2016 ANNUAL MEETING
THURSDAY, APRIL 28 - SUNDAY, MAY 1, 2016
Rosen Shingle Creek
Orlando, Florida

48th ACMS ANNUAL MEETING

Abstract, Poster & CME Information

ACMS American College of Mohs Surgery

www.MohsCollege.org/AnnualMeeting

48th ACMS ANNUAL MEETING

ORLANDO *florida*

APRIL 28 - MAY 1, 2016 ROSEN SHINGLE CREEK

Abstract, Poster & CME Information

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ACMS American College of Mohs Surgery

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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:

- Develop a strategy for providers and office staff to be prepared and respond effectively in emergency situations;
- Design and execute routine and advanced reconstructions of the lip, nose, and ear;
- Describe current recommendations for diagnosis and treatment of melanoma, high-risk squamous cell cancer, and Merkel cell cancer;
- Identify key elements of surgical and laboratory procedures to develop complete and high-quality frozen section microscopic tissue samples;
- Develop office protocols to enhance the experience of patients undergoing surgical procedures;
- Design staged reconstruction procedures to refine suboptimal scars;
- Identify unique patient populations that require modifications of surveillance, staging, or treatment of skin cancers;
- Implement office protocols that improve the safety of outpatient surgery patients;
- Recognize potential pitfalls in frozen section examination of skin cancers and develop strategies to minimize errors;
- Describe essential principles to optimize preoperative, intraoperative, and postoperative surgery of the hands and feet;
- Explain proper billing and coding practices for Mohs and reconstructive surgery;
- Describe eyelid anatomy and common reconstruction strategies;
- Explain the pros and cons of common variations in Mohs surgery technique;
- Describe surgical technique for Mohs surgery of the nail unit;
- Describe recent developments in the management of skin cancer in organ transplant recipients;
- Identify strategies for personal and professional development within the American College of Mohs Surgery.

Accreditation Statement

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the sponsorship of the American College of Mohs Surgery (ACMS). ACMS is accredited by the ACCME to provide continuing medical education for physicians.

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The American Academy of Physician Assistants accepts *AMA PRA Category 1 Credit(s)*™ from organizations accredited by the ACCME. Physician Assistants attending the Annual Meeting can submit certificates or transcripts showing how many physician CME credits were offered for an activity to the AAPA and get them "converted" to PA CME credit. The AAPA also grants and counts *AMA PRA Category 1 Credit(s)*™, but those are specifically for PAs and have to come from a provider accredited by the AAPA. The AAPA labels their credits Category 1 CME, but the labels, though they read the same, refer to different evaluations.

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Tromovitch Award Abstract Session – Thursday, April 28: 10:00-11:00 am

April 28, 10:00-10:07 am

Presenter: James T. Highsmith, MD, MS

Title: Frozen Section Concordance of Mohs Micrographic Surgery

Authors: James T. Highsmith, MD, MS[1,2]; Michael Highsmith, PhD[3]; Gary Monheit, MD[1,4]

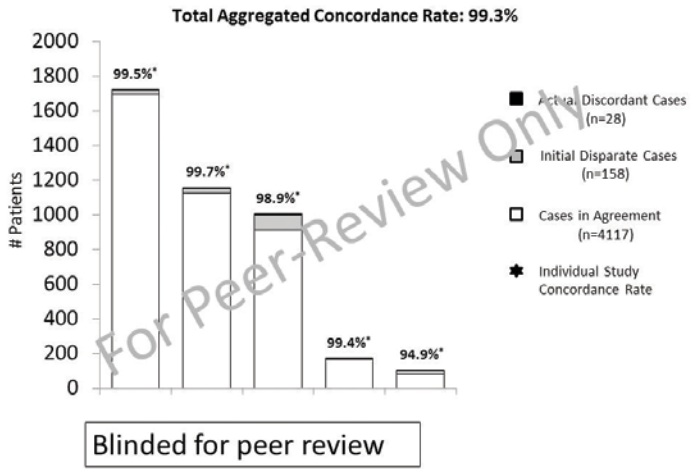
Institutions: 1. Total Skin and Beauty Dermatology Center, Birmingham, AL
2. James Haley VA Hospital, Tampa, FL
3. U.S. Department of Veterans Affairs, Tampa, FL
4. University of Alabama at Birmingham, Birmingham, AL

Purpose: The purpose of this project was to conduct the largest concordance study to date with data spanning a ten year period of 1720 cases. Results were then compared with that of similar smaller studies to confirm previous findings. The second purpose was to aggregate the total data set of this local study along with previous studies. Finally, a systematic review was performed to determine the strength of empirical support for the accuracy of histologic interpretation of the fellowship-trained Mohs micrographic surgeon.

Summary: Studies have reported high rates of concordance between fellowship-trained dermatopathologists and fellowship-trained Mohs micrographic surgeons regarding histologic interpretation of frozen section slides. However, it was unclear if all concordance studies were consistent, the level of bias, level of validity, as well as the clinical significance. This fellowship project sought to objectively rate these uncertainties and determine the strength of evidence supporting fellowship training regarding histologic interpretation and high cure rates of Mohs micrographic surgery. The first phase of the study analyzed 1720 (local study) cases by both the surgeon and dermatopathologist. The second phase (pooled data) reviewed a total of 4145 cases with both phases yielding a concordance rate of greater than 99% (FIGURE). The systematic review graded the bias risk as low in three of four domains and unclear in the fourth. High external validity and clinical significance is suggested given the low applicability concerns regarding surgeons for the included studies. This original data has not been published nor presented elsewhere.

Design: This project utilized a retrospective chart review of the quality control process at our institution spanning a ten year period. All discordant slides were then reviewed by an independent dermatopathologist and results recorded. A systematic review was also utilized that incorporated a three database search in accordance with PRISMA guidelines. Pertinent studies were retrieved and evaluated using the QUADAS-2 tool for diagnostic test accuracy and bias risk assessment. All procedures were conducted and data collected in accordance with the Declaration of Helsinki. The study was unfunded and the contents are the opinions of the author(s). The data set and analysis is complete.

Conclusion: The quality metrics of this project included the local study, aggregated data, and systematic review which all confirm a high level of correlation between the histologic interpretations of the fellowship-trained Mohs micrographic surgeon and the fellowship-trained dermatopathologist with a low risk of bias, high external validity, and high clinical significance.



April 28, 10:08-10:15 am

Presenter: Renato Goreshi, MD

Title: Matrilin-2 as an Invasion Marker to Distinguish Basal Cell Carcinoma with Benign Adnexal Tumors

Authors: Renato Goreshi, MD[1]; Satori Iwamoto, PhD[1]

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

Purpose: Mohs micrographic surgery (MMS) holds the lowest recurrence rate for basal cell carcinoma (BCC). Benign adnexal tumors may simulate BCC on frozen sectioning and consequently may occasionally lead to the unnecessary removal of additional tissue. A reliable marker is needed to differentiate the malignant cells of BCC from similar appearing benign cells. Most histopathological markers for BCC target the malignant cells in question, the basal keratinocyte. While a sound approach, there inherently is the limitation that the marker cannot distinguish between the malignant basal keratinocyte and its benign counterpart. Subsequently, we investigated a marker that targets the stroma around BCCs in an effort to be able to overcome this limitation.

Summary: This study included 42 pathologically-proven BCCs, specifically 6 cases of superficial BCCs, 25 cases of nodular BCCs, and 11 cases infiltrative or morpheaform BCCs. Immunohistochemical analysis revealed positive matrilin-2 staining in the peritumoral stroma of 41 of 42 BCCs (97.7%). There was little to no expression of matrilin-2 in all 7 cases of basaloid follicular hamartoma. Comparing among BCC subtypes, it was shown that matrilin-2 was strongly expressed in all the morpheaform and infiltrative BCCs (11 of 11) and strongly expressed in 4 of 25 (16%) of nodular BCCs. 21 of 25 (84%) nodular BCCs showing moderate expression. Among superficial BCCs, 2 of 6 (33%) showed moderate expression, 3 of 6 (50%) showed mild expression, and 1 of 6 (17%) showed negative expression. Matrilin-2 was found to be expressed by fibroblasts specifically in peritumoral stroma.

Design: Matrilin-2 is the largest member of the matrilins, a family of oligomeric non-collagenous extracellular matrix (ECM) proteins. We attempt to demonstrate that matrilin-2 can be used as a marker to distinguish BCC from similar appearing, benign tumors. We compared matrilin-2 immunohistochemical

staining between BCC and basaloid follicular hamartoma. We also attempt to elucidate the role of matrilin-2 by comparing its expression among BCC subtypes and recognizing where it is expressed. Immunohistochemical expression was scored in a semi-quantitative method and classified based on immunohistochemical intensity and pervasiveness. Flow cytometry was used to determine where matrilin-2 expression occurred.

Conclusion: We postulate that matrilin-2, an ECM protein, forms a scaffold surrounding the BCC in an attempt to restrict invasion from the malignancy. We hypothesize that the malignant cells secrete ADAMTS-4, a metalloproteinase previously known to proteolytically cleave matrilin-2, as a response to matrilin-2 expression in order to permit for further invasion. Using a marker that targets the stroma rather than the malignant basal cell, we demonstrate that matrilin-2 is a sensitive and specific marker for BCC, especially in infiltrative and morpheaform BCC where it was ubiquitously strongly expressed, and thus could be valuable during MMS to delineate lesion margins.

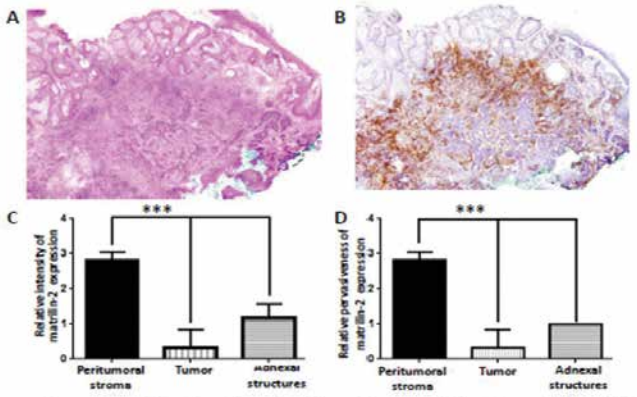
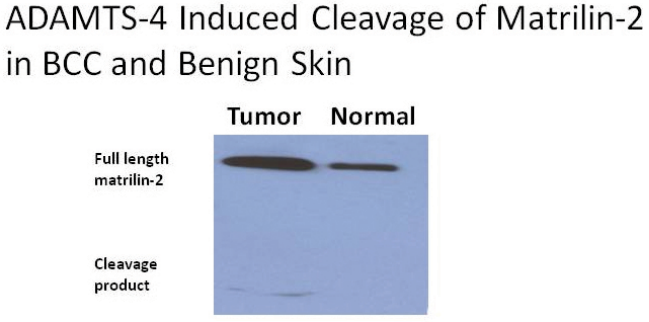
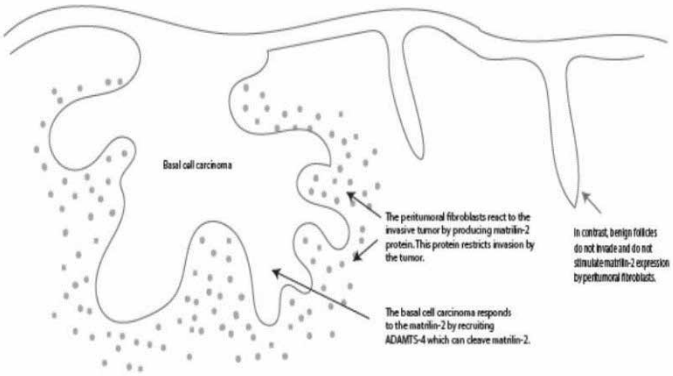


Figure 1. Infiltrative basal cell carcinoma. (A) H&E staining. (B) Matrilin-2 expression in the peritumoral stroma. Intensity and pervasiveness of Matrilin-2 staining (C) and (D).





Proposed model of matrilin-2 expression in the stroma around tumors.

April 28, 10:16-10:23 am

Presenter: Sogyong Auh, MD, PhD

Title: Assessing the Feasibility of an Alternative Payment Model for Mohs Micrographic Surgery

Authors: Sogyong Auh, MD, PhD[1]; Pooja Chitgopeker, MD[1]; Josh Hammel, MD[1]; Nkanyezi Ferguson, MD[1]; Hillary Johnson-Jahangir, MD, PhD[1]; Marta VanBeek, MD, MPH[1]

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

Purpose: Utilization of procedures to treat cutaneous malignancies has increased exponentially and will continue to do so with the aging Medicare population and epidemic of non-melanoma skin cancer (NMSC). Under the current fee-for-service (FFS) model, physicians receive more compensation for patients with complex medical conditions who require frequent care. To manage rising costs, policymakers have supported development of alternative payment models (APMs) to replace the FFS system. Currently, some surgical specialties utilize bundled APMs. These systems link payments for multiple services into a single episode-based payment with the intention of reducing costs and improving quality. Bundled payments are most effective when the cost-saving interventions are aligned with improvement in outcomes. Mohs micrographic surgery (MMS) is a cost-effective treatment for NMSC with higher cure rates than comparable treatments. MMS already incorporates bundling of costs for surgical excision, tissue processing and histopathological interpretation. However, a comprehensive MMS bundle would also include the costs of reconstruction, pre-operative and post-operative care. The objective of this study was to determine the average cost of an episode of care (EOC) for MMS in an academic hospital setting and assess the feasibility of an APM for MMS.

Summary: In 2014, 848 patients with 1056 tumors were treated with MMS. 85% of encounters involved MMS for a single site (Table 1). The mean number of stages for tumor clearance was 1.6. An EOC was determined to include a pre-operative visit, MMS and reconstruction. The average Medicare payment for an EOC was $730.05. When analyzing by repair type, bundles for complex linear closure and flap/graft repairs were significantly different than the average bundle (Table 2).

Design: A retrospective chart review was performed for patients who underwent MMS in 2014. Payment codes obtained for

clinical visits, MMS and surgical repair were analyzed by patient encounter (Figure 1). Chart review extracted tumor type, size and location, immune status of patient, number of stages, and type of repair. Referred repairs were excluded from the payment analysis.

Conclusion: Our analysis demonstrates that bundling surgical repairs with MMS based on an average payment does not statistically represent the heterogeneity of the care provided. In other surgical subspecialties, over a third of EOC payments may relate to post-discharge care, which provides opportunities for decreasing costs by incentivizing shorter post-acute care. Given the low incidence of surgical complications with MMS, the main cost in a bundle would be the index procedure, not post-operative care. Furthermore, the complexity of surgical repair required for a MMS defect is not a proxy for quality of care, but a reflection of intrinsic patient/tumor characteristics. Value-based care is the future of medicine. Mohs surgeons must proactively direct changes in payment structure to maintain our ability to provide the highest quality care for our patients.

Table 1. Characterization of patients and tumors treated with MMS in an academic hospital setting

Patient Demographics	
Number of Patients	848
Gender	
Male	486 (57.3%)
Female	362 (42.7%)
Immunocompromised	
Yes	68 (8.0%)
No	780 (92.0%)
Age, Mean (SD)	66.9 (13.8)
Tumor Characteristics	
Number of Tumors	1056
Required Number of MMS Stages for Tumor Clearance	
1	498 (47.2%)
2	443 (42.0%)
3	79 (7.5%)
4	26 (2.5%)
5	8 (0.8%)
6	2 (0.2%)
Type of Tumor	
BCC	749 (70.9%)
SCC	255 (24.1%)
MMIS	33 (3.1%)
Other	19 (1.8%)
Encounter Descriptions	
Number of Encounters	898
Number of MMS Sites per Encounter	
1	766 (85.3%)
2	113 (12.6%)
3	12 (1.3%)
4	7 (0.8%)

Table 2. Comparison of Average Total Medicare Payment by Site of Care

			Academic Center Payment				Medicare National Facility[a]				Medicare National Non-Facility[a]			
Type of Repair	# of MMS Encounters	# of Stages Required	Pre-op	Mohs	Repair	Total	Pre-op	Mohs	Repair	Total	Pre-op	Mohs	Repair	Total
Flap/Graft	99	1.8	$23.49	$330.73	$673.86	$1,028.08	$26.39	$502.46	$793.86	$1,322.71	$38.90	$879.39	$934.29	$1,852.57
Complex Linear Closure	174	1.5	$16.57	$427.02	$141.47	$585.07	$19.75	$462.87	$324.22	$806.84	$28.76	$807.01	$475.29	$1,311.06
Other	32	1.9	$23.34	$493.25	$79.75	$596.34	$27.33	$521.12	$136.88	$685.32	$40.14	$913.70	$185.60	$1,139.44
Total	**305**	**1.6**	**$19.53**	**$402.72**	**$307.80**	**$730.05**	**$22.70**	**$481.83**	**$457.01**	**$961.54**	**$33.25**	**$841.69**	**$593.88**	**$1,468.83**

[a] Based on 2014 Medicare Physician Fee Schedule

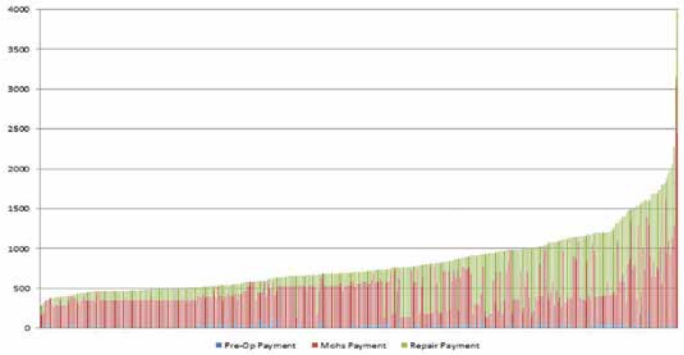


Figure 1. Medicare Total Payment Distribution by MMS Encounter in US Dollars

April 28, 10:24-10:31 am

Presenter: Emily S. Ruiz, MD

Title: Mohs Micrographic Surgery Utilization is Correlated with Number of Skin Biopsies Performed: An Analysis of Medicare and Private Insurance Claims Data

Authors: Emily S. Ruiz, MD[1]; Pritesh S. Karia, MPH[1]; Corwin Zigler, PhD[2]; Chrysalyne D. Schmults, MD, MSCE[1]

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

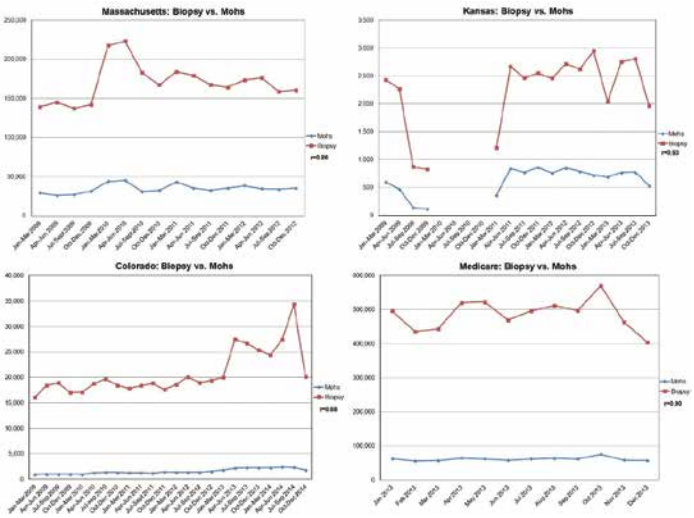
Purpose: Over the last two decades, there has been a significant increase in surgical procedures for non-melanoma skin cancer (NMSC). Dermatologists have been scrutinized for overutilization of Mohs micrographic surgery (MMS), the most effective treatment for NMSC. However, few studies have explored the reasons for increased MMS utilization in the U.S. This study evaluates the correlation between the number of skin biopsies performed and MMS utilization using fee-for-service Medicare and private insurers claims data.

Summary: Data was available for Massachusetts for the years 2009-2012, Kansas for the years 2009 & 2011-2013, Colorado for the years 2009-2014, and Medicare for the year 2013. In Massachusetts, the average number of MMS and biopsies performed over a 3-month interval was 34,678 (range: 26,119-45,853) and 169,859 (range: 137,303-223,265), respectively. In Kansas, the average number of MMS and biopsies performed over a 3-month interval was 628 (range: 115-858) and 2,226 (range: 826-2,948), respectively. In Colorado, the average number of MMS and biopsies performed over a 3-month interval was 1,543 (range: 893-2,385) and 20,842 (range: 16,039-34,359), respectively. Nationally, the average number of MMS and biopsies performed each month was 63,313 (range: 55,680-75,140) and 485,578

(range: 404,260-569,400), respectively. A strong positive Pearson correlation was observed between the number of skin biopsies and MMS utilization (Massachusetts: 0.86; Kansas: 0.93; Colorado: 0.88; Medicare: 0.94).

Design: Data from the All-Payer Claims Database (APCD) of Massachusetts, Kansas, and Colorado, and the 5% sample Medicare claims set were queried for current procedure terminology codes for skin biopsies (CPT codes 11100-11101, 40490, 54100, 67810, 69100, 88331, 11755, 11300-11313) and first stage of MMS (CPT codes 17311 and 17313). The numbers of biopsy and MMS procedures were tabulated for 3-month intervals for all available years for Massachusetts, Kansas, and Colorado, and in one-month intervals for Medicare. A Pearson correlation coefficient (PCC) was calculated comparing the number of biopsies and MMS.

Conclusion: The number of MMS procedures is strongly correlated with the number of skin biopsies performed. The upward trend in MMS utilization may be attributed to the increasing number of skin biopsies performed that diagnose skin cancers. Further studies examining APCDs from other states will provide insight as to whether this trend exists in other states; such work is underway by our group. Studies evaluating the impact of MMS utilization on overall skin cancer spending adjusted for number of incident skin cancers will aid in developing cost-effective skin cancer management.



April 28, 10:32-10:39 am

Presenter: Karen Connolly, MD

Title: Time to Local Recurrence of Lentigo Maligna

Authors: Karen Connolly, MD[1,2]; Brian Hibler, BA[3]; Erica Lee, MD[1]; Anthony Rossi, MD[1]; Kishwer Nehal, MD[1]

Institutions: 1. Memorial Sloan Kettering Cancer Center, New York, NY
2. Private practice, West Orange, NJ
3. University of Wisconsin, Madison, WI

Purpose: The time to local recurrence (LR) of lentigo maligna and thin lentigo maligna melanoma (LM/LMM) has not been well-defined. The purpose of this study was to describe time to LR, clinical, pathological, and surgery characteristics of locally recurrent LM/LMM referred to a dermatological surgery practice over a 15-year period.

Summary: Six hundred forty nine cases of LM/LMM were seen from July 2000 through November 2015. Forty one cases were defined as locally recurrent at presentation after chart review revealing pigmentation at the margin of the scar from the initial surgical procedure or within a skin graft used to repair the defect. All LM/LMM were histologically proven. Twenty nine of the 41 cases had a pathology report and/or excision slides from the first procedure confirming the original tumor pathology and date of treatment available for review at the time of their initial consulation. For these 29 patients with a confirmed date of first treatment, time to initial LR was 57.5 months (range 7 to 194). The primary lesions were LM in 21 cases and LMM in 8 cases. For primary LM, LR was also in situ in 76% of cases. Only five of 22 LM recurred as LMM, with a mean depth of 0.29mm (range 0.2 to 0.58). The mean depth of the primary LMM was 0.44mm (range 0.25 to 1.07). Of the nine primary LMM, three presented with subsequent LMM. For these three LMM that recurred as LMM, all were slightly deeper on re-excision, but no tumors were upstaged beyond 1A.

Design: A retrospective chart review was completed for all patients referred for surgical treatment of LM/LMM from October 2006 to November 2015 after institutional IRB approval. Selected patient and tumor characteristics were recorded. Outside pathology reports and when available internal pathology slide reports were reviewed for details on the initial tumors and treatment.

Conclusion: This study demonstrates that the mean time to LR of primary LM and thin LMM is 57.5 months. This long time to LR has not been previously demonstrated in a large series of patients and underlines the importance of very long-term follow up for this disease entity. Five of 22 LM did recur as LMM, but the lack of development of LMM from LM in the majority of recurrent cases confirms that LM is slowly progressive.

April 28, 10:40-10:47 am

Presenter: Ali A. Damavandy, MD

Title: Intraoperative Immunostaining for Cytokeratin-7 During Mohs Micrographic Surgery Reduces Recurrence Rates in Extramammary Paget's Disease - A Multicenter Retrospective Study

Authors: Ali A. Damavandy, MD[1]; Vitaly Terushkin, MD[2]; John A. Zitelli[3], MD; David G. Brodland, MD[4]; Christopher J. Miller, MD[1]; Jeremy Etzkorn, MD[1]; Thuzar Shin, MD, PhD[1]; Mario Mitkov, MD[5]; Mark Capell, MD[5]; Ali Hendi, MD[6]

Institutions: 1. University of Pennsylvania, Philadelphia, PA
2. New York University, New York, NY
3. Zitelli and Brodland, Pittsburgh, PA
4. Zitelli and Brodland, Clairton, PA
5. Mayo Clinic Jacksonville, Jacksonville, FL
6. Georgetown University Hopsital, Washington, DC

Purpose: Extramammary Paget's Disease (EMPD) is a rare intraepithelial malignancy which is difficult to treat effectively. The reported recurrence rates for standard surgical treatments including wide local excision, vulvectomy, and abdominoperineal resection are high, ranging from 22-60% in the largest

retrospective reviews. Previously, the largest reported cohort of EMPD patients treated with Mohs micrographic surgery (MMS) demonstrated a local recurrence rate of 16% for primary tumors, 50% for recurrent tumors, and 26% overall. Given the considerable morbidity associated with surgical treatment of recurrent disease as well as the possible risks of invasion and metastasis, an optimized treatment approach to decrease local recurrence rates would be of great benefit to patients.

Summary: A total of 49 patients and 62 cases of both primary and recurrent tumors of EMPD treated with MMS with intraoperative immunohistochemistry for CK-7 were obtained. Fifty-eight (93.5%) of the tumors were cleared with MMS with CK-7 staining alone with 4 (6.5%) cases requiring referral for further organ-specific resection (e.g. vaginectomy, hysterectomy, abdominoperineal resection) following clearance of the peripheral skin. The overall local recurrence rate was 3.2%, with 2.3% and 5.3% local recurrence rates for primary and recurrent EMPD lesions, respectively, with a mean follow-up period of 39.8 months. The 5-year tumor free rate (Kaplan-Meier analysis) for the MMS with CK-7 cohort was 94.8% overall (97.1% and 83.3% for primary and recurrent tumors), compared with 77.3% overall (79.7% and 75.0% for primary and recurrent tumors, p=0.029) in the historical cohort treated with MMS alone.

Design: A multicenter retrospective review of all patients with biopsy-proven EMPD expressing cytokeratin-7 (CK-7) treated using MMS with intraoperative immunohistochemistry for CK-7 since the adoption of the technique in 2004 was conducted at four high-volume outpatient MMS practices. The pertinent patient demographic, disease, treatment, and follow-up data were obtained. Examination of the affected anatomic location by a physician was required to establish the presence or absence of recurrence and all lesions suspicious for recurrence were sampled by formalin-fixed paraffin embedded sections with immunohistochemistry for CK-7 for confirmation. Qualitative and quantitative analysis was carried out to determine the local recurrence rate for patients treated with MMS with immunohistochemistry for CK-7 with primary and recurrent EMPD and a comparative analysis was carried out using a previously published cohort of patients treated with MMS alone. The 5-year tumor free rates by Kaplan-Meier analysis for both techniques was also calculated.

Conclusion: The addition of intraoperative immunohistochemistry for CK-7 improves tumor cell visualization during MMS and reduces recurrence rates for both primary and recurrent EMPD compared to previously reported data for standard surgical management and MMS alone. MMS with the use of immunostains to CK-7 should be the curative treatment of choice for patients with local EMPD.

April 28, 10:48-10:55 am

Presenter: Ryan P. Johnson, MD

Title: A Retrospective Case-Matched Cost Comparison of Surgical Treatment of Melanoma and Non-melanoma Skin Cancer in the Outpatient vs Operating Room Setting

Authors: Ryan P. Johnson, MD[1,2]; Niraj Butala, MD[3]; Murad Alam, MD[4]; Naomi Lawrence, MD[3]

Institutions: 1. Medical Dermatology Specialists, Phoenix, AZ
2. Banner MD Anderson, Gilbert, AZ
3. Cooper University Hospital, Marlton, NJ
4. Northwestern University Feinberg School of Medicine, Chicago, IL

Purpose: To compare the cost of surgical treatment of skin cancer in the outpatient vs operating room setting using matched cases based on patient and skin cancer characteristics.

Summary: Skin cancer is the most common cancer diagnosed in the United States and its incidence is increasing. There were nearly 5 million adults treated for skin cancer annually from 2007-2011, costing 8.1 billion dollars a year. With this significant escalating economic impact it is reasonable to examine the cost of treating skin cancer in different settings to determine the most cost effective approach for skin cancer. Mohs micrographic surgery provides the highest cure rates for both primary and recurrent skin cancer while sparing tissue compared to surgical excision. However, its cost effectiveness has come under scrutiny in today's healthcare economy prompting many authors to publish research on the subject. Some studies have compared the cost of Mohs micrographic surgery to other treatment options for skin cancer using extrapolated data. To date no studies have used authentic billing data in a matched case-control fashion.

Design: ICD-9 diagnosis codes for skin cancers were used to identify patients who had an operating room malignant excision CPT code from 2010-2014. We matched these patients by age, gender, and skin cancer subtype with similar patients treated with Mohs micrographic surgery or excision in the outpatient setting. A total of 18 operating room and 18 outpatient (8 Mohs and 10 excision) cases had the required information and characteristics to be matched. Detailed billing charges for all cases were then analyzed and health status was determined by ASA anesthesia grading scale.

Conclusion: A total of 18 matched pairs were included in the cost analysis study. 17 of the matched pairs had enough information for the three blinded anesthesiologists to determine ASA scores. The outpatient cases had a mean age of 58.32 and mean ASA score of 1.924. The operating room cases had a mean age of 58.21 and mean ASA score of 2.018. No statistically significant differences were found in the age ($p > 0.9$) or ASA scores ($p > 0.6$). A Wilcoxon Signed-Ranks Test indicated that the ranked operating room costs (median $11,323) were statistically significantly higher than the ranked outpatient costs (median $1,745) for treating skin cancer, with a difference of $9578 ($p < 0.001$). This is the first cost analysis study using actual patient billing data for patients treated in the operating room versus an outpatient dermatologic surgery office, controlling for age, gender, health status, and skin cancer subtype. Outpatient dermatologic surgery offers high quality of care with significant cost-saving benefits.

