THE CUTTING EDGE

AAPA American Association of Pathologists' Assistants

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PEER-REVIEWED

COAL WORKER'S PNEUMOCONIOSIS

CE Article

by Kimberly Green
2015 Fellow Conference Scholarship Winner

Fellow members were given the opportunity to apply for a scholarship to attend an upcoming meeting. Nine case reports were received and the top four received a scholarship valued at up to $1,800 (full registration for fall or spring + $1,000 to help cover travel expenses). The following submission was chosen as one of the winning entries. Congratulations Kimberly!

Patient History

The patient is a 61-year-old Caucasian male who presented with progressive shortness of breath and dyspnea on exertion. He worked in the coal mines of West Virginia for 35 years, had known occupational exposure to coal dust and silica, and was a former smoker with a 10-pack-per-year history. Co-morbidities included hypertension and hyperlipidemia, both of which were well controlled with medication. At the time of presentation, he had been retired for five years and a non-smoker for almost 30 years.

Clinical Course

The patient began having mild respiratory symptoms in 1995. Initially, no medical intervention was sought. In 2013, he developed worsening symptoms and he was placed on supplemental oxygen. An echocardiogram at this time demonstrated severe pulmonary hypertension with right ventricular dilation and hypertrophy. Over the following year, his supplemental oxygen requirements steadily increased from 3L/min to a maximum of 10L/min during mild exertion, and he was hospitalized multiple times for pneumonia. Serial pulmonary function testing showed severe obstructive defects as well as reduced total lung capacity and decreased compliance. The patient's symptoms eventually progressed to intractable respiratory failure, and he was placed on the lung transplant list. Nearly 20 years after his symptoms began, the patient received a bilateral orthotopic lung transplant.

Figure 1: The right lung

Diagnosis

The bilateral native lungs were received in the surgical pathology laboratory. The left lung was 742 grams and the right lung was 745 grams (normal: L-450-600gm and R- 500-700gm).[1] The upper lobes of each lung were replaced by black, rubbery lesions, which were 10.5 cm in greatest dimension. The bilateral lesions crossed the fissures, thickened the surrounding pleura, and had large areas of central cavitation. The lower lobes of each lung displayed multiple smaller, palpable, black nodules and severe, scattered anthracosis. The lung parenchyma surrounding each lesion had mild to moderate emphysema (Figure 1). The case was signed out as complicated coal worker's pneumoconiosis (CWP) with progressive massive fibrosis (PMF). Special stains for mycobacteria and fungi were performed on the areas of cavitation and were negative.

Discussion

Coal worker's pneumoconiosis is one of several respiratory maladies, collectively known as "black lung disease", which affect coal miners.[1] CWP is divided into simple and complicated forms. Simple

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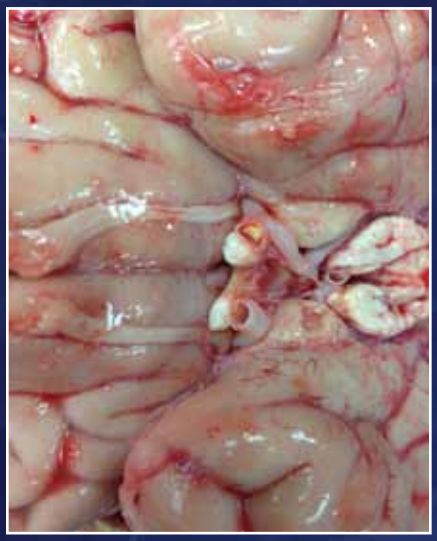

Gross Photo Unknown
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JOURNAL SUBMISSIONS

The AAPA encourages any AAPA member or interested party to contribute articles, updates, photos or upcoming event announcements for the quarterly edition of *The Cutting Edge*. In particular, articles related to the field of pathology are welcomed. Articles and photos may be submitted electronically. (**Note: photo files must be a minimum of 300 dpi resolution.**)

Use the upload link on the AAPA website or send your contributions directly to journal@pathassist.org. All submitted material is edited for content and clarity. Research articles and case reports are subjected to a peer review process. Please see the AAPA website for complete submission details.

