

anatomic location. Histologically, prognostic parameters and solar elastosis grade for PM were recorded. In MM multiple parameters including the site of metastasis, necrosis magnitude and degree of pigmentation were observed. Cumulative 21-year averages of UVR for LB (110 kJ/m²/yr) and PK (128 kJ/m²/yr) were derived from the National Center for Atmospheric Research databases.

Results: The overall BRAF mutation rate was 27.3% in PM and 56.9% in MM. V600E was the predominant mutation in 88% of PM and 92% of MM. A 3/9 (33.3%) discordant mutation rate was identified, 2 patients lost the mutation in the metastasis and 1 gained it. The relative incidence of BRAF mutation with UVR exposure was reversed for primary [PM (Low vs. High UVR): 5.4% vs. 43%] compared to metastatic [MM: 57% vs. 22%] melanomas ($p < 0.05$). Predictors of BRAF mutation were trunk location and epithelioid cytology for PM versus subcutaneous metastasis and decreased pigmentation for MM ($p < 0.05$). In PK, BRAF positivity was significantly more encountered in the absence of ulceration in PM and with decreased necrosis in MM. The other examined parameters did not affect the BMS in both PM and MM, irrespective of region. BRAF positive status in PM was reasonably predicted by multivariate binary logistic regression [C-statistic (95% confidence interval (C.I.) = 0.67 (0.53-0.81) with two independent predictors 1) High UVR [odds ratio (OR) (95% C.I.) = 14.947 (3.086-72.400); $P = 0.001$] and 2) Trunk location OR (95% C.I.) = 3.646 (1.057-12.579); $P = 0.041$]. In MM, only high UVR [OR (95% C.I.) = 0.208 (0.063-0.0689); $P = 0.010$] predicted BRAF mutation.

Conclusions: BMS in regions with different UVR exposures is reversed for PM as compared to MM. In view of newly invested targeted therapy, discordance in the BMS between PM and MM highlights the need for routine BRAF testing on both sites prior to treatment.

561 Perianal Verrucous Porokeratosis, a Rare Lesion Mimicking Inflammatory and Neoplastic Conditions

RM Ziegler, K Darabi, JS Roy, CS Embi, SB Peters. The Ohio State University Medical Center, Columbus, OH.

Background: Porokeratosis (PK) represents a heterogeneous group of lesions with disordered keratinization with a distinctive ridge-like border. The key histologic feature of PK is the cornoid lamella with a column of parakeratotic cells overlying epidermis with a decreased to absent granular layer and dyskeratotic cells in the stratum spinosum. A verrucous variant of PK involving the gluteal cleft has recently been described.

Design: To assess the frequency of perianal verrucous PK, we retrospectively searched our institutional pathology database from 2001-2011 for perianal skin lesions with one of the following diagnostic/microscopic terms, "porokeratosis", "hyperkeratosis", "cornoid lamella", "columnar parakeratosis", "atypical squamous proliferation", "verrucous" and "benign keratosis". Carcinomas, intraepithelial neoplastic lesions, melanocytic nevi, ulcers/abscesses/fistula tracts, and spongiotic dermatitides were excluded. Eighty-seven cases were available for review. The pre-biopsy clinical impression for each case was also collected.

Results: Of the 87 cases reviewed, four cases were identified as diagnostic of verrucous PK, and no misdiagnoses were found. The patients ranged in age from 50 to 75 (mean: 60; median: 58) and included 2 males and 2 females. The clinical impressions included inflamed seborrheic keratoses, malignant neoplasms, condyloma acuminata and inflammatory skin conditions, such as psoriasis, papular eczema, and lichen simplex chronicus. Histologically the four biopsies showed hyperkeratosis and acanthosis with cornoid lamellae overlying dyskeratotic cells, a decreased to absent granular layer and irregular papillomatosis. The remaining 83 patients ranged in age from 9 to 93 (mean: 44; median: 45) and included 47 males and 36 females. The diagnoses included 5 (6%) psoriasis, 25 (30%) viral-associated keratoses and 53 (65%) variants of benign keratoses.

Conclusions: Gluteal verrucous PK is an uncommon variant of PK. In order to avoid a misdiagnosis, dermatologists and dermatopathologists must consider PK in the differential diagnosis of persistent verrucous, psoriasiform or lichenified perianal/gluteal plaques.

Education

562 The Frozen Section: Practicum Using Video Tutorial and Mock Specimens

N Aardtsma, R Emmadi, E Wiley. University of Illinois at Chicago, Chicago, IL.

Background: Frozen section diagnosis for first year pathology Residents can be a daunting task because there is unfamiliarity with the equipment and procedure as well as the need to provide rapid, accurate diagnoses for the operating surgeons. As part of a new curriculum for incoming Residents, we introduced a new learning initiative for the frozen section process involving practice with fresh mammalian organs. This alleviated some of the trepidation involved before commencement of actual service work.

Design: The first step involved viewing of an instructional video detailing the entire process from specimen receipt to result reporting. This video was also made available online for further review at any time from any location. Fresh tissue was obtained as part of the autopsy orientation which involved the dissection of sheep and/or pig organ blocks obtained from a local meat packer. Each Resident was required to identify and embed 12 different tissue types including liver, spleen, kidney, heart, thymus, pancreas, esophagus/stomach, adrenal, gonads, lung, bronchus, and lymph node. The use of the different tissue types allowed the resident to experience the different cutting characteristics exhibited by the divergent tissue types. Using proper technique involving the use of OCT embedding medium and the heat extractor, the trainee was shown several methods to obtain complete sections of the tissue. This allowed each Resident to develop the technique that worked best for him/her. After two proper sections were obtained using a cryostat microtome, the sections were fixed and stained using the standard H&E procedure. The sections were cover-slipped, and all cases were collectively reviewed,

discussed and graded by the Residents and a group of Attending Pathologists. This allowed for recognition and analysis of various artifacts that can be present.

Results: Each trainee was assessed on his/her ability to obtain complete sections with proper staining patterns for each of the 12 tissue types. This exercise allowed the Residents to select the technique that worked best for them. The Resident also had time to become familiar with the frozen section equipment and procedure as well as tissue artifacts without the time and stress constraints of providing quick diagnoses to the operating room.