Clinical Pearls Abstract Session – Thursday, April 28: 3:15-4:15 pm

April 28, 3:15-3:22 pm

Presenter: Thuzar M. Shin, MD, PhD

Title: Demographic and Clinicopathologic Tumor Characteristics Associated with Subclinical Spread of Invasive Melanoma

Authors: Waqas R. Shaikh, MD, MPH[1]; Christopher J. Miller, MD[1]; Joseph F. Sobanko, MD[1]; Jeremy R. Etzkorn, MD[2]; Thuzar M. Shin, MD, PhD[1]

Institutions: 1. University of Pennsylvania, Philadelphia, PA
2. University of Pennsylvania, Yardley, PA

Purpose: Current appropriate use criteria (AUC) for Mohs micrographic surgery (MMS) to treat melanoma are based on consensus opinion and restricted to melanoma in situ with anatomic location and recurrence status as the criteria to distinguish between appropriate and inappropriate use. This study evaluated the association between multiple demographic and clinicopathologic tumor characteristics and subclinical spread of invasive melanoma. Identifying subsets of invasive melanoma with elevated frequencies of subclinical spread may inform AUC for MMS to treat invasive melanomas.

Summary: 216 invasive melanomas in 212 patients treated with MMS were identified. 62% (133/216) required one Mohs stage and 38% (83/216) required more than one Mohs stage to obtain clear microscopic margins. Statistically significant predictors of subclinical spread included: head/neck location (OR 3.16, 95% CI: 1.32, 7.59), tumor size > 1 cm (OR 2.08, 95% CI: 1.15, 3.76), previously treated tumors (OR 3.55, 95% CI: 1.50, 8.40), age > 65 (odds ratio [OR] 4.33, 95% CI [confidence intervals]: 1.54, 12.16), and presence of mitoses (OR 2.04, 95% CI: 1.06, 3.93). A count prognostic model (Table 1) was constructed using these five risk factors and logistic regression. The likelihood of subclinical spread varied depending on the number risk factors, ranging from 9.22% (95% CI: 2.57%, 15.86) if no risk factors were present to 80.32% (95% CI: 68.13%, 92.51%) if 5 risk factors were present (*Ptrend*<0.001). If a melanoma had ≥ 3 risk factors, the probability of subclinical spread approached 50% (48.22% [95% CI: 40.17%, 56.28%]).

Design: We conducted a retrospective, single academic center, cross-sectional study of invasive melanomas treated with MMS using hematoxylin-eosin (H&E) and melanoma antigen recognized by T cells-1 (MART-1) staining from March 2006 through September 2013. Demographic and clinicopathologic tumor characteristics were correlated with the presence of subclinical spread, defined as the requirement for more than one stage of MMS to obtain clear microscopic margins. Logistic regression models were constructed to generate ORs and 95% CI. A logistic regression-based count prognostic model was constructed to determine the likelihood of subclinical spread per the number of risk factors that were statistically significant in univariate analysis.

Conclusion: The following clinicopathologic factors are independently associated with significantly increased odds of subclinical spread of invasive melanoma: location on the head and neck, recurrence after previous treatment, tumor size > 1 cm, patient age > 65, and mitogenicity. The odds of subclinical spread increases with the number of risk factors. These data may help to develop evidence-based criteria for appropriate use of MMS for invasive melanoma.

Table 1: Probabilities of subclinical spread by number of risk factors for invasive melanoma treated with MMS (n=216)*

Risk factors*	Observed probabilities of subclinical spread (relative frequencies)	Count model predicted probabilities (95% CI)
0	0.00% (0/5)	9.22% (2.57%, 15.86%)
1	20.75% (11/53)	17.53% (9.79%, 25.27%)
2	29.63% (16/54)	30.79% (23.69%, 37.90%)
3	46.48% (33/71)	48.22% (40.17%, 56.28%)
4	65.52% (19/29)	66.10 (54.56%, 77.63%)
5	100.00% (4/4)	80.32% (68.13%, 92.51%)

*Risk factors: age ≥ 65, previously treated tumors, tumor size > 1 cm, head/neck location, positive mitotic rate

April 28, 3:23-3:30 pm

Presenter: Babu Singh, MD

Title: Incidence of High-Risk Features and Tumor Upstaging Based on Debulk Analysis from Mohs Micrographic Surgery and Excisions Compared to Initial Biopsy of Cutaneous Basal Cell and Squamous Cell Carcinoma: A Quantitative Systematic Review

Authors: Babu Singh, MD[1]; Adriana Dorelles, ScD, MS[2]; Nellie Konnikov[3]; Bichchau Michelle Nguyen, MD, MPH[3,4]

Institutions: 1. Boston University Medical Center, Boston, MA
2. Arizona State University, Tempe, AZ
3. VA Boston Healthcare System, Boston, MA
4. Tufts Medical Center, Boston, MA

Purpose: To determine the (i) incidence of high risk features on debulk analysis compared to initial biopsy, and (ii) incidence of upstaging of tumors based on debulk analysis compared to initial biopsy according to the American Joint Committee on Cancer (AJCC) and the Brigham and Women's Hospital (BWH) Alternative staging criteria.

Summary: Fourteen studies encompassing 2565 keratinocytic tumors were analyzed. Initial diagnosis was made via punch biopsy in 1344/2565 (52%), shave biopsy in 305/2565 (12%), and unspecified biopsy technique in 916/2565 (36%) cases. Out of 2079 BCCs, 643 (30.9%) were initially classified as low-risk subtype (superficial, nodular or not otherwise specified (NOS)) based on biopsy but were re-classified as high-risk subtype (basosquamous, infiltrative, micronodular, morpheaform, aggressive NOS) on debulk analysis ($p < 0.001$). 47/292 (16%) of initially SCC in-situ were found to have invasive SCC component on debulk analysis. 9/201 (4.5%) cases of invasive SCC were re-classified from low-risk (well to moderately differentiated or NOS) to high-risk subtype (poorly differentiated) based on debulk analysis ($p < 0.001$). Out of 47 cases of PNI noted on debulk analysis, only 3 (6.4%) were detected on initial biopsy. Incidence of upstaging to a higher tumor (T) stage for SCC was 9.1% based on AJCC and 13.1% based on BWH Alternative staging criteria (Table 1,2). Furthermore, (22/23) 95% of BWH high-risk T2b SCCs were inaccurately staged as T2a or lower based on biopsy results (Table 2).

Design: A quantitative systematic review of all published literature was performed using the following key words: "excision", "Mohs surgery", "microsurgery", "basal cell carcinoma", "squamous cell carcinoma", "squamous cell carcinoma in situ", "skin neoplasm", and "biopsy." 14 studies were identified, which encompassed 2565 tumors. Data on location, size, histologic subtypes, and perineural (PNI) or lymphovascular invasion were extracted from the individual tumor cases when available. Tumors were staged based on AJCC 7th ed. criteria alone (BCCs) or both AJCC 7th ed. and BWH alternative staging criteria (SCCs) using histologic features from initial biopsy first, then initial biopsy and final debulk analysis to determine incidence of upstaging/downstaging.

Conclusion: Our systematic review suggested that relying on pathology findings from biopsy specimen alone would miss poorly differentiated SCC in 5%, high-risk BCC subtype in 30%, perineural invasion in >90% of cases. More importantly, 95% of high-risk (BWH T2b) SCCs would be misclassified as lower risk tumors, potentially resulting in under-treatment. Sampling errors in biopsy specimens can contribute to inaccurate tumor staging. Tumor debulk from Mohs micrographic surgery should be evaluated histologically when appropriate per clinical assessment.

Table 1. Tumor (T) stage of SCC on initial biopsy and debulk analysis based on AJCC 7th ed. Criteria.

AJCC 7th ed. SCC N(%)		Debulk Analysis Specimen				
	Tumor (T) Stage	Tis	T1	T2	T3	T4
Initial Biopsy	Tis	111 (22.8)	32 (6.6)	0	0	0
	T1	0	284 (58.4)	12 (2.5)	0	0
	T2	0	0	47 (9. 7)	0	0
	T3	0	0	0	0	0
	T4	0	0	0	0	0

Table 2. Tumor (T) stage of SCC tumors on initial biopsy and debulk analysis based on BWH Alternative staging criteria.

BWH Alternative staging SCC N(%)		Debulk Analysis Specimen				
	Tumor Stage (T)	Tis	T1	T2a	T2b	T3
Initial Biopsy	Tis	111 (22.8)	31 (6.4)	1 (0.2)	0	0
	T1	0	268 (55.1)	6 (1.2)	2 (0.4)	0
	T2a	0	0	42 (8.6)	20 (4.1)	3 (0.6)
	T2b	0	0	0	1 (0.2)	1 (0.2)
	T3	0	0	0	0	0

April 28, 3:31-3:38 pm

Presenter: Timothy W. Chang, MD

Title: Outcomes of Adjuvant Radiotherapy Following Negative Surgical Margins for Cutaneous Squamous Cell Carcinoma

Authors: Timothy W. Chang, MD[1]; David J. Schwartz, MD[1]; Phillip C. Hochwalt, MD[1]; Christopher J. Arpey, MD[1]; Jerry D. Brewer, MD[1]; Thomas L. Hocker, MD[1]; Clark C. Otley, MD[1]; Randall K. Roenigk, MD[1]; Christian L. Baum, MD[1]

Institution: 1. Mayo Clinic, Rochester, MN

Purpose: While the majority of cutaneous squamous cell carcinomas (CSCC) are curable with surgical monotherapy, 4% develop lymph node metastases, and 1.5% die from the disease. Complete surgical clearance is considered the standard of care for CSCC, although it is unknown which CSCC patients benefit from adjuvant radiotherapy. According to the National Comprehensive Cancer Network in 2006, the role of radiotherapy for nonmelanoma skin cancers was likely the single largest source of disagreement. The purpose of this study was to characterize a cohort of patients who were treated with adjuvant radiotherapy following negative surgical margins for CSCC.

Summary: Thirty-two patients met the inclusion criteria, including 18 with a primary CSCC and 14 with recurrent CSCC. There were 31 patients treated with Mohs Micrographic Surgery and 1 patient treated with excision. According to AJCC 7th edition staging, 2 were stage T1, and 27 were stage T2. According to Brigham & Women's Hospital (BWH) staging, 1 was stage T1, 3 were stage T2a, 19 were stage T2b, and 6 were stage T3. Three patients with intransit metastasis were designated as having M1 disease. Perineural invasion was found in 23 patients. Radiation in cGy per person ranged from 2700-6000. Fractions ranged from 3-30. Radiation cGy per fraction ranged from 250-900. Last date of radiation to last date of follow-up or recurrence ranged from 0.21-9.07 years, with an average of 3.86 years. Three patients developed recurrence after adjuvant radiation, all of which occurred with distant metastases. These 3 patients had perineural invasion on the originally excised tumor and were staged as T2 by AJCC, while 2 patients were T3 and 1 patient was T2b by BWH. Time to recurrence after finishing radiation ranged 0.9-2.6 years, with an average of 1.74 years. Two of the 3 patients who developed recurrence died; one from intracranial metastasis and the other was undocumented. There were a total 13 deaths of the 32 patients.

Design: Institutional Review Board approval was obtained. A retrospective case review evaluated patients treated between March 10, 1998 and April 26, 2013. Patients were included if they had CSCC treated with adjuvant radiotherapy after negative margins were achieved via either Mohs Micrographic Surgery or excision.

Conclusion: To our knowledge, this case series represents one of the largest studies investigating the role of adjuvant radiotherapy after surgically clear margins for CSCC. The 3 patients with recurrence had perineural invasion and were BWH stage >= T2b. Of those with perineural invasion and negative surgical margins,

we found the recurrence rate after adjuvant radiotherapy to be 3/22 (14%). Further studies comparing surgical monotherapy with surgery plus adjuvant radiation will be important in defining the role of adjuvant radiotherapy for patients with negative surgical margins after surgical resection of CSCC.

April 28, 3:39-3:46 pm

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

Title: Can the American College of Mohs Surgery Mohs Video Impact a Patient's Perception of Mohs Surgery

Authors: Sidney P. Smith, III, MD, FACMS[1]

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

Purpose: The purpose of study was to determine if the 9-minute American College of Mohs Surgery (ACMS) Mohs video presentation could impact a Patient's Perception of Mohs Surgery.

Summary: A research study was conducted with 100 Mohs Surgery patients. They were asked to view a 9-minute video about Mohs surgery that was produced by American College of Mohs Surgery (ACMS) and, then they were asked to respond to a 24-item questionnaire about their perception of the ACMS video and Mohs surgery.

Design: Of the 200 Mohs surgery patients participating in the study 47 patients had never had Mohs surgery performed while 53 patients had had Mohs surgery performed. When asked, "How did you learn about Mohs?" 84% of the patients stated their practitioner recommended the Mohs procedure, 12% heard from friends, 3% searched the Internet, and 2% obtained their information through other means. All patients were asked if they had ever viewed an educational video about their needed surgical procedure, such as Mohs surgery. Ninety-nine percent of the 200 patients had never viewed a video explaining the surgical procedures prior to surgery. Yet, 94% of the patients stated they believed the Mohs video did answer most of their questions and reported it was valuable to their health care. More than 85% found the Mohs video relieved their fear about the surgery and 95% recorded they believed that Mohs surgery maximized their success rate for removal of their cancers. Eighty seven percent of the 100 patients stated they believed that all surgical procedures should be preceded with a video presentation.

Conclusion: The findings revealed that American College of Mohs Surgery video serves as an effective mechanism for patient education and improves patients' perception of Mohs surgery. Also the video helps decrease the patients' fear and anxiety prior to surgery.

April 28, 3:47-3:54 pm

Presenter: Jason M. Hirshburg, MD, PhD

Title: Adverse Events Associated with Lidocaine and Epinephrine Use in Dermatologic Surgery: A Retrospective Review

Authors: Jason M. Hirshburg, MD, PhD[1]; Matthew C. Fox, MD[1]; Dayna G. Diven, MD[1]

Institution: 1. University of Texas at Austin, Austin, TX

Purpose: In 2013, the state legislature passed SB 978, which recategorized the administration of local anesthesia involving greater than 50% of the recommended maximum dose in outpatient settings from a level I service to a level II. This change required physicians to have and maintain a crash cart in the office; maintain American Heart Association ACLS certification; attend the patient until the patient is discharged; and ensure that a second BLS certified assistant be present during the procedure. In part due to the effective lobbying of the local dermatological society, American Society for Dermatologic Surgery (ASDS) and American College of Mohs Surgery (ACMS), an amendment excluding Mohs micrographic surgery from applicability of the bill was adopted by the state medical board. Nevertheless, the requirements of the bill are not inconsequential for many dermatologists. Furthermore, this bill passed with very little data evaluating the safety of outpatient lidocaine use in dermatologic surgery. A retrospective chart review was conducted to evaluate the safety of local anesthesia with lidocaine plus epinephrine during Mohs micrographic surgery as well as to identify comorbid conditions associated with adverse events.

Summary: With interim analysis of preliminary data in this ongoing study, 477 patient charts met the inclusion criteria of documented patient weight, past medical history, and total amount of lidocaine with epinephrine administered. No adverse events occurred among study patients over this time period, nor were any adverse events identified among patients who did not meet inclusion criteria. Comorbidities of the study population included: Arrhythmia (92), Coronary artery disease (58), Congestive heart failure (36), Hypertension (275), Hyperlipidemia (196), TIA/Stroke (27), COPD (30), Cirrhosis (12), Chronic kidney disease (16), Diabetes mellitus (79), Current smoker (68). Of the study population, 45 (9.4 %) patients received greater than 50 % of the maximum recommended dose (7 mg/kg) of lidocaine plus epinephrine with no adverse events occurring.

Design: A retrospective review was conducted of patients undergoing Mohs micrographic surgery from the time period of March-December 2015. 723 patient charts were reviewed with 477 meeting the inclusion criteria of documented patient weight, medical history, and amount of lidocaine with epinephrine administered. Charts were evaluated for adverse events including death, emergency medicine intervention of any kind, arrhythmia, shortness of breath, cardiac arrest, transient ischemic attack/cerebrovascular accident, hypertensive crisis, or hospitalization.

Conclusion: A review of 477 patients undergoing Mohs surgery showed no adverse events despite many patients having serious comorbid conditions and a significant percentage of patients

receiving greater than 50% of the maximum recommended dose of lidocaine with epinephrine. Outpatient surgery has an important role in health care in the United States and loss or limitation of this modality further increases healthcare expenditures without any evidence that it would improve patient safety.

April 28, 3:55-4:02 pm

Presenter: Nita Kohli, MD, MPH

Title: Practice Patterns and Job Satisfaction of Mohs Surgeons

Authors: Nita Kohli, MD, MPH[1]; Nicholas Golda, MD[1]

Institution: 1. University of Missouri, Columbia, MO

Purpose: Presently, approximately 68 Mohs surgeons complete fellowship training each year. While the number of Mohs surgeons trained each year has been slowly increasing, the number of skin cancers diagnosed in the United States is increasing at an alarming rate, and the number of Mohs surgeons may not be adequate to match the need for those services created by the skin cancer epidemic. This may be due, at least in part, to issues such as gender based practice patterns and physician satisfaction. There is a paucity of data on Mohs surgery workforce patterns, and this project aims to evaluate potential gender differences in Mohs surgeon practice patterns and job satisfaction. Objectives: To identify if there is a difference between practice patterns of male and female Mohs surgeons, to identify factors that influence gender-specific practice patterns of Mohs surgeons, and to identify factors influencing job satisfaction amongst male and female Mohs surgeons.

Summary: A total of 140 ACMS members completed the survey. 35% of respondents are female; 91% are married. 24.5% of females and 25.3% of males work part-time. Of females, 38.8% practice in academia vs 40.8% in private practice; whereas, males are 24.2% academia vs 60.4% private practice. 36.7% of females and 24.2% of males identified children as a factor affecting their ability to work full time. Gender comparisons for current job satisfaction show 59.3% of males and 36.7% of females being very satisfied; this is a significant difference. Supervision/feedback/recognition adds to satisfaction for females (53%) at a significantly higher rate than for males (29%). Among factors influencing job satisfaction, for both genders combined, work content, patient base, and autonomy had the highest average ratings and administrative work had the lowest average rating.

Design: An electronic survey was distributed to members of the American College of Mohs Surgery (ACMS), the Association of Professors in Dermatology, and Mohs surgeons of the American Medical Association Dermatology Section Council from October through December 2015. The target population was ACMS members.

Conclusion: There is a difference in practice patterns of male and female Mohs surgeons with regards to practice setting, with women, as a percentage, being more likely to practice in an academic setting than men. Male Mohs surgeons are more likely to be very satisfied with their work, regardless of practice setting. Supervision, feedback, and recognition add to satisfaction to a significantly greater degree for female Mohs surgeons than for males. Work content, patient base, and autonomy are rated highest in contributing to job satisfaction amongst both genders. This study demonstrates factors that could influence job satisfaction among female Mohs surgeons. This knowledge could be important to individuals who lead, mentor or supervise female Mohs surgeons.

April 28, 4:03-4:10 pm

Presenter: Thomas J. Knackstedt, MD

Title: Patient and Disease Specific Outcomes in Digit Sparing En Bloc Surgery of Nail Apparatus Melanoma in Situ

Authors: Thomas J. Knackstedt, MD[1]; Erin Wilmer, MD[2]; Leslie Robinson-Bostom[2], MD; Gladys H. Telang, MD[2]; Nathaniel J. Jellinek, MD[1,2,3]

Institutions: 1. Dermatology Professionals, Inc., East Greenwich, RI
2. The Warren Alpert Medical School at Brown University, Providence, RI
3. University of Massachusetts Medical School, Worcester, MA

Purpose: Nail apparatus melanoma (NAM) is often diagnosed at an advanced stage. A primary reason for poor prognosis is the failure to biopsy suspicious lesions early. Consequently, early stage melanoma and in situ (NAMis) are not well-described. Many cases of NAMis are treated by amputation, while digit-sparing surgery is underutilized. Prior series are limited to 11 or fewer patients. This study evaluates the treatment of NAMis with en bloc excision (of nail folds, matrix, bed, hyponychium, with margins) and summarizes patient characteristics, oncologic outcomes, and patient quality of life (QOL) thereafter.

Summary: Twenty-nine cases of NAMis were identified amongst 10 men and 19 women with a mean age of 39 years (9-87 years). Preceding trauma (6.9%) or prior cutaneous melanoma (3.4%) was rare. NAMis was most frequent on the thumb (N=7) and the hallux (N=6)(Figure 1). The average lesion duration was 4.8 years (6 months-13 years). Twenty-four patients (83%) presented with longitudinal melanonychia, average diameter 4.1 mm (range 2-10mm), four patients (14%) with complete melanonychia, and one patient with erythronychia. NAMis diagnosis was established by tangential matrix shave in 21 patients (72%), lateral longitudinal excision in three patients (10%), and matrix punch biopsy or paramedian longitudinal excision in one case each. In three cases (10%) the biopsy was performed by an outside provider or no biopsy technique details were available. En bloc surgery was performed in 27 cases (93%) (Figure 2). Twenty-six cases (89%) were repaired with a full thickness skin graft and one case each by first dorsal metacarpal artery flap, second intention healing, or the aforementioned amputation. Complications included infection (n=2), delayed graft necrosis (n=1), nail spicule (n=7), and cyst (n=2). There were no cases of tendon injury. After a mean follow up of 34 months (1-109 months) no recurrences were noted. Telephone survey response rate for QOL was 79%. Surveyed patients were unanimously 'very much' satisfied with the treatment of their NAMis. In 11 additional questions evaluating QOL, 78% of patients reported that NAMis treatment affected QOL either only 'a little' or 'not at all'. Few patients

Clinical Pearls Abstract Session – Thursday, April 28: 3:15-4:15 pm

reported 'a lot' or 'very much' interference with QOL. Average pain rating over the past week was 1.3 on the universal pain scale.

Design: An IRB-approved retrospective review of patients diagnosed with NAMis between 2005 and 2015 was performed. Demographics, clinical and histologic features, treatment, and reconstruction details and information on follow up, recurrence status, and survival were extracted. Identified subjects were prospectively evaluated with a 13-question modified dermatology life quality index (DLQI) telephone survey with answer choices 'not at all', 'a little', 'a lot', or 'very much'.

Conclusion: Digit sparing en bloc excisions are a viable treatment option for NAMis, offering low morbidity and high postoperative QOL without compromising oncologic safety. This is the largest series of NAMis treated with conservative en bloc surgery to date of which we are aware.

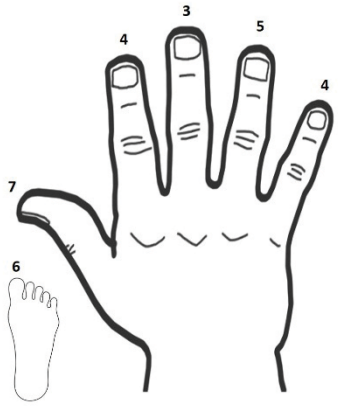


Figure 1. Distribution of nail apparatus melanoma in situ cases, irrespective of left-right laterality.

Figure 2. Exemplary case of patient presenting with biopsy-proven nail apparatus melanoma in situ treated by digit sparing en bloc excision and full thickness skin graft.

Scientific Abstract Session – Friday, April 29: 8:30-9:30 am

April 29, 8:30-8:37 am

Presenter: Waqas R. Shaikh, MD, MPH

Title: National Utilization Patterns and Survival Outcomes of Wide Local Excision and Mohs Micrographic Surgery for Merkel Cell Carcinoma

Authors: Waqas R. Shaikh, MD, MPH[1]; Joseph F. Sobanko, MD[1]; Jeremy R. Etzkorn, MD[2]; Thuzar M. Shin, MD, PhD[1]; Christopher J. Miller, MD[1]

Institutions: 1. University of Pennsylvania, Philadelphia, PA
2. University of Pennsylvania, Yardley, PA

Purpose: Surgical excision is the recommended treatment for primary Merkel cell carcinoma (MCC). Although MCC is most commonly treated with conventional wide local excision (WLE), several studies have demonstrated the efficacy of Mohs micrographic surgery (MMS) for MCC. We sought to determine utilization patterns and survival outcomes of MMS-treated MCC compared to WLE-treated MCC in the United States.

Summary: A total of 2,610 cases of MCC were identified from 2004-2009. Among the 2,267 cases of MCC treated with surgery, 92.32% (2,039) were treated with WLE and 7.68% (174) were treated with MMS. Mohs utilization rates were similar throughout 2004-2009 (Ptrend=0.68). Utilization of MMS for MCC varied by region, with highest use in the San Francisco-Oakland, San Jose-Monterey, Greater California and Greater Georgia registries. Compared to WLE-treated MCC cases, MMS-treated MCC cases are associated with age > 75 (odds ratio [OR] 1.66, 95% confidence interval [CI]: 1.03, 2.67), facial location (OR 4.37, 95% CI: 2.10, 9.09), lack of sentinel lymph node biopsy (OR 3.24, 95% CI: 2.26, 4.65), treatment with radiation therapy (OR 1.79, 95% CI: 1.31, 2.45), American Joint Committee on Cancer (AJCC) T1 stage (OR 1.94, 95% CI: 1.13, 3.34), AJCC N0 stage (2.15, 95% CI: 1.35, 3.44), and AJCC group stage 1 (OR 2.33, 95% CI: 1.36, 4.00). In univariable Cox survival analysis, compared to WLE-treated MCC, there was no significant difference in survival for MMS-treated MCC (hazard ratio [HR] 0.98, 95% CI: 0.64, 1.14), and worse survival if MCC was not treated with surgery (HR 2.84, 95% CI 2.29, 3.52). Multivariable Cox survival analysis, controlling for age, gender, race, Hispanic ethnicity, county-level socioeconomic status, tumor location, sentinel lymph node biopsy use, radiation therapy and AJCC group stage, demonstrated similar results with no significant difference in survival for MMS-treated MCC (hazard ratio [HR] 1.09, 95% CI: 0.67, 1.76), and worse survival if MCC was not treated with surgery (HR 1.50, 95% CI 1.03, 2.19), when compared to WLE-treated MCC.

Design: A retrospective population-based cohort study using the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) 18 registry database was conducted for microscopically-confirmed cases of MCC from 2004-2009 with active follow-up through 2013. Clinical, tumor, staging, management, and survival characteristics of MMS-treated MCC were compared to WLE-treated MCC using univariable and multivariable logistic and Cox regression models.

Conclusion: A stable minority of MCC are treated with MMS. Compared to WLE-treated MCC, MMS-treated MCC is associated with older patient age, tumor location on the face, absence of a sentinel lymph node biopsy, use of adjuvant radiation therapy, and earlier AJCC stage. No significant survival differences were observed between MMS-treated and WLE-treated MCC.

April 29, 8:38-8:45 am

Presenter: Bradley N. Greenhaw, MD

Title: Estimation of Prognosis in Invasive Melanoma Using a Gene Expression Profile Test

Authors: Bradley N. Greenhaw, MD[1,2]; David G. Brodland, MD[2]; John A. Zitelli, MD[3]

Institutions: 1. The Dermatology Center of North Mississippi, Tupelo, MS
2. Zitelli & Brodland Skin Cancer Center, Clairton, PA
3. Zitelli & Brodland Skin Cancer Center, Pittsburgh, PA

Purpose: Most malignant melanomas (MMs) encountered are thin (<1mm) and cured with surgical excision. However, thin MMs have been shown to be the leading cause of melanoma specific mortality, highlighting the need for more accurate prognostic tools. We sought to determine the usefulness of a commercially available gene expression profile (GEP) test which stratifies Stage I and II MM patients as either low risk, Class 1, or high risk, Class 2, for metastasis within 5 years. The test predicts 97% of Class 1 patients and 31% of Class 2 patients will be metastasis free for 5 years.

Summary: A total of 257 patients were enrolled. GEP testing placed 215 patients (84%) in Class 1, low risk, and 42 patients (16%) in Class 2, high risk. Statistical differences between clinical and histologic features of the Class 1 versus Class 2 patients were seen in mean age (66yrs vs 74yrs, p=0.0006), mean Breslow's depth (0.74mm vs 2.26mm, p<0.0001), and ulceration (p<0.0001). Sixteen of the 42 high risk tumors were ulcerated. The mean follow-up time of the entire cohort was 23 months. The test had a negative predictive value of 98%, as only 4 of 215 (2%) Class 1 tumors metastasized. Two of the Class 1 tumors that metastasized were less than 1mm in depth without ulceration. They comprised 1% of the subcohort of Class 1 tumors which were less than 1mm in depth (n=178). Ten of 42 (24%) Class 2 tumors metastasized. Ten Class 2 tumors were less than 1mm in depth and not metastatic. With these excluded, 31% of the subcohort of intermediate and thick Class 2 tumors metastasized. Overall, Class 2 tumors were 12 times more likely to metastasize than Class 1 tumors.

Design: A prospectively collected cohort of patients from our institution's melanoma registry with invasive melanomas treated within the last 5 years underwent GEP testing. The GEP results were correlated with patient and tumor characteristics abstracted from the registry. Chart reviews were performed in cases of missing registry data.

Conclusion: The GEP test provided a strong negative predictive value of 98% in our cohort, which matched the test's prediction of 97% metastasis free survival at 5 years. Only 1% percent of thin Class 1 MMs metastasized. Breslow's depth alone would predict a metastatic rate of 5-10% at 5 years. While only 23% of Class 2 patients metastasized, the test correctly identified 67% of the metastatic patients as high risk. The lack of 5 year follow up for all patients may explain the lower than expected metastatic rate for Class 2 tumors. Nonetheless, this study showed the GEP test's utility as a prognostic tool for this "real world" patient cohort.

