCCs on the upper extremity, while non-transplant patients had higher rates of cSCC on the lower extremity (p=0.0388).

Design: Data was collected for 117 SOTRs and 117 agematched non-transplant controls diagnosed with shave biopsyproven cSCC who underwent subsequent wide local excision from January 2004 – December 2016. Patients with cSCC on the scalp, ears, face or genitals were excluded. All SOTRs were on immunosuppressive therapy at the time of their shave biopsy. Two sample T-test or Chi-square test was used to compare the demographics and tumor-related characteristics in the transplant and non-transplant group when applicable. Conditional logistic regression was used to investigate if transplant is associated with residual tumor.

Conclusion: Our results show that SOTRs have higher rates of residual cSCC in excision samples after shave biopsy when compared to non-immunosuppressed controls. We hypothesize that immunosuppression, and its effects on wound healing and immune-mediated tumor clearance, contributes to the higher rates of residual cSCC in SOTRs. SOTRs with biopsy-proven cSCC should be prioritized for margin controlled surgery in a timely manner.



Table 1. Demographis and Tumor Characteristics by Transplant and non-Transplant Group

	Non-Transplant (N=117)	(N=117)	Total (N=234)	p value
Age at excision				0.7017
N	117	117	234	
Mean (SD)	63.3 (9.2)	63.8 (9.2)	63.5 (9.2)	
Median	64.0	64.7	64.0	
Range	(47.0 \$5.0)	(17.3 85.2)	(47.0 \$5.2)	
Gender				0.4252
F	51 (43.6%)	45 (38.5%)	96 (41.0%)	
М	66 (56.4%)	72 (61.5%)	138 (59.0%)	
Time between biopsy and exci	tion (days)			0.0432
N	117	117	234	
Mean (SD)	26.8 (21.6)	33.0 (25.4)	29.9 (23.7)	
Median	23.0	29.0	27.5	
Range	(0.0-127.0)	(0.0-161.0)	(0.0-161.0)	
Tumor				0.0388
Trunk	29 (24.8%)	32 (27.4%)	61 (26.1%)	
UE	50 (42.7%)	62 (53.0%)	112 (47.9%)	
LE	30 (25.6%)	13 (11.1%)	43 (18.4%)	
Neck	8 (6.8%)	10 (8.5%)	18 (7.7%)	
Time between transplant and	excision (years)			
N	-	117		
Mean (SD)		11.4 (9.4)		
Median		8.8		
Range	-	(0.1-40.0)	-	
Kidney transplant				
Yes		93 (79.5%)		
No	-	24 (20.5%)		
Immunosuppressant no				
1		11 (9.4%)		
2	-	32 (27.4%)		
3	-	74 (63.2%)	-	

Two sample t-test was used to compare age at excision and time between biopsy and excision and Chi-square test was used to compare gender and tumor location in the transplant and non-transplant group It shows that the time between biopsy and excision is significantly longer in the transplant group than that in the non-transplant group (p=0.0432). Transplant group nore residual tumor in upper extremity while non-transplant and more residual tumor in lower extremity (p=0.0388).

Table 2. Model Results for Residual Tumor in Combined Population

Predictor	Level	OR (95% CI)	pyalue	
Transplant	Transplant vs. Non-transplant	2.59 (1.29,5.22)	0.0076	
Gender	F vs M	0.84 (0.36,1.94)	0.6764	
Time between biopsy and excision		1.02 (0.99,1.04)	0.2024	
	UE vs Trunk	0.59 (0.19,1.89)		
Location	Neck vs Trunk	1.83 (0.27,12.61)	0.5992	
	LE vs Trunk	0.94 (0.24,3.70)		

Multivariable conditional logistic regression was used to investigate which is the associated with residual tumor in the combined population. Potential predictors considered here were transplant, gender, time between biopsy and excision and tumor location. Model results were listed in Table 2. The only thing came out significantly is transplant. The odds of having residual tumor in the transplant group is 2.59 (95% CI: 1.29 to 5.22, p=0.0076) times higher than that in the non-transplant group. Other predictors were all not significant in the model.