Conclusions: Residents exhibited increased confidence and proficiency with the frozen section procedures while handling actual patient diagnostic tissues during service work after completion of the frozen section practicum.

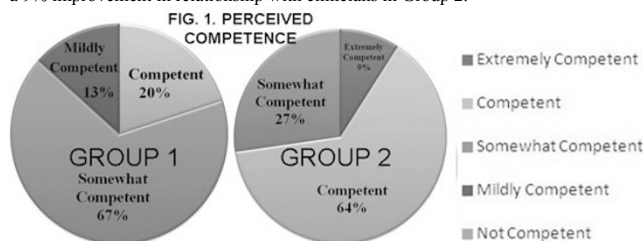
563 Utility of Digital Microscopy for Renal Biopsy Adequacy Assessment

LL Adams, S Setty, EL Wiley. University of Illinois at Chicago, Chicago, IL.

Background: At our institution pathology residents are required to have expertise in assessing renal biopsies for adequacy. We tested a novel approach, using a digital microscope connected to a netbook, for visualization of renal biopsy cores. We compared the glomerular counts with results from a conventional dissecting scope. We trained faculty, residents, and technical staff to use both methods. A survey of the participants was performed to assess the impact on operator competence and outcome.

Design: Digital and dissecting microscopes were used to assess renal biopsies. The specimens were visualized and a glomerular count was enumerated for each core including perfusing and obsolescent glomeruli. Both techniques were applied by two independent operators on a total of 23 biopsies and the results compared with counts from formalin fixed histologic sections. A survey questionnaire was distributed to individuals who operated the conventional method (Group 1) and those who used both methods (Group 2), to assess their impression of change in competence, professional relationship, and modality preference.

Results: The glomerular counts obtained by the two methods were compared to the counts obtained from histologic sections. This quantitative data demonstrated no significant difference in glomerular counts ($p = 0.5$) between the two methods, thus validating the digital microscope as a viable option for assessing adequacy. Qualitative data from the survey demonstrated a 9% increase in perceived level of competence and a 9% improvement in relationship with clinicians in Group 2.



Conclusions: A comparison of two methods of renal biopsy assessment demonstrated that the new digital microscope method yielded similar results to the conventional dissecting scope, thus offering a viable option. A survey qualitatively assessed subjective operator competence and its impact on professional relationships, revealing an increased level of perceived competence, and a more positive professional relationship with clinicians, in individuals who used the digital microscope.

564 Development and Validation of a Tool To Evaluate the Quality of Medical Education Websites in Pathology

R Alyusuf, A Prasad, A Abdul Satir, A Abalkhail, R Arora. Salmaniya Medical Complex, Manama, Bahrain; All India Institute of Medical Sciences, New Delhi, India; Nile College, Khartoum, Sudan; Arabian Gulf University, Manama, Bahrain.

Background: The exponential use of the internet as a learning resource coupled with varied quality of many websites, lead to a need to identify suitable websites for teaching purposes.

Aim:

To develop and validate a tool which evaluates the quality of undergraduate medical educational websites; and apply it to the field of Pathology.

Design: A tool was devised through several steps of item generation, reduction, weightage and pilot testing. After developing a draft tool that encompasses criteria to be used in evaluating medical education websites, steps included pilot testing of the tool, post-pilot modification of the tool and validating the tool. Tool validation included measurement of inter-observer reliability; and generation of criterion related validity by testing the tool against a gold standard, construct related validity by measuring the relationship between the gold standard consensus with the actual score of the tool and the relationship of gold standard consensus with general website rating tools and content related validity by comparing the tool with general website rating tools and obtaining the subsequent gold standard rating of the tool. The validated tool was subsequently tested by applying it to a population of pathology websites.

Results: The tool was validated by applying a number of reliability and validity tests. Reliability testing showed a high internal consistency reliability (Cronbach's alpha = 0.92), high inter-observer reliability (Pearson's correlation = 0.88), intraclass correlation coefficient = 0.85 and Kappa = 0.75. It showed high criterion related, construct related and content related validity. The tool showed moderately high concordance with the gold standard (Kappa = 0.61); 92.2% Sensitivity, 67.8% Specificity, 75.6% positive predictive value and 88.9% Negative Predictive Value. The validated tool was applied to 278 websites; 29.9% were rated as recommended, 41.0% as recommended with caution and 29.1% as not recommended.

Conclusions: A systematic tool was devised to evaluate the quality of websites for medical educational purposes. The tool was shown to yield reliable and valid inferences through its application to pathology websites.

565 iPad Based Real-Time Wireless Image Capturing and Tele-Consultation: "There Is an App for That"

R Dewar, I Lewis, J Levine, R Joyce. Beth Israel Deaconess Medical Center, Boston, MA; Ikona Inc., Westwood, MA.

Background: Reviewing slides of tumors with the clinical care provider constitutes part of an important consultation activity of a pathologist. This review is traditionally done on a multi-headed microscope or in a multi-specialty tumor board setting. However, these consulting activities demand that the physician to come to the pathologist's office (needing a microscope) or restricted to specific scheduled time (for tumor boards). Pathology slide images also remain important teaching tools within clinical rounds and sometimes with patients. We have implemented an 'app' (short for application) for an iPad, that combines realtime streaming of images telecast wirelessly or the internet.

Design: A compact VGA to ethernet frame grabbing device may be used for this application. We used a commercially available high speed VGA to ethernet frame grabber, that can process up to 120 frames/second. The device is hard wired to the microscope camera using a VGA or DVI cable. A common RJ45 ethernet port is used to interface with a computer for online applications. The framegrabber is connected to a wireless router that provides a wireless LAN connection. Using a proprietary iPad or iPhone app, available from iTunes as a freeware (<http://itunes.apple.com/pk/app/vga2ethernet/id424225828?mt=8#>), images could be transmitted wirelessly in a conference room setting to the iPad. The telepathology consultation portion requires an unique IP address, through which the images are streamed. The consulting physician accesses the website, for reviewing images and for realtime consultation

Results: We implemented the VGA - Ethernet iPhone and iPad application for our clinical colleagues. At frame rates of up to 120 frames/second, the device was able to streamline images realtime through a wireless router and to the iPads. In a multi-user setting, the device is slower, up to 10 seconds for displaying images. These images are useful for real time consultation as well as teaching tool in a clinical rounds setting. The online consultation also is convenient & time saving as remote access telepathology service. This further improves image based consultation for the busy clinician.

