# CME & Abstract Book



ACIONS American College of Mohs Surgery 50<sup>TH</sup> ANNUAL MEETING Thursday, May 3 – Sunday, May 6, 2018

CHICAGO

www.MohsCollege.org/AnnualMeeting

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American College of Mohs Surgery 555 East Wells Street, Suite 1100 Milwaukee, WI 53202

 
 Phone:
 (414) 347-1103 (800) 500-7224

 Fax:
 (414) 276-2146

 Email:
 info@mohscollege.org

 Website:
 www.MohsCollege.org

 www.SkinCancerMohsSurgery.org

# **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, eyelid and ear;
- Describe current recommendations for diagnosis and treatment of melanoma, and Merkel cell cancer;
- Recall the benefits and techniques involved in utilizing immunohistochemistry in the treatment of melanoma and nonmelanoma skin cancers;
- 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 dermatologic surgery, advances in the care of nail disease, and melanoma;
- Describe recent developments in the management of skin cancer in organ transplant recipients.

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Maral K. Skelsey, MD	Grant/Research Support - Dermtech
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#### May 3, 10:00–10:07 am

Presenter: S. Alison Basak, MD, MA

Title: Post-Procedural Perceptions Amongst Geriatric Patients Regarding Mohs Micrographic Surgery for Treatment of Non-Melanoma Skin Cancer

Authors: S. Alison Basak, MD,  $MA^1$ ; Nicholas J. Golda,  $MD^2$ ; Allison Sindle,  $MD^2$ 

Institutions: 1. Forefront Dermatology, St. Louis, MO 2. University of Missouri-Columbia, Columbia, MO

**Purpose:** The skin cancer epidemic in the United States disproportionately affects the elderly. Mohs micrographic surgery (MMS) is the current standard of care for many tumors, and its safety in the elderly has been supported by numerous studies. Some well-intentioned healthcare providers, however, are reluctant to pursue surgical treatment for non-life-threatening cancers in the elderly due to concerns that the stress of surgery and recovery outweighs any potential benefit of treating the cancer. There is little information about how older patients feel regarding MMS. We sought to examine attitudes towards MMS by elderly patients who underwent MMS at age 80 years or older.

Summary: 1101 potential patients were identified using billing data from 1/1/2007-12/31/2015. 270 (24.5%) patients were able to be contacted by phone, 242 agreed to participate in the study, and 198 surveys (81.8% response rate) were analyzed. Table 1 summarizes the cohort information. Table 2 summarizes the survey data. The MTSS component scores were: body image +1.2, scar appearance +2.5, and surgical experience +3.5. The average MTSS was +7.2(±2.9) (Figure 1). During surgery, the most common complications were bleeding (n=17, n=17)8.6%), pain (n=16, 8.1%), swelling (n=11, 5.6%), and anxiety (n=10, 5.1%). 135 patients (68.2%) denied complications. After surgery, the most common complications were pain (n=19, 9.6%), difficulty with bandage changes (n=15, 7.6%), and bleeding (n=11, 5.6%). 124 patients (62.6%) denied post-operative complications. 166 (89.7%) of patients rated their worst complication as "not severe"/"mild" versus 19 patients (10.3%) that rated them "moderate"/"very severe". 160 patients (83.8%) felt that the time spent at the office for surgery was appropriate. 136 patients (74.3%) resumed their normal daily activities quickly following MMS. 181 patients (91%) were glad that they had MMS. 3(1.5%) were unsure, and 14(7.1%) did not answer the question. Statistical analysis of demographic and surgical variables in relation to MTSS did not demonstrate any relationships of clinical significance, defined as  $\geq$ 3-point difference on the MTSS scale.

**Design:** A retrospective cohort study was designed using a mail survey created to explore the body image, scar appearance, and surgical experience aspects of MMS and integrated them into a single Mohs Treatment Satisfaction Score (MTSS). Each component was translated into a 5-point scale centered on zero, with negative values corresponding to a negative answer and vice versa. The total MTSS score could range from -12 to +12.

**Conclusion:** Elderly patients demonstrate a highly positive outlook regarding their MMS experience and value their MMS skin cancer treatment. While MMS may not be appropriate for all elderly patients, it should not be dismissed out-of-hand merely due to age. Physicians should be careful about making assumptions regarding patient values and engage patients in a dialogue to determine the most appropriate skin cancer treatment modality.

Characteristics				
Survey Response	n			
Number of patients	198			
Number of tumors	242			
Ace (v)	MeantSD (range)			
At time of surgery	83.7±3.2 (80-94)			
At time of survey	86.9+3.8 (81-98)			
Sex	n (%)			
Female	60 (30.3)			
Male	138 (69.7)			
Marital Status	n (%)			
Married	122 (61.6)			
Single (widowed,	60 (30.3)			
divorced)				
Linknown	26 (8.1)			
Charlson Comorbidity Index at Time of Surgery	n (%)			
4	81 (40.9)			
5	60 (30.3)			
6	34 (17.2)			
7	34 (7.1)			
8-10	9 (4.6)			
Skin Cancer Types	n (%)			
Basal cell carcinoma	164 (68.3)			
Squamous cell carcinoma	71 (29.5)			
Other (atypical	5 (2.1)			
fibroxanthoma,				
microcystic adnexal				
carcinoma,				
extramanimary Paget's				
disease)	20.0			
Cancer Location	n (%)			
Forehead	31 (12.9)			
Cheek	54 (22.5)			
Eyelid	5 (2.0)			
Lip .	11 (4.6)			
Nose	49 (20.4)			
Scalp	15 (6.3)			
Ear	43 (17.9)			
Neck	8 (3.3)			
Hand	7 (2.9)			
Other (trunk, buttock, arm, lost)	17 (7.1)			

(Table 1 cont)	
Stages to Tumor	n (%)
1	136 (55.7
2	74(30.6)
3	15 (6.3)
4	11 (4.6)
25	411.7
Repair Type	n (%)
Second intent	35 (14.8)
Complex linear	154 (65.3
Flap (advancement, rotation, interpolation)	29 (12.3
Full thickness skin graft	14 (5.9
Other (venograft, intermediate linear, ovtside repair)	4 (1.7)
Anti-Coagulant Medication	n (%)
None	62 (31.3
Aspirin	102 (51.5)
Warfarin	21 (10.6)
Clopidogrel	7125
Other (dabigatran, rivaroxaban, dipyridamole)	5 £1.0
Repair Size	Mean±50 (range)
Length of linear closure (cm)	4.3:1.4 (1.8-9.2)
Area of flap/graft (cm*)	13.1±19.4 (0.3 109.7

Table 2: MMS Satisfact	ion Survey
Data	
iurgery Duration	n (%)
Much too long	2 (1.1)
Slightly too long	29 (15.2)
Appropriate/fine	160 (83.8)
Slightly too short	0 (0)
Much too short	0 (0)
ntraoperative	n (%)
omplications	
Allergic reaction	1 (0.51)
Anxiety	10 (5.1)
Bleeding	17 (8.6)
Bruising	5 (2.5)
Saelline	11/5.6)
Pain	16 (8.1)
Parahosis	0.00
Other	2 (3.0)
Stone .	115.000
Nin secure	133 (00-2)
no antiwer	0 (3.0)
ostoperative	n (si)
Alleris	1 40 531
Anergic reaction	4 (0.51)
Arusety	0 (0)
Bleeding	11 (5.6)
Bruising	3 (1.5)
Swelling	7 (3.5)
Pain	19 (9.6)
Infection	1 (0.51)
Difficulty with bandage	15 (7.6)
changes	
Numbriess	8 (4.0)
Wound dehiscence	4 (2.0)
Unattractive scarring	4 (2.0)
Paralysis	0 (0)
Other	3 (1.5)
None	124 (62.6)
No answer	10 (5.1)
everity of Worst	n (%)
omplication	
Not applicable/Not	127 (68.7)
severe	102-10-20-20-20-20-20-20-20-20-20-20-20-20-20
Mid	39 (21.1)
Moderate	17 (9.2)
Very severe	2 (2.1)

Medical Attention for Postoperative Complication	n (%)
Yes	19 (9.6)
No/Not applicable	170 (85.9)
No answer	9 (4.6)
Resumption of Daily Activities Following Surgery	n (%)
No delay	136 (74.3)
Short delay	44 (24.0)
Moderate delay	3 (2.6)
Lengthy delay	0 (0)
Pleased with MMS	n (%)
Yes	181 (91.4)
No	0 (0)
Unsure	3 (1.5)
No answer	14 (7.1)
Multivariate analysis	p value*
Cancer location	0.85
Stages to tumor clearance	0.25
Anti-coagulant medication	0.32
Sex	0.15
Time elapsed since surgery	0.43
Marital status	0.0039**
*p <0.01 needed **Statistically significant bu significance with only 1-pc	I for statistical significance it lacks clinical sint difference



#### May 3, 10:08–10:15 am

Presenter: Jeffrey F. Scott, MD

#### Title: Risk Factors for Skin Cancer After Hematopoietic Cell Transplantation

Authors: Jeffrey F. Scott, MD<sup>1,2</sup>; Kevin R. Brough, MD<sup>3</sup>; Konstantin V. Grigoryan, MD<sup>3</sup>; Grace Y. Kim, BS<sup>3</sup>; Ruzica Conic, MD<sup>1,2</sup>; Sheena Tsai, BS<sup>1,2</sup>; Jerry D. Brewer, MD<sup>3</sup>; Christian L. Baum, MD<sup>3</sup>; Mark R. Litzow, MD<sup>3</sup>; William J. Hogan, MB, BCh<sup>3</sup>; Mrinal S. Patnaik, MBBS<sup>3</sup>; Shahrukh K. Hashmi, MD<sup>3</sup>; Hillard M. Lazarus, MD<sup>2</sup>; Jeremy S. Bordeaux, MD, MPH<sup>1,2</sup>; Cheryl L. Thompson, PhD<sup>2</sup>; Meg R. Gerstenblith, MD<sup>1,2</sup>; Julia S. Lehman, MD<sup>3</sup> Institutions: 1. University Hospitals Cleveland Medical Center, Cleveland, OH

2. Case Western Reserve University School of Medicine, Cleveland, OH 3. Mayo Clinic, Rochester, MN

**Purpose:** Hematopoietic cell transplant (HCT) recipients are at increased risk for developing skin cancers, including basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma. However, patient-specific and transplant-specific risk factors for skin cancer after HCT are incompletely described. Identifying patients at high risk for skin cancer after HCT would allow for targeted secondary prevention strategies that may reduce the morbidity and mortality of skin cancer in this patient population. Therefore, we aimed to characterize patient-specific and transplant-specific risk factors for skin cancer in a large cohort of HCT recipients.

**Summary:** In total, 876 HCT recipients developed 55 BCC, 63 SCC, and 16 melanomas during the follow-up period (Table 1). The 5- and 10-year incidence rates of BCC and SCC were 5.7% and 17.6%, and 10.6% and 17.2%, respectively. In univariate analysis (Table 2), increasing age, male sex, Fitzpatrick skin type I and II, history of phototherapy, photodamage and dysplastic nevi documented on exam, skin cancer in a first degree relative, chronic graft-versus-host disease (GVHD), and pre-transplant history of BCC and SCC were all associated

with non-melanoma skin cancer (NMSC) after HCT (p<0.05 for all). Photodamage and dysplastic nevi documented on exam, pre-transplant history of SCC and melanoma, and acute GVHD involving the skin were associated with melanoma after HCT (p<0.05 for all). Acute GVHD was not associated with NMSC after HCT (p=0.76). In multivariate analysis (Table 3), pre-transplant history of BCC (HR 3.9, 95% Cl 1.3-11.9) and photodamage documented on exam (HR 3.5, 95% Cl 1.5-8.4) were significantly associated with BCC after HCT, and pre-transplant history of SCC (HR 4.2, 95% Cl 1.7-10.2), photodamage documented on exam (HR 3.2, 95% Cl 1.5-6.8), and chronic GVHD with skin involvement (HR 2.7, 95% Cl 1.1-6.7) were significantly associated with SCC after HCT. A pre-transplant history of SCC (HR 6.6, 95% Cl 2.8-15.6) was significantly associated with melanoma after HCT.

**Design:** A single center retrospective cohort study was conducted of patients who received a HCT between January 1, 2000 and December 31, 2016. Medical records were reviewed to determine the number, type, and interval time to development of histologically confirmed skin cancers after HCT, as well as the presence of various patient-specific and transplant-specific risk factors. Univariate and multivariate Cox proportional hazard regression models using stepwise modeling were used to calculate hazard ratios (HR) with 95% confidence intervals (Cl) for the patient-specific and transplant-specific risk factors, and risk factors significantly associated with skin cancer were determined.

**Conclusion:** The majority of SCC develop within the first 5 years of HCT, while the majority of BCC develop 5 years after HCT. Pre-transplant history of NMSC, photodamage documented on exam, and chronic GVHD are strongly associated with the development of skin cancer after HCT.

Table 1. Overall patient cohort description

	HCT Recipients (N=876)
Age at transplantation, mean (SD)	48.3 (12.6)
Sex, N (%)	
Male	512 (58.4)
Female	354 (41.6)
Race, N (%)	
Non-Hispanic white	814 (92.9)
Hispanic	24 (2.7)
Black	12 (1.4)
Other	22 (2.5)
Skin cancers diagnosed during follow-up, N (%)	
Basal cell carcinoma	55 (6.3)
Squamous cell carcinoma	63 (7.2)
Melanoma	16 (1.8)
None	745 (85.0)
Incidence rates (5-year, 10-year)	
BCC	5.7%, 17.6%
SCC	10.6%, 17.2%
Melanoma	2.7%, 2.7%

Abbreviations: HCT, hematopoietic cell transplant; SD, standard deviation; N, number

		NMSC*	Controls	BCC	Controls	SCC	Controls	Melanoma	Castrol		
		P value (	log rank)	P value	(log rank)	P value	(log rank)	P value (i	leg rank)		
	Age at morpholation	ation <0.001			1.02	0.03		0.04			
	See		0.01		1.29		.001	0.0	ж		
	Rice'	0.	0.49		0.01		0.00		0.54		
	Fitspatrick skin type	6	6.01 0.50 8.02 0.35		0.36		0.76				
ĕ.	History of pluncherapy				1.95		1.01	0.3	19		
£1	Outdoor occupation	adoor ocception 0.08 otodanaga documented ve ataan 40.091 replante nevi documented en cuum 0.091		of occupation 0.08 0.80		0.02		0.64			
14	Photodanage documented version			1.4	1.991	- 14	1001	0.0	24		
22	Dysplastic area documented on exam-				0.04		128	*0.0	+0.003		
	Skin cancer in 1" degree relative		0.01		1.01		0.30	0.0	14		
	Pro-manuplant history of BCC				1.001	- 3	0.41	9.1	17		
	Pro-transplant history of SCC	thinny of SCC 40.001		-	1.001	- 9	1.001	0.0	91		
	Pre-transplant history of melanama	0	.95	1	1.28		164	+0.0	803.		
	Donor source*	0.	54		1.68		1.88	0.1	80 C		
¥.,	Number of HLA momaches	0.	0.43		0.43		0.68		0.45		64
ã E	Conditioning tegimon*	+0.	+0.005		003		.001	0.1	74		
12	Illistory of arste GVIID	0.76 0.40 <0.001		3	1.95		0.20	0.1	10		
13	Ellatory of acute GVIED (skin)				1.60	- 9	1.08	0.0	20		
£	History of chronic GV11D				1.04		LINGE	0.1	18		
	History of decour CNHD (date)	+0.	005		1.01		0.005	0.0			

Merelafans: NMOC, non-inducers via cause, BCC, beal coll cavitoria. SCC, spannen sell catcinens, GAIID, godi sonce-best discus. HCA, becau for

Tex Judes BCC and SCC

Bacholes New Harpanic white, Hopanic, Hark, and other Macholes accelerate and accelerate accelerate and accelerate and

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Table 3. Multivariate Cox proportional hazard models using stepwise modeling for risk factors

		HR (95% CI)	P value
NMSC <sup>1</sup>	Pre-transplant history of SCC	4.7 (2.1-10.4)	<0.001
	Photodamage documented on exam	3.5 (1.9-6.5)	<0.001
	Fitzpatrick skin type 1 vs. III-VI II vs. III-VI	9.3 (1.5-56.1) 7.2 (1.6-33.1)	0.02
BCC	Pre-transplant history of BCC	3.9 (1.3-11.9)	0.02
	Photodamage documented on exam	3.5 (1.5-8.4)	0.01
SCC	Pre-transplant history of SCC	4.2 (1.7-10.2)	0.002
	Photodamage documented on exam	3.2 (1.5-6.8)	0.002
	History of chronic GVHD (skin)	2.7 (1.1-6.7)	0.03
Melanoma	Pre-transplant history of SCC	6.6 (2.8-15.6)	<0.001

Abbreviations: HR, hazard ratio; CL confidence interval; NMSC, non-melanoma skin cancer; SCC, squamou cell carcinoma; BCC, basal cell carcinoma; GVHD, graß-versus-host disease

Includes BCC and SCC

#### May 3, 10:16-10:23 am

Presenter: Emily de Golian, MD

#### Title: The Comparative Efficacy of N95, Laser, and Procedural Mask Filtration of Electrocautery Smoke Particulate Matter

Authors: Emily de Golian, MD<sup>1</sup>; Swati Kannan<sup>1</sup>; S. Brian Jiang, MD<sup>1</sup> Institution: 1. University of California-San Diego, San Diego, CA Purpose: Current literature has demonstrated that toxic and carcinogenic compounds exist in surgical electrocautery smoke, including known causes of leukemia, respiratory disease, and neurological problems. Particulate matter generated by electrocautery has also been associated with vascular disease, thrombosis, lung cancer, and transmission of infectious disease. Although the impact of electrocautery smoke on dermatologic surgeons is yet uncertain, in light of these hazards and according to governmental guidelines, dermatologic surgeons would be wise to adapt protective measures during surgical procedures. Presently, the relative clinical efficacy of various forms of mask filtration against surgical electrocautery smoke is unknown. In this study, we aim to assess the relative efficacy of N95 mask, laser mask, and basic procedural mask filtration of fine and ultrafine particulate matter.

**Summary:** When comparing N95 mask, laser mask, basic procedural mask, and baseline data points, a significant difference between these groups was demonstrated using single-factor analysis of variance inquiry (P-track P=6.2173E-08; DustTrack P=0.0001). To determine where the differences between individual P-track data sets occurred, for ultrafine particulate measurements, paired two-tail t-tests established that N95 masks were superior to procedural masks (P=0.0084) and laser masks (P=0.0221), and procedure masks were superior to laser masks (P=0.0439). Less difference was seen between groups for larger particle filtration as measured by the DustTrack. Whereas there was no significant difference between the N95 and laser masks (P=0.1293) or laser and procedural masks (P=0.1989) for larger particle filtration, the N95 mask was superior to the procedural mask in this setting (P=0.0482).

**Design:** Monopolar cautery was applied to discarded surgical Burow's triangle tissue for generation of electrocautery smoke in this study, and particulate matter levels were recorded using the P-track particulate meter (<1 um particles) and DustTrack particulate meter (>2.5 um particles). To ensure adequate exposure potential, measurements were recorded after 30 seconds of continuous cautery for each data point. We recorded five separate data points for each of the following categories: 1) no filtration, 2) N95 mask filtration, 3) laser mask filtration, and 4) basic procedural mask filtration. A complete seal over the probes was obtained by sealing the mask edges to the probes with paper tape.

**Conclusion:** Dermatologic surgeon survey results have previously demonstrated low adoption of suction filtration in dermatologic surgery clinics. Accessible and relatively inexpensive masks are therefore a useful means of decreasing surgeon exposure to hazardous electrocautery plumes. Our data suggest clear dominance of N95 masks at filtering electrocautery particulate matter over commonly utilized procedural masks, as well as superiority to laser masks. Particularly considering the tight seal that should occur with N95 masks in clinical use, in comparison to less fitted laser and procedural masks, an even greater disparity in plume exposure among these masks in clinical practice is likely.





#### May 3, 10:24–10:31 am

Presenter: Melanie A. Clark, MD

# Title: The Utility of Imaging in Squamous Cell Carcinoma of the Nail Unit

Authors: Melanie A. Clark, MD<sup>1</sup>; Thomas J. Knackstedt, MD<sup>2</sup> Institutions: 1. Medical College of Wisconsin, Milwaukee, WI 2. Cleveland Clinic Foundation, Cleveland, OH

**Purpose:** Squamous cell carcinoma (SCC) is the most common cancer of the nail unit and bony invasion may be observed in this special site (Figure 1). Mohs micrographic surgery (MMS) or surgical excision with standard margin analysis is the standard of care. Distal digital amputation is considered when bony involvement is suspected to a degree that cannot be addressed with digit sparing surgery. Although imaging is commonly performed, no guidelines currently exist regarding the role of imaging in the management of SCC in this specific location. The objective of this study was to investigate the utility of imaging in nail unit SCC.

Summary: Fifty-five patients with nail unit SCC were identified, thirtyfour patients (61.8%) had imaging performed, and 21 patients (38.2%) had no imaging performed. The demographics and tumor characteristics of both groups were similar (Table 1). The most commonly observed primary treatments were MMS (45.5%), amputation (34.5%), or excision (18.2%). No significant differences in treatment were identified when comparing groups with and without imaging. Of the 34 patients that received imaging, 28 (82%) had plain X-ray radiography performed, 15 (44.1%) had magnetic resonance imaging (MRI) performed, and one patient had a computed tomography (CT) scan performed. The most commonly observed imaging findings were soft tissue edema or enhancement (47.1%), bony changes (32%), degenerative joint disease (25%), and discrete soft tissue mass (5.9%). In six patients (17.6%), imaging findings directly impacted patient care and caused a change in the treatment plan. In all of these patients, imaging showed findings concerning for bony infiltration and in all but one case, amputation was performed (Table 2).

**Design:** A 20-year retrospective review was conducted of patients treated for nail unit SCC. Data was collected on patient characteristics, tumor qualities, treatment modalities, the presence or absence of radiographic imaging, and imaging findings. A change in treatment was defined as more aggressive treatment (amputation) rather than local excision or MMS. Patient and surgical characteristics were described overall and by imaging group. Statistical comparisons were performed using Pearson chi-square tests or Fisher exact tests for categorical factors, two-sample t-tests for normally distributed categorical factors, and Wilcoxon rank sum tests for non-normally distributed categorical factors.

**Conclusion:** Imaging findings resulted in a management change in 17.6% of patients that had pre-operative imaging performed and in 10.9% of the cohort as a whole. No clinical or histologic factors reliably predict the risk for underlying bony invasion or correlated with bony abnormalities on imaging. These statistics have varying implications with regard to patient morbidity, patient cost, and cost to our health care system. While imaging may play a role in select cases, the majority of nail unit SCC cases treated by MMS can be successfully managed without imaging.





Figure 1A. Severe soft tissue irregularity and swelling of the thumb with erosive bone change (X-Ray).

Figure 1B. Soft tissue abnormality with edema. Lesion abuts but does not directly invade the underlying bone (MRI).

lable 1. Demographic co	omparisons by ima	ging stat	us	_					
		No Imaging (N=21)			1				
Factor	Total (N=55)	n	Statistics			Statistics	ya Va	p- due	
Age at Diagnosis (years)	59.2±15.5	21	57.3±19.4		34	60.4±12.8	0.4	8"	
Gender		21		Π	34		0.9	5	
. Male	39(70.9)		15(71.4)			24(70.6)			
. Female	16(29.1)		6(28.6)	П		10(29.4)	-	_	
Race		21		П	34		0.5	81	
. White, non-Hispanic	48(87.3)		20(95.2)	Н		28(82.4)	-	_	
. Hispanic	1(1.8)		0(0.0)	Н		1(2.9)	-	_	
. Black	2(3.6)		1(4.8)	Н		1(2.9)	+	_	
. Asian	1(1.8)		0(0.0)	Н		1(2.9)	+	_	
. Other/unknown	3(5.5)		0(0.0)	Н		3(8.8)	+	_	
Smoker	19(34.5)	21	7(33.3)	Н	34	12(35.3)	0.8	8'	
Immune Status		21		Н	34		0.6	31	
Immunocompetent	51(92.7)		19(90.5)	Н		32(94.1)	-	-	
Immunosuppressed	4(7.3)		2(9.5)	Н		2(5.9)	+-	_	
The versus Finner	-(12)	21	2(712)	Н	34	a contra	0.9	91	
Finter	51(92.7)		20(95.2)	Н		31(91.2)	1.1	_	
The	4(7.3)		1(4.8)	Н		3(8.8)	+-	_	
Digit Number	-(12)	21	I(40)	Н	34	5(6/6)	0.4	A.	
1 (Thumb/Hallux)	25(45.5)		9(42.9)	Н		16(47.1)		~	
2-5	30(\$4.5)		12(57.1)	Н		18(52.9)	+-		
Primary vs. Recurrent	30(34.3)	21	12(37.1)	Η	34	10(36.9)	0.6	3'	
Tumor Status				Ц			+		
. Primary	51(92.7)		19(90.5)	Ц		32(94.1)	_		
. Recurrent	4(7.3)		2(9.5)	Ц		2(5.9)	-		
Lesion Duration	635 [180,1095]	19	540 [180,1080]		30	720 [180,1095]	0.5	9	
SCC Type & Grade		21			34		0.3	7'	
. SCC in situ	12(21.8)		5(23.8)			7(20.6)			
. Well Differentiated	18(32.7)		10(47.6)			8(23.5)			
. Moderately Differentiated	14(25.5)		4(19.0)			10(29.4)	Γ		
. Poorly Differentiated	3(5.5)		1(4.8)	Π		2(5.9)	Γ		
. SCC, grade unknown	4(7.3)		0(0.0)			4(11.8)			
. Keratoacanthoma	4(7.3)		1(4.8)			3(8.8)			
Preoperative Size	1.3[0.90,2.0]	15	1.3[0.70,1.7]	П	26	1.4[0.90,2.0]	0.4	2°	
(cm2)									
HPV Infection	11(20.0)	21	6(28.6)		34	5(14.7)	0.2	1ª	
Symptoms									
. Asymptomatic	17(30.9)	21	9(42.9)		34	8(23.5)	0.1	3'	
. Pain	34(61.8)	21	11(52.4)		34	23(67.6)	0.2	18	
. Bleeding	9(16.4)	21	6(28.6)		34	3(8.8)	0.0	54'	
. Drainage	1(1.8)	21	0(0.0)		34	1(2.9)	0.9	9	
Statistics presented as Mean = St p-values: a=t-test, c=Pearson's ch	Statistics presented as Mean n SD or N (column %). p-values: an-test, or Pearson's chi-source test, driftsher's Exact test,								

Case #	Tumor location	SCC subtype	Imaging modality	Findings	Impacted Care	Outcoase
1	L1" fager	Mod diff	XR finger	Soft tissue swelling, enosive change in clistal phalaxys	Amputation at MCP joint	NED 6 years post-op
2	1.3 <sup>4</sup> fager	Mod diff	MRI upper extremity	Enhancing soft tissue mass extending from tip of finger to base of distid phalanc, concerning for bony infiltration	Amputation at DIP joint, anillary and epitochicar SLNRx (02 positive nodes)	NED 1 year post op
3	1.3" finger	Usknown	XR hand MRI hand	Well-defined evoling radiolucency investing distal toft	Amputation at mid 2 <sup>rd</sup> phalans; asillary and apitrochlear SLNBs (D2 positive nodes)	NED 14 years post-op
4	1.2 <sup>st</sup> finger	Well-mod diff	XR fingers XR hard MRI hand	Ostaolytic Insiens, destruction of distal portion of bons	Amputation at DIP joint	Healing 1 month post-op, LTFU
5	R.1" finger	KA-type	XR hand	30% destruction of distal phalaets	Excision and cureffage, no margin control	Healing I month post-op. LTFU
6	R 1º finger	Well-diff	XR hand MRI hand	Ulcerative lesion with adjacent bony destruction	Amputation at IP joint; acillary SLNBx (0/7 positive nodes)	NED 6 months post-op

#### May 3, 10:32–10:39 am

Presenter: Sean Condon, MD

Title: Mohs Micrographic Surgery for SEER Registry-Captured Melanoma in situ and Other Rare Cutaneous Tumors: Comparing National Utilization Patterns Before and After Implementation of the Affordable Care Act (2010) and Appropriate Use Criteria (2012)

Authors: Sean Condon, MD<sup>1</sup>; Thomas J. Knackstedt, MD<sup>1</sup> Institution: 1. Cleveland Clinic Foundation, Cleveland, OH

**Purpose:** We wish to evaluate Mohs Micrographic Surgery (MMS) utilization for melanoma in situ (MIS) and rare cutaneous tumors (RCT) before and after implementation of the Affordable Care Act (ACA) and Appropriate Use Criteria (AUC).

**Summary:** In recent years, two events have had the potential to significantly influence skin cancer patient care; the ACA in 2010 and the AUC in 2012. The ACA resulted in increased health insurance coverage of approximately 20 million previously uninsured adults. The AUC were created in 2012 to help guide clinical decision making for MMS utilization. Well established for basal cell and squamous cell carcinoma, the AUC also deemed MMS appropriate for MIS and several rare cutaneous tumors including adnexal carcinomas and fibrohistiocytic malignancies (Table 1).

The primary aim of this study was to determine if MMS utilization for MIS and RCT increased and to identify socioeconomic predictors of MMS utilization. Surprisingly, the percentage of MIS cases treated with MMS around the ACA implementation declined between 2008-2009 (13.9%) and 2011-2013 (12.3%). Utilization did not change around the AUC introduction between 2010-2011 (12.6 %) and 2013-2014 (12.3%)(Table 2).

No significant difference in the number of RCT cases treated with MMS between 2008-2009 (14.4%) and 2011-2013 (14.3%) were identified. Additionally, no significant difference in the number of RCT treated with MMS between 2010-2011 (15.25%) and 2013-2014 (14.6%) was found. When controlling for race, insurance status, income, or poverty level, no significant change in MMS utilization for MIS or RCT around the ACA or AUC dates was noted in any subgroup. However, lower income patients and individuals in the highest poverty quartile were significantly less likely to have MMS for MIS or RCT throughout all years (Table 3). Insurance status did not predict MMS utilization for MIS but insured individuals were more likely to utilize MMS for RCT than uninsured individuals. White individuals were 2-2.4 times more likely to utilize MMS for RCT when compared to black individuals.

**Design:** This was a review of 25,322 patients diagnosed with MIS or RCT between 2008 and 2014 from the 18 registries of the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database. Data from 2008-2009 was compared to 2011-2013 data to reflect changes related to the ACA. Data from 2010-2011 was compared to 2013-2014 to account for changes induced by AUC guideline publication.

**Conclusion:** No increase in relative MMS utilization for MIS or RCT was identified after the introduction of the ACA or AUC. This study highlights the continued need for improved patient access to MMS, a persistent knowledge gap regarding optimal treatments in the greater medical community, and need for further demonstration of MMS value and refinement of utilization guidelines for RCT and MIS in the updated version of AUC guidelines.

Adenoid cystic carcinoma
Apocrine adenocarcinoma
Dermatofibrosarcoma
Granular cell carcinoma
Eccrine Adenocarcinoma
Leiomyosarcoma
Malignant fibrous histiocytoma (Undifferentiated Pleomorphic
Sarcoma)
Merkel cell carcinoma
Mucinous adenocarcinoma
Paget disease, extramammary (except Paget disease of bone)
Papillary adenocarcinoma
Sclerosing sweat duct carcinoma (Microcystic Adnexal Carcinoma)
Sebaceous adenocarcinoma
Sweat gland adenocarcinoma
▼

Table 1. List of SEER Captured Rare Cutaneous Tumors

Effect	Odds Ratio	95% Confidence Intervals	P-value
	MMS for !	MIS - Before & After ACA 2010	
2011-2013 vs 2008-2009	0.872	0.784 - 0.970	.012
	MMS for 1	MIS - Before & After AUC 2012	- 22
2013-2014 vs 2010-2011	0.976	0.874 - 1.09	.66
MMS fo	r Rare Cuta	neous Tumors - Before & After ACA	2010
2011-2013 vs 2008-2009	0.992	0.837 - 1.175	.92
MMS fo	r Rare Cuta	neous Tumors - Before & After AUC	2012
2013-2014 vs 2010-2011	0.950	0.790 - 1.141	.58

Table 2. MMS utilization for MIS and Rare Cutaneous Tumors Before and After Accountable Care Act and Appropriate Use Criteria

Effect	Odds Ratio	95% Confidence Interval	P-value	Odds Ratio	95% Confidence Interval	P-value
		MMS for M ACA 2010	15	MMS	for Rare Cutar ACA 201	eous Tumors 0
Insurance	Sec. 2		1			
2011-2013 vs 2008-2009	0.967	0.852-1.098	.61	1.106	0.917-1.334	.29
Insured vs. Uninsured	1.502	0.689-3.278	.31	3.209	1.402-7.344	.006
Any Medicaid vs. Uninsured	2.162	0.901-5.188	.08	1.453	0.570-3.702	.43
Mean Income Quartiles						
2011-2013 vs 2008-2009	0.874	0.785-0.972	.013	0.987	0.831-1.171	.87
Income Q4 vs. Q1	1.355	1.166-1.574	<.0001	2.611	2.033-3.354	<.0001
<b>Poverty Percent Quartiles</b>				in second		
2011-2013 vs 2008-2009	0.859	0.77-0.956	.005	0.971	0.818-1.152	.73
Poverty % Q4 vs. Q1	0.644	0.550-0.754	<.0001	0.522	0.405-0.673	<.0001
		MMS for M AUC 2012	IS	MMS for Rare Cutaneous Tumor AUC 2012		
Insurance			12			
2013-2014 vs 2010-2011	0.974	0.856-1.109	.69	0.924	0.759-1.126	.43
Insured vs. Uninsured	1.205	0.576-2.520	.62	2.399	1.035-5.559	.041
Any Medicaid vs. Uninsured	1.687	0.728-3.909	.22	0.972	0.368-2.564	.95
Mean Income Quartiles						
2013-2014 vs 2010-2011	0.972	0.870-1.086	.61	0.961	0.798-1.157	.67
Income Q4 vs. Q1	1.262	1.069-1.489	.006	3.038	2.257-4.089	<.0001
<b>Poverty Percent Quartiles</b>	1		· · · · · ·		Sec.	
2013-2014 vs 2010-2011	0.974	0.872-1.088	.64	0.945	0.786-1.136	.54
Poverty % Q4 vs. Q1	0.637	0.535-0.757	<.0001	0.539	0.411-0.709	<.0001

Table 3. Socioeconomic Predictors of MMS Utilization of MIS and Rare Cutaneous Tumors Before and After ACA and AUC

#### May 3, 10:40–10:47 am

Presenter: Adam B. Blechman, MD

# Title: Prediction of Poor Outcomes for Cutaneous

Squamous Cell Carcinoma in Immunosuppressed Patients using American Joint Committee on Cancer 8th Edition and Brigham and Women's Hospital Staging Systems

Authors: Adam B. Blechman, MD<sup>1</sup>; John A. Carucci, MD, PhD<sup>1</sup>; Mary L. Stevenson, MD<sup>1</sup>

Institution: 1. NYU Langone, New York, NY

**Purpose:** Staging criteria for cutaneous squamous cell carcinoma (cSCC) include the Brigham and Women's Hospital (BWH) and eighth edition of the American Joint Committee on Cancer staging system (AJCC-8) recently released to update AJCC-7. Limited data on the validity of staging guidelines in the immunosuppressed population exists. This study compares AJCC-8 and BWH staging systems for cSCC in immunosuppressed patients.

Summary: Fifty-eight immunosuppressed patients with 263 primary cSCC were diagnosed from January 1, 2012 to December 31, 2015 at this institution. Among these tumors, 229 had enough information in the medical record to assign a BWH T stage and 228 had enough information to assign an AJCC-8 T stage. Hematologic malignancy was the most common reason for immunosuppression at 55.2% (32/58). Fifty percent of tumors were AJCC-8 T1, 44.7% T2 and 4.8% T3. Fifty percent of tumors were BWH T1, 48.5% T2a, 1.3% T2b and 0.4% T3. Risk of PO for AJCC-8 was 1.7% (95% CI 0-4.1%), 8.8% (95% CI 3.3-14.3%) and 36.4% (95% Cl 7.9-64.8%) for T1, T2 and T3, respectively (p < 0.01). Risk of PO for BWH was 1.8% (95% CI 0-4.2%), 9.9% (95% CI 4.4-15.5%), 33.3% (95% CI 0-86.7%) and 100% (95% CI 100-100%) for T1, T2a, T2b and T3, respectively (p < 0.01). A statistically significant higher proportion of poor outcomes occurred in high AJCC-8 stages T3/T4 compared to low T1/T2 stages (36.4% vs. 5.1%, p = 0.002). A statistically significant higher proportion of poor outcomes occurred in high BWH stages T2b/T3 compared to low T1/T2a stages (50.0% vs. 5.3% for BWH, p = 0.01).

**Design:** A single-institution retrospective cohort study of cSCCs in immunosuppressed patients diagnosed from 2012 to 2015. Patients were immunosuppressed if they had a diagnosis of at least one of the following conditions – hematologic malignancy, organ transplantation or human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS). Data was collected using RedCap and analyzed using Microsoft Excel with Institutional Review Board approval. The main endpoint was any poor outcome (PO), which included local recurrence (LR), nodal metastasis (NM) and disease-specific death (DSD). The distinctiveness, homogeneity and monotonicity of AJCC-8 and BWH staging systems were assessed in regards to any poor outcome using Fisher exact tests with a p-value threshold of less then 0.05.