April 29, 8:46-8:53 am

Presenter: Euphemia W. Mu, MD

Title: Evaluation of Digitally Stained Multimodal Confocal Mosaics for Screening Non-melanoma Skin Cancer

Authors: Euphemia W. Mu, MD[1]; Jesse M. Lewin, MD[1]; Mary L. Stevenson, MD[1]; John Carucci, MD, PhD[1]; Shane A. Meehan, MD[1]; Daniel S. Gareau, PhD[2]

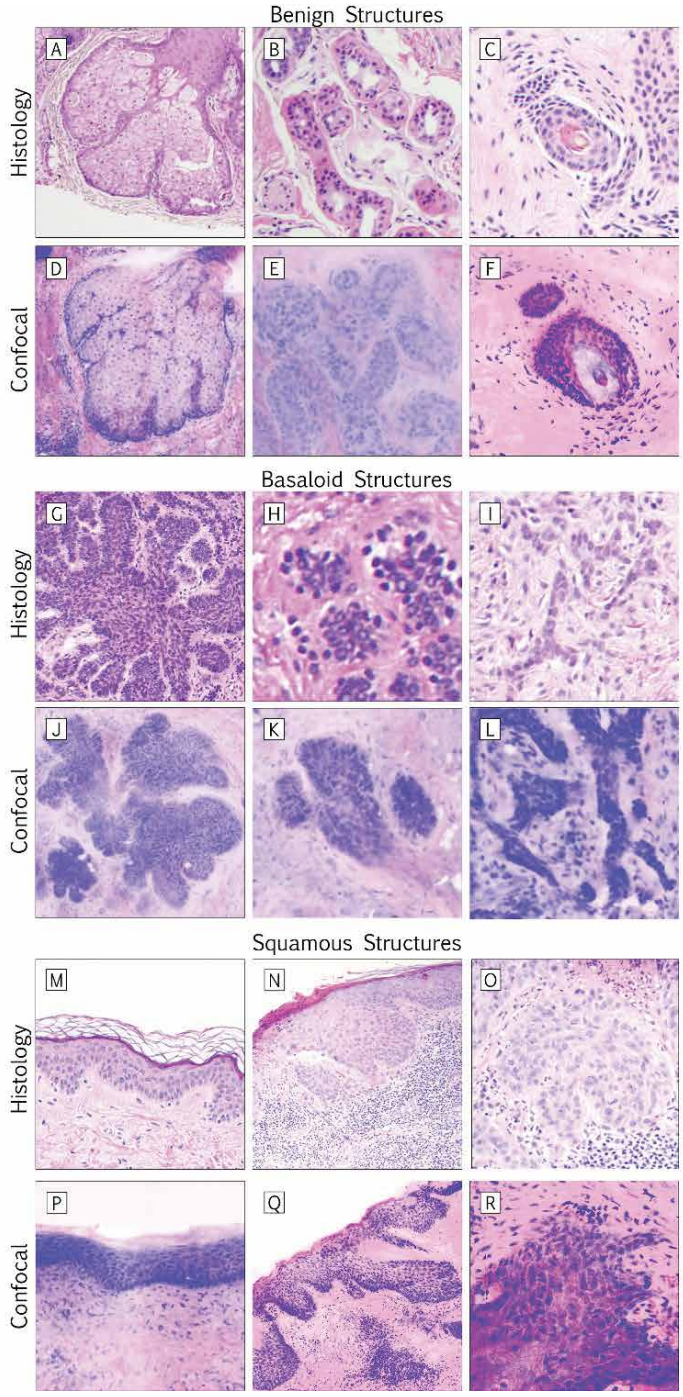
Institutions: 1. New York University School of Medicine, New York, NY
2. The Rockefeller University, New York, NY

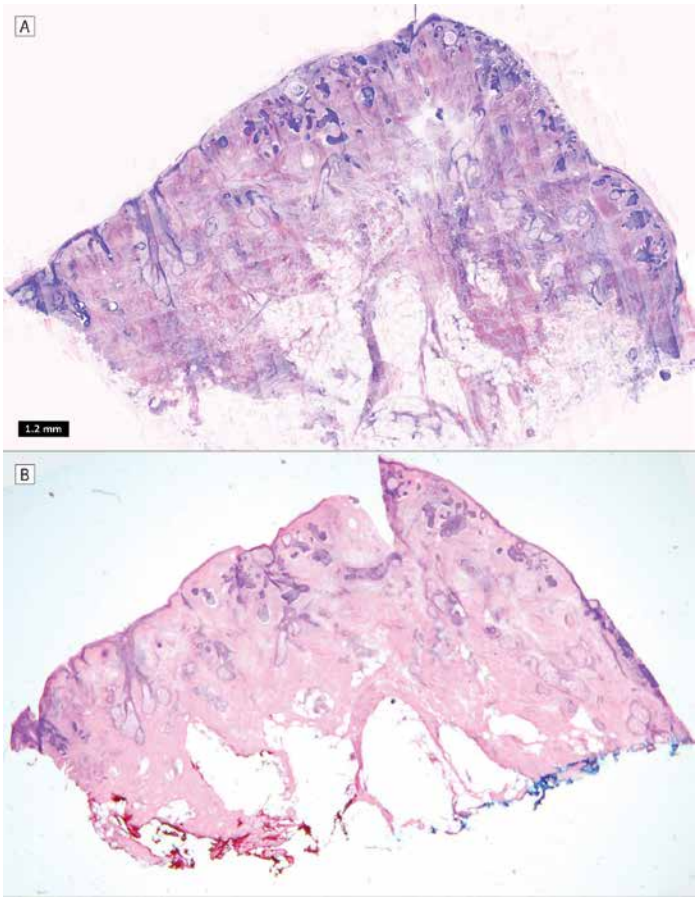
Purpose: Confocal microscopy has potential to provide rapid effective bedside pathology, however clinical adoption has been limited in part by the learning curve for reading gray-scale images. Digitally stained confocal mosaic-microscopy (DSCM) recapitulates the colors of routine histology and may increase adaptability of this technology in screening non-melanoma skin cancer (NMSC). The objective of this study was to evaluate the diagnostic accuracy and precision of using DSCM before and after training to detect basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) in Mohs micrographic surgery fresh tissue specimens.

Summary: The average sensitivity and specificity of detecting NMSC was 90% and 78% prior to training and 99% (p = 0.0012) and 93% (p = 0.18) after training, respectively. BCC was detected with a mean sensitivity and specificity of 83% and 92% pre-training and 98% and 98% post-training, respectively. SCC was diagnosed with a sensitivity and specificity of 73% and 89% pre-training and 99% and 98% post-training, respectively. The inter-observer agreement pre-training was 73% (k = 0.58) and post-training was 98% (k = 0.97, p = 0.039).

Design: This is a retrospective study using 133 DSCM from 64 Mohs tissue excisions, which included clear margins, residual BCC, or residual SCC. Two Mohs surgeons and a Mohs fellow, who were blinded to the frozen section diagnoses, independently reviewed the mosaics for residual NMSC before and after training. The two assessment sessions were separated by a six-month washout period. The diagnostic accuracy using DSCM compared to standard frozen histopathology was characterized based on sensitivity and specificity. The diagnostic precision was calculated based on inter-observer agreement and kappa score. Paired two-sample t-tests were used for comparative means analyses before and after training.

Conclusion: DSCM shows promising correlation to frozen histology of fresh tissue excisions, and physician observers were able to accurately and precisely diagnose NMSC with training. Further advances in DSCM to improve image contrast and reduce mosaicing artifact will augment the clinical utility of this technology.





April 29, 8:54-9:01 am

Presenter: Isaac Zilinsky, MD

Title: The Helical Rim Arcade, from Clinical Experience to Anatomical Conclusions

Authors: Isaac Zilinsky, MD[1]; Sebastian Cotofana[2]

Institutions: 1. The Sheba Medical Center, Tel Aviv University, Ramat Gan, Israel
2. Institute of Anatomy, Paracelsus Medical University, Salzburg, Austria

Purpose: To describe the discovery of the helical rim arterial arcade and the design of the new ear lobe based advancement flap (ELBAF).

Summary: Reconstruction of acquired helical rim defects is especially challenging because of the delicate anatomy of the auricle. The auricular blood supply described in anatomy atlases is via randomly dispersed radial spokes-like vessels originating from the superficial temporal artery. Based on this random blood supply different reconstructive techniques were described, one of which was the widely accepted Antia-Buch technique. Nevertheless, our cumulative experience in reconstructing auricular defects after Mohs surgery for skin cancer and after trauma lead us to believe that contrary to the prevalent anatomical description blood supply to the helical rim is in fact axial rather than random. Based on this assumption, we conducted an anatomical cadaver research using the Corrosion Technique in order to delineate the auricular blood supply.

Our research demonstrated a newly discovered arterial arcade along the helical rim, connecting the anterior to the posterior auricular artery. Based on this discovery a new ELBAF axial flap was designed for reconstruction of superiorly located full thickness helical rim defects, instead of the more complicated random Antia-Buch flap.

Design: A case series of 13 patients with helical rim defects of up to 3.8 cm in length were reconstructed using the ELBAF technique solely or with additional procedures. Patients were followed for the occurrence of complications and evaluation of aesthetic results for up to 8 years. An anatomical assay that included cadaver dissection and anatomical corrosion technique was performed in order to support the ELBAF technique.
The cadaver dissections demonstrated a consistent arterial blood supply emerging from the earlobe area, producing arteries that run circularly along the helical rim.

Conclusion: Based on the axial vessel pattern, the ELBAF technique seems to be a useful strategy to reconstruct full-thickness helical defects of up to 3.8 cm in length. This procedure can be regarded as a valid addition to the ear reconstruction repertoire, which can be used alone or in combination with other established techniques.

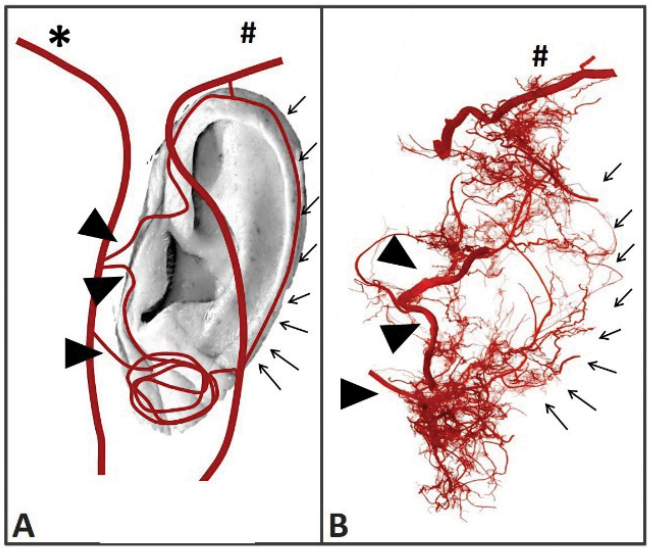


Figure 1: Schematic drawing (A) and corrosion specimen (B) showing the arterial blood supply of the outer ear. *= superficial temporal artery (missing in image B); #= posterior auricular artery (partially visible in the cranial part of the outer ear but missing in the inferior part); arrow heads mark the inferior, middle and superior branch of the anterior auricular artery; small arrows mark the anastomosis of the superior and the inferior branch along the helical rim. Note: the earlobe is supplied both by the middle and the inferior branch. Note: an anastomosis is visible between the superior branch and the posterior auricular artery.

Scientific Abstract Session – Friday, April 29: 8:30-9:30 am

April 29, 9:02-9:09 am

Presenter: Jonathan J. Lopez, MD

Title: Outcomes of Sentinel Lymph Node Biopsy for Primary Cutaneous Squamous Cell Carcinoma of the Head and Neck

Authors: Jonathan J. Lopez, MD[1]; John G. Muzic, MD[1]; Daniel L. Price, MD[1]; Jerry D. Brewer, MD[1]; Christian L. Baum, MD[1]

Institution: 1. Mayo Clinic, Rochester, MN

Purpose: There is limited data to guide clinicians in the selection of patients for sentinel lymph node biopsy (SLNB) in cutaneous squamous cell carcinoma (cSCC). The purpose of this study is to review the outcomes of SLNB in the management of high-risk primary cSCC of the head and neck (H&N) at our institution.

Summary: From January 1, 2000 to October 31, 2014, 24 patients were identified. Prior to SLNB, 12 patients underwent Mohs micrographic surgery, eight underwent wide local excision, and four underwent Mohs micrographic surgery followed by resection of an additional safety margin. Patients were staged using the AJCC and BWH staging systems. Three (12.5%) patients had occult nodal disease. Of these, two patients (8.3%), both AJCC T2 and BWH T2b, had a positive SLNB. One was immunosuppressed with a history of double lung transplantation, declined radiotherapy, and died less than two months after SLNB at home of unclear causes. The second was not offered radiotherapy and died of unknown causes four years after his SLNB with no evidence of recurrence at his last visit 6 months prior. The third patient (AJCC T2 and BWH T2a) underwent elective nodal dissection immediately after a negative SLNB and was found the have occult nodal disease. All of the remaining 21 patients had negative SLNB. Two (both AJCC T2 and BWH T2b) had a history of multiple cSCCs, developed nodal recurrence, and died of metastatic cSCC (mean 2.9 years after SLNB), and two (both AJCC T2 and BWH T2b) had local (dermal) recurrence (mean 1.0 years after SLNB). Fourteen patients had no evidence of recurrent or metastatic disease at follow-up (mean 2.9 years after SLNB). Three died of unrelated causes (mean 1.2 years after SLNB). Negative SLNB had a negative predictive value of 90.9% for local recurrence, nodal recurrence, and disease-specific death. In the AJCC staging system, there were two T3 patients who had a negative SLNB and no recurrence. The remaining 22 patients were AJCC T2. In the BWH staging system, one patient was T1, two were T2a, 17 were T2b, and four were T3. Of the 17 T2b patients, two (11.7%) had a positive SLNB, two (11.7%) had negative SLNB and local/regional recurrence, and two (11.7%) had negative SLNB but subsequently died of metastatic cSCC. This study is limited by the retrospective nature, small sample size, single institution experience, heterogenous patient characteristics, and limited follow-up.

Design: Retrospective chart review.

Conclusion: Patients with H&N BWH T2b cSCC appear to be at sufficiently high risk for positive SLNB to consider further investigation of the procedure as a staging tool. Further research is needed to elucidate additional criteria, such as immunosuppression, and a standardized evaluation approach to properly select patients for SLNB.

April 29, 9:10-9:17 am

Presenter: Mary L. Stevenson, MD

Title: Metastatic Cutaneous Squamous Cell Carcinoma: The Importance of T2 Stratification and Hematologic Malignancy in Prognostication

Authors: Mary L. Stevenson, MD[1]; Anna C. Pavlick, DO[1]; John A. Carucci, MD, PhD[1]

Institution: 1. New York University School of Medicine, New York, NY

Purpose: While the majority of primary cutaneous squamous cell carcinomas (cSCC) have good outcomes, about 3-5% of cases will result in metastatic disease that may be fatal. Recent research has aimed at identifying high-risk features of cSCC in order to better stage and prognosticate these patients including the revised American Joint Committee on Cancer (AJCC) staging guidelines and the modified Brigham and Women's Hospital (BWH) criteria. We sought to identify what clinical and histologic features existed in our cohort of metastatic patients at risk for poor outcomes and also to evaluate current AJCC and modified BWH staging guidelines for prognostication in these patients.

Summary: Sixteen patients with metastatic cSCC were identified at our institution over a 15-year study period. Clinical and histologic features of these tumors are described in Table 1. Patients were staged with AJCC and modified BWH criteria (Table 2) and compared to 32 controls. Ten of 12 patients for whom primary tumor characteristics were known were stage T2b or higher. Seven of 16 patients were stage T2 by AJCC criteria and stage T2b by BWH criteria (Table 3). Using the BWH staging system, the odds ratio for presence of a high-risk lesion (defined as stage T2b or higher) in patients with metastases versus controls was 75 (95% CI 7.2-973). Under the AJCC staging system the odds ratio for high-risk lesions (defined as T2 or higher) between the same groups was 8.3 (95% CI 1.4-87). Additionally, 5 patients had hematologic malignancy and 1 was a solid organ transplant recipient.

Design: We reviewed all cases of metastatic primary cSCC seen at our institution between 1998-2013. Patients who did not receive treatment at our institution were excluded. Patients were matched to two controls by age within five years, sex, and site of primary cSCC. Patient records were reviewed for: age, sex, location and size of primary cSCC, recurrence, treatment modality, high-risk histologic features on initial biopsy, disease specific death, history of radiation, chronic ulceration, and immunosuppression (i.e. history of hematologic malignancy, bone marrow or solid organ transplantation). AJCC and BWH staging were applied with invasive squamous cell carcinoma that was not noted to be superficially invasive considered extension into the reticular dermis and therefore a high-risk feature. Univariate comparisons of odds ratios were conducted using Fisher's exact test.

Conclusion: The modified BWH criteria aims to better prognosticate the large group of AJCC T2 tumors comprising the majority of cSCC resulting in metastasis and mortality. In our experience, the majority of patients with metastatic disease were T2, stratifying to stage T2b by BWH criteria, or more advanced T-stages. Our findings support BWH stratification of T2 tumors

and also indicate that hematologic malignancy is a significant co-morbidity associated with a poor outcome.

Table 1. Clinical and histologic features of patients with metastatic cSCC.

	Metastatic cSCC patients $n = 16$
Gender, *n* (%)	
Male	13 (81)
Female	3 (19)
Location of metastasis *n* (%)	
Lymph nodes	11 (69)
Cranial nerves	3 (19)
Parotid	2 (13)
Bone	1 (6)
Location of primary, *n* (%)	
Face	8 (50)
Lower extremity	4 (25)
Unknown	4 (25)
Size of primary, *n* (%)	
< 2 cm	1 (6)
≥ 2 cm	5 (31)
Unknown	10 (63)
High-risk histologic features,* *n* (%)	
Yes	8 (50)
No	8 (50)

*Infiltration, invasive disease, perineural involvement, or poor differentiation

Table 2. Modified BWH Criteria for Tumor Staging

BWH T Stage	Definition
T0	SCCIS
T1	0 Risk Factors*
T2a	1 Risk Factor*
T2b	2-3 Risk Factors*
T3	≥4 Risk Factors or bone invasion*

*Risk factors: tumor diameter ≥ 2cm, poorly differential histology, perineural invasion, and tumor invasion beyond the subcutaneous fat

Table 3. AJCC and modified BWH staging of metastatic cSCC patients.

	Metastatic cSCC $n = 16$	Control cSCC $n = 32$
AJCC, *n* (%)		
T0	0 (0)	2 (6)
T1	2 (13)	18 (56)
T2	7 (44)	12 (38)
T3/T4	3 (19)	0 (0)
Unknown*	4 (25)	0 (0)
Modified BWH Staging, *n* (%)		
T0	0 (0)	2 (6)
T1	2 (13)	16 (50)
T2		
T2a	0 (0)	12 (38)
T2b	7 (44)	2 (6)
T3	3 (19)	0 (0)
Unknown*	4 (25)	0 (0)

* Unknown primary or metastatic at presentation or insufficient data

April 29, 9:18-9:25 am

Presenter: Adam Sutton, MD, MBA

Title: Skin Cancer as a Chronic Disease

Authors: Adam Sutton, MD, MBA[1]; Ashley Crew, MD[1]; Ashley Wysong, MD, MS[1]

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

Purpose: Chronic diseases in the United States have profound costs as well as morbidity, mortality, and associated quality of life implications. At present, all forms of cancer are considered chronic diseases with the exception nonmelanoma skin cancer (NMSC). Although no consensus definition for a chronic disease exists, there are three components that are present in most definitions: duration of disease, need for ongoing medical care and functional impairment. For a growing subset of patients with NMSC, these components are easily met. Dermatologists are aware of a subset of high-risk patients, but their characteristics, along with the associated morbidity and impact of their disease, is not well described. The purpose of this study is to use both general and skin specific health related quality of life (HRQoL) indices along with functional status and co-morbidity questionnaires to identify, describe and characterize a subset of patients who would benefit from having their condition classified as a chronic disease.

Summary: A total of eight patients completed the study. All of the patients identified as white, their average age was 67 and 88% were male. On average they had 9.5 NMSC diagnosed over the last year and 75.4 over their lifetime. On a scale of 0 to 100, with 100 being all of the time, patients on average scored the weekly impact of their skin cancer as 73.5. The SF-20 subgroup scores for Physical Functioning, Role Functioning and Health Perceptions were 39.6, 40.7 and 49.4, respectively. Subgroups are scored on a scale of 0-100, with 100 representing a higher quality of life. Skindex-16 subscale scores, which measure bother on a 0-100 scale, were 69 and 56 for the Emotional and Symptom subscales. The comparison of these scores with other chronic diseases will be discussed.

Design: A cohort of patients who attended clinic for evaluation and management of their NMSC were recruited to participate in the study. Specifically, patients older than 18 with greater than 5 diagnosed NMSC were asked to participate. Patients who agreed to participate completed questions regarding their skin cancer history as well as the MOS 20-Item Short-Form Health Survey (SF-20), Skindex-16, Skin Cancer Index, Patient Satisfaction Questionnaire 18, Self-Administered Co-morbidity Index and the Lawton Instrumental Activities of Daily Living Scale.

Conclusion: Redefining how NMSC is classified in a subset of high-risk patients has the potential to alter how the disease is viewed by the public and other health professionals. Additionally, developing criteria for NMSC as a chronic disease and a clear definition will promote the development of meaningful quality and outcomes measures as well as help improve delivery system processes. Ultimately, these patients may benefit from heightened surveillance, increased prevention measures, and customized treatment algorithms.

Rapid Pearl Abstract Session – Saturday, April 30: 4:00-5:00 pm

April 30, 4:00-4:02 pm

Presenter: Douglas Fife, MD

Title: Double Layer Undermining For Large Scalp Defects

Authors: Douglas Fife, MD[1,2]; Mac Machan, MD[1,2]; Brittny Call, MMS, PA-C[1]

Institutions: 1. Surgical Dermatology & Laser Center, Las Vegas, NV
2. University of Nevada School of Medicine, Las Vegas, NV

April 30, 4:03-4:05 pm

Presenter: Jeremy R. Etzkorn, MD

Title: The Use of Gentian Violet Solution to Evaluate Complete Integrity of the Deep Margin During Mohs Micrographic Surgery

Authors: Thuzar M. Shin, MD, PhD[1]; Jeremy R. Etzkorn, MD[1]; Joseph Sobanko, MD[1]; Christopher J. Miller, MD[1]

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

April 30, 4:06-4:08 pm

Presenter: Chetan Vedvyas, MD

Title: Hair-Bearing Scalp: A Novel Donor Site for Split-Thickness Grafts

Authors: Chetan Vedvyas, MD[1]; Keyan Matinpour, MD[1]; Leonard Goldberg, MD[1]; Arash Asadi, MD[1]

Institution: 1. Dermsurgery Associates, Houston, TX

April 30, 4:09-4:11 pm

Presenter: Melanie Wong, MD

Title: Use of a Single Anatomic Donor Site for Harvesting a Full Thickness Skin Graft and a Free Cartilage Graft for Nasal Defects

Authors: Melanie Wong, MD[1]; Mariah Brown, MD[1]

Institution: 1. University of Colorado, Aurora, CO

April 30, 4:12-4:14 pm

Presenter: Wesley Wu, MD

Title: Equalizing Wound Edges of Uneven Lengths: The Buried Half-Horizontal, Half-Vertical Mattress

Authors: Wesley Wu, MD[1]; Arianne Chavez-Frazier, MD[2]; Tri H. Nguyen, MD[3]

Institutions: 1. Baylor College of Medicine, Houston, TX
2. Park Avenue Dermatology, Fleming Island, FL
3. Mohs and Dermatology Associates, Houston, TX

April 30, 4:15-4:17 pm

Presenter: Zain Syed, MD, MBA

Title: A Novel Fasciotomy Technique for the Keystone Flap

Authors: Zain Syed, MD, MBA[1,2]; Heidi Donnelly, MD[1,2]

Institutions: 1. Dayton Skin Care Specialists, Dayton, OH
2. Wright State University School of Medicine, Dayton, OH

April 30, 4:18-4:20 pm

Presenter: Spring Golden, MD

Title: The Poor Man's Bilayer Wound Matrix

Authors: Spring Golden, MD[1]; Anna Bar, MD[1]; Justin Leitenberger, MD[1]

Institution: 1. Oregon Health and Science University, Portland, OR

April 30, 4:21-4:23 pm

Presenter: Jennifer Ang, MD

Title: 4x Dermoscopy in Mohs Micrographic Surgery

Authors: Jason DuPont[1,2]; Jennifer Ang, MD[2]

Institutions: 1. Southern Arizona VA Health Care System, Tucson, AZ
2. University of Arizona-Banner University Medical Center, Tucson, AZ

April 30, 4:24-4:26 pm

Presenter: Joseph F. Sobanko, MD

Title: Inking Strategies to Ensure Complete Mohs Tissue Sections

Authors: Joseph F. Sobanko, MD[1]; Ali A. Damavandy, MD[1]; Christopher J. Miller, MD[1]

Institution: 1. University of Pennsylvania, Philadelphia, PA

April 30, 4:27-4:29 pm

Presenter: Ravi Krishnan, MD

Title: Single-Stage Nasolabial Transposition Flaps for Large Nasal Tip Defects

Author: Ravi Krishnan, MD[1,2]

Institutions: 1. Virginia Mason Medical Center, Seattle, WA
2. University of Washington School of Medicine, Seattle, WA

April 30, 4:30-4:32 pm

Presenter: Diana K. Cohen, MD, MS

Title: Modified Purse String Closure for Mohs Defects Near Facial Free Margins (Eyebrows and Lips)

Authors: Diana K. Cohen, MD, MS[1]; Angela E. Aackus, MD[1]; Jing Liu, MD[1,2]; Hilary C. Reich, MD[1]; Sarah E. Schram, MD[1,3]; Peter K. Lee, MD, PhD[1]

Institutions: 1. University of Minnesota, Minneapolis, MN
2. Hennepin County Medical Center, Minneapolis, MN
3. Pima Dermatology, Tucson, AZ

Rapid Pearl Abstract Session – Saturday, April 30: 4:00-5:00 pm

April 30, 4:33-4:35 pm

Presenter: S. Tyler Hollmig, MD

Title: Retroauricular Pull-Through Flap for Superior Auricular Defects

Author: S. Tyler Hollmig, MD[1]

Institution: 1. Stanford University, Redwood City, CA

April 30, 4:36-4:38 pm

Presenter: Michael Mortazie, DO

Title: The Batten Stitch: A Tissue-Sparing Technique for the Correction of Inverted Dog Ears

Authors: Michael Mortazie, DO[1]; Jeremy C. Davis, MD[2]; Richard G. Bennett, MD[3,4]

Institutions: 1. St. Joseph Mercy Hospital, Ypsilanti, MI
2. Georgetown University School of Medicine, Washington, DC
3. University of California-Los Angeles, Santa Monica, CA
4. University of Southern California, Santa Monica, CA

April 30, 4:39-4:41 pm

Presenter: David Chen, MD

Title: Limitations of Staged Surgical Excisions

Author: David Chen, MD[1]; Adam Terella, MD[1]; Mariah Brown, MD[1]

Institution: 1. University of Colorado, Aurora, CO

April 30, 4:42-4:44 pm

Presenter: Daniel J. Pearce, MD

Title: Myospherulosis

Author: Daniel J. Pearce, MD[1]

Institution: 1. The Skin Surgery Center, Winston-Salem, NC

Poster Presentation List

Posters will be displayed inside the Exhibit Hall. Posters will be displayed from 11:00 am Thursday, April 28 through 2:00 pm Saturday, April 30.

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

Even Number Posters (2 – 38):
Thursday, April 28 from 12:00-1:00 pm

Odd Number Posters (1 – 37):
Saturday, April 30 from 12:00-1:00 pm

1

Comparison of American Joint Committee on Cancer and Brigham and Women's Hospital Tumor Staging for Cutaneous Squamous Cell Carcinoma in Immunosuppressed Patients

Jessica L. Gonzalez, BS[1]; Kiera Cunningham, BS[1]; Melanie Chen[1]; Maggie Feng[1]; Elana Madan[1]; Rebecca Silverman[1]; Ronghao Zhou[1]; Bichchau Michelle Nguyen, MD, MPH[1]

1. Tufts Medical Center, Boston, MA

2

Role of Alkaline Ceramidases and Bioactive Sphingolipids in Non-Melanoma Skin Cancer

Chih-Li Lin[1]; Ruijuan Xu[1]; Fang Li[1]; Evan Jones[1]; Jordan Slutsky[1]; Lina Obeid[1]; Yusuf Hannun[1]; Cungui Mao[1]

1. Stony Brook University, Stony Brook, NY

3

Comparison of Three Embedding Media for Preparation of Frozen Sections for Mohs Micrographic Surgery

Jeave Reserva, MD[1]; Cindy Krol, BS[1]; Jodi Speiser, MD[1]; William Adams, MA[1]; Eleanor Tung-Hahn[1]; Murad Alam, MD, MSCI[2]; Rebecca Tung, MD[1]

1. Loyola University Chicago, Maywood, IL
2. Northwestern University, Chicago, IL

4

Does the Method of Preoperative Education Influence Levels of Patient-Reported Anxiety and Satisfaction for Patients Undergoing Mohs Micrographic Surgery?

Joseph F. Sobanko[1]; Diego DaSilva, MSII[1]; Zelma Chiesa Fuxench[1]; Badri Modi[1]; Thuzar Shin, MD, PhD[1]; Jeremy Etzkorn[1]; Sara Samimi[1]; Karolyn Wanat[2]; Christopher J. Miller, MD[1]

1. University of Pennsylvania, Philadelphia, PA
2. University of Iowa, Iowa City, IA

5

Frequency of Residual Squamous Cell Carcinoma (SCC) in Elliptical Excision vs. Mohs Micrographic Surgery Specimens after Diagnostic Biopsy of SCC-in Situ

Eduardo K. Moioli, MD, PhD[1]; Clifford Hsieh,BS[1]; Angela R. Tisch, BSN[1]; Diana Bolotin, MD, PhD[1]

1. University of Chicago, Chicago, IL

6

Incidence of Occult Tumor in Biopsy Proven Basal Cell Carcinoma Lesions - Analysis of Variation Factors and Impact of Clinical Outcome

Luke Hyder, MD[1]; Chih Shan Jason Chen[1,2]

1. Stony Brook University Hospital, East Setauket, NY
2. Memorial Sloan Kettering Cancer Center, Hauppauge, NY

7

Desmoplastic Trichoepithelioma. Institutional Retrospective Chart Review and Systemic Review of All Cases Reported in English Literature

Sean E. Mazloom, MD[1]; Alex C. Holliday, MD[1]; Naeha Gupta, MS[2]; Golta Rasouli, MD[1]; Garrett Coman, MD[1]; Mariana A. Phillips, MD[1]; Michael Kolodney, MD, PhD[1]; Rahul N. Chavan, MD, PhD[1]; Douglas J. Grider, MD[1]

1. Virginia Tech Carilion Clinic, Roanoke, VA
2. Edward Via College of Osteopathic Medicine, Blacksburg, VA

8

Absence of Characteristic Lymphocytic Infiltrates on Frozen Sections of Mohs Surgery in Patients with Non-Hodgkin Lymphoma

Luke C. Nicholas[1]; Dori Goldberg[1]; Mary E. Maloney[1]

1. University of Massachusetts School of Medicine, Worcester, MA

9

A Prospective Multi-Center Characterization of Melanoma Treated with Mohs Micrographic Surgery

Patrick M. Ellison, MD[1]; John A. Zitelli, MD[2]; David G. Brodland, MD[2]

1. Queen's Medical Center, Honolulu, HI
2. Zitelli & Brodland Skin Cancer Center, Pittsburgh, PA

Poster Presentation List

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Scar Outcomes in Dermatologic Surgery: Does Intraoperative Technique Influence Clinician and Patient Reported Outcomes?