Conclusions: An application for realtime wireless image grabbing function for education and clinical consultation is described. This along with the online imaging service is a great digital tool for the busy clinician and pathologist to use image based pathology consultation as well as learning.

566 Pathology Resident Performance in Simulated Clinician Communication Hand-Offs

SM Dintzis, S Mehri, D Luff, JS Stuijk, H Mack, G Kotnis, SS Raab. University of Washington, Seattle; University of Colorado, Denver; Cleveland Clinic, Cleveland.

Background: Although errors in communication hand-offs are a major source of sentinel events, anatomic pathology residents generally receive little training in communication science. We developed and pilot-tested 15 resident-clinician communication simulation information transfer modules requiring varying levels of conflict resolution.

Design: We designed 15 intraoperative consultation, information transfer modules involving resident-clinician communication. Trained simulated clinicians communicated with residents (n = 10) through phone calls using scripted scenarios. The physicians assumed specific behaviors based on test performance metrics (e.g., turn around time, error, degree of clinical-pathologic correlation, and meaning or consequence of test results) and resident communication methods. Resident interactions were evaluated using checklists of 15-20 elements. In scenarios involving escalated physician conflict, residents received higher scores for problem solving and de-escalating behaviors. All residents had no prior training in communication science and were provided feedback after each module block. We measured resident performance based on year of training, de-escalation behaviors, and problem solving.

Results: Overall baseline resident performance ranged from 52%-85% on all modules (mean: 64%) with more senior residents receiving higher scores on basic communication checklist elements such as patient, self, and clinician identification and read-backs. All residents scored highly (range: 80%-100%) on information transfer checklist elements such as providing a diagnosis and other pathology report elements (e.g., tumor size, margin status, etc.). Residents generally performed at a lower level (e.g., 0%-60%) on some checklist items in modules involving information transfer adversity (e.g., lack of clinical-pathologic correlation) as many residents were challenged in the problem solving of potential or real errors. In resident-clinician conflict scenarios, residents exhibited high levels of empathy on checklist items (e.g., 80%-100%) and exhibited variable performance on anger de-escalation behaviors.

Conclusions: Simulated resident-clinician communication scenarios show variable performance by year of training. Residents generally perform well in straightforward information transfer and less well in clinician conflict scenarios. Augmentation of current communication resident training in areas of anger de-escalation and problem solving potentially would benefit training programs and decrease less than optimal hand-offs.

567 The Pathologist in the Era of Personalized Medicine: Patient and Physician Perceptions

TT Ha, JB Taxy. University of Chicago, Chicago, IL.

Background: The emergence of "personalized medicine" is creating pressure for an increasingly broader role for pathologists, given their unique laboratory training. Anecdotally, some patients and physicians may not understand the pathologist's role in patient care within a multidisciplinary medical team. Efforts to rectify these misperceptions may benefit from better understanding of the nature of this

misinformation and how it may hamper communication. The current study seeks to evaluate how patients and other physicians perceive and interact with pathologists.

Design: Separate questionnaires were anonymously administered to physicians (attending physicians, fellows, and residents) and non-health care professionals of at least 18 years old using the free website "surveyMonkey.com."

Results: Of the 36 patients who participated, 61% had tissue removed and 100% had laboratory tests performed. 53% have seen their laboratory or pathology report. 86% did not inquire nor were told by whom the result of their test or biopsy came about. Finally, 19% think that pathologists are laboratory technologists. Most of the physician participants (n=16) are family physicians. All have interacted with pathologists, most frequently via a biopsy, multidisciplinary conferences, teaching, and frozen section.

Interactions Between Pathologists and Other Physicians

	%, n=16
Interpretation of a biopsy	87
Multidisciplinary conferences	73
Teaching	67
Frozen section	67
Interpretation of a laboratory test	60
Evaluating the utility and relevance of a laboratory test	40
Obtaining a biopsy	33
Autopsy service	20
Implementing a new laboratory test	13

Although 87% think pathologists are "very important" to patient care, only 67% of the surveyed physicians inform their patients a pathologist was involved in their care. While 60% have patients who requested to see the pathology report, a significantly smaller proportion (6%) have patients who requested to speak with a pathologist.

Conclusions: The majority of physicians in this study understand and highly value the contribution of pathologists to patient care. However, this may reflect an intrinsic bias where physicians who view pathology positively to be more likely to participate in the survey. Although many patients request the pathology report, only a minority wants to speak with a pathologist which may reflect the nature of the test or illness, lack of time, or misperception that pathologists are laboratory technicians. Further studies are needed to better understand whether better access to patient-pathologist communication would contribute additional value to patient care.

568 Interactive Case Vignettes Utilizing Simulated Pathologist-Clinician Encounters with Whole Slide Imaging and Video Tutorials of Whole Slide Scans Improves Student Understanding of Disease Processes

A Horn, DK Czarnecki, SM Lele. University of Nebraska Medical Center, Omaha, NE.

Background: One of the drawbacks of studying pathology in the second year of medical school in a classroom setting is the absence of patient encounters/clinical rotations making it difficult to understand and fully realize the significance of the course material, specifically the molecular and tissue aspects of disease. In this study, we determined if case vignettes incorporating real/simulated pathologist-clinician encounters with whole slide imaging (WSI) and narrated/annotated videos of whole slide (WS) scans in addition to clinical data improved student understanding of pathologic disease processes.

Design: Case vignettes were created for several genitourinary disease processes that utilized clinical data including narratives of pathologist-clinician encounters, WSI, and narrated/annotated video tutorials of WS scans (designed to simulate "double-heading" at a microscope). The students were encouraged to view the virtual slide first, with the video tutorials being provided to offer additional assistance. The case vignettes were created to be interactive with a detailed explanation of each correct and incorrect question choice. The cases were made available to all second year medical students via a web site and could be viewed only after completing a 10 question pre-test. A post-test could be completed after viewing all cases followed by a brief satisfaction survey.