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Presenter: Robert Fischer, MD

Title: A 10-Minute Method to Animate Suture Techniques Using Adobe Software

Authors: Robert Fischer, MD¹; Miaoyuan Wang, MD¹; Satori Iwamoto, MD, PhD¹

Institution: 1. Roger Williams Medical Center, Barrington, RI

Purpose: To present a novel method to easily create simple animations of suture techniques commonly used in dermatologic surgery with Adobe Animate CC.

Summary: A variety of visual resources exist to illustrate suture techniques in dermatologic surgery, however most of these resources consist of static graphics and images. While a series of illustrations may be helpful to conceptualize techniques, the true motions and movements that are essential to correctly implementing them are not always adequately represented. An animation may solve this problem, but they are often made by animators with no medical/surgical experience and therefore may lack the subtleties to correctly understand the technique. We present a method that is both simple and efficient to create a variety of suture animations, thereby allowing surgeons, fellows, residents, and students with minimal or no animation experience to easily animate desired techniques. Adobe Animate CC was chosen as the platform for animation due to its ease of use and widespread availability. Examples of simple suture animations are presented which may be used for education or to demonstrate technique in presentations. While these methods may be expanded to other areas of dermatologic surgery, we focus only on suturing techniques.

Design: Methods to create simple animations of suture techniques were developed using Adobe software. Adobe Animate CC was chosen as the platform for animation due to its ease of use, widespread availability, and relatively low cost. The animations were created with a step-wise, layered approach. Animation layers of the skin, the final suture path, and suture tail are created first, and then incrementally stepped backward beginning with the final path of the suture. The suture tail layer expands to provide the visual element of a continuous length of suture. The final step is to simply reverse the frames to create a finished animation. Sample animations were created using these methods.

Conclusion: While animation is a more effective medium to convey techniques in dermatologic surgery, it is often underutilized due to its perceived level of difficulty. The methods we present are an effective way to quickly create animations of suture techniques with little or no prior animation experience required. This will allow medical professionals to create animations for teaching, lectures/ presentations, or other purposes.

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Presenter: Adam Sutton, MD, MBA

Title: Defining Skin Cancer as a Chronic Disease

Authors: Adam Sutton, MD, MBA¹; Ashley Crew, MD¹; Alexandre Ly, RN, BSN¹; Shauna Higgins, MD¹; Ashley Wysong, MD, MS¹

Institution: 1. USC Keck School of Medicine, Los Angeles, CA

Purpose: Chronic diseases are the leading cause of death and disability in the United States. The notable absence nonmelanoma skin cancer (NMSC) as a chronic disease minimizes both healthcare providers and the public's perception of the actual morbidity and impact that NMSC has on a group of highrisk individuals. Our group's proposed reclassification of NMSC as a chronic disease aims to validate NMSC as a disease that requires long term management and a whole person approach.

Summary: A total of 32 patients were enrolled in the study. On average, they had five non-melanoma skin cancers over the last year and 34 over their lifetime. When stratifying by lifetime skin cancers, those with 5-9 and 10+ had notable differences in general and skin specific quality of life subscale scores. Patients with 10+ skin cancers had lower Role (66 vs. 86), Social (77 vs. 93) and Current Health (58 vs. 73) Short Form Health Survey (SF-20) subscale scores, which measure quality of life on a 0-100 scale, with 100 representing a higher quality of life. When looking at the Skindex-16, the Emotional (48 vs. 26) and Symptoms (27 vs. 9) subscale scores for patients with 10+

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lifetime cancers were higher than those with 5-9. The Skindex-16 measures bother on a 0-100 scale, with 100 representing greater bother.