JOURNAL DEADLINES

Q1: January 1 **Q3:** July 1
Q2: April 1 **Q4:** October 1

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***The Cutting Edge* is a quarterly journal published by the American Association of Pathologists' Assistants**

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Letter from the Editor

Dennis Strenk
Editor-in-Chief
journal@pathassist.org

This issue marks the beginning of Volume 6 of *The Cutting Edge.* The journal has gradually changed over these few years, and we begin this volume with another change: the addition of a product review feature. This is an idea that has been discussed for some time, and we are now at the point of trying it. The idea is to look at more technology-based products, like what we have in this issue. You'll find the product review on page 17. The format includes a short list of pros and cons, and then a "Final Cut" with a rating of the product, given as a number of scalpels. Five scalpels is excellent, and one scalpel is poor. Clever, right? I would very much like to know what people think of this new feature, and if you have ideas for future reviews.

In addition to the standard two articles with CE quizzes, this issue has a third article, written by Meghan Pickard. This article discusses PA generated literature, and compares it to literature written by other physician extenders. It concludes with some suggestions about the type of articles to write, and a few ideas about topics.

On page 20 there is a preview of this year's Spring Meeting, which will be in Chicago in April. I have been to a Spring Meeting in the past, and it's a great option if you can't attend the fall conference. It looks like a good mix of lecture topics again, and Chicago has so many things to see and do as well. ■

AAPA
American Association of Pathologists' Assistants

Our Mission

The AAPA is dedicated to providing comprehensive professional support for pathologists' assistants.

Our Vision

The AAPA will be the premier professional association for pathologists' assistants, supporting the individual practitioners as they serve patients, pathologists, and the profession.

Core Values

Quality Patient Care* ▪ *Education* ▪ *Advocacy* ▪ *Collaboration

Quality Patient Care: The AAPA ensures quality patient care is an integral component to the environment and endeavors of the Association.

Education: The AAPA provides educational opportunities that support quality patient care and promote the advancement of professional competencies.

Advocacy: The AAPA advocates for pathologists' assistants.

Collaboration: The AAPA commits to active collaboration with outside organizations whose purposes are synergistic with the Association.

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Coal Worker's Pneumoconiosis

> continued from cover

ONLINE QUIZ

CWP consists of coal dust macules and nodules.[1,2] Depending on the severity of the disease, patients with simple CWP may not have radiological or pulmonary function test (PFT) defects. If PFT defects are present, such as an increase in residual volume, they are likely related to industrial/chronic bronchitis.[1,2] Complicated CWP is defined by the development of progressive massive fibrosis. Unlike the simple form of CWP, complicated CWP is usually associated with radiologic and PFT abnormalities.[3,4] Patients with complicated CWP can have airway obstruction as well as restrictive defects,[2] and are likely to develop pulmonary hypertension and cor pulmonale.[1,4]

The coal dust macule is the defining lesion of CWP. Grossly, macules are non-palpable, black lesions that range from 1-4 mm. Microscopically, macules are composed of coal dust-laden macrophages located within the alveolar spaces and the surrounding interstitium.[1,2,4] Scanty reticulin fibers may be associated with the macules; however, mature collagen is absent (Figure 2). Although macules can occur anywhere in the lung, there is upper lobe predominance.[3] This distribution pattern correlates with the decreased density of lymphovasculature in the upper zones of the lung and the lungs' overall ability to clear particles.[1] The coal dust macules found in CWP are similar to anthracotic lesions found in urban dwellers and cigarette smokers.[1,2] These lesions are nearly identical morphologically; however, the presence of macules greater than 2 mm in size and a history of working in coal mines for more than ten years are sufficient to establish a diagnosis of CWP.[3]