**Conclusion:** Both AJCC-8 and BWH staging systems separate cSCC into T stages with statistically significant distinctiveness for immunosuppressed patients. AJCC-8 and BWH had statistically significant higher proportions of poor outcomes in high T stages compared to low T stages, which suggests good monotonicity in both staging systems. Similar to prior reports, the majority of tumors in this study were low stages. Though, a greater proportion of tumors met criteria for stages higher than T1, especially T2 and T2a in AJCC-8 and BWH, respectively.

Table I. Tumor Characteristics	
Total cutaneous SCC	263
Tumor location	
Legs	69 (26.2)
Trunk	48 (18.3)
Face (excluding ear, nose, eyelid, temple, lip)	34 (12.9)
Hand (excluding nail)	29 (11.0)
Arms	21 (8.0)
Scalp	18 (6.8)
Neck	9 (3.4)
Ear	8 (3.0)
Temple	8 (3.0)
Nose	7 (2.7)
Cutaneous lip	4(1.5)
Eyelid	3 (1.1)
Genitals	3 (1.1)
Feet	2(0.8)
Tumor diameter	
Mean, range (cm)	1.7, 0.5-12.0
< 2 cm	136
$\geq$ 2 cm and < 4 cm	84
$\geq$ 4 cm	9
Perineural invasion	
$\geq 0.1$ mm nerve diameter	2
< 0.1 mm or unknown diameter	8
* Parcentages are noted in parentheses	

\* Percentages are noted in parentheses.

			LE	2	NN	(	DS	D	PO	•
Staging System	% (X/N)	95% CI	% (#/X)	95% CI	% (#/X)	95% CI	% (#/X)	95% CI	% (#/X)	95% C
AJCC-8										
T1	50.4 (115/228)	43.9-56.9	1.7 (2/115)	0-4.1	0 (0/115)	× .	0 (0/115)		1.7 (2/115)	0-4.1
T2	44.7 (102/228)	38.3-51.2	6.9 (7/102)	2.0-11.8	2.0 (2/102)	0-4.7	2.0 (2/102)	0-4.7	8.8 (9/102)	3.3-143
T3	4.8 (11/228)	2.0-7.6	18.2 (2/11)	0-41.0	18.2 (2/11)	0-41.0	9.1 (1/11)	0-26.1	36.4 (4/11)	7.9-64.8
T4	0 (0/228)	-							-	-
			p = 0.	021	p = 0.	002	p = 0	021	p < 0.0	100
BWH										
T1	49.6 (114/229)	43.3-56.3	1.8 (2/114)	0.4.2	0 (0/114)	-	0 (0/114)	-	1.8 (2/114)	0-4.2
T2a	48.5 (111/229)	42.0-54.9	7.2 (8/111)	2.4-12.0	2.7 (3/111)	0-5.7	1.8 (2/111)	0.4.3	9.9 (11/111)	4.4-15.5
Т2Ь	1.3 (3/229)	0-2.8	33.3 (1/3)	0-86.7	0 (0/3)		0 (0/3)		33.3 (1/3)	0-86.7
T3	0.4 (1/229)	0-1.3	0(0/1)		100(1/1)	100-100	100 (1/1)	100-100	100 (1/1)	100-100
			p = 0	034	p = 0,	002	p = 0	002	p = 0.0	901

\* N is total number of tamors in each staging system. X is number of tamors in each tamor stage.
\* Por outcome (PO) includes any local recurrence (EX), nodal metantasis (DA) or disease specific death (DSD)
\* P values calculated with Fisher's exact test using 30c and 4c2 contingency tables.

#### Table III. Evaluation of Staging Systems' Monotonicity: Proportion of Poor Outcomes Occurring in 1

	LR		NM		DS	D	PO*	
	#	%	#	%	#	%	#	%
Proportion of outcomes occurring								
in low T stages								
AJCC-8 T1/T2	9/217	4.1	2/217	0.9	2/217	0.9	11/217	5.1
BWH T1/T2a	10/225	4.4	3/225	1.3	2/225	0.9	13/225	5.3
Proportion of outcomes occurring								
in high T stages								
AJCC-8 T3/T4	2/11	18.2	2/11	18.2	1/11	9.1	4/11 <sup>b</sup>	36.4
BWH T2b/T3	1/4	25.0	1/4	25.0	1/4	25.0	2/4 <sup>b</sup>	50.0

Hospital \*Poor outcome (PO) includes any local recurrence (LR), nodal metastasis (NM) or disease specific death (DSD)

#### May 3, 10:48–10:55 am

Presenter: Adam V. Sutton, MD, MBA

# Title: Advanced Age and Skin Cancer Treatment: Functional Status and Outcomes

**Authors:** Adam V. Sutton, MD, MBA<sup>1,2</sup>; Shauna Higgins, MD<sup>2</sup>; Alex Ly, RN<sup>2</sup>; Shera Feinsteins<sup>2</sup>; Ryan Gilbertson<sup>1</sup>; Hugh T. Greenway, Jr., MD<sup>1</sup>; Ashley Wysong, MD, MS<sup>2</sup>

Institutions: 1. Scripps Clinic, La Jolla, CA

2. Keck Medicine of USC & LAC+USC Medical Center, Los Angeles, CA **Purpose:** The incidence of non-melanoma skin cancer (NMSC) is on the rise and it is well known that an individual's risk of developing a skin cancer increases with age. Given these trends, our healthcare system is being challenged to provide appropriate and high quality care in the setting of an aging population and constrained resources. Recent data has suggested that NMSC is treated similarly regardless of limited life expectancy (LLE) or comorbid conditions. Additionally, it has been suggested that patients with LLE have a high rate of complications after office based procedures. Our group sought to understand functional status and post-operative course for patients older than 75 undergoing Mohs Micrographic Surgery.

**Summary:** Thirty-seven patients were recruited to participate in the study, 33 agreed to participate (survey response rate 89%). The mean age of the analytical cohort was 81 years, 67% were male and 97% identified as white. The mean Lawton Instrumental Activities of Daily Living (iADL) score was 7.5, out of a possible 8. Post-operative complications occurred in 12% of patients, including two cases of bleeding and one case each of a hematoma, infection and wound dehiscence. At approximately one month post-operatively, 97% reported that the risks and benefit discussion prior to the procedure adequately prepared them for the procedure itself. Post-operative problems (bruising, itching, numbness, pain, tingling, swelling, loss of motor function) rated as serious or extremely serious occurred in 0% of patients. A higher percentage of patients reported "Quite a Bit" or "Very Much" discomfort with liquid nitrogen treatment, a skin biopsy, a prostate exam and teeth cleaning than they did with Mohs surgery.

**Design:** English speaking patients 75 years of age or older undergoing Mohs Micrographic Surgery were recruited to participate in the study. Patients who agreed to participate completed questions regarding their skin cancer history as well as quality of life and functional status questionnaires. One month after their procedure they were contacted by telephone and asked a series of questions regarding their post-operative experience.

**Conclusion:** While age is often discussed as a deciding factor in treatment recommendations, one must also consider functional status and tolerability of the intervention to help guide appropriate treatment recommendations. Patients over the age of 75 undergoing Mohs surgery were found to be highly functional and had no reported significant post-operative problems. The patients high Lawton iADL scores indicate an ability to complete most complex tasks independently. Post-operative complications were higher than most reports in the literature, however, this may be related to the tumor characteristics of this cohort in an academic Mohs clinic, with 18% having a final defect size of 3+ cm.

#### May 3, 3:15–3:21 pm

#### Presenter: Donald E. Neal, BA

#### Title: Distally-Based Flaps Relying on a Perforating Branch from the Dorsal Metacarpal Artery (DMA) for Proximal Phalanx Defects After Mohs Surgery

Authors: Donald E. Neal, BA<sup>1</sup>; Joseph F. Sobanko, MD<sup>2</sup>; Jeremy R. Etzkorn, MD<sup>2</sup>

**Institutions:** 1. Sidney Kimmel Medical College at Thomas Jefferson University, Philadelphia, PA

2. University of Pennsylvania, Philadelphia, PA

**Purpose:** Distally based flaps may be employed to cover significant defects of the skin and soft tissues of the finger. For example, the reverse dorsal metacarpal artery flap (RDMAF) is a 'propeller' style flap based on a reliable perforating vessel found at the base of the metacarpal heads. This abstract presents the results of four Mohs surgical defects involving the proximal phalanx repaired with distally-based flaps reliant on a perforating vessel from the DMA.

**Summary:** Four patients were treated with distally based flaps relying on a perforating branch from the DMA (Figure 1) following extirpation of squamous cell carcinoma by Mohs surgery. For all cases, a Doppler probe was used to identify the DMA in the intercarpal space and to track the vessel distally to the base of the metacarpal head where the perforating vessel is reliably located.

**Design:** Retrospective case series of flaps based on single perforating artery at the level of the base of the metacarpal head for post-Mohs surgical defect. Charts were reviewed to determine size of Mohs defect and any postoperative complications.

**Conclusion:** Knowledge of the predictable arterial supply of the hand permits reliable design and execution of distally based flaps. No post-operative complications were observed for the flaps in this case series, and all patients retained full extension and flexion of their hands and digits. The presented variations of flap design and closure may be useful for Mohs surgeons when encountering defects on the proximal phalanges.





### May 3, 3:23–3:29 pm

Presenter: Richard L. Torbeck, III, MD

#### Title: Mohs Micrographic Surgery as Peripheral Margin Control in Large Cutaneous Neoplasms in a Multidisciplinary Setting

**Authors:** Daniel Bernstein, MD<sup>1,2</sup>; Richard L. Torbeck, III, MD<sup>1</sup>; Sara Giddings<sup>1</sup>; Hooman Khorasani, MD<sup>1</sup>

**Institutions:** 1. Icahn School of Medicine at Mount Sinai Hospital System, New York, NY

2. Medical Dermatology & Cosmetic Surgery Centers, New York, NY

**Purpose:** We present three cases where Mohs Micrographic surgery was utilized to achieve peripheral margin clearance prior to en-bloc resection of complex cutaneous tumors.

**Summary:** The need for management of Non-melanoma skin cancers (NMSC) continues to grow with an aging patient population; Mohs micrographic surgery (MMS) remains a cornerstone in care. MMS ability to achieve margin control is a key concept that provides patients with a long term cure for NMSC. However, in some cases MMS is unable to achieve margin control in a safe and effective way due to the complex nature of the tumor (e.g. size and/or location). We present three cases where MMS was utilized to achieve clear margins prior to en-bloc resection by plastic surgery in the OR.

**Design:** The three cases to be discussed are, first a 58-year-old male with morpheaform basal cell carcinoma of the left midface; a 56-year-old female with recurrent morpheaform BCC of scalp; and lastly, a 73-year-old male with multiple recurrent SCCs with a large SCC of the right lower extremity. Each patients was first treated with MMS to achieve adequate margin control. Upon each layer, taken as a standard Mohs layer, the removed tissue was evaluated for presence of tumor. Two to three stages at 2-5mm per layer, were required for margin clearance across the three cases. Upon establishment of the margin the patient was then referred to plastic surgery for en-bloc resection and reconstruction in the OR.

**Conclusion:** The three cases of complex NMSC provide support to the practice of utilizing MMS as a peripheral margin control before total tumor extirpation in the OR. This allows the use of MMS tissue conservation and 100 percent margin evaluation that result in superior results in comparison to wide local excision (WLE) for large NMSCs. Further added benefit is reduction in time under genreal anesthesia with MMS margin control being underatken in an office setting with local anesthesia, reducing general anesthesia exposure. A multidisciplinary approach for complex cutaneous tumors utilizing MMS prior to en bloc resection can provide enhanced tumor clearance with a longer durable response compared to standard WLE for large cutaneous skin cancers.



#### May 3, 3:31–3:37 pm

Presenter: Nour Kibbi, MD

#### **Title: Four Challenging Lip Cases for the Mohs Surgeon**

**Authors:** Nour Kibbi, MD<sup>1</sup>; Sean R. Christensen, MD, PhD<sup>1</sup>; David Leffell, MD<sup>1</sup>; Christine Ko, MD<sup>1</sup>; Kathleen Suozzi, MD<sup>1</sup>

Institution: 1. Yale University, New Haven, CT

**Purpose:** Inflammatory lip lesions can masquerade as cutaneous malignancies and vice versa.

**Summary:** We review four clinical examples and suggest an algorithm for evaluation and management of challenging lip lesions.

**Design:** Case 1: A 63 year-old man with a history of allogeneic hematopoietic stem cell transplant (AHSCT) complicated by acute graftversus-host disease (GVHD) presented with an eroded pink papule of the lower vermilion lip. Prior biopsy showed candidiasis with marked keratinocyte atypia. Repeat biopsy of the eroded area showed actinic cheilitis, which resolved with photodynamic therapy.

Case 2: A 32 year-old man with AHSCT presented from another institution with a lower lip carcinoma for which wide-local excision with extensive reconstruction were recommended. To clarify the true nature of the lesion, a repeat biopsy was performed which showed well-differentiated SCC with focal invasion. Mohs micrographic surgery (MMS) was performed as a tissue-sparing technique. The wound healed by second intent without complication.

Case 3: A 50 year-old woman with type IV skin presented with a scaly pink papule on the lower lip. A prior biopsy showed SCC. The first MMS stage revealed a dense, band-like infiltrate and atypical keratinocytes, suggesting reactive atypia versus squamous cell carcinoma in situ. The second Mohs stage showed a band-like lymphocytic infiltrate, which on histopathologic review of the permanent sections revealed an atypical squamous epithelial proliferation with brisk lichenoid infiltrate. Immunohistochemistry for CD123 revealed positive cells along the dermal-epithelial junction and was suggestive of lupus. She no further evidence of chronic cutaneous lupus erythematosus upon follow-up with her medical dermatologist, and the operative site healed by second intent without recurrence.

Case 4: An 87 year-old woman with type II skin and long-standing subacute cutaneous lupus erythematosus presented with an unchanging, verrucous plaque on the lower lip. Multiple partial biopsies showed varying degrees of epithelial hyperplasia with lichenoid lymphocytic infiltrate as well as buds of atypical keratinocytes with disordered maturation. Definitive carcinoma was not identified. Plaquenil, topical and intralesional steroids, and photodynamic therapy were ineffective in eliminating the plaque. Because of the persistence of the lesion and the elusiveness of the diagnosis, the patient was referred to head and neck surgery for vermilionectomy with mucosal advancement. The surgical specimen revealed an area of significant acanthosis, keratinocyte atypia, and scattered eosinophils within the epithelium, overall consistent with SCC. Separately, areas of lichenoid inflammation and atypia similar to the prior biopsies were identified.

**Conclusion:** These four cases informed the development of an algorithm to evaluate challenging lip lesions. Factors that are central to the algorithm include clinical findings (such as duration of lesion, immune status, presence of symptoms) and pathologic findings. Lack of correlation between these two and/or lack of clinical improvement should prompt a reconsideration of the diagnosis and likely additional sampling.



#### May 3, 3:39-3:45 pm

Presenter: Alexander W. Kennon, MD

#### Title: Squamous Cell Carcinoma in situ of the Penis Involving the Glans and Urethra- A Multidisciplinary Approach

Authors: Alexander W. Kennon, MD<sup>1</sup>; Lancing Patterson, MD<sup>2</sup>; Steven M. Kent, MD<sup>3</sup>; David E. Kent, MD<sup>1</sup>

**Institutions:** 1. Dermatologic Surgical Specialist PC, Macon, GA 2. Southeastern Urology Associates, Macon, GA

3. Mercer University School of Medicine, Macon, GA

**Purpose:** Squamous cell Carcinoma (SCC) of the penis is potentially a life altering diagnosis. Pathogenesis of penile SCC is not fully understood, however risk factors include: HPV or HIV infection, uncircumcised status, smoking, poor hygiene, lichen sclerosis, and chronic balanitis. Anatomical stage, largely dictates treatment and may include topical therapies, Mohs micrographic surgery (MMS) cryosurgery, or laser vaporization for Stage 0 and 1. Treatment for Stages 1-4 include penectomy with or without inguinal lymph node dissection, brachytherapy and chemotherapy. Traditionally, urethral involvement has precluded use of MMS but recent case series have shown promise with adjuvant distal urethrectomy. We present two cases of SCC in situ (SCCis) of the glans penis with intra-urethral extension into the fossa navicularis treated in a multidisciplinary approach.

**Summary:** Case 1: A 75 year old male presented with biopsy proven SCCis with circumferential erythema encompassing the majority of the glans and perimeatal mucosa. Urology evaluation including biopsy demonstrated intra urethral carcinoma in situ (CIS) in the fossa navicularis. In conjunction with urology, the patient was taken to the operating room, and using a cystoscope and holmium laser, the proximal CIS was ablated (Figure 1)(Video to be shown) and documented via video. The cutaneous SCC was removed with fully ablative CO2 laser, (Figure 2) at the time of cystoscopy. No evidence of locoregional recurrence was detected at 4 months post op.

Case 2: A 75 year old male presented with a 1 cm SCCis on the glans penis circumferentially around the urethral meatus. Cystoscopy and urethral biopsy demonstrated CIS in the fossa navicularis. A multidisciplinary approach of MMS initially with second intention healing followed by meatatomy and distal urethrectomy was performed. A unique bolster dressing surrounding the foley catheter was fashioned to maintain absolute hemostasis and allow for urinary voiding. The patient showed no evidence of locoregional disease at 2 months.

Design: Review of the literature.

**Conclusion:** Removal of cutaneous SCCis involving the glans penis with distal urethral involvement can be accomplished in selected patients via a multidisciplinary approach. This result may avoid partial penile amputation and thus substantially improve a patient's quality of life.





# May 3, 3:47–3:53 pm

Presenter: Lindsey Goddard, MD

#### Title: Simultaneous Lateral Tarsal Strip and Medial Spindle Procedures for Cicatricial Ectropion

Authors: Lindsey Goddard, MD<sup>1</sup>; Cameron Chesnut, MD<sup>2,3</sup>

**Institutions:** 1. Loma Linda University, Loma Linda, CA 2. Chesnut MD Cosmetics at Dermatology Specialists of Spokane, Spokane, WA

3. University of Washington School of Medicine, Spokane, WA

**Purpose:** Cicatricial ectropion is a complication after dermatologic surgical procedures, most commonly encountered after repair of periorbital or cheek defects. The lateral tarsal strip (LTS) and medial spindle (MS) procedures are surgical techniques to address cicatricial ectropion.

Our objective is to evaluate the clinical characteristics and efficacy of simultaneous LTS and MS procedures for repair of cicatricial ectropion occurring after dermatologic surgeries.

**Summary:** Fifty-six tumors involving the lower eyelid were considered at risk in the senior author's practice and underwent Mohs micrographic surgery with reconstruction, resulting in 3 (5.3%) cases of cicatricial ectropion. From outside surgeons, 5 cases resulted from Mohs surgery and 7 from pigmented lesion excisions. One post-operative complication (6.7%) of undercorrection required reoperation, with initial surgical success rate being 93.3%.

Procedure Description: After adequate anesthesia, a lateral canthotomy was made. Then, a stab incision future exit was made on the superiormedial aspect of the lid-cheek junction at the orbital rim. A traction suture was placed through the lower lid to aid in eversion and lid control. A retropunctal diamond of conjunctiva was then excised. The conjunctiva was elevated with forceps and each arm of a double-armed suture was placed with an inferior to superior motion through the middle of the diamond to hook the lower lid retractors. Next, with an inferior to superior motion suture was placed along the inferior edge of tarsal plate together with the conjunctiva lying at the superior edge of the diamond. Each needle was then placed through both conjunctiva at the inferior edge of the diamond and anterior and posterior lamellae exiting through the previously made stab incision point. Suture ends were tied together, effectively inverting the everted lid and punctum with instantaneous results.

The periosteum of the lateral orbital rim was then exposed. The lateral edge of the tarsal plate was grasped, and the anterior and posterior lamella were separated. The palpebral margin was trimmed of skin and the conjunctival layer was removed from the tarsal strip.

Using single-armed suture, a full-thickness anterior to posterior bite of the tarsal strip was taken. The tarsal strip was sutured to Whitnall's tubercle in a posterior to anterior direction and tied. A second suture was passed identically just inferior to the first bite. A commisuroplasty was performed and the skin along the lateral rhytids was closed.

**Design:** A retrospective review of all cases of symptomatic cicatricial lateral and medial punctal ectropion in one author's practice over 2 years was performed. Those resulting from dermatologic surgical procedures and repaired with simultaneous LTS and MS procedures were included.

**Conclusion:** Simultaneous LTS and MS are useful procedures for dermatologic surgeons yielding surgical success and low complication rate for correction of medial and lateral cicatricial ectropion with punctal eversion.





#### May 3, 3:55–4:01 pm

Presenter: Kristin Bibee, MD, PhD

#### Title: Sarcomatoid Variant of Cutaneous Squamous Cell Carcinomas; Analysis of Cases Found at a Single Tertiary-Referral Center Over 18 Years

**Authors:** Kristin Bibee, MD, PhD<sup>1</sup>; Bryan T. Carroll, MD, PhD<sup>1</sup>; Vladamir Lamm, MD<sup>1</sup>; Melissa Pugliano-Mauro, MD<sup>1</sup>; Timothy Patton, DO<sup>1</sup> **Institution:** 1. University of Pittsburgh, Pittsburgh, PA

**Purpose:** A number of histologic variants of cutaneous squamous cell carcinoma (cSCC) exist, each with varying risk for local recurrence as well as dermal, regional, and distant metastasis. Here we describe the outcomes of thirty-three patients who developed the sarcomatoid variant of cSCC at our institution. This variant, also described in the literature as spindle cell cSCC, is characterized by dermal infiltrates often composed of single elongated cells with minimal keratinization.

**Summary:** Thirty-three cases were identified, 2 of which were noted to be associated with squamatized portions of a basal cell carcinomas, one of which was a component of a basosquamous cell carcinoma. Fifteen of the patients had a history of at least one skin cancer, and eight were noted to have a history of multiple keratinocyte carcinomas prior to the sarcomatoid cSCC diagnosis. There was one additional case identified where a recurrence of a poorly differentiated cSCC of the scalp was found to have sarcomatoid histology. This patient was immunosuppressed due to a history of lung transplant and ultimately died of metastatic sarcomatoid cSCC.

Eleven cases were located on the scalp and an additional 14 cases were located on the head and neck. Ten of the patients were treated with Mohs Micrographic Surgery, one of which was then referred to Otolaryngology for further resection to achieve clear margins and for a neck dissection. Eighteen patients had a wide local excision, one patient declined surgery and was treated with palliative radiotherapy given advanced age. The remaining four patient records did not have a definitive therapy documented. Of the 28 patients who had documented surgical resection, all but 3 were noted to have pathologically clear margins. Three patients had adjuvant radiation therapy. Thirty percent of the tumors recurred or metastasized with a mean time to recurrence/ spread of 13mos (range 1-30mos). Two of the tumors which recurred did not have clear surgical margins. One-year survival was 84.8% while 5-year survival was 31.8%. Twenty one percent of the patients had disease-related death. Notably, 12 of the 33 cases at our tertiary referral center arose in immunosuppressed individuals, 9 of which were organ transplant recipients.

**Design:** After approval by the Institutional Review Board, a retrospective chart review of the cases seen at our tertiary care facility from 1999-2017 was completed by searching the pathology record database for "sarcomatoid" or "spindle cell", "skin", and "squamous cell carcinoma" to identify cases.

**Conclusion:** These data suggest that sarcomatoid cSCCs are an aggressive histologic subtype with a low 5-year survival and high rate of recurrence and metastasis. Subgroup analysis of these 33 cases did not reveal a tumor location, therapeutic choice, or patient factor that made recurrence, metastasis, or death more common.

#### May 3, 4:03-4:09 pm

#### Presenter: Katarina R. Kesty, MD, MBA

#### Title: Fetal Bovine Collagen Matrix; Our Experience with 46 Patients Including Case Examples and Proper Coding and Billing of a Novel Outpatient Product

Authors: Katarina R. Kesty, MD, MBA<sup>1</sup>; John G. Albertini, MD<sup>1,2</sup> Institutions: 1. Wake Forest University School of Medicine, Winston-Salem, NC

2. Skin Surgery Center, Winston-Salem, NC

**Purpose:** We present our experience with a porous acellular collagen matrix derived from fetal bovine dermis that provides an ideal wound healing environment. Rich in Type I and particularly Type III collagen, which is active in developing and healing tissues, this collagen scaffolding attracts blood, growth factors, and repopulating cells, supporting revascularization and dermal regeneration. This product is indicated for full-thickness wounds, ulcers, burns, and surgical wounds, including Mohs defects as an alternative to secondary intention healing or skin grafting. The matrix is available as solid, meshed (2:1) and fenestrated in various sizes ranging from 14 mm discs to 6 x 6 cm sheets. In January 2017, this product first became available for outpatient office use and reimbursement by Medicare. We highlight representative cases, proper coding and reimbursement policy, and cost-savings available by utilizing this product in the Mohs office setting compared to referral to operating room or facility-based settings.

**Summary:** From March to December 2017, we applied this product to the Mohs defects of 46 patients at our academically-affiliated outpatient Dermatology practice. The majority of the wounds were on the scalp, temple, periauricular, and lower leg. Surgical defects ranged from 0.2 cm^2 to 69 cm^2 with an average area of 19 cm^2. The average healing time for defects less than 10 cm^2 and 10-25 cm^2 was 9.3 weeks and 10.4 weeks respectively. Healing time for defects greater than 25 cm^2 averaged 15.7 weeks. When grouped by wound bed, defects with exposed periosteum, perichondrium, or bone healed in 13.8 weeks on average, compared to 10.8 weeks for subcutaneous wounds.

Proper reimbursement requires: completion of a pre-authorization form (but approval can be obtained on same day for Medicare and many other insurers); CPT codes 1527x (skin substitute graft <100 cm2) and Q4110 (Primatrix per unit – cm2); and ICD10 code Z85.828 (personal history of non-melanoma skin cancer).

**Design:** Representative cases (Figures 1, 2, 3) illustrate appropriate Mohs defects with multiple stages of healing after collagen matrix application with solid and meshed products. The costs were significantly less in the Mohs office setting as anesthesia, facility fees, and potential costs associated with sedation and the operating room were avoided. **Conclusion:** Fetal bovine collagen matrix is an effective alternative to secondary intention healing and skin grafting for many challenging Mohs surgical defects. We applied this product to 46 patients over 10 months and have observed favorable healing times and good cosmesis. In-office application of this product is cost-effective when compared to similar products applied in the operating room by plastic surgeons and other specialties. Reimbursement for outpatient use of this collagen matrix is now possible through appropriate use of diagnostic and billing codes.



#### May 4, 8:30-8:37 am

Presenter: Thuzar M. Shin, MD, PhD

#### Title: Appropriate Use of Mohs Surgery in Immunocompromised Patients is High and Published Indications for Mohs Decrease Inappropriate Use

**Authors:** Thuzar M. Shin, MD, PhD<sup>1</sup>; Victoria O'Malley<sup>1</sup>; Scott Tuttle<sup>1</sup>; Nicole Howe, MD<sup>1</sup>; Jeremy R. Etzkorn, MD<sup>1</sup>; Joseph F. Sobanko, MD<sup>1</sup>; David Margolis, MD, PhD<sup>1</sup>; Christopher J. Miller, MD<sup>1</sup>

Institution: 1. Hospital of the University of Pennsylvania, Philadelphia, PA

**Purpose:** Mohs surgery (MMS) utilization has increased dramatically. A recent study of an academic surgery practice demonstrated that immunosuppression was associated with inappropriate use of MMS. Inappropriate use of MMS for the increased quantity of skin cancers in growing immunosuppressed populations may inflate health care costs. This study assessed MMS utilization in a cohort of exclusively immunocompromised patients before and after publication of appropriate use criteria (AUC) for MMS in 2012. A secondary outcome was to determine the frequency of subclinical spread.

**Summary:** 680 patients with 3012 skin cancers were included in the study. MMS was used appropriately in 95.7% (2881/3012) of tumors. Adherence to AUC improved from 95% (1660/1748) before to 96.6% (1221/1264) after publication of the AUC for MMS (p<0.05). Younger age, female gender, immunosuppression  $\geq$ 10 years, and tumor location on trunk and proximal extremities were associated with decreased AUC compliance (Table 1). Clinical rationale for inappropriate MMS included tumor within a field of actinic damage, history of difficult or numerous skin cancers, close proximity to a scar, and multiple tumors treated with MMS on the same day. The rate of subclinical spread was 22.3% (671/3012) and did not differ based on anatomic location or AUC rating (p>0.05).

**Design:** Retrospective, single-center study of immunocompromised patients treated with MMS from July 2005 through March 2016. The primary outcome measure was compliance with published AUC. Each tumor was assigned a score using the American Academy of Dermatology's MMS AUC app. Cases were considered compliant if they had a score of 7-9 ("appropriate" on the app) and non-compliant for scores  $\leq 6$  (4-6: "uncertain"; 1-3: "inappropriate"). Non-compliant cases were reviewed to identify reasons for deviation. Compliance rates before or after publication of AUC for MMS2 were compared. The secondary outcome measure was the frequency of subclinical spread (requiring >1 stage of MMS to achieve tumor-free margins). Univariate logistic regression was used to identify variables of interest associated with AUC compliance. Odds ratios (ORs), 95% confidence intervals (Cls), and p-values were generated (p<0.05 considered significant).

**Conclusion:** This first study evaluating MMS AUC in an exclusively immunocompromised population demonstrated a high rate (95.7%) of appropriate use. Inappropriate use declined after publication of consensus guidelines in 2012, suggesting a positive influence on utilization rates. MMS was useful to detect subclinical tumor spread in 22.3% of patients. These data may inform future guidelines and curtail inappropriate use in patients who are younger, female, have been immunosuppressed  $\geq 10$  years, and or have tumors in low-risk anatomic sites.

#### Table 1. The influence of clinical variables on likelihood of compliance with AUC for MMS

Variable	OR*	95% CI
Age at surgery	1.03	1.008-1.044
Female gender	0.45	0.31-0.67
Immunosuppression ≥10 years	0.53	0.41-0.68
AUC location L**	0.0035	0.0007-0.018
A H A R A R A R A R A R A R A R A R A R		

\*All ORs were significant at p<0.001</p>

\*\*Area L: Trunk and extremities (excluding pretibial surface, hands, feet, nail units, and ankles)<sup>2</sup>

#### May 4, 8:38–8:45 am

Presenter: Addison M. Demer, MD

#### Title: Benefit of Mohs Micrographic Surgery Over Wide Local Excision for Melanoma of the Head and Neck: A Rational Approach to Treatment

**Authors:** Addison M. Demer, MD<sup>1</sup>; Karl K. Vance, MD<sup>1,2</sup>; Nikoo Cheraghi, MD<sup>1</sup>; Hilary C. Reich, MD<sup>1,3</sup>; Peter K. Lee, MD, PhD<sup>1,4</sup>

Institutions: 1. University of Minnesota, Minneapolis, MN

2. Zel Skin & Laser Specialists, Edina, MN

3. Essentia Health, Duluth, MN

4. Park Nicollet, Saint Louis Park, MN

**Purpose:** Due to the challenging clinical nature of head and neck melanoma, Mohs micrographic surgery (MMS) has increasingly been utilized for treatment. Unfortunately, management guidelines are limited and in many instances fail to acknowledge MMS as a treatment approach. This observation may be explained by the paucity of published data comparing wide local excision (WLE) to Mohs micrographic surgery (MMS) for the treatment of melanoma.

**Summary:** Among 388 patients with head and neck melanoma treated at our institution (Table 1), MMS was associated with decreased rates of local recurrence (P=0.0012), metastasis (P<0.0001), and melanoma-related death (P<0.0001).(Table 2) However, patient and tumor characteristics varied significantly, and WLE subgroup was largely comprised of higher stage and risk tumors. MMS was most often utilized for in situ and thin invasive melanomas on anatomically challenging sites (nose, cheek, periocular) of older patients, and WLE for deeper, higher stage/risk malignancies on less cosmetically sensitive areas (neck, scalp). Subgroup analysis found that patients with in situ or thin invasive tumors (<0.75 mm) treated with MMS had improved local recurrence outcomes (P=0.0049), but no difference in metastasis or death. Additionally, MMS was associated with a favorable delay in time to local recurrence for in situ tumors (P=0.0102).

**Design:** A 10-year retrospective chart review was performed, including all in situ and invasive melanomas of the head and neck treated at one academic institution from January 2004 to June 2013. All patients were treated with either MMS with immunohistochemisty or WLE. Rates of local recurrence, delayed metastasis, and melanoma-related death were compared. Based on our cohort and experience, we developed a treatment algorithm designed to guide operative management.(Figure 1) By stratifying patients based on Breslow depth, high risk tumor features, sentinel lymph node biopsy (SLNB) indication per NCCN guidelines, anatomic site, and patient/surgeon preference, this algorithm provides a rational treatment approach for these otherwise challenging tumors.

**Conclusion:** These findings further support the use of MMS for treatment of both invasive and in situ melanoma of the head and neck and help to validate our proposed clinical management decision tree.





The flow chart demonstrates a proposed decision tree for surgical management of head and neck meliacoma. Tumors are inst stratefled by Breslow depth, using the 0.25 mm catoff proposed by the NCCK for SMM side situation. Group A includes low rink in situa and this insulane machineronas (s0.25.5mm); (i) these tumors are most commonly considered for MMS with INC. Group B includes higher risk insulate tumors and greater illnesione depth (or 15.5.15.8.18) is discussed with these publicities. (I) Agreeable potients are offered SMM with and other submitted and freed per NCCN potentianes. (II) Agreeable potients are offered SMM with concurrent WLE with Songical Oncologiat or Head and Neck Surgeon. (BB) Few patients will decline SMM per preference; they are offered MMS with IHC. (III)\* Group B patients that elect for SMM following SMM per surgeon ant/origination; subs futual tip, eyelid, ear, etc) may be offered interval MMS following SMM per surgeon ant/ent/entres.

Table I. Study Group and	<b>Tumor Characteristics</b>
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Characteristic	Wide Local Encision	Mohs Micrographic Surgery	All Patients	P-Value
No. of autients	97	291	388	
No. of tamors	97	292	389	
Average Age (521)	65.5	69.0 (13.3)	68	10.0271
Female, a (%)	31 (3250	63 (22%)	94 (24%)	0.0147
Tumor Type				-
In situit M. e (N)	8 CENG	221 (76)	229 (59)	-
Investive/LMM. o /NJ	89 (92%)	71.04	160 (41)	
Location, + 00	-		·	
Check/line	21 (22%)	98 (34%)	119 (31%)	
Forehead/temple	13 (13%)	50 (17%)	63 (16%)	
Ear	15 (15N)	37 (13%)	52 (1310	1
Periorbital	2 (2%)	40 (34%)	42 (1110)	
Scale	27 (28%)	14 (5%)	41 (11%)	1
Note	4 (410)	21 (1250	35 (990)	
Nert	14 (14%)	18 (6%)	82 (8%)	
Lip	1010	2 (0.7%)	3 (0.8%)	1
Chin.	0 (0%)	2 (0.7%)	2 (0.5%)	1
Stape, n (N)				-
Erman At	25 (263)	269 (92%)		
Crown R	72 (24%)	22.050	294 (76%)	*<0.0001
Tamer Programming a PD	14 11440	22 (00)	94 (24%)	-<0.0001
0-Primary	99/9390	253 (82%)	MAX CREWS	1
1-Recurrent	2 (290	18.0550	20 (5%)	0.2354
2-Incompletely	5 (5%)	20 (7%)	25 (6%)	1 1 1 2 2 2
Breslow Depth, mm, mean	22 (2.9)	62 (0.6)	1.73	
Histologic Risk Factors, n	39 (40%)	11 (4%)	50 (12.9%)	
Mitotic Rate	29/3000	8 (25)	18 (1490)	*******
Increased, in (10)				
Ciccentrier, n clu	14 (1450	2 (0.7%)	16 (4%)	
Sateritosis, n Cu	a cesu	e orne	4 (150	-6.9037
No. Immunosuppressed	2 (2%)	17 (1%)	11 (190)	0.7360
Desmoplasia, n (%)	7 (7%)	1 (0.3%)	# (2%)	*0.0003
Number of Stages, in (N)		100.000	A44 (419)	in the second
-	94 (97%)	167 (57%)	291 (57%)	*<9.0001
	100	118 (4150	121 0190	1 530000
		0 (2N)	6(1.5%)	
Poursee Margins, n 263	6 (6%)	2 (0.7%)	4 (2%)	*6.003A
SUNB, N (N)			ALC INTAL	
0-Not performed	37 (3850	276 (96N)	315 (81%)	*<0.0001
2-Negative	44 (45%)	400	5.5 (14%)	10,000
2=resilve	19 (19%)	4.0%	20 (3%)	-
mean (50)	25 (26.5)	18 (21.3)	20	16.0217

			and the state of the second	a second s
Stage/Subgroup	Outcome Measure	Wide Local Excision	Mohs Micrographic Surgery	P-Value (183
	Local Recurrence, n (N)	7 (7%)	2 (0.7%)	*0.0012
	Delayed Metastasis, n (%)	19 (20%)	\$ (2%)	*<0.0001
All Tumora	Melanoma Related Death, n (%)	11 (119)	2 (0.7%)	*<0.0001
And Contracts	Median Time to Recurrence, mo.	12.6	16.5	*0.0102 (12.4)
	Median Time to Metastases, mo.	17.81	16.5	0.4689 (1.6)
	Median Time to MR Death , mo.	31.87	41.19	0.6953 (1.4)
	Local Recurrence, n (N)	1 (13%)	2 (0.9%)	0.1020
in Situ	Oelayed Metastasis, n (N)	0 (0.0%)	1 (0.5%)	1.0000
	Melanoma Related Death, n (%)	0 (0.0%)	1 (0.5%)	1.0000
i sana in	Local Recurrence, n 00	2 (12%)	0	0.0634
Invasive (50.75mm)	Delayed Metastasis, n (%)	1 (6N)	1 (2%)	0,4517
	Melanoma Related Death, n 00	0	0	N/A
	Local Recurrence, n (N)	3 (12%)	2 (0.7%)	*0.0049
Group A*	Delayed Metestasis. n (%)	1 (4%)	2 (0.7%)	0.2348
- 13 - I	Melanoma Related Death, n 00	0	1 (0.4%)	1
	Local Recurrence, n (N)	4 (6%)	0	0.5697
Group II'	Delayed Metastasis, n (%)	18 (25%)	3 (14%)	0.3829
	Melanoma Related Death, n (%)	11 (15%)	1 (5%)	0.2828

Table II. Recurrence, Metastases and Survival Outcomes By Tumor Subgroup

\*Group 8 defined as tumors with depth > 0.75mm

#### May 4, 8:46–8:53 am

Presenter: Ann M. John, MD

# Title: Reflectance Confocal Microscopy of Equivocal Lesions: To Remove or Not to Remove

Authors: Ann M. John, MD<sup>1</sup>; Attiya Haroon, MD, PhD<sup>1</sup>; Babar K. Rao, MD<sup>1.2</sup> Institutions: 1. Rutgers Robert Wood Johnson Medical School, Somerset, NJ

2. Weill Cornell Medical College, New York, NY

**Purpose:** Reflectance confocal microscopy (RCM) is an FDA-approved device to supplement clinical examination in determining the need for biopsy. By non-invasively imaging the epidermis and superficial dermis, RCM provides images with details similar to histological images to identify keratinocyte and melanocytic neoplasms. The purpose of our study is to determine the utility of RCM in determining whether lesions that are equivocal on dermoscopy warrant biopsies to rule out malignant neoplasms.