Junqian Zhang, BS[1]; Victoria O'Malley, BA[1]; Eric Bowman, Jr., BA[1]; Christopher Miller, MD[1]; Jeremy Etzkorn, MD[1]; Thuzar Shin, MD, PhD[1]; Joseph Sobanko, MD[1]

1. University of Pennsylvania, Philadelphia, PA

11

The Effects of Topical Dapsone Gel on Wound Healing

Matthew Q. Hand, MD[1]; Doug Grossman, MD, PhD[1]; Keith Duffy, MD[1]

1. University of Utah School of Medicine, Salt Lake City, UT

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Pleomorphic Dermal Sarcoma: A Case Series Further Delineating a Separation from Atypical Fibroxanthoma

James W. Behan, MD[1]; Min Deng, MD[3]; Michael A. Renzi, BS[3]; Alexandre Ly, RN, BSN[2]; Daniel Belkin, MD[2]; Naomi Lawrence, MD[3]; Ashley Wysong, MD, MS[2]

1. University of Colorado Health Sciences, Denver, CO
2. University of Southern California, Los Angeles, CA
3. Cooper Medical School of Rowan University, Marlton, NJ

13

Mohs Micrographic Surgery for the Treatment of Dermatofibrosarcoma Protuberans: A Retrospective Follow-up Study of Patients Treated with Consistent Surgical Margins by a Single Surgeon Over an 18 Year Period

Nikki Tang, MD[1]; Priya Nayyar[2]; Zena Zoghbi[3]; Vishal Patel, MD[3]; Desiree Ratner, MD[1]

1. Mt. Sinai Beth Israel Comprehensive Cancer Center, New York, NY
2. Northwell Health Physician Partners, Manhasset, NY
3. Columbia University Medical Center, New York, NY

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Outcomes for Wide Local Excision Compared with Mohs Micrographic Surgery for Melanoma in Situ

Adi Nosrati, MD[1]; Shilpa Goel, MD[2]; Joseph McGuire[1]; Barbara Grimes, MS, PhD[1]; Jacqueline Berliner, MD[1]; Vera Morhenn, MD[2]; Roy Grekin, MD[1]; Ana Griffin, PhD[1]; Maria L. Wei, MD, PhD[1]

1. University of California, San Francisco, CA
2. Veterans Affairs Medical Center, San Francisco, CA

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Recognizing Value in US Healthcare Expenditure: A Comparison of US and Japanese Procedural Skin Cancer Treatment Costs

Thomas Barlow, DO, DHEd[1]

1. US Naval Hospital, Yokosuka, Japan

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Diagnostic Change from Atypical Intraepidermal Melanocytic Proliferation to Melanoma after Conventional Excision – A Cross-Sectional Single Academic Institution Study

Junqian Zhang, BS[1]; Jeremy Etzkorn, MD[2]; Christopher Miller, MD[1]; Joseph Sobanko, MD[1]; Thuzar Shin, MD, PhD[1]

1. University of Pennsylvania, Philadelphia, PA
2. University of Pennsylvania, Yardley, PA

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Evaluation of Early Postoperative Quality of Life in Mohs Micrographic Surgery Patients

Joseph Sobanko, MD[1]; Junqian Zhang, BS[1]; Victoria O'Malley, BA[1]; Thuzar Shin, MD, PhD[1]; Jeremy Etzkorn, MD[1]; Christopher Miller, MD[1];

1. University of Pennsylvania, Philadelphia, PA

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Patient-Acquired Photographs for the Management of Post-Operative Concerns

Sowmya Ravi, MD[1]; Molly S. Moye, MD[1]; Divya Srivastava, MD[1]; Rajiv I. Nijhawan, MD[1]

1. University of Texas Southwestern Medical Center, Dallas, TX

19

A Synthetic, Injectable Microporous Wound Healing Scaffold to Decrease Inflammation and Scar Formation after Full Thickness Surgical Excision

Stephanie J. Martin[1]; Don Griffin, PhD[1]; Westbrook Weaver, PhD[1]; Gary Lask[1]; Theresa Soriano[1]; Philip Scumpia[1]

1. UCLA, Los Angeles, CA

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Modification of the Zitelli Bilobed Flap

Ashley N. Sullivan[1]; Timothy Wang[1]; Robert Egbers[1]

1. Johns Hopkins, Baltimore, MD

Poster Presentation List

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The Effect of Porcine Xenografts in Reducing Pain and Inflammatory Chondritis in Auricular Mohs Defects Healing by Secondary Intention: A Prospective Randomized Controlled Single-Blind Pilot Study

Sean E. Mazloom, MD[1]; Garrett Coman, MD[1]; Alex C. Holliday, MD[1]; Rahul N. Chavan, MD, PhD[1]; Marian A. Phillips, MD[1]

1. Virginia Tech Carilion Clinic, Roanoke, VA

22

Randomized Trial Comparing Pressure versus Simple Adhesive Dressing after Mohs Reconstruction

Eleni Marmarelis[1]; Faramarz Samie, MD, PhD[2]

1. Geisel School of Medicine at Dartmouth, Lebanon, NH
2. Dartmouth Hitchcock Medical Center, Lebanon, NH

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Mohs Micrographic Surgery in the Treatment of Rare Cutaneous Tumors

Jesse Y. Howell, MD[1]; Jonathan Wood[1]; Craig Wood[1]; Victor Marks, MD[1]; Lance Wood, MD[1]

1. Geisinger Health Systems, Danville, PA

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Outcomes of a Combination Melolabial Interpolation Flap and Local Tissue Flap for Large Nasal Defects: A Multicenter Series

Judah N. Greenberg, MD[1]; Kathryn Kreicher, BA[2]; Nicole M. Burkemper, MD[1]; Jeremy S. Bordeaux, MD, MPH[2]; Ian H. Maher, MD[1]

1. St. Louis University School of Medicine, St. Louis, MO
2. Case Western Reserve University School of Medicine, Cleveland, OH

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Horizontal Primary Closure of the Forehead: Does It Cause Long-Term Eyebrow Asymmetry?

Daniel Winchester, MD[1]; Logan Skellye, MD[1]; Adam Wright, MD[1]; Michael Chang, MD[1]; Christian Baum, MD[1]; Jerry Brewer, MD[1]; Christopher Arpey, MD[1]; Clark Otley, MD[1]; Randall Roenigk, MD[1]

1. Mayo Clinic, Rochester, MN

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Basal Cell Carcinoma of the Head and Neck: The Role of Anatomic Location in Clinically Undetectable Tumor Extension

Ashley M. Yu, BHSc[1]; Jillian Macdonald, MD, FRCPC[1]

1. The Ottawa Hospital, Ottawa, ON, Canada

27

A Retrospective Assessment of Post-Operative Complications in Patients on a Vast Array of Antithrombotic Medications Following Dermatologic Surgery

Robert Eilers, MD[1]; S. Brian Jiang, MD[1]

1. University of California San Diego, San Diego, CA

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Algorithmic Reconstruction of Facial Cosmetic Subunits: A Training Tool

Adam Sperduto, MD[1]; Christopher Harmon, MD[1]

1. Surgical Dermatology Group, Birmingham, AL

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True Margin: A Novel Approach to Tissue Embedding

Jonathan Kanevsky, MD[1]; Tyler Safran[1]; Kurt Hemmings[1]; Manish Khanna, MD[1]

1. McGill University Health Center, Montréal, QC, Canada

30

MMS Practice-Specific Evaluation of the Affordability and Impact on Patient Care of Novel in vivo Imaging Systems

Kate L. Montgomery, PhD[1]; Gabriel Sanchez, PhD[1]; Fred Landavazo, IV, MS[1]

1. Zebra Medical Technologies, Mountain View, CA

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Does Surgical Removal Improve Quality of Life in Nonmelanoma Skin Cancer Patients? A Prospective Study

Stephanie Mlacker, BS[1]; Adam S. Aldahan, BS[1]; Vidhi V. Shah, BA[1]; Daniel Fatemi, BS[1]; Daniel J. Baldor BS[1]; Sahal Samarkandy, MD[1]; Keyvan Nouri, MD[1]

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

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Purse-String Closure After Lower Extremity Dermatologic Procedures May Contribute to Postoperative Infection Risk

Su Luo, MD[1]; Suzanne M. Olbricht, MD[1,2]

1. Lahey Hospital and Medical Center, Burlington, MA
2. Harvard Medical School, Boston, MA

Poster Presentation List

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The Utility of Dehydrated Human Amnion/Chorion Membrane Allograft in Lower Extremity Mohs Defects Healing by Secondary Intention: A Case Series

Sean E. Mazloom, MD[1]; Jonathan R. Hottman, BS[2]; Alex C. Holliday, MD[1]; Garrett Coman, MD[1]; Rahul Chavan, MD, PhD[1]; Michael Kolodney, MD, PhD[1]; Mariana Phillips, MD[1]

1. Virginia Tech Carilion Clinic, Roanoke, VA
2. Virginia Tech School of Medicine, Roanoke, VA

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Treatment of Squamous Cell Carcinoma of the Nail Unit with Mohs Micrographic Surgery

Matthew LeBoeuf, MD, PhD[1]; Joseph Sobanko, MD[1]; Christopher Miller, MD[1]

1. University of Pennsylvania, Philadelphia, PA

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A Comparison of the Duration of Intradermal 1% Lidocaine with Epinephrine 1:100,000 and 1:1 Mixture of 1% Lidocaine with 1:100,000 Epinephrine and 0.5% Bupivacaine

Cory Trickett, DO[1]; David Kent, MD[1]

1. Dermatologic Surgery Specialists, Macon, GA

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Neoadjuvant Use of Vismodegib Prior to Excision by Mohs Micrographic Surgery in Patients with Basal Cell Carcinoma

Sarah Arron, MD, PhD[1]; Seaver Soon, MD[2]; Glen Bowen, MD[3]; Shari A. Ochoa[4]; Gagik Oganesyan, MD, PhD[5]; Clay J. Cockerell, MD[6,7]; Sherrif Ibrahim, MD[8]; Yong Mun[9]; Keith Dawson[9]; Jean Tang[10]; Abel Torres, MD[11]

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2. Scripps Clinic, La Jolla, CA
3. Huntsman Cancer Institute at the University of Utah, Salt Lake City, UT
4. Mayo Clinic Scottsdale, Scottsdale, AZ
5. Sutter Pacific Medical Foundation, Santa Rosa, CA
6. University of Texas Southwestern Medical Center, Dallas, TX
7. Cockerell Dermatopathology, Dallas, TX
8. University of Rochester Medical Center, Rochester, NY
9. Genentech, Inc., South San Francisco, CA
10. Stanford University, Redwood City, CA
11. Case Western Reserve University, Loma Linda, CA

37

Birhombic Transposition Flaps for Repairs of Surgical Defects of the Nasal Dorsum

Thomas J. Knackstedt, MD[1]; Nathaniel J. Jellinek, MD[1-3]

1. Dermatology Professionals, Inc., East Greenwich, RI
2. The Warren Alpert Medical School at Brown University, Providence, RI
3. University of Massachusetts Medical School, Worcester, MA

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Minimizing Tissue Wastage in Mohs Micrographic Surgery Frozen Section Processing Using a Novel Embedding Device

Manish Khanna, MD[1]; Kurt Hemmings[1]

1. Jewish General Hospital, Westmount, QC, Canada

Poster Presentation Summaries

1

Presenter: Jessica L. Gonzalez, BS

Comparison of American Joint Committee on Cancer and Brigham and Women's Hospital Tumor Staging for Cutaneous Squamous Cell Carcinoma in Immunosuppressed Patients

Authors: Jessica L. Gonzalez, BS[1]; Kiera Cunningham, BS[1]; Melanie Chen[1]; Maggie Feng[1]; Elana Madan[1]; Rebecca Silverman[1]; Ronghao Zhou[1]; Bichchau Michelle Nguyen, MD, MPH[1]

Institution: 1. Tufts Medical Center, Boston, MA

Purpose: To compare the prognostic value of the American Joint Committee on Cancer (AJCC) 7th edition and the Brigham and Women's Hospital (BWH) Alternative staging systems for cutaneous squamous cell carcinoma (SCC) in immunosuppressed patients.

Summary: 412 SCCs from 106 immunosuppressed patients treated at a single academic center from 2005-2015 were analyzed. The majority (58%, n=61) of patients were organ transplant recipients, with the remainder being patients with HIV, or taking immunosuppressive therapies. 17% (n=69) of SCCs were ≥ 20 mm, 6% (n=26) located on vermillion lip or ear, 2% (n=9) with invasion to subcutaneous fat or deeper, 3% (n=12) poorly differentiated, and 2% (n=9) with perineural invasion. Based on AJCC staging, 85% (n=352) of SCCs were T1 and 15% (n=60) were T2. Based on BWH staging, 81% (n=333) of SCCs were T1, 18% (n=74) T2a, 1% (n=4) T2b, and 0.2% (n=1) T3. No tumors qualified for AJCC T3/T4 (bone invasion). Risks of local recurrence (LR), nodal recurrence (NR), and any poor outcome were 12% (43/352), 1% (3/352) and 13% (45/352) for AJCC T1, and 20% (12/60), 5% (3/60), and 23% (14/60) for AJCC T2 SCCs. Risks of LR, NR and any poor outcomes were 11% (38/333), 0.3%, (1/333) and 11% (38/333) for BWH T1; 20% (15/74), 4% (3/74), and 24% (18/74) for BWH T2a; 25% (1/4), 25% (1/4) and 50% (2/4) for BWH T2b; and 100% (1/1), 100% (1/1) and 100% (1/1) in BWH T3 SCCs. Mean duration of follow-up was 4.24 ± 2.85 years.

Design: Retrospective chart review of all cutaneous SCCs in immunosuppressed patients treated at a single academic center from 2005-2015. Patient demographics, tumor characteristics, treatment, follow-up and outcomes including LR, NR, in-transit metastasis, distant metastasis and death from cutaneous SCC were analyzed. Subgroup analysis of SCCs from organ transplant recipients will be performed, along with analysis for homogeneity, monotonicity and distinctiveness of AJCC vs. BWH alternative staging system.

Conclusion: Our preliminary analysis suggests that compared to the AJCC 7th edition, the BWH alternative staging system may better risk stratify SCCs in immunosuppressed patients. While both staging systems showed increased risk of poor outcomes with increased stage, the BWH staging system appears to further separate out those SCCs (T2b and T3) at very high risk of poor outcomes.

2

Presenter: Jordan Slutsky, MD

Title: Role of Alkaline Ceramidases and Bioactive Sphingolipids in Non-Melanoma Skin Cancer

Authors: Chih-Li Lin[1]; Ruijuan Xu[1]; Fang Li[1]; Evan Jones, MD[1]; Jordan Slutsky, MD[1]; Lina Obeid[1]; Yusuf Hannun[1]; Cungui Mao[1]

Institution: 1. Stony Brook University, Stony Brook, NY

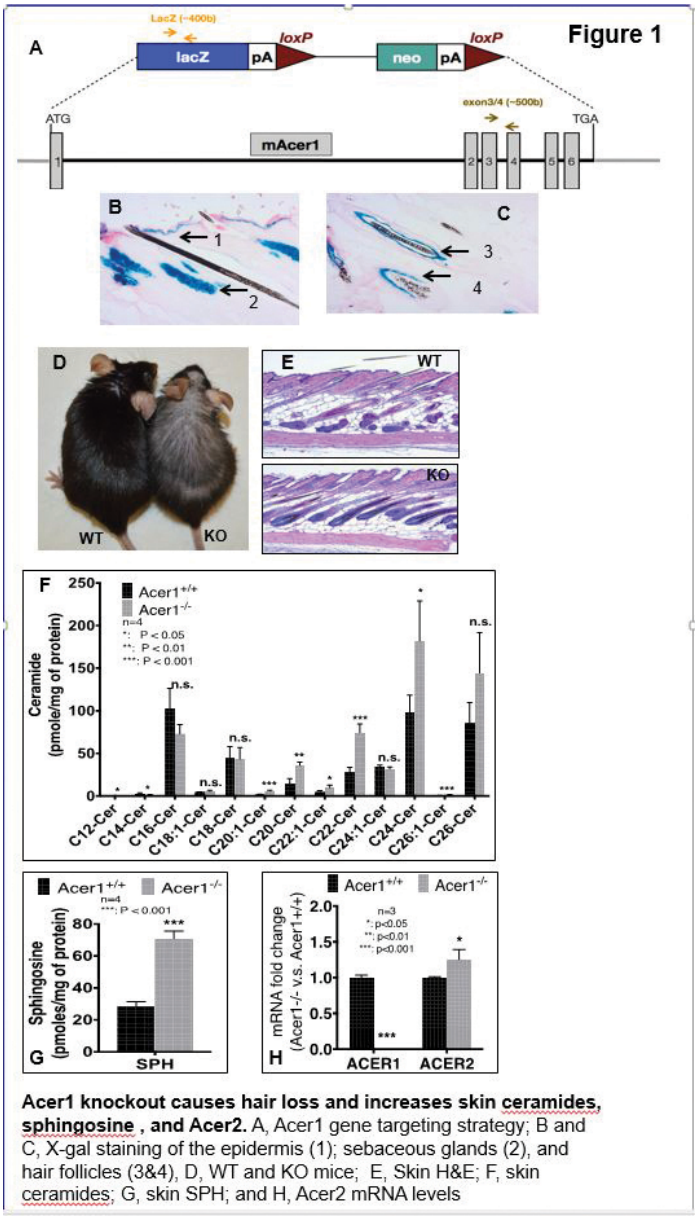
Purpose: Non-melanoma skin cancer (NMSC) is the most common cancer in the world and its incidence continues to rise. NMSC includes two main types: basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). Both BCC and SCC arise from malignant keratinocytes in the epidermis of the skin. Most cases of NMSC can be treated with surgery, destructive techniques, topical or light based therapies or radiation therapy. However, NMSC remains a leading cause of cancer-related morbidity and health related costs worldwide. Therefore, we still need a better understanding of its pathogenesis and the development of novel and effective approaches to diagnosis, prevention, and treatment of NMSC. NMSC, like many other cancers, results from dysregulation of the proliferation, differentiation, and apoptosis of the keratinocytes that it originates from. Emerging evidence suggests that sphingolipids play an important role in regulating the cellular responses of keratinocytes and the homeostasis of the epidermis.

Summary: In this study, we identify the human alkaline ceramidases ACER1 and ACER2 as novel tumor suppressors in NMSC. ACER1 and ACER2 are two members in the alkaline ceramidase family that we initially identified from the yeast Saccharomyces cerevisiae and then from mammals. These two enzymes catalyze the hydrolysis of ceramides to generate the bioactive sphingolipid sphingosine that has been shown to have anti-proliferative and pro-apoptotic roles in various cell types including keratinocytes. We demonstrate that ACER1, which is highly expressed in normal epidermis, is downregulated in NMSC and its downregulation leads to keratinocyte hyperproliferation and defective keratinocyte differentiation due to dyshomeostasis of bioactive sphingolipids in this cell type.

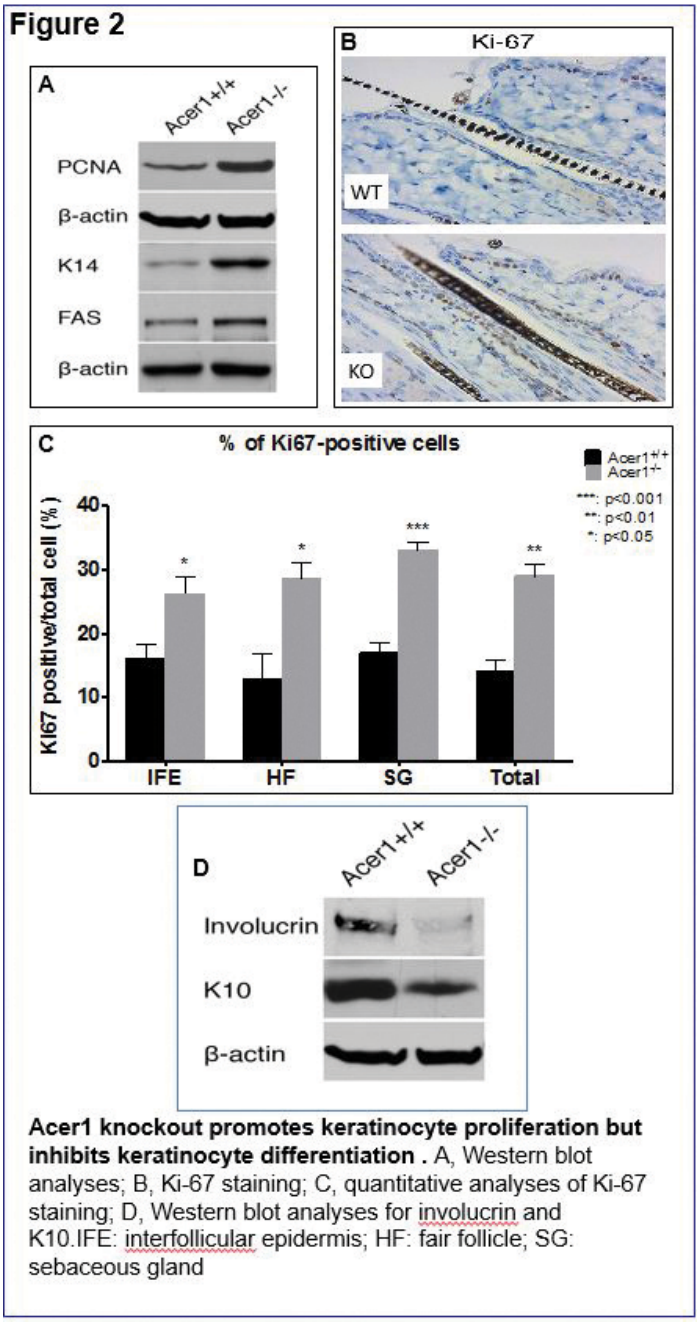
Design: Using a mouse model of two-stage skin carcinogenesis induced by the combination of the chemical carcinogen 7,12-dimethylbenz[a]anthracene (DMBA) and tumor promoter 12-O-Tetradecanoylphorbol-13-acetate (TPA), we demonstrated that overexpression of the human transgene ACER1 specifically in the epidermis inhibits skin tumor formation. Unexpectedly, knocking out the mouse alkaline ceramidase 1 (Acer1) also inhibited tumor formation. Mechanistic studies demonstrate that either ACER1 overexpression or Acer1 knockout markedly increases the levels of sphingosine in the mouse epidermis. We further demonstrate that Acer1 knockout leads to a compensatory upregulation of the alkaline ceramidase 2 (Acer2) and that the compensatory upregulation of Acer2 may be responsible for the sphingosine rise as well as the anti-skin tumor role.

Conclusion: Taken together, these results suggest that ACER1 and ACER2 coordinate the anti-NMSC role by co-regulating the levels of sphingosine in epidermal keratinocytes and that their dysregulation may contribute to NMSC development.

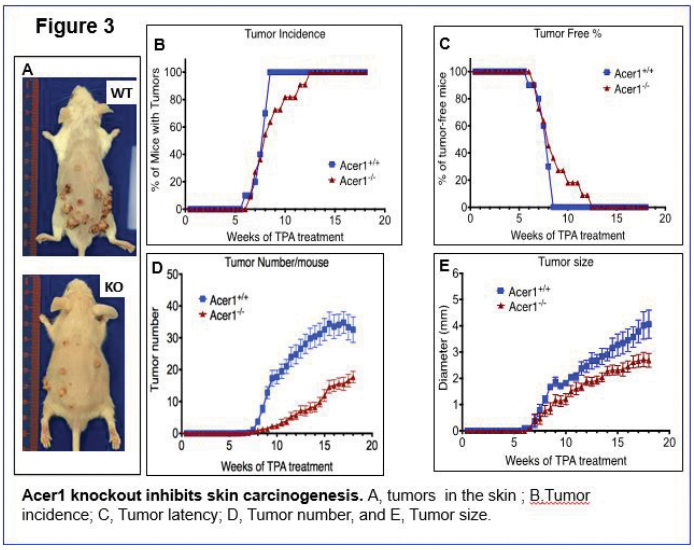
Poster Presentation Summaries



Acer1 knockout causes hair loss and increases skin ceramides, sphingosine , and Acer2. A, Acer1 gene targeting strategy; B and C, X-gal staining of the epidermis (1); sebaceous glands (2), and hair follicles (3&4), D, WT and KO mice; E, Skin H&E; F, skin ceramides; G, skin SPH; and H, Acer2 mRNA levels



Acer1 knockout promotes keratinocyte proliferation but inhibits keratinocyte differentiation . A, Western blot analyses; B, Ki-67 staining; C, quantitative analyses of Ki-67 staining; D, Western blot analyses for involucrin and K10.IFE: interfollicular epidermis; HF: fair follicle; SG: sebaceous gland



Acer1 knockout inhibits skin carcinogenesis. A, tumors in the skin ; B.Tumor incidence; C, Tumor latency; D, Tumor number, and E, Tumor size.

3

Presenter: Jeave Reserva, MD

Title: Comparison of Three Embedding Media for Preparation of Frozen Sections for Mohs Micrographic Surgery

Authors: Jeave Reserva, MD[1]; Cindy Krol, BS[1]; Jodi Speiser, MD[1]; William Adams, MA[1]; Eleanor Tung-Hahn[1]; Murad Alam, MD, MSCI[2]; Rebecca Tung, MD[1]

Institutions: 1. Loyola University Chicago, Maywood, IL
2. Northwestern University, Chicago, IL

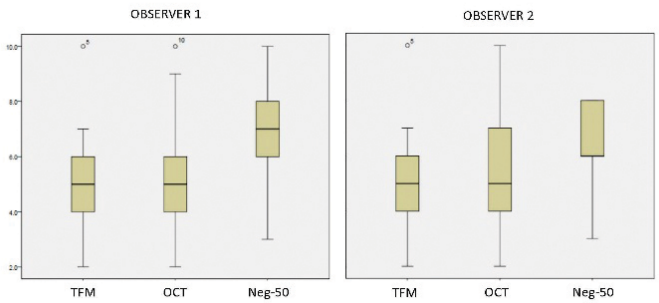
Purpose: To compare three commercially available embedding media based on the quality of the resulting frozen sections in terms of the following parameters: overall readability (OR), ease of sectioning, minimum depth required to obtain a full section, and slide preparation time.

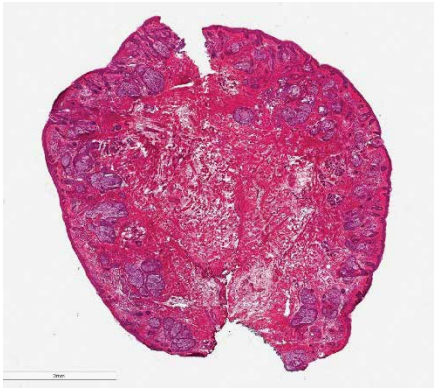
Summary: Mohs micrographic surgery (MMS) is a meticulous multistep process heavily dependent on high quality frozen sections prepared in an efficient manner. For tissue embedding, OCT, TFM, and Neg-50 are three of the most commonly used frozen section embedding media. Because formal comparative studies are lacking, preferences for using one over the other have primarily been based on personal/institutional experiences. Differences in frozen section quality may be related to the molecular weights of a medium's component polyvinyl alcohol and polyethylene glycol, which are proprietary information. However, we hypothesize that the frozen section overall readability score (OR) does not differ across media. In this comparative study, mean ORs for each of two raters were as follows: TFM: 5.23+/-2.09, 5.46+/-1.94; OCT: 5.31+/-2.43, 5.46+/-1.94; Neg-50: 6.69+/-2.20, 6.38+/-1.55 (Figure 1). Analysis of both raters' scores detected no statistically significant differences in OR across media (p1=0.148; p2=0.242). Although no significant differences (p=0.120) in the minimum depth required to cut a full section were noted between the media, significantly (p=0.034) easier sectioning and significantly (p=0.021) shorter slide preparation times were seen with Neg-50, compared to TFM and OCT.

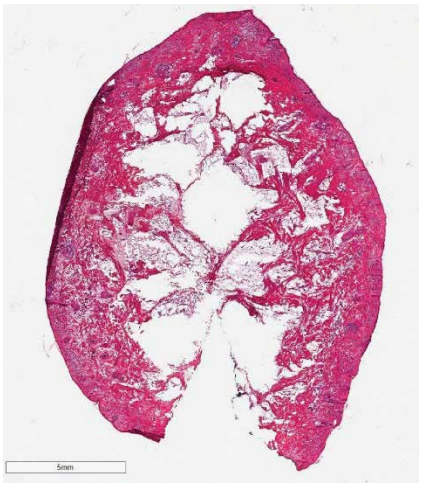
Design: One blinded experienced histotechnician prepared frozen section slides on 39 consecutive Mohs cases using embedding media labeled "A", "B", or "C", corresponding to TFM, OCT, and Neg-50, respectively. Each medium was used for 13 randomly selected cases, with each case then assessed for ease of cutting (0=difficult to 2= easy), minimum depth (μm) for complete section, and slide preparation time (minutes) by the histotechnician. Overall readability (0-10) was evaluated by two blinded raters, a Mohs surgeon and a dermatopathologist. A score of 10 represented the most ideal Mohs frozen section slide (Figure 2), with 1 point subtracted for an incomplete epidermis, dermal tissue distortion/dropout, tissue folding (Figure 3), or air bubbles, for each tissue level. If defects were present on additional levels, two points were subtracted for each of the aforementioned criteria thus observed. Analysis was performed using Kruskal-Wallis tests with post-hoc pairwise comparisons that adjust for inflated Type 1 Error.

Conclusion: While the price of embedding media varies from least (OCT) to most (TFM) expensive, the ease of sectioning and time savings observed with the use of Neg-50 may argue for its value and preferential utilization despite similar overall readability among products. Further studies are necessary to understand one medium's propensity for particular histologic artifacts over another.

FIGURE 1: OVERALL READABILITY OF FROZEN SECTION SLIDES PREPARED USING TFM, OCT, and Neg-50







4

Presenter: Joseph F. Sobanko, MD

Title: Does the Method of Preoperative Education Influence Levels of Patient-Reported Anxiety and Satisfaction for Patients Undergoing Mohs Micrographic Surgery?

Authors: Joseph F. Sobanko, MD[1]; Diego DaSilva, MSII[1]; Zelma Chiesa Fuxench[1]; Badri Modi[1]; Thuzar Shin, MD, PhD[1]; Jeremy Etzkorn, MD[1]; Sara Samimi[1]; Karolyn Wanat[2]; Christopher J. Miller, MD[1]

Institutions: 1. University of Pennsylvania, Philadelphia, PA 2. University of Iowa, Iowa City, IA

Purpose: Patient-reported outcomes (PROs) of anxiety and satisfaction are important metrics to evaluate the success of Mohs micrographic surgery (MMS). Preoperative education may influence patient anxiety and satisfaction. We studied whether patient anxiety and satisfaction on the day of MMS varied based on the method of preoperative education (preoperative educational print mailings versus preoperative education print mailings plus a personalized phone call). Anxiety was measured with the State-Trait Anxiety Inventory (STAI) and Visual Analog Scale (VAS) on the day of MMS immediately before and after the procedure. Satisfaction was measured with the Visit Specific Patient Satisfaction Questionnaire (VSQ) immediately after surgery.