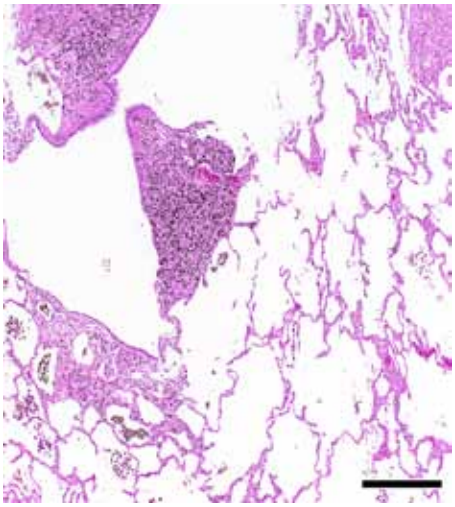

Figure 2: A coal dust macule, bar = 500 µms

Coal dust nodules are discrete, palpable lesions, which are maximally 2 cm in diameter, and are more commonly found in the perivascular and peribronchial regions of the lung. Histologically, the center of the nodule is composed of mature collagen which may be hyalinized. Coal-laden macrophages are present within the nodule and surround the nodule in a stellate pattern.[4] The presence of the coal dust nodule represents a change in the pathologic response of the lung to the coal dust.[4] Due to the morphological similarities of coal dust nodules and silica nodules, as well as the similar distribution pattern, it is thought the pathologic response is due to the silica content of the coal dust and is often referred to as anthracosilicosis.[4]

Although the development of PMF lesions defines the progression of simple CWP to complicated CWP, it is not unique to this disease process. PMF is seen in other pneumoconioses such as silicosis and talcosis.[1] In CWP, these lesions are greater than 2 cm in a single dimension and are more commonly found in the upper and posterior aspects of the lungs. Grossly, they are firm, black, and rubbery, with irregular borders. PMF lesions can cross the lobar fissures, involving adjacent lobes. Often there are large areas of central cavitation that may represent ischemic necrosis or a superimposed infection with *M. tuberculosis*.[1,4] It is important to stain the areas of cavitation to rule out an infection. Histologically PMF lesions are composed of disorganized, mature collagen with abundant intervening coal dust-laden macrophages (Figure 3A). PMF lesions often obliterate vascular and bronchial structures[1,3] and are commonly associated with perifocal or paracicatricial emphysema.[4] Under polarized light, platy silica particles can be observed in higher concentrations throughout the PMF lesion compared to the surrounding lung parenchyma.[1] (Figure 3B)

Coal dust is a variable mixture of amorphous, elemental carbon and crystalline silica (quartz, silicon dioxide), as well as various metals and minerals. The variety of metals and minerals, as well as the amount of silica in the coal dust, is highly variable and depends on the type of coal and the geographical location of the mine.[1] Coal is ranked based on the total amount of fixed carbon. Hard coal, such as anthracite, has a higher rank and generally has higher quartz content compared to lower ranked coals such as lignite. Coal dust exposure also varies for different jobs within a mine. For example, miners who drill into rock have higher exposure rates than miners who load coal for transportation.[1,4]

Alveolar macrophages are the principle cell involved in silica-related lung injury.[1] Macrophages are known to have microbicidal properties; however, they also play a role in tissue repair and fibrosis.[5] Scar formation via collagen deposition is an important aspect of CWP pathogenesis. Alveolar macrophages that have phagocytized coal dust can become injured and die. The death of the macrophages stimulates fibroblast growth and induces collagen synthesis.[1]

The precise mechanisms behind the development of PMF lesions from simple CWP are largely unknown. The amount of silica present in the coal dust is one of the most important contributing factors to the pathological response. Silica is known to be highly fibrogenic, whereas amorphous carbon is classified as a nuisance dust as it does not incite a pathological response.[4] Other factors thought to contribute to the development of PMF include the cumulative exposure to coal dust, superimposed infections (most notably *M. tuberculosis*), and the immunological reactivity of the patient.[1,2] Smoking does not increase the risk of progressing from simple to complex CWP[1]; however, it does contribute to