**Summary:** A total of 1,189 clinically suspicious lesions were included in the analysis. Of the lesions, 25.9% were located on the face and neck, 41.7% were located on the trunk, 28.5% were located on the extremities, and 3.8% were located on the hands and feet. Overall, 155 lesions were determined to be positive for malignancy or atypia on RCM diagnosis and 1,034 lesions were determined to be benign. Additionally, 109 lesions were considered true positives, 46 lesions were considered false positives, 1,032 lesions were considered true negatives, and 2 lesions were considered false negatives. Overall sensitivity and specificity were calculated as 98.2% and 99.8% respectively. Positive and negative predictive values were 70.3% and 99.8% respectively.

**Design:** Clinically suspicious lesions from 2011 to 2017 were retrospectively reviewed. Patient age, location of lesion, confocal microscopy diagnosis by a trained confocal specialist, histology diagnosis, and patient follow up of lesions determined to be benign were recorded. Lesions were excluded if the patient was lost to follow up after RCM diagnosis, if no biopsy was performed when RCM recommended biopsy, and if RCM was not performed on clinically suspicious lesions. A true positive was defined as RCM diagnosis of malignancy or atypia with histologic confirmation; a false positive was defined as RCM diagnosis

of malignancy or atypia with contradicting histologic outcome; a true negative was defined as RCM diagnosis of benign lesion with the lesion remaining the same over at least 1 year; and a false negative was determined as RCM diagnosis of malignancy with histology showing atypia or RCM diagnosis of benign nature with the lesion being biopsied within 1 year.

**Conclusion:** While dermoscopy has become a standard supplement to visual examination in dermatology, RCM has yet to be used regularly. Dermoscopy has increased the sensitivity of biopsies of malignant lesions by 30% and decreased the benign to malignant ratio from 18:1 to 8:1. For lesions that are equivocal on dermoscopy, our study has demonstrated that RCM can improve sensitivity and decrease the number of unnecessary biopsies by elucidating characteristics of malignant, atypical, or benign lesions. With the advent of newer handheld RCM devices, RCM can conveniently be incorporated into practice. Moreover, RCM can be used during Mohs procedures to determine the diameter of layers necessary to remove atypical and malignant cells.



#### May 4, 8:54–9:01 am

Presenter: Ervin Epstein, Jr., MD

#### Title: Topical Application of the HH Inhibitor Patidegib Reduces Facial BCC Burden in Patients with Gorlin Syndrome

Authors: Catherine Harwood, MA,  $PhD^1$ ; John Lear,  $MD^2$ ; Ervin Epstein, Jr.,  $MD^3$ ; Jean Y. Tang, MD,  $PhD^4$ 

**Institutions:** 1. Queen Mary University of London, London, United Kingdom

2. Manchester Academic Health Science Centre and Salford Royal NHS Foundation Trust, Salford, United Kingdom

- 3. PellePharm, Inc, Orinda, CA
- 4. Stanford University School of Medicine, Redwood City, CA

**Purpose:** Systemic hedgehog (HH) inhibitors can cause complete clinical and histologic remission of non-advanced basal cell carcinomas in patients with Gorlin syndrome. However, the troublesome adverse effects including hair loss, taste loss, and muscle cramps cause most patients to discontinue treatment, following which BCCs recur. A topical HH inhibitor potentially could have anti-BCC efficacy without the adverse effects and could represent a useful lifetime treatment for Gorlin patients.

**Summary:** In this Study, patients with Gorlin syndrome applied 4% (n=6), 2% (n=6) or 0% patidegib (n=6) gel twice daily to their entire face and to 4 evaluable target lesions for 6 months. 2% gel shrank surgically-eligible BCCs (SEBs), and 2% and 4% gels caused complete clinical disappearance of 25% of initially present SEBs. No vehicle-treated SEB disappeared. In addition, 3 of 5 patients applying vehicle gel developed one or more new facial SEBs; 2 of 12 applying 2% or 4% gels occurred only in those in whom HH pathway activity was reduced after 6 weeks of topical application, a finding consistent with the anti-BCC effect of the drug being via HH inhibition. Importantly, unlike oral HH inhibitors, topical patidegib did not produce hair loss, taste loss, or muscle cramps and produced circulating blood levels at least 500-fold lower those found in patients treated with oral patidegib.

**Design:** We have developed a topical HH inhibitor and report here the first double-blind randomized human trial of topical patidegib, a small molecule HH inhibitor derived from plant-produced cyclopamine.

**Conclusion:** Topical patidegib gel has the potential to reduce significantly the facial scarring that now plagues patients with this syndrome without the adverse effects that accompany systemic HH inhibitors now available. A randomized one year Phase 3 trial comparing 2% gel vs. vehicle control gel applied to the face is planned to enroll approximately 150 patients at sites across the United States and Europe and is scheduled to start in the summer of 2018.

#### May 4, 9:02–9:09 am

Presenter: Sarah T. Arron, MD, PhD

#### Title: A Gene Expression Profile Signature for Prediction of Recurrence Risk in Patients with Cutaneous Squamous Cell Carcinoma

**Authors:** Sarah T. Arron, MD, PhD<sup>1</sup>; Nathan Cleaver, DO<sup>2</sup>; Ian A. Maher, MD<sup>3</sup>; Sherrif Ibrahim, MD, PhD<sup>4</sup>; David Panther, MD<sup>5</sup>; David G. Brodland, MD<sup>5</sup>; Kyle Covington, PhD<sup>6</sup>; Chrysalyne D. Schmults, MD, MSCE<sup>7</sup>; Jason Newman, MD<sup>8</sup>; Ashley Wysong, MD, MS<sup>9</sup>

- Institutions: 1. UCSF, San Francisco, CA
- 2. Cleaver Dermatology, Kirksville, MO
- 3. St. Louis University, St. Louis, MO
- 4. University of Rochester, Rochester, NY
- 5. Zitelli & Brodland, P.C., Pittsburgh, PA
- 6. Castle Biosciences, Inc., Friendswood, TX
- 7. Brigham and Women's Hospital, Jamaica Plain, MA
- 8. University of Pennsylvania, Philadelphia, PA
- 9. USC, Los Angeles, CA

**Purpose:** Although cutaneous squamous cell carcinoma (cSCC) is a common skin cancer with generally good outcome, a subset of patients will develop local, regional or distant recurrences following complete excision of the primary tumor. Adjuvant treatment options, including radiation therapy, chemotherapy and sentinel lymph node biopsy/ completion dissection, are available for cSCC patients with clinical features that are associated with recurrence. However, there remains a paucity of evidence-based data for determining which cSCC lesions may require additional workup and management. Therefore, we set out to develop a gene expression-based biomarker associated with disease recurrence (local, nodal or distant metastasis) in cSCC.

Summary: We identified 73 candidate genes from the scientific literature and pathway analysis, most of which had reported associations with tissue remodeling, cellular proliferation, invasion, and immune function. as well as internal control candidates. Six control genes were confirmed as showing consistent expression across all samples tested, and were used as controls to normalize expression values of the remaining genes. Eighteen genes were found to be differentially expressed between recurrent and non-recurrent cases (p<0.05). Multiple machine learning algorithm approaches were applied with 75% of the specimens used for training and the remaining 25% used for validation. The optimal model identified from the analysis was 71% sensitive, 90% specific, had a 50% positive predictive value, and a 96% negative predictive value (NPV) for recurrence. Based upon a comparison to current literature, our model was more sensitive than staging criteria developed at Brigham and Women's Hospital and the American Joint Committee on Cancer (71% vs. 60% and 10% respectively) while maintaining a clinically reliable NPV (96% vs. 99% and 98% respectively).

Design: Under an IRB approved multi-center protocol, a total of 230 primary cSCC tumors from 12 US centers were analyzed for mRNA expression of the candidate genes. Associated clinical data for each case was collected and monitored for accuracy. After quality filtering of specimens and genes, we assessed 63 genes across 212 samples.

Conclusion: These results show that recurrent and non-recurrent cSCC can be identified through gene expression profiling and suggest that a gene expression test to identify cSCC patients with a higher risk of recurrence is feasible. Such a test could improve adjuvant intervention decisions and help determine which patients may benefit from additional therapeutic modalities.

#### May 4, 9:10–9:17 am

Presenter: William C. Fix

Title: Melanomas of the Head and Neck Have High Risk Features for Local Recurrence and Require Tissue **Rearranging Reconstruction More Commonly than BCC** and SCC: A Comparison of Indications for MMS in 13,664 Tumors

Authors: William C. Fix<sup>1</sup>; Jeremy R. Etzkorn, MD<sup>1</sup>; Joseph F. Sobanko, MD<sup>1</sup>; Thuzar M. Shin, MD<sup>1</sup>; Nicole M. Howe<sup>1</sup>; Mehul Bhatt, MBA<sup>1</sup>; Christopher J. Miller, MD1

Institution: 1. University of Pennsylvania, Philadelphia, PA

Purpose: Indications for Mohs micrographic surgery (MMS) in National Comprehensive Cancer Network (NCCN) guidelines for basal cell carcinomas (BCC) and squamous cell carcinomas (SCC) include high risk local recurrence features and anatomic location. Reconstructions with adjacent tissue transfers "are best performed after clear margins are verified." Comparable indications for MMS and timing of reconstruction are not included in NCCN guidelines for melanoma. This study determined the frequency with which head and neck melanomas meet well-established indications for MMS for BCC and SCC and require flap reconstruction.

Summary: The study cohort included 13,664 cases of melanoma, BCC, and SCC of the head and neck treated with MMS between 2007 and 2017. The cohort included 1,475 (10.79%) melanomas (1065 MIS and 410 invasive melanoma); 8,749 BCC (64.02%); 3,346 SCC (24.49%), and 94 (0.69%) mixed BCC and SCC lesions. Table 1 summarizes demographic and tumor characteristics. Compared to BCC and SCC,

melanomas were larger (preoperative diameter 2.10 cm vs. 1.30 cm, p<0.0001) and more likely to be recurrent (5.08% vs. 3.91%, p=0.031) or poorly defined (rate of >1 MMS stage: 31.73% vs. 26.52%, p<0.0001), and require tissue rearranging reconstruction (44.86% vs. 33.02%, p<0.0001). By multivariable logistic regression analysis, melanomas had an odds ratio (OR) of 1.98 for flap reconstruction versus BCC/SCC after adjusting for recurrence status, poorly defined borders, and anatomic location.

**Design:** A retrospective cohort study was performed to compare high risk local recurrence features in melanoma versus BCC/SCC (size [defined as the longest preoperative dimension], recurrence status [recurrent versus primary], poorly defined clinical borders [defined as requiring more than 1 stage of MMS]), anatomic location (high risk area ['mask' area of face] versus moderate risk area [cheek, forehead, scalp, neck]), and tissue rearranging reconstruction (defined as local flap, staged interpolation flap, or wedge repair) for melanoma versus BCC and SCC of the head and neck treated with MMS at a single center. STATA version 15 was used for analysis. T-tests and tests of proportion were used for comparative hypothesis testing. A logistic regression model was constructed in a forward, stepwise manner using a p-value cutoff of 0.10 to assess determinants of tissue rearrangement repair.

Conclusion: Melanomas of the head and neck are more likely to have a larger preoperative size, recurrent status, poorly defined borders, and tissue rearranging reconstruction. These findings highlight the importance of microscopic margin assessment prior to reconstruction for head and neck melanoma and may help to develop melanoma consensus guidelines that are comparable to those established for BCC and SCC.

High Risk Recurrence Features: Melanoma vs. BCC/SCC



	Melanoma	BCC and SCC	Total
Number (%)	1,475 (10.79%)	12,189 (89,21%)	13,664
onana ana ana ana ana ana ana ana ana an	a ser a contra se		P-value #
Mean age (SD)	67.0[12.6]	67.0[13.4]	0.94
Male (%)	1001 (67 9%)	8,048 (66 0%)	0.15
Preoperative size in cm [SD]*	2 10 [1 55]	1 30 [1 10]	<0.0001
Recurrent lesions (%)	75 (5.08%)	477 (3.91%)	0.031
Subclinical spread (> 1 stage required) (%)	468 (31.75%)	3,233 (26 52%)	<0.0001
Location*	No. of Astronomy		100000
Area H	353 (23.93%)	4,771 (39.14%)	<0.0001
Area M	1,122 (76.07%)	7,418 (60.86%)	<0.0001
Repair – Tissue Rearrangement (%)	659 (44.86%)	4,025 (33.02%)	<0.0001
Local Flaps	451 (30 58%)	3,202 (26,27%)	
Interpolation Flaps	120 (8.14%)	278 (2.28%)	
Wedge Repairs	9 (0.61%)	71 (0.58%)	
Outside Referrals	79 (5.36%)	474 (3.89%)	100000
Repair – Non-Tissue Rearrangement (%)	816 (55 32%)	8,164 (66.98%)	<0.0001
Linear Closure	670 (45.42%)	6,444 (52.87%)	
Secondary Intent	49 (3 32%)	813 (6 67%)	
Grafts	82 (5.56%)	741 (6.08%)	1
Other	15 (1.02%)	166 (1.36%)	

"Preoperative size measures the longest linear dimension of the lesion. "Area H defined as: pen-oral, eyeld, nose, ear. Area M defined as: scalp, non-central face, neck # Bolded p-value indicates statistic ally significant difference between melanoma and BCC/SCC.

#### May 4, 9:18–9:25 am

Presenter: Lauren D. Crow, MD, MPH

Title: Development of an Expert Consensus Guideline for Skin Cancer Screening in Solid Organ Transplant Recipients in the United States

**Authors:** Lauren D. Crow, MD, MPH<sup>1,2</sup>; Sarah T. Arron, MD, PhD<sup>1</sup>; Christina Chung, MD<sup>3</sup>; Anokhi Jambusaria-Pahlajani, MD<sup>4</sup>; Stefan Lowenstein, BS<sup>1</sup>

Institutions: 1. UCSF, San Francisco, CA

- 2. University of Arizona, Phoenix, AZ
- 3. Drexel Medicine, Philadelphia, PA
- 4. Baylor, Scott & White, Round Rock, TX

**Purpose:** To form standardized, consensus skin cancer screening recommendations for solid organ transplant recipients (SOTR) in the United States utilizing Delphi surveys completed by an expert panel of dermatologists and transplant physicians.

**Summary:** Skin cancer is the most common malignancy affecting SOTR. Transplant recipients have a significantly increased risk for developing both melanoma and nonmelanoma skin cancers compared to the general population. However, there are currently no consensus guidelines for routine screening for skin cancer surveillance in this population.

**Design:** Three rounds of Delphi surveys were emailed to panelists. Data from completed surveys was analyzed and compiled into summary reports which were then redistributed to the panel after each round. Data from a recent publication about epidemiologic incidence of skin cancer and risk factors in SOTR was included for review prior to completing the final survey. Consensus was set a priori to be 80% agreement of experts.

Conclusion: 84 expert panelists completed all three rounds of the Delphi surveys. Panelists agreed that patients should be risk assessed by the transplant team to identify potential need for screening. Panelists reached consensus on the need for an evidence-based risk assessment tool that is time-efficient and can be completed by office staff, to feasibly implement into current clinical practice. Panelists agreed that a dermatologist should perform full body examinations (FBSE) for the purpose of skin cancer screening. According to the consensus risk stratification, all Caucasian, Asian, Hispanic, and high risk African American patients should be screened within 5 years after transplant. High risk Caucasian patients should be screened within 2 years after transplant. High risk was defined as SOTR with thoracic organ transplants, age>50, and male gender. No consensus was reached for low risk African American SOTR. All SOTR with a history of skin cancer should continue follow-up standard of care for skin cancer surveillance. We propose a standard approach to skin cancer screening in SOTR based on consensus of experts in the fields of dermatology and transplant medicine. Future directions will include development of a risk stratification tool to guide dermatology referral for skin cancer screening.

### Rapid Pearl Abstract Session – Saturday, May 5, 4:15–5:00 pm

#### May 5, 4:15-4:17 pm

Presenter: Mary-Katharine Collins, MD

Title: Differentiating Epidermodysplasia Verruciformis-Like Features from Pagetoid Squamous Cell Carcinoma in situ on Mohs Micrographic Surgery Slide Sections

Authors: Mary-Katharine Collins, MD<sup>1</sup>; Melissa Pugliano-Mauro, MD<sup>1</sup> Institution: 1. University of Pittsburgh Medical Center, Pittsburgh, PA

#### May 5, 4:18-4:20 pm

Presenter: Rajiv I. Nijhawan, MD

#### Title: Partially De-epithelialized Nasolabial Hinge Flap for Repair of Nasal Lining

Author: Rajiv I. Nijhawan, MD<sup>1</sup> Institution: 1. University of Texas Southwestern Medical Center

#### May 5, 4:21-4:23 pm

Presenter: Whitney L. Pollard, DO

#### Title: The Granny Knot: Technique for Single-person Closure of High-Tension Defects

Authors: Whitney L. Pollard, DO<sup>1</sup>; Cory V. Trickett, DO<sup>1</sup> Institution: 1. San Antonio Uniformed Services Health Education Consortium, JBSA-Lackland, TX

#### May 5, 4:24-4:26 pm

Presenter: Ivy I. Norris

#### Title: Swoosh Modification to Cheek Advancement Flaps for Upper Lip Reconstruction

Authors: Ivy I. Norris<sup>1</sup>; Todd E. Holmes, MD<sup>1</sup> Institution: 1. University of Vermont Medical Center, Burlington, VT

#### May 5, 4:27-4:29 pm

Presenter: Young J. Kwak, MD

#### Title: Pain Indicators in Mohs Surgery with Minimal-Needle Insertion Technique

Authors: Young J. Kwak, MD<sup>1,2</sup>; David Wright, MD<sup>2</sup>; Leonard H. Goldberg, MD<sup>1</sup>

**Institutions:** 1. DermSurgery Associates, Houston, TX 2. Houston Methodist Hospital, Houston, TX

#### May 5, 4:30-4:32 pm

Presenter: Mariam Mafee, MD

#### Title: Incidental Merkel Cell Carcinoma Encountered During Mohs Surgery

Authors: Mariam Mafee, MD<sup>1</sup>; Daniel D. Bennett<sup>1</sup>; Andrew M. Swanson<sup>1</sup> Institution: 1. University of Wisconsin, Madison, WI

#### May 5, 4:33-4:35 pm

Presenter: Ankit Gor, MD

# Title: High Definition, Cost-Effective, and Point of View Video Recording for Dermatologic Surgery

Authors: Matthew LeBoeuf, MD, PhD; Ankit Gor<sup>1</sup>; David Chen, MD<sup>1</sup> Institution: 1. University of Vermont Medical Center, Burlington, VT

#### May 5, 4:36-4:38 pm

Presenter: Maral K. Skelsey, MD

#### Title: Rapid Pearls: Pitfalls in Frozen Section Pathology

Authors: Florencia Anatelli<sup>1</sup>; Maral K. Skelsey, MD<sup>2</sup> Institutions: 1. Aurora Diagnostics, Sterling, VA 2. Georgetown University, Washington, DC

#### May 5, 4:39-4:41 pm

Presenter: Natalia M.K. Spierings, BSc, MBBS, MRCP(UK), MBA

#### Title: The RAST Flap

Authors: Natalia M.K. Spierings, BSc, MBBS, MRCP(UK), MBA1; Walayat Hussain, MD, MRCP(UK)1

Institution: 1. Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

#### May 5, 4:42-4:44 pm

Presenter: Alison M. Spiker, MD

#### **Title: Internal Control for Extramammary Paget Disease**

Authors: Alison M. Spiker, MD<sup>1</sup>; Victor J. Marks, MD<sup>1</sup> Institution: 1. Geisinger Medical Center, Danville, PA

#### May 5, 4:45-4:47 pm

Presenter: Alexander W. Kennon, MD

#### Title: Management of Perimeatal Surgical Defect Follow Mohs Micrographic Surgery on the Penis- A Novel Bandaging Technique

Authors: Alexander W. Kennon, MD<sup>1</sup>; Lancing Patterson, MD<sup>2</sup>; Steven M. Kent, MD<sup>3</sup>; David E. Kent, MD<sup>1</sup>

Institutions: 1. Dermatologic Surgical Specialist PC, Macon, GA 2. Southeastern Urology Associates, Macon, GA

3. Mercer University School of Medicine, Macon, GA

#### May 5, 4:48-4:50 pm

Presenter: Ally-Khan Somani, MD, PhD

#### **Title: Vermilion Advancement Flap**

Author: Ally-Khan Somani, MD, PhD1

Institution: 1. Indiana University School of Medicine, Indianapolis, IN

### Rapid Pearl Abstract Session – Saturday, May 5, 4:15–5:00 pm

#### May 5, 4:51-4:53 pm

Presenter: Molly C. Powers, MD

Title: Simple and Effective Treatment of Reactive Post-Surgical Koebnerizing Keratoacanthomas

**Authors:** Molly C. Powers, MD<sup>1</sup>; David G. Brodland, MD<sup>1,2</sup> **Institutions:** 1. Zitelli and Brodland Skin Cancer Center, Clairton, PA 2. University of Pittsburgh, Pittsburgh, PA

#### May 5, 4:54-4:56 pm

Presenter: James T. Highsmith, MD, MS

#### **Title: Improving Smartphone Use in Medical Photography**

Authors: James T. Highsmith, MD,  $MS^{1,2}$ ; Michael J. Highsmith,  $PhD^{2,3}$ ; David Weinstein,  $MD^4$ 

Institutions: 1. Dermatology Surgery Institute, Lutz, FL

2. Department of Veterans Affairs, Tampa, FL

3. University of South Florida, Tampa, FL

4. University of Central Florida College of Medicine, Orlando, FL

#### May 5, 4:57-4:59 pm

Presenter: Rupert B. Barry, MB, BCh, BAO

# Title: Large Lateral Canthal Defect Requiring Repair with a Combination of Cutaneous Flaps

**Authors:** Laura A. Nestor<sup>1</sup>; Michael Lavery<sup>1</sup>; Rupert B. Barry, MB, BCh, BAO<sup>1</sup>

Institution: 1. St. James' Hospital, Dublin, Ireland

Posters will be displayed in the Exhibit Hall (Stevens Salon D/Lower Level), and will be displayed from 11:00 am Thursday, May 3 through 4:00 pm Saturday, May 5.

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

#### Even Number Posters (2-56):

Thursday, May 3 from 12:00-1:00 pm

#### Odd Number Posters (1–57):

Saturday, May 5 from 12:00-1:00 pm

#### 1

#### "Pin it Down:" Facilitating Mohs Tissue Preparation

<u>Natalia M.K. Spierings, BSc, MBBS, MRCP(UK), MBA</u>1; Lisa Martin, RN1; Walayat Hussain, MD, MRCP(UK)<sup>1</sup>

1. Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

#### 2

#### Determination of Sentinel Lymph Node Biopsy Eligibility Using a 31-Gene Expression Profile Test in Melanoma Patients

<u>Robert Cook</u><sup>1</sup>; Clare Johnson, RN<sup>1</sup>; Kyle Covington, PhD<sup>1</sup>; Federico Monzon, MD<sup>1</sup>

1. Castle Biosciences, Inc., Friendswood, TX

#### 3

# The Effect of Lidocaine Dilution on Pain and Duration of Intradermal Anesthesia

<u>Randall Gunther, MS</u><sup>1</sup>; Elizabeth Stein<sup>1</sup>; Julia Harrington<sup>2</sup>; Lena Mak<sup>2</sup>; Tyler McBride<sup>2</sup>; Zaineb Makhzoumi, MD, MPH<sup>3</sup>; Zain U. Syed, MD<sup>4</sup>; Allan C. Harrington, MD<sup>2</sup>

- 1. University of North Carolina School of Medicine, Chapel Hill, NC
- 2. Anne Arundel Dermatology, Anapolis, MD
- 3. University of Maryland School of Medicine, Baltimore, MD
- 4. Skin Care Specialty Physicians, Lutherville, MD

#### 4

#### Post-Operative Infections After Complex Reconstruction: A Retrospective Review Comparing Rates of Infection With or Without Perioperative Antibiotics

<u>Adam B. Aronson<sup>1</sup></u>; Amanda J. Tschetter<sup>2</sup>; Matthew J. Landherr<sup>3</sup>; Nahid Y. Vidal<sup>4</sup>; Marta J. VanBeek, MD<sup>1</sup>

- 1. University of Iowa Hospitals and Clinics, Iowa City, IA
- 2. University of South Dakota, Vermillion, SD
- 3. Forefront Dermatology, Cedar Rapids, IA
- 4. Mayo Clinic, Rochester, MD

#### 5

#### Pilot Study of Topical Itraconazole for the Treatment of Basal Cell Carcinomas in Gorlin Syndrome Patients

<u>Grace E. Kim, MD</u><sup>1</sup>; Gina Kwon, MD<sup>1</sup>; Irene Bailey-Healey, BS<sup>1</sup>; Amar Mirza, BS<sup>1</sup>; Raymon Whitson, PhD<sup>1</sup>; Tony Oro, MD, PhD<sup>1</sup>; Jean Y. Tang, MD, PhD<sup>1</sup>

1. Stanford University, Redwood City, CA

#### 6

#### Recurrent Primary Cutaneous Adenoid Cystic Carcinoma in an African-American Patient with HIV: Excision Versus Mohs Micrographic Surgery

<u>Rodrigo Valdes-Rodriguez, MD</u><sup>1</sup>; Casey L. Ross, BA<sup>1</sup>; Abhishek Aphale,  $MD^{1,2}$ 

1. Temple University Hospital, Philadelphia, PA

2. Fox Chase Cancer Center, Rockledge, PA

#### 7

#### Mohs Fellowship Training at Scripps Clinic, 1984–2018

<u>Hugh T. Greenway, Jr., MD</u><sup>1</sup>; Ryan Gilbertson, BS<sup>1</sup>; Judy Plis, BS, MBA<sup>1</sup> 1. Scripps Clinic, La Jolla, CA

#### 8

#### Eccrine Porocarcinoma: New Insights and A Systematic Review of the Literature

Reyna Swift, MD<sup>1</sup>; Azadeh Nazemi, MS<sup>1</sup>; Shauna Higgins, MD<sup>1</sup>; <u>Maggie</u> <u>Chow, MD, PhD<sup>1</sup></u>; Ashley Wysong, MD, MS<sup>1</sup>

1. Keck Medicine at USC, Los Angeles, CA

#### 10

#### Gabor-Domain Optical Coherence Microscopy: An in vivo Aid for Margin Delineation in Mohs Surgery

<u>Jonathan M. Soh, MD</u><sup>1</sup>; Patrice Tankam, PhD<sup>1</sup>; Mara Lanis, BS<sup>1</sup>; Adam Hayes, PhD<sup>1</sup>; Cristina Canavesi, PhD, MBA<sup>2</sup>; Andrea Cogliati, MS<sup>1,2</sup>; Jannick P. Rolland, PhD<sup>1,2</sup>; Sherrif F. Ibrahim, MD, PhD<sup>1</sup>

- 1. University of Rochester Medical Center, Rochester, NY
- 2. LighTopTech, West Henriette, NY

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#### Novel "Winged" Modified Keystone Flap for Repair of a Variety of Defects

<u>Katherine Hrynewycz, MD</u><sup>1</sup>; Prasanthi Kandula, MD<sup>1</sup>; Ally-Khan Somani, MD, PhD<sup>1</sup>

1. Indiana University, Indianapolis, IN

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#### Blood Pressure Monitoring for Outpatient Dermatologic Surgery: A Survey of Mohs Surgeons

<u>Tejaswi Mudigonda, MD</u><sup>1</sup>; Daniel Christiansen, MD; Thomas Stasko, MD<sup>2</sup>

- 1. Washington University School of Medicine, St. Louis, MO
- 2. University of Oklahoma College of Medicine, Oklahoma City, OK

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#### Eruptive Keratoacanthomas in the Setting of Anti-Retroviral Therapy Non-Compliance Managed with Serial Excision

<u>Deanna Dickerman, MD</u><sup>1</sup>; Weston Wall, MD<sup>1</sup>; Sandra Tadros, BS<sup>1</sup>; Loretta Davis, MD<sup>1</sup>

1. Medical College of Georgia, Augusta, GA

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#### Primary Cutaneous Clear Cell Sarcoma: A Diagnostic Dilemma

<u>Geoffrey Lim</u><sup>1</sup>; Maral Rahvar<sup>1</sup>; Sonal Choudhary<sup>1</sup>; Jonhan Ho<sup>1</sup>; Melissa Pugliano-Mauro, MD<sup>1</sup>

1. University of Pittsburgh, Pittsburgh, PA

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# Pre-Incisional Transcutaneous Ligature for Hemostasis – the Worming Technique

Matthew Hand, MD1; Lindsey Goddard, MD2; Cameron Chesnut, MD1,3

1. Chesnut MD Cosmetics at Dermatology Specialists of Spokane, Spokane, WA

2. Loma Linda University, Loma Linda, CA

3. University of Washington School of Medicine, Spokane, WA

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#### Neuroendocrine Type Composite Hemangioendothelioma: A Rare Vascular Neoplasm Treated with Mohs Micrographic Surgery

<u>Jennifer Brooks, MD</u><sup>1</sup>; Sarah Telliard, BS<sup>2</sup>; Alison Spiker, MD<sup>1</sup>; Gabrielle Strike, PA-C<sup>3</sup>; Nicole Warner, MD<sup>4</sup>; Wells Chandler, MD<sup>1</sup>; Victor J. Marks, MD<sup>1</sup>

1. Geisinger, Danville, PA

- 2. Mercer University School of Medicine, Macon, GA
- 3. Children's Hospital of Wisconsin, Madison, WI
- 4. The Dermatology Group, Mason, OH

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#### Bedside Management of Malignant Melanoma with Reflectance Confocal Microscopy

<u>Hamza D. Bhatti, DO</u><sup>1</sup>; Attiya Haroon<sup>1</sup>; Bahar Firoz, MD, MPH<sup>1</sup>; Babar Rao, MD<sup>1,2</sup>

1. Rutgers University- Robert Wood Johnson Medical School, Somerset, NY 2. Weill Cornell Medical College, New York, NY

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#### A Predictive Model for Primary Closure Lengths in Mohs Surgery Based on Skin Cancer Type, Dimensions and Location

Adam B. Blechman, MD<sup>1</sup>; Zachary Theroux, MD<sup>2</sup>; Mark A. Russell, MD<sup>3</sup>

1. NYU Langone, New York, NY

2. Stony Brook Health System, Stony Brook, NY

3. University of Virginia Health System, Charlottesville, VA

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#### In-office Compounding of Lidocaine-Epinephrine: A Safe and Effective Method of Anesthesia Administration Prior to Skin Biopsy

Chelsea Kesty, BS<sup>1</sup>; Ross L. Pearlman<sup>1,2</sup>; Steven R. Feldman, MD, PhD<sup>1</sup>; Leah Cardwell, MD<sup>1</sup>; <u>Katarina R. Kesty, MD, MBA<sup>1</sup></u>

- 1. Wake Forest University School of Medicine, Winston-Salem, NC
- 2. University of Alabama School of Medicine, Birmingham, AL

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# Narrow Pedicle Transposition Flap: A Novel Reconstructive Technique

<u>Addison M. Demer, MD</u><sup>1</sup>; Lauren B. O'Neill, MD<sup>1,2</sup>; Angela E. Aakhus, MD<sup>3</sup>; Hilary C. Reich, MD<sup>4</sup>; Peter K. Lee, MD, PhD<sup>1,2</sup>

- 1. University of Minnesota, Minneapolis, MN
- 2. Park Nicollet, Saint Louis Park, MN
- 3. Sanford Health, Bemidji, MN
- 4. Essentia Health, Duluth, MN

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#### Lentigo Maligna Melanoma Combined with Nodular Basal Cell Carcinoma Treated with Mohs Micrographic Surgery

<u>Alex C. Holliday, MD</u><sup>1</sup>; George R. Collins, DO<sup>1</sup>; Kyle A. Prickett, MD<sup>1</sup>; Mariana A. Phillips, MD<sup>1</sup>

1. Virginia Tech Carilion Clinic, Roanoke, VA

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#### The Effect of Lesion Rate of Change on Subsequent Stage Margins

<u>Robert Fischer, MD</u><sup>1</sup>; Satori Iwamoto, MD, PhD<sup>1</sup> 1. Roger Williams Medical Center, Providence, RI

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#### Zinc Chloride Astringent Treatment Helps Prevent Progression of Melanoma in situ

Norman A. Brooks, MD1

1. Skin Cancer Medical Center, Encino, CA

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#### Evaluation of a New Generation Quaternary Ammonium Compound on Surgical Forceps

<u>Carolyn A. Hardin, D0</u><sup>1</sup>; Jonathan F. Madden, MD<sup>1</sup>; Lori Henrichs, MS<sup>2</sup>; Mark D. Ervin, MD<sup>2</sup>; Joshua Lospinoso, PhD<sup>3</sup>; Thomas M. Beachkofsky,  $MD^4$ 

1. San Antonio Uniformed Services Health Education Consortium, JBSA-Lackland, TX

- 2. Joint Base San Antonio, Lackland, TX
- 3. Fort Meade, Fort Meade, MD
- 4. MacDill Air Force Base, MacDill AFB, FL

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# Simple Solution to Perform Deep Sutures Without an Assistant

<u>Collin M. Blattner, DO</u><sup>1</sup>; Benjamin Perry, DO<sup>1</sup>; William Lear, MD<sup>1</sup> 1. Silver Falls Dermatology, Salem, OR

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#### A Retrospective Review and Comparison of Mohs Micrographic Surgical Cases Closed by Dermatologic Surgery (Mohs) Versus Plastic Surgery Services

Cynthia L. Nicholson<sup>1</sup>; Abdel K. El Tal<sup>2,3</sup>

- 1. Wayne State University, Dearborn, MI
- 2. Dermatology Associates, Perrysburg, OH
- 3. University of Toledo, Toledo, OH

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#### Risk of Adverse Events Due to High Volumes of Local Anesthesia During Mohs Surgery

<u>Charles Darragh, MD</u><sup>1</sup>; Nicholas Frank MD<sup>1</sup>; Brandon Danford, MD<sup>1</sup>; Lee Wheless, MD, PhD<sup>1</sup>; James R. Patrinely, MS<sup>1</sup>; Jason Arnold, MD<sup>2</sup>; Anna S. Clayton, MD<sup>1</sup>

1. Vanderbilt Medical Center, Nashville, TN

2. Georgia Dermatology, Conyers, GA

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# Utilization of Mohs Micrographic Surgery in the Treatment of Merkel Cell Carcinoma

Lark G. Guss, MD, MSc<sup>1</sup>; Zachary D. Guss, MD, MSc<sup>2.3</sup>; Reith R. Sarkar<sup>3</sup>; Hugh T. Greenway, Jr., MD<sup>1</sup>; James Murphy, MD, MS<sup>3</sup>

1. Scripps Green Hospital, La Jolla, CA

- 2. Johns Hopkins School of Medicine, Baltimore, MD
- 3. University of California San Diego, La Jolla, CA

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#### 2-Octyl-Cyanoacrylate vs. Nonabsorbable Suture: A Comparative Analysis of Cost and Complications

Lisa R. Chastant, MD<sup>1</sup>; Hillary Johnson-Jahangir, MD, PhD<sup>1,2</sup>

1. University of Iowa, Iowa City, IA

2. Iowa City VA Health Care System, Iowa City, IA

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#### Educational Videos and the Patient Experience in Mohs Micrographic Surgery

<u>Ashley Decker, MD</u><sup>1</sup>; Josh Schimmel, BS<sup>1</sup>; Naomi Lawrence, MD<sup>1</sup> 1. Cooper Hospital/Rowan University, Marlton, NJ

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#### Surgical Site Infections with Rare Organisms following Cutaneous Surgery: A Retrospective Review

<u>Jessica B. Dietert, MD</u><sup>1</sup>; James Ko, MD<sup>1</sup>; Eva A. Hurst, MD<sup>1</sup> 1. Washington University in St. Louis, Creve Coeur, MO

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#### Mohs Surgical Assessment Tool (MSAT) – An Assessment Tool to Objectively Assess Mohs Surgery Fellow's Surgical Skills via Intra-Operative Video Recording