Summary: 53 patients were sent print mailings as the sole method of education before MMS, and 51 patients were sent educational print mailings and received a personalized phone call. The study groups had no statistically significant differences in demographic and tumor characteristics, including age, sex, marital status, history of prior MMS at our institution, tumor type, and tumor location. Anxiety levels as measured by STAI [score range 20-80] and Visual Analog Scale (VAS) [score range 0-100] were similar in both groups immediately prior to surgery (Table 1). Patients in both groups reported similarly excellent levels of satisfaction immediately after surgery (Table 2). More than half of the patients reported that they prepared for their upcoming MMS by independently researching information separate from the educational materials and phone call included in the study.

Design: Patients scheduled for MMS for skin cancer without a preoperative office consult (N=104) were randomized to receive either preoperative educational print mailings about their procedure versus preoperative educational print mailings plus a personalized educational phone call (Figure 1). Patients reported their anxiety levels on the day of surgery immediately before and after the procedure by completing the STAI and VAS. They reported their level of satisfaction immediately after the surgery by completing the VSQ.

Conclusion: The method of preoperative education may not result in differences in patient-reported anxiety and satisfaction on the day of MMS. Many patients independently conduct research to prepare for MMS. Patient self-education and their experience on the day of surgery may have a greater influence on patient anxiety and satisfaction than preoperative interventions.

Figure 1. CONSORT Flow Diagram

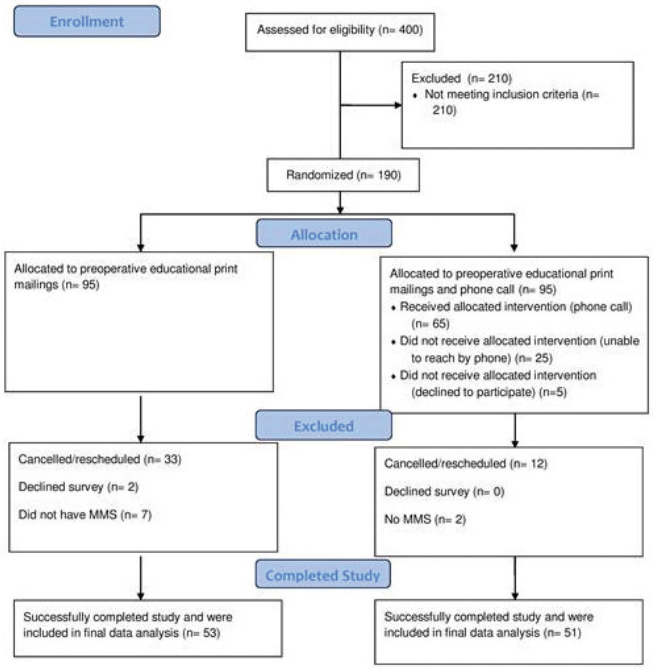


Table I. Level of Anxiety and STAI Score Preoperatively and Postoperatively

	Patients who received preoperative educational print mailing	Patients who received preoperative educational print mailing + phone call	p-value
All patients who completed study	N=53	N=51	
Anxiety Pre-op			
Level of anxiety prior to start of procedure (VAS)			
Mean (SD), range	39.40 (29.48), 0-94	41.90 (28.00), 1-93	0.66
Trait anxiety score pre-op			
Mean (SD); 95%CI	32.94 (9.65); 30.28, 35.60	32.16 (8.83); 29.68, 34.64	0.75
State anxiety score pre-op			
Mean (SD); 95%CI	36.43 (11.28); 33.32, 39.54	37.20 (12.66); 33.64, 40.76	0.87
Anxiety Post-op			
Level of anxiety following completion of the procedure (VAS)			
Mean (SD), range	14.47 (18.63), 0-85	20.14 (22.56), 0-90	0.17
State anxiety score post-op			
Mean (SD); 95%CI	28.68 (9.56); 26.04, 31.32	31.67 (11.41); 28.46, 34.88	0.14

Continued on page 30

Table II. Comparison between excellent and not excellent responses using Visit Satisfaction Questionnaire among study groups

	Patients who received preoperative educational print mailing	Patients who received preoperative educational print mailing + phone call	P-value
How long did you have to wait to get an appointment	N (%)	N (%)	
Excellent	27 (50.94)	26 (50.98)	0.99
Not Excellent	26 (49.06)	25 (49.02)	
Convenience of the location of the office			
Excellent	24 (45.28)	20 (39.22)	0.53
Not Excellent	29 (54.72)	31 (60.78)	
Getting through to the office phone?			
Excellent	38 (71.70)	28 (54.90)	0.08
Not Excellent	15 (28.30)	23 (45.10)	
Length of time waiting at the office			
Excellent	26 (49.06)	28 (54.90)	0.55
Not Excellent	27 (50.94)	23 (45.10)	
The time spent with the doctor you saw			
Excellent	47 (88.68)	43 (84.31)	0.51
Not Excellent	6 (11.32)	8 (15.69)	
Explanation of what was done to you			
Excellent	51 (96.23)	47 (92.16)	0.37
Not Excellent	2 (3.77)	4 (7.84)	
The technical skills of the doctor who saw you			
Excellent	52 (98.11)	49 (96.08)	0.53
Not Excellent	1 (1.89)	2 (3.92)	
The personal manner of the doctor who saw you			
Excellent	53 (100.00)	49 (96.08)	0.15
Not Excellent	0 (0.00)	2 (3.92)	
The visit overall			
Excellent	46 (86.79)	43 (84.31)	0.72
Not Excellent	7 (13.21)	8 (15.69)	

5

Presenter: Eduardo K. Moioli, MD, PhD

Frequency of Residual Squamous Cell Carcinoma (SCC) in Elliptical Excision vs. Mohs Micrographic Surgery Specimens after Diagnostic Biopsy of SCC-in Situ

Authors: Eduardo K. Moioli, MD, PhD[1]; Clifford Hsieh, BS[1]; Angela R. Tisch, BSN[1]; Diana Bolotin, MD, PhD[1]

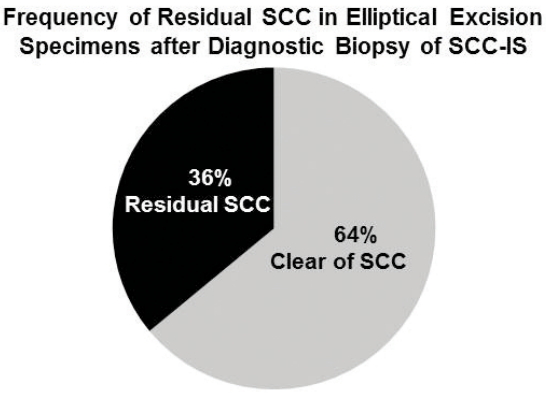
Institution: 1. University of Chicago, Chicago, IL

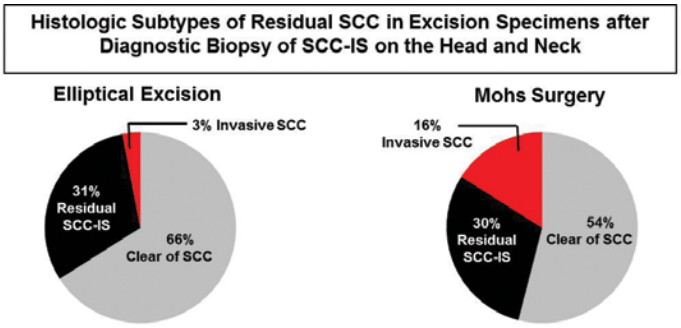
Purpose: Cutaneous squamous cell carcinoma-in situ (cSCC-IS) is often treated by excision after initial diagnostic biopsy. Previously, we demonstrated that nearly half of cSCC-IS treated with Mohs micrographic surgery (MMS) had residual cSCC in the excised specimens. Unlike MMS, elliptical excision is limited by the incomplete evaluation of margins and only assesses a small portion of the specimen. Consequently, the rates of residual tumor in elliptical excision specimens may be different than what has been reported after MMS. The present study evaluates the frequency of residual cSCC in elliptical excision specimens of previously biopsy-proven cSCC-IS.

Summary: A total of 107 consecutive cases of excised cSCC-IS by elliptical excision were evaluated. The average patient age was 69. The male to female ratio was 1.18. Thirty eight cases (36%) showed residual cSCC in the elliptical excision specimens (Figure 1). When stratified by location, head and neck cSCC-IS treated with elliptical excision showed no residual tumor in 66% of the excision specimens, 31% residual in situ tumors, and 3% invasive cSCC. In contrast, cSCC-IS treated with MMS showed no residual cSCC in 54%, residual in situ tumors in 30%, and invasive cSCC in 16% of the cases (Figure 2).

Design: Consecutive cases of biopsied cSCC-IS that underwent complete excision between 2004 and 2013 were evaluated retrospectively according to the protocol approved by the institutional review board. Cases were then stratified by tumor location. Pathology reports and MMS maps were utilized to determine final histopathologic diagnosis at excision.

Conclusion: The frequency of residual tumor at the time of excision of cSCC-IS has not been well established. A significant proportion of cSCC-IS are in fact invasive cSCCs at the time of excision. Previously, we demonstrated that 46% of cSCC-IS diagnosed by biopsy had residual tumor in the MMS excision specimens. Here, demonstrate that when similar tumors are treated with elliptical excision, only 33% show residual malignancy in the excised specimens. Importantly, the initial "in situ" biopsy diagnosis was upstaged to invasive cSCC in 16% of the specimens at the time of MMS as compared to only 3% of the specimens from elliptical excision (p=0.06). Comparable patient demographics were considered for both groups and only head and neck cSCC were evaluated during comparison of excision techniques. These results suggest that patients with cSCC-IS benefit from complete surgical excision given the risk of tumor persistence after biopsy and potential for presence of invasive cSCC. In addition, the present data demonstrate that MMS detects tumor invasion more reliably than elliptical excision in biopsy-proven head and neck cSCC-IS and is the optimal treatment for high-risk patients.





6

Presenter: Luke Hyder, MD

Title: Incidence of Occult Tumor in Biopsy Proven Basal Cell Carcinoma Lesions - Analysis of Variation Factors and Impact of Clinical Outcome

Authors: Luke Hyder, MD[1]; Chih Shan Jason Chen, MD, PhD[2]

Institutions: 1. Stony Brook University Hospital, East Setauket, NY 2. Memorial Sloan Kettering Cancer Center, Hauppauge, NY

Purpose: Basal cell carcinoma (BCC) is the most common skin cancer in the US. Definitive diagnosis is most often obtained by means of a diagnostic shave biopsy. Often however, resultant inflammation and healing of the biopsy site results in a pink scar that may obscure residual tumor showing no clinical evidence of BCC. The physician is left with the often challenging task of reinforcing to the patient the necessity of further treatment and likely need for invasive surgery on what appears to the patient as "normal" appearing skin.

Summary: A total of 638 patients with biopsy proven BCC were included. We found residual tumor in 52% of those of cases where no tumor was clinically appreciable. Location revealed to be a major determinant as to whether a site concealed residual tumor. The eyelid and nose were most likely to harbor clinically regressed tumor, whereas the chest and back were least likely. Despite different clinical practices, our data showed that the probability of obtaining therapeutic shave biopsy was strikingly similar among providers ranging from 36% to 45% of total sites biopsied. In our study, the number of Mohs stages needed to clear cases with occult tumor versus cases with grossly obvious tumor was statistically insignificant. However, the presence of gross tumor indicates potential wider and deeper Mohs defect, while the absence of residual BCC often results in least amount of tissue loss.

Design: We retrospectively compiled a list of patients who were referred for Mohs surgery for biopsy proven BCC from October 2014 to February 2016. We collected associated relevant information including as to whether the tumor was clinically appreciable or regressed at the time of consultation. The presence of residual tumor was examined by means of sectioning through the Mohs specimens after the initial Mohs stage. We also examined whether the presence of residual tumor was associated with body location, its effects on pre and post-op Mohs defect size and depth as well as the total number of stages needed to clear. We further analyzed the incidence of residual BCC based on individual physician who performed the biopsy.

Conclusion: Approximately half of the patients with no clinically evident tumor after biopsy still carry occult BCC. No significant provider dependent variation found in the incidence of residual BCC further supports above statement. Body locations most likely to harbor occult tumor were the eyelids & nose highlighting the importance of timely treatment in these critical locations. There is a higher risk of complexity when residual BCC is grossly evident. Our findings may facilitate pre-operative consultation of Mohs surgery.

7

Presenter: Sean E. Mazloom, MD

Title: Desmoplastic Trichoepithelioma. Institutional Retrospective Chart Review and Systemic Review of All Cases Reported in English Literature

Authors: Sean E. Mazloom, MD[1]; Alex C. Holliday, MD[1]; Naeha Gupta, MS[2]; Golta Rasouli, MD[1]; Garrett Coman, MD[1]; Mariana A. Phillips, MD[1]; Michael Kolodney, MD, PhD[1]; Rahul N. Chavan, MD, PhD[1]; Douglas J. Grider, MD[1]

Institutions: 1. Virginia Tech Carilion Clinic, Roanoke, VA 2. Edward Via College of Osteopathic Medicine, Blacksburg, VA

Purpose: This study aims to increase the understanding of desmoplastic trichoepithelioma, its association with other neoplasms and optimal management options.

Summary: Desmoplastic trichoepitheliomas (DTE) are benign adnexal tumors, which clinically and histologically mimic basal cell carcinomas (BCC). Our institutional data search revealed 69 trichoepithelioma diagnoses within the past five years. Six cases were deemed desmoplastic (Table 1) after slide review by two dermatopathologists. A literature search using terms "desmoplastic trichoepithelioma(s)" and "sclerosing epithelial hamartoma" in PubMed, Medline, ClinicalKey, Google Scholar, and ScienceDirect identified an additional 92 cases (1-34). Patient and tumor characteristics are summarized in Table 2. Patient age at diagnosis ranged from birth to 81 years old (mean=36.6, median=37 years old) and females were more often affected (72%). Ninety three percent presented with a single lesion. Approximately 68% of patients had the lesion for over two years while 51% had the lesion for five or more years before diagnosis. Lesion size ranged from 0.2 to 4.0 cm. Clinically, DTEs presented as skin-colored to erythematous papules, nodules, or plaques, often having an annular configuration with raised borders. The face was the most common location (92.6%) with slightly over half on the cheek (Figure 1). Interestingly, the most common clinical diagnosis was BCC in 42% (n=41). Histological findings included slender cords of basaloid follicular cells embedded in a sclerotic stroma, often with small microkeratocysts, focal calcifications, and occasional granulomatous infiltrates. Two cases were found in conjunction with BCC and two cases were found with a concurrent microcystic adnexal carcinoma (MAC). Excision (47.5%) followed by Mohs (34.4%) were the most common treatments employed. Half the cases treated with Mohs required more than one stage. There were no recurrences in up to 6 years follow up in these cases. No cases of metastasis have been reported with observation alone.

Design: Retrospective Chart Review and Systematic Review

Conclusion: This is the largest systematic review of DTE to date. While DTEs are considered benign, they have the potential for subclinical growth. In this series, 4% were found to arise in combination with BCC or MAC. Therefore, Mohs micrographic surgery should be considered an acceptable treatment option for DTE lesions occurring on the head and neck.

Continued on page 32

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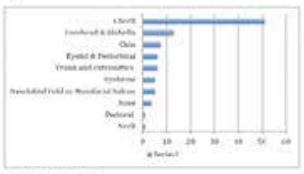
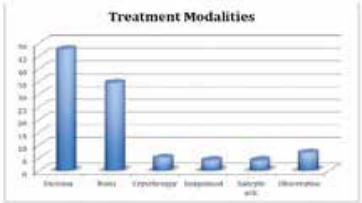
Table 1. Institutional DTE Cases

Case	Age (Year)	Sex	Location	Size (cm)	Duration Prior to Biopsy (years)	Co-existing Tumor	Treatment (after biopsy)	Follow Up(Years)	Prognosis
1	48	Male	Right Cheek	0.6x0.5	1	BCC	Excision	5	No recurrence
2	42	Male	Left Forearm	NA	6-7	Proliferating Pilomatricoma	Excision	1 month	No Recurrence
3	75	Female	Left Nasal Sidewall	0.7x0.5	1	None	Observation	5	N/A
4	22	Female	Right Cheek	0.5x0.5	N/A	None	Excision	3	No Recurrence
5	44	Female	Right Posterior Shoulder	0.5x0.5	3	None	Observation	3	No Recurrence
6	78	Female	Right Periocular	0.8x0.5	2	BCC	Excision	4	No Recurrence





8

Presenter: Luke C. Nicholas, MD

Title: Absence of Characteristic Lymphocytic Infiltrates on Frozen Sections of Mohs Surgery in Patients with Non-Hodgkin Lymphoma

Authors: Luke C. Nicholas, MD[1]; Dori Goldberg, MD[1]; Mary E. Maloney, MD[1]

Institution: 1. University of Massachusetts School of Medicine, Worcester, MA

Purpose: Chronic lymphocytic leukemia (CLL) is thought to represent the leukemic version of small lymphocytic lymphoma (SLL), a subtype of non-Hodgkin lymphoma (NHL). Patients with CLL and NHL have an increased risk of developing nonmelanoma skin cancer (NMSC) and a higher rate of recurrence following treatment. Dense lymphocytic infiltrates have been documented in frozen sections during Mohs micrographic surgery in patients with CLL and, in some cases, have led to the initial diagnosis of CLL. We sought to examine for the presence of dense, nodular inflammatory infiltrates in frozen histologic Mohs sections in patients with NHL, similar to those found in patients with CLL.

Summary: We identified 14 patients with NHL that accounted for 34 separate Mohs cases. Though many histologic sections demonstrated peritumoral or mild perivascular or periadnexal lymphocytic inflammation, the dense nodular infiltrates characteristic of CLL were absent in all sections.

Design: A retrospective chart review was conducted to identify patients with NHL who were also treated with Mohs micrographic surgery at our institution between 2013 and 2015. The histologic sections from these cases were then reviewed for the presence of lymphocytic infiltrates.

Conclusion: The dense, nodular lymphocytic infiltrate seen on Mohs sections in patients with CLL appears to be unique to this entity and is not encountered in patients with other related forms of NHL. Dense lymphocytic inflammation in patients with NHL should be highly suspect for persistent NMSC rather than a distinctive phenomenon related to the underlying lymphoma. The lack of such an infiltrate, unfortunately, precludes making the diagnosis of NHL for patients in which the diagnosis is not already known.

Poster Presentation Summaries

9

Presenter: Patrick M. Ellison, MD

Title: A Prospective Multi-Center Characterization of Melanoma Treated with Mohs Micrographic Surgery

Authors: Patrick M. Ellison, MD[1]; John A. Zitelli, MD[2]; David G. Brodland, MD[2]

Institutions: 1. Queen's Medical Center, Honolulu, HI
2. Zitelli and Brodland Skin Cancer Center, Pittsburgh, PA

Purpose: Mohs micrographic surgery (MMS) in the management of cutaneous melanoma is increasing nationally and its utility continues to be defined. We sought to investigate the clinical, histologic, therapeutic characteristics, and surgical margins for excision associated with superficial and invasive cutaneous melanomas treated with MMS.

Summary: A total of 563 cases of melanoma among 518 unique patients were treated with MMS. Within this cohort, melanoma in situ represented 67% of all cases and further, 96% of all cases were less than or equal to 1 mm in Breslow thickness. The great preponderance of all tumors, 63% in total, were located on the head, neck, hands, feet or genitalia. The mean pre-operative tumor diameter was 1.7 cm. A histological diagnosis of lentigo maligna (LM) was rendered in the initial biopsy report in 54% of all tumors. LM were more often associated with tumors of the head and neck, encountered in older patients, required a larger margin, and were more often recurrent. The use of 10 mm margins would have cleared 95% of all primary melanomas ≤1 mm in Breslow thickness. Further, a 10 mm margin achieved 95% clearance rates for primary LM tumors while, 9 mm margins yielded similar results for primary melanoma in situ tumors. Recurrent tumors required larger margins and represented 9% of our cases. A family history of melanoma was detected in 16% whilst a personal history of melanoma was observed in 21% of our cohort. The average cost of MMS and reconstruction was $884.38 and $637.47, respectively, yielding an average cost of $1521.85 per tumor. Reconstruction involved healing by second intention in 14%, side-to-side closure in 43%, adjacent tissue transfer in 28%, grafting in 14%, and interpolation flaps in 1%.

Design: We conducted an IRB approved (WesternIRB #2012232) multicenter prospective analysis of patients with melanoma undergoing MMS at 12 referral centers across the United States. The study prospectively recruited patients diagnosed with melanoma and referred for MMS. Written consent was obtained and demographic data, tumor data, treatment characteristics, and margin data were tabulated. All patients were treated with MMS which was initiated by excising the biopsy site or remaining visible tumor with 2-3 mm of normal appearing skin to adipose tissue (debulking). An additional 3 mm margin was then excised around the debulked wound to the subcutaneous plane. Excised tissue was meticulously mapped and color coded, followed by preparation of 2 to 4 um thick frozen sections. Tissue were stained with hematoxylin, eosin and immunostained with MART-1. Areas found to be positive were excised with a further 3 mm margin.

Conclusion: Mohs surgery was utilized for uniquely difficult melanomas. They tend to be large, recurrent, located on the head and neck, and arise in sun damaged skin. The recommended 5 mm margins for melanoma in situ are often inadequate, regardless of whether a designation of lentigo maligna is rendered. Likewise, 1 cm margins were found to often be inadequate to achieve histologically tumor free margins for recurrent melanoma on the head and neck.

10

Presenter: Junqian Zhang, BS

Title: Scar Outcomes in Dermatologic Surgery: Does Intraoperative Technique Influence Clinician and Patient Reported Outcomes?

Authors: Junqian Zhang, BS[1]; Victoria O'Malley, BA[1]; Eric Bowman, Jr., BA[1]; Christopher Miller, MD[1]; Jeremy Etzkorn, MD[1]; Thuzar Shin, MD, PhD[1]; Joseph Sobanko, MD[1]

Institution: 1. University of Pennsylvania, Philadelphia, PA

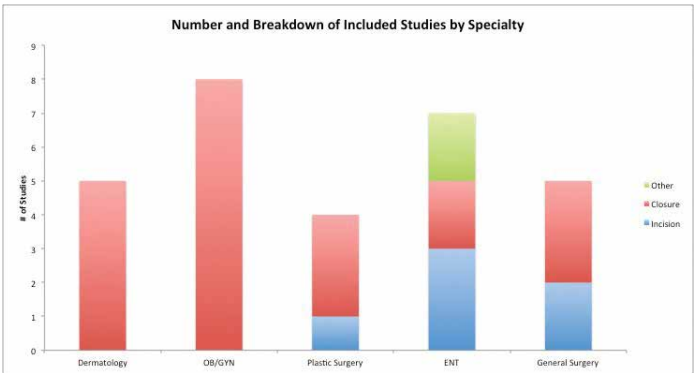
Purpose: Scarring is an inevitable consequence of surgery. While the physical and aesthetic qualities of surgical scars are most often assessed using objective, clinician-graded instruments, patient-reported scar assessment is often overlooked. We conducted a systematic review to investigate scarring after dermatologic surgery and trends in clinician and patient assessment of postoperative scar outcomes.

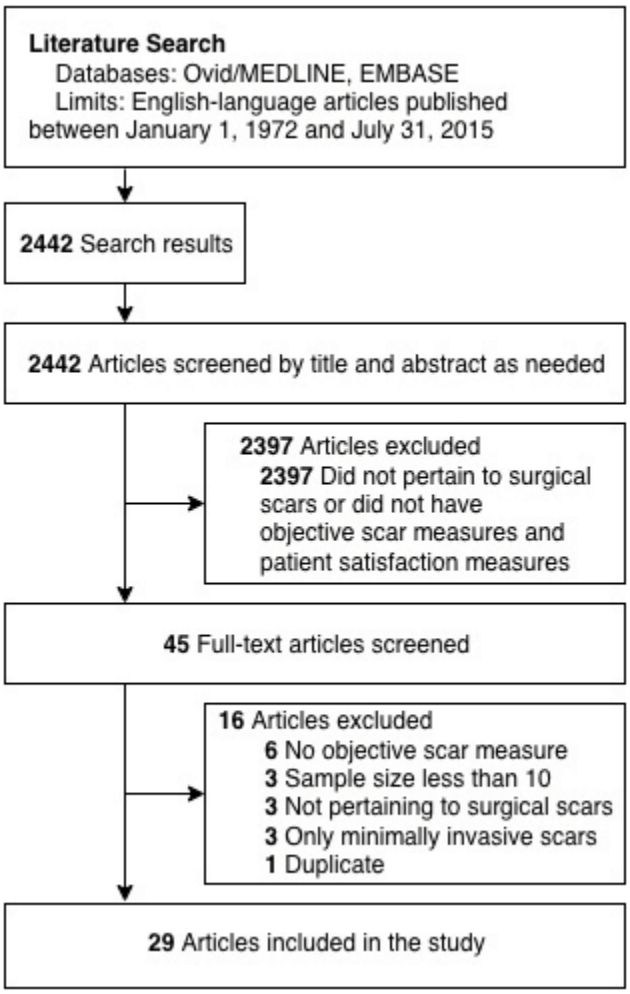
Summary: 29 studies satisfied inclusion criteria and were incorporated in the systematic review. Included articles assessed incision techniques, closure techniques, and scar appearance that spanned the fields of dermatology, obstetrics & gynecology, plastic surgery, otolaryngology, and general surgery (Figure 1). None of the five studies assessing scar length reported significant correlations between scar length and patient-reported satisfaction with their scar. However, incisional orientation along natural skin folds was associated with higher patient scar satisfaction in two studies. Of the studies focusing on skin closure techniques, 13/21 (61.9%) did not find significant associations between the studied closure method and patient satisfaction. In the studies pertaining specifically to dermatologic surgery, the use of tissue adhesive compared to no tissue adhesive, purse-string suture compared to granulation, and wound eversion compared with non-eversion closure were not associated with differences in patient-reported scar satisfaction. In addition, in 14/29 (48.3%) of studies, there was significant change noted in either the observer or patient-reported scar measure but not in both.

Design: We performed a comprehensive systematic review of English-language articles retrieved from the Ovid/Medline and EMBASE electronic databases on August 1st, 2015 (Figure 2). The query terms used for each database was '(surgical scar) AND (patient satisfaction OR patient assessment)'. Two authors independently screened all queried studies for eligibility by title. Inclusion criteria for reviewed articles were: (1) prospective study design; (2) studies pertaining to non-laparoscopic surgical scars; (3) studies employing at least one objective scar measure; (4) studies employing at least one patient-reported satisfaction measure. Studies pertaining to non-surgical scars, including burn and radiation scarring, and studies assessing post-surgical treatment of scars were excluded. Complete manuscripts were then examined for pre-determined study characteristics including patient characteristics, study design and methodology, objective scar measure data, patient satisfaction data, and results. The

quality of each individual study was evaluated using the Strength of Recommendation Taxonomy (SORT) criteria.

Conclusion: Despite more than 230 million surgical procedures being performed worldwide each year, methodologically rigorous studies that include clinician-reported and patient-reported scar outcomes are uncommon. Studies that incorporate subjective and objective scar grading reveal discordance between clinicians and physicians. Intraoperative surgical technique may not influence changes in both patient and clinician reported outcomes but the evidence remains weak and improved future studies are recommended.





11

Presenter: Matthew Q. Hand, MD

Title: The Effects of Topical Dapsone Gel on Wound Healing

Authors: Matthew Q. Hand, MD[1]; Doug Grossman, MD, PhD[1]; Keith Duffy, MD[1]

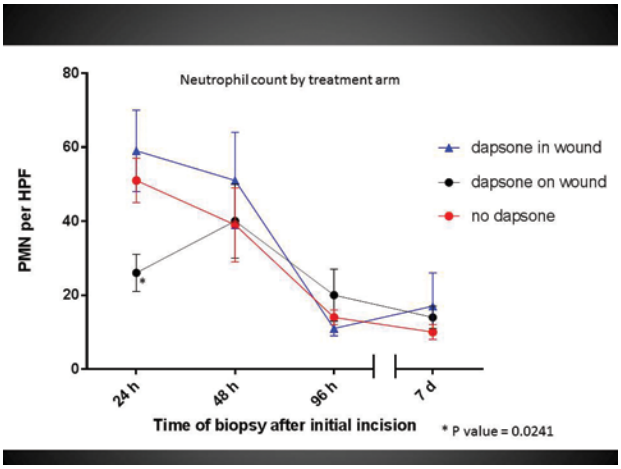
Institution: 1. University of Utah School of Medicine, Salt Lake City, UT

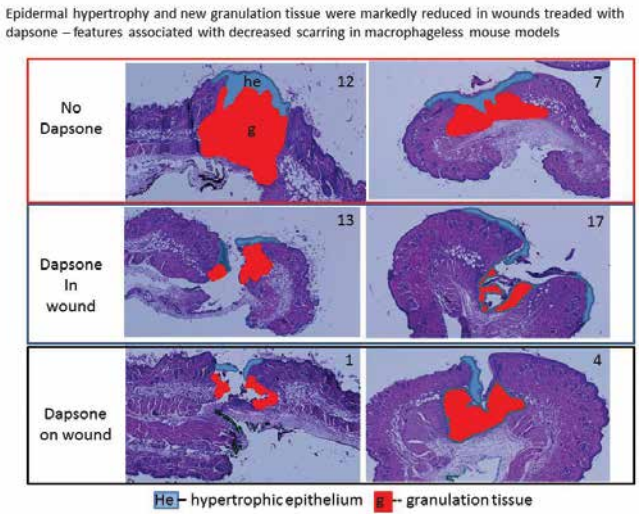
Purpose: One of the strongest predictors of how a patient rates the outcome of surgery is how satisfied they are with the scar. In our practice we have observed increased and more persistent erythema in wounds of younger patients (age <50 yrs) making them higher risk for unfavorable scarring outcomes. Topical dapsone gel applied to wounds in this demographic have resulted in less post-op erythema and subjectively better healing. We suspect that topical dapsone gel reduces inflammation and thus scarring, and have created a mouse model to evaluate this hypothesis.

Summary: Research on wound healing has demonstrated that inflammation affects scarring in a dose dependent manner. Nearly scar less wound healing has been achieved by suppressing inflammatory cytokines (IL-6 & IL-8) and also by inhibiting neutrophil and macrophage recruitment to the wound. We hypothesized that dapsone, which suppresses IL-8 and neutrophil recruitment through a variety of mechanisms, could be used topically to reduce neutrophil infiltration and thus blunt the inflammatory cascade responsible for scarring. We chose a mouse model for proof of concept so that tissue could be obtained for evaluation of treatment response without subjecting patients to biopsy scarring.

Design: Eighteen mice were divided into three treatment arms: a control group in which only ointment (Vaseline) was applied to the wound; a group in which dapsone (Aczone gel 5%, Allergan) was applied to the exterior of the wound after closure; and a group in which dapsone was applied to the inside of the wound prior to closure. The dapsone treatment groups had dapsone gel applied to the closed wound twice a day on days 2-7, and thus only differed in how the initial application of dapsone gel was applied. To evaluate the inflammatory response, peri-incisional biopsies were obtained at 24, 48 and 96 hour intervals. On day 7 the mice were sacrificed and the entire surgical site was excised for histologic examination. Outcomes were measured via histologic assessment of wound architecture on day seven, and levels of inflammation were quantified by neutrophil and macrophage counts in a single high power field in each biopsy.