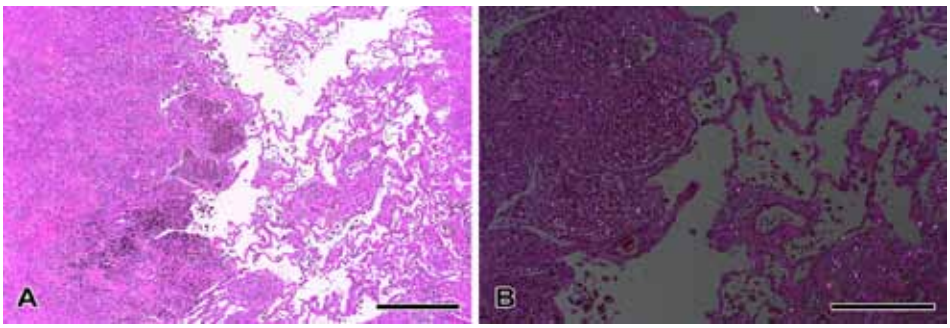

Figure 3: A PMF lesion adjacent to uninvolved lung tissue. A) bar = 500 µms B) Polarized, bar = 250 µms

the progression of emphysema and bronchitis.[5] Despite eliminating further coal dust exposure, patients with simple CWP can continue to progress. Approximately 4% of all coal miners die directly from complications of CWP.[1,3,4]

The prevalence of CWP in underground miners within the United States drastically decreased from 11.2% to 2.0% between the early 1970s and the late 1990s, largely due to increased regulations and better mining technologies.[6] Despite the increased regulations, there has been a rise in the number of CWP cases in the United States, particularly in small mines[7] and in mines located in the Central Appalachian region.[6,8] Further studies are needed to identify the reasons for these trends.

Though CWP is still an uncommon disease, pathologists, pathology residents, and pathologists' assistants should be familiar with the clinical, gross, and microscopic features of CWP as it can be seen in both the surgical pathology lab and autopsy.

Acknowledgements: I would like to thank Dr. Thomas Sporn for his support and guidance in writing this paper. I would also like to thank Steve Conlon for his help acquiring the gross photograph and Susan Reeves for her help in editing the microscopic photographs. ■

Peer Review Notes:
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AAPA CALENDAR

March 1
Membership suspension for non-renewals

March 12-18
AAPA Exhibit Booth at USCAP, Seattle, WA

March 15
Monthly CE article released this month

April 1
Journal submission deadline

April 11-13
AAPA Spring Meeting, Chicago, IL

April 14
Third Annual Pathologists' Assistant Day

April 15
Monthly CE article released this month

April 24-30
Lab Professionals Week

May 15
Monthly CE article released this month

Registration is open for the Spring Meeting! It will be held at The Fairmont Chicago, Millennium Park, on April 11-13, 2016.

Space is limited for this smaller, condensed meeting, so you'll want to register soon. We look forward to seeing you there!

April 14, 2016
Pathologists' Assistant Day

AAPA
American Association of Pathologists' Assistants

Caring for the whole patient, one specimen at a time.

We are excited to begin preparing for our 3rd Annual Pathologists' Assistant Day on April 14, 2016! PA Day represents a great opportunity to promote our profession and display the pride we take in providing quality care for patients across the country. Furthermore, we would like to build upon our prior efforts to celebrate, within our workplaces and the community, the important role we play in healthcare.

As PA Day approaches, please be sure to visit the AAPA website for updates and downloadable materials to help promote PA Day at your institution. We encourage you to share your stories and photos on our PA Day Blog and PA Day Photo Gallery; both can be found on the AAPA website. You can also use the hashtag **#PADay** on social media.

We want to strongly encourage you to take an active role in using these materials as a means to educate others about the Pathologists' Assistant profession. There are numerous ways to accomplish this. For example, notify an administrator in the department or contact your institution's marketing department to ask about placing an ad on your Intranet/web page, message board, screensavers, or in one of their publications.

Finally, this provides a great opportunity to promote and celebrate our profession in the week leading up to and coinciding with Medical Laboratory Professionals Week scheduled for the week of April 24-30, 2016.