Results: 96 students completed the pre-test with an average score of 7.7/10. Fifty-seven students completed the post-test with an average score of 9.4/10. Thirty-six students completed the satisfaction survey. 94.4% agreed or strongly agreed that this was a useful exercise and 91.6% felt that it helped them better understand the topics.

Conclusions: The development of interactive case vignettes incorporating simulated pathologist-clinician encounters with WSI and video tutorials of WS scans helps to improve student enthusiasm to learn and grasp pathologic aspects of disease processes that lead to clinical therapeutic decision making.

569 Pathology Mini Tutorial Video Podcasts for Teaching Medical Students

G Hulman. Nottingham University Hospitals, Nottingham, Nottinghamshire, United Kingdom.

Background: The widespread availability of the Internet and MP4 enabled devices has created new opportunities and demands for teaching. The production and use of video podcasts was investigated for delivery of pathology teaching to medical students.

Design: The proposal was to create short pathology video podcasts using computer, scanning and video equipment. These were purchased following a successful bid for funds to promote teaching.

The podcasts are created using a Macintosh computer and the iMovie video-making program. Text clips are produced using PowerPoint slides saved as JPEGs. Digitised departmental photographs are added for illustration. Transitions are utilised to emphasize associations between images. The Ken Burns effect is used to pan across and zoom in and out of the pictures. This allows a dynamic demonstration of pathological changes. The voice over sound track is added using the computer's microphone.

The video podcast episodes are saved as MP4 files and uploaded using an RSS feed provided by Nottingham University. They are submitted to iTunes to provide easy access for the students.

Global downloads are monitored for the first month of each new episode. A questionnaire about the podcasts has been circulated to the students for feedback.

Results: The video podcasts are free, available worldwide and may be viewed using iTunes or an alternative RSS reader. By subscribing, new episodes automatically download and synchronise with smart phones, MP4 players and tablets. This enables students to develop a growing library of easily accessible short teaching episodes. Worldwide downloads average around 2,000 for the first month of each episode. The questionnaire revealed that approximately 80% of students use computers to watch the podcasts despite the huge range of electronic gadgets available. Over 95% of the students find the podcasts useful and they are popular when compared with other ways of learning pathology.

How do you like to learn pathology? 1 - Least favourite 5 - Most favourite

	1	2	3	4	5	Rating Average	Response Count
Reading	20.0%(5)	24.0%(6)	28.0%(7)	16.0%(4)	12.0%(3)	2.76	25
Lectures	4.0%(1)	16.0%(4)	28.0%(7)	24.0%(6)	28.0%(7)	3.56	25
Tutorials	8.0%(2)	4.0%(1)	8.0%(2)	52.0%(13)	28.0%(7)	3.88	25
Online Power Point	8.0%(2)	36.0%(9)	28.0%(7)	16.0%(4)	12.0%(3)	2.88	25
Video Podcasts	16.7%(4)	4.2%(1)	12.5%(3)	16.7%(4)	50%(12)	3.79	24

Table 1

Conclusions: Video podcasts are a useful, flexible and popular form of pathology teaching.

To view the podcasts visit:

<http://itunes.apple.com/gb/podcast/pathology-mini-tutorials/id343794004>

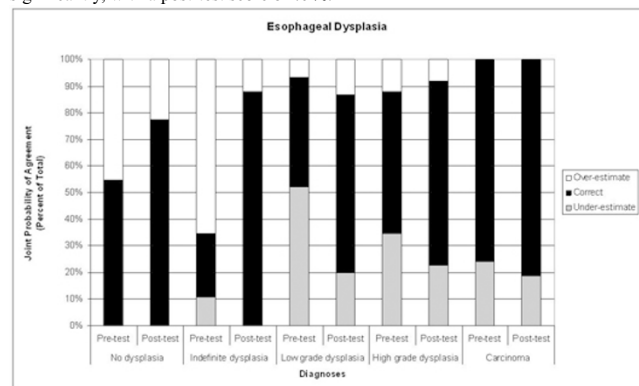
570 Optimizing Inter-Observer Agreement on Esophageal Dysplasia Via Web-Based Self-Directed Learning Modules

JH James, J Lee, J Prather, G Chejfec, S Sontag, EL Wiley. University of Illinois, Chicago, IL; Edward Hines, Jr. VA Hospital, Maywood, IL.

Background: Esophageal dysplasia is a well documented diagnostic challenge, with significant inter-observer variation noted in interpretation of low and high grade dysplasia. While previous studies have relied on evaluation of glass slides by small groups, web-based modules allow self-directed learning with pathologists at distant sites. This pilot study evaluates the value of designing and implementing a publically accessible, web-based tutorial in training junior and senior residents.

Design: 75 classic examples of negative, indefinite, low-grade or high grade esophageal dysplasia, along with carcinoma, were selected by expert pathologists. Images from these cases were equally split between pre-training, training, and post-training modules, which were posted online. Scores from residents (n = 15) were analyzed with pairwise percent agreement to assess inter-observer correlation before and after training.

Results: Our findings demonstrate that web-based learning improves inter-observer agreement; overall scores improved from 50%, in the pre-training set, to 76% in the post-training set. While both first year and senior residents shared the same knowledge level at first (42%), training generated a greater improvement in senior residents (66%) than first year residents (62%). The most significant diagnostic challenge in interpreting esophageal biopsies were cases which were "indefinite for dysplasia," with only 30% agreement among residents taking the pre-test. Training improved this score significantly, with a post-test score of 79%.



Conclusions: This pilot study demonstrates that self-directed modules effectively improve inter-observer correlation among residents. Web-based modules are an excellent supplement to traditional slide-based instruction, with the additional advantage of allowing residents to assess and direct their own learning through text and images. This allows for a richer appreciation for subtle histomorphological cues contributing to each diagnosis. Ultimately, these modules may be used to standardize teaching of challenging diagnoses across multiple institutions. In the future, we plan to build on our experience to create a library of training modules for both residents and pathologists.

571 Inter-Rater Variability in Checklist Assessment of Resident Performance

HN Mack, S Dintzis, S Mehri, DF Luff, J Stuijk, G Kotnis, SS Raab. University of Washington, Seattle, WA; University of Colorado, Denver; Cleveland Clinic, Cleveland, OH.