Design: A cohort of patients older than 18 who attended clinic for evaluation and management of their NMSC were recruited to participate in the study. Patients who agreed to participate completed questions regarding their skin cancer history as well health related quality of life and functional status surveys.

Conclusion: Patients were on average diagnosed with their first skin cancer 26.5 years ago, 78% required 4+ visits to the dermatologist over the last year and general and skin specific quality of life impact was present. Although chronic disease lacks a consensus definition, they are generally defined as meeting three components: duration, need for ongoing medical care and functional or health related quality of life impairment. The findings in our cohort support the reclassification of NMSC as a chronic disease in high-risk individuals. Based on the findings in this study we propose that high-risk patients with five or more skin cancers over a 12+ month period have their skin cancers classified as a chronic disease. This reclassification aims to encourage providers to approach skin cancer management from a whole person and long term perspective with a focus on prevention. Applying a disease management algorithm based on lifetime skin cancers emphasizing primary, secondary and tertiary prevention strategies along with acknowledging the physical disfigurement and social isolation that can occur in these patients has the potential to improve outcomes and quality of life while limiting morbidity.

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Presenter: Sarah Arron, MD, PhD

Title: Mohs Micrographic Surgery in the Veterans' Health Administration

Authors: Andrew Tam, MD¹; Joyce Yuan, MD¹; Theodora Mauro, MD^{1,2}; Robert Dellavalle, MD, PhD, MSPH³; Sarah Arron, MD, PhD^{1,2}

Institutions: 1. University of California-San Francisco, San Francisco, CA

San Francisco VA Medical Center, San Francisco, CA
University of Colorado, Denver VA Medical Center, Denver, CO

Purpose: A 2007 survey of dermatologists in the Veterans' Healthcare Administration (VHA) reported that Mohs micrographic surgery (MMS) was available at 11% of sites. We aimed to update data on availability of MMS in the VHA, to characterize standard practices in staffing and access to care for MMS, and to investigate utilization of non-VA care for MMS.

Summary: 52 (70.3%) surveys were returned. MMS was provided in nineteen VA sites (36.5%). An estimated 6,686 cases were reported for 2015, with an average of 371 cases per site (range 40-1000 cases). 12 sites (63.2%) had one or two Mohs surgeons; 7 (36.8%) had more than two. Information was available on 30 surgeons. 63.3% were hired as VA employees and 33.3% as contractors. 89.3% were affiliated with an academic dermatology program. Thirteen sites (68.4%) participated in training dermatology residents and five trained Mohs fellows (26.3%). Nursing and support staff correlated with case volume. Eight sites (42.1%) reported a wait time <

1 month, ten (52.6%) reported 2-6 months, and one (5.3%) reported 7 months - 1 year. All but two sites (89.5%) use a triage or grading system to expedite high-risk cancers. The majority of dermatology chiefs at sites offering MMS felt that patients are able to get surgery in a reasonable amount of time, and that the facility and resources at their site are adequate in meeting the demand, but noted that patients have to travel a long distance for care (Figure 1). Among the 33 (63.5%) of VA sites that do not offer MMS, 28 (84.8%) use purchased care via referral to non-VA facilities. 30 (90.0%) reported that their patients had used Veterans Choice to receive MMS. 8 (25%) reported referring patients to other services within the VA, including plastic surgery, otolaryngology, and general surgery. The majority of dermatology chiefs from sites using purchased care to provide MMS felt that patients are able to get surgery in a reasonable amount of time after referral, and did not identify a concern with long travel distance. 44.4% of respondents found it difficult to follow up with patients after physician-initiated fee-basis/Non-VA care referrals for MMS, but 83.3% of respondents found it difficult to follow up with patients after they activated Veterans' choice for MMS (Figure 2).

Design: A cross-sectional survey of chiefs at 74 VA medical centers providing dermatology services.