Like last year, we again look forward to seeing and hearing all of the stories on how you were celebrated! ■

An Argument for Pathologists' Assistants Generated Literature

by Meghan Pickard

Although input from other fields and other colleagues outside the PA world is invaluable, some of the very best teachers and reservoirs of knowledge are unsurprisingly PAs themselves. Despite this, and with the free admittance that this is painting the profession with a broad brush, pathologists' assistants are not the ones publishing. To investigate this discrepancy further, three studies were designed. First, Continuing Education credits (CE) were analyzed to see if an increase of PA authors also increased the relevance of the CE to the field. Second, the journals of other major physician extenders were compared to that of pathologists' assistants, to ascertain whether PAs publish at the same rates and varieties as similar professions. Finally, the available PA generated literature was examined with geography, subject matter, and an eye to the future.

STUDY ONE: Does PA-Generated Continuing Education (CE) Improve CE Available to the Field?

Background

Pathologists at many institutions still gross, but pathologists' assistants have completely taken over that aspect in labs across the country. PAs are increasingly being relied upon to teach residents, PA students, and grossing technicians to recognize all relevant pathologic data up to the point of microscopy. In short, there is the expectation that PAs are experts in the fields of gross anatomy and pathology. In this light, the idea of Continuing Education credits (CE) becomes even more important as the PA is less a technician doing cookie cutter work, and more a discerning expert who could expedite or ruin a case. For most PAs, there are three main sources of CE: boards and conferences available at their specific institution, the ASCP, and the AAPA. As tumor boards can vary greatly by institution, they are not analyzed in this study.

Methods

All new PAs are now accredited through the American Society of Clinical Pathologists (ASCP), an organization that provides and tracks CE for numerous types of lab staff, from technicians to pathologists. To maintain their certification, a PA must accumulate 20 credits in anatomic pathology, 1 credit in lab safety, and 24 credits in a related field.[1] On the ASCP's website, sixteen disciplines are listed as subheadings, and courses are available under each subheading.[1] The two disciplines arguably most relevant to this field are surgical pathology and autopsy/forensics. As of September 2015, 147 courses are available under these headings, and 124 of these explicitly state pathologists' assistants as one of the target groups of the lesson.[1] Most of the lessons are written by pathologists, and none are explicitly written by PAs. The ASCP classifies the lessons by anatomic region (as referenced in Figure 1), and for ease of comparison, this study further sorts them into focus areas (as referenced in Figure 2).

In order to compare these offerings with the PA-originated CE offerings published by the AAPA, the following study was designed. The 147 courses offered by the ASCP were compared to the CE credits currently published on the AAPA website as of September, 2015.[2-28] Only articles associated with potential CE credits were included. The articles were divided into subcategories based upon their title, abstract, and where possible and necessary, their exact text.

"Ancillary Studies" referred to anything not traditionally thought of as a PA role (immunochemistry, molecular diagnostics, etc.). "Autopsy" included any adult, pediatric, or forensic autopsy case. "Case Report" was a category of exclusion and was reserved for reports in which the main focus was on the gross and microscopic findings. Case reports on autopsies or those that mainly or exclusively focused on immunochemistry or molecular studies were classified with "Autopsy" or "Ancillary Studies," respectively. "Frozen" referred to any case report, instruction guide, or general report that featured frozen sectioning as the main focus. "Gross" referred to any learning module that, instead of focusing on a single case like a Case Report, focused on a single pathologic feature and drew from several cases. "Management" referred to any learning module that focused on running a lab. It is important to note here that the ASCP does have further offerings on management that were not explored in this study as they did not overlap with the two chosen disciplines. The final category, "Micro", included articles that primarily focused on the histological appearance of different diseases.