Background: The assessment of resident performance through the use of test checklists provides feedback for improvement. The measure of inter-rater scoring of test items establishes checklist reliability that is necessary prior to using these tests as a true measure of performance. We measured inter-rater variability in assessing resident responses in simulated communication scenarios.

Design: We developed 20 information transfer scenarios of resident communication with pathologists and clinical educators who role-played clinicians, laboratory staff, and pathologists. From 2 to 7 raters (pathologists, technicians and pathologist assistants) measured resident performance with checklists that contained 15-25 elements, divided into categories of Introduction, Information Giving, Information Seeking, Information Verification, Content, and Empathy/Conflict Resolution. The scenarios represented a range of typical communications and behaviors, including anger management and empathy. We tested 2-10 point Likert scales (ranging from categories of performed well to performed poorly to not performed) for each checklist item to measure initial and experienced inter-rater scoring variability using the metric of crude agreement.

Results: The inter-rater variability in scoring depended on checklist category and rater experience. Depending on the number of raters, Introduction and Content items had the highest level of scoring agreement with crude agreement ranging from 80%-100% for even novice raters on Likert scale checklists of 5 or more categories. Information Giving/Seeking/Verification items generally had a lower level of scoring agreement (20%-100%) for novice raters on Likert scale checklists of 3 or more categories. Scoring agreement for these items improved with more experienced raters. Empathy/Conflict Resolution items had variable scoring agreement (20%-100%) that depended on specific scenarios and rater experience; Likert scales with 2-3 categories had higher scoring agreement than scales with more categories.

Conclusions: We conclude that the inter-rater checklist scoring variability in communication scenarios testing resident performance depended on factors such as rater experience, checklist item, and scenario design. In testing scenarios, lower scoring variability across all checklist items generally was achieved using Likert scales comprised of 2 or 3 categories. For training and educational scenarios, a larger number of Likert scale categories allows for more granular feedback.

572 University of British Columbia Office of Biobank Education and Research (OBER): An Education and Support Resource for Biobanking and Translational Research

LAM Matzke, S O'Donnoghue, S Cheah, S Dee, S Eshragh, P Watson. University of British Columbia, Vancouver, BC, Canada; BC Cancer Agency, Victoria, BC, Canada.

Background: Biobanks are central to the process of collection of human biospecimens for translational research. The UBC Office of Biobank Education and Research (OBER), the first of its kind in Canada, aims to advance translational health research by establishing an international centre of excellence in biobanking education and support for biospecimen based translational health research.

Design: OBER is a novel concept to provide integrated support for BC and affiliated biobanks through education on biospecimen science and communication of best practices and standards for biobanking. Located in and funded by the UBC Department of Pathology and Laboratory Medicine, OBER builds on and unites into a working entity both the machinery and resources of BCBIOLibrary framework for BC biobanks (funded by Michael Smith Foundation for Health Research) and BC's contributions to national initiatives led by the Canadian Tumor Repository Network (CTRNet, funded by Canadian Institutes for Health Research).

Delivery of support services for new and established biobanks is through both online tools and in-person consulting and draws on extensive resources created by OBER and our partners by: 1) creation and delivery of education and training for a range of stakeholders involved in biobanking; 2) development and deployment mechanisms to communicate common protocols, standards and policies for biobanking; 3) promote establishment and maintenance of biobanks to support translational research; 4) facilitation, in collaboration with CTRNet, of registration/certification of biobanks in coordination with provincial and national and international biobanking organizations.

Results: The priority for OBER since its creation June 2011 has been to a) complete development of online biobank education tools in support of CTRNet's national registration and certification program; b) provide support to four hospital groups to establish biobank consenting mechanisms and development of practices and operations; c) begin creation of three online tools for biobank operations; d) compile component based solution packs for new and existing biobanks.

Conclusions: OBER has been established as a center to communicate common standards and policies amongst biobanks and between biobanks and the public through education and training.

573 Critical Thinking in Pathology: A Role for Concept Mapping Assessment?

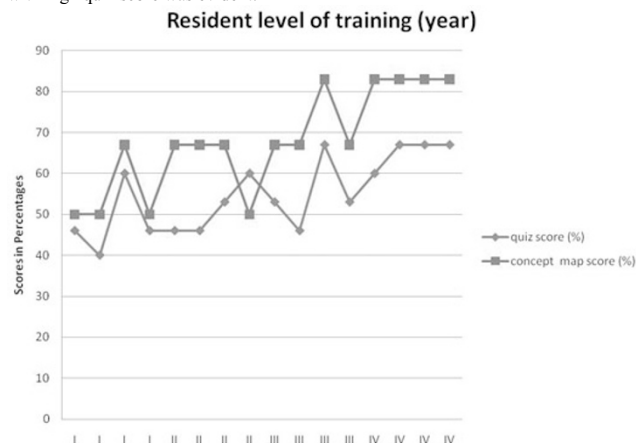
V Mehta, JJ Speiser, P McNally, Y Li, GA Barkan. Loyola University Medical Center, Maywood, IL; Loyola University Medical Center, Maywood.

Background: Tools to assess the evolving conceptual framework of pathologists-in-training are limited, despite their critical importance to their evolving diagnostic expertise. Concept maps (CM) are visual learning tools that demonstrate how information is related. Concept mapping assessment (CMA) enables teachers to view students' organization of their knowledge at various points in training.

Design: A group of 16 resident pathologists (4 residents each in PGY I-IV) from a university-based pathology training program underwent CM training, completed an education course on prostate pathology and then drew a postinstruction CM. All the residents were given a postinstructional quiz. The quiz as well as the CMs prepared by residents were scored. The CMs were scored based on level of hierarchy (score 0-2), concept links (0-2) and cross links (0-2). Scores for each component were added together to produce a total structural score for each map, giving score between 0 (minimum) and 6 (maximum).

Results: The quiz score of the residents ranged from 40-67% (average =54%; PGYI 48%; PGYII 51%; PGYIII 54% and PGYIV 65%). The scores ranged from 3 to 6 with an average of 4.1 for all years (PGYI 3.2; PGYII 3.7%; PGYIII 4.2% and PGY IV 5.5%). There was no significant difference between the average quiz score of first,

second and third year residents despite more training and experience of senior residents. The PGY IV residents however had better scores both in CMs as well as in quiz. The CM scores on the other hand increased gradually from first to fourth years. When both types of scores (quiz and CM) were plotted, a correlation between high CM scores with high quiz score was evident.