<u>Andrew Hankinson, MD</u><sup>1</sup>; Victor J. Marks, MD<sup>1</sup>; Alison Spiker, MD<sup>1</sup>; Mary Petrick, MD<sup>1</sup>; Michael L. Ramsey, MD<sup>1</sup>

1. Geisinger Health System, Danville, PA

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#### Interpolation Flaps in the Outpatient Mohs Surgery Setting: Patient Comfort and Satisfaction Study

<u>Victoria Godinez-Puig, MD</u><sup>1</sup>; Irèn Kossintseva, MD<sup>1</sup>; David M. Zloty, MD<sup>1</sup> 1. University of British Columbia, Vancouver, BC, Canada

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# Mohs Micrographic Surgery for Extramammary Paget's Disease: 40 Years Experience with 29 Patients

Christine Shaver, MD<sup>1</sup>; Richard G. Bennett, MD<sup>1</sup>

1. Bennett Surgery Center, Santa Monica, CA

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(Withdrawn)

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# Sub-Clinical Extension of Basal Cell Carcinoma Involving the Distal Nose: A Subtype Analysis

<u>Rami Hamadeh El-Khayat, MD, MRCP</u><sup>1</sup>; Paul J. Salmon, BhB, MBChB, FRACP<sup>1</sup>; Neil J. Mortimer, BSC Hons, MBChB, FRCP, FRACP<sup>1</sup> 1. Skin Cancer Institute, Tauranga, New Zealand

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#### The Utility of Mohs Micrographic Surgery with Final Permanent Section Analysis in Treating Lentigo Maligna and Lentigo Maligna Melanoma

<u>Lauren P. Rimoin, MD</u><sup>1</sup>; Sarah Wilson, MD<sup>2</sup>; Kevin Luk<sup>2</sup>; Katarina Lequeux Nalovic<sup>2,3</sup>

- 1. Aurora Health Care, Waukesha, WI
- 2. Emory University, Atlanta, GA
- 3. Atlanta Skin Cancer Specialists, Atlanta, GA

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#### A Novel Film-Forming Silicone-Based Wound Dressing to Minimize Infection and Prevent Dermatitis After Mohs Micrographic Surgery

<u>Jonathan P. Staidle, MD</u><sup>1</sup>; Paul X. Benedetto, MD<sup>2</sup>; Ernest A. Benedetto, MD<sup>2</sup>; Anthony V. Benedetto, DO<sup>3,2</sup>

- 1. Skin Cancer and Dermatology Institute, Reno, NV
- 2. Dermatologic SurgiCenter, Drexel Hill, PA
- 3. Perelman School of Medicine, Philadelphia, PA

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#### Melanoma Treated with Mohs Micrographic Surgery Using a Modified 15-Minute MART-1 Immunostain: Discussion of Technique and Experience

<u>Nikoo Cheraghi, MD</u><sup>1</sup>; Addison Demer, MD<sup>1</sup>; Andrew Meister, BS, HT (ASCP)<sup>2</sup>; Peter K. Lee, MD, PhD<sup>1,2</sup>

1. University of Minnesota, Minneapolis, MN

2. Park Nicollet, St. Louis Park, MN

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#### Antibiotic Prophylaxis for Staged Interpolation Flaps Following Mohs Micrographic Surgery: A Single-Center Experience on Practice Variability

<u>Pooja Chitgopeker, MBChB</u><sup>1</sup>; Zoe Brown-Joel, BS<sup>2</sup>; Jina Chung, MD<sup>1</sup>; Lisa Chastant<sup>1</sup>; Hillary Johnson-Jahangir, MD, PhD<sup>1</sup>; Marta VanBeek, MD, MPH<sup>1</sup>; Nkanyezi Ferguson, MD<sup>1</sup>

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

2. University of Iowa, Iowa City, IA

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#### The Rhombic Flap: A Useful Flap for Small-Medium Size Defects of the Medial Canthus

Brienne D. Cressey, MD, MBA<sup>1</sup>; Nathaniel J. Jellinek, MD<sup>1,2</sup>

1. Dermatology Professionals, Inc, East Greenwich, RI

2. The Warren Alpert Medical School at Brown University, Providence, RI

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#### Clinical and Histologic Factors Influencing Clearance Rates for Melanoma in situ Treated by Standard Excision

<u>Kathleen C. Suozzi, MD</u><sup>1</sup>; Sean R. Christensen, PhD<sup>1</sup>; Gauri Panse<sup>1</sup>; David J. Leffell, MD<sup>1</sup>

1. Yale School of Medicine, New Haven, CT

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#### Use of 5-0 Fast Absorbing Gut vs 6-0 Fast Absorbing Gut During Cutaneous Wound Closure on the Head and Neck: A Randomized Evaluator-Blinded Split-Wound Comparative Effectiveness Trial

Milene K. Crispin, MD<sup>1</sup>; Ashley K. Clark, MS, MAS<sup>2</sup>; Daniel B. Eisen, MD<sup>2</sup>

1. California Skin Institute, Carmel-By-The-Sea, CA

2. University of California-Davis, Sacramento, CA

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# Conservative Thickness Layers in Mohs Micrographic Surgery

<u>Stanislav N. Tolkachjov, MD</u><sup>1</sup>; Jonathan A. Cappel, MD<sup>1</sup>; Elizabeth A. Bryant, BBA<sup>1</sup>; Christopher B. Harmon, MD<sup>1</sup>

1. Surgical Dermatology Group, Birmingham, AL

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#### A Split-Scar Study Investigating the Effectiveness of Early Intervention with Electroabrasion on Improving the Cosmetic Appearance of Post-Surgical Scars

Brian Jiang, MD<sup>1</sup>; <u>Swati Kannan, MD</u><sup>1</sup> 1. University of California-San Diego, San Diego, CA

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#### The Incidence of Upstaging of Lentigo Maligna with Excisional Biopsies

<u>Nathan J. Luby</u><sup>1</sup>; Glen M. Bowen, MD<sup>1</sup> 1. University of Utah, Salt Lake City, UT

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#### Incidence, Treatment, and Survival in Undifferentiated Pleomorphic Sarcoma

Kyle Rismiller, BS<sup>1</sup>; Maria Ibanez, BS<sup>1</sup>; Brandon T. Beal,  $MD^1$ ; Thomas J. Knackstedt,  $MD^1$ 

1. Cleveland Clinic, Cleveland, OH

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#### Association of Cutaneous Squamous Cell Carcinoma Outcomes with Area-Based Socioeconomic Indicators

<u>Brandon T. Beal, MD</u><sup>1</sup>; David Xiong, BS<sup>1</sup>; Neil Woody, MD<sup>2</sup>; Allison T. Vidimos, MD, RPh<sup>1</sup>; Shlomo A. Koyfman, MD<sup>2</sup>; Hannah Cundall, BS<sup>1</sup>; Vamsi Varra, BS<sup>2</sup>; Kachiu Lee, MD, MPH<sup>3</sup>; Thomas J. Knackstedt, MD<sup>1</sup>

- 1. Cleveland Clinic Dermatology, Cleveland, OH
- 2. Cleveland Clinic Radiation Oncology, Cleveland, OH
- 3. Brown University Dermatology, Providence, RI

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#### Complete Margin Assessment Techniques Versus Surgical Excision for the Treatment and Reconstruction of Non-Melanoma Skin Cancers: A Systematic Review and Pooled Analysis

Sophia Fraga<sup>1</sup>; Robert Besaw, MPH<sup>2</sup>; Chrysalyne D. Schmults, MD, MSCE<sup>1</sup>; <u>Abigail Waldman, MD, MHS<sup>2,3</sup></u>

- 1. UPenn, Philadelphia, PA
- 2. Brigham and Women's Hospital, Boston, MA
- 3. Boston VA Hospital, Boston, MA

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#### AIMS (Anxiolytics in Mohs Surgery) in Patient Satisfaction: a Randomized, Double Blinded, Placebo Controlled Trial

Danny Guo, MD, MSc<sup>1</sup>; David M. Zloty, MD<sup>1</sup>; Irèn Kossintseva, MD<sup>1</sup> 1. University of British Columbia, Vancouver, BC, Canada

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#### Outcomes of Melanoma in situ and Invasive Melanoma Treated With Mohs Micrographic Surgery with and Without MART-1 Immunostain

<u>Michael Heath, BS</u><sup>1</sup>; Anna A. Bar, MD<sup>1</sup>; Megan Woody, MD, MPH<sup>1</sup>; Justin J. Leitenberger, MD<sup>1</sup>

1. Oregon Health and Science University, Portland, OR

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#### Mohs in the 'Twighlight Zone'

<u>Natalia M.K. Spierings, MB, ChB, MRCP (UK), MBA</u><sup>1</sup>; Shelagh Turvill, FRCA<sup>1</sup>; Walayat Hussain, MRCP (UK)<sup>1</sup>

1. Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

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#### Preoperative Factors Predicting Greater Subclinical Extension of Nonmelanoma Skin Cancers of the Scalp

<u>Kelly M. MacArthur, MD</u><sup>1</sup>; Brian C. Baumann, MD<sup>2</sup>; George J. Hruza, MD, MBA<sup>3</sup>; Robert G. Egbers, MD, MS<sup>1</sup>

- 1. Johns Hopkins University, Baltimore, MD
- 2. Washington University, St. Louis, MO
- 3. Laser and Dermatologic Surgery Center, St. Louis, MO

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#### Treatment Stratification for Mohs Micrographic Surgery Referrals at Veterans Health Administration Dermatology Clinic: A Single Center Experience

<u>Maxim Polansky, MD</u><sup>1</sup>; Suephy Chen, MD<sup>1</sup>; Travis W. Blalock, MD<sup>1</sup> 1. Emory University School of Medicine, Atlanta, GA

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#### Use of Chlorhexidine as a Pre-Surgical Antiseptic Among ACMS Members

<u>Iona Chapman</u><sup>1</sup>; Carlton B. Phillips<sup>1</sup>; Conway C. Huang, MD<sup>1</sup> 1. University of Alabama, Birmingham, AL

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#### **Review of Mohs Surgery for Vulvar Neoplasms**

<u>Alison M. Spiker, MD</u><sup>1</sup>; Andrew Hankinson, MD<sup>1</sup>; Mary G. Petrick, MD<sup>1</sup>; Michael L. Ramsey, MD<sup>1</sup>; Victor J. Marks, MD<sup>1</sup>

1. Geisinger Medical Center, Danville, PA

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#### Paper Medical Record: Revisited as an Alternative to Electronic Medical Record

Holly Sprow, BA1; Carl F. Schanbacher, MD2

- 1. Kuchnir Dermatology and Dermatologic Surgery, Milford, MA"
- 2. Tufts Medical School, Boston, MA

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### Presenter: Natalia M.K. Spierings, BSc, MBBS, MRCP(UK), MBA Title: "Pin it Down:" Facilitating Mohs Tissue Preparation

**Authors:** Natalia M.K. Spierings, BSc, MBBS, MRCP(UK), MBA<sup>1</sup>; Lisa Martin, RN<sup>1</sup>; Walayat Hussain, MD, MRCP(UK)<sup>1</sup>

Institution: 1. Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

**Purpose:** Ensuring high quality frozen tissue specimens is of paramount importance in maintaining the high cure rates associated with Mohs micrographic surgery. Laying down tissue can be challenging when dealing with larger specimens, those involving thick sebaceous skin, where cartilage is involved, and extirpating friable peri-ocular tissue.

**Summary:** We describe a simple, cost effective method of ensuring high quality Mohs specimens which minimizes the risk of crush artefact associated with the use of tissue forceps.

**Design:** Equipment needed: 30 gauge needles and chopping board. Needles inserted through periphery of specimen into chopping board; specimen is stabilized (see Figure 3). Specimen can then be divided, with releasing incisions as required without risk of cruch artefact using minimal force with tissue forceps and blade (see Figure 4).



Figure 1.



Figure 2. A large, thick, multi-contoured Mohs specimen



Figure 3.



Figure 4.

# 2

Presenter: Robert Cook

#### Title: Determination of Sentinel Lymph Node Biopsy Eligibility Using a 31-Gene Expression Profile Test in Melanoma Patients

**Authors:** Robert Cook<sup>1</sup>; Clare Johnson, RN<sup>1</sup>; Kyle Covington, PhD<sup>1</sup>; Federico Monzon, MD<sup>1</sup>

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

**Purpose:** Sentinel lymph node biopsy (SLNB) is recommended as standard of care to assess the extent of disease in melanoma patients. Decisions to perform SLNB are typically guided by high-risk features recognized by the American Joint Committee on Cancer staging system, including Breslow thickness and ulceration, and the procedure is not recommended in the population of patients in which the SLN positivity rate is <5%. We sought to use molecular features of the primary melanoma tumor, in combination with clinical features, to identify those populations who would most benefit from the addition of SLNB and those who might be spared the procedure. In particular, we evaluated the Medicare population (65 and older), because the majority of patients who die from melanoma are in this group, and their rate of SLN positivity has been observed to be lower.

**Summary:** Integration of a 31-gene expression profile (GEP) test result into predictive modeling approaches, alone or in combination with traditional staging factors, identified populations with different positive SLNB rates. Validation of the algorithm was performed in a contemporary, multi-center, prospective study cohort (n=584). Patients in the validation cohort with a low risk (Class 1) tumor profile had lower rates of SLN positivity compared to patients with a high risk (Class 2) profile. The group of patients 65 and older with T1/T2 tumors and Class

1 outcomes had a SLN positive rate of 4% (NPV=96%). SLN positive outcomes were enriched from 12% using current SLNB criteria to 20% if this group of patients was spared the procedure. When analysis was expanded to include all age groups, the algorithm achieved a similar NPV and an increase in the SLN positivity rate from 14% to 22%. The 5-year melanoma specific survival rate for T1/T2 Class 1 patients was 99% with overall survival of 97% and distant metastasis free survival of 93%.

**Design:** To identify a population with a positive SLN biopsy (SLNB) rate below 5%, predictive modeling was performed on a cohort of 946 retrospectively analyzed primary tumor specimens, wherein traditional staging information, as well as results of a 31-GEP test were known. This clinically available GEP test determines a cutaneous melanoma patient's risk for metastatic disease, classifying patients into low (Class 1) or high (Class 2) risk groups. Once the model was identified, validation of the algorithm was performed in a contemporary, multi-center, prospective study cohort (n=584). Outcome data were derived from the retrospective cohort.

**Conclusion:** The GEP test results can be useful in identifying a patient population with <5% likelihood of a positive SLN and thus has potential utility in guiding SLNB decisions in patients  $\ge 65$  years-old.

#### 3

Presenter: Randall Gunther, MS

# Title: The Effect of Lidocaine Dilution on Pain and Duration of Intradermal Anesthesia

Authors: Randall Gunther, MS<sup>1</sup>; Elizabeth Stein<sup>1</sup>; Julia Harrington<sup>2</sup>; Lena Mak<sup>2</sup>; Tyler McBride<sup>2</sup>; Zaineb Makhzoumi, MD, MPH<sup>3</sup>; Zain U. Syed, MD<sup>4</sup>; Allan C. Harrington, MD<sup>2</sup>

Institutions: 1. University of North Carolina School of Medicine, Chapel Hill, NC

- 2. Anne Arundel Dermatology, Annapolis, MD
- 3. University of Maryland School of Medicine, Baltimore, MD
- 4. Skin Care Specialty Physicians, Lutherville, MD

**Purpose:** The purpose of this study is to evaluate the effects of diluting lidocaine on (1) pain during intradermal injection and (2) duration of local anesthesia.

**Summary:** The current national shortage of lidocaine poses a challenge for Mohs surgeons. Diluting commercially available lidocaine may therefore help practices conserve medical supplies and in the process decrease cost and enhance safety. We sought to evaluate the utility of diluting a commercially available lidocaine with epinephrine solution. We hypothesized that there would be no clinically significant difference between pain on injection and duration of anesthesia for 0.25% and 1.0% lidocaine solutions with epinephrine injected intradermally.

**Design:** 40 healthy men and women were recruited and gave consent to participate in the study. Four injection sites on each participant – left and right extensor forearms (EF) and postauricular surfaces (PA) – were randomized to receive 1cc of 1.0% lidocaine with 1:100,000 epinephrine or 0.25% lidocaine with 1:400,000 epinephrine. All injections were made intradermally for five seconds with a 30 gauge needle by a surgical technician who was blinded to the contents of the syringe. Participants reported pain during each injection using a numerical rating scale (NRS) from 0-10. Injection sites were checked for sensation at 5, 20, 40, 60, 80, 100, and 120 minutes post injection using a needle stick in the center of the wheal and participants were asked if they were able to feel pain.

**Conclusion:** The mean NRS scores during injections for all sites (EF and PA combined) were 3.4 for 1.0% lidocaine and 2.8 for 0.25% lidocaine. (p = 0.07) There was no reported pain on needle sticks up to 120 minutes post-injection for all sites and dilutions. 55% of sites were reported to have a lower pain score during the 0.25% lidocaine injection, 26% of sites were reported to have no difference between dilutions, and 19% of sites were reported to have a higher pain score during the 0.25% lidocaine injection. There was no significant difference between the location of injection (EF vs PA).

We have demonstrated that there was no statistically significant difference in pain on injection between 1.0% and 0.25% lidocaine with epinephrine, with a trend toward less pain with the 0.25% dilution. In addition, both solutions provided adequate anesthesia for the duration of the two-hour timeframe studied. This study provides quantitative evidence that lidocaine may be diluted to 0.25% without compromising clinical effectiveness, thus decreasing the chance for toxicity and improving the cost effectiveness of local anesthesia.

#### 4

Presenter: Adam B. Aronson

#### Title: Post-Operative Infections after Complex Reconstruction: A Retrospective Review Comparing Rates of Infection With or Without Perioperative Antibiotics

**Authors:** Adam B. Aronson<sup>1</sup>; Amanda J. Tschetter<sup>2</sup>; Matthew J. Landherr<sup>3</sup>; Nahid Y. Vidal<sup>4</sup>; Marta J. VanBeek, MD<sup>1</sup>

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

2. University of South Dakota, Vermillion, SD

3. Forefront Dermatology, Cedar Rapids, IA

4. Mayo Clinic, Rochester, MD

**Purpose:** Despite low rates of surgical site infection (SSI) following Mohs micrographic surgery (MMS), antibiotics are frequently prescribed following complex reconstruction, (random pattern flaps, skin grafts, mucosal or composite wedge resections). However, antibiotics are not without risk. The goal of this study is to determine the incidence of SSI following complex reconstruction with and without perioperative antibiotics.

**Summary:** 477 MMS defects in 452 patients were repaired with complex reconstruction. 34 (7.5%) of these patients were immunosuppressed and 71 (15.7%) were smoking at the time of surgery. 111 (24.6%) of patients received perioperative antibiotics. 4 patients experienced a culture-proven, post-operative infection; 1 patient was treated for a presumed infection by an outside provider (1.05%). 11 patients were lost to follow-up (Table 1, Table 2).

Of the 5 incidences of infection, 1 patient received perioperative antibiotics, 1 patient was immunosuppressed, and 2 smoked at the time of surgery. Infections occurred in patients who had an average of 2.2 stages and an average surgical defect of 6.67cm2. Mean repair area was 11.9 cm2. The 4 proven SSIs included 2 advancement flaps, 1 interpolation flap, and 1 repair combining a full-thickness skin graft with a rotation flap (Table 3).

**Design:** A single surgeon, retrospective review was performed, identifying all patients who were repaired with complex reconstruction after MMS from 2010 to 2013. Data collection included patient demographics, tumor characteristics, immune and smoking status, occurrence of mucosal

breech, and presence or absence of infection. Antibiotic data collected included whether or not a prophylactic or postoperative antibiotic was given and the stated reason for the antibiotic.

Conclusion: In this study, we performed complex reconstructions in 317 patients who received no perioperative antibiotics. The documented infection incidence was 1.2% in this group, compared to 0.9% of the 111 patients who did receive perioperative antibiotics, suggesting that use of antibiotics did not change the rate of SSI. From our data, the number of prophylactic antibiotic courses needed to prevent one SSI was 289, excluding patients lost to follow-up. Considering recent data that an estimated 20% of people who receive antibiotics have at least one adverse event, as well as our role in antibiotic stewardship for prevention of bacterial drug resistance, we do not feel routine use of perioperative antibiotics for complex reconstruction (flaps, grafts, mucosal or composite wedge resection) is indicated. As SSIs are generally easily treated without significant adverse effects, we suggest antibiotics should only be used to treat known infections. The total number of patients receiving perioperative antibiotics in this study is higher than our current practice. Based on our experience, we no longer prescribe antibiotics to any MMS patient unless they have a culture proven infection.

#### Table 2

and the second se	
Antibiotics	n=452
Yes	111(24.6%)
No	341(75.496)
Infections (excluding lost to follow	w-up):
No	436 (98.9%)
Yes	5(1.196)

#### Table 1

Patient Demographics	
MMS patients	2897
Patients with complex reconstruction	452
One site	431
Two sites	17
Three sites	4
Tumors	477
Age	
Average Age (years)	67-44
Median Age	68
Range Age	31-97
Sex	
Male	226
Female	226
Immunosuppression	
Yes	34
No	418
Smoking Status	
No	378
Yes	71
Unknown	3
Follow-up:	N=452
Standard post-operative evaluation in dermatology	432
Nursing/MA phone call post-op	9
Lost to follow-up	11 (2.43%)

#### Table 3 **Data From Cases of Infection** n=5 Average Age (years) 63.2 Sex Male з Female 2 Immunosuppressed 1 Perioperative antibiotics No 4 Yes **Smoking Status** No з Yes 2 Surgical Site Nose 2 Cheek 1 Ear 2 Average Number of Stages 2.2 Range of Stages 1-5 Average defect Size (cm2) 6.674 Range of Defect Size (cm2) 0.8-10.1 Average repair Size (cm 2) 11.9 Range of repair sizes (cm2) 8-14 Repair Type Advancement 2 Combo - Rotation/FTSG 1 Interpolation 2 **Culture Results** Unknown 1 MRSA 2 Many Mixed Skin Flora 1

#### .....

5

M55A

#### Presenter: Grace E. Kim, MD

#### Title: Pilot Study of Topical Itraconazole for the Treatment of Basal Cell Carcinomas in Gorlin Syndrome Patients

1

**Authors:** Grace E. Kim, MD<sup>1</sup>; Gina Kwon, MD<sup>1</sup>; Irene Bailey-Healey, BS<sup>1</sup>; Amar Mirza, BS<sup>1</sup>; Raymon Whitson, PhD<sup>1</sup>; Tony Oro, MD, PhD<sup>1</sup>; Jean Y. Tang, MD, PhD<sup>1</sup>

Institution: 1. Stanford University, Redwood City, CA

**Purpose:** This study aimed to (1) determine whether 4-12 weeks of itraconazole 0.7% gel reduces GLI1 mRNA levels, the target of the hedgehog signaling pathway and a biomarker for basal cell carcinoma (BCC) as well as (2) assess whether itraconazole gel reduces BCC tumor area in high-frequency BCC (Hf-BCC) patients.

Summary: Our study enrolled 6 Gorlin syndrome and 3 Hf-BCC patients with a total of 114 tumors. Seven patients were male; the majority (67%) was non-Hispanic white with a mean age of 53 years. The mean percent change in GLI1 mRNA levels was not significantly different between the itraconazole and placebo groups at 4 weeks (132% vs. 19% from baseline, p = 0.2) or 12 weeks (1140% vs. 424% from baseline, p = 0.7. There was no significant difference in the mean percent change in tumor area at 4 (0.04% vs. -10.9% from baseline, p = 0.4) or 12 weeks (8.9% vs. 26.5% from baseline, p = 0.4). Serum itraconazole levels were negligible after 4 and 12 weeks of topical treatment (N = 8 patients). The mean itraconazole concentration within BCC tumors was 133 ug/gram of skin at 4 weeks and 96 ug/g at 12 weeks. Patients tolerated topical itraconazole well with only grade 1-2 side effects including application site reaction, (N = 4), pruritus (N = 4), lesion pain (N = 3), dysgeusia (N = 2), and xerosis (N = 2). Design: In this open label, intra-patient study, 9 Gorlin syndrome or Hf-BCC patients each contributed at least 4 target BCCs: one tumor was collected at baseline for GLI1 mRNA comparison, one or more tumors

were treated with placebo gel twice daily (BID), and 2 or more tumors were treated with itraconazole 0.7% gel BID for 4 to 12 weeks. Tumors were measured and photographed in addition to measuring research blood and safety labs at baseline, 4 weeks, and 12 weeks. Safety assessment visits were performed at 4 and 12 weeks. Target BCC tissue was collected at baseline and 4 weeks. Seven patients who participated in the 4-week treatment regimen opted to continue with the 12-week treatment regimen.

The primary outcome was reduction in GLI1 mRNA expression measured by real-time polymerase chain reaction. The secondary outcome was reduction in BCC tumor area. Safety analyses included all patients who received at least one dose of study treatment with graded adverse events reported according to the National Cancer Institute Common Terminology Criteria for Adverse Events.

**Conclusion:** In this pilot study, topical itraconazole 0.7% gel was safe, led to measurable drug concentrations within the tumor, and did not cause systemic absorption. However, in this small phase 2 proof-of-concept trial, topical itraconazole failed to reduce GL11 mRNA levels and BCC tumor area after 12 weeks. Future studies are needed to investigate whether topical itraconazole may be effective for treating sporadic BCCs outside of the Gorlin syndrome or Hf-BCC populations.

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#### Presenter: Rodrigo Valdes-Rodriguez, MD

#### Title: Recurrent Primary Cutaneous Adenoid Cystic Carcinoma in an African-American Patient with HIV: Excision Versus Mohs Micrographic Surgery

Authors: Rodrigo Valdes-Rodriguez, MD<sup>1</sup>; Casey L. Ross, BA<sup>1</sup>; Abhishek Aphale, MD<sup>1,2</sup>

**Institutions:** 1. Temple University Hospital, Philadelphia, PA 2. Fox Chase Cancer Center, Rockledge, PA

**Purpose:** Primary Cutaneous Adenoid Cystic Carcinoma (PCACC) is a rare, slow-growing adnexal tumor with a high rate of recurrence. We present a case of PCACC in a 42-year-old male that was initially treated with excision, but then recurred and was definitively excised with Mohs micrographic surgery. The standard treatment of PCACC is wide local excision. However, due to the tumor's high recurrence rate, we aim to compare excision versus Mohs micrographic surgery.

**Summary:** A comprehensive search was performed in, Pubmed, Ovid, and Web of Science databases using the keywords "Primary Cutaneous Adenoid Cystic Carcinoma," "case report," "excision," and "Mohs surgery" from January 1975 to June 2017. Since Boggio's initial report in 1975, a total of 129 cases of PCACC were found, including ours, in the English-language literature as of 2017. Despite its tendency to recur, the majority of these tumors have been treated with local excision. Only 11 cases have been treated with Mohs micrographic surgery. A review of the literature demonstrates no recurrence in these 11 cases, with a follow-up range of 6-28 months. We propose that Mohs surgery is an ideal method to achieve margin-free removal of PCACC due to the fact that this tumor exhibits a high degree of local infiltration with frequent perineural invasion while also demonstrates a low potential for distant metastasis.

**Design:** A comprehensive search was performed in, Pubmed, Ovid, and Web of Science databases using the keywords "Primary Cutaneous Adenoid Cystic Carcinoma," "case report," "excision," and "Mohs surgery" from January 1975 to June 2017. **Conclusion:** We propose that Mohs surgery is an ideal method to achieve margin-free removal of PCACC due to the fact that this tumor exhibits a high degree of local infiltration with frequent perineural invasion while also demonstrates a low potential for distant metastasis.

7

Presenter: Hugh T. Greenway, Jr., MD

#### Title: Mohs Fellowship Training at a Clinic, 1984 - 2018

Authors: Hugh T. Greenway, Jr., MD<sup>1</sup>; Ryan Gilbertson, BS<sup>1</sup>; Judy Plis, BS, MBA<sup>1</sup>

Institution: 1. Scripps Clinic, La Jolla, CA

**Purpose:** Outline the Mohs Micrographic Surgery Family Tree for the Scripps Clinic Fellowship Program.

**Summary:** Scripps Clinic has had a continuous one-year Fellowship program since 1984, initially under the College and subsequently the ACGME.

**Design:** Poster with photo of each Fellow, year of training, practice location. Total 53 Fellows (including year 2018-2019); plus program Director, Dr. Hugh Greenway, Jr., and his Director, Fred E. Mohs, MD.

**Conclusion:** The one-year Fellowship training program established by the College has evolved under the ACGME. It continues to offer the best of education and training for those seeking to pursue Micrographic Surgery and Dermatologic Oncology.



#### 8

**Presenter:** Maggie Chow, MD, PhD

# Title: Eccrine Porocarcinoma: New Insights and A Systematic Review of the Literature

**Authors:** Reyna Swift, MD<sup>1</sup>; Azadeh Nazemi, MS<sup>1</sup>; Shauna Higgins, MD<sup>1</sup>; Maggie Chow, MD, PhD<sup>1</sup>; Ashley Wysong, MD, MS<sup>1</sup>

Institution: 1. Keck Medicine at USC, Los Angeles, CA

**Purpose:** In attempt to provide a thorough framework with which to apply existing research to a clinical approach of eccrine porocarcinoma, a systematic review of individual patient data from the PubMed database was performed.

**Summary:** Eccrine porocarcinoma is a rare aggressive adnexal malignancy. Clinical presentation varies morphologically, and histopathologic evaluation is challenged by histopathologic features shared with other tumor types. Local recurrence approximates 20% following surgical treatment, and metastasis rates approximate 20% as well. Lymph node involvement portends poor outcomes, with mortality approaching 67%. Historically, wide local excision (WLE) has been the

primary modality of surgical management employed. However, more recently Mohs surgery (MMS) has been favored due to comparatively lower rates of recurrence.

We reviewed individual data of 206 patients from 154 manuscripts, and identified several novel clinical pearls in addition to noting trends reported in existing research. We found that porocarcinomas were found at higher rates on the head and neck (32% vs 24%) and lower rates (33% versus 44%) on lower limbs compared to prior findings. The overall metastasis rate was 22%, which was consistent with prior reports. Histologic stains that were helpful in confirming diagnosis include EMA, PAS, cytokeratins, P63, and Ki67. Known high risk features include increased tumor depth, lymphovascular invasion, high number of mitoses, and poor tumor differentiation. We additionally found primary tumor location to be correlated with the presence of any metastasis and distant metastasis. Specifically, primary tumor location on the head and neck appeared responsible for comparatively fewer nodal metastasis compared to other primary tumor sites. Also, there was an increased proportion of distant metastases resulting from primary genitalia and buttock tumors. Though there is a paucity of data regarding comparative imaging techniques, diagnostic radiology may play an important role in clinical decision making, particularly in patients with high risk features. Additional diagnostic measures that have been used include sentinel lymph node biopsy (SLNB) and fine needle aspiration (FNA) which may be particularly useful in patients with high risk features without palpable lymphadenopathy. Regarding treatment, WLE was the most common therapy utilized in this review, with variable margins. Of patients who developed metastasis after treatment, 61% occurred after WLE compared to 3.6% after MMS.

**Design:** A systematic review of individual patient data from the PubMed database was performed. Patient demographics, tumor characteristics, work-up, and treatments were recorded. Outcomes included local recurrence, lymph node metastasis, and survival.

**Conclusion:** Our systematic review of existing individual cases of porocarcinomas demonstrated significant associated morbidity and mortality and that primary tumors on the trunk and extremities have higher rates of metastasis. Our results support the use of MMS in the treatment of porocarcinoma given lower rates of metastasis. However, prospective data is lacking, likely due to the rarity of the tumor

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(Withdrawn)

#### 10

Presenter: Jonathan M. Soh, MD

# Title: Gabor-Domain Optical Coherence Microscopy: An in vivo Aid for Margin Delineation in Mohs Surgery

**Authors:** Jonathan M. Soh, MD<sup>1</sup>; Patrice Tankam, PhD<sup>1</sup>; Mara Lanis, BS<sup>1</sup>; Adam Hayes, PhD<sup>1</sup>; Cristina Canavesi, PhD, MBA<sup>2</sup>; Andrea Cogliati, MS<sup>1,2</sup>; Jannick P. Rolland, PhD<sup>1,2</sup>; Sherrif F. Ibrahim, MD, PhD<sup>1</sup>

**Institutions:** 1. University of Rochester Medical Center, Rochester, NY 2. LighTopTech, West Henriette, NY

**Purpose:** Non-invasive, real-time imaging modalities (ie. ultrasound, optical coherence tomography, reflectance confocal microscopy) have been used to guide margin delineation with Mohs surgery. To further enhance resolution and provide three-dimensional, en-face images, a variant of Optical Coherence Tomography called Optical Coherence

Microscopy (OCM) has been explored. Gabor-domain OCM (GD-OCM) uses variable numerical aperture lenses to achieve horizontal and vertical resolutions of 2 um and 2 um respectively up to depths of 1.6 mm. The study aimed to determine the clinical application of GD-OCM in Mohs surgery for basal cell carcinomas. We evaluate the ability of the system to define pre-operative tumor margins and help predict number of stages required for clearance.

**Summary:** Of 28 patients enrolled, 8 had incomplete data leaving 20 patients for analysis. 38 margins were examined with OCM and frozen section histology. In 25/38 (65.8%) cases, GD-OCM visualized tumor and predicted tumor within the final surgical margin. In the remaining 13/38 (34.2%) cases, GD-OCM visualized tumor outside of the final histologic margin. There were 11/38 (28.9%) multi-stage cases, and in all 11 (100%) cases, GD-OCM visualized tumor beyond 2 mm of the drawn clinical margin and suggested it may require multiple stages. The GD-OCM determined margin and the final surgical margin was within +/- 1 mm agreement in 23/38 (60.5%) cases.

**Design:** 28 patients with biopsy proven basal cell carcinoma underwent Mohs surgery with a single surgeon (Figure 1). For each tumor, the surgeon inked a clinical margin to outline the first stage of excision (first stage included clinical margin plus 2 mm). Three-dimensional images were obtained based on this clinical margin. The GD-OCM probe (1 mm x 1 mm field of view) was placed and pictures were taken at 1 mm within the drawn clinical margin, on the margin itself and then at 1 mm increments (up to 4 mm) beyond the margin. These steps were completed at the 12, 3, 6, and 9 o'clock positions of the drawn margin encompassing the tumor (Figure 2). In some anatomic locations (ie. nose, ears), it was not possible to collect margin data at all 4 clock face positions.

After imaging was completed, the surgeon performed Mohs surgery and recorded a final surgical margin for tumor clearance. A blinded participant evaluated each GD-OCM margin image for presence of tumor and these were compared with the final surgical margins.

**Conclusion:** Gabor domain-OCM can be useful to delineate initial clinical margins for BCC. In 100% of cases that required multiple stages; GD-OCM suggested that a single initial stage would be insufficient (ie. it visualized tumor >2 mm outside clinically drawn margin). Non-invasive imaging can help reduce the numbers of stages, time and cost of the procedure.

Figure 1. Patient and tumor demographics

	N	24
Enrolled cases	28	
Incomplete cases	8	
Average patient age	69.1	
Male	13	65
Female	7	35
Tumor Location		
Forehead	8	40
Cheeks	7	35
Temple	2	10
Lower Extremity	3	15
Tumor subtype		
Nodular	15	75
Infiltrative	2	10
Not specified	3	15
Total cases	20	
Total margins examined	38	

Figure 2. Margin analysis set up for optical coherence microscopy (OCM) image capture. OCM probe placed and images taken at -1, 0, 1, 2, 3, 4 for Margins I-IV (3, 6, 9, 12 o'clock positions).



Figure 3. OCM margin images obtained at -1, 0, 1, 2, 3, 4 mm. Tamor (white arrows) extends up to +1 mm outside clinical margin. Adnexal structures identified with black arrows

#### 11

#### Presenter: Katherine Hrynewycz, MD

#### Title: Novel "Winged" Modified Keystone Flap for Repair of a Variety of Defects

**Authors:** Katherine Hrynewycz, MD<sup>1</sup>; Prasanthi Kandula, MD<sup>1</sup>; Ally-Khan Somani, MD, PhD<sup>1</sup>

Institution: 1. Indiana University, Indianapolis, IN

**Purpose:** The use of the keystone flap and modified keystone flap has been described in the literature in the repair of a variety of surgical wounds, mostly on the lower extremities. We described the novel use of the "winged" modified keystone flap in the repair of surgical defects in high tension areas.

**Summary:** Of these 3 patients, 2 were female and 1 was male with ages ranging from 56 to 85 years. Excised tumors included basal cell carcinoma and squamous cell carcinoma. Anatomical locations included the sternal notch, thigh, and anterior leg. All were removed with Mohs micrographic surgery in 1 stage. Defect size ranged from to 2.0 to 35.7 cm2 with depth from subcutis to fascia. The "winged" modified keystone flap was designed with skin from the inferior portion of the defect as the leading edge of the advancement flap. A modified keystone was created and to minimize the tension, the lateral edges of the modified keystone flap were completely undermined and folded together to account for the vertical distance. The tip of the leading edge of the flap was secured to the superior edge of the defect and then

the lateral secondary defects were closed in a linear fashion. Patients experienced no significant complications and achieved good cosmetic and functional outcome.

**Design:** A series of 3 patients underwent repair with a winged modified keystone flap following Mohs micrographic surgery in our dermatologic surgery clinic at Indiana University.

**Conclusion:** Our "winged" modified keystone flap represents a further alteration of the modified keystone island pedicle flap. The ability to fold the "wings" of the two lateral edges of the modified keystone flap affords a facile, tension free closure along the vertical axis of the defect. The flap can be used for surgical defects in locations that lack the necessary laxity for primary closure, and in patients who are poor candidates for transposition or rotation flaps. Our flap allows coverage of a greater vertical distance while minimizing tension on the trailing intact skin edge and eliminating the need for creation of wider flaps. The adaptation of this novel "winged" modified keystone flap extends the versatility of the existing keystone, and modified keystone flaps and should be considered as a viable simple surgical reconstructive option.