Results

The most dramatic finding from analysis is that a high percentage (50%) of the CE offered by the ASCP marketed at PAs is best described as focusing primarily on subjects slightly outside the usual PA realm (immunochemistry, molecular testing, etc.). This is not a bad thing; certainly PAs can be involved in these tasks and well-established PAs may receive more benefit from a learning module slightly outside their usual task list. However, it does contrast strongly with the breakdown of percentages from the AAPA. Here, the majority of CE credits fall into either "Case Reports" (38%) or "Gross" (36%). However, a relatively low percentage of articles (11%) focus primarily on "Ancillary Studies." Figure 3 shows the breakdown of percentages between each of the CE providers. Using this data, at least, ASCP and AAPA are both strong providers of CE, but the focus and modules are wildly different. Though the ASCP offers a greater amount of CE credits, the AAPA arguably offers more directed and potentially more useful credits. This is hardly surprising as almost all of the AAPA's credits are written by pathologists' assistants for pathologists' assistants, whereas in this particular study, no ASCP offerings were found to be marketed exclusively to PAs, nor were any of the offerings actually written by PAs. While there will certainly always be a place for a wide variety of learning modules written by people outside of this field, there seems to be justification for expanding the amount and breadth of topics on which PAs write.

	ASCP	AAPA
Adult Autopsy	11	4
Bone	3	2
Breast	16	6
Derm	14	2
Endocrine	1	2
Forensic Autopsy	4	0
General	3	17
GI	5	6
GU	6	2
Gyn	3	9
Head and Neck	8	4
Heme	12	4
Liver	2	4
Lung	3	4
Neuro	1	2
Ped	1	10
Pediatric Autopsy	1	4
Renal	3	6
Soft Tissue	3	11
CV	0	4

Figure 1: CE currently available, sorted by anatomic region

	Brief Description	ASCP	AAPA
Ancillary	Primary focus is outside traditional PA realm, especially immunochemistry or molecular studies	73 (50%)	6 (11%)
Autopsy	Adult, pediatric, or forensic autopsy cases	19 (13%)	4 (7%)
Case Report	Main focus on gross and microscopic findings of a single interesting case; category of exclusion	8 (6%)	20 (38%)
Frozen	Frozen sectioning as primary focus	2 (1%)	1 (2%)
Gross	A report on a disease process that draws from several cases	15 (10%)	19 (36%)
Management	Management as primary focus	1 (1%)	2 (4%)
Micro	Microscopic appearance of disease is primary focus	28 (19%)	1 (2%)