Conclusion: Wounds in the dapsone treated mice exhibited architectural changes compatible with reduced scarring, including decreased granulation tissue formation and less epidermal hypertrophy. Neutrophil counts were also significantly lower (p-value of 0.024) at the 24 hr mark in the group that had dapsone applied to exterior of the wound. The reduced neutrophil counts and structural changes suggest that dapsone reduces inflammation in the early stages of wound healing and may reduce scarring. Human trails are being developed to objectively evaluate the healing response to topical dapsone in post incisional wounds.





12

Presenter: James W. Behan, MD

Title: Pleomorphic Dermal Sarcoma: A Case Series Further Delineating a Separation from Atypical Fibroxanthoma

Authors: James W. Behan, MD[1]; Min Deng, MD[3]; Michael A. Renzi, BS[3]; Alexandre Ly, RN, BSN[2]; Daniel Belkin, MD[2]; Naomi Lawrence, MD[3]; Ashley Wysong, MD, MS[2]

Institutions: 1. University of Colorado Health Sciences, Denver, CO
2. University of Southern California, Los Angeles, CA
3. Cooper Medical School of Rowan University, Marlton, NJ

Purpose: The classification of fibrohistiocytic tumors is controversial and has been debated over the years. In 2013, WHO updated soft tumors and included atypical fibroxanthoma (AFX) as a malignant but indolent lesion of the skin with low risk for recurrence or metastasis. A new class, undifferentiated sarcoma, was added that should only be used when all recognizable lines of differentiation have been excluded and refers to tumors originating from the deep soft tissue. The term "malignant fibrous histiocytoma" (MFH), previously reserved for AFX tumors with dermal/SQ extension, was discontinued. More recently, the term "pleomorphic dermal sarcoma" (PDS) was suggested by Tardio JC et al to encompass lesions with immunohistochemistry (IHC) of AFX and histopathologic features of tumor necrosis, infiltration beyond the deep dermis, lymphovascular, or perineural invasion. PDS has emerged as a dermally based fibrohistiocytic tumor with an elevated risk for recurrence and metastasis, however, very little is known about this tumor. We present the largest case series of pleomorphic dermal sarcoma treated with Mohs surgery (MMS).

Summary: Seven patients with 14 confirmed PDS tumors were treated with MMS over 8 years. The average age of the patients was 70.3 (range 51-82) and all were male (7/7). The most common tumor location was the scalp (64%, 9/14), followed by the forehead/temple areas (14%, 2/14), the ear (14%, 2/14), and the chest (7%, 1/14). All of the original tumors (14/14) were negative for S100, CKs, and desmin. 12/12 tumors were negative for a vascular marker (2 missing). All initial tumors had infiltration beyond the deep dermis (7/7), no necrosis, lymphovascular invasion, or perineural invasion was seen. All tumors were treated with MMS with 3/7 patients experiencing "loco-regional"recurrence within the skin (recurrence not contiguous with the surgical scar and outside of the greatest radius of the final defect) and no evidence of distant metastasis. Two of seven patients have passed while undergoing adjuvant treatment for disease, 1/7 is currently undergoing adjuvant therapy with active disease, while the remaining 4/7 patients are alive without disease (AWOD).

Design: A retrospective review of two tertiary referral centers of patients with appropriate histopathologic criteria for PDS from January 2008 – December 2015. Basic demographic data, patient medical history, treatment modalities, and clinical follow up was obtained.

Conclusion: Although PDS is histologically similar to AFX, it is important to differentiate these more aggressive lesions given the increased risk of local-regional recurrence and metastasis with rare reported disease related mortality. We report the largest case

series of PDS tumors treated with Mohs surgery and highlight the high rate of recurrence vs. in-transit cutaneous metastasis within the anatomic region of the original tumor, despite complete margin assessment. Long-term studies are needed to further delineate the nature, prognosis, and ideal management of PDS.

13

Presenter: Nikki Tang, MD

Title: Mohs Micrographic Surgery for the Treatment of Dermatofibrosarcoma Protuberans: A Retrospective Follow-up Study of Patients Treated with Consistent Surgical Margins by a Single Surgeon Over an 18 Year Period

Authors: Nikki Tang, MD[1]; Priya Nayyar[2]; Zena Zoghbi[3]; Vishal Patel, MD[3]; Desiree Ratner, MD[1]

Institutions: 1. Mt. Sinai Beth Israel Comprehensive Cancer Center, New York, NY
2. Northwell Health Physician Partners, Manhasset, NY
3. Columbia University Medical Center, New York, NY

Purpose: One of the practice gaps identified in the management of dermatofibrosarcoma protuberans (DFSP) involves lack of consensus in the width of surgical margins taken around the clinically evident tumor. In contrast to wide excision (WE), which involves margins as large as 3-5cm, Mohs micrographic surgery(MMS) for DFSP is generally performed with narrower margins of 1-2cm. Furthermore, while WE was long considered the gold standard for treatment, high recurrence rates have been reported(11% to 60%). Previous studies of MMS for DFSP have shown recurrence rates from zero to 8.3%. The purpose of this study is to confirm the effectiveness of MMS for the treatment of DFSP by examining the recurrence rate in a large population of patients treated by a single surgeon using consistent margins(1cm margin for tumors <3cm in diameter, 1.5cm margins for tumors 3-10cm in diameter, and 2cm margins for tumors >10cm) over an 18 year period.

Summary: 70 sequential DFSP patients were treated with MMS by one physician over 18 years(1998-2015). 22 of these patients were lost to follow-up. Of the 48 remaining patients, none had any recurrence after 5.4 years mean follow-up. No recurrence was noted after 5.4 years mean follow up in the remaining 48 patients. The average age of patients at time of surgery was 40.4 years (range 8 to 66) with a slight female predominance(52.9%). The most common location was the trunk(60%) followed by the extremities(20%). 78.6% of these tumors were primary lesions. The remainder were recurrent. 39 were tumors <3cm in diameter and removed with 1cm margins. 26 tumors had a diameter from 3-10cm and were removed with 1.5cm margins. 5 were tumors >10cm in diameter and removed with 2cm margins. The average number of stages required for tumor clearance was 1.6. The overall mean lesion size was 14.9cm2 and the overall mean margin required for tumor clearance was 1.3cm. The majority of tumors extended to the fascia(55.7%). 74.3% were repaired with a layered linear closure, followed by STSG or FTSG(10%) and 7.1% were referred to plastic surgery.

Design: This is an IRB approved retrospective chart review in an academic practice. Each patient's medical record was examined and all relevant data collected. In addition, the patient or the patients' referring dermatologist was contacted by telephone if further information was needed.

Conclusion: This is the single largest study tracking patients with DFSP treated with MMS by a single surgeon with consistent surgical margins. Our zero recurrence rate supports the effectiveness of the margins taken during MMS in the treatment of DFSP(1cm margin for tumors<3cm, 1.5cm margin for tumors 3-10cm, 2cm for tumors>10cm). MMS can achieve tumor clearance with smaller margins, lower recurrence rates, and greater preservation of healthy tissue than standard excision, thus substantiating previous treatment recommendations.

14

Presenter: Adi Nosrati, MD

Title: Outcomes for Wide Local Excision Compared with Mohs Micrographic Surgery for Melanoma in Situ

Authors: Adi Nosrati, MD[1]; Shilpa Goel, MD[2]; Joseph McGuire[1]; Barbara Grimes, MS, PhD[1]; Jacqueline Berliner, MD[1]; Vera Morhenn, MD[2]; Roy Grekin, MD[1]; Ana Griffin, PhD[1]; Maria L. Wei, MD, PhD[1]

Institutions: 1. University of California, San Francisco, CA
2. Veterans Affairs Medical Center, San Francisco, CA

Purpose: The standard of care for melanoma in situ (MIS) is wide local excision (WLE). Mohs micrographic surgery (MMS) is also performed, but is not widely accepted as an effective treatment modality. The purpose of this study was to compare outcome measures for these two procedures.

Summary: We compared patient characteristics, local recurrence and survival rates for 393 MIS in 385 patients who were treated with WLE and for 288 MIS in 277 patients who were treated with MMS. Mean follow-up interval was 17.9 + 0.43 y (median 21.5 y). Patients treated with MMS were more likely to be older (mean 64 vs 58.5 y; P <.0001) and have lesions located predominately on the face (80%) compared with WLE (36.7%), whereas for individuals undergoing WLE, lesions were primarily on the trunk and extremities (56.5%), likely reflecting a selection bias. Recurrence rates were 5 of 288 (1.7%) in the MMS treated group and 22 of 393 (5.6%) in the WLE treated group; these differences did not reach significance (0.41, 95% CI 0.155-1.096). The average time to recurrence in the MMS treated group was 10.7 + 0.08 yrs, and in the WLE group 10.0 + 0.09 yrs (P=0.07). Overall survival for the MMS treated cohort (18.4 + 0.8 yrs) did not differ significantly from overall survival the WLE treated cohort (17.4 + 0.4 yrs; HR=1.25, 95%CI 0.8-1.8). Melanoma specific survival was better for melanomas treated with MMS compared with WLE; this result did not reach statistical significance (HR=0.51, 95%CI 0.06-4.4).

Design: We conducted a retrospective observational study at a tertiary referral academic center. We identified a total of 681 MIS in 662 individuals that were treated with either MMS or WLE from 1989-2013.

Conclusion: These data indicate that wide local excision and Mohs micrographic surgery for melanoma in situ are similar in outcomes as measured by time to recurrence, and recurrence

and survival rates. Our results suggest that Mohs micrographic surgery should be considered as an effective alternative to WLE in situations where preservation of the function of anatomic structures is desirable.

15

Presenter: Thomas Barlow, DO, DHEd[1]

Title: Recognizing Value in US Healthcare Expenditure: A Comparison of US and Japanese Procedural Skin Cancer Treatment Costs

Author: Thomas Barlow, DO, DHEd[1]

Institution: 1. US Naval Hospital, Yokosuka, Japan

Purpose: The United States spends more per capita on health care than any other nation in the world. Pressure to control costs is felt throughout the U.S. medical system, including in treatment of the growing skin cancer epidemic. In contrast to the U.S., Japan's medical system spends less than half as much per capita, yet many metrics of Japanese health outcomes are superior, including the longest lifespan of any country. This cost effectiveness makes Japan's healthcare system a persuasive model, and their best practices should be identified and studied. We compared the average cost associated with procedural treatment of skin cancers in these two countries to explore whether this is an appropriate target for cost savings in the U.S. health care system.

Summary: The average cost of procedural treatment per skin cancer in the United States in 2014 was estimated using claims data from the Medicare Part B National Summary Data File. Destruction, excision, and Mohs micrographic surgery were included in calculation of the average. The average Medicare payment of $273.82 was compared with the fixed payment of $908.26 which is paid by Japanese National Insurance for excision of a malignant cutaneous lesion, the only common procedure for cutaneous malignancy. The cost of procedural treatment per skin cancer in Japan is 332% the average cost in the United States.

Design: A direct cost comparison was performed. The average U.S. treatment cost per lesion was estimated by averaging the 2014 Medicare payment for malignant excision codes (11600–11606, 11620–11626, and 11640–11646), malignant destruction codes (17260–17266, 17270–17276, and 17280–17286), and Mohs micrographic surgery codes (17311 and 17313). The cost of additional Mohs stages was included, but the number of those claims was not, as they did not represent distinct lesions. The treatment cost per lesion in Japan was the fixed value paid by Japanese National Insurance to service providers, converted to dollars using the 2014 average currency conversion. The cost of additional wound repair and hospitalization was not included in either estimate because databases did not allow determination of repairs attributable to malignancies. However, the rate of hospitalization was much higher in Japan, and the reimbursement per complex repair (flap or graft) was higher in Japan.

Conclusion: Although the Japanese healthcare system spends less per capita overall, procedural treatment per skin cancer is significantly more expensive in Japan than in the United States. This comparison demonstrates a high relative value per dollar of skin cancer procedures in the U.S., and suggests this may not be the best target for healthcare cost reduction.

16

Presenter: Junqian Zhang, BS

Title: Diagnostic Change from Atypical Intraepidermal Melanocytic Proliferation to Melanoma After Conventional Excision – A Cross-Sectional Single Academic Institution Study

Authors: Junqian Zhang, BS[1]; Jeremy Etzkorn, MD[2]; Christopher Miller, MD[1]; Joseph Sobanko, MD[1]; Thuzar Shin, MD, PhD[1]

Institutions: 1. University of Pennsylvania, Philadelphia, PA
2. University of Pennsylvania, Yardley, PA

Purpose: Atypical intraepidermal melanocytic proliferation (AIMP) is a descriptive histopathologic diagnosis typically reserved for melanocytic lesions that have certain features consistent with melanoma but whose attributes are insufficient to make a diagnosis of cancer. Since the malignant potential of AIMP is uncertain, a histopathologic diagnosis of AIMP presents a pre-operative counseling dilemma for the treating physician. Additionally, after complete histopathologic evaluation of the excisional specimen, the final diagnosis rendered may change, and diagnostic change to melanoma may alter treatment and follow-up recommendations. The principal aim of this study was to describe the rate of diagnostic change from AIMP to melanoma after review of the excisional specimen. We evaluate potential clinical and histopathologic risk factors for this diagnostic change. Our data may inform treatment recommendations for AIMP and improve pre-operative patient counseling for AIMP.

Summary: Diagnostic change to melanoma was seen in 4.2% (13/306) of conventional excisions of AIMP. Factors associated with diagnostic change to melanoma included anatomic location on the head & neck (OR 8.49, 95% CI 2.17, 33.19; p = 0.001) and acral areas (OR 9.24, 95% CI 2.18, 39.24; p = 0.001), lesion extension to the base of the biopsy specimen (OR 13.07, 95%CI 2.98, 57.31; p = 0.001), biopsy with the punch technique (OR 6.06, 95% CI 1.95, 18.86; p = 0.013), and melanoma in the initial biopsy's histopathologic differential diagnosis (OR 13.29, 95% CI 1.71, 103.57; p = 0.001).

Design: We performed a cross-sectional study of AIMPs treated by conventional excision between January 1st, 2008 and December 31st, 2013. Inclusion criteria for the study were: age greater than 18 years, biopsy and excisional specimen interpreted by a board-certified dermatopathologist, and surgical treatment with conventional excision.

Conclusion: AIMP is a histopathologic diagnosis that presents a management dilemma for clinicians. Our data indicates that certain clinical and demographic characteristics, including anatomic location on the head & neck and acral areas, lesion extension to the base of the biopsy specimen, biopsy with the punch technique, and melanoma in the histopathologic differential diagnosis are associated with higher rates of diagnostic change to melanoma after conventional excision of AIMP. Pre-operative counseling and surgical planning for AIMP should account for potential diagnostic change to melanoma, especially when these risk factors are present.

Poster Presentation Summaries

17

Presenter: Joseph Sobanko, MD

Title: Evaluation of Early Postoperative Quality of Life in Mohs Micrographic Surgery Patients

Authors: Joseph Sobanko, MD[1]; Junqian Zhang, BS[1]; Victoria O'Malley, BA[1]; Thuzar Shin, MD, PhD[1]; Jeremy Etzkorn, MD[1]; Christopher Miller, MD[1];

Institution: 1. University of Pennsylvania, Philadelphia, PA

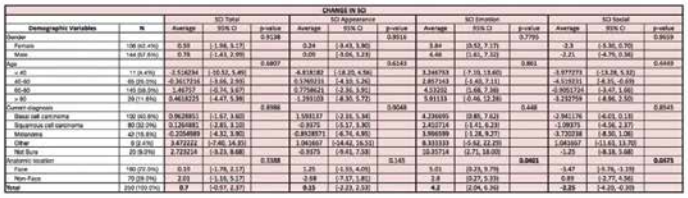
Purpose: Studies in other surgical fields have shown that patient reported outcomes (PROs), such as quality of life (QOL), may worsen in the early postsurgical period (Pepper JP et al Plast Reconstr Surg 2012). Few studies have systematically examined how Mohs micrographic surgery (MMS) for localized skin cancer impacts the psychosocial health of dermatologic surgery patients and most have measured QOL with instruments that have limited relevance for patients with skin cancer. We used an instrument specific to skin cancer to evaluate for changes in QOL immediately before and one week after MMS.

Summary: 250 patients completed the skin cancer-specific QOL survey immediately before and 1 week after undergoing MMS. Patient medical and sociodemographic characteristics were recorded (Table 1). Regardless of the type of skin cancer, patients reported statistically significantly reduced quality of life levels if they were female, younger than 40 years old, and had skin cancers located on the face (Table 2). Mean QOL scores did not differ immediately before (73.8/100) versus one week after surgery (74.5/100) [p = 0.16] (Table 2). The association between reduced patient reported QOL and female gender, age < 40, and facial tumor location persisted 1 week after surgery.

Design: We performed a prospective cohort study on patients undergoing MMS for biopsy-proven, localized skin cancer. Exclusion criteria included the following: age less than 18 years, inability to provide consent, evidence of nodal or distant skin cancer metastases, and a diagnosis of melanoma with a tumor stage of T1b or greater. Immediately prior to surgery, patients completed a web-based survey (REDCap) of demographic and health information and the Skin Cancer Index (SCI). The SCI is a validated, responsive, self-reported measure of QOL in skin cancer patients with three subscales: emotions, societal interactions, and appearance concerns. Each question is scored 1-5, and the mean score of questions within each subscale is used to calculate the subscale score, which is then scaled to 100 (higher values indicating increased QOL). Patients repeated the SCI when they returned to clinic one week after surgery.

Conclusion: To our knowledge, our study is the largest reported cohort of patients undergoing MMS to evaluate QOL using the SCI, a validated instrument that has proven to be sensitive to detect psychosocial changes in patients with nonmetastatic skin cancer. Our data indicate that MMS does not result in an early postoperative decrease in QOL. Additionally, women, patients younger than 40 years old, or patients with facial cancers are statistically significantly more likely to report reduced QOL immediately before and 1 week after surgery. We will report separately our data assessing QOL in the late postoperative period.

Demographic Variables	N	Demographic Variables	N
Gender		Sunscreen use	
Male	144 (57.6%)	Daily	25 (10.0%)
Female	106 (42.4%)	When exposed to sun	108 (43.2%)
Age		Sometimes	93 (37.2%)
< 40	11 (4.4%)	Never	24 (9.6%)
40-60	65 (26.0%)	Tanning bed use	
60-80	145 (58.0%)	Never	215 (86.0%)
> 80	29 (11.6%)	Previously used	34 (13.6%)
Health status*		Currently using	1 (0.4%)
Healthy	135 (54.0%)	History of skin cancer	
Mild systemic disease	91 (36.4%)	No	94 (37.6%)
Severe systemic disease	22 (8.8%)	Yes	156 (62.4%)
Life-threatening systemic disease	2 (0.8%)	Number of current skin cancers	
Immune status		1	179 (71.6%)
Immunocompetent	221 (88.4%)	> 1	71 (28.4%)
Immunosuppressed	29 (11.6%)	Current diagnosis	
Education		Basal cell carcinoma	102 (40.8%)
High school or less	69 (27.6%)	Squamous cell carcinoma	80 (32.0%)
Vocational school	20 (8.0%)	Melanoma	42 (16.8%)
College degree	85 (34.0%)	Other	6 (2.4%)
Graduate degree	76 (30.4%)	Unsure	20 (8.0%)
Marital status		Longevity of lesion	
Never married	24 (9.6%)	< 1 month	12 (4.8%)
Married	171 (68.4%)	< 6 months	125 (50.0%)
Divorced	26 (10.4%)	< 1 year	58 (23.2%)
Widowed	29 (11.6%)	1-2 years	18 (7.2%)
Living situation		> 2 years	37 (14.8%)
Lives alone	46 (18.4%)	Previous treatment	
With spouse/partner	139 (55.6%)	No	205 (82.0%)
With spouse/partner & children	49 (19.6%)	Yes	45 (18.0%)
With other relatives	16 (6.4%)	Clinic Location	
Income		PCAM	225 (90.0%)
< 25K	28 (11.2%)	Bucks Co	25 (10.0%)
25K-50K	42 (16.8%)	Anatomic location	
50K-75K	68 (27.2%)	Scalp	24 (9.6%)
75K-150K	54 (21.6%)	Face	180 (72.0%)
> 150K	58 (23.2%)	Forehead	23
Employment		Eyelid	18
Unemployed	12 (4.8%)	Nose	56
Part-time	17 (6.8%)	Temple	13
Full-time	90 (36.0%)	Cheeks	37
Retired	106 (42.4%)	Lips	7
Homemaker	8 (3.2%)	Chin	3
Self-employed	17 (6.8%)	Ear	22
Smoking		Neck	10 (4.0%)
Current smoker	21 (8.4%)	Back	5 (2.0%)
Current non-smoker	229 (91.6%)	Chest	3 (1.2%)
Lifetime sun exposure		Upper extremity	15 (6.0%)
Minimal	19 (7.6%)	Lower extremity	12 (4.8%)
Intermediate	163 (65.2%)	Genitals	1 (0.4%)
Heavy	68 (27.2%)	Total	250 (100.0%)



18

Presenter: Sowmya Ravi, MD

Title: Patient-Acquired Photographs for the Management of Post-Operative Concerns

Authors: Sowmya Ravi, MD[1]; Molly S. Moye, MD[1]; Divya Srivastava, MD[1]; Rajiv I. Nijhawan, MD[1]

Institution: 1. University of Texas Southwestern Medical Center, Dallas, TX

Purpose: Telemedicine has proven to improve accessibility and provide convenience to dermatologic care, especially for management of medical concerns such as acne and atopic dermatitis as well as for screening of skin cancers. This study seeks to assess the utility of patient-directed photography for the triaging and management of post-operative concerns.

Summary: From November 17, 2015 to January 4, 2016, 502 procedures were performed. Thirty patients called with a post-operative concern (30/502; 6%). 5/30 (16.7%) involved concerns for active bleeding/hematoma or infection while the remaining 25/30 (83.3%) were of low urgency. Twenty-four of 30 (80%) patients sent in photos for evaluation, and 100% of these 24 were satisfied with photograph assessment with satisfaction average of 4.72 out of 5 (5 = highest degree of satisfaction). 6/30 patients did not send a photograph, citing inability to do so or sensitivity of the involved site (e.g. genitals). Distance required to travel was the most cited reason for preference of photograph (average=48.6 miles of the 30 patients; range = 4-300 miles), though 25% of those patients lived within ten miles of the clinic. All patients (100%) who sent in a photo reported alleviation of concerns after receiving reassurance or recommendations over the phone. 11/24 patients evaluated by photograph were also seen in clinic for suture removal or wound check, at which time there was also no change in assessment or management by the provider. Blinded review of patient photographs demonstrated 96% concordance in assessment among dermatologic surgeons.

Design: Patients in this study had a surgical procedure performed at a single academic institution. All patients who called with a post-operative concern other than general questions regarding wound care or pain control were triaged by one of the Mohs surgeons or fellows, who followed a script to assess the patients' concerns. Patients were offered the opportunity to email a photograph of the surgical site. Those patients with concerns of active bleeding or infection were requested to return for an in-office post-operative visit (POV) immediately. All patients were also offered a POV, but those who declined in-office assessment received a follow-up phone call 1-3 days after the initial call to ensure improvement. Two dermatologic surgeons blindly evaluated all photographs to assess inter-observer concordance.

Conclusion: While all patients were offered a POV, the majority preferred to send in a photograph for evaluation. All patients who sent in photographs reported interval alleviation of their concerns and a high level of satisfaction with photo evaluation. The high level of concordance in assessment by multiple dermatologic surgeons demonstrated the reliability of photographs in assessing post-operative concerns. This pilot study demonstrates the utility of teledermatology as a convenient, safe, and dependable option for the triaging and management of most post-operative concerns.

19

Presenter: Stephanie J. Martin, MD

Title: A Synthetic, Injectable Microporous Wound Healing Scaffold to Decrease Inflammation and Scar Formation after Full Thickness Surgical Excision

Authors: Stephanie J. Martin, MD[1]; Don Griffin, PhD[1]; Westbrook Weaver, PhD[1]; Gary Lask, MD[1]; Theresa Soriano, MD[1]; Philip Scumpia[1]

Institution: 1. UCLA, Los Angeles, CA

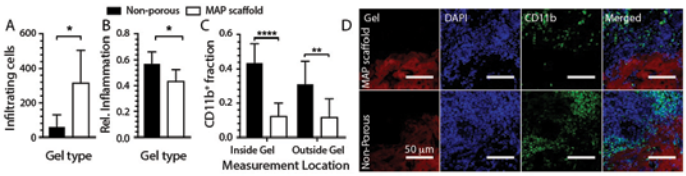
Purpose: With organ transplant patients developing larger, more aggressive cutaneous squamous cell carcinomas, including areas that are traditionally difficult to close primarily like the scalp and lower extremities, there is a need for a material that can improve wound healing and decrease scar formation while preventing further manipulation of the surgical site which can lead to infection. Implantable biomaterial grafts are expensive and require suturing, while injectable hydrogel or collagen biomaterials do not allow tissue to grow into the material. Both injectable and implantable biomaterials elicit a foreign body reaction from the host tissue, leading to inflammation and increased scar formation. We have developed a fully synthetic and injectable porous scaffold, that allows cellular infiltration and tissue regeneration while the material breaks down. This Microporous Annealed Particle (MAP) biomaterial is composed of injectable microsphere hydrogel building blocks. We hypothesized, that the material would decrease the tissue immune response, increase healing rate, and result in less scar formation after healing. Here we present data to confirm that hypothesis.

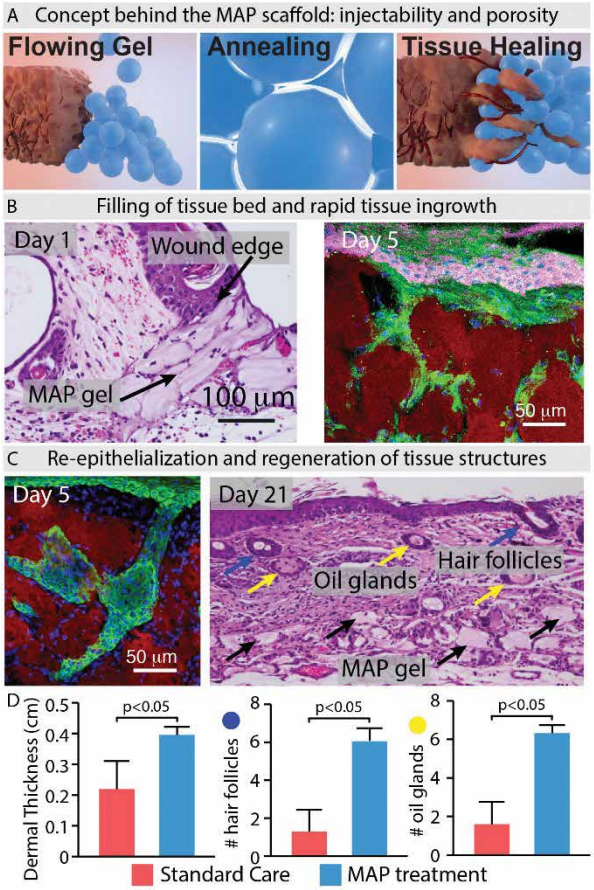
Summary: MAP demonstrated faster healing than all controls. The MAP scaffold also resulted in diminished inflammatory CD11b+ cells within and without the scaffold when compared to non-porous control. Importantly, at 21 days after wounding, H&E sections demonstrate decreased scar width with hair follicle and sebaceous gland adnexal structures overlying the full thickness injury site.

Design: MAP building blocks (~90 mm diameter) are produced via a microfluidic water-in-oil emulsion approach and are composed of cell-degradable PEG hydrogel. Here we investigate two methods to fix the gel within the wound bed: (i) enzymatic Factor XIII based (~30 min) and (ii) Eosin-Y and white light based (~30 sec). We utilized a murine full-thickness skin wound healing model and examined the wounds histologically at 7 and 21 days. Wound contracture by the paniculus carnosus was prevented using a sutured rubber splint to better simulate the human healing response (granulation/reepithelialization). We compared MAP gel to (i) non-annealing building blocks, (ii) non-porous, injectable PEG gel, (iii) and untreated wounds to explore the importance of a stable, porous scaffold in diminishing scar formation.

Conclusion: The MAP biomaterial scaffold appears to increase in situ skin regeneration without requiring stem cell or growth factor delivery. This appears to be correlated with a decreased early inflammatory response. Further investigations into the

mechanism of tissue regeneration and decreased scarring will be critical in determining the effects of the MAP gel on the wound microenvironment.





20

Presenter: Ashley N. Sullivan, MD

Title: Modification of the Zitelli Bilobed Flap

Authors: Ashley N. Sullivan, MD[1]; Timothy Wang, MD[1]; Robert Egbers, MD, MS[1]

Institution: 1. Johns Hopkins, Baltimore, MD

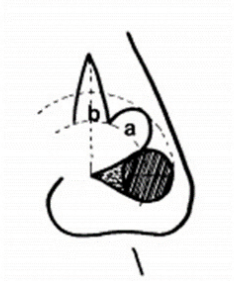
Purpose: To describe a modification to bilobed flap design based on the geometry of transposition flaps.

Summary: The bilobed transposition flap is often used to reconstruct post-Mohs nasal defects. Typically, flap design begins with a Burow's triangle drawn from the defect margin. A line drawn from the tip of the triangle through the middle of the triangle to the distal defect margin is used as a radius to define the margins of the lobes (see figure A). Bilobed flaps are transposition flaps and as such share geometry with all transposition flaps. In simplest terms, transposition flaps can be viewed as parallelograms where the length of the flap is defined as the distance from a central pivot point to the distal defect margin (see figure B; note labels for central pivot point vs. skin tether points). This holds true even when the flap is designed such that one margin of the flap meets the margin of the defect (for example, at 30°, see figure C). Note that although the defect "appears" to be a triangle, the flap and defect remain parallelograms.

Design: The bilobed transposition flap functions as two adjacent transposition flaps that share a single central pivot point and a single broad base. Design should be based on a pivot point described by the center of a parallelogram rather than the tip of the Burow's triangle (see figure D). This effectively shifts the pivot point by approximately ½ the width of the flap and results in slightly longer lobes than described by the current design. Although a relatively small change, we believe this to be geometrically correct and helps to resolve the shortfall in flap length noted in prior studies and in our clinical experience (Cho et al 2006).

Conclusion: The successful use of bilobed flaps in nasal reconstruction is without question. However, we believe that their design should be based on a central pivot point (seen as the center of a parallelogram) rather than a skin tether point (seen as the center of the Burow's triangle).

Figure A



Copied from Zitelli JA. The bilobed flap for nasal reconstruction. *Arch Dermatol.* 1989; 125(7): 957-959.