Conclusions: Our data provides preliminary evidence that CMA reflects expected differences and change in the conceptual framework of resident pathologists-in training based on PGY level. It was concluded that making CMs promoted meaningful learning that allowed the PGY I residents to get comparable scores to PGY II and PGY III residents, despite their relative lack of pathology experience. This study signifies the usefulness of role of concept mapping in education of pathologists-in training.

574 Development of Peer Reviewed Standardized Video-Tutorials on Grossing Techniques To Improve Resident Training in Surgical Pathology

P Mroz, P Weisman, R Goyal, E Gersbach, ME Sullivan, K Siziopikou, SM Rohan. Northwestern University, Chicago, IL.

Background: The routine work associated with a surgical pathology specimen includes gross and microscopic examination. Surgical pathologists deal with many types of tissues and numerous specimens on a daily basis and each of these specimens must be evaluated carefully. The dissection, gross description and selection of sections for microscopic study is a crucial part of pathologic examinations. It is therefore of utmost importance to develop and standardize the grossing approach to specimens encountered by residents during training. To help facilitate accurate gross evaluation and provide trainees with specimen specific guidelines we initiated a pilot project that aims to provide a series of web-based video-tutorials on gross examination of routine as well as difficult specimens.

Design: We utilized high-definition video technology to record audio-video-tutorials that will guide the viewer through the gross preparation of the following specimens: radical prostatectomy, radical nephrectomy, partial nephrectomy, radical cystoprostatectomy, breast lumpectomy for mass, breast lumpectomy for non-mass forming lesions, simple mastectomy for mass, and mastectomy status post neoadjuvant therapy. Each video-tutorial is accompanied by figures detailing the anatomical structures and surgical approach relevant to each specimen.

Results: Step-by-step narrated grossing videos of the specimens outlined above were created. Techniques for avoiding specimen contamination, avoiding creation of false positive margins, finding of lymph nodes, and proper sampling after neoadjuvant therapy were emphasized. The completed videos will be submitted for peer revision and subsequently for publication in an online journal of scientific videos. Subsequently a video-library will be created and made available on computers at each grossing station at our institution to facilitate use in real time.

Conclusions: Grossing is a critical part of the diagnostic process and resident training. However, in reality trainees are often semi-supervised for most of the grossing day. The accessibility of a video-library of grossing techniques on computers at grossing stations will provide residents with additional aid as well as help streamline specimen processing. To our knowledge this is the first time that video-technology will be used to provide peer reviewed standardized tutorials on grossing techniques. We believe that these videos will be a tremendous educational resource for residents and students alike.

575 Death Certification at an Academic Medical Center: A Re-Evaluation

C Paquette, S Shapiro, NJ Hardin. Fletcher Allen Health Care, Burlington, VT; University of Vermont, Burlington, VT; Office of the Chief Medical Examiner, Burlington, VT.

Background: Death certificate data are central to epidemiologic research, safety data, and population monitoring; however, certification is poorly taught, often yielding inaccurate or irreproducible certificates. A prior 50 patient retrospective study at this institution found a high death certification error rate. The results prompted a five-year period of procedural and educational changes including new 'death packets' and an online tutorial. Recommendations not implemented included an annual refresher exercise and discussion of certification on rounds; additionally, death certification was removed from the intern orientation. In this study, we evaluate an additional 50 death certificates to assess for progress.

Design: Fifty death certificates from non-pathologists were randomly selected from 2009. One author (CP) abstracted summaries from the medical chart, and two authors (NH and SS) used the summary to create mock certificates while blinded to the original. Discrepancies were resolved by consensus, and errors were identified. The error framework from the prior study was used. (Table 1)

Error Types	
0	No error
Ia	Incomplete fields
Ib	Abbreviations or illegible
Ic	Part I diagnoses not in logical order
II	Minor missed comorbidities
III	Major missed comorbidities
IVa	No acceptable cause of death in Part I
IVb	Wrong cause or manner of death

Results: Thirty-six (72%) certificates contained at least one error, compared to 96% in the 2005 study. Type Ia was most common (52%). The percentages of errors of Type III, IVa and IVb were 22%, 28%, and 4%, respectively. There was an increase in Type 0 from 4% in 2005 to 28% in 2009. We identified two forensic errors (failure to notify the medical examiner of a non-natural death).

Conclusions: Death certification education is inconsistent at this medical center, and correspondingly it appears that the error rates have not improved over the past five years. Most worrisome are two unreported forensic deaths. While a literature review suggests that there are short-term improvements in certification after education, the effect is not sustained. We attribute the errors to multiple factors including sporadic use of certification skills, time constraints, and perceived irrelevance of the document. We recommend random or even total review of inpatient certificates by autopsy pathologists as a mechanism for quality improvement, as well as increased consultation of the medical examiners.

576 Post-Sophomore Fellowships in Pathology: A National Survey

DE Summers, J Smith, R Klein, R Weinstein, ER Bracamonte. University of Arizona, Tucson, AZ.

Background: During the post-sophomore fellowship (PSF) program, a medical student spends 12 months exploring the field of pathology. PSF programs provide a unique educational experience and sometimes serve as a recruitment tool for future pathologists. This study surveyed US pathology residency programs to determine how many currently offer a PSF program, whether the programs recruit more students into the field of pathology, and to elucidate potential barriers to offering the PSF program at more institutions.

Design: Using the Intersociety Council for Pathology Information website as a resource, the Director of Residency Training from 129 US pathology residency programs were contacted to determine whether their program offered a PSF. Depending on their response, Directors were sent one of two surveys. Programs offering a PSF were asked the rates of past fellows choosing pathology as a career and the benefits and drawbacks to the program. Programs not currently offering a PSF were asked if they had offered a PSF in the past and the reasons for not currently offering a PSF. The average national rate of medical students choosing pathology from 2007-2011 was obtained from the Results and Data 2011 Main Residency Match.