Figure 2: Types of CE learning modules available from the ASCP and AAPA

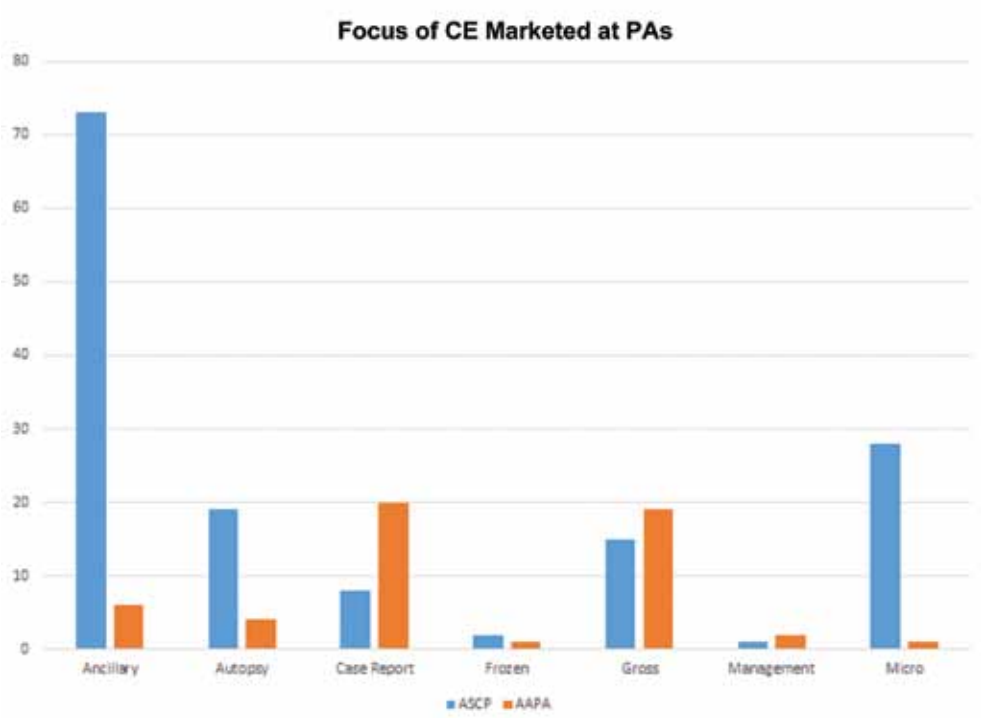

Figure 3: Types of articles offered as CE, expressed as percentages

AAPA Exhibit Booth Travels

The exhibit booth travels to major pathology-related conferences. We promote the PA profession, build relationships with exhibitors, and endorse our annual conference. If you're able to be a booth volunteer, contact the Central Office!

USCAP: March 12-18, 2016, Seattle, WA | **APC:** July 12-15, 2016, San Diego, CA
Washington State Convention Center | Rancho Bernardo Inn

STUDY TWO
Do Pathologists' Assistants Publish in a Manner Comparable to That of Other Physician Extenders?

Background

The PA field would no doubt benefit from more PA-published CE. However, not all published articles are destined for CE, which poses a second question: Should PAs publish for the sake of publishing? Certainly pathologists and residents are encouraged to publish, but peer-reviewed published work is not routinely expected of other clinical lab staff. In addition to being considered clinical lab staff, pathologists' assistants can also be considered mid-level care providers, or physician extenders.[29] It is therefore reasonable to compare pathologists' assistants rates of publishing with that of other physician extenders.

Methods

For this study, four peer-reviewed journals were compared: *The Cutting Edge* (Pathologists' Assistants, currently in Volume 5), T*he Journal for Nurse Practitioners* (Nurse Practitioners, currently in Volume 11), *Journal of the American Academy of Physician Assistants* (Physician Assistants, currently in Volume 28), and *Journal of Midwifery and Women's Health* (Nurse Midwives, currently in Volume 60).[2-4, 30-51] Two things were analyzed: the types of articles published, and the number of people publishing.

After briefly reviewing the available articles from each journal, the following broad categories were designed: "Photo," "Case Study," "Literature Review," "Study," "Quick Review," and "Instruction/Tips", illustrated in Figure 4. The "Photo" category referred to any type of case challenge. For T*he Cutting Edge*, this would best correlate with the Gross Photo

continued on page 14 >

Pancreatic Involvement in Von Hippel-Lindau Disease

by Michael Gerling, 2015 Leica Student Scholarship Winner, University of Calgary

Student members were given the opportunity to apply for a $2500 Leica scholarship. Six case reports were received with the following chosen as the winner. Congratulations Michael!

ONLINE QUIZ

CE Article

Case Report

A 33-year-old female presented to her physician in 2010 with a several-month history of diplopia, vertigo, and gait instability. Examination and imaging of her head revealed multiple hemangioblastomas in the cerebellum, which not only explained her symptoms, but also raised concerns about the possibility of Von Hippel-Lindau (VHL) disease, a disorder commonly associated with such tumors.[1] Additional diagnostic imaging revealed numerous hemangioblastomas in the spine, as well as simple cysts in both kidneys and the pancreas, providing further evidence of VHL disease.[1] A subsequent genetic workup identified a mutation in the VHL gene, confirming a diagnosis of VHL disease. There was no evidence of solid lesions anywhere in the abdomen at this time, and the patient was subsequently followed with yearly MRI and ultrasound imaging to monitor for changes in her renal and pancreatic cysts.

Following imaging in 2013, a non-specific change was noted in one of the pancreatic cysts located in the uncinate process, though it was unclear whether a solid lesion was present. The following year, imaging revealed that this area had become two solid nodules, measuring 5 cm and 3 cm in diameter. Several solid nodules were also found in the liver, raising suspicions of metastatic disease. Furthermore, MRI showed arterial phase hypervascularity with rapid washout. Subsequently, the patient underwent a pancreaticoduodenectomy, or Whipple procedure, with complete resection of the pancreas and corresponding resection of the spleen. Liver resection was not performed, though biopsies of the liver lesions were taken at this time.