#### 12

Presenter: Tejaswi Mudigonda, MD

#### Title: Blood Pressure Monitoring for Outpatient Dermatologic Surgery: A Survey of Mohs Surgeons

**Authors:** Tejaswi Mudigonda, MD<sup>1</sup>; Daniel Christiansen, MD; Thomas Stasko, MD<sup>2</sup>

**Institutions:** 1. Washington University School of Medicine, St. Louis, MO 2. University of Oklahoma College of Medicine, Oklahoma City, OK

**Purpose:** Blood pressure (BP) monitoring for Mohs micrographic surgery (MMS) patients and subsequent risk management has received little attention in the literature. While widely regarded as a safe and efficacious procedure, patient complications do occur. Localized post-

operative complications such as wound dehiscence, localized bleeding, superficial wound infections, and graft/flap necrosis occur in up to less than 2% of MMS cases. The incidence of systemic complications such as cardiovascular and cerebrovascular incidents has not been accurately determined but is believed to be exceedingly rare. The effect that elevated BP has on the rate of these complications is unknown. Studies in other surgical fields, including ophthalmology and dentistry, have shown BP monitoring may not be useful for stratifying patients and assessing risk of complications. The purpose of our survey study was to determine if Mohs surgeons routinely check BP measurements on patients during the preoperative, perioperative, and postoperative periods and, if so, how this information is utilized.

Summary: 74% (191/258) of the Mohs surgeons surveyed reported checking preoperative BP and 32.7% (81/248) obtained postoperative measurements. Only 7.4% (19/258) of Mohs surgeons reported monitoring BP intraoperatively. Systolic and diastolic BP levels used by surgeons to delay surgery or provide antihypertensive medications varied widely. The majority of physicians who reported postponing cases used a value between 200-209 mmHg systolic (71/173, 41%) and between 100-109 mmHg diastolic (102/163, 63%) as cut-offs for postponing surgery. 83.5% (157/188) of Mohs surgeons reported obtaining BP measurements due to a perceived increased risk of cardiovascular complications (TIA, stroke, MI). Ten participants provided "Other (please specify)" responses with three citing medical legal reasons to postpone cases in the setting of elevated blood pressures. In terms of medications used to lower blood pressure pre-operatively, of the 22% (58/260) Mohs clinicians who replied, the most commonly used class were benzodiazepines (39/58). 33.9% of respondents reported complications seen in hypertensive patients, ranging from increased bleeding to stroke. The most commonly reported complication reported was increased intraand postoperative bleeding with or without hematoma formation. Chest pain, shortness of breath, headache, intra-operative capillary oozing, flap necrosis, and delayed or aberrant wound healing were other less frequently reported complications.

**Design:** After obtaining institutional review board approval, a onetime e-mail questionnaire was sent to all available members of the ACMS to ascertain their use of BP monitoring preop-, intraop-, and postoperatively. The entire ACMS list serve was utilized and a total of 850 available members were contacted. The response rate was 30.6% (260/850).

**Conclusion:** The anecdotal survey evidence provided suggests that elevated BP may have an impact on patient outcomes but the importance of obtaining preoperative BP measurements in MMS and its true overall impact on cardiovascular complications is currently unknown. Further controlled studies are needed in the area.





Figure 2. Reasons for why Mohs surgeons postpone surgery in hypertensive patients



Figure 3. The distribution of the most commonly prescribed hypertension medications used by Mohs surgeons

#### 13

Presenter: Deanna Dickerman, MD

#### Title: Eruptive Keratoacanthomas in the Setting of Anti-Retroviral Therapy Non-Compliance Managed with Serial Excision

**Authors:** Deanna Dickerman, MD<sup>1</sup>; Weston Wall, MD<sup>1</sup>; Sandra Tadros, BS<sup>1</sup>; Loretta Davis, MD<sup>1</sup>

Institution: 1. Medical College of Georgia, Augusta, GA

**Purpose:** Introduction: Multiple keratoacanthomas (KAs), rapidly growing keratinocyte neoplasms, can be sporadic or occur as part of a syndrome. We present a case of a 64-year-old male with human immunodeficiency
virus (HIV) infection presenting with multiple large eruptive KAs coincident with HIV medication non-compliance and increased viral load. These were managed by sequential surgical excision.

**Summary:** Presentation of Case: A 64-year-old male with no history of skin cancer reported the sudden onset of multiple tender skin growths. The patient had long-standing HIV. During the previous 6 months he had not been adherent to anti-retorvial therapy (ART). Labs at presentation demonstrated a precipitous decrease in CD4 count, from 476 cells/uL to 43 cells/uL, with corresponding increase in HIV RNA copy number from <40/mL to 378,831/mL. On physical examination, four crateriform pink nodules (1.1cm to 3cm in size) were present on his right lateral neck (fig.1), upper back and right chest, consistent with a diagnosis of multiple keratoacanthomas. ART was reinstituted and no new lesions developed in the subsequent 6 months. The nodules were removed via sequential surgical excision. Pathology of surgical specimens confirmed the diagnosis of well differentiated invasive squamous cell carcinoma, keratoacanthoma type with clear margins (fig. 2).

**Design:** Discussion: This is an unusual case of multiple KAs arising in the setting of worsening HIV control as indicated by CD-4 count and viral load. Established syndromes causing multiple KAs include Ferguson-Smith and Gryzbowski. Recent reports suggest trauma or immunomodulatory medications may also be associated with this presentation. There are two reported cases of eruptive KAs occurring in the setting of HIV--one in a patient with coincident Muir Torre and uncontrolled HIV, and one in a patient with normal CD4 counts.

Management of multiple KAs presents a therapeutic challenge. Reported cases of multiple KAs were managed more frequently with medical than surgical modalities, most commonly with low-dose acitretin or 5-FU. A minority of cases were observed, and only one reported case of multiple KAs was treated via surgical excision. Though KAs are generally considered benign, and no deaths related to KAs were identified in a large series, there have been reports of KAs with invasive architecture. At a single institution, the rate of KA recurrence following non-surgical management was 12.5-33%, depending on modality, compared to <1% for surgical management.

**Conclusion:** We present a case of multiple KAs arising in an HIV patient associated with worsening immunodeficiency and managed by sequential surgical excision. Given that squamous neoplasia are known to be more common and aggressive in immunosuppressed patients, surgical management may have advantages relative to non-surgical in this population.





#### 14

Presenter: Geoffrey Lim

### Title: Primary Cutaneous Clear Cell Sarcoma: A Diagnostic Dilemma

**Authors:** Geoffrey Lim<sup>1</sup>; Maral Rahvar<sup>1</sup>; Sonal Choudhary<sup>1</sup>; Jonhan Ho<sup>1</sup>; Melissa Pugliano-Mauro, MD<sup>1</sup>

**Institution:** 1. University of Pittsburgh, Pittsburgh, PA

**Purpose:** To identify the diagnostic and therapeutic challenges associated with the primary cutaneous variant of an otherwise rare, yet biologically aggressive, malignancy.

**Summary:** Clear cell sarcoma (CCS) is a rare and aggressive melanocytic tumor that usually arises in the deep tissues of the foot and ankle region of young individuals. Cutaneous involvement is predominately from extension by large, deep-seated tumors. Until recently, few cases of primary cutaneous CCS were identified, and fewer still were of the head and neck. Here, we present two cases of primary cutaneous CCS--one of the upper trunk, and another of the scalp--that challenge conventional understanding of both the typical anatomic locations affected as well as the etiology of cutaneous involvement of CCS.

**Design:** We report a case series of two patients with primary cutaneous CCS as well as a systematic review of the literature on primary cutaneous CCS.

**Conclusion:** Though uncommon, primary cutaneous CCS cephalad to the waist should be considered in the differential diagnosis for cutaneous neoplasms.







#### 15

Presenter: Lindsey Goddard, MD

## Title: Pre-Incisional Transcutaneous Ligature for Hemostasis – The Worming Technique

Authors: Matthew Hand, MD1; Lindsey Goddard, MD2; Cameron Chesnut,  $\mathrm{MD}^{1,3}$ 

**Institutions:** 1. Chesnut MD Cosmetics at Dermatology Specialists of Spokane, Spokane, WA

2. Loma Linda University, Loma Linda, CA

3. University of Washington School of Medicine, Spokane, WA

**Purpose:** Hemostasis in the removal of larger tumors on the scalp can be challenging due to the degree of vascularity and the propensity for vessels to retract into the dense connective tissue after transection. We introduce a proactive approach to hemostasis by palpating for large vessels and tying them off transcutaneously prior to taking the first stage. We refer to this technique as "worming" as the search for vessels is conducted similar to birds hunting for worms.

**Summary:** After marking the first stage, the periphery of the tumor is gently palpated and pulsatile vessels are identified. A 4-0 polyglactin 910 suture on a Ps-2 needle is then used to tie off the vessel transcutaneosly. Once all vessels have been tied off, the first stage is removed. Cautery is used for any additional hemostasis if necessary. Sutures remain in place while tissue is being processed. Subsequent stages are taken as needed and vessels can be tied off more peripherally if the tumor extends to the initial ligature. Once the tumor is cleared, the ligatures can be taken down if the surgeon feels they are adequately tamponaded after a reconstruction or left in place for a week with either reconstruction or secondary intention healing.

**Design:** Patients with tumors at increased risk for bleeding on extirpation are identified based on presence and degree of anticoagulation as well as tumor characteristics such as size, perceived depth, and location on the scalp.

**Conclusion:** Vessel palpation with transcutaneous ligature results in a near bloodless field leading to more efficient tumor extraction with total extirpation time reduced. Collateral tissue heating and damage from excess cautery are also significantly reduced. As opposed to ligating post-transection in a bloody operative field, the preemptive, transcutaneous ligation is very low stress. The worming technique is particularly useful in patients on blood thinners who are prone to bleeding and in a practice setting where surgical assistance is sparse.







#### 16

Presenter: Jennifer Brooks, MD

## Title: Neuroendocrine Type Composite Hemangioendothelioma: A Rare Vascular Neoplasm Treated with Mohs Micrographic Surgery

**Authors:** Jennifer Brooks, MD<sup>1</sup>; Sarah Telliard, BS<sup>2</sup>; Alison Spiker, MD<sup>1</sup>; Gabrielle Strike, PA-C<sup>3</sup>; Nicole Warner, MD<sup>4</sup>; Wells Chandler, MD<sup>1</sup>; Victor J. Marks, MD<sup>1</sup>

- Institutions: 1. Geisinger, Danville, PA
- 2. Mercer University School of Medicine, Macon, GA
- 3. Children's Hospital of Wisconsin, Madison, WI
- 4. The Dermatology Group, Mason, OH

**Purpose:** To discuss the novel use of Mohs micrographic surgery for the treatment of neuroendocrine type composite hemangioendothelioma, a rare, newly described vascular malignancy.

**Summary:** Composite hemangioendothelioma is a rare malignant vascular neoplasm of low to intermediate grade. The newly described neuroendocrine subtype, however, is considered more aggressive. A 92-year-old male presented with a 4-month history of an asymptomatic bulbous, erythematous growth on the tip of his nose. On exam, an ill-defined red nodule at the left nasal tip measured approximately 1.5 cm x 1.5 cm. Histopathology revealed an atypical vascular proliferation consisting of retiform vascular spaces and cords of malignant epithelioid

cells. Neoplastic cells stained positively with ERG, FLI-1, and D2-40, and weakly with synaptophysin and CD56. A second opinion was obtained, confirming the diagnosis of composite hemangioendothelioma of the neuroendocrine subtype. The patient and family decided to proceed with surgical removal of the tumor. He was treated with Mohs micrographic surgery, requiring 8 stages to achieve tumor clearance with a post-operative defect size of 3.5 cm x 3.8 cm. Repair options were discussed and the patient preferred not to undergo a staged procedure. The defect was closed by first using a superiorly based hinge flap to line the mucosal defect of the right nare. The left mucosal defect and the donor site of the hinge flap were closed primarily. A modified nasolabial flap was then used to cover the cutaneous defect spanning the nasal tip and supratip. The distal end of the flap was split to cover the right alar rim and columella. At 7 months post-op, the patient was without evidence of clinical recurrence.

#### Design: Case report.

**Conclusion:** Historically, most composite hemangioendotheliomas have been excised with a recurrence rate of approximately 50%. In this case, the neoplasm extended far beyond the clinical margins and wide local excision would likely have been insufficient for complete removal. This case highlights the use of Mohs micrographic surgery to treat a rare vascular malignancy.





## 17

Presenter: Hamza D. Bhatti, DO

# Title: Bedside Management of Malignant Melanoma with Reflectance Confocal Microscopy

Authors: Hamza D. Bhatti, D0<sup>1</sup>; Attiya Haroon<sup>1</sup>; Bahar Firoz, MD, MPH<sup>1</sup>; Babar Rao,  $MD^{1,2}$ 

**Institutions:** 1. Rutgers University- Robert Wood Johnson Medical School, Somerset, NY

2. Weill Cornell Medical College, New York, NY

**Purpose:** Reflectance confocal microscopy (RCM) is a noninvasive tool that can aid in bedside diagnosis of various skin cancers such as basal cell carcinoma, squamous cell carcinoma and melanoma.

**Summary:** We herein present a case report of a male patient with quick and non-invasive diagnosis of malignant melanoma with RCM that allowed for rapid removal and improved prognosis for the patient.

**Design:** A 68 year-old man presented with a 1 cm pigmented macule on the upper back. Based on the history, patient's co-morbidities, clinical suspicion, and dermoscopy, we decided to perform confocal microscopy at the bedside. RCM enabled us to visualize irregular honeycomb pattern, atypical cobblestone pattern, several atypical cells in the epidermis and dermis, non-edged papillae at the dermoepidermal junction. These findings fulfilled the RCM major criteria of malignant melanoma, hence a bedside diagnosis of malignant melanoma was made and an excision was performed immediately. Histopathology report later showed invasive melanoma (2mm thickness).

**Conclusion:** Delaying treatment in melanoma can be harmful to the patient. RCM can be one way to expedite the management of melanoma therefore potentially improving melanoma prognosis.







#### 18

#### Presenter: Adam B. Blechman, MD

## Title: A Predictive Model for Primary Closure Lengths in Mohs Surgery based on Skin Cancer Type, Dimensions and Location

Authors: Adam B. Blechman, MD<sup>1</sup>; Zachary Theroux, MD<sup>2</sup>; Mark A. Russell, MD<sup>3</sup>

Institutions: 1. NYU Langone, New York, NY

2. Stony Brook Health System, Stony Brook, NY

3. University of Virginia Health System, Charlottesville, VA

**Purpose:** Surgical scar length is a common concern among patients undergoing Mohs Micrographic Surgery (MMS). Primary intent closure lengths for non-melanoma skin cancer (NMSC) treated with MMS are relatively unpredictable. This study evaluates three metrics of preoperative lesion size (circumference, area, short axis length) to determine which correlates best with primary linear closure lengths for non-melanoma skin cancers (NMSCs) treated with MMS. This metric is then used to develop predictive models for primary linear closure length following MMS based on tumor size, location and skin cancer type.

**Summary:** Among 4,049 NMSCs, there were 3,234 BCCs, 472 SCCs and 343 SCCISs (79.9%, 11.6% and 8.5%, respectively). The three most common tumor locations for all cancer types were the cheek (20.9%), forehead/temple (18.3%) and nose/paranasal (12.6%). The mean age for all patients was sixty-six years old with a range of twenty to ninety nine years. Sixty percent of patients were male. On average, preoperative NMSC circumference yielded the highest R^2 values on linear regression with final closure lengths across all anatomic regions for all cancer types. Twenty-one of the twenty-eight regression models had coefficients of determination (R^2) above 0.5. Closure lengths increased by 0.52-1.1 millimeters, depending on location, for every millimeter increase in preoperative NMSC circumference. Male gender was associated with significantly larger average closure lengths compared to females (34.7mm vs. 27.8mm, p<0.001).

**Design:** A single-institution retrospective study of 4,049 NMSCs treated with MMS and repaired with primary linear closure. Patient and tumor characteristics, NMSC type, tumor location, preoperative NMSC dimensions, postoperative wound dimensions and final linear closure lengths were collected from patients' medical records. NMSC was divided into basal cell carcinoma (BCC), squamous cell carcinoma (SCC) and squamous cell carcinoma in situ (SCCIS). Primary closure lengths were plotted against preoperative lesion circumference, area, and short axis length. Linear regression analysis was performed. P values were calculated to assess statistical significance of each linear regression model. Once a model was determined statistically significant, coefficient of determination (R^2) values were calculated and compared to determine which metric correlates best with closure length.

**Conclusion:** Preoperative lesion circumference is directly proportional to linear closure length and is a better indicator of closure length than preoperative lesion area and short axis for MMS of NMSCs. Closure lengths are most sensitive to differences in NMSC preoperative size when located on the nasal tip, supratip or periocular areas.

Anotemic Anno	BCC	800	80078	All Chile Comments
Anatomic Area	BCC	SCC	SCCIS	All Skin Cancers
Cheek	635 (19.6)	118 (25.0)	93 (27.1)	846 (20.9)
Forehead and Temple	595 (18.4)	79 (16.7)	67 (19.5)	741 (18.3)
Ear and Periauricular	292 (9.0)	91 (19.3)	43 (12.5)	426 (10.5)
Nose and Paranasal	451 (13.9)	36 (7.6)	24 (7.0)	511 (12.6)
Nasal tip and Supratip	165 (5.1)	9 (1.9)	6(1.7)	180 (4.45)
Periocular	220 (6.8)	8 (1.7)	17 (5.0)	245 (6.1)
Perioral	316 (9.8)	15 (3.2)	15 (4.4)	346 (8.5)
Scalp	193 (6.0)	30 (6.4)	17 (5.0)	240 (5.9)
Vermilion Lip	2 (0.1)	2 (0.4)	2 (0.6)	6 (0.15)
<b>Trunk and Extremities</b>	358 (11.1)	70 (14.8)	49 (14.3)	477 (11.8)
Hands and Feet	5 (0.2)	14 (3.0)	8 (2.3)	27 (0.07)
<b>Genitalia and Perianal</b>	2 (0.1)	0 (0.0)	2 (0.6)	4 (0.1)
Total	3234 (100)	472 (100)	343 (100)	4049 (100)

Table II. Coefficient of Determination (R^2) values based on preoperative short axis, circumference,

and area									
	3	Short A	xis	Ci	rcumfer	ence		Area	
	BCC	SCC	SCCIS	BCC	SCC	SCCIS	BCC	SCC	SCCIS
Cheek	0.559	0.501	0.599	0.615	0.655	0.636	0.522	0.507	0.582
Forehead and Temple	0.435	0.463	0.404	0.569	0.521	0.560	0.474	0.385	0.437
Ear and Periauricular.	0.356	0.300	0.515	0.555	0.617	0.494	0.457	0.340	0.455
Nose and Paranasal	0.396	0.359	0.368	0.461	0.365	0.421	0.428	0.312	0.391
Nasal tip and Supratip.	0.219	0.650	0.133	0.262	0.509	0.098	0.465	0.552	0.092
Periocular	0.446	0.686	0.399	0.562	0.606	0.418	0.485	0.538	0.355
Perioral	0.480	0.487	0.671	0.543	0.617	0.558	0.529	0.525	0.549
Scalp	0.504	0.590	0.621	0.529	0.586	0.760	0.445	0.613	0.762
<b>Trunk and Extremities</b>	0.562	0.145	0.366	0.649	0.464	0.505	0.493	0.309	0.482
Hands and Feet	0,799	0.564	0.006	0.848	0.640	0.178	0.831	0.612	0.189
Average	0.476	0.475	0.408	0.559	0,558	0.463	0.513	0.469	0.429

	BCC	SCC	SCCIS
Cheek	PCL = (0.795 x POC) + 11.978	PCL = (0.719 x POC) + 16.010	PCL = (0.751 x POC) + 12.791
Ear and Perinaricalar.	PCL = (0.518 x POC) + 17.564	PCL = (0.541 x POC) + 18.695	PCL = (0.579 x POC) + 16.222
Forehead and Temple	PCL = (0.653 x POC) + 14.291	PCL = (0.581 x POC) + 20.104	PCL = (0.666 x POC) + 15.674
Nove and Encannual.	PCL = (0.700 x POC) + 9.513	PCL = (0.551 x POC) + 12.606	PCL = (0.617 x POC) + 9.352
Nasal Tip and Supratip.	PCL = (0.718 x POC) + 12.614	PCL = (0.976 x POC) + 5.980	
Perincolar.	PCL = (0.852 x POC) + 6.241	PCL = (1.053 x POC) = 7.492	PCL = (0.735 x POC) + 11.757
Perioral	PCL = (0.767 x POC) + 9.164	PCL = (0.691 x POC) + 12.138	PCL = (0.984 a POC) + 6.765
Scalp	PCL = (0.586 x POC) + 17.270	PCL = (0.622 x POC) + 19.365	PCL = (0.792 x POC) + 10.853
Trunk and Extremities	PCL ~ (0.650 x POC) + 17.850	PCL = (0.53) x POC) + 24.743	PCL = (0.713 x POC) + 15.644
Hands and Feet	PCL = (0.757 x POC) + 7.877	PCL ~ (0.527 x POC) + 17.476	

not listed as these had p values were greater than 5.05. PCL: Predicted Clowere Length (nm), POC: Pre-Operative Circumference (nm)

## 19

Presenter: Katarina R. Kesty, MD, MBA

## Title: In-office Compounding of Lidocaine-Epinephrine: A Safe and Effective Method of Anesthesia Administration Prior to Skin Biopsy

**Authors:** Chelsea Kesty, BS<sup>1</sup>; Ross L. Pearlman<sup>1,2</sup>; Steven R. Feldman, MD, PhD<sup>1</sup>; Leah Cardwell, MD<sup>1</sup>; Katarina R. Kesty, MD, MBA<sup>1</sup>

Institutions: 1. Wake Forest University School of Medicine, Winston-Salem, NC

2. University of Alabama School of Medicine, Birmingham, AL

**Purpose:** In-office compounding of local anesthesia is a common practice in outpatient dermatology offices. Compounding is the process of combining two or more prescribed drugs to tailor medications to individual patient needs. Lidocaine hydrochloride 1% with epinephrine 1:100,000 represents a very common anesthetic preparation. Premixed lidocaine with epinephrine is acidic, so it produces significant pain upon injection. Adding 8.4% sodium bicarbonate neutralizes the pH of the solution and reduces injection pain. Risks associated with pharmacy compounding have been highlighted in the media recently. The United States Pharmacopeia compounding provisions establish that in-office

compounding for dermatologic procedures should require sterile preparation with properly garbed personnel and near-immediate use of compounded lidocaine preparations. In outpatient settings, however, compounding typically takes place in non-sterile settings.

**Summary:** The type and frequency of adverse events associated with in-office compounded anesthetic injections is poorly characterized. In this study, we aim to assess the risk and character of adverse events associated with in-office compounding of local anesthesia with sodium bicarbonate in an outpatient academic dermatology facility. We reviewed the charts of 100 randomly selected patients with biopsies performed using 1-3 milliters of 1% lidocaine and 1:100,000 epinephrine compounded with 8.4% sodium bicarbonate anesthesia between January 6, 2015 and March 2, 2017.

**Design:** The ages of patients included in our study ranged from 30 to 93 with a mean age of 72. Males accounted for 66 of the biopsies and 34 were females. Out of the 100 biopsies performed, one adverse event was noted. The low number of adverse events encountered in our study supports that in-office compounding of lidocaine preparations is a safe method of providing anesthesia for dermatologic procedures. Furthermore, the adverse event encountered in our study, paresthesia after biopsy, is more likely due to perineural invasion of tumor (noted on subsequent Mohs surgery) rather than the compounded anesthesia used for biopsy.

**Conclusion:** This retrospective chart review of patients who received anesthesia compounded in-office supports the theory that in-office compounding is a safe and effective way to administer anesthesia for dermatologic procedures. Requiring pharmacy compounding of local anesthesia would presumably increase costs and would not necessarily confer any benefit to patient safety. In-office compounding helps ensure cost-effective care for our patients. More studies with larger patient samples and various procedure settings are necessary to further support this conclusion and ensure that in-office compounding does not become prohibited by costly and unnecessary regulation.

#### 20

Presenter: Addison M. Demer, MD

# Title: Narrow Pedicle Transposition Flap: A Novel Reconstructive Technique

Authors: Addison M. Demer, MD<sup>1</sup>; Lauren B. O'Neill, MD<sup>1,2</sup>; Angela E. Aakhus, MD<sup>3</sup>; Hilary C. Reich, MD<sup>4</sup>; Peter K. Lee, MD, PhD<sup>1,2</sup> Institutions: 1. University of Minnesota, Minneapolis, MN 2. Park Nicollet, Saint Louis Park, MN

- 3. Sanford Health, Bemidji, MN
- 4. Essentia Health, Duluth, MN

**Purpose:** The Narrow Pedicle Transposition Flap is a novel reconstructive technique best employed for closure of large surgical defects and those in challenging anatomic sites. By utilizing tissue that would otherwise be sacrificed in the standing cones of traditional closure techniques, this method minimizes tissue loss and subsequently leads to shortened, low tension defects, with cosmetically acceptable results. The narrow pedicle design allows for successful defect closure in areas within tight anatomical confines, while the generous subcutaneous pedicle provides adequate vascular supply and ensures flap survival.

**Summary:** In a series of thirteen patients treated with the Narrow Pedicle Transposition Flap technique there was no incidence of flap necrosis, and no revision surgeries were required. In three cases, post-

operative intralesional triamcinolone was successfully utilized for pedicle flattening. No additional complications were observed, and all results were deemed cosmetically acceptable.

**Design:** After creation of a round or ovoid surgical defect, a single traditional Burow's triangle is designed. With the exception of a narrow cutaneous pedicle proximal to the surgical defect, the entire triangle is dissected to the layer of the deep fat. The resulting flap is subsequently transposed and rotated 90 degrees, draped over the defect, shaped to fit exactly, and carefully sutured in place to minimize tissue redundancy of the proximal flap.

**Conclusion:** The Narrow Pedicle Transposition Flap technique, which is a modification of a rhombic flap, makes use of tissue that would otherwise be discarded. It has been used with success to repair defects on challenging anatomic sites including the medial canthus, nose, and ear, as well as for closure of large defects of more forgiving sites such as the cheek. In areas where maximizing pedicle size is difficult, using this narrow cutaneous pedicle with a robust subcutaneous pedicle can allow for successful defect closure, while ensuring excellent flap survival rates. Use is limited by defect size and shape; however, this has been used successfully in combination with other closure techniques. The Narrow Pedicle Transposition Flap is a simple to use reconstructive technique which decreases flap tension and subsequent risk for skin necrosis, while ultimately resulting in a shortened and cosmetically acceptable surgical scar.



### 21

#### Presenter: Alex C. Holliday, MD

## Title: Lentigo Maligna Melanoma Combined with Nodular Basal Cell Carcinoma Treated with Mohs Micrographic Surgery

Authors: Alex C. Holliday, MD<sup>1</sup>; George R. Collins, DO<sup>1</sup>; Kyle A. Prickett, MD<sup>1</sup>; Mariana A. Phillips, MD<sup>1</sup>

Institution: 1. Virginia Tech Carilion Clinic, Roanoke, VA

**Purpose:** Tumors composed of both malignant epithelial and melanocytic populations are rare and no treatment standard exists.

Summary: An 89 year-old-male with a history of multiple nonmelanoma skin cancers presented for Mohs micrographic surgery (MMS) of a combined melanoma in situ (MIS) and basal cell carcinoma (BCC) on the left lower cheek. Although the lesion had been present for many months, a new nodular growth in the area prompted him to seek dermatologic evaluation. Review of the initial biopsy revealed an ulcerated central malignant basaloid neoplasm with peripheral clefting and a loose myxoid stroma. Intermingled MIS extensively permeated and extended peripherally beyond the nodular BCC. The atypical melanocyte proliferation stained positive with SOX10 and melan A while the basal cells stained positive with Ber-EP4. No invasive melanoma was appreciated. The patient underwent MMS with an initial 5 mm margin and the tissue was stained with both hematoxylin and eosin (H&E) and MART-1 immunostain. Although BCC was not seen on the en face margin, the MART-1 stained sections were difficult to interpret because of the extensive background of melanocytic hyperplasia attributed to chronic sun damage. Therefore, an additional 2 mm margin was circumferentially excised surrounding the Mohs defect and sent for en face margin analysis in formalin fixation ("slow Mohs"). Two stages of "slow Mohs" were required to clear the MIS. Further analysis of the initial debulking specimen revealed an invasive melanoma, Breslow depth 0.26 mm, cleared from the nearest peripheral margin by 1.1 cm. The 6.4 x 6.0 cm defect was left to heal by secondary intention due to the presence of infection noted on post-operative day 3. An excellent cosmetic outcome was apparent 2 months later.

#### Design: Case report.

Conclusion: Our patient's melanoma most likely preceded BCC development given his history of a new nodule in the lesion. It is important to understand the Breslow depth does not increase with atypical melanocytes contained within the BCC; invasive melanoma is considered present only when separate from the BCC. Four categories are proposed to classify tumors composed of both epithelial and melanocytic cell populations: 1) collision tumors are two distinct neoplasms that occur closely proximal to one other while maintaining sharp boundaries; 2) colonization is when MIS infiltrates a tumor but is confined solely to that tumor, most commonly BCC; 3) combined tumors are composed of two distinct intertwining malignant cell populations often appreciated with immunohistochemistry; 4) biphenotypic tumors arise from divergent differentiation of a common stem cell precursor resulting in tumor cell populations that share molecular properties. Respecting semantics, our patient's tumor was of the combined type. Despite the dearth of knowledge on combined tumor behavior and clinical outcomes. MMS is a reasonable treatment modality, especially when immunostains and/or staged excision are used.



#### 22

Presenter: Robert Fischer, MD

# Title: The Effect of Lesion Rate of Change on Subsequent Stage Margins

Authors: Robert Fischer, MD<sup>1</sup>; Satori Iwamoto, MD, PhD<sup>1</sup> Institution: 1. Roger Williams Medical Center, Providence, RI Purpose: To discuss the concept of rate of change of lesion size and its effect on subsequent stage margin decision making.

Summary: Mohs micrographic surgery is a well-established technique for the treatment of skin cancer in anatomically and functionally sensitive areas. Integral to the success of Mohs surgery is the ability to minimize the amount of tissue removed in order to successfully clear various lesion types. In order to achieve and optimize this goal, it is important that a practitioner understand the three-dimensional characteristics of a lesion and how those characteristics translate to two-dimensional representations in histopathologic slides. We discuss the concept of lesion rate of change as an important characteristic for deciding the size of additional stage margins. Various examples of frozen section slides from Mohs cases are used to illustrate how a tumor with a slowly changing two-dimensional (2-D) area may necessitate a larger subsequent margin as opposed to cases with rapidly changing 2-D areas. This concept may also be utilized to better understand and visualize asymmetrical tumor growth as well as anticipated tumor growth direction. This proficiency may lead to better patient outcomes as well as time and cost savings.

**Design:** Frozen section slides from various Mohs cases were used to illustrate the rate of change of tumor size. A technique for generating layered three dimensional models of the frozen section slides was utilized to better visualize the translation of a three dimensional tumor to the two-dimensional slides. This method was also utilized to demonstrate other important concepts, such as the histologic identification of a new tumor focus.

**Conclusion:** The ability to understand lesion rate of change and its effect in regard to remaining tumor burden is an important concept in planning Mohs layers. We illustrate that rapid rate of change should lead to planning of smaller margins in subsequent stages. This concept is illustrated visually so that the learner may develop improved spatial understanding and improve patient outcomes and efficiency.

#### 23

Presenter: Norman A. Brooks, MD

## Title: Zinc Chloride Astringent Treatment Helps Prevent Progression of Melanoma in situ

Author: Norman A. Brooks, MD<sup>1</sup>

Institution: 1. Skin Cancer Medical Center, Encino, CA

**Purpose:** A simplified chemosurgery technique for invasive melanoma was recently published in Dermatologic Surgery, but the value and use of this technique for melanoma in situ was not emphasized. The technique is the same for invasive and melanoma in situ, and helps to prevent progression and facilitates the removal of a melanoma in situ. With the permission of Dermatologic Surgery the conclusion, the introduction and the new technique are reprinted for a presentation on astringent treatment of melanoma in situ using zinc chloride solution or zinc chloride paste.

**Introduction:** Mohs melanoma chemosurgery using 50% zinc chloride has not been widely accepted despite a 30-year consecutive series indicating 53% survival improvement (p = .003) for advanced melanomas over conventional surgery. In chemosurgery, melanomas are fixed and removed in layers with 24- hour zinc chloride paste applications before each excision. An extra application is made to the tumor- free plane to encompass possible satellites.

However, in a study of 64 5-year determinate cases of thin melanomas (<0.85 mm), the procedure was simplified to remove melanomas with fresh-tissue excision, and then, the extra application was made with zinc chloride paste for 24 hours to the fresh- tissue excision wounds after surgery. Survival was improved 60% (hazard ratio 0.37) for zinc chloride over fresh-tissue excision alone.

Because zinc chloride is a caustic agent, it immediately and deeply kills living tissue when applied to an open fresh-tissue excision wound. An equally effective much simpler extra application is to briefly manually apply zinc chloride to the fresh melanoma excision wound similar to astringent application on a surgical site. Occult melanoma cells, which molecular staging studies suggest may be prevalent, despite histologically clear and immunohistochemically negative margins, may be fixed and killed, and vaccine-like anti- melanoma immunity may be stimulated.

Zinc chloride is recognized by the FDA as a generally safe substance when used in accordance with good manufacturing practice. (Code of Federal Regulations Title 21 [Part 182]). Zinc chloride is available as zinc chloride granular USP from Spectrum Chemical Supply. A saturated solution is prepared by dissolving 4 parts of zinc chloride to 1 part of distilled water by weight.

**Technique:** Small amounts of 50% zinc chloride (drops of solution or pea-sized amounts of paste) are applied to the excisional wound of a melanoma after fresh-tissue surgery and held in place manually with sterile gauze with mild-to-moderate pressure for several seconds but may be somewhat longer for larger blood vessels until bleeding has stopped or decreased. Figures 1 and 2 illustrate an advanced melanoma treated with zinc chloride paste.

**Summary:** Treatment helps prevent progression. **Design:** N/A.

**Conclusion:** For the uninitiated, treatment with zinc chloride may be limited to thin melanomas with little risk of metastases and selected melanoma in situ.



Figure 1. Melanome wand in an 87-year-oot women: 2.5 mm thick: Clark level IV. A conservative saccentrad hist-bissoe Mote accision investeled ofear margins using permanent sections. A this layer (1 mm thick) of acc monole gate was borkly applied to the dyna excision wound under local anesthesia. Reputeted Demotologic Surgery).



Figure 2: Melanoma healed wound. No recurrence in over 5 years. The patient, at hor advanced age, warried to aword lymph node surgery. There was no palpable lymphodenopathy, and an ultrasound and whole-body position emission tomography.computed tomography were negative. (Reprinted Deministory: Surgery).

## 24

Presenter: Carolyn A. Hardin, DO

## Title: Evaluation of a New Generation Quaternary Ammonium Compound on Surgical Forceps

**Authors:** Carolyn A. Hardin, DO<sup>1</sup>; Jonathan F. Madden, MD<sup>1</sup>; Lori Henrichs, MS<sup>2</sup>; Mark D. Ervin, MD<sup>2</sup>; Joshua Lospinoso, PhD<sup>3</sup>; Thomas M. Beachkofsky, MD<sup>4</sup>

**Institutions:** 1. San Antonio Uniformed Services Health Education Consortium, JBSA-Lackland, TX

2. Joint Base San Antonio, Lackland, TX

3. Fort Meade, Fort Meade, MD

4. MacDill Air Force Base, MacDill AFB, FL

**Purpose:** Quaternary ammonium compounds (QACs) are disinfectants with bactericidal, virucidal, and fungicidal activity commonly used in healthcare. They are advertised to withstand long-term use and sterilization processes by creating covalent, permanent bonds on many surfaces. However, attempts to reproduce manufacturers' results have been inconsistent. In an IRB-approved protocol, the efficacy of a new generation QAC was evaluated using representative gram-positive and gram-negative bacteria on a common surgical instrument.

**Summary:** The QAC agent provided superior protection against A. baumannii colonization as compared to S. aureus. There was no growth of A. baumannii on any of the QAC-treated instruments during the 6 test variations. Inhibition of S. aureus was variable; 7 of 9 (77.8%) test iterations demonstrated higher bacterial yield from the control while

2 of 9 (22.2%) tests demonstrated increased bacterial growth on the QAC-treated forceps. The observed decrease in bacterial growth on the treated forceps was statistically insignificant.

**Design:** Using autoclaved surgical forceps, growth of Staphylococcus aureus and Acinetobacter baumannii was evaluated under multiple conditions. Test variations included duration of submersion in the QAC solution and air-drying, and a second autoclave sterilization. Control and treated forceps were exposed to a bacterial suspension and air-dried for the same amount of time before being submerged in sterile saline and vortex mixed. The saline solution was serially diluted 1:10 and plated on tryptic soy agar (TSA) II plates. After a 24 hour incubation, colony forming units (CFU)/mL were counted.

**Conclusion:** In these independent tests, the QAC agent effectively prevented growth of A. baumannii but had unpredictable results suppressing S. aureus. These results may relate to inherent properties of the bacteria or autoclave exposure, although the manufacturer asserts that the coating withstands such degradation. Additional testing could be performed using a broader range of microorganisms and exposure to varying conditions including other sterilization methods.