Conclusion: Access to MMS remains limited within the VHA, but sites that do offer MMS report adequate resources and patient access. Sites that did not provide MMS utilize purchased care from facilities outside of the VA. Communication and care coordination for patients treated outside the VHA remains difficult. Future endeavors should focus on standardizing care and improving access to MMS for our veterans.



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Presenter: Martha Council, MD

Title: Atypical Fibroxanthoma Treated with Mohs Micrographic Surgery vs. Conventional Excision: A Single Institution Experience

Authors: Patrick Phelan¹; Martha Council, MD¹

Institution: 1. Washington University, St. Louis, MO

Purpose: Atypical fibroxanthoma (AFX) is a rare dermal neoplasm typically occurring on the sun-exposed skin of the elderly. Often presenting as a small, nodular tumor on the head and neck, the clinical features of AFX are non-specific and biopsy with immunohistochemical assessment is required to support a diagnosis (Figure 1). Surgical removal is standard and often curative, though the use of Mohs micrographic surgery (MMS) versus conventional excision varies with clinical setting. As the precise etiology and relationship to tumors of similar morphology remain uncertain, diagnostic criteria have been refined in order to better inform prognosis. Nonetheless, the clinical behavior of AFX is variable, with potential for local recurrence and rare distant metastasis. Thus, the objective of the present study was to evaluate the characteristics of contemporary cases of AFX, and to determine whether the complete margin analysis and tissuesparing technique of Mohs micrographic surgery had an impact on patient outcomes.

Summary: Seventy-five cases of AFX were identified with 56 cases occurring in males and 19 in females (male: female ratio 2.9:1). All patients with known race (71) were white. The median age at diagnosis was 73 (range 11 - 91). Sixty-five percent of patients reported a prior history of skin cancer, including basal cell carcinoma, squamous cell carcinoma, and melanoma. Seventeen percent of cases occurred in immunocompromised patients. Ninety-one percent of tumors occurred on the head and neck, distributed roughly equally between the face, ears, and scalp. (Figure 2) Most tumors were treated with Mohs micrographic surgery or excision. Pre-operative sizes were similar between the two treatment groups; Mohs micrographic surgery required a median 3.3 cm² less tissue removal than conventional excision. Seven recurrences were observed (Table 3). Two cases received revised diagnoses after treatment, one to superficial undifferentiated pleomorphic sarcoma and one to cutaneous leiomyosarcoma. From an intent-to-treat perspective, the overall recurrence rate was 14% (6.7% Mohs, 25% excision). Excluding the two cases for which the final diagnoses were revised, the overall recurrence rate for true AFX was 10.4%.

Design: A retrospective review was conducted to identify all cases of AFX treated at our institution from January 2000 through July 2016. Data recorded included both patient and tumor characteristics. In order to compare variables between the surgical techniques of Mohs micrographic surgery and conventional excision, surgical tissue removal was calculated as the difference between the two-dimensional post-operative defect and pre-operative lesion size.

Conclusion: AFX is a rare cutaneous neoplasm, typically treated with surgical modalities. Mohs micrographic surgery allows for a complete margin analysis and is tissue-sparing, resulting in lower rates of recurrence and smaller defect size when compared to conventional excision. Local recurrence and distant metastasis are possible regardless of treatment modality, and careful postoperative monitoring is prudent.



Figure 1: Clinical (top) and histopathologic appearance (bottom) of typical AFX. **Top**: Ulcerated nodule on the scalp. **Bottom**: Dense atypical spindle, epithelioid, and multinucleated cells with abundant mitoses.





Case No.	Age			Immune Status		Time to Recurrence (months)		
1	66	м	Scalp	Normal	Staged excision	12.25	Staged excision	•
2	66	м	Face	Transplant	LE	4	Local excision (x3), RT	+ mets
3	70	M	Ear	Normal	MMS	2.75	MMS	-
4	75	M	Face	CLL	MMS	3	MMS, RT	-
5	76	М	Ear	Normal	Multiple	3	Completion auriculectomy	UPS*
6	76	F	Scalp	Normal	LE	3	Local excision, SCT	+ mets
7	82	F	Scalp	Normal	LE	3.5	Local excision, RT	LMS*

CLL = chronic lymphocytic leukemia, RT = radiotherap *Final diagnosis revised after recurrence.