Figure B

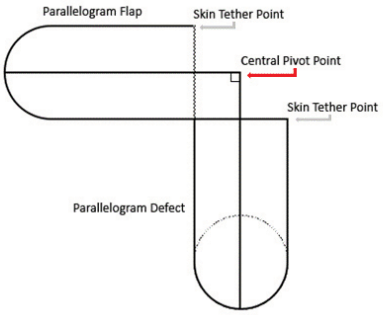


Figure C

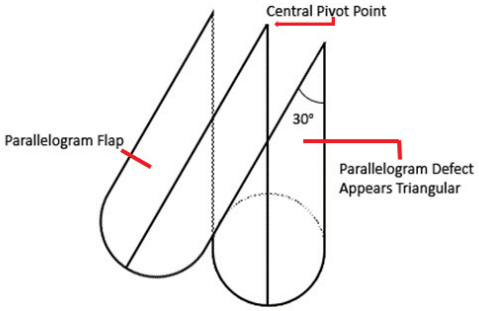
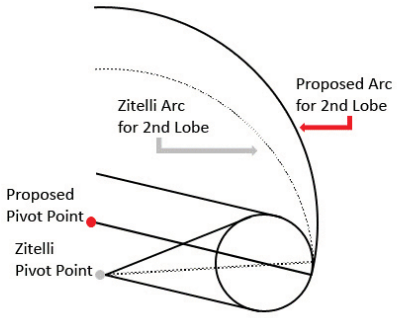


Figure D



21

Presenter: Sean E. Mazloom, MD

Title: The Effect of Porcine Xenografts in Reducing Pain and Inflammatory Chondritis in Auricular Mohs Defects Healing by Secondary Intention: A Prospective Randomized Controlled Single-Blind Pilot Study

Authors: Sean E. Mazloom, MD[1]; Garrett Coman, MD[1]; Alex C. Holliday, MD[1]; Rahul N. Chavan, MD, PhD[1]; Marian A. Phillips, MD[1]

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

Purpose: The purpose of this study is to evaluate the efficacy of a porcine dressing in reducing post-operative pain, time to healing, and wound contraction in Mohs defects left to heal by secondary intention on the ear.

Summary: Secondary intention healing is ideal for small defects on the ear but can be associated with pain due to chondritis, prolonged healing, scar contraction, and poor cosmesis 1-3. Porcine xenografts have been used to expedite reepithelialization and reduce pain in partial-thickness burns and surgical wounds; however, this is the first controlled trial comparing xenograft placement to traditional secondary intention healing of ear wounds 4-11. Methods: After obtaining approval from the institutional internal review board, patients with post-Mohs ear defects deemed appropriate for secondary intention healing were enrolled. Defects 4 cm(2) or less were included while current smokers and those using narcotics, steroids, or antibiotics were excluded. Study subjects received either xenograft or petrolatum in a randomized fashion, followed by a non-adherent pressure dressing. Outcome measures included time to full granulation and reepithilialization, analgesic intake, post-operative pain, and wound measurements. Results: Currently, 15 patients have been enrolled in the study. Eight patients received the xenograft and 7 were randomized into the control arm and complete data is available for 13. Two patients were excluded from the study: one due to xenograft misplacement and one due to oozing stopped with transition to primary closure in the control group. On preliminary review, all patients achieved complete or near complete reepithelialization between weeks 4 and 8. The available pain log data reveals 71% of patients in the xenograft group had some degree of pain on post-operative day (POD) 0 compared to 60% of control patients. Two xenograft patients and one control patient experienced pain on days beyond POD 0. Forty three percent of the xenograft and 40% of the control subjects consumed narcotic pain medication on the procedure day; no one required narcotics after POD 0. A full statistical analysis, including computer calculated wound reepithelialization rates, is anticipated by the time of presentation.

Design: Prospective Randomized Controlled Single-Blind Pilot Study

Conclusion: We have observed a lack of expected chondritis, similar reepithelialization rates, and generally low levels of self-reported pain and narcotic pain medication use in both groups for post-Mohs ear defects. We hypothesize a complete occlusive dressing (with or without porcine xenograft) during the first post-operative week decreases pain and lowers the risk of inflammatory chondritis in auricular defects healing by secondary intention.

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22

Presenter: Eleni Marmarelis

Title: Randomized Trial Comparing Pressure versus Simple Adhesive Dressing after Mohs Reconstruction

Authors: Eleni Marmarelis[1]; Faramarz Samie, MD, PhD[2]

Institutions: 1. Geisel School of Medicine at Dartmouth, Lebanon, NH
2. Dartmouth Hitchcock Medical Center, Lebanon, NH

Purpose: Practice variations exist in post-surgical care. Dermatologists routinely use pressure dressings, despite a paucity of evidence supporting their effectiveness in promoting wound healing. In contrast, surgeons in other fields opt for a simple adhesive bandage following many procedures. While each approach has its advantages and disadvantages, there is little objective data regarding each practice. This study characterizes the current standard of care for Mohs postoperative dressings and compares the two dressing types in terms of effectiveness and patient satisfaction in a randomized trial.

Summary: 132 members of the American College of Mohs Surgery (ACMS) responded to a survey regarding their postoperative practices. 127 respondents (96%) reported using a pressure dressing following Mohs reconstruction. Only 5 reported using a simple adhesive dressing made from transparent film, hydrocolloid, or butterfly closures. 44 patients undergoing Mohs reconstruction were recruited and randomized to receive either a pressure or simple adhesive dressing following their procedure. Demographic data was comparable between the two groups (Table 1). Both primary closures and flaps were used, and there was no difference in closure length or flap size between the two groups. There were no postoperative complications requiring medical attention in either group. In all categories, patients had greater satisfaction with the simple adhesive dressing, but only increased ease of sleeping with the simple dressing reached statistical significance (Table 2). The estimated costs associated with the two dressings were comparable; however, the application time for the simple adhesive dressing was shorter.

Design: To characterize Mohs postoperative dressing practices, a survey was emailed to ACMS members. To assess the effectiveness of pressure and simple adhesive dressings following Mohs reconstruction, patients were randomized to receive either a pressure dressing, consisting of an emollient, petrolatum gauze, high absorbency sponge, and tape, or a simple adhesive dressing, consisting of an emollient, petrolatum gauze, and waterproof transparent dressing. At suture removal, participants completed a survey regarding postoperative complications (including bleeding, pain, swelling, erythema, drainage, or dehiscence), and rated the difficulty with sleeping, bathing, returning to normal activities, and overall happiness on a 1-5 scale (5 being greater satisfaction). Patients were excluded if they were anticoagulated or if they were referred elsewhere for closure.

Conclusion: The vast majority of ACMS members reported using pressure dressings. In our trial, there were no postoperative complications requiring medical attention with pressure or simple dressings. However, patients reported greater ease of sleeping with the simple adhesive dressing. Given greater satisfaction with simple dressings, no difference in complications or cost, and additional time needed to apply a pressure dressing, in the appropriate clinical setting, a simple adhesive dressing may be sufficient following Mohs reconstruction.

Demographics	Simple Dressing	Pressure Dressing	p-value
Gender			
Male	13	13	
Female	8	10	
Age	67 (55-74)	63 (60-71)	0.83
Closure Type			
Primary	15	19	
Flap	6	6	
Primary Closure (cm)	4.0 (3.0-4.5)	3.9 (3.0-4.6)	0.83
Flap Size (cm^2)	3.0 (1.6-5.2)	5.9 (3.9-14.3)	0.10

Table 1: Study Participant Demographics and Closure Types. T-test was used to compare the two groups. Medians and quartiles (25^{th} and 75^{th}) are reported.

Patient Satisfaction	Simple Dressing	Pressure Dressing	p-value
Ease of Sleeping	4.7±0.5	4.4±0.9	0.04*
Ease of Bathing	4.5±0.8	4.3±1.0	0.42
Ease of Activities	4.5±0.9	4.3±1.0	0.46
Overall Satisfaction	4.6±0.9	4.4±0.8	0.69

Table 2. Patient Satisfaction with Simple and Pressure Dressings: One-Way ANOVA was used to compare the two groups in all four categories. Means ± standard deviations are reported.

23

Presenter: Jesse Y. Howell, MD

Title: Mohs Micrographic Surgery in the Treatment of Rare Cutaneous Tumors

Authors: Jesse Y. Howell, MD[1]; Jonathan Wood[1]; Craig Wood[1]; Victor Marks, MD[1]; Lance Wood, MD[1]

Institution: 1. Geisinger Health Systems, Danville, PA

Purpose: Mohs micrographic surgery (MMS) offers high cure rates and maximum tissue preservation in the treatment of more common cutaneous malignancies, but its effectiveness in rare, aggressive tumors is less well defined. Our goal is to evaluate the effectiveness of MMS in the treatment of six rare aggressive cutaneous tumors as seen by Mohs surgeons working at a large referral center. To our knowledge this is one of the only known studies evaluating the effectiveness of MMS in the treatment of poorly differentiated squamous cell carcinoma. This study contributes to the body of literature supporting the efficacy of MMS in rare aggressive cutaneous tumors.

Summary: The mean numbers of cases identified per year for each tumor type were as follows: PDSCC, 16.50; DFSP, 3.00; MAC, 1.63; EMPD, 1.25; SEB CA, 3.38; and MCC, 0.50. For PDSCC, 121 cases were available for follow-up with a local recurrence rate of 5% at a mean follow-up time of 31 months. For DFSP, there were 18 cases with no local recurrence at a mean follow-up of 45 months. For MAC, there were 13 cases with a local recurrence rate of 8% at a mean follow-up of 40 months. For EMPD, there were 10 cases with a local recurrence rate of 10% at a mean follow-up of 31 months. For SEB CA, there were 24 cases with no local recurrence at a mean follow-up of 31 months. For MCC, there were 4 cases with a local recurrence rate of 25% at a mean follow-up of 16 months.

Design: Retrospective chart review of 28,000 cases treated with MMS at a single institution during an 8-year period with

the following diagnoses: poorly differentiated squamous cell carcinoma (PDSCC), dermatofibrosarcoma protuberans (DFSP), microcystic adnexal carcinoma (MAC), extramammary Paget's disease (EMPD), sebaceous carcinoma (SEB CA), and merkel cell carcinoma (MCC). Patient demographic data, tumor measurements, treatment characteristics, and marginal recurrence rates were compiled and evaluated.

Conclusion: Eight years of cumulative data on PDSCC, DFSP, MAC, EMPD and SEB CA, combined with other studies in the literature, support MMS as an effective therapy for these rare aggressive cutaneous malignancies.

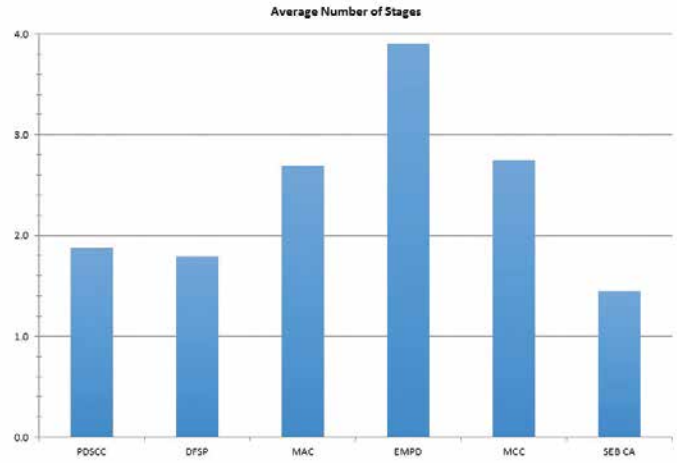


Figure 1. Mean number of stages.

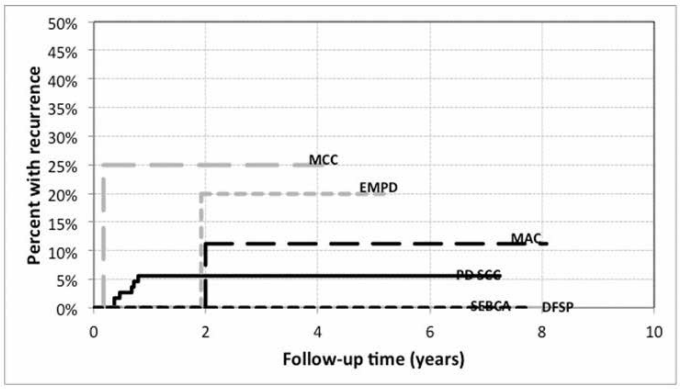


Figure 2. Kaplan-Meier curve for recurrence: overall recurrence

Characteristic	PDSCC			DFSP			MAC			EMPD			MCC			SEB CA		
Sample size (n)	132			24			13			10			4			27		
Age at surgery*	80	9	53-98	44	15	21-77	67	11	48-81	65	9	52-87	82	5	75-90	72	14	42-95
Sex, male†	99	75		10	42		4	31		7	70		3	75		15	56	
Size (cm^2)*																		
Lesion	3.4	4.0	0.2-25	7.7	7.6	0.16-30	3.0	3.4	0.36-12.15	47.7	66.2	1-225	2.0	0.7	1-3	1.3	1.7	0.09-6.25
Defect	9.8	11.8	0.9-81	30.2	25.8	2.25-100	13.0	18.4	0.8-63	222.7	285.8	4-875	8.4	3.5	4-12.25	3.1	3.3	0.3-16
Defect-Lesion	6.4	9.1	0.57-77	22.5	18.9	1.25-70	10.0	15.4	0.44-50.85	175.0	223.9	3-650	6.4	3.8	2.31-10.4	1.8	1.9	0.14-9.75
Primary, yes†	127	96		22	92		11	85		9	90		3	75		25	93	
Stages*	1.9	0.9079	1-6	1.8	0.58	1-3	2.7	1.682	1-7	3.9	2.4	1-9	2.8	1.5	1-5	1.4	0.7	1-3
Follow-up	31	25	1-87	45	30	7-101	40	26	10-97	31	23	1-63	16	19	2-49	31	22	6-93
Available†	121	92		18	75		13	100		10	100		4	100		24	89	
Marginal recurrence																		
Any†	6/121	4.9587		0/18	0		1/13	8		1/10	10		1/4	25		0/24	0	
Overall‡																		
1 year	6	(1-10)		0	(NA)		0	(NA)		0	(NA)		25	-67		0	(NA)	
3 year	6	(1-10)		0	(NA)		11	(0-32)		20	(0-55)		25	-67		0	(NA)	
5 year	6	(1-10)		0	(NA)		11	(0-32)		20	(0-55)		25	-67		0	(NA)	
Tumors recurrent at presentation																		
Any†	1/3	20		0/2	0		1/2	50%		0/1	0		0/1	0		0/2	0	

*Data are reported as mean (SD) [range].
†Data are reported as number (%).
‡Data are reported as percent (95% CI).

TABLE 1. Characteristics of Study Populations by Tumor Type

24

Presenter: Judah N. Greenberg, MD

Title: Outcomes of a Combination Melolabial Interpolation Flap and Local Tissue Flap for Large Nasal Defects: A Multicenter Series

Authors: Judah N. Greenberg, MD[1]; Kathryn Kreicher, BA[2]; Nicole M. Burkemper, MD[1]; Jeremy S. Bordeaux, MD, MPH[2]; Ian H. Maher, MD[1]

Institutions: 1. St. Louis University School of Medicine, St. Louis, MO 2. Case Western Reserve University School of Medicine, Cleveland, OH

Purpose: Large nasal defects, particularly those involving multiple cosmetic subunits, present a reconstructive challenge to the Mohs surgeon. The paramedian forehead flap (PMFF) has become the repair-of-choice for such defects. However, in certain cases the PMFF may not be the optimal reconstructive modality for such defects, due either to patient preference or other contraindications. The combination of a melolabial interpolation flap and a local tissue flap may serve as an alternative in such cases, but the outcomes of such a repair have not been systematically investigated.

Summary: 14 subjects (11 women, 3 men) who underwent the specified repair were identified. Their mean age was 70.9 ± 16.3 years. The mean time-to-follow-up was 19 ± 13 weeks. No post-operative complications were reported. The mean total "Patient" POSAS score was 9.1 ± 4.7, and the mean total "Observer" POSAS score was 10.9 ± 3.3 (best possible score = 6; worst possible score = 60). The mean "Patient" Overall Opinion score was 2.3 ± 2.6, and the mean "Observer" Overall Opinion score was 1.9 ± 0.9 (best possible score = 1; worst possible score = 10).

Design: A retrospective case series, comprising cases performed by 2 surgeons at 2 institutions, was undertaken to quantitatively evaluate the aesthetic outcomes of the specified repair. The outcome measure employed was the Patient and Observer Scar Assessment Scale (POSAS), a patient-centered, validated instrument which evaluates post-operative outcomes on the basis of 6 parameters, as well as an "Overall Opinion" score. Patients who underwent the specified repair were surveyed to evaluate their own perception of their outcome using the "Patient" component of the POSAS. A dermatologist rater evaluated clinical follow-up photographs of each patient using the "Observer" component of

the POSAS. Means and standard deviations were calculated for "Patient" and "Observer" POSAS scores.

Conclusion: The combination of a melolabial interpolation flap and a local tissue flap is a safe and effective repair, which yields a high rate of patient satisfaction with low morbidity and quality-of-life impairment. This repair provides favorable aesthetic outcomes, and may serve as a reasonable alternative to PMFF in appropriate cases.

25

Presenter: Daniel Winchester, MD

Title: Horizontal Primary Closure of the Forehead: Does it Cause Long-Term Eyebrow Asymmetry?

Authors: Daniel Winchester, MD[1]; Logan Skellye, MD[1]; Adam Wright, MD[1]; Michael Chang, MD[1]; Christian Baum, MD[1]; Jerry Brewer, MD[1]; Christopher Arpey, MD[1]; Clark Otley, MD[1]; Randall Roenigk, MD[1]

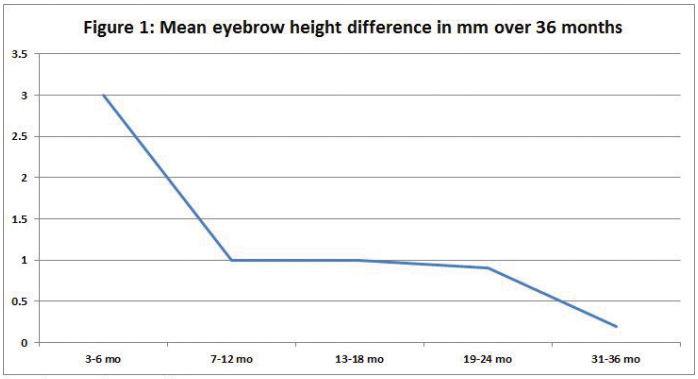
Institution: 1. Mayo Clinic, Rochester, MN

Purpose: Horizontal primary closure on the forehead is thought to cause excess and possibly long term upward tension on the eyebrow so is often avoided despite its inherent benefits of simplicity, lower tension, and ability to hide the scar in the horizontally running relaxed skin tension lines. This study aimed to measure the long term differences in eyebrow heights in patients with horizontal forehead closures.

Summary: Mean age of patients evaluated was 73.1 years (51-87 years). Mean pre-closure diameter of the defect was 1.5 cm (0.8 – 2.7 cm) and mean length of the primary closure was 4.4 cm (2.6 – 7.0 cm) (Table 1). Mean differences in eyebrow heights showed LC-LUE at 0.3 mm, MidP-MidUE at 0.7 mm, and MC-MUE at 0.04 mm. Compared to the control group, no statistical difference was noted. Mean differences in eyebrow height differed based on the amount of time after the closure before the measurement was made (Figure 1). In patients measured at 3-6 months after closure, the mean difference of the accumulated three height measurements was 3.0 mm but in patients measured after 31 months the difference was only 0.2 mm. Three patients (12%) noted numbness over their ipsilateral forehead. In two cases it completely resolved after 6 months, the other case was followed up within six months. In five patients (20%) a staff observer could note visible asymmetry. All of these had a mean difference of over 3.0 mm. Only three (12%) of these patients noticed a difference themselves. Three patients had visible asymmetry after 6 months (8,15, 17 months respectively) . Only one of these patients noticed a visible difference themselves (8 months post-op). No patient had a visible difference after 18 months (n=8).

Design: We retrospectively evaluated 25 patients who had laterally based horizontal primary forehead closures causing noticeable elevation of the eyebrow on the side of the forehead where Mohs surgery was performed and thus asymmetric when compared to the contralateral side. Surgery had to be performed between 3 months to 36 months prior. Patients had a one-time measurement of their lateral canthus to the lateral upper margin of the eyebrow (LC-LUE), mid-pupillary line to mid-upper eyebrow (MidP-MidUE), and medial canthus to medial-upper eyebrow (MC-MUE). Measurements were done on both eyebrows and the differences between the two were measured. 25 age and gender matched controls without previous surgery to the forehead also had their eyebrow heights measured. Any numbness, paresthesias, difficulty closing the eye or patients perception in eyebrow asymmetry was also noted.

Conclusion: While horizontal primary closures may initially cause eyebrow asymmetry (Figure 2), long term follow-up shows no significant difference in eyebrow heights with little chance for long term complications such as numbness or difficulty closing the ipsilateral eye.



Legend: mo- months, mm- millimeters

Figure 2: Follow-up in one patient with horizontal forehead closure

A. Pre-op with some baseline asymmetry B. Immediately Post op C. 3 months post-op D. 5 months post-op

Table 1: Follow-up of 25 patients with primary horizontal closure of the forehead

	Study group	Controls	T-test
Age (mean)	73.1 yrs	73.1 yrs	
Gender	17 M, 8 F	17 M, 8 F	
Pre-closure diameter (cm)	1.5	NA	
Post-closure length (cm)	4.4	NA	
Eyebrow asymmetry (mm)			
LC-LUE	0.30	0.40	-1.7 (-0.21-0.01)
MidP-MidUE	0.73	0.90	1.2 (-0.07-0.27)
MC-MUE	0.04	0.03	1.1 (-0.10-0.25)
Numbness	3 (12%)	NA	
Noticable difference (staff)	5 (20%)	3 (12%)	1.67 (0.44-6.21)
Noticable after 6 months (staff)	3 (16%)	3 (12%)	1.31 (0.30-5.81)
Noticable difference (patient)	3 (12%)	NA	

Legend: M- male, F- female, yrs- years, cm- centimeters, mm- millimeters

26

Presenter: Ashley M. Yu, BHSc

Title: Basal Cell Carcinoma of the Head and Neck: The Role of Anatomic Location in Clinically Undetectable Tumor Extension

Authors: Ashley M. Yu, BHSc[1]; Jillian Macdonald, MD, FRCPC[1]

Institution: 1. The Ottawa Hospital, Ottawa, ON, Canada

Purpose: The purpose of this study was to determine whether clinically undetectable tumor extension of basal cell carcinoma (BCC) on the head and neck varies by anatomic location.

Summary: BCC typically spreads through the 'path of least resistance' in that it is more likely to spread along perichondrium, periosteum, fascia, and embryonic fusion planes, rather than to invade cartilage, bone, or muscle. Given that the composition of fascia, cartilage, bone, and muscle varies with anatomic location, this suggests that tumor invasion must also vary by site. Surgical excision margins for BCC range from 3-15mm in the literature. There is little data to guide these margins as they relate to anatomic sites, and few studies have examined the relationship between anatomic location and clinically undetectable tumor extension.

Design: A retrospective analysis of 1,606 patients with BCC was conducted (Table 1). Clinically undetectable tumor extension was defined as the difference between pre-operative lesion area and final defect area during Mohs micrographic surgery (MMS). Statistical analysis was conducted using independent samples T-test and one-way ANOVA (with Bonferroni corrections). Further, linear regression was used to model the relationship between clinically undetectable tumor extension and age, sex, number of MMS levels, embryonic fusion plane status (alar groove, medial canthus, melonasal triangle, nasal angle, nasojugal fold, philtrum), and anatomic location (cheek, chin, ear, eyelids, forehead, lips, neck, nose, scalp).

Conclusion: When stratified by anatomic location (Table 2), a significant difference in pre-operative lesion area ($p<0.0001$), final defect area ($p<0.0001$), mean difference in lesion area ($p<0.0001$), and number of MMS levels ($p=0.005$) was observed. Mean difference in lesion area, or estimated clinically undetectable tumor extension, varied by anatomic site, ranging from 1.56cm^2 (95%CI 1.41-1.71) on the nose, to 6.66 cm^2 (95%CI 3.04-10.27) on the neck. The most significant tumor extension was observed on the neck, ear, forehead, scalp, and cheek, suggesting preferential lateral invasion in these locations. Mean difference in lesion area was significantly smaller ($p<0.0001$) for lesions on embryonic fusion planes 1.42 (95%CI 1.15-1.69) cm2 versus non-embryonic fusion planes 2.99 (95%CI 2.79-3.18) cm2 (Table 3). The linear regression model also showed that anatomic location was a statistically significant ($p<0.0001$) predictor of clinically undetectable tumor extension after correcting for the aforementioned covariates. These results indicate that lesions of the neck, ear, forehead, scalp, and check, may have true tumor margins that extend laterally much further than pre-operative clinical observations, and may necessitate more liberal surgical margins if MMS is unavailable. Further, these results may suggest that BCC of the nose, lips, eyelids, chin, and embryonic fusion planes spread laterally to a lesser degree. It is possible that they may preferentially invade in a vertical axis.

Table 1. Patient Characteristics

Characteristics	All Patients (N=1606)	Embryonic Fusion Plane	
		Yes (n=100)	No (n=1506)
Mean Age, years (SD)	67.5 (12.4)	64.54 (12.2)	67.67 (12.4)
Sex, n (%)			
Male	840 (52.3%)	48 (48.0%)	792 (52.6%)
Female	765 (47.7%)	52 (52.0%)	713 (47.3%)
Location, n (%)			
Cheek	270 (16.8%)	10 (10.0%)	260 (17.3%)
Chin	26 (1.6%)	0 (0.0%)	26 (1.7%)
Ear	137 (8.5%)	0 (0.0%)	137 (9.1%)
Eyelids	69 (4.3%)	21 (21.0%)	48 (3.2%)
Forehead	257 (16.0%)	0 (0.0%)	257 (17.1%)
Lips	76 (4.7%)	2 (2.0%)	74 (5.0%)
Neck	14 (0.9%)	0 (0.0%)	14 (1.0%)
Nose	706 (43.9%)	67 (67.0%)	639 (42.4%)
Scalp	51 (3.2%)	0 (0.0%)	51 (3.4%)
Mean Number of Levels, n (SD)	2.16 (0.72)	2.09 (0.68)	2.17 (0.72)

Table 2. BCC lesions stratified by anatomical location

		Mean pre-op lesion area (cm^2) (95% CI)	Mean post-op lesion area (cm^2) (95% CI)	Mean difference in lesion area (cm^2) (95% CI)	Mean number of levels (95% CI)
Anatomical Location	Nose (n=706)	1.16 (1.08-1.24)	2.72 (2.52-2.92)	1.56 (1.41-1.71)	2.19 (2.13-2.24)
	Lips (n=76)	1.10 (0.83-1.36)	2.85 (2.17-3.53)	1.75 (1.30-2.20)	2.07 (1.91-2.22)
	Eyelids (n=69)	1.49 (1.09-1.90)	4.00 (3.14-4.86)	2.50 (1.96-3.05)	2.16 (1.98-2.34)
	Chin (n=26)	1.61 (0.76-2.47)	4.03 (1.85-6.22)	2.41 (1.06-3.77)	1.88 (1.68-2.09)
	Cheek (n=270)	2.13 (1.85-2.41)	5.67 (5.03-6.30)	3.53 (3.10-3.97)	2.09 (2.00-2.17)
	Ear (n=137)	2.86 (2.47-3.25)	7.22 (6.10-8.33)	4.35 (3.43-5.27)	2.26 (2.13-2.38)
	Forehead (n=257)	3.27 (2.79-3.75)	7.97 (7.00-8.93)	4.70 (4.10-5.29)	2.14 (2.06-2.23)
	Scalp (n=51)	4.83 (3.46-6.21)	11.14 (8.52-13.77)	6.31 (4.83-7.79)	2.43 (2.20-2.67)
	Neck (n=14)	5.08 (2.16-7.99)	11.74 (5.32-18.16)	6.66 (3.04-10.27)	1.79 (1.54-2.03)
p-value*		<0.0001	<0.0001	<0.0001	0.003

CI: confidence interval
*one-way ANOVA

Table 3. BCC lesions stratified by embryonic fusion plane status

		Mean pre-op lesion area (cm^2) (95% CI)	Mean post-op lesion area (cm^2) (95% CI)	Mean difference in lesion area (cm^2) (95% CI)	Mean number of levels (95% CI)
Embryonic Fusion Plane	Yes (n=100)	0.88 (0.70-1.05)	2.30 (1.89-2.70)	1.42 (1.15-1.69)	2.09 (1.95-2.23)
	No (n=1506)	2.05 (1.92-2.18)	5.04 (4.74-5.33)	2.99 (2.79-3.18)	2.17 (2.13-2.20)
p-value‡		<0.0001	<0.0001	<0.0001	0.282

CI: confidence interval
‡independent samples T-test

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Presenter: Robert Eilers, MD

Title: A Retrospective Assessment of Post-Operative Complications in Patients on a Vast Array of Antithrombotic Medications Following Dermatologic Surgery

Authors: Robert Eilers, MD[1]; S. Brian Jiang, MD[1]

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

Purpose: A significant proportion of patients who undergo Dermatologic surgery for treatment of skin cancers have medical comorbidities that require treatment with antithrombotics. It has been reported that approximately 46% of cutaneous surgery patients are treated with at least one anticoagulant or anti platelet agent. Our retrospective study aims to analyze the incidence of post-operative complications in patients on a vast array of new antithrombotic agents, including Eliquis, Xarelto, and Pradaxa, following Dermatologic surgery. The incidence of post-operative complications in patients treated with traditional anticoagulants, including Aspirin 325mg, Coumadin, and Plavix, will also be analyzed. The findings from our study will allow dermatologic surgeons to provide appropriate counseling regarding these novel agents as well as to more accurately guide perioperative management of these medications.

Summary: A total of 152 patients taking anticoagulants (including Aspirin 325mg, Coumadin, Plavix, Eliquis, Xarelto, and Pradaxa) underwent 246 cutaneous surgeries. Nine (3.6%) of the 246 cutaneous surgical sites developed complications. Seven (78%) of the nine complications occurred in patients treated with traditional anticoagulants (four with Coumadin, two with Aspirin 325mg, and one with Plavix). Two (22%) of the nine complications occurred in patients treated with newer classes of anticoagulants (one with Eliquis, one with Xarelto). The only severe hemorrhagic complication occurred in a patient on Coumadin who experienced sustained post-operative bleeding following a large 54cm2 advancement flap on the face, which required evacuation and packing in the Emergency Department. The remainder of the complications included wound infections and minimal transient bleeding at the surgical sites.

Design: Retrospective chart analysis was performed for all patients who underwent Mohs micrographic surgery at a University while undergoing treatment with oral anticoagulation from July 1, 2014 through June 30, 2015.