Figure 2: S. Aureus growth on QAC treated vs. untreated surgical forceps.



Figure 3: A. baumannii growth on QAC treated vs. untreated surgical forceps.



#### 25

Presenter: Collin M. Blattner, DO

# Title: Simple Solution to Perform Deep Sutures Without an Assistant

Authors: Collin M. Blattner, DO<sup>1</sup>; Benjamin Perry, DO<sup>1</sup>; William Lear, MD<sup>1</sup> Institution: 1. Silver Falls Dermatology, Salem, OR

**Purpose:** Busy dermatologists and dermatologic surgeons perform closures that require subcutaneous and deep dermal sutures to decrease tension from wound edges and approximate tissue. Support staff assists in blotting, cutting, and pinching suture but are not always available to help the dermatologic surgeon when performing deep dermal sutures. A simple solution is needed to keep tension on deep dermal sutures and approximate wound edges without use of an assistant.

**Summary:** Dermatologists may encounter situations where they need to perform procedures without an assistant, and they may have difficulty keeping tension on the deep dermal sutures without the use of an assistant. A simple set of step-by-step instructions to keep tension on deep dermal sutures and approximate wound edges without the use of an assistant is presented below.

**Design:** The surgeon performs the deep dermal suture in normal fashion by entering the wound in the deep tissue and exiting at the dermalepidermal junction. The needle driver is then reloaded and the surgeon enters the contralateral wound edge at the superficial dermal-epidermal junction before exiting at the reticular dermis at the same depth as the opposite side of the wound (Figure 1). The surgeon then holds tension on the needle driver in one hand and uses the opposite index finger to

grasp the other end of the suture (Figure 1). The surgeon then creates a cross with the suture by bringing the index finger into contact with the thumb. The needle driver is then unloaded while the cross remains under constant tension between the index finger and thumb (Figure 1). The needle driver is then used go in between the cross and pull the suture through ensuring a tight knot that is able to approximate tissue and maintain adequate tension without the use of an assistant.

**Conclusion:** A simple set of step-by-step instructions to keep tension on deep dermal sutures and approximate wound edges without the use of an assistant is presented above. We find this extremely helpful in busy dermatology clinics where assistants may not always be available to assist the dermatologic surgeon.



## 26

Presenter: Cynthia L. Nicholson

## Title: A Retrospective Review and Comparison of Mohs Micrographic Surgical Cases Closed by Dermatologic Surgery (Mohs) versus Plastic Surgery Services

Authors: Cynthia L. Nicholson<sup>1</sup>; Abdel K. El Tal<sup>2,3</sup>; Institutions: 1. Wayne State University, Dearborn, MI 2. Dermatology Associates, Perrysburg, OH 3. University of Toledo, Toledo, OH **Purpose:** Mohs micrographic surgery is a specialized surgical technique using staged excisions and standard margins to treat cutaneous malignancies in difficult to treat or high-risk locations. Defect closure can be performed primarily by the Mohs surgeon or after referral to another surgical subspecialist. We sought to identify differences in the number of Mohs layers taken for cases that were eventually closed by Plastic Surgery compared to Dermatologic Surgery (Mohs) services.

Summary: A total of 3,135 cases were closed by a Mohs micrographic surgeon, while 86 cases were referred to a plastic surgeon. A combined total of 152 surgical cases closed by plastic surgery (76 cases) and matched controls closed by dermatologic surgery (76 cases) were included. Both cases closed by plastic surgery and by the Mohs surgeon had a mean pre-operative area of 1.01 cm2, while those closed by plastic surgery had a mean defect area of 2.54 cm2 versus 1.8 cm2 for the Dermatologic Surgery matched group. On average, cases closed by plastic surgeons were clear of malignancy after 2.07 stages vs. 1.42 stages in the group closed by dermatologic surgeon (p = < 0.001). Cases sent to plastic surgery were more of the aggressive types (14 cases of infiltrative or micronodular basal cell carcinoma cases and one microcystic adnexal carcinoma vs 5 cases of infiltrative or micronodular basal cell carcinoma cases and one microcystic adnexal carcinoma). Cases sent to Plastics were also more likely to be recurrent in nature (3) vs. 0 cases).

**Design:** A retrospective review of 3,221 Mohs micrographic surgical cases performed between October 2014 and March 2017 of a busy private dermatology practice was performed. Closure by plastic surgery vs. dermatologic surgery was used to stratify cases into 2 groups. Cases referred to plastic surgery for closure were matched to dermatologic surgery (Mohs) closure cases based on pre-operative area +/- 0.1 cm2 and treatment site, as labeled by electronic medical record system. Surgical characteristics including pre-operative size, location, defect area, and number of stages were analyzed.

**Conclusion:** Cases performed via Mohs Surgery and sent to Plastics differ slightly compared to those closed by the dermatologic surgeon. Cases referred to plastics were more likely to have an increased number of stages and an increased defect size in comparison to those closed by the Mohs surgeon. The most likely explanation for this finding is (1) that cases sent to Plastics are more aggressive in nature or more likely to be recurrent in nature. One should also consider the possibility that (2) unconsciously the Mohs surgeon starts with a smaller layer for the Plastics colleague and end up with a positive stage, hence leading to higher number of stages and consequently a larger defect size.

## 27

Presenter: Charles Darragh

# Title: Risk of Adverse Events Due to High Volumes of Local Anesthesia During Mohs Surgery

**Authors:** Charles Darragh, MD<sup>1</sup>; Nicholas Frank MD<sup>1</sup>; Brandon Danford, MD<sup>1</sup>; Lee Wheless, MD, PhD<sup>1</sup>; James R. Patrinely, MS<sup>1</sup>; Jason Arnold, MD<sup>2</sup>; Anna S. Clayton, MD<sup>1</sup>

**Institutions:** 1. Vanderbilt Medical Center, Nashville, TN 2. Georgia Dermatology, Conyers, GA

**Purpose:** Guidelines for the maximum amounts of locally injected lidocaine exist; however, there is a paucity of data in the Mohs micrographic surgery (MMS) literature. We sought to determine the safety of locally injected lidocaine in patients that receive larger amounts.

Summary: Of the 563 patients reviewed, 1.4% of patients had a complication the day of surgery and 4.4% of patients had a complication within seven days of the surgery. The most common complications were excessive bleeding/ hematoma formation and wound infection. One patient experienced lightheadedness and one experienced nausea and diaphoresis. One serious complication noted was a patient found in a coma on postoperative day (POD) 1. The average amount of anesthesia received was 39.81 mL, including 33.58mL of 1% lidocaine with epinephrine (1:300,000), 5.21 mL of 0.5% lidocaine with epinephrine (1:300,000), 0.71 mL of 0.25% marcaine with epinephrine, and 0.23 mL of 1% plain lidocaine. The average weight of the patients was 86.69 kilograms (kg). The average patient received 3.87 milligrams (mg)/ kg of 1% lidocaine with epinephrine and 0.3 mg/ kg of 0.5% lidocaine with epinephrine for a total of 4.17 mg/ kg of lidocaine. This amount was injected over an average of 3.61 stages and 4.24 hours. Gender, heart disease, hypertension, diabetes, and smoking were not found to be significant risk factors for development of complications.

**Design:** The authors performed a retrospective chart review of 563 patients from 1992 to 2016 who received over 30 milliliters (mL) of locally injected lidocaine. We examined the patient records for complications the day of surgery and within 7 days postoperatively. Differences in proportions and means were measured using the Fisher's exact test, or the Wilcoxon Rank sum, or the Student's T tests.

**Conclusion:** This data suggests that MMS is a safe office procedure in patients who require over 30 mL of locally injected anesthesia. There were two complications the day of surgery that could resemble symptoms of early lidocaine toxicity including lightheadedness/ dizziness and drowsiness. This rate is lower than published data in all patients undergoing procedures requiring locally injected lidocaine. One patient was found in a coma on POD #1, which can be a symptom of high levels of lidocaine toxicity. After investigation, this was thought to be due to an incorrect medication given at the pharmacy. The patient made a full recovery within 10 days. The safety of high volumes of lidocaine extends to patients with risk factors such as heart disease, hypertension, diabetes, and smoking. This preliminary study argues for the safety of outpatient MMS cases requiring doses of greater than 30mL of lidocaine due to their size and complexity.

	Mean value (SD)	Ranges
Age (years)	65.69 (13.82)	16-95
Weight (kg)	86.69 (23.79)	19.4 - 183
Duration of surgery (hours)	4.24 (2.64)	0.5 - 41
Number of stages	3.61 (1.68)	1.7
Systolic blood pressure	138.57 (20.20)	82 - 208
Diastolic blood pressure	80.19 (12.43)	36 - 125
Total volume anesthesia (mL)	39.81 (11.58)	30 - 119
Total volume 1% lidocaine with epi	33.58 (7.61)	0 - 99
Total volume 0.5% lidocaine with epi	5.21 (11.19)	0-87
Total volume marcaine	0.71 (2.44)	0-24
Total volume 1% plain lidocaine	0.23 (2.38)	0-32

	Complications day	g-value*	Complications	gevalue
	of surgery		within 7 days	
	(n)		(n)	
Gender		0.21	12	0.13
Male (n = 439)	8		23	
Female (n = 124)	0		2	
Hypertension		0.74		0.04
Yes (n = 311)	5		19	
No (n = 252)	3		6	
Heart disease		0.46		0.01
Yes (n = 198)	4		15	
No (n = 365)	- 4		10	
Diabetes		0.63		1
Yes (n = 95)	2		4	
No (n = 468)	6		21	
Smoking		1		1
Yes (n = 106)	1		- 4	
No (n = 457)	7		21	
Type of skin cancer		0.40		0.08
BCC <sup>2</sup> (n = 297)	4		8	
SOC <sup>2</sup> (n = 184)	2		13	
SOC-15 <sup>1</sup> (n = 18)	1		2	
MIS <sup>1</sup> (n = 16)	0		0	
Melanoma (n = 4)	0		0	
AFX: (n = 5)	0		1	
DFSP (n = 20)	0		1	
Other (n = 19)	1		0	
Site		0.42	- N.	0.38
H&N* (n = 433)	6		20	
Trunk (n = 57)	1		1	
UEs* (n = 49)	0		4	
LEs** (n = 24)	1		0	
Type of repair	100	0.17	22	0.24
CLC <sup>11</sup> (n = 152)	0		7	
Second intent (n = 33)	1		0	
FTSG=2 (n = 110)	2		3	I
Advancement flap (n = 70)	0		5	
Rotational flap (n = 44)	1		0	
Transposition flap (n = 32)	0		1	
Interpolation flap (n = 8)	0		1	
Outside repair (n = 114)	4		8	
1 Fisher's Exact test				
2 Basal Cell Carcinoma				
Squamous Cell Carcinoma				
Squamous Cell Carcinoma in sit	u			
5 Melanoma in situ				
6 Atypical fibroxanthoma				
7 Dermatofibrosarcoma protuber	ans			
8 Head and Neck				
Upper extremities				
0 Lower extremities				
11 Complex linear closure				
There and a second shift much				

Table 3		
Complications the day of surgery	8/563 (1.4%)	
	2 surgeries stopped due to patient fatigue	
	4 episodes of excessive bleeding/ hematoma	<ul> <li>one patient admitted overnight for observation with no issues</li> <li>others resolved with pressure</li> </ul>
	1 episode of feeling lightheaded	<ul> <li>resolved with trendelenberg</li> </ul>
	1 episode of nausea and sweating	- resolved with oral caloric intake
Complications within 7 days of surgery	25/563 (4.4%)	
	1 morbilliform skin eruption	<ul> <li>patient given general anesthesia, resolved</li> </ul>
	5 wound infections	
	1 Transient ischemic attack	
	7 episodes of excessive bleeding/ hematoma	
	2 episodes of significant postoperative swelling	
	1 admission for chest pain	- POD #6, resolved
	4 episodes of wound dehiscence	
	2 cases of OR complications	<ul> <li>both following closure in the OR, patients required prolonged intubation and pressers, multiple risk factors</li> </ul>
	1 patient found in a coma	<ul> <li>POD #1, thought to be due to incorrect medication dispensed at pharmacy, recovered, no further details</li> </ul>
	1 case of difficulty controlling blood sugars	

#### 28

Presenter: Lark G. Guss, MD, MSc

## Title: Utilization of Mohs Micrographic Surgery in the Treatment of Merkel Cell Carcinoma

Authors: Lark G. Guss, MD, MSc<sup>1</sup>; Zachary D. Guss, MD, MSc<sup>2,3</sup>; Reith R. Sarkar<sup>3</sup>; Hugh T. Greenway, Jr., MD<sup>1</sup>; James Murphy, MD, MS<sup>3</sup>

**Institutions:** 1. Scripps Green Hospital, La Jolla, CA 2. Johns Hopkins School of Medicine, Baltimore, MD 3. University of California San Diego, La Jolla, CA

**Purpose:** Merkel cell carcinoma (MCC) is a rare, aggressive cutaneous cancer with local recurrence rates reported between 32-50% and distant metastasis rates between 34-49%. However, several studies demonstrate excellent results using Mohs micrographic surgery (MMS) for MCC. As MCC is quite rare, reports comparing MMS to standard wide excisions are limited. Using the National Cancer Database (NCDB), we sought to evaluate utilization of MMS for the treatment of MCC.

**Summary:** 8318 patients with MCC were identified from the NCDB. Patient demographics and treatment characteristics for patients who received MMS compared to those receiving local or wide local excision are presented in Table 1. The fraction of cases managed by MMS remained stable, ranging from 6.3% in 2004 to 5.8% in 2015. Patients receiving MMS were more likely to reside in the West or South and in urban areas, have primary tumors on the face, neck, or scalp, clinical T stage 1 or 2 tumors, and have no clinical evidence of nodal involvement (p < 0.05, Table 2). Additionally, fewer patients who underwent MMS (46%) received surgical lymph node evaluation than those who underwent local or wide local excision (68%, p < 0.0001).

Overall margin negative rates for local excision, wide excision, or MMS, were 81%, 94%, and 92%, respectively. On multivariable analysis, we found no difference in margin status between wide excision and MMS when controlling for potential confounding factors (Table 3). Increased surgical volume was associated with lower risk of positive margins.

**Design:** The NCDB Participant User File (PUF) containing patients diagnosed from 2004 to 2014 was analyzed. Sociodemographic, clinical, and treatment factors were collected. Surgical techniques were categorized as MMS, wide excision, or local excision. Facilities were ranked and divided into tertiles based on the volume of MCC treated at the facility.

Characteristics for patients treated with MMS were compared to those managed with other interventions by chi-square test. A multivariable logistic regression was conducted to identify patient features associated with receipt of MMS. A separate analysis evaluated the association of patient characteristics with negative margins among patients receiving local excision, wide excision, or MMS.

**Conclusion:** Use of MMS for MCC has been stable over the past 10 years. MMS and wide excision deliver higher rates of negative margins than local excision alone. Health care facilities that treat a low volume of MCC have worse negative margin rates. On multivariate analysis, there was no significant difference in margin status between patients receiving MMS or wide excision despite a higher proportion of head and neck MCC being treated by MMS. Our analysis suggests that MMS may offer greater tissue conservation without compromising surgical margin status.

#### Table 1. Patient Demographics and Treatment Characteristics: MMS vs Wide Local or Local Excision

	Management of Primary			Management	e of Primery
	MMS (n=456)	Other (nr7,862)		MMS (n=456)	Other (m-7,862)
Nar of Diagnosis			Sa		
2006-2007	1.N (27%)	3,074 (26%)	Male	268 (59%)	4,699 (60%)
2006-2011	162 (369)	2,609 (33%)	female.	388 (42%)	8,363 (40%)
2012-2015	170 (37%)	3,179 (40%)	Anatomic Region*		
Apr Criver			fere	275 (90%)	2,649 (34%)
1846	48(119)	1,058 (13%)	Scala and Neck	43 (0.450	680 (8.7%)
61-74	157 (34%)	2,727 (34%)	Other	138 (30%)	4,533 (58%)
75+	251 (5350)	4,078 (52%)	GinitalT 10ge*	erde Gernariaa	
Geographic Region 7			•	>222 (>49%)	3,358 (40%)
Care)	29(17)0	1,852 (24%)	1	56(12%)	1,219 (17%)
Mdunit	94 (21%)	1,890 (24%)	34	<11(42%)	370 (510)
South	187 (42%)	2,753 (85%)	efte	178 (1995)	8,035 (39%)
WHEE	96-(22%)	1,357 (17%)	Cinical N Stage*		
Type of Institution			0	302 (66%)	4,772 (62%)
Acidemia	422 (920)	7,262 (929)	14.5	34 (7.5%)	477 (119)
other .	34 (7.5%)	400 (7.5%)	Writingan (	130 (26N)	2,213 (2810)
Mice Volume By RecElly			Fathologic Nodal Accessored		
Let Rettle	131(29%)	2,506 (82%)	No.	245 (54%)	2,554 (32%)
2 <sup>nd</sup> Texture	182 (40%)	2,817 (36%)	Yes :	211 (40%)	5,308 (68%)
en tentie	143 (81%)	2,539 (82%)	Redistor Decays*		
in contraince Type			N=	152 (33Nj	3,785 (48%)
Private/Man aged Care	110 (34%)	2,000 (25%)	100	304 (67%)	4,077 (52%)
Medicare	326 (72%)	5,474 (70%)			
Other/United wit	30 (4.4%)	388 (5.0%)			

Table 2. Multivariable Logistic Regression Models fo Receipt of MMS

A	Odds Ratin (SSN E)	Photos
THE OF Diagonalia	Contraction of the second	
2012-2011	1.00 (0.77-1.80)	0.16
2000-2011	0.03 (0.43-1.08)	1.00
2004-2007	ref	
Geographic Region	10	
Midweld	1.18 (0.85-1.61)	0.32
South	3.58 (1.19-2.10)	-0.01
west.	1.62 (1.19-3.22)	<0.01
fait	ref	
Facility Volume (Tertile)		
P <sup>4</sup>	0.95 (0.72-1.26)	0.78
e.	1.14 (0.89-1.46)	0.31
t-	ref	
Age Group (print)	and the second sec	
794	1.09 (0.75-1.59)	0.66
41-74	1.20 (0.83-1.73)	0.32
18-40	ref	
Anatoma Region	A	
lete	3.34(2.694.15)	-0.01
Meik/Solut	2.06 (1.44-2.95)	<0.01
00hir	ed	
divised T triege		
	0.24 (0.10-0.60)	<0.01
1	0.01 (0.59-1.10)	0.18
university .	1.04 (0.79-1.37)	0.78
	ref	
Clinical N 19age		
14	0.71 (0.49-1.03)	0.07
Unknown	0.73 (0.53-3.00)	0.05
Elementer.		

Table 3. Multivariat N	ole Logistic Regression egative Margins	n Models for
	Ores Ratio (25% D)	P.Value .
War of Disposals		
2012-2015	1.22 (1.01-1.46)	0.04
2008-2011	1.25 (1.43-1.51)	0.02
2004-2007	ref	
Geographic Register		
Widwest	0.91 (0.73-1.14)	0.40
South	0.771 (0.629-0.945)	0.01
Net	0.904 (0.793-1.568)	0.51
160	ref	
(active Volume (Tertile)		
<b>1</b> 00	1.46 (1.19-1.76)	<0.01
<u>p</u> u	1.33 (1.11-1.59)	+0.01
19.	ref	
Age Group (years)		
N+	0.74 (0.56-0.99)	0.04
a 17	1.10 (0.83-1.47)	0.50
1840	ref	
Anatomic Region		
INF	0.74 (0.63-0.87)	+0.01
ieo/lota	0.61 (0.48-0.78)	<6.01
Other	ref	
Unical Filoge		
and the second se	0.22 (0.17-0.29)	+0.01
1	0.44 (0.36-0.54)	+0.01
Qrânten -	0.65 (0.54-0.70)	
í.	ref	
logical Approach		
NING	2,44 (1,72-3,46)	+0.01
Wide Licolon	3.63 (3.11-4.24)	<0.01
Land Centeron	ref	

#### 29

Presenter: Lisa R. Chastant, MD

## Title: 2-Octyl-Cyanoacrylate vs. Nonabsorbable Suture: A Comparative Analysis of Cost and Complications

Authors: Lisa R. Chastant, MD<sup>1</sup>; Hillary Johnson-Jahangir, MD, PhD<sup>1,2</sup>

**Institutions:** 1. University of Iowa, Iowa City, IA 2. Iowa City VA Health Care System, Iowa City, IA

**Purpose:** To identify the most cost-effective methods of providing healthcare, it is important to assess cost differences and other metrics. In prior studies, cyanoacrylate epidermal closure devices show comparable effectiveness, aesthetic outcomes, and patient satisfaction compared with non-absorbable sutures. Cost analysis is a fundamental first step to identifying cost-effective healthcare but is not described for these two closure methods. We calculated the estimated costs to patients and the Veterans Health Administration (VHA) for a series of 270 patients repaired using nonabsorbable suture versus 2-octyl-cyanoacrylate. Complication rates were compared as they impact overall cost of care.

**Summary:** The estimated per patient additional cost for suture care and removal following Mohs surgery at this VHA was roughly \$30/patient and out of pocket VHA patient cost was about \$52/patient on average. Most patients receive integrated care within the VHA system and pricing is predictable. No difference in complications in a predominantly male population with significant comorbidities and extensive use of anticoagulants was observed over a range of body locations and closure types including skin flaps.

**Design:** This is a retrospective chart review of 460 consecutive Mohs excision and repair events adherent to appropriate use criteria spanning July 2014-June 2015 and November 2016-June 2017 performed by a single Mohs surgeon working with resident and fellow trainees at a VHA hospital. In 2014/2015, non-absorbable suture was used exclusively whereas only 2-octyl-cyanoacrylate was used for epidermal closures in 2016/2017. Patient exclusions included closures using staples or

absorbable superficial sutures, granulation, and outside repairs. Health records reviewed included all follow up patient visits related to the original surgery within the VHA system. Direct costs per patient counted materials, copayments, and travel based on a \$0.41/mile compensation rate for qualifying veterans. All VHA suture removal visits are copay eligible without a post-operative global period. Materials costs for performance of closures and bandaging using either non-absorbable suture or 2-octyl-cyanoacrylate was equivalent. The cost to the VHA for provision of suture removal was estimated using the Medicare Physician Fee Schedule price for CPT code 99211.

**Conclusion:** Out of pocket costs for suture removal can rise to \$75-81 for veterans who pay higher copay fees for dermatology services and travel a greater distance for care. Suture removal at primary care sites and community-based clinics or use of 2-octyl cyanoacrylate can generate potential savings for both the VHA and patients. Non-absorbable suture and 2-ocytl-cyanoacrylate performed similarly with minimal complications. Costs or complications for patients who may have received aftercare outside the VHA system may be underestimated, however, most patients had documented follow-up in the VHA system. In the future, cost analysis may be collected prospectively for real-time calculations.

Figure 1A: Total cents calculated for nature care and removal. The sample represents 107 consecutive patients with 135 date cancer sites regulated after Mohs excision unit non-advantable subtractor projectional closure.



a. To calculate estimated VMX cost of providing subcreamoval care, the Medicare Physician Fee Schedule prior for OPT cost 1933 to commode used for nature removal office-sist: Veterana eligible for compression for travel for VHX case user emistraned in Sch Zinde.

b. Our of poster actualized care minutes included the poster of providing approximation to suprement the supremental (33) theory of providing approximation of providing approximation of the poster and poste

#### Figure 18: Average costs per patient for soture care and removal. Cost averages for the 107 consecutive patients with 135 skin cancer

Cost averages for the 107 consecutive putients with 135 skin cancer silves repaired after Mohs excision using non-absorbable suture for epidermal closure.





## Table I: Patient and tumor characteristics.

		uture
	absorbable 5	wil-Cyanoaci y
Demographics Not	n-au- 2-0	Det N. C.
Male	134 (99%)	133 (99%)
Female	1 (1%)	2 (1%)
Tumor Location		
Eyelid	4 (3%)	10 (7%)
Ear	27 (20%)	13 (10%)
Cutaneous lip	11 (8%)	9 (7%)
Mucosal lip	1 (1%)	0
Nose	30 (22%)	20 (15%)
Forehead	9 (7%)	17 (1%)
Cheek	40 (30%)	40 (30%)
Chin	4 (3%)	4 (3%)
Neck	3 (2%)	7 (5%)
Trunk	2 (1%)	0
Extremities	2 (1%)	1 (1%)
Hands/Digits	0	6 (5%)
Scalp	2 (1%)	8 (2%)
Closure Type <sup>a</sup>		
Linear	88 (65%)	110 (81%)
Flap	47 (35%)	25 (19%)
Post-Op Complication	ns	
Hematoma	1 (1%)	0
Bleeding	0	1 (1%)
Infection	1 (1%)	0
Partial dehiscence	1 (1%)	2 (1%)
Full dehiscence	1(1%)	0
Comorbidities & Risk	Factors	
Diabetes mellitus	29 (21%)	34 (25%)
Cardiac disease	59 (44%)	41 (30%)
Hypertension	99 (73%)	84 (62%)
Renal disease	22 (16%)	24 (18%)
Liver disease	0	3 (2%)
Cancer	4 (3%)	11 (8%)
COPD	16 (12%)	17 (13%)
Dementia	5 (4%)	8 (6%)
Tobacco	23 (17%)	10 (7%)
Immunosuppression	22 (16%)	23 (17%)
Anticoagulation	102 (76%)	82 (61%)

g: Skin substitute or graft and absorbable suture excluded

#### Figure 2: 2-Octyl-Cyanoacrylate Flap and Linear Closures

Day of surgery placement of purple 2-ocytl-cyanoacrylate on the left panel next to the same site at varying time points after surgery.



#### 30

#### Presenter: Ashley Decker, MD

# Title: Educational Videos and the Patient Experience in Mohs Micrographic Surgery

Authors: Ashley Decker, MD<sup>1</sup>; Josh Schimmel, BS<sup>1</sup>; Naomi Lawrence, MD<sup>1</sup> Institution: 1. Cooper Hospital/Rowan University, Marlton, NJ

**Purpose:** To determine if a video describing the components of Mohs micrographic surgery (MMS) and postoperative course shown immediately prior to treatment increases patient satisfaction and decreases postoperative inquiries. Patient satisfaction was assessed using a modified version of the the Consumer Assessment of Healthcare Providers and Systems Outpatient and Ambulatory Surgery Survey (OAS CAHPS).

**Summary:** 200 patients presenting for MMS were randomized by day of appointment into a video vs non-video treatment arm. Each group completed the modified OAS CAHPS at after their surgery. The average age was 67.9 years old. 47% were female and 53% male. Preoperative clinical size and average number of layers was similar between the video and non-video arm (0.48 cm2 v 0.49 cm2 area and 1.7 vs 1.65 layers, respectively). Basal cell carcinoma was the most common type of skin cancer (n=125) followed by squamous cell carcinoma (n=58), melanoma/MIS (n=10) and other (n=7). Primary closure was the most common type of reconstruction in both groups (n=105), followed by flaps (n=53), second intention (n=29) and grafts (11). (Table 1)

A statistically significant difference was seen in the survey questions (12-15) which assessed management of postoperative pain, bleeding and infection in the recovery domain (0.003, 0.001, <0.001 respectively). (Table 2). Although not statistically significant, there were fewer postoperative phone calls from patients in the video arm vs. non-video arm (14 vs 33, respectively).

**Design:** We conducted a prospective, randomized trial. A total of two hundred patients were randomized by day of appointment into two arms. In the video arm, patients were shown an informative video on appointment structure and a postoperative video highlighting postoperative expectations/common complications. In the non-video arm, patients received verbal instructions regarding appointment structure and postoperative expectations/complications. Patients filled out a modified version of the OAS CAHPS at the end of their appointment. The modified survey was scored according to the guidelines presented by CMS. Initially designed to assess patient satisfaction, Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys provide comparison between individual clinicians, practice sites, and medical groups. Different versions of this survey were developed to assess inpatient and outpatient services. The authors decided to use a modified version of the ambulatory and outpatient surgery survey because it better reflects the metrics relevant to the MMS setting.

Demographic information, tumor type, clinical size, number of levels, type of closure, use of anticoagulants and number of postoperative phone calls were recorded.

**Conclusion:** Educational videos highlighting postoperative expectations/ complications improves patient satisfaction as measured by this modified OAS CAHPS survey and decreases the number of postoperative phone calls.

Table 2. Percentage of answers in the top ("yes-definitely") cat

	Question	Video Group (%)	Non-video Group (%)	P value
Part I: Before the procedure	<ol> <li>Before your procedure, did your doctor or anyone from the facility give you all the information you needed about your procedure?</li> </ol>	92	93.0	0.67
	<ol> <li>Before your precedure, did your doctor or anyone from the facility give you easily to understand instructions about getting ready for your procedure?</li> </ol>	92	94	0.42
	3. Did the check-in process run smoothly?	99	99	
	4. Was the facility clean?	99	98	0.56
Part II: About the facility and staff	5. Were the clerks and receptionists at the facility as helpful as you thought they should be?	98	95	0.25
	<ol><li>Did the clerks and receptionists at the facility treat you with courtesy and respect?</li></ol>	100	98	0.16
	7. Did the doctors and nurses treat you with courtesy and respect?	100	100	
	<ol><li>Did the doctors and nurses make sure you were as comfortable as possible?</li></ol>	99	98	0.56
Part III: Communications about procedure	<ol> <li>Did the doctors and nurses explain your procedure in a way that was easy to understand?</li> </ol>	99	95	0.10
	<ol> <li>Before you left the facility, did you get written discharge instructions?</li> </ol>	100	100	-
Part IV: Recovery	11. Did your doctor or anyone from the facility prepare you for what to expect during your recovery?	100	93	0.008
	12. Did your doctor or anyone from the facility give you information about what to do if you had pain as a result of your procedure?	96	83	<0.001
	13. Before you left the facility, did your doctor or anyone from the facility give you information about what to do if you had bleeding as a result of your procedure?	96	78	<0.001
	14. Before you left the tacility, did your doctor or anyone from the facility give you information about what to do if you had possible signs of inflection?	95	76	<0.001

Table 1: Demographics

	Video Group	Non-Video Group
	(n=100)	(n=99)
Age, yr - mean (SD)	67.4 (12.4)	68.3 (11.6)
Female, n (%)	49 (49.0)	45 (45.5)
Race/Ethnicity		
Caucasian		
Black		
Hispanic		
Asian		
New Patient		
Yes	88	74
No	12	26
Lesion area, cm2 - median (IQR)	0.48 (0.25, 1.2)	0.49 (0.30, 1.1)
Type of skin cancer		
SCC/SCCIS	33	25
BCC	59	66
MIS	4	4
Melanoma	2	0
Other	2	5
Average number of layers	1.7	1.65
Type of Closure		
Second intention	13	16
Primary	53	52
Graft	6	5
Flap	26	27
Referred out for closure	2	0
Postoperative phone calls	14	33

#### 31

#### Presenter: Jessica B. Dietert, MD

# Title: Surgical Site Infections with Rare Organisms following Cutaneous Surgery: A Retrospective Review

**Authors:** Jessica B. Dietert, MD<sup>1</sup>; James Ko, MD<sup>1</sup>; Eva A. Hurst, MD<sup>1</sup> **Institution:** 1. Washington University in St. Louis, Creve Coeur, MO **Purpose:** Mohs micrographic and cutaneous surgery is relatively safe and low risk, with a previously reported surgical site risk of 1-5%. Prophylaxis and anti-microbial therapy for suspected surgical site infection (SSI) in dermatologic surgery typically covers gram positive organisms including staphylococcal and streptococcal species. Though thought to be infrequent, surgical site infection with less common organisms (i.e. Pseudomonas, Klebsiella) may not be covered with routine antimicrobial therapy and may pose a challenge in management. To the authors' knowledge, an investigation of the frequency and strain of organisms, as well as patient characteristics, for non-Staph/non-Strep surgical site infections has not been performed.

**Summary:** There were a total of 582 positive bacterial cultures after exclusion criteria were implemented. Coagulase negative staphylococcus, considered to be normal skin flora, accounted for 20.8% of positive results (121/582). Almost half of all results were positive for staphylococcus aureus (45.4%, 264/582). The remaining 33.8% (197/582) were due to non-staphylococcus aureus bacteria, of which the most common organism was pseudomonas aeruginosa (10.8% total, 63/582). Of the non-staph aureus group, there was a subset of cultures that yielded positive results for multiple bacteria. Therefore, the 197 culture results positive for more unusual organisms represented a total of 166 patients.

Bacteria by wound site are listed in Tables 1 and 2.

The average age for both the Staph. Aureus and non-staph. Aureus group was 68. There was a statistically significant difference in gender proportion between the two groups (p = 0.0017). The staphylococcus aureus group had more males (56.4%) than females (43.6%), while the non-staph. Aureus group had more females (58.4%) than males (41.5%). **Design:** A retrospective database search was performed of all patients treated at the Washington University in St. Louis Center for Dermatologic and Cosmetic Surgery between October 31, 2007 and October 31, 2017. Cultures excluded were viral, fungal, and mycobacterial cultures, nail cultures, bacterial cultures that resulted in duplicate results, "normal flora," "mixed microorganisms," or "fungal structural elements." The remaining 582 true positive bacterial culture results were analyzed. P-values were calculated using the N-1 Chi squared test.

**Conclusion:** Overall infection rate at our institution was found to be less than 0.5% of all surgical procedures over the ten-year time period analyzed. Antibiotics are not given routinely pre-operatively, and prophylaxis is not given routinely by site. A significant proportion of all surgical site infections with positive culture results were due to gram-negative and unusual gram-positive bacteria that would not be covered with cephalexin, amoxicillin, or clindamycin often used to treat SSIs. Therefore, more broad coverage for gram negative organisms (particularly pseudomonas) should be considered, particularly in higher risk sites such as the lower extremity, when an SSI is suspected.

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	Neck				9
	Scalp				21
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#### 32

Presenter: Andrew Hankinson, MD

## Title: Mohs Surgical Assessment Tool (MSAT) – An Assessment Tool to Objectively Assess Mohs Surgery Fellow's Surgical Skills via Intra-Operative Video Recording

Authors: Andrew Hankinson, MD<sup>1</sup>; Victor J. Marks, MD<sup>1</sup>; Alison M. Spiker, MD<sup>1</sup>; Mary G. Petrick, MD<sup>1</sup>; Michael L. Ramsey, MD<sup>1</sup>

Institution: 1. Geisinger Health System, Danville, PA

**Purpose:** To create an assessment tool to evaluate the intraoperative surgical skills of Mohs fellows in-training.

**Summary:** Objective assessment tools to evaluate intraoperative surgical skills of surgical trainees exist across multiple surgical specialties and are important for consistent, reliable trainee evaluation.

To our knowledge, we have developed the first intraoperative assessment tool to evaluate Mohs fellow surgical skills on individual components of the procedure, such as blade beveling technique during stage removal, approximation of tissue during repair, economy of motion, and other components. This tool, the Mohs Surgical Assessment Tool (MSAT), breaks down the entire Mohs procedure into 16 individual criteria for proper assessment of technique (Figures 1 and 2).

Unlike other surgical subspecialties, in Mohs surgery the patient is awake and aware, making direct, candid, real-time feedback difficult. Complete observation and assessment of the fellow's surgical skills for the entire procedure is difficult and often not possible. We have found that video recording of the fellow's surgeries is the best method of utilizing the MSAT, so that the entire surgery can be evaluated afterwards.

**Design:** Multiple surgical specialties have demonstrated that inexpensive retail camera systems can provide exceptional video quality at low cost. Our system's total cost was around \$550. The system can be mounted either to the surgical light or the surgeon's head via a headset (Figure 3).

The MSAT consists of two sections, stage removal (4 criteria) and repair (12 criteria). There are 16 total criteria to be evaluated on, each graded on a scale from 1-5, with 5 being near-perfect technique and 1 being poor technique. At the end of each section there is room for comments and open feedback. One or multiple attendings first watch the video and evaluate the fellow's surgical performance via the MSAT. The fellows then watch and evaluate themselves via the MSAT. This affordable video setup allows the reviewers to zoom-in, fast-forward, or rewind, while watching the entire technique via high definition video at their convenience. Reviewers can observe every fine detail of hand movement, blade movement, and suture placement.

**Conclusion:** Evaluations of our fellows' surgeries have been done at approximately monthly intervals since inception. The fellows at our institution have used the MSAT feedback to identify multiple areas for improvement in both layer removal technique and reconstruction technique. The fellows report that the MSAT has directly lead to numerous improvements in their surgical technique that would not have occurred without the assessment tool.

We have found the MSAT to be an easy to use and effective assessment tool to evaluate and improve Mohs fellow surgical training. Given the simplicity and low cost of the commercial camera setup, we believe other fellowships can utilize the MSAT to help identify weaknesses and optimally train their fellows. Trainee: Evaluator Date of Procedure: Date of Evaluation:

#### ATTENDING-EVALUATION OF PERFORMANCE

Instructions: Please objectively rate fellow's surgical performance based on the video recording of the procedure. A rating of 5 should reflect performance consistent with an experienced attending. A rating of 4 should reflect performance of a fellow near graduation. If not applicable, leave blank. Use the free response area at end of each section to explain any pertinent feedback. Sections 1 and 2 may be explained semarative on different cases if desired.

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Moles Surgical Assessment Tool (MSAT)

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#### 33

Presenter: Victoria Godinez-Puig, MD

### Title: Interpolation Flaps in the Outpatient Mohs Surgery Setting: Patient Comfort and Satisfaction Study

**Authors:** Victoria Godinez-Puig, MD<sup>1</sup>; Irèn Kossintseva, MD<sup>1</sup>; David M. Zloty, MD<sup>1</sup>

**Institution:** 1. University of British Columbia, Vancouver, BC, Canada **Purpose:** To date, no studies have evaluated pain, anxiety and satisfaction in patients undergoing staged interpolation flaps (SIFs) under local anesthesia in the outpatient setting. Measuring such patientreported outcomes (PROs) provides direct information from the patient's perspective, and allows physicians to improve quality of care. The objective of this study was to assess pain, anxiety and satisfaction levels in patients undergoing SIFs performed by Mohs surgeons.