Table 3: Characteristics of recurrent lesions diagnosed as AFX



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Presenter: Joseph Sobanko, MD

Title: Scar Appearance Improves with Time but Favorable or Unfavorable Short-Term Appearance Persists at Longer-Term Follow-Up

Authors: Kimberly Shao, BS¹; Christopher J. Miller, MD¹; Thuzar M. Shin, MD, PhD¹; Jeremy Etzkorn, MD¹; Joseph Sobanko, MD¹

Institution: 1. Perelman Center for Advanced Medicine, Philadelphia, PA

Purpose: Although surgical dogma dictates that scars improve with time, the appearance of the scar at suture removal may predict longer-term outcomes. This study evaluated the relationship between scar appearance at short- and longer-term postoperative periods.

Summary: The longer-term appearance of the scar, as rated by the mean Observer Scar Assessment Scale (OSAS)'s total score, improved by 49% (9.7 mean absolute decrease), compared to the short-term appearance (p<0.001) (Figure 1). The physicians' gestalt subjective overall opinion aligned with summation scoring of the individual scar characteristics of the OSAS at both timepoints (r=0.976, p <0.001). Scar irregularity and surface area showed the greatest improvement (50%) between the two timepoints (Figure 1). Overall opinion of short-term scar appearance accounted for 38% of the longer-term scar's overall score (p=0.005) (Figure 2). Skin grafts were graded with the least aesthetic scores at both time-points (p=0.0069, 0.0019). Surface area was the most critical element in predicting overall opinion of scar appearance at short- and longer-term assessment (Figure 3).

Design: Retrospective, analytic study of physician-evaluated scars in 113 patients with biopsy-proven, facial skin cancers treated with Mohs micrographic surgery at a single institution. High-resolution (minimum 475x424 pixels), de-identified photographs of patient scars from short-term (1-2 week suture removal) and longer-term (≥3 months) postoperative visits were rated by four physicians with the Observer Scar Assessment Scale (OSAS). Each scar characteristic from the OSAS (vascularity, pigmentation, thickness, irregularity, and surface area) was scored on a Likert scale of 1 (="normal skin") to 10 (="worst imaginable scar"). The sum of all categories provided a total OSAS score (maximum of 50) at each time-point. Observers also provided an "overall opinion" of the scar's appearance, which was graded on the same 1 to 10 Likert scale. Linear regression was used to assess the extent that short-term postoperative scar appearance predicted longer-term scar appearance. Standardized beta coefficients were used to determine the OSAS scar characteristic(s) that contributed most to overall scar appearance.

Conclusion: The appearance of facial surgical scars improves in the early postoperative period, especially due to changes in irregularity and surface area. Overall positive or negative scar appearance at 1-2 week suture removal appointments correlates with appearance at longer-term follow-up. At the time of suture removal, physicians may counsel patients that the scar appearance will improve. However, patients with unfavorably rated scars 1 week after surgery may expect persistently poor appearance at longer-term follow-up.



Figure 1: Percent improvement was determined by linear regression models, which were adjusted, when appropriate, for anatomic location, for whether the lesion was on the central or lateral face, and for reconstruction procedure type. *p<0.05.



Figure 2: Coefficients of determination (R^2) were determined by linear regression models, which were adjusted, when appropriate, for anatomic location, for whether the lesion was on the central or lateral face, and for reconstruction procedure type. R^2 represents the percent of the variation in longer-term scar appearance explained by short-term scar appearance.



Figure 3: Standardized beta coefficients were compared to determine which OSAS item contributed most to the prediction of overall opinion. For both short-term and longer-scars, surface area had the highest Beta. *p<0.05



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