Conclusion: In our retrospective review, new classes of anticoagulants failed to demonstrate a higher risk of complications following Dermatologic Surgery as compared to traditional anticoagulants. At this time, it is reasonable for Dermatologic surgeons to manage these newer classes of anticoagulants in a manner similar to that of traditional anticoagulants. A retrospective analysis of all patients who underwent Mohs micrographic surgery at the university from July 1, 2013 through June 30, 2015, including those not on anticoagulation, is currently underway. Larger, prospective studies are warranted to validate the findings presented above.

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Presenter: Adam Sperduto, MD

Title: Algorithmic Reconstruction of Facial Cosmetic Subunits: A Training Tool

Author: Adam Sperduto, MD[1]; Christopher Harmon, MD[1]

Institution: 1. Surgical Dermatology Group, Birmingham, AL

Purpose: To describe a training exercise for reconstruction of facial cosmetic subunits for fellows-in-training.

Summary: Functional and aesthetic repair of soft tissue defects of the face following Mohs micrographic surgery requires a scientific understanding of normal facial anatomy and physiology as well as an artistic ability to appreciate symmetry and manipulate complex three-dimensional shapes. When designing the repair of soft tissues defects of the face, surgeons often visualize each cosmetic subunit involved in the defect, and design a repair that recreates the desired shape, contour, and volume. Designing the repair of a soft tissue defect of the face may become easier for the experienced reconstructive surgeon, who has likely repaired hundreds or thousands of similar defects, however, for the inexperienced surgeon or fellow-in-training, it is often a challenge. As an educational tool for fellows-in-training, we have created an algorithmic approach to repair of facial cosmetic subunits. During this exercise, the fellow-in-training designs repairs for small (< 1cm), medium (1-3 cm), and large (>3cm) defects for each of the major cosmetic subunits of the face, including: nasal tip, nasal ala, nasal dorsum, nasal sidewall, medial and lateral canthi, superior and inferior eyelids, brow, forehead, temple, medial cheek, lateral cheek, preauricular cheek, helical rim, anterior pinna, posterior pinna, superior cutaneous and vermillion lip, inferior cutaneous and vermillion lip, chin. This exercise is performed on paper, and requires the fellow to visualize each defect and repair. As a secondary exercise, for each major type of repair designed, the fellow lists the steps required to perform the reconstruction. Ideally, factors such as texture, color, and quality of the skin as well as depth of the proposed defect are considered for each reconstructive design. It is also important to design all reconstructive options that may be appropriate for a given defect.

Design: Description of a training excercise currently practiced for fellows-in-training at one ACMS/ACGME approved fellowship program.

Conclusion: By performing these exercises, committing ideas to paper, and reviewing the repairs and their limitations with an experienced mentor, the fellow gains valuable insight and understanding of many approaches to reconstruction. This exercise, of course, does not address many variables that affect the choice of reconstructive options for a given patient such as performance status, comorbidities, and aesthetic demands. This exercise is in no way meant to replace a high-volume of hands on reconstruction guided by an experienced mentor. However, if performed with diligence, we feel it is a useful tool for the fellow-in-training.

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Presenter: Jonathan Kanevsky, MD

Title: True Margin: A Novel Approach to Tissue Embedding

Authors: Jonathan Kanevsky, MD[1]; Tyler Safran[1]; Kurt Hemmings[1]; Manish Khanna, MD[1]

Institution: 1. McGill University Health Center, Montréal, QC, Canada

Purpose: The purpose of the present study examines a novel embedding device designed to address variability in tissue embedding, tissue waste, and false positives from excessive trimming.

Summary: Effective treatment by Mohs micrographic surgery (MMS) requires preparation of high quality slides. Slide quality depends on proper embedding of tissue. Although many methods of tissue embedding and slide preparation exist, there is no gold standard which results in variability in slide quality. Therefore, a standardized, evidence based approach to embedding tissue can minimize false positives and improve the efficiency of Mohs surgery.

Design: A novel tissue embedding device was designed to account for angular errors and unparallel tissue embedding that arise during the process of tissue embedding and cryostat manipulation. To assess the efficacy of the device, the authors recorded the number of Mohs surgeries performed daily and the number of stages per procedure, over the course of four years (2012-2015). The number of patients and layers processed before and after the use of the device was noted. SPSS was used to determine any statistical significance in the effect of the device on number of patients or layers processed per day.

Conclusion: From 2012 until June 10, 2014, the average number of stages per case is 1.65 (n = 3680). From June 10, 2014 until October 2nd, 2015, with the introduction of the embedding device, the average number of stages per case is 1.58 (n = 2562) (p=0.02). From 2012 until June 10, 2014, the average number of surgeries per day is 6.34 (n = 640). From June 10th, 2014 until October 2nd, 2015, with the introduction of the embedding device, the average number of surgeries per day is 7.05 (n= 358) ($p < 0.001$). Results from the novel embedding device demonstrate a significant increase the number of cases per day and decrease in the average number of stages per case at a single hospital setting. Overall, embedding tissue using the device results in less tissue wasted during trimming when compared to alternative processing techniques found in the existing literature.

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Presenter: Kate L. Montgomery, PhD

Title: MMS Practice-Specific Evaluation of the Affordability and Impact on Patient Care of Novel in vivo Imaging Systems

Authors: Kate L. Montgomery, PhD[1]; Gabriel Sanchez, PhD[1]; Fred Landavazo, IV, MS[1]

Institution: 1. Zebra Medical Technologies, Mountain View, CA

Purpose: Recent advances in in vivo, non-invasive imaging may dramatically improve the time- and cost-efficiency of Mohs micrographic surgery (MMS) by providing more accurate margin estimations before an incision is made. These imaging advances may also improve the predictability of schedules and decrease patient wait time. Assessing the impact a new system may have on a MMS practice is complicated by many factors, including current patient throughput, current complexity of MMS cases, upfront costs of purchasing a new system, and the potential for improved competitiveness.

Summary: Here we present a computational simulation that is customizable to individual MMS surgeons and their practices to estimate the standard-of-care improvement and financial impact of the adoption of new in vivo imaging technology.

Design: We calculated the affordability of a new system based on the system's effectiveness in reducing case complexity, the fixed and recurrent costs of the system, and factors specific to each MMS practice, including patient throughput, time spent evaluating each patient, and current stage percentages. We also calculated the impact new technology would have on patient care, including the predictability of the schedule, typical patient wait time, and cost per patient in the event of incomplete insurance coverage.

Conclusion: We found that the affordability of new imaging systems increased as either typical case complexity or patient throughput increased, and that affordability decreased as the new technology increased time spent evaluating each patient. Additionally, we found the introduction of new technology improved schedule predictability, decreased patient wait time, and decreased cost per patient as a function of the effectiveness of the technology to reduce the number of stages. Overall, new non-invasive imaging technology may substantially improve the efficiency of MMS, but its affordability and ultimate impact on patient care will be dictated by practice-specific factors as well as the effectiveness of the device to reduce the average number of MMS stages per patient.

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Presenter: Stephanie Mlacker, BS

Title: Does Surgical Removal Improve Quality of Life in Nonmelanoma Skin Cancer Patients? A Prospective Study

Authors: Stephanie Mlacker, BS[1]; Adam S. Aldahan, BS[1]; Vidhi V. Shah, BA[1]; Daniel Fatemi, BS[1]; Daniel J. Baldor BS[1]; Sahal Samarkandy, MD[1]; Keyvan Nouri, MD[1]

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

Purpose: Scars may negatively impact a person's physical appearance, which can lead to psychological distress, behavioral problems, and decreased quality of life. This study aims to determine whether scar formation has a positive, negative, or neutral impact on quality of life in the setting of preexisting nonmelanoma skin cancer.

Summary: 118 patients (mean age of 66.96 years old, standard deviation of 14.39) have completed the first survey, 29.6% (35/118) of which are women and 66.9% (79/118) of which are men, with all patients achieving a DLQI score in the range of 1 to 2. These responses suggest that basal cell carcinoma and squamous cell carcinoma at our clinic carry minimal to no impact on the patient's quality of life, regardless of the lesion's location. 50 patients have been phone-called 3 months following their Mohs surgery. 78% (39/50) of patients have responded, all of which achieve a DLQI score of 0 to 1, indicating that the resulting scar carries no impact on their quality of life. The remaining patients will be called in the next 2 months and statistical analysis, relating to demographic information, medical comorbidities, history of skin cancer, history of Mohs surgery, history of scars, subsequent skin cancers, location and number of skin cancer lesions undergoing removal, pre-op/post-op lesion size, and DLQI scores will be performed.

Design: Before undergoing Mohs surgery, patients at our clinic will be asked to complete the Dermatology Life Quality Index (DLQI). This survey will be given again to patients 3 months following their surgical removal, either in the office or via telephone. The second survey will be used to assess whether the patient's scar—resulting from the Mohs surgery—impacts his or her quality of life.

Conclusion: Quality of life measures are becoming increasingly important to determine patient-reported outcomes in Dermatology, supplementing traditional measures of disease response to treatment. As the most common malignancy in the US, nonmelanoma skin cancer continues to affect millions of people, while increasing in incidence. Therefore, the widespread occurrence of nonmelanoma skin cancer, along with the resulting scar formation after Mohs surgery, highlights the importance of determining quality of life in the treatment of nonmelanoma skin cancer.

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Presenter: Su Luo, MD

Title: Purse-String Closure After Lower Extremity Dermatologic Procedures May Contribute to Postoperative Infection Risk

Authors: Su Luo, MD[1]; Suzanne M. Olbricht, MD[1,2]

Institutions: 1. Lahey Hospital and Medical Center, Burlington, MA 2. Harvard Medical School, Boston, MA

Purpose: The lower extremities are known to have a higher incidence of infection compared to other sites on the body after dermatologic surgery. However, few studies have examined what factors contribute to this increase. To address this limitation, we sought to examine what parameters contribute to lower extremity infection within our institution.

Summary: There were a total of 332 cases, of which 290 were excisions and 42 were Mohs micrographic surgery cases. As expected, there was a female predominance (61%) and most of the sites were located on the lower leg (71%). There were 21 culture proven infections, resulting in an overall infection rate of 6.3% Four additional cases were documented as clinically suspicious for infection but had no culture or a negative culture. Three of the 21 patients with infection had one or two other sites concomitantly excised on the ipsilateral leg. The predominant organism demonstrated on culture was staphylococcus aureus, contained in 16 out of 21 cases; two of these were MRSA. Preliminary analyses seem to suggest that a specific type of repair, the complete or partial purse-string closure, had a significant relationship with the incidence of infection. 10 of the infected cases (47%) had been repaired with a purse-string while only 7.5% of all cases utilized this repair. Surprisingly, advanced age, location of the tumor, defect size (in area and maximal diameter), type of suture used, and duration of surgery did not appear to be significantly related to infection in our cohort and neither, reassuringly, did participation by a resident or fellow in the case. Lastly, we suspected that use of a calamine and zinc oxide impregnated gauze wrap (Unna boot) would reduce infection rates, but we only had 21 of these cases in this study and could demonstrate a significant protective effect.

Design: This is a single-center retrospective study of all lower extremity excision and Mohs micrographic surgery cases performed within our clinic's Department of Dermatology over a 15-month period. Sites included were the lower leg, thigh, genitals, ankle, foot and toe. To assess what factors influenced the rate of infection, we built a logistic regression model relating each patient's infection status to demographic and procedural parameters.

Conclusion: While a purse-string closure is a good option to consider in reducing the area and ultimately time to heal lower extremity wounds, our study seems to suggest a greater proportion of these cases are being complicated by infection. One putative explanation is that a purse-string closure without excised dog-ears leads to greater tension and potential pressure necrosis in an area of already compromised blood supply. In our future direction, we hope to collect a larger cohort of patients to make these observations more robust.

Poster Presentation Summaries

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Presenter: Sean E. Mazloom, MD

Title: The Utility of Dehydrated Human Amnion/ Chorion Membrane Allograft in Lower Extremity Mohs Defects Healing by Secondary Intention: A Case Series

Authors: Sean E. Mazloom, MD[1]; Jonathan R. Hottman, BS[2]; Alex C. Holliday, MD[1]; Garrett Coman, MD[1]; Rahul Chavan, MD, PhD[1]; Michael Kolodney, MD, PhD[1]; Mariana Phillips, MD[1]

Institutions: 1. Virginia Tech Carilion Clinic, Roanoke, VA
2. Virginia Tech School of Medicine, Roanoke, VA

Purpose: The purpose of this study is to detail our experience using dehydrated human amnion/chorion membrane allograft to promote healing of lower extremity Mohs defects left to heal by secondary intention.

Summary: Lower extremity defects often present challenges to the Mohs surgeon due the relative inelasticity of the skin, poor circulation, and higher rate of infection. Here we report our experience using dehydrated human amnion/chorion membrane allograft (DHACM) in lower extremity Mohs surgery defects healing by secondary intention. DHACM is derived from the human placenta and consists of dehydrated, sterilized amniotic membrane. The tissue is composed of both amnion and chorion layers and contains numerous growth factors and cytokines. Multiple randomized controlled studies have shown statistically significant improvement in the healing of diabetic and venous foot ulcers with the use of DHACM as compared to standard therapy (1-5). To our knowledge, there have been four other case reports detailing the use of DHACM in Mohs defects, however, none were located on the lower extremity (6, 7). In this retrospective chart review from an academic Mohs practice, we identified a total of 6 lower extremity defects in 5 patients where DHACM was applied to augment secondary intention healing (summarized in table 1 and 2). In all patients, the dressing was applied on the same day as tumor eradication. All patients received a compression wrap (from toes to knees) and were placed on prophylactic antibiotics for one week. Four of the five patients were female. Age ranged from 55-77 years old (mean=68, median=69). Four (67%) of the tumors removed were SCCs and the remaining were BCCs. Post-Mohs defect size ranged from 2.2-3.7 cm (mean=3.05, and median=3.1cm) and 5 (83%). Five of six defects required only one application of DHACM allograft (mean=1.2). Time to full granulation ranged from 2 to 3 weeks (mean=2.8 and median=3 weeks). No complications or adverse events were noted and very little inflammation of the wound bed was present during follow up visits. All patients reported minimal to no pain postoperatively. Data on time to full reepithelialization will be available at the time of poster presentation.

Design: Retrospective case series and review of literature.

Conclusion: In summary, we describe the use of DHACM in Mohs defects healing by secondary intention on the lower extremity. To our knowledge this is the largest case series detailing the utility of DHACM in Mohs defects.

Table 1. Patients Characteristics

Patient (Case)	Age (years)	Sex	Skin cancer	Location	Comorbidities	Smoker (Y/N)
1	64	Female	BCC	Left anterior leg	Hypertension (HTN), Hyperlipidemia (HL)	N
2	55	Female	SCC	Left lateral shin (left medial calf)	HTN	N
3	75	Female	SCC	Right medial supramalleolar	HTN, HL, Atrial fibrillation	N
4	69	Male	BCC	Right distal anterior leg	None	N
5	77	Female	1) SCC	Left distal medial leg	PVD, HL, lung Cancer	Y (1PPD)
			2) SCC	Left anterior thigh		

Table 2. Wounds Characteristics

Patient (case)	Defect Size(cm)	Total # of EpiFix Used	100% Granulation (week)	Pain Level (0-10*)	Any Adverse effect?
1	2.2 x 2.2	2	3	0-1	None
2	3.0 x 1.5	1	3	0-1	None
3	3.7 x 3.1	1	2	0-1	None
4	3.2 x 3.0	1	3	0-1	None
5	1) 3.3x3.5	1	3	0-1	None
	2) 2.7x2.7	1	3	0-1	None

* 0 would mean having no pain and 10 would be the worst pain ever experienced by patient.
** Total defect size was 2.7 x 2.0; however, the nasal portion covered with DHACM allograft was 1.0x0.8cm.

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Presenter: Matthew LeBoeuf, MD, PhD

Title: Treatment of Squamous Cell Carcinoma of the Nail Unit with Mohs Micrographic Surgery

Authors: Matthew LeBoeuf, MD, PhD[1]; Joseph Sobanko, MD[1]; Christopher Miller, MD[1]

Institution: 1. University of Pennsylvania, Philadelphia, PA

Purpose: Reported recurrence rates after Mohs surgery for nail unit squamous cell carcinoma (SCC) are higher than cutaneous SCC in other locations. We aimed to study the patient demographics, tumor characteristics, and surgical outcomes of patients undergoing Mohs micrographic surgery for nail unit SCC and SCCIS.

Summary: Mohs micrographic surgery (MMS) was performed on 32 cases of SCC and 27 cases of SCCIS. A disproportionate number (52.5%) of cases occurred in patients known to be immunocompromised (Table 1). Younger age of onset and polydactylous disease were more common in immunocompromised patients. There were no differences in invasion level or number of Mohs stages required to achieve clear margins between immunocompetent and compromised patients (Table 2). There were no differences in number of Mohs stages to achieve clear margins for invasive SCC versus SCCIS (Table 2). The local recurrence rate was 1.7% (1/59) with an average follow-up time of 50.6 months. The single recurrence was an invasive SCC in a patient with multiple myeloma. No cases of metastases were identified in this cohort of patients during the study or follow-up period.

Design: We performed a retrospective chart review with prospective follow-up of patients with SCC or SCCIS of the nail unit treated with MMS at a single institution between 2005 and 2015. Exclusion criteria included the following: age less than 18 years, inability to provide consent, inability to obtain in office or telephone follow-up. Immunocompromised patients were defined as those with: solid organ transplants, Human Immunodeficiency Virus, or multiple myeloma.

Conclusion: This study represents the largest series of cases of nail unit SCC and SCCIS treated with MMS. The recurrence rate of 1.7% (1/59) with an average follow-up time of 50.6 months indicates the utility of MMS to treat squamous cell carcinoma of the nail unit regardless of invasion level or patient immune status.

Table 1. Patient medical and demographic characteristics

Demographic Variables	N (cases)
Gender	
Male	44 (74.6%)
Female	15 (25.4%)
Age	
< 40	2 (3.4%)
40-60	30 (49.2%)
60-80	25 (42.4%)
> 80	3 (5.1%)
Tumor Type	
SCC	34 (56.7%)
SCCIS	26 (43.3%)
Immune Status	
Immunocompetent	29 (48%)
Immunocompromised	31 (52%)
Organ Transplant	11 (18.6%)
HIV	17 (28.8%)
Multiple Myeloma	3 (5.1%)
Ethnicity	
Caucasian	38 (63.3%)
African American	11 (18.3%)
Asian	2 (10.4%)
Hispanic	1 (1.7%)
Middle Eastern	2 (3.4%)
Unknown	6 (10.1%)
Digit	
1st Finger	19 (31.7%)
2nd Finger	9 (15.0%)
3rd Finger	14 (23.3%)
4th Finger	11 (18.3%)
5th Finger	2 (3.3%)
Toe	5 (8.3%)
Total	59 (100.0%)

Table 2: Tumor characteristics and surgical parameters

	Immunocompetent	Immunocompromised	p-value
Recurrence after MMS #	0 (0%)	1 (3.2%)	N/A
Invasion Level			
SCCIS	1	1	N/A
SCC	2.24	2.33	0.36
Stages Required to Clear			
SCCIS	1.90	1.75	0.28
SCC	1.88	1.6	0.12
Predicted Tumor Size (cm^2)			
SCCIS	2.45	2.12	0.39
SCC	2.58	3.73	0.23
Final Defect Size (cm^2)			
SCCIS	4.55	4.02	0.34
SCC	4.66	5.44	0.33
Difference in Predicted Size and Final Defect Size (cm^2)			
SCCIS	2.11	1.9	0.36
SCC	2.07	1.72	0.28
Presence of Bony Invasion			
Yes	4	2	N/A
No	24	29	N/A
Amputation			
For treatment	4	2	N/A
For repair	2	3	N/A
Recurrent Lesion			
SCC	0	1	N/A
SCCIS	0	0	N/A

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Presenter: Cory Trickett, DO

Title: A Comparison of the Duration of Intradermal 1% Lidocaine with Epinephrine 1:100,000 and 1:1 Mixture of 1% Lidocaine with 1:100,000 Epinephrine and 0.5% Bupivacaine

Authors: Cory Trickett, DO[1]; David Kent, MD[1]

Institution: 1. Dermatologic Surgery Specialists, Macon, GA

Purpose: The purpose of this study is to compare the duration of anesthesia between 1% lidocaine with epinephrine to a 1:1 mixture of 1% lidocaine with epinephrine and 0.5% bupivacaine plain. Review of the dermatologic literature did not turn up any prior comparison.

Summary: Onset of anesthesia was immediate for both anesthetics. The mean duration of 1% lidocaine with 1:100,000 epinephrine was 219 minutes, the 1:1 mixture of 1% lidocaine with epinephrine 1:100,000 and 0.5% bupivacaine 293 minutes, with the mean difference of duration 74 minutes ($p<0.00001$).

Design: 18 healthy adult volunteers received 0.2cc postauricular intradermal injections of 1% lidocaine with epinephrine 1:100,000 on the left and 1:1 mixture of 1% lidocaine with epinephrine 1:100,000 and 0.5% bupivacaine on the right. Anesthetic quality was assessed with needle prick compared to nearby, non-anesthetized skin immediately after injection, at 1 hour, and then every 15 minutes. The testing was terminated upon the subject feeling sharp/pain sensation in the anesthetized area and time recorded.

Conclusion: Using a 1:1 mix of 1% lidocaine with epinephrine and 0.5% bupivacaine provides the benefit of both rapid onset of action and longer duration of anesthesia. A longer duration of anesthesia has several obvious advantages for both patient and physician during Mohs surgery.

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Presenter: Sarah Arron, MD, PhD

Title: Neoadjuvant Use of Vismodegib Prior to Excision by Mohs Micrographic Surgery in Patients with Basal Cell Carcinoma

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Purpose: Mohs micrographic surgery (MMS) is the definitive treatment for complex basal cell carcinoma (BCC). Hedgehog pathway inhibitor treatment has been shown to reduce tumor size in locally advanced BCC. It is unclear whether islands of noncontiguous residual tumor (skip areas) remain following treatment. This study investigated tumor contiguity following neoadjuvant treatment with vismodegib to reduce surgical defect size in patients with BCC (Clinicaltrials.gov identifier, NCT01898598).

Summary: Eighteen patients were randomized to vismodegib (n = 12) or placebo (n = 6). The intention-to-treat population (randomized patients who received ≥1 dose of study treatment) comprised 11 patients given vismodegib and 5 patients given placebo. Baseline median target lesion areas were 126.1 mm2 and 94.0 mm2 for vismodegib and placebo recipients, respectively. MMS was performed in 9/11 (82%) vismodegib and 5/5 (100%) placebo recipients. At MMS visit, median percent reduction from baseline in expected surgical defect area was 37.04% and 43.76% in vismodegib and placebo recipients, respectively (not significant). Numerous discrepancies were noted in measurement of defect areas, which may have contributed to lack of difference between arms. Lack of clear protocol instructions regarding defect area measurement was identified as a contributing factor to these findings. Composite punch biopsy/first Mohs stage revealed residual tumor in 3/9 (33%) vismodegib recipients and 4/5 (80%) placebo recipients. On histologic examination of the expected surgical defect (defined pretreatment), skip areas were present in 0/11 vismodegib patients and 2/5 (40%) placebo patients. Treatment-emergent AEs (TEAEs) were reported in 9/11 (81.8%) vismodegib patients and 2/5 (40%) placebo patients. The most common AEs with vismodegib were muscle spasms (55%), dysgeusia (36%), alopecia (27%), and diarrhea (27%). All but one grade 1 AE of dysgeusia resolved within 12 weeks after MMS.

Design: Eligible patients had a single, untreated, biopsy-confirmed target BCC suitable for MMS. Patients were randomized 2:1 to oral vismodegib 150 mg/day or placebo for 12 weeks, followed by MMS within 2 weeks of last dose. Primary outcome was percent change in expected surgical defect area (tumor area plus 2-mm margin). Secondary outcomes included actual change in expected surgical defect area, percent change in actual tumor-free margin excision area, clinical response rate, presence of skip areas, safety, and adverse event (AE) resolution.

Conclusion: This pilot study's TEAEs demonstrated the feasibility of investigating vismodegib in patients with larger, more complex tumors that may benefit from neoadjuvant treatment before MMS. A key secondary finding is that there was no evidence that vismodegib resulted in noncontiguous tumor shrinkage. This study also highlighted the need for clear instructions and independent assessment for reliable measurement of tumor areas which may have implications for design of future neoadjuvant trials.

Poster Presentation Summaries

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Presenter: Thomas J. Knackstedt, MD

Title: Birhombic Transposition Flaps for Repairs of Surgical Defects of the Nasal Dorsum

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Purpose: Nasal dorsum defects are frequently encountered yet present specific challenges for the reconstructive surgeon. Viable reconstructive options include second intention healing, complex linear closures, full thickness skin grafts but all have inherent limitations. Larger defects may require local tissue flaps including advancement flaps (traditional or based on a nasalis sling), rotation flaps such as the anchor, Peng, or dorsal nasal flaps, or transposition flaps such as the bilobed or rhombic transposition flap. When the defect size precludes the use of a single rhombic flap, two laterally based rhombic flaps designed as mirror images on opposing defect sides can be utilized for successful reconstruction (Figure 1). This technique is distinct from the previously reported anchor and Peng flaps, and is a variant of a single 2003 case report. We report our technique and experience with birhombic transposition flaps for the reconstruction of nasal dorsum surgical defects and survey patient scar assessment.

Summary: Six patients, two men and four women, average age 76 years (range 49-91 years) underwent birhombic flap repair. All except one tumor were basal cell carcinoma, cleared after an average of 2 Mohs stages (range 1-3). Defect sizes averaged 2.5 cm^2 (range 1.95-3.42 cm^2) and flap sizes averaged 12.25 cm^2 (range 10.5-15 cm^2); five flaps were designed with superior standing cones and one flap with an inferior standing cone. Two patients had postoperative scar line revision, one with pulsed dye laser and the other with dermabrasion. There were no complications. The patient portion of the Patient and Observer Scar Assessment scale (POSAS) was completed an average of 26 months (range 15-38 months) after surgery. The average response to individual questions was 2.3 points (SD 0.9). The total average scar score was 12.2 points (SD 5.9) out of a possible maximum 70 points, where higher scores imply worse patient scar evaluation (Figure 2).

Design: A retrospective review of patients undergoing Mohs micrographic surgery with subsequent birhombic transposition flap repair between 11/2012 and 11/2015 was performed. Demographics, clinical and histologic features, treatment and reconstruction details were extracted. Detailed photographs demonstrating the execution and utility, as well as long term results with this reconstruction were reviewed. Patients were invited to complete the patient portion of the Patient and Observer Scar Assessment scale (POSAS), assessing symptoms and appearance in 7 parameters on a scale of 1-10 (Figure 2)

Conclusion: The birhombic transposition flap is a versatile one-stage reconstructive procedure for cutaneous defects up to 2 cm on the midline or paramedian nasal dorsum, and can be performed with high patient satisfaction.

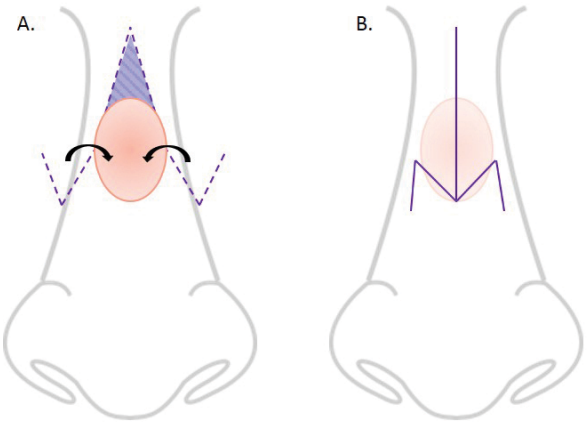

Figure 1. Birhombic transposition flap design and execution. (A) The shared superior standing cone (shaded area) is excised. The flap is elevated along the inferior purple markings and transposed as indicated by the black arrows. (B) Final suture line of the birhombic transposition flap.

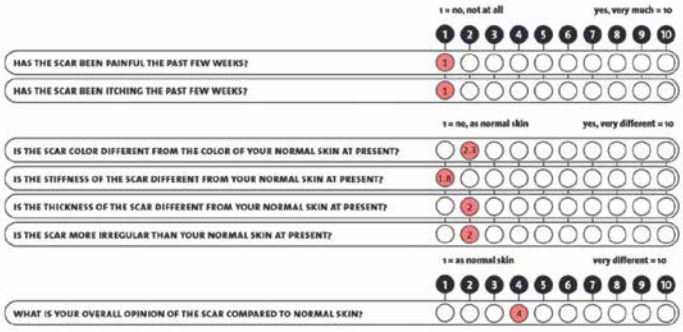

Figure 2. Patient and Observed Scar Assessment Scale (POSAS) Patient scale v2.0. Mean patient response values shaded in red.

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Presenter: Manish Khanna, MD

Title: Minimizing Tissue Wastage in Mohs Micrographic Surgery Frozen Section Processing Using a Novel Embedding Device

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Purpose: The cornerstone of Mohs micrographic surgery (MMS) is obtaining high cure rates while sparing tissue. Precise handling of tissue during the embedding process is crucial for the latter. There is a paucity of published data on specific techniques utilized to quantify the amount of tissue sacrificed during processing. Studies that exist report a range of 187 to 900 microns of trimming to obtain the "entire margin". The problem is that what constitutes the "entire margin" is poorly defined in each study. The study which reports the most success reports an average of 187 microns of depth required to cut into the block to obtain a "complete section". However further review of the study demonstrates that this represents a full face section as viewed by the technician unstained, after which further sections must be obtained in order to visualize the true microscopic margin. Other studies report the thickness of tissue cut in order to obtain 95% of the margin as a complete section. In our study we refer to the surgeon viewing 100% of the microscopic margin

as the complete section. The present study examines a novel embedding device designed to facilitate reproducible tissue embedding, thereby decreasing tissue waste and false positives.

Summary: An average of 18 microns of cutting was required for visualizing the full face of the block, 131 and 182 microns of cutting were required in order to microscopically visualize between 95 and 100% of the peripheral and deep margins respectively. The diameter of the whole mounted tissue in the block ranged from 7 to 32 mm with an average of 16.57 mm.

Design: Fifty consecutive cases of MMS were cut with the new embedding device. The number of microns required to obtain the full block face, 95% and a 100% complete section were recorded after visualizing consecutive sections of the cut tissue block. All the tissue was prepared with the previously described glass slide method. However, a novel mechanical device was used to precisely align the tissue block with the microtome blade, which eliminated the need for manual alignment. It is this automation which allows consistent block alignment thereby minimizing tissue wastage.

Conclusion: This prospective study utilizing a novel embedding device is the first that we know of that determines an average depth of trimming required in which a complete section is observed microscopically with very minimal tissue loss. These complete sections are very close to the true margin of the surgical resection. By minimizing tissue sacrifice during the cutting process, we believe this reduces false positives.

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