**Summary:** Twenty-one patients requiring SIFs after clearance of skin cancer with Mohs micrographic surgery were included in the study. Patients underwent paramedian forehead (n=16, 76.2%), melolabial (n=3, 14.3%) and posterior auricular (n=2, 9.5%) interpolation flaps. Fifteen patients (71.4%) had postoperative defects > 4cm2. Six patients (28.6%) had full thickness defects requiring repair of the nasal mucosal lining and the use of cartilage grafts (Table 1).

On the day of surgery (D0), mean pain (2.97 +/- 2.27) and anxiety levels (3.31 +/- 2.63) were mild. Mean pain (4.41 +/- 2.48) and anxiety (3.94 +/- 2.6) levels peaked at postoperative day 1 (D1) and were considered moderate. Post-operative days 2 to 7 (D2-7) showed a gradual and consistent decrease in pain and anxiety back to mild levels (Figures 1 and 2).

Patients were very satisfied with their surgical experience. Mean satisfaction levels were not statistically different between D0 (9.82 +/- 4.9) and the day of flap division (DD) (9.63 +/- 6.4), (p=0.29), indicating that postoperative care and changes in facial appearance due to the presence of the flap pedicle before division did not alter patient's satisfaction.

**Design:** This was a prospective, single-institution cohort study conducted from August 2017 to January 2018. Pain and anxiety scores were recorded using validated Visual Analog Scales (VAS) on D0 through D7, and on DD. In addition, VAS satisfaction scores were recorded on D0 and DD. Patient demographics, as well as tumor, defect and repair characteristics were recorded on D0. Information relating to use of analgesics and anxiolytics was obtained from D0 to DD. Surgical complications were recorded on D7. The validated VAS for pain and anxiety uses a ten-point scale. Literature interpretation of the VA equates <3.5 to mild, 3.6-6.5 as moderate and >6.6 as severe pain or anxiety.

**Conclusion:** SIFs performed by Mohs surgeons in the outpatient setting are well tolerated by patients. Mild to moderate pain and anxiety levels tend to peak on D1, after which they gradually decrease back to mild levels on subsequent days. Patient satisfaction is very high and unchanged before and after pedicle division.

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	SCC 0 (PDI)	Anvolytics or DD	None: 18(85.7%)
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Table 1- Patient characteristics



Figure 1- Mean VAS pain scores



Figure 2- Mean VAS anxiety scores

#### 34

Presenter: Christine Shaver, MD

## Title: Mohs Micrographic Surgery for Extramammary Paget's Disease: 40 Years Experience with 29 Patients

Authors: Christine Shaver, MD<sup>1</sup>; Richard G. Bennett, MD<sup>1</sup>

Institution: 1. Bennett Surgery Center, Santa Monica, CA

**Purpose:** Extramammary Pagets disease (EMPD) is an unusual skin cancer that is thought to be amenable to Mohs micrographic surgery (MMS). We sought to determine the recurrence rate and limitations of Mohs micrographic surgery in the treatment of EMPD.

**Summary:** Patient and tumor variables are presented in Table 1, MMS variables in Table 2, and MMS follow-up data in Table 3. Of the 29 patients, MMS was completed in 21 (72.4%) but not completed in 8 of 29 (27.6%). In those patients that Mohs surgery was incomplete, 3 had persistent disease and refused further therapy, 4 went to the operating room in conjunction with other specialties, and 1 was lost to follow-up. Of the 12 patients that presented with persistent disease, 2 refused completion of Mohs surgery; of the 10 patients that completed Mohs surgery, 5 recurred, giving a 50% recurrence rate. Of the 17 cases who presented with primary EMPD, 11 completed Mohs surgery, of which 3 recurred, giving a cure rate of 72.7%. Of the remaining 6 patients with primary EMPD who did not complete MMS, 2 had persistent disease and refused further therapy, 1 went to the operating room, and 3 were lost to follow-up. Three patients died from EMPD, of whom MMS could not be completed in two.

Design: A retrospective study of 29 patients with EMPD treated with MMS was done. All surgeries were performed by a single surgeon using hematoxylin and eosin (H&E) frozen sections without special stains. Further, examination of the whole underside of the excised skin was done on every case. If the tumor needed to be excised in the OR, we followed the patient there. Data from patient charts, photographs and microscopic sections were abstracted. Patient variables included gender, race, age at surgery, smoking, and internal malignancy. Tumor variables included primary versus recurrent, location, dermal invasion and glandular involvement. Mohs surgery variables included number of stages, post-op minus pre-operative diameter difference, extension into orifices (rectal, urethral, vaginal) and requirement for an OR with assistance from another specialist. Recurrence after MMS for primary and recurrent tumors was calculated. In addition, the number that died with their disease, without their disease and the number that were lost to follow-up were determined.

**Conclusion:** MMS provides a higher cure rate for primary EMPD compared to recurrent EMPD, however, its limitations are that it cannot be often completed in tumors which are invasive at the time of presentation or that extend into areas, such as the rectum, that require general anesthesia and assistance of other specialists. A small but significant number of tumors involve underlying apocrine or sebaceous glands or invade the dermis. Thus it is important that all margins peripheral and deep be examined.

TABLE 1: PATIENT AND TUMOR VARIABLES (N = 29 PATIENTS)

GENDER	17 MALE, 12 FEMALE
RACE	19 CAUCASIAN, 9 ASIAN, 1 HISPANIC
AGE AT SURGERY	MEAN 71.2 YEARS
	(73.9 YRS MEN, 67.5 YRS WOMEN)
SMOKING HISTORY	1 CURRENT, 16 FORMER, 12 NON-SMOKER
UNDERLYING CANCER	8 TOTAL WITH CANCER AT EMPD DIAGNOSIS
	4 WITH NEW DIAGNOSIS OF CANCER POST-SURGERY
% PRIMARY TUMORS	17 PRIMARY, 12 RECURRENT
LOCATION	14 MALE GENITALIA, 8 FEMALE GENITALIA, 5 PERI-
	RECTAL, 2 PUBIC
INVASION	6/29 WITH PATH INVASION
	(3 DERMAL INVASION, 3 GLANDULAR INVASION)

TABLE 2: MOHS SURGERY VARIABLES

MEAN NUMBER OF STAGES	7.8 STAGES (RANGE 2-29)
PRE-OP TUMOR SIZE	OVERALL 6.03 CM
	(PRIMARY: 5.28 CM, RECURRENT: 7.08 CM)
POST-OP TUMOR SIZE	OVERALL 11.5 CM
	(PRIMARY: 11.6 CM, RECURRENT: 11.4 CM)
MEAN OVERALL POST-PRE OP SIZE	5.47 CM
EXTENSION INTO ORIFICES	7 OVERALL
	(3 PERIANAL, 2 URETHRA, 2 VAGINA)
REQUIREMENT FOR AN OR	7 PATIENTS

TABLE 3: MOHS SURGERY FOLLOW-UP

NUMBER UNDERGOING MMS	29
MOHS COMPLETED	21
NO RECURRENCE	14/21 (66.7%)
PRIMARY EMPD	17
LOST/PERSISTENT/OR	6
NO RECURRENCE	8/11 (72.7%)
RECURRENT EMPD	12
PERSISTENT	2
NO RECURRENCE	5/10 (50%)
NO RECURRENCE RECURRENT EMPD PERSISTENT NO RECURRENCE	8/11 (72.7%) 12 2 5/10 (50%)

#### 35

(Withdrawn)

#### 36

Presenter: Rami Hamadeh El-Khayat, MD, MRCP

## Title: Sub-Clinical Extension of Basal Cell Carcinoma Involving the Distal Nose: A Subtype Analysis

Authors: Rami Hamadeh El-Khayat, MD, MRCP<sup>1</sup>; Paul J. Salmon, BhB, MBChB, FRACP<sup>1</sup>; Neil J. Mortimer, BSc Hons, MBChB, FRCP, FRACP<sup>1</sup> Institution: 1. Skin Cancer Institute, Tauranga, New Zealand

**Purpose:** Aggressive histologic subtypes of basal cell carcinoma (BCC): infiltrating; sclerosing and micronodular; are reported to exhibit greater subclinical extension than 'low risk' subtypes: nodular and superficial. Our study aimed to analyse subclinical extension of BCC according to histologic subtype on the distal nose area during Mohs Micrographic Surgery (MMS)

**Summary:** Between January 2009 and August 2017, 827 cases of BCC affecting the distal nose were identified, of which 106 BCCs required 3 or more stages of MMS. 87 of these were primary BCC and 19 recurrent/ persistent BCC following previous treatment.

Analysis of histologic subtype following the first stage of MMS showed 36.7 % superficial BCC compared to 34.9 % infiltrative/ sclerosing and 22.6 % mixed subtype. Subtype analysis for subsequent stages of MMS showed 36.7% superficial BCC compared to 29.2 % infiltrative/ sclerosing and 31.1% mixed subtype. There was no statistically significant difference between the number of stages required to achieve tumor clearance between superficial BCC and infiltrative/ sclerosing BCC subtype or non-aggressive versus aggressive BCC subtypes (P=0.15, P = 0.55 respectively). On the final Mohs stage, 50.9 % of cases were superficial BCC subtype compared to 37.7% infiltrative and 3.7 % mixed.

The histologic subtype of the initial biopsy specimen correlated with MMS BCC subtype in only 42.8% of cases. The correlation between the histologic subtype assessment of the first MMS stage and all MMS slides assessment was 88%.

**Design:** A retrospective analysis of 106 cases of BCC involving the distal nose (tip and ala) requiring three or more Mohs stages to achieve tumor clearance was performed for the period between January 2009 and August 2017. The histologic subtypes present at each stage were analysed. Chi-squared analysis was used to examine the data for statistical significance.

**Conclusion:** Superficial, infiltrative/ sclerosing and mixed BCC subtypes involving the distal nose can exhibit significant subclinical extension warranting multiple stages of MMS to achieve clearance. Whilst this may be expected with BCCs with aggressive growth patterns, some Mohs surgeons may not be aware of the potential for extensive subclinical extension with superficial BCC. Our study demonstrates that superficial BCC subclinical extension can be as significant as aggressive BCC subtypes. Knowledge of this is important for surgical planning and preoperative counselling of patients prior to MMS for BCC of the distal nose.

The Histologic subtype present on the first Mohs stage appears more predictive of the true histologic subtype and consequently, the biologic behaviour of the BCC, than the subtype on initial biopsy. This may again have implications for decisions regarding treatment.

#### 37

#### Presenter: Lauren P. Rimoin, MD

## Title: The Utility of Mohs Micrographic Surgery with Final Permanent Section Analysis in Treating Lentigo Maligna and Lentigo Maligna Melanoma

Authors: Lauren P. Rimoin,  $MD^1$ ; Sarah Wilson,  $MD^2$ ; Kevin Luk<sup>2</sup>; Katarina Lequeux Nalovic<sup>2,3</sup>

Institutions: 1. Aurora Health Care, Waukesha, WI 2. Emory University, Atlanta, GA 3. Atlanta Skin Cancer Specialists, Atlanta, GA **Purpose:** There is disagreement in the literature regarding the minimal surgical margin necessary for acceptably low rates of tumor recurrence as well as a lack of standardized method for effective tumor extirpation in melanoma. The shortcomings of vertical sectioning and standardized margin recommendations are particularly problematic in the case of LM and LMM subtypes, where recurrence rates tend to be higher than with other types of melanoma. Although Mohs micrographic surgery (MMS) has been shown to effectively treat melanoma and melanoma in situ, concordance amongst surgical protocols is lacking. Additionally, the sensitivity and specificity of the Mohs procedure for identifying tumor margins of melanoma has never been published.

Our objective was to evaluate a method of treating lentigo maligna (LM) and lentigo maligna melanoma (LMM) with MMS involving traditional permanent vertical sectioning of debulking excision, examination of en face frozen sections without immunostains, and review of final permanent margins by dermatopathology prior to closure. We describe recurrence rate, tumor upstaging, undercalls and overcalls associated with this technique and calculate first-ever reported sensitivity and specificity in assessing LM and LMM margins.

**Summary:** We observed 1 recurrence, reflecting a 0.003% 5-year recurrence rate. No significant difference in upstaging between LM and LMM (p=0.779) was found. Rate of overcalls was 8.98%, with no significant difference between LM and LMM (p=0.548). Sensitivity and specificity was 90.14% and 81.7%, respectively, for this technique in assessing tumor margins with the Mohs technique.

**Design:** A retrospective analysis of 621 patients referred for Mohs micrographic surgery of LM and LMM from 2007 through 2012 was performed. All analyses were performed using Chi-squared testing between patient characteristics and individual items, including: number of stages to clear, overcalls, undercalls, and upstaged cancers.

**Conclusion:** We demonstrate efficacy of our method for surgical treatment of LM and LMM using MMS and H&E, followed by analysis of permanent section by dermatopathology. The 5-year recurrence rate was 0.003%. Sensitivity was 90.14% and specificity was 81.7% for this technique.

Figure 1. Lentigo maligna melanoma. After initial debulk has been removed

and placed on gauze, a 5mm rim of tissue is excised for a lentigo maligna

#### melanoma.



Figure 2: Lentigo maligna melanoma. A) The excised debulk specimen and 5mm rim of tissue from the same lentigo maligna melanoma. B) The 5mm excision specimen is bisected, inked and prepared for freezing.



Figure 3) Lentigo maligna melanoma. A) Once the lentigo maligna melanoma is cleared by the Mohs technique, a final 5mm rim of tissue and layer of fat is inked and submitted to a dermatopathologist for permanent sections. B) The associated map submitted with permanent sections.



#### 38

#### Presenter: Jonathan P. Staidle, MD

## Title: A Novel Film-Forming Silicone-Based Wound Dressing to Minimize Infection and Prevent Dermatitis After Mohs Micrographic Surgery

**Authors:** Jonathan P. Staidle, MD<sup>1</sup>; Paul X. Benedetto, MD<sup>2</sup>; Ernest A. Benedetto, MD<sup>2</sup>; Anthony V. Benedetto, DO<sup>3,2</sup>

Institutions: 1. Skin Cancer and Dermatology Institute, Reno, NV

- 2. Dermatologic SurgiCenter, Drexel Hill, PA
- 3. Perelman School of Medicine, Philadelphia, PA

**Purpose:** An increasing number of studies have demonstrated an increase in the presence of antibiotic-resistant bacteria due to the overuse of antibiotics, and an increased risk of allergic and irritant contact dermatitis with topical antibiotics. The primary objectives of this study were to compare the prevalence of contact dermatitis, healing time, and healing quality of wounds with an antibiotic-free, film forming silicone gel to traditional topical petrolatum-based triple antibiotic ointment (bacitracin zinc-neomycin sulfate-polymyxin B sulfate) as control. The secondary objectives were to compare the presence of infection, patient satisfaction, comfort and ease of application of the film forming silicone gel against the petrolatum-based triple antibiotic ointment to their post-operative wounds.

**Summary:** A prevalence of contact dermatitis of 22% and 0% was observed for the petrolatum-based antibiotic control group versus the silicone trial group (p = 0.007). Healing time was also significantly enhanced in the silicone group (+0.41) compared to the petrolatum antibiotic group (-0.003, p = 0.013). Healing quality was +0.66 for the silicone group compared to that of -0.07 for the antibiotic control group, which was also statistically significant (p = < 0.001).

**Design:** A randomized, placebo controlled study involving 60 patients who underwent Mohs micrographic surgery was performed to compare the prevalence of allergic contact dermatitis, healing time, and healing quality of a novel film-forming silicone gel (treatment group, n=30) to a traditional petrolatum-based topical triple antibiotic (control group, n=30). Patients applied the silicone gel or petrolatum-based antibiotic ointment immediately after surgery and at least twice daily thereafter until healed. Patients with a history of allergic contact dermatitis to topical antibiotics were excluded from the study but were included in the statistical analysis for the calculation of contact dermatitis prevalence. At the initial and follow up visits, the surgical wounds were photographed and assessed for the presence of infection or contact dermatitis. Wound healing time and quality was evaluated by the dermatologic surgeon using a rating scale against expected results from -4 (much worse) to +4 (much better).

**Conclusion:** Mohs surgical wounds treated with the film-forming silicone dressing demonstrated statistically significant improvements in wound healing time and quality compared to the petrolatum-based triple antibiotic control. Additionally, a higher prevalence of contract dermatitis was observed in the antibiotic group without a significant difference in the presence of infection between the groups. The efficacy of silicone for scar reduction has been well established, but may only be applied once the wound is healed. The film forming silicone wound dressing used in this study has been approved for use on open granulating wounds and presents a viable alternative to petrolatum-based topical antibiotics for post-operative wound care without enhancing the risk of infection.

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### Presenter: Nikoo Cheraghi, MD

## Title: Melanoma Treated with Mohs Micrographic Surgery Using a Modified 15-Minute MART-1 Immunostain: Discussion of Technique and Experience

**Authors:** Nikoo Cheraghi, MD<sup>1</sup>; Addison Demer, MD<sup>1</sup>; Andrew Meister, BS, HT (ASCP)<sup>2</sup>; Peter K. Lee, MD, PhD<sup>1,2</sup>

**Institutions:** 1. University of Minnesota, Minneapolis, MN 2. Park Nicollet, St. Louis Park, MN

**Purpose:** Mohs micrographic surgery (MMS) is increasingly utilized for the treatment of melanoma in situ (MIS) and invasive melanoma. The process of performing MMS using immunohistochemistry (IHC) can be tedious and time-consuming, therefore, limiting the number of melanomas that can be treated per MMS session. Anecdotally, the standard 10-minute MART-1 immunostains are challenging to replicate reliably. We describe a novel method of tissue processing and staining for cutaneous melanomas treated with MMS. This modified 15-minute MART-1 IHC protocol allows for ease of use, efficiency, and reliability. We also describe the characteristics of the melanomas that have been treated with this method thus far at our institution.

Summary: A Wood's lamp is used to determine the extent of the melanoma. Depending on whether the lesion is MIS or invasive melanoma, the tissue is processed in a specific manner with a positive control. (Figure 1) For MIS, an internal positive control is taken as a thin column from within the pigmented center of the lesion; the positive control should show positive staining in the center with normal distribution of melanocytes at both edges. For invasive melanomas, the pigmented lesion is sharply debulked down to deep fat and sent to pathology for standard processing and staging if indicated. An internal positive control is taken as a thin shave in a lesser pigmented area of the melanoma; this allows for the probable invasive component, which is usually more highly pigmented, to be unimpaired. The first stage is taken as a 2-mm margin around the debulk. Tissue cuts are stained in alternating fashion with either hematoxylin and eosin (H&E) or MART-1 using our 15-minute MART-1 IHC protocol. (Figure 2) Over fourteen months, 155 melanomas (111 in situ) were treated with this protocol. Sixty six percent of subjects were male with an average age of 68.8 years. The melanomas were mostly primary tumors (85%) located on the head and neck (88%). On average, it took 1.39 stages to clear the melanomas. (Table 1)

Design: A retrospective chart review was performed including all MIS and invasive melanomas treated with MMS with MART-1 immunostain by a single surgeon from October 2016 to November 2017. Data was collected on subject characteristics including subject age and gender, melanoma depth, number of stages needed to clear the melanoma, pre-operative and post-operative sizes, and whether the melanoma was primary, incompletely excised, or recurrent.

**Conclusion:** Performing MMS using a 15-minute MART-1 stain can be used on a wide variety of melanoma types and is easy to use. We describe a standardized and reliable method of staining using a modified 15-minute MART-1 immunostain.



Figure 1: Processing of first stage of MIS and invasive melanoma, Positive control of MIS with MART-1 immunostain shows the transition between melanoma in situ and normal distribution of melanocytes.

Figure 2: Modified Fifteen-Minute MART-1 Immunostain Protocol



shaker incubator

30 seconds

Xylene

Coverslip sections

Age in years (average ± SD)	68.8 ± 13.3
Male	103 (66%)
Melanoma Site	
Cheek	39 (25%)
Neck	23 (15%)
Forehead	18 (12%)
Ear	16 (10%)
Scalp	15 (10%)
Nose	11 (7%)
Eyelid	9 (6%)
Arm	8 (5%)
Back	3 (2%)
Hand	3 (2%)
Chin	3 (2%)
Lip	2 (1%)
Chest	2 (1%)
Foot	2 (1%)
Leg	1 (1%)
Pre-operative size in cm <sup>2</sup> (average ± SD)	3.0 ± 3.5
Post-operative size in cm <sup>2</sup> (average ± SD)	9.6±7.9
Breslow depth in mm (average, range)	0.13, 0 - 2.13
In situ	111 (72%)
Melanoma History	
Primary	131 (85%)
Incompletely excised	8 (5%)
Recurrent (prior Mohs)	5 (3%)
Recurrent (prior excision)	11 (7%)
Stages to clearance (average, range)	1.39, 1 - 4

Table 1: Subject and Melanoma Characteristics

Data is reported as number (percent) unless otherwise specified.

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Presenter: Pooja Chitgopeker, MBChB

## Title: Antibiotic Prophylaxis for Staged Interpolation Flaps Following Mohs Micrographic Surgery: A Single-Center **Experience on Practice Variability**

Authors: Pooja Chitgopeker, MBChB1; Zoe Brown-Joel, BS2; Jina Chung, MD<sup>1</sup>; Lisa Chastant<sup>1</sup>; Hillary Johnson-Jahangir, MD, PhD<sup>1</sup>; Marta VanBeek, MD, MPH<sup>1</sup>; Nkanyezi Ferguson, MD<sup>1</sup>

Institutions: 1. University of Iowa Hospitals and Clinics, Iowa City, IA 2. University of Iowa, Iowa City, IA

**Purpose:** There is a lack of consensus regarding the use of antibiotic prophylaxis to prevent surgical site infection (SSI) with staged interpolation flaps. Antibiotic use in this situation varies widely with some surgeons using prophylaxis prior to and/or following: the first inset stage, the second takedown stage and some do not use them at all. We sought to compare SSI rates in patients with staged interpolation flaps that received antibiotics compared to those that did not receive antibiotics.

**Summary:** Antibiotics were administered to 28 (39.1%) out of 46 patients undergoing staged interpolation flaps. Antibiotic prophylaxis was administered at various times including: prior to stage 1, after stage 1, immediately prior to stage 2 and immediately after stage 2. There was overlap of these groups with some patients receiving antibiotics at more than one time point. There were a total of 3 culture proven infections that occurred following stage 2 and of these, 2 were in the prophylactic antibiotics group and 1 was in the no antibiotics group. There were also 3 patients started on antibiotics by non-surgeon primary care providers for suspected, non-culture proven infection.

**Design:** A retrospective chart review of all 46 patients who had staged interpolation flaps (melolabial, retroauricular and paramedian forehead) following Mohs Micrographic Surgery (MMS) between 2011-2017. Patients were matched for gender and age. Patient and surgery characteristics of those who did not receive antibiotics vs. those who received antibiotics can be seen in Table 1. SSI rates following first and second stages was compared between the two groups (Figure 2) as well as other covariates including: type of skin cancer, site, post-operative size (cm2), interpolation flap type, smoking history, immunosuppressive status, history of diabetes and anticoagulation history. Statistical analysis was performed using the Wilcox rank sum test for non-parametric ordinal variables and the Fisher's exact test was used for categorical variables. A subgroup analysis of patients who received antibiotics immediately preceding and following stage 2 was carried out using Fisher's exact test (Figure 3).

**Conclusion:** The SSI rate following interpolation flaps is comparable between patients who receive antibiotic prophylaxis versus those who did not. Based on our results, we propose that antibiotic prophylaxis with interpolation flaps may not be necessary to prevent post-operative SSI. Historically there has been significant variability of antibiotic regimens used at our institution as highlighted in this study. Our study limitations include the small sample size. In any study looking at infection rates, results are hampered by variability of culture use and low threshold to initiate antibiotics by providers who may not have been the primary surgeon. Considering the overuse of antibiotics, there is little evidence for a need of antibiotics in this patient population.

Table 1: Baseline Characteristics	CAN DOMEST	201120-00Hz	100
	No antibiotics	Antibiotics	p-value
N (%)	10(39.1)	28 (60.5)	1. 57 2. 1. 1.
Demographics			
Female, N (%)	10(55.6)	14 (50)	0.769
Male, N (%)	8 (49.3)	34(30)	0.769
Age, mean (SD)	68.9 (34.6)	67.4 (12.1)	0.7355
Tumor and Surgical Characteristics			
Type, N (N)			0.487
BCC .	34 (77.8)	24 (85.7)	
scc	1 (5.6)	3 (10.7)	
Melanoma in situ / lentigo maligna	3 (16.7)	1(34)	
line, N (%)			0.486
far .	3 (16.7)	8 (29.4)	
Nose	35 (03.3)	20 (71.4)	
Flap type, N (%)			0.369
Melolabial	14 (77.8)	24(50)	
Paramedian forehead	1 (5.0)	6 [23.4]	
Retroauricular	3 (16.7)	8 (26.6)	
Days between stages, mean (50)	18.6 (8.9)	38.7 (4.7)	0.7613
Preoperative size in cm2, mean (SD)	0.9 (1)	2.6 (2.3)	0.4363
Postoperative side in cm2, mean (SD)	3.5 (2.4)	5.8 (4.4)	0.0797
Medical Comorbidities			
Current Smoker, N (%)	2(13.1)	7 (25)	0.448
immunocompromised, N (%)	1(5.6)	2 (7.3)	1
Diabetes, N(%)	3 (16.7)	7(25)	0.717
Hertory of CLL, N (%)	0 (0)	0 (0)	
Anticoagulation use, N (%)	7(38.9)	34 (50)	0.351
Anticoagulation type, N (%)			0.513
Aspirin	5 (72.4)	22 (85.7)	
warfann	3 (14.3)	2 (14.3)	
Rivarovaban	1 (14.3)	5-(17.5)	

Figure 2: Surgical Site Infection Rates With and Without Antibiotic Prophylaxis Following Interpolation Flap Inset and/or Takedown



gure 1: Sorgical Site Infection in Patients Who Received Antibiotics Prior to and/or immediately Following Interpolation Flap Takedown



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Presenter: Brienne D. Cressey, MD, MBA

# Title: The Rhombic Flap: A Useful Flap for Small-Medium Size Defects of the Medial Canthus

**Authors:** Brienne D. Cressey, MD, MBA<sup>1</sup>; Nathaniel J. Jellinek, MD<sup>1,2</sup> **Institutions:** 1. Dermatology Professionals, Inc, East Greenwich, RI 2. The Warren Alpert Medical School at Brown University, Providence, RI

**Purpose:** Reconstruction of surgical defects on the medial canthus

present a frequent challenge for dermatologic surgeons. Surgical repair in this area may inadvertently lead to canthal webbing, ectropion and/or epiphora. The canthal rhombic flap can be designed with a superiorly, medially, or inferiorly based pedicle. Our objective was to describe the use of the inferiorly-based rhombic flap for reconstructing defects on the medial canthus.

**Summary:** 34 cases were identified and charts reviewed. Average defect size was 1.1 cm. Postoperative photographs were evaluated for all patients with follow-up photographs and scars scored using the Vancouver Scar Scale (VSS). VSS assesses vascularity, height/thickness, pliability and pigmentation on a scale with total score ranging from 0 (best) to 13 (worst) at variable follow-up time. 33/34 scars were evaluated, 24/34 scored 0, and 9/34 scored 1 at variable follow-up. Scores were uniformly for swelling of 2mm or less or vascularity with tendency to resolve at long term follow-up. No significant complications were noted.

**Design:** IRB approval was obtained. A retrospective analysis of Mohs micrographic surgery database over a 5-year period was performed. All cases on the medial canthus in which an inferiorly-based rhombic flap was used were identified. Defect location, size, any postoperative complications, overall results were noted.

**Conclusion:** The inferiorly based rhombic flap is a straight-forward, reliable, and versatile technique for reconstructing surgical defects of the medial canthus. Several points of emphasis can be incorporated to minimize complications and maximize aesthetic and functional outcomes: 1) this is best utilized for defects in the lower half of the medial canthus, 2) the flap design can hide suture lines from closure of the secondary defect in the nasofacial sulcus when possible, and 3) use of pexing sutures to the medial canthal tendon can reliably set the flap and prevent canthal webbing and ectropion.

These cases are demonstrated with detailed case analysis and photographs, with emphasis on the key points to achieve reproducible results from this procedure.





#### 42

Presenter: Kathleen C. Suozzi, MD

Title: Clinical and Histologic Factors Influencing Clearance Rates for Melanoma in situ Treated by Standard Excision Authors: Kathleen C. Suozzi, MD<sup>1</sup>; Sean R. Christensen, PhD<sup>1</sup>; Gauri Panse<sup>1</sup>; David J. Leffell, MD<sup>1</sup>

**Institution:** 1. Yale School of Medicine, New Haven, CT

**Purpose:** To evaluate the clearance rates of melanoma in situ (MIS) after conventional excision with 4-5mm margins. We sought to determine if clearance rates with these standard margins were associated with

specific clinical factors including patient age, lesion site and lesion size. We also evaluated the degree of basilar melanocytic hyperplasia (BMH) at the margins of all cases to determine if the presence of BMH correlates with subclinical extension and lower clearance rates.

**Summary:** Retrospective analysis of 178 cases of MIS revealed an overall clearance rate on initial excision of 84.8% with average margin size of 0.47 centimeters. Analysis by lesion site demonstrated clearance rates were lower for lesions of the head and neck: 76.6% clearance (mean 0.49 cm margin) for head and neck vs 92.2% clearance (mean 0.44 cm margin) for truncal lesions and 96.7% clearance (mean 0.47 cm margin) for extremity lesions (p=0.004). As previously reported, older age was associated with higher likelihood of positive margins on initial excision: clearance rates were 91% vs 79% for patients <70 vs >70 years old (OR 1.14; p=0.039). Lesion size did not impact clearance rate. Subgroup analysis by site also failed to show an association between lesion size and clearance rates. There was no significant difference in BMH between cases that were clear vs not clear on initial excision. The overall rate of BMH was 30.6% for all lesions scored and was not associated with location or patient age.

**Design:** We performed a retrospective analysis of all cases (n=178) of MIS treated by four surgeons at a single institution with excision using permanent sections for margin evaluation over a 32-month period. Cases with positive margins on initial excision were evaluated for additional staged excision. Age, sex, anatomic site (head, trunk or extremity), margin size, lesion dimension (diameter and calculated area of an ellipse), and histologic detail were recorded and correlations evaluated. The presence of BMH was determined by a dermatopathologist in a blinded fashion according to the scale by Hendi et al (2011). Positive BMH was defined by average count greater than 9 melanocytes per high power field on H&E.

**Conclusion:** Retrospective analysis of MIS treated with conventional excision showed that 4-5mm margins resulted in high cure rates for lesions on the trunk and extremity, with lower initial clearance rates on the head and neck. Younger patients were more likely to be clear on initial excision but lesion size was not associated with initial clearance using conventional margins. The results of this study failed to show an association between BMH and subclinical spread of MIS, suggesting that BMH is not a critical determinant in margin evaluation of MIS.

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#### Presenter: Milene K. Crispin, MD

Title: Use of 5-0 Fast Absorbing Gut vs 6-0 Fast Absorbing Gut During Cutaneous Wound Closure on the Head and Neck: A Randomized Evaluator-Blinded Split-Wound Comparative Effectiveness Trial

**Authors:** Milene K. Crispin, MD<sup>1</sup>; Ashley K. Clark, MS, MAS<sup>2</sup>; Daniel B. Eisen, MD<sup>2</sup>

**Institutions:** 1. California Skin Institute, Carmel-By-The-Sea, CA 2. University of California-Davis, Sacramento, CA

**Purpose:** The purpose of this study was to determine whether the use of 5-0 fast absorbing gut during repair of linear cutaneous surgery wounds improves scar cosmesis compared to wound closure with 6-0 fast absorbing gut on the head and neck. We used a split wound model, where half of the wound was treated with 5-0 fast absorbing gut and the other half was repaired with 6-0 fast absorbing gut. Three months

post-surgery, 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 on the head and neck were enrolled in the study. At 3 month follow up, the patient and two blinded observers evaluated the wound using the Patient Observer Self-Assessment Scale (POSAS). Forty-six patients were available for follow up. The observer POSAS score for the 6-0 fast absorbing gut (12.03) was more favorable than the POSAS score for 5-0 fast absorbing gut (13.11), but the difference was not statistically significant (p=0.5371). The observer overall opinion was also more favorable for 6-0 fast absorbing gut (2.49) compared to that of 5-0 fast absorbing gut (2.64) but the result was not statistically significant (p=0.2568). The scar width for 6-0 fast absorbing gut (0.74 mm) was smaller compared to 5-0 fast absorbing gut (0.78 mm) but the result was not statistically significant. There was an increased number of complications in the group that received 5-0 fast absorbing gut (12).

**Design:** This was a prospective, randomized, split-scar intervention in patients undergoing repair of linear cutaneous surgery on the head and neck. After buried vertical mattress sutures were placed with vicryl sutures, half of the wound was randomized to receive running cuticular sutures with 5-0 or 6-0 fast absorbing gut; the other size received the opposite. Three months post-surgery, the patient and two 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 worse scar imaginable." The scar width and adverse events were recorded.

**Conclusion:** For the linear repair of cutaneous wounds, 6-0 fast absorbing gut was aesthetically superior to 5-0 fast absorbing gut, with improved overall scar assessments by blinded observers. There was no difference in scar width or complications.

Table I. Demographics and Surgery Data				
Characteristic		Value		
Age, median		69		
Male sex, n (%)	1000 C	39 (78)		
Race, n (%)	White	51 (100)		
Location n (%)	Cheek	24 (48)		
	Forehead	12 (24)		
	Pre-auricular	3 (6)		
	Temple	6 (12)		
	Other	5 (10)		
Closure length, mean cm	Sec.	5.8		
Surgeon experience, n (%)	Fellow	27 (54)		
	Attending	20 (40)		
	Resident	3 (6)		
Indication	Mohs surgery	50 (100)		

#### 44

Presenter: Stanislav N. Tolkachjov, MD

# Title: Conservative Thickness Layers in Mohs Micrographic Surgery

Authors: Stanislav N. Tolkachjov, MD<sup>1</sup>; Jonathan A. Cappel, MD<sup>1</sup>; Elizabeth A. Bryant, BBA<sup>1</sup>; Christopher B. Harmon, MD<sup>1</sup> Institution: 1. Surgical Dermatology Group, Birmingham, AL

**Purpose:** Mohs micrographic surgery (MMS) is used to treat cutaneous malignancies in locations to maximize tissue sparing. The authors aim to demonstrate the utility of conservative thickness layers (CTL) in MMS and review patient and tumor characteristics and the potential anatomic locations where this technique may be most useful.

Summary: 339 tumors were treated with conservative thickness layers. 165 were basal cell carcinomas (BCC) and 174 were squamous cell carcinomas (SCC). The average patient age was 68.9 with a male to female ratio of 1.1:1. The most common anatomic site was the lower extremity (97; 28.6%) with 77.4% of these being female. The next most common sites were: nose (83; 24.5%), scalp (47; 13.9%), back (39; 11.5%), ear (22; 6.5%), shoulder (17; 5.0%), foot and upper extremity (6; 1.8%) each, forehead and chest (5; 1.5%), hand (4; 1.2%), digit and lip (2; 0.6%) each, and abdomen, evelid and cheek (1) each. Most tumors were cleared with 1 conservative layer (269), but some required 2 conservative layers (42), 3 conservative layers (11) and 4 conservative layers (1-nose). Out of those requiring 2 layers, 20 were on the nose. Of those requiring 3 layers, 5 were on the nose, 4 on the lower extremity, and 2 on the ear. Most subsequent layers after the first were taken at the periphery to clear a wider tumor margin. Of the 4 tumors on the back and scalp, respectively, that required 2 layers, all back tumors were BCC while all scalp were SCC. Of the tumors that required 3 and 4 layers, all were BCC. When looking at repair options for these tumors, 264 were left to granulate while 75 of the nasal tumors treated with partial thickness layers had immediate dermabrasion. Of those with multiple tumors on the nose, 3 patients had 7 total lesions repaired with a dermabrasion with 1 patient having a single dermabrasion encompassing 3 distinct nasal tumors. Twenty-two total complications (6.5%) were reported with contact dermatitis (6), bleeding (4), hypertrophic scarring and infection (3) each, trouble breathing due to intranasal scar thickness (2), blister formation at site or prurigo (1) each.

**Design:** We performed a retrospective chart review of patients with non-melanoma skin cancers (NMSC) treated with conservative thickness layers in MMS from July 2016-October 2016. Any phone calls and complications were recorded and reviewed in order to assess the complaint's relationship to surgery. Each patient was seen at 2 to 3 weeks postoperatively to assess healing and aesthetic outcome.

**Conclusion:** In the properly selected patient and anatomic location, CTL taken as the first stage in MMS can be an effective and time-saving technique, leaving wounds in optimal condition for granulation with a low complication rate. Tissue sparing may allow for more reconstructive options.

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#### 45

Presenter: Swati Kannan, MD

## Title: A Split-Scar Study Investigating the Effectiveness of Early Intervention with Electroabrasion on Improving the Cosmetic Appearance of Post-Surgical Scars

Authors: Brian Jiang, MD<sup>1</sup>; Swati Kannan, MD<sup>1</sup>

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

**Purpose:** The purpose of this prospective, single-blinded, randomized investigation is to evaluate the effectiveness of early scar revision using electrobrasion on post-surgical wounds.