Results: 81 of 129 residency program directors contacted responded to our survey, of which 17 (21%) currently offer a PSF and 64 (79%) do not. Of 17 programs that currently offer a PSF program, 9 maintained statistics regarding prior PSF specialty choices. Of these 9 programs, an average of 37% of past fellows chose pathology as their specialty. The most commonly cited advantages to offering a program were opportunity for in-depth pathology exposure (76%), enhancement of general medical knowledge (59%), and potential recruiting tool (35%). The most commonly cited disadvantages were additional year of training for the medical student (41%) and expense for the department (35%). Of the 64 programs not currently offering a PSF, 17 had offered a program in the past. The most commonly cited reasons for not offering the program included funding constraints (58%), lack of medical student interest (17%), and insufficient staff/small program (17%).

Conclusions: Although only 21% of responding pathology residency programs currently offer a PSF opportunity, the program remains a powerful tool for recruiting medical students into pathology. The percentage of medical students choosing pathology as a career after a PSF experience far exceeds the national average, which was 2.2% of graduating medical students in the US between 2007-2011. The advantages of a PSF program should be emphasized as a worthy investment of departmental resources.

577 Impact of Instructive Videos and Internet Based Learning Portal on Residents' Teaching Education in Molecular Pathology

LJ Szymanski, JM Szymanski, DA Chitale, M Cankovic. Henry Ford Hospital, Detroit, MI.

Background: In the era of personalized medicine and targeted therapeutics, modern pathology must be a synergy of pathology, immunohistochemistry and molecular pathology, all incorporated into a single diagnostic opinion. This creates a challenge in resident education where the traditional approach to teaching has remained centered around reading reference books and passively observing technicians. Our goal was to increase resident competency by achieving mastery of core analytical competencies and by providing easy access to vast amounts of under-utilized educational content available in the form of videos, electronic books, faculty power point presentations including challenging clinical cases and educational teleconferences, all of which could be delivered electronically via the internet and used to supplement didactic lectures and compulsory lab rotations.

Design: Creation of a web based learning portal that incorporates: 1) Instructional videos of basic techniques (polymerase chain reaction (PCR), sequencing, microarray) created

by residents; 2) Learning based modules for techniques and diagnostic procedures; 3) Resources from basic concepts to advanced topics; 4) Board review material and questions in interactive formats.

Results: Multiple learning modules incorporating reference material, web based resources and teleconferences, and procedures were constructed in a format that would be intuitive for most residents to use. Distinct sections for basic terminology, lab management, and board review materials were included. Additionally 3 video presentations (10-12 min long) were provided to residents as part of a didactic lecture series. In an anonymous survey residents (7/14) evaluated the portal as excellent and plan to use it to gain molecular competency and for board reviews. The videos were rated as good to excellent.

Conclusions: With ever expanding molecular knowledge in this molecular era, the portal based training modules will be a central part of a comprehensive resident training in molecular pathology. The current "one size fits all" approach would be altered to best fit the residents' interests in different molecular subspecialty after completion of basic training in molecular pathology. This web based portal will help system based training for residents in smaller programs where these state of the art molecular assays are not offered. This type of portal will make all these supplementary educational materials available to pathologists, medical students, and laboratory technologists which may also serve as proficiency testing.

578 Using Digital Bone and Soft Tissue Tumor Pathology Teaching Library To Enhance Training of Future Pathologists

X Zhang, JJ Johnson, MC Lloyd, D Letson, MM Bui. University of South Florida College of Medicine, Tampa, FL; H. Lee Moffitt Cancer Center, Tampa, FL.

Background: The training of residents in bone and soft tissue tumor pathology has been limited in most of the training programs due to the rarity of the tumor, difficulty in diagnosis, and lack of expertise. Whole slide digital imaging technology has increasing role in the education of pathologist trainees. We envision that a virtual bone and soft tissue tumor pathology teaching library will greatly enhance training. This study is to investigate the feasibility and effectiveness of this alternative paradigm for education and assessment.

Design: The project was done collaboratively by pathology residents, sarcoma pathologist, sarcoma surgeon, radiologist, and scientists at digital imaging lab. Representative glass slides were retrospectively selected using the WHO Bone and Soft Tissue Tumor Classification (2006). De-identified slides were scanned using AperioScanScope XT. The effectiveness between traditional method using glass slides and the alternative method using digital slides in sarcoma learning was evaluated.

Results: As one of the premier cancer centers and sarcoma programs, we are able to collect 2,000 cases of bone and soft tissue tumors listed in the WHO book which include 120 types. Currently 351 bone and soft tissue virtual slides are in the library. High-resolution digital images of whole slides can be viewed at any work station using a password protected server. The virtual images were organized and annotated to incorporate diagnosis, clinical information and key pathologic findings. A web browser based interface with search engine features is being constructed. The library can be accessed from the work stations outside Moffitt when residents are rotating in other hospitals or at home. Residents using the alternative learning method scored higher than the residents using the traditional method.

Conclusions: A digital bone and soft tissue tumor pathology teaching library is feasible for both a sarcoma center and non-sarcoma centers via internet, thus beyond the limitation of resources. It is an effective tool in educating residents in bone and soft tissue pathology. It is one time investment which will last indefinitely. For the future, the library will be expanded to educate related specialties including orthopedic surgeons and musculoskeletal radiologists.

Endocrine

579 Cytoplasmic Staining of OCT4 in Pheochromocytoma Is Highly Sensitive and Specific: A Novel Immunohistochemical Finding

RE Alexander, DJ Grignon, MT Idrees. Indiana University School of Medicine, Indianapolis, IN.

Background: OCT4 immunostaining has become an essential resource in the diagnosis of germ cell neoplasia. OCT4 is a transcription factor and has a characteristic nuclear staining specific to germ cell neoplasms. The diagnosis of adrenal malignancy is sometimes challenging and it is often difficult to establish a diagnosis on morphology alone, especially in metastatic cases. In our institute, it has been observed that paraganglionic tissue consistently displayed intense cytoplasmic staining and we intended to determine if OCT4 can provide additional diagnostic utility in adrenal tumors. To our knowledge, the cytoplasmic expression of OCT4 in pheochromocytoma has not been specifically studied. The goal of this study is to analyze the immunoreactivity of adrenal cortical carcinoma (ACC) and pheochromocytoma, especially in metastatic settings.