Summary: Electroabrasion, which utilizes a common in-office electrosurgery device, is a unique method of surgical planing that can aid in improving the cosmetic outcome of surgical scars. Most investigations for scar revision have studied the effectiveness of lasers, microneedling or dermasanding on scars several weeks to months after surgeries. However, a few case series have shown that intervention as early as one week post-operatively reduces scar formation more drastically than late scar revision. Even fewer studies have studied the effectiveness of electroabrasion. One investigation compared the effectiveness of dermasanding and electroabrasion on post-surgical scars that were approximately 10 months old; this study showed that electroabrasion is equally as efficacious as dermasanding for scar revision. Our investigation would be the first one studying the effectiveness of electroabrasion on early scar formation, as electroabrasion would be performed on the day of surgery. If effective, this method would add to the repertoire of scar revising interventions that could easily be performed in the office without buying new equipment or materials.

**Design:** The study design is a prospective, randomized, single-blinded, clinical trial with a total of 10 patients using a split-scar model. After placement of dermal sutures, one half of the linear wound is randomly treated with electroabrasion using an electrocautery unit at a low setting of 2-3. The other half is used as a control. Subsequently, superficial subcuticular sutures are placed. The patient follows standard post-operative wound care instructions. Scar appearance is assessed by a

blinded observer and by the patient using the Patient and Observer Scar Assessment Scale (POSAS) at suture removal, 1 month and 3 months post-surgery. Photos are also taken on the day of surgery and at all postoperative visits.

**Conclusion:** As this investigation has just begun, the final 3-month results are still pending. Preliminary results show that scar contours on the treated side are much smoother compared to the untreated side. However, at suture removal and 1-month post-operative visits, erythema seems to be more predominant on the treated side. Final results will be available by the ACMS meeting date in May 2018.

#### 46

Presenter: Nathan J. Luby

## Title: The Incidence of Upstaging of Lentigo Maligna with Excisional Biopsies

Authors: Nathan J. Luby<sup>1</sup>; Glen M. Bowen, MD<sup>1</sup>

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

**Purpose:** Evaluate the incidence of the upstaging of lentigo maligna with excisional biopsies in cases originally diagnosed by incisional biopsies.

**Summary:** Incisional biopsies are often performed when a diagnosis of lentigo maligna (LM) is suspected. Incisional biopsies are problematic as they can lead to sampling errors where a nidus of invasion might be missed. There are various reports in the literature of the incidence of the upstaging of LM to lentigo maligna melanoma (LMM) when the LM was initially diagnosed with an incisional biopsy and then invasion was detected at the time of surgical excision. We sought to address the question regarding the disparity between diagnoses made on incisional biopsies versus excisional biopsies for LM prior to definitive surgery.

**Design:** Ninety consecutive cases of LM diagnosed by incisional biopsies were referred for surgical management and had clinical evidence for residual tumor, i.e. residual pigment was seen on examination. All cases of LM with residual clinical tumor were treated with an excisional biopsy defined as removal of all of the remaining visible tumor. Excisional biopsy specimens were submitted for histologic review with formalin-fixed, paraffin-embedded sections stained with hematoxylin and eosin and immunohistochemistry. The final diagnosis was rendered by a board-certified dermatopathologist.

**Conclusion:** Invasion was identified in 24 of 90 LM specimens (26.7%) with a mean Breslow depth of 0.51 mm and a median Breslow depth of 0.4 mm (range: 0.17 mm – 3.0 mm). Based on these results, excisional biopsies are clearly superior to incisional biopsies for correctly staging LM. Furthermore, we were very surprised by cases that had no clinical signs to make one suspicious for invasion including one case that had a light tan monotone macule remaining after incisional biopsy but ultimately had a depth of invasion of 3.0 mm when the excisional biopsy was performed and reviewed (See Case 1). This patient underwent sentinel lymph node biopsy which was positive for a final stage of IIIB (pT3a, pN1a, M0). Because nearly 30% of cases of LM referred for surgery are actually LMM, we advocate making every effort to correctly stage LM before commencing with definitive surgery.



#### 47

Presenter: Brandon T. Beal, MD

# Title: Incidence, Treatment, and Survival in Undifferentiated Pleomorphic Sarcoma

**Authors:** Kyle Rismiller, BS<sup>1</sup>; Maria Ibanez, BS<sup>1</sup>; Brandon T. Beal, MD<sup>1</sup>; Thomas J. Knackstedt, MD<sup>1</sup>

Institution: 1. Cleveland Clinic, Cleveland, OH

**Purpose:** Limited information exists on the influence of demographics, tumor characteristics, and treatment on survival in undifferentiated pleomorphic sarcoma (UPS), previously known as malignant fibrous histiocytoma. The goal of this study was to describe incidence rates, survival, and prognostic factors affecting overall survival in patients with UPS based on the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program.

Summary: There were 2423 cases of UPS identified in SEER. The ageadjusted incidence rate was 152 cases per 1 million population. The age-adjusted incidence in males was 4.5 fold higher than in females (p<0.001). Whites were disproportionately affected by UPS compared to black or other races (p<0.001). The overall incidence of UPS increases with an annual percent change (APC) of 3.0 (p<0.001), males experience a greater increase than women (<0.001). Male gender, white race, and increasing age over 40 were significantly associated with decreased overall survival. Tumors located on the head and neck (Figure 1), larger than the median size of 1.5 cm (Figure 2), and with poor (grade III) or undifferentiated (grade IV) histology had significantly decreased overall survival (Table 1). While primary surgical treatment was unknown in 1.3% of cases, 56.4% underwent non-wide margin excision, 21.0% underwent wide margin excision, 7.2% underwent Mohs micrographic surgery, and the remainder had incomplete treatment or declined treatment. Patients who received non-wide (p=0.19) and wide excisions (including Mohs micrographic surgery) (p=0.004) had a significant overall survival benefit compared to patients who received no treatment. Radiation therapy did not provide a significant survival benefit. Patients with SEER stage of localized disease had the greatest overall survival followed by those with regional disease and then those with distant disease. Gender, race, tumor grade, primary site location, age group, and tumor size were not predictive of SEER stage (local, regional, distant). Large tumor sizes were associated with male gender, non-white race. trunk or extremity location, and with worsening histologic grade.

**Design:** Data from 18 SEER program registries was examined for patients diagnosed with UPS (formerly malignant fibrous histiocytoma) from 1972-2013 to provide demographic, cancer-related, and treatment information, and to calculate race- and age-specific rate ratios, incidence, and mortality. Patients were stratified by stage (local, regional, distant disease) for further comparison. Categorical variables were analyzed using the chi-square tests, transitioning to logistic regression for polynomial variables. Survival analyses utilized the Kaplan-Meier method in conjunction with the Log-rank test and Cox proportional hazards model.

**Conclusion:** Tumor size, grade, gender, age at diagnosis, and race appear to influence overall survival as prognostic factors in UPS. While the SEER database may not be sufficient to draw conclusions regarding appropriate margin selection, surgical tumor extirpation provides a survival benefit over no treatment whereas primary or adjuvant radiation does not provide a survival benefit.







Figure 2. Kaplan-Meier overall survival by tumor size.

Characteristic	Hazard Ratio	95% Confidence Interval	p-value
Race			
White	1 [Ref]		
Black	0.49	0.33-0.75	0.001
Other	0.46	0 29-0 73	0.001
Sex		1200 C	
Male	1 [Ref]	+	**
Female	0.74	0.65-0.85	< 0.001
Age Group	New Services		
≤19	1 [Ref]		-
20-39	3.20	0.38-26.73	0.283
40-59	27.29	3.78-197.20	0.001
60-79	76.86	10.66-554.06	<0.001
>80	212.92	29.49-1537.17	<0.001
Primary Site	Conserved 1		
Head/neck	1 [Ref]	**	**
Trunk	0.62	0.50-0.78	< 0.001
Extremities	0.61	0.52-0.71	<0.001
Tumor Grade	interes.		
Well-differentiated (I)	1 [Ref]	24	100 C
Moderately differentiated (II)	1.17	0.69-2.00	0.564
Poorly differentiated (III)	1.85	1.08-3.15	0.024
Anaplastic (TV)	2.27	1.30-3.97	0.004
Tumor Size > 1.5 CM	Sector St.		
No	1 [Ref]		10.
Yes	1 31	1.09-1.56	0.004
SEER Historic Disease Stage			
Localized	1 [Ref]		100
Regional	1.23	1.06-1.43	0.005
Distant	7.49	5.24-10.70	<0.001
Treatment			and the second sec
None	1 [Ref]		124
Local/incomplete	0.80	0.54-1.19	0.270
Non-wide excision/NOS	0.81	0.67-0.97	0.019
Wide excision/definitive	0.74	0.61-0.91	0.004
Mohs micrographic surgery	0.79	0.58-1.06	0.116
Radiation	1000	No. 5 No.	
No	1 [Ref]	**	÷.
Vas	1.12	0.04.1.35	0.201

Table 1. Multivariable Survival Analysis of Undifferentiated Pleomorphic Sarcoma.

#### 48

#### Presenter: Brandon T. Beal, MD

### Title: Association of Cutaneous Squamous Cell Carcinoma Outcomes with Area-Based Socioeconomic Indicators

**Authors:** Brandon T. Beal, MD<sup>1</sup>; David Xiong, BS<sup>1</sup>; Neil Woody, MD<sup>2</sup>; Allison T. Vidimos, MD, RPh<sup>1</sup>; Shlomo A. Koyfman, MD<sup>2</sup>; Hannah Cundall, BS<sup>1</sup>; Vamsi Varra, BS<sup>2</sup>; Kachiu Lee, MD, MPH<sup>3</sup>; Thomas J. Knackstedt, MD<sup>1</sup>

Institutions: 1. Cleveland Clinic Dermatology, Cleveland, OH

- 2. Cleveland Clinic Radiation Oncology, Cleveland, OH
- 3. Brown University Dermatology, Providence, RI

**Purpose:** Patients with lower socioeconomic status (SES) present with more advanced stage and worse outcomes in breast cancer, colon cancer, lung cancer, and melanoma compared to individuals with higher SES. To our knowledge, the relationship between SES and outcomes in cutaneous squamous cell carcinomas (SCCs) has not been examined. The aim of this study is to determine the impact of SES on the presentation and outcomes of SCC.

**Summary:** There was a total of 651 biopsy-proven SCC cases identified. Average age was 73 years (SD 13 years, range 35-98 years) and 31.2% of the patients were female. Average tumor diameter was 1.5cm (SD 1.0cm). Mohs micrographic surgery was used in 71.1% (n=463) of cases, 4% (n=27) received radiation therapy or chemotherapy (RT/CT), and 3% (n=17) had locoregional recurrence or distant metastasis. Across all included zip codes, the median household income was \$64,389 (SD \$16,876), educational attainment of at least high school was 92.4% (SD 4.5%) and the percent below poverty level was 9.2% (SD 7.3%). Tumor size <sup>3</sup> 2cm was associated with lower educational attainment (p<.02). Patient's receiving RT/CT for advanced SCC were significantly more likely to have lower educational attainment (p=.001), higher poverty levels (p <0.1), and lower median household income (p <.001). Recurrent tumors were associated with lower educational attainment (p <.001) and lower median household income (p <.001). Histologic grade, American Joint Committee on Cancer (AJCC) T or N stage, and Brigham and Women's (BWH) stage did not significantly correlate with lower SES.

**Design:** After institutional board approval, demographic, tumor and treatment data were obtain for all patients with biopsy-proven SCC enrolled in an institutional skin cancer registry. Tumors treated with local destruction, cryosurgery, or topical therapy were excluded. Previous studies have validated patient zip code linked to US Census Bureau data as a reliable surrogate of SES. Zip codes were merged with sociodemographic data (median household income, educational attainment [percentage of high school graduates], and poverty levels [percentage of individuals below poverty]) and analyzed with the institutional dataset. Advanced stage and poor outcomes were defined as tumor size <sup>3</sup> 2cm, AJCC T stage > T2, AJCC N stage > N0, BWH stage > T2a, need for adjuvant RT/CT, locoregional recurrence, or distant metastasis. Analysis was completed using the Wilcoxen rank sum test, with univariate and multivariate regressions on Stata (v14.0, College Station, TX). P-values<=.05 were considered significant.

**Conclusion:** Lower SES is associated with more advanced SCC at presentation, defined by tumor size <sup>3</sup> 2cm, increased recurrence risk, and an increased frequency of radiation and chemotherapy. These findings have implications for population health. Targeting certain zip codes with skin cancer education, screening, and healthcare resources might improve outcomes and decrease healthcare costs by addressing these tumors at an earlier stage.

#### 49

Presenter: Abigail Waldman, MD, MHS

## Title: Complete Margin Assessment Techniques Versus Surgical Excision for the Treatment and Reconstruction of Non-Melanoma Skin Cancers: A Systematic Review and Pooled Analysis

**Authors:** Sophia Fraga<sup>1</sup>; Robert Besaw, MPH<sup>2</sup>; Chrysalyne D. Schmults, MD, MSCE<sup>1</sup>; Abigail Waldman, MD, MHS<sup>2,3</sup>

Institutions: 1. UPenn, Philadelphia, PA

2. Brigham and Women's Hospital, Boston, MA

3. Boston VA Hospital, Boston, MA

**Purpose:** To compare recurrence rates and use of reconstruction methods between complete margin assessment (CMA) techniques (Mohs micrographic surgery [MMS] and Tubingen method) and surgical excision (SE) for the treatment of nonmelanoma skin cancers (NMSC).

**Summary:** 46 studies were included in the analysis. The recurrence rates of total NMSC and total BCC after CMA were significantly lower compared to SE at 1.9% versus 4.6% (p<0.0001), and 1.6% versus 4.4% (p<0.0001), respectively. For aggressive subtypes of BCC, CMA techniques were significantly more effective than SE in reducing the risk of recurrence (3.1% versus 7.3%, p<0.0001). NMSC with PNI had significantly higher recurrence rates after SE compared to CMA (69/262 [26.3%] vs. 13/35 [15.3%], p=0.037).For reconstructions, CMA

used significantly more second intention healing (9.9% versus 2.8%, p<0.0001), and fewer flaps and grafts (41.9% versus 57%, p<0.0001, respectively) compared to SE.

**Design:** The EMBASE and MEDLINE databases were searched for eligible articles with a minimum follow-up time of 24 months. All studies that reported recurrence data (local, nodal, and distant) of basal cell and squamous cell carcinomas (BCC, SCC), and studies that reported on reconstruction methods used after NMSC treatment were included. BCCs with noted aggressive subtypes and tumors with perineural invasion (PNI) were also compared in a separate subgroup analyses. X2 statistics and Fisher exact tests were used to evaluate differences in recurrence outcomes and reconstruction methods.

**Conclusion:** CMA techniques offer lower recurrence rates, and use less complex and less costly reconstructions than SE. Further studies are needed to determine differences in the cost, quality of life, and cosmetic outcome after SE and CMA.

#### 50

#### Presenter: Danny Guo, MD, MSc

## Title: AIMS (Anxiolytics in Mohs Surgery) in Patient Satisfaction: A Randomized, Double Blinded, Placebo Controlled Trial

Authors: Danny Guo, MD, MSC<sup>1</sup>; David M. Zloty, MD<sup>1</sup>; Irèn Kossintseva, MD<sup>1</sup> Institution: 1. University of British Columbia, Vancouver, BC, Canada **Purpose:** Patient anxiety can complicate surgical outcomes by elevating blood pressure, increasing the need for post-operative pain management, and reducing overall patient satisfaction. While preprocedural benzodiazepines are commonly used for anxiety control in Mohs surgery, only a limited number of studies have evaluated their efficacy and safety profiles, as well as how they compare to nonbenzodiazepine anxiolytic medications. The purpose of this study is to conduct a randomized, double-blinded, placebo-controlled trial testing the efficacy and safety of anxiolytic medications in Mohs micrographic surgery, as well as their effects on patient satisfaction.

**Summary:** The diazepam group (n=20) demonstrated significant reduction of anxiety at T1, T2, and Tf compared to the placebo group (n=30) (fig 1). The lorazepam (n=15), alprazolam (n=20), gabapentin (n=28), and pregabalin (n=28) groups had significant anxiety reduction at T1 compared to the placebo group, while the pregabalin group also demonstrated a significant reduction at T2 (fig 1). Anxiety levels in the melatonin group (n=18) were not different from the placebo group at any time point. No major adverse events or alterations to vital signs were observed (fig 2). Patient satisfaction was similar between all groups except melatonin, where it was reduced compared to placebo (fig 3).

**Design:** Three hundred and fifty Mohs surgery patients are randomized in a single-institution, randomized, double-blinded, placebo-controlled trial of single-dose lorazepam, diazepam, alprazolam, gabapentin, pregabalin, or melatonin. Anxiety levels and patient satisfaction are measured using Visual Analog Scale. Patient anxiety levels, vital signs, and cognition are measured at baseline (TO), before the first surgical level (T1), before the second surgical level (T2), and at post-op (Tf). Patient overall satisfaction is recorded prior to discharge.

**Conclusion:** Interim analysis demonstrated early and sustained reduction in patient anxiety levels in the diazepam group and early but transient effects in the alprazolam, lorazepam, gabapentin, and pregabalin groups. Our study shows that single-dose benzodiazepines

and GABA-related medications are safe and efficacious options for achieving early anxiety control without jeopardizing patient satisfaction. Melatonin's slight deleterious effect on patient satisfaction may be associated with its sedating but non-anxiolytic properties on patients. In general, this study suggests that out-patient Mohs surgeries have an overall high level of patient satisfaction, regardless of anxiolytic usage.







#### 51

Presenter: Michael Heath, BS

## Title: Outcomes of Melanoma in situ and Invasive Melanoma Treated With Mohs Micrographic Surgery With and Without MART-1 Immunostain

Authors: Michael Heath, BS<sup>1</sup>; Anna A. Bar, MD<sup>1</sup>; Megan Woody, MD, MPH<sup>1</sup>; Justin J. Leitenberger, MD<sup>1</sup>

Institution: 1. Oregon Health and Science University, Portland, OR

**Purpose:** To assess the efficacy of Mohs micrographic surgery (MMS) with or without MART-1 immunostain in the treatment of primary and recurrent melanoma in situ and invasive melanoma.

Summary: Mohs micrographic surgery (MMS) was performed on 535 melanomas in situ (MIS) and 134 invasive melanomas over a 10year period. Standardized MMS protocol was used, with the eventual addition of intraprocedural MART-1 frozen sections. Standard cases had en-face permanent sections taken for permanent histologic evaluation. Upstaging prior to reconstruction occurred in 28 lesions and same day reconstruction was achieved in 202 cases. Patients were followed up via provider examination and/or telephone. The mean follow-up time was 3.87 years (5.49 years without MART-1 and 1.38 years with MART-1 immunostain). Overall local recurrence rate was 1.94% (2.96% without MART-1 and 0.38% with MART-1, statistical significance not appreciated in the setting of different follow-up time). Stages of locally recurrent lesions (n=13) were Tis (n=10), T1a (n=2), and T3a (n=1) all of which were successfully treated with additional excision. Notably, no invasive melanomas have had local recurrence (0/134, average follow-up 3.0 years). The overall five-year Kaplan-Meier local recurrence free and melanoma-specific survival rates were  $0.985 \pm 0.00608$  and  $0.994 \pm$ 0.00377 respectively, although the three melanoma related deaths were not likely attributable to MMS treatment failure but rather non-recurrent lesions and unrecognized metastasis prior to MMS. Melanomas treated with MMS resulted in lower local recurrence rates and higher Kaplan-Meier melanoma specific survival rates when compared to conventional wide local excision.

**Design:** A retrospective review of 669 melanomas, in 643 patients, which were treated with Mohs micrographic surgery at an academic tertiary care referral center from January 1, 2007 to June 30, 2017. Follow-up data was obtained through provider examination or telephone conversation. Follow-up data was collected up to January 3, 2018.

**Conclusion:** Utilizing Mohs micrographic surgery with or without MART-1 immunostain is an effective treatment for melanoma in situ and invasive melanoma as shown by low local recurrence and high melanoma specific survival rate regardless of anatomic location. MMS also has the advantage of complete microscopic margin evaluation, upstaging identification, tissue sparing technique and reconstruction considerations compared to conventional wide local excision technique.

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#### 52

Presenter: Natalia M.K. Spierings, MB, ChB, MRCP (UK)

#### Title: Mohs in the 'Twighlight Zone'

Authors: Natalia M.K. Spierings, MB, ChB, MRCP (UK), MBA<sup>1</sup>; Shelagh Turvill, FRCA<sup>1</sup>; Walayat Hussain, MRCP (UK)<sup>1</sup>

# Institution: 1. Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

**Purpose:** Mohs Micrographic Surgery (MMS) under local anesthesia (LA) has been shown to be safe and well-tolerated by patients in numerous studies across the globe. There are, however, a very small minority of patients in whom the prospect of complex LA facial surgery is associated with unduly high levels of pre- and intra-operative anxiety and stress. As a consequence, these patients may decline the opportunity to undergo the gold-standard treatment for facial skin cancer. We therefore describe our approach to providing the severely needle-phobic patient with MMS via a 'twilight' anesthesia approach.

Summary: Pre-operative Mohs assessments performed by fellowshiptrained Mohs Surgeons identified severely needle-phobic patients via a ten-point Likert scale (0=no fear, 10=extremely needle-phobic). Patients with a score >8 were offered MMS under twilight anesthesia. MMS was performed in main operating theaters where patients underwent a target-controlled infusion of propofol using a syringe infusion pump with boluses, as required, of fentanyl and ketamine. Boluses were delivered prior to each stage of tumour extirpation to ensure patients were sufficiently sedated to experience no pain but conscious enough to maintain spontaneous breathing. Patients were given anti-emetics as required and had full monitoring (ECG, BP and SpO2) and oxygen administered via the nasal route (Figure 1). The average time to complete tissue processing of each Mohs stage was 40 minutes. During this time, the propofol infusion to the patient was stopped, allowing the patient to regain a full level of consciousness. If a further Mohs stage was required or if reconstruction was to be performed, the propofol infusion was simply re-initiated (Twilight Anesthesia Protocol – TAP).

**Design:** Twelve patients (7F, 5M, median age 64) have received the TAP during MMS for facial basal cell carcinomas to date, the majority of which were located on the distal nose. The average pre-op tumour area was 2.2cm2 - average post-MMS defect area 4.2 cm2. The mean number of stages required for tumour clearance was two. All patients required complex flap reconstructions with one-quarter requiring interpolated flaps. On average, tumour extirpation and reconstruction was completed within four hours. No intra-operative or peri-operative complications occurred. All single-stage flap patients were discharged on the day of their surgery. A ten-point Likert scale prior to the patient leaving the department post-MMS and again at four-week review, asking them about their experience, was performed. All patients reported very high levels of satisfaction (average score 9) and would be willing to undergo the procedure again in the future if so required.

**Conclusion:** Twilight anesthesia offers a safe and effective method of performing MMS and reconstruction in severely needle-phobic patients and is associated with very high levels of patient satisfaction.





#### 53

Presenter: Kelly M. MacArthur, MD

# Title: Preoperative Factors Predicting Greater Subclinical Extension of Nonmelanoma Skin Cancers of the Scalp

Authors: Kelly M. MacArthur, MD1; Brian C. Baumann, MD2; George J. Hruza, MD, MBA3; Robert G. Egbers, MD, MS1

**Institutions:** 1. Johns Hopkins University, Baltimore, MD 2. Washington University, St. Louis, MO

3. Laser and Dermatologic Surgery Center, St. Louis, MO

**Purpose:** Mohs micrographic surgery (MMS) is the gold-standard treatment for many skin cancers because of the unpredictable degree of subclinical extension(SCE). Prior studies have identified clinical factors associated with greater SCE, based upon histologic type [basal cell carcinoma(BCC) and cutaneous squamous cell carcinoma(SCC)]. However, these analyses included various tumor sites, limiting the statistical power of analysis on a single cosmetic subunit. There is limited data on the factors that specifically impact SCE for skin cancers of the scalp. This study's purpose was to investigate preoperative factors that influence SCE for BCC and SCC of the scalp.

**Summary:** 322 patients underwent MMS of 374 primary, previously untreated skin cancers of the scalp (142 SCCs, 232 BCCs). All patients had Fitzpatrick skin type I-II.

**Design:** Patients ≥18 years old with BCC or SCC (excluding SCC in situ) of the scalp who underwent MMS at an institution (1/2012-12/2017) were identified. For this comparative analysis, SCE was estimated as the difference between the measured MMS defect area and the measured preoperative clinical area, as determined by the surgeon's measurements. Univariate and multivariable linear regression were separately performed to assess clinical factors predictive of SCE for BCC and for SCC. Factors predictive on univariate analysis at the p<0.05 level were included in the multivariable model.

**Conclusion:** This study is the largest to examine factors that influence the degree of subclinical extension of SCC and BCC of the scalp. For SCC, older age, poor tumor differentiation, and larger preoperative tumor size were significant predictors of increased SCE. For BCC, older age, aggressive histology, and larger preoperative tumor size were significant predictors of increased SCE. Future studies focusing on individual tumor sites are warranted to explore site-specific factors that may impact SCE.

Table 1. Patient and Tumor Characteristics

	SCC (n=142)	BCC (n=232)
Patient age (years)		
Mean	72	62
Median	73	62
Range	23-94	21-92
Patient gender		
Male	122	162
Female	20	70
Immune status		
Immunosuppressed	45	30
Immunocompetent	97	202
Tumor Histology		
Poorly Differentiated SCC/Aggressive BCC*	6	81
Mod-Well Differentiated SCC/Non-Aggressive BCC*	136	151
Clinical Area (cm <sup>2</sup> )		
Mean	1.5	1.4
Median	1.0	0.8
Range	0.1-7.1	0.1-19.6
Mohs Defect Area (cm <sup>2</sup> )		
Mean	3.9	3.9
Median	3.1	2.5
Range	0.7-14.1	0.5-50.2

\* Aggressive BCC Subtype as defined by Mohs Appropriate Use Criteria

#### 54

#### Presenter: Maxim Polansky, MD

## Title: Treatment Stratification for Mohs Micrographic Surgery Referrals at Veterans Health Administration Dermatology Clinic: A Single Center Experience

Authors: Maxim Polansky, MD<sup>1</sup>; Suephy Chen, MD<sup>1</sup>; Travis W. Blalock, MD<sup>1</sup> Institution: 1. Emory University School of Medicine, Atlanta, GA

Purpose: The Veterans Health Care Administration (VHA) is one of the largest healthcare systems that sees significant numbers of patients with nonmelanoma skin cancers (NMSC)(1). In 2012, 49,229 cases of basal cell carcinomas(BCC) and 26,310 cases of squamous cell carcinomas(SCC) were diagnosed in the VHA population(2). Mohs micrographic surgery (MMS) has been shown to be an effective tissue sparing technique in treatment of NMSC, but is not available at many VHA locations(3,4). A 2007 survey of 101 VHA sites revealed only 11 VHA sites across 9 states provide MMS(4). The appropriate use criterion (AUC) was developed by major dermatological organizations to help guide decision making when considering treatment of NMSC with Mohs micrographic surgery(3). Although veterans can obtain MMS care through fee-basis referrals, the process can create disproportionate burdens such as delay of care, excessive travel burdens, and suboptimal handoffs to the fee-based providers. Our study aimed to assess NMSC treatment modalities and appropriateness of MMS referrals in a 3-month period at a VA Dermatology Clinic.

**Summary:** A total of 101 patients with 125 NMSCs cases were treated (BCC - 78(62%), SCC - 35(28%), squamous cell carcinoma in-situ (SCCIS) – 12(10%)) (Table 1). Ninety-seven(78%) cases met AUC for MMS, 19(15%) were classified as uncertain, and 9(7%) were inappropriate. Of the 97 cases that met AUC, 52(54%) were adjudicated to MMS, 43(44%) were treated with wide local excision (WLE), and 2(2%) treated with electrodessication and curettage (ED&C). Forty-six (89%) cases that were referred for MMS were located on the face (excluding neck/scalp) and ears. There were no cases treated with MMS that were uncertain or inappropriate according to AUC.

**Design:** A retrospective review of 101 patients with diagnoses of BCC, SCC, or SCCIS diagnosed and treated between 9/2017-11/2017 were included. NMSC location and subsequent treatment modality including MMS, WLE, ED&C, or topical imiguimod therapy (IMQ), were documented.

**Conclusion:** Our cohort of 125 NMSC cases over a 3-month period is the first to provide insight for treatment stratification seen at a VHA Dermatology clinic that refers patients for MMS. Nearly 80% cases met AUC, but only 54% of those appropriate cases were treated with MMS. Although all patients that qualify for MMS are offered the procedure, 44% choose to forego the referral process and opt out for other treatment modalities. Therefore, local tumor cure rates are simply not the only factor that drive patients to choose alternative modalities over MMS. Other reasons for this may include wanting to avoid waiting for the referral process, difficulty traveling, desire to keep all care within VHA, or faster same-day treatment. Expansion of MMS to more VHA Dermatology clinics may mitigate these issues and provide veterans with continuity and higher quality patient-centered care.

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Figure 1: Locations of NMSC on the body that were referred to MMS. Nearly 50% of referrals were for NMSC located on the nose alone, and almost 90% of cases were localized to the face and ears (excluding scalp and neck).

NMSC Tre	ated by Subtype			
	Cases	Pe	rcent	
BCC	7	8	62.4%	
SCC	3	5	28.0%	
SCCIS	12		9.6%	
Total Cases	125			
Appropriate Use Cr	iteria (AUC) Strat	ificat	ion	
	Cases	Pe	rcent	
Appropriate	9	7	77.6%	
Uncertain	1	9	15.2%	
Inappropriate	9		7.2%	
Total Cases	12	5		
Treatments of NMS	SC with Appropri	ate A	uc	
	Cases	Pe	rcent	
Excision	4	3	44.3%	
MMS	5	2	53.6%	
ED&C	2		2.1%	
Topical (Imiquimod)		0	0.0%	
Total Cases	9	7		
Treatments of NN	ISC with Uncerta	in AU	c	
	Cases	Pe	Percent	
Excision	1	8	94.7%	
MMS		0	0,0%	
ED&C		1	5.3%	
Topical (Imiquimod)	0		0.0%	
Total Cases	1	9		
Treatments of NMS	C with Inappropr	iate /	wc	
	Cases	Percent		
Excision		5	55.6N	
MMS		0	0.0%	
ED&C		2	22.2%	
Topical (Imiquimod)		2	0.0%	

Table 1: Breakdown of NMSC by type and breakdown of treatments according to AUC.

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Presenter: Iona Chapman

## Title: Use of Chlorhexidine as a Pre-Surgical Antiseptic Among ACMS Members

**Authors:** Iona Chapman<sup>1</sup>; Carlton B. Phillips<sup>1</sup>; Conway C. Huang, MD<sup>1</sup> **Institution:** 1. University of Alabama, Birmingham, AL

**Purpose:** Periocular and periauricular use of chlorhexidine as a presurgical antiseptic for cutaneous surgery is controversial. While there are case reports of ocular and ototoxicity after chlorhexidine exposure, none have been described in the context of dermatologic surgery, where brief procedures under local anesthesia are typical. We sought to quantify and qualify the use of chlorhexidine and any subsequent negative outcome from a representative sample of ACMS members via a survey tool.

**Summary:** 137 members completed the survey. These respondents have a shared 1,604 years of experience practicing Mohs micrographic surgery and have treated a total of 1,939,957 lesions with Mohs.

126 (92%) of respondents currently use chlorhexidine. Of those, 30 (24%) use chlorhexidine to prepare periocular sites and 75 (60%) use it in periauricular sites. Of the 137 respondents, none reported having had a temporary or permanent auditory side effect from chlorhexidine use, and 10 reported cases of temporary conjunctivitis. These 10 practitioners reported a total of 17 cases of temporary conjunctivitis within a sum of 155 years of clinical experience and 150,500 Mohs cases (at all anatomical sites). None of the 137 respondents reported permanent ocular damage.

**Design:** A 20 question survey designed with REDCap software was approved by our institutional review board. A link to this survey was emailed to ACMS members in electronic newsletters.

**Conclusion:** Chlorhexidine is commonly used by ACMS members, with one study showing it as the most commonly used product for Mohs layer excision and defect repair (63% of study participants). Of the 126 respondents that currently use chlorhexidine (with a total of 1,377 years of experience and 1,522,957 cases) no permanent ocular or ototoxicities were noted. These results form the basis for surveying a larger cohort and/or a prospective investigation to more definitively assess chlorhexidine-caused ocular and/or ototoxicity in dermatologic surgery and for developing best practices and recommendations.

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Presenter: Alison M. Spiker, MD

#### **Title: Review of Mohs Surgery for Vulvar Neoplasms**

**Authors:** Alison M. Spiker, MD<sup>1</sup>; Andrew Hankinson, MD<sup>1</sup>; Mary G. Petrick, MD<sup>1</sup>; Michael L. Ramsey, MD<sup>1</sup>; Victor J. Marks, MD<sup>1</sup>

Institution: 1. Geisinger Medical Center, Danville, PA

**Purpose:** We report types of vulvar neoplasms treated with Mohs micrographic surgery (MMS) to provide insight to the medical community about the possible applications of Mohs surgery in the treatment of these tumors.

**Summary:** Vulvar cancer is rare with an estimated annual incidence of 6,020 cases in the United States with projection of 1,050 deaths in 2017. Malignant neoplasms of the vulva include squamous cell carcinoma, melanoma, extramammary Paget disease, basal cell carcinoma, verrucous carcinoma, dermatofibrosarcoma protuberans, and adenocarcinoma of the vulva. Vulvar cancer is treated according to the type and stage of the disease. Treatment often involves wide local excision of the visible tumor with at least 1 cm margins but may combine surgery with radiation or chemotherapy. Wide local excision may remove non-cancerous tissue of significance and does not ensure negative surgical margins. Repeated excisions may be required and recurrences are common in certain rare cutaneous malignancies, such as extramammary Paget disease as it often has subclinical fingerlike extensions. Mohs surgery is an ideal technique to treat vulvar neoplasms through microscopically-guided precise excision of cancerous tissue and maximal tissue preservation. The vulvar neoplasms discussed above demonstrate contiguous growth patterns, a requirement for success with MMS.

**Design:** A retrospective review of our surgery database for vulvar skin cancers treated by a Mohs surgeon with Mohs technique was performed. During a 28-year period, 40 cases of vulvar neoplasms were identified with diagnoses of basal cell carcinoma, squamous cell carcinoma, basosquamous carcinoma, malignant melanoma, extramammary Paget disease, and dermatofibrosarcoma protuberans. Analysis of the data is in process and will be completed by March 2018. A review of the current literature (English text only) for reports of vulvar neoplasms treated with Mohs surgery was also performed.

**Conclusion:** Vulvar neoplasms can be successfully treated with Mohs surgery through microscopically-guided precise excision of cancerous tissue and maximal tissue preservation.

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Presenter: Holly Sprow, BA

## Title: Paper Medical Record: Revisited as an Alternative to Electronic Medical Record

Authors: Holly Sprow, BA<sup>1</sup>; Carl F. Schanbacher, MD<sup>2</sup>

Institutions: 1. Kuchnir Dermatology and Dermatologic Surgery, Milford, MA

2. Tufts Medical School, Boston, MA

**Purpose:** Electronic Medical Records (EMRs) have been employed in medical practice for over 30 years. In the US healthcare system, EMR has been promulgated widely and enhanced for efficiency, time-savings, cost containment, and improved overall patient care. However, as rank and file physicians have adopted the EMR, the idealization of an EMR as a worry-free, efficient, cost-effective data management system has fallen short. We chose to modify our medical record by combining both EMR and paper medical record (PMR) to evaluate its feasibility and usefulness.

**Summary:** Electronic Medical Records (EMRs) have been employed in medical practice for over 30 years. In the US healthcare system, EMR has been promulgated widely and enhanced for efficiency, time-savings, cost containment, and improved overall patient care. However, as rank and file physicians have adopted the EMR, the idealization of an EMR as a worry-free, efficient, cost-effective data management system has fallen short. We chose to modify our medical record by combining both EMR and paper medical record (PMR) to evaluate its feasibility and usefulness.

**Design:** We conducted a review of the medical literature pertaining to PMR to EMR conversion. Our office administered a survey to participants who had experience using a commercially available, well-known EMR as well as an on-site custom software program, which generates a paper medical record. A questionnaire was fielded assessing both programs on a ten-point scale relating to its usability, time efficiency, organization, level of support from the company, flexibility, privacy, error rate, and training. The results of the survey suggested EMR as being time consuming, difficult to use, slightly disorganized, and inflexible with a moderate error rate, a moderate amount of time to train people to use the program, and a low level of support from the software company. Our

custom program was rated as being user-friendly, efficient, organized, and flexible, with a moderate level of privacy, a low error rate, and a low amount of time to train people.

**Conclusion:** Given some negative aspects of the EMR including a high monthly cost and the need for constant updates, we decided to transition to an electronically-assisted PMR (ea-PMR). During the surgical encounter, the patient's data is recorded within the Microsoft Excel worksheet by the Mohs Surgery assistant. Operative reports, consultation encounters, referral physician letters, and the excision and biopsy notes and letters are printed out and stored in a paper chart. The ea-PMR has proven tremendously beneficial, and it has solved some of the problems many providers experience with both EMRs and PMRs, such as handwriting, cloud storage, patient privacy, and information ownership. In the future, we hope to make this program more accessible to other physicians.



American College of Mohs Surgery 555 East Wells Street, Suite 1100 Milwaukee, WI 53202

Phone: (414) 347-1103 (800) 500-7224 Fax: (414) 276-2146 Email: info@mohscollege.org Website: www.MohsCollege.org www.SkinCancerMohsSurgery.org