Design: Thirty cases of primary pheochromocytoma, 24 cases of ACC (two metastatic), and 8 cases of metastatic pheochromocytoma were selected from our database. Hematoxylin and eosin (H&E) stained slides were reviewed and OCT4 (MRQ-10, Mouse monoclonal, Cell Marque Corp.; Rocklin CA, ready to use) immunostaining was performed. OCT4 staining was scored on a four-tier system (0-3), judging two separate criteria: intensity and extent of staining.

Results: In 30 of 30 (100%) cases of primary pheochromocytoma, strong and diffuse (3+3) immunoreactivity was observed. In metastatic pheochromocytoma, all cases showed diffuse staining. Six of 8 (75%) metastatic pheochromocytomas showed strong expression (3+3), the remaining two (25%) showed moderate intensity (2+3). In 24 of

24 (100%) cases of ACC, including metastatic cases, OCT4 was completely negative. In all positive staining pheochromocytoma cases, the staining pattern was uniformly cytoplasmic. Nuclei were overshadowed by cytoplasmic staining in most cases. Controls, using seminoma, stained in an appropriate nuclear fashion.

Conclusions: The results describe a novel staining pattern for OCT4 in pheochromocytoma. This staining pattern has not been demonstrated elsewhere and appears to be highly specific and sensitive to paraganglionic tissue. These findings suggest that OCT4 is an immunostain with diagnostic implications in adrenal neoplasms. The difference in staining pattern may be reactivity to an unknown cross-reacting cytoplasmic antigen and needs further analysis. Additional immunoelectron microscopic and comparative studies using different commercially available OCT4 antibodies may be helpful in determining the cytoplasmic antigen.

580 Papillary Thyroid Carcinoma with Hobnail Features: Histopathological Criteria To Predict Aggressive Behavior

S Asioi, LA Erickson, A Righi, RV Lloyd. Department of Biomedical Sciences and Human Oncology, University of Turin, Turin, Italy; Department of Laboratory Medicine and Pathology, Mayo Clinic, Rochester, MN; University of Wisconsin School of Medicine and Public Health, Madison, WI.

Background: Recent reports indicate that papillary thyroid carcinoma (PTC) with hobnail features (micropapillary variant of papillary thyroid carcinoma, MPTC) is a rare, but very aggressive variant of PTC. We examined 23 cases of MPTC to determine the prognostic significance of the amount of micropapillary or hobnail features in these tumors.

Design: The histopathological and immunohistochemical features of 23 MPTC were examined. Follow up information was obtained from medical record review. The patients included 17 females and 6 males. Ages ranged from 28 to 78 (mean 57). Tumor size ranged from 1 to 5.8 cm (mean 3 cm). The average follow-up time was 106 months (range: 4 to 272 months).

Results: Twelve cases (52.2%) of MPTC showed more than 30% micropapillary or hobnail features and all but 3 cases were associated with an aggressive behavior during follow-up. In particular, all but two cases showed lymph node metastases at presentation. During follow-up, 6 of these patients died of disease after a mean of 44.8 months and 3 patients remained alive with extensive disease involving the epiglottis, larynx, and nasopharynx in two cases and the shoulder, lung, bone, muscle, and pancreas in one case after a mean follow-up of 32.3 months. The other 3 patients with prominent micropapillary or hobnail features were alive without evidence of disease after a mean follow-up of 125.3 months. The other 11 PTC cases (47.8%) showed less than 30% micropapillary or hobnail features. Eight of these patients were alive without disease after a mean of 169 months and one patient died of sepsis which was not related to thyroid tumor after 155 months. Two patients in this group died of disease after 21 and 163 months respectively.

Conclusions: These findings confirm earlier observations that MPTC is an aggressive variant of PTC. Tumors with more than 30% hobnail features were often very aggressive, although two patients with tumors with less than 10% hobnail features also had poor outcomes.

581 Beta-HCG Producing Anaplastic Thyroid Carcinoma – A Variant with Improved Prognosis?

N Becker, RD Chernock, B Nussenbaum, JS Lewis. Washington University School of Medicine, St. Louis, MO.

Background: Anaplastic thyroid carcinoma (ATC) is a rare malignancy which is clinically very aggressive. The median survival is 5 months after diagnosis. No treatment is associated with a significant improvement in survival. Recently, we identified what we believe is the first case of a beta-hCG secreting ATC. It responded dramatically to chemotherapy and radiation and was subsequently surgically resected. The patient's serum beta-hCG was 53 IU/L at diagnosis and dropped to 6 IU/L two weeks after surgery. After 14 months, the patient has no evidence of disease or detectable serum beta-hCG. Although beta-hCG secretion has been reported in many neoplasms, it has not yet been described in ATC.

Design: After characterization of the sentinel beta-hCG secreting case, which was strongly positive in almost all tumor cells for beta-hCG and negative for PAX8, an additional 29 cases of anaplastic thyroid carcinoma were retrieved from our files and immunostained for beta-hCG and PAX8. Staining was graded for intensity (weak, moderate, strong) and distribution (quartiles) by 3 study pathologists. Clinical follow up information was obtained by chart review.

Results: Beta-hCG staining was present in five of 30 cases (17%), but only the sentinel case showed strong, diffuse staining. The remaining positive cases showed either strong beta-hCG staining in <25% of cells, or moderate staining in up to 75% of the cells. PAX8 staining was present in 18 of 30 (60%) cases, including two of the five (40%) beta-hCG positive cases. Follow up of the beta-hCG positive patients showed that only the index case was treated with chemoradiation and surgery. The remaining beta-hCG positive patients either went to hospice or received palliative treatment only. Twenty-seven of 29 patients died of disease at a median of 3.3 months, including all four additional beta-hCG positive patients at a median of 2.7 months. PAX8 positive cases had improved overall survival (median survival 4.9 months versus 2.0 months; p=0.0164).

Conclusions: Our study demonstrates the first beta-hCG secreting ATC. It was treatment responsive and has had a provisionally favorable outcome. Four additional cases showed beta-hCG expression but none was treated with curative intent. Although only a single case, our findings suggest that strongly beta-hCG positive ATC may be a unique entity within the larger group. In addition, our results suggest that PAX8 expression by ATC may correlate with a better prognosis.