Upon gross examination of the resection specimen, the presence of multiple fluid-filled cysts within the pancreatic parenchyma was apparent (Figure 1). Histologic examination of the pancreas led to a diagnosis of serous cystadenoma mixed with a well-differentiated intermediate grade neuroendocrine tumor (Ki67 index 5%) (Figure 2). The neuroendocrine tumor (Figure 3) measured 5.5 cm in greatest dimension, approached the mesenteric resection margin by 0.02 mm, and showed no endothelium-lined channel invasion or uniform detectable hormone expression. Three peripancreatic lymph nodes were also submitted – one was found to contain direct extension of neuroendocrine tumor, while the other two were negative for metastases. Liver biopsies were positive for well-differentiated, low-grade metastatic neuroendocrine tumor (Ki67 index < 2%). Examination of the spleen showed no pathologic indications.

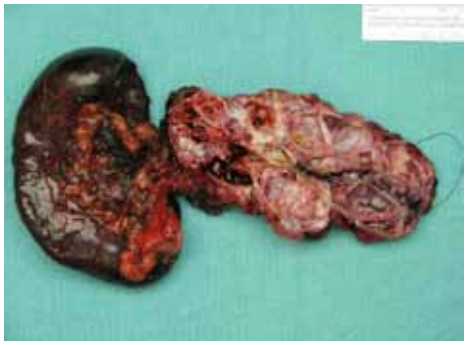

Figure 1: Cross section of the body and tail of the pancreas (with spleen) showing generalized cystic change to pancreatic parenchyma

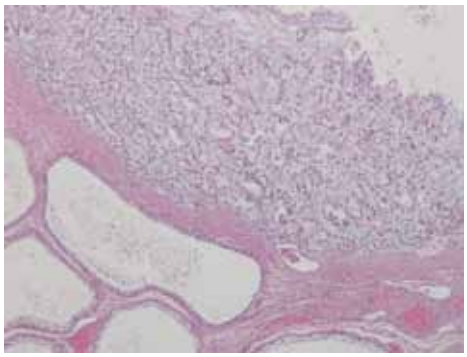

Figure 2: Micrograph of the pancreatic neuroendocrine tumor (upper right), and adjacent serous cystadenoma (lower left). The two types of lesions have distinct histological features, and can be easily differentiated here.

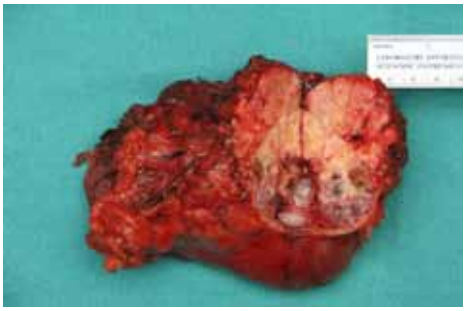

Figure 3: Cross section of pancreatic neuroendocrine tumor

The patient is currently doing very well post resection, with no complications or evidence of residual disease. She is currently being treated for her iatrogenic endocrine and exocrine pancreatic insufficiency, and continues to undergo routine imaging to monitor her liver and kidneys.

Discussion

Von Hippel-Lindau (VHL) disease is a rare, autosomal dominant inherited cancer syndrome resulting from a germ-line mutation in the VHL gene.[2] Individuals with VHL disease are prone to developing hemangioblastomas of the central nervous system (CNS) and retina, as well as cysts in the pancreas, liver, and kidneys. They are also at increased risk of developing renal cell carcinoma, pheochromocytoma, pancreatic neuroendocrine tumors, and epididymal cystadenoma.[3,4] The incidence of VHL disease is 1 in 36,000 live births,[4] and has a mean age of onset of 26.3 years.[2] Furthermore, it has almost complete penetrance, with 97% of patients presenting with symptoms by 60 years of age.[2]

The VHL gene is a tumor suppressor gene located on the short arm of chromosome 3.[1,2] Most individuals with the disease inherit a germ-line mutation of the gene from an affected parent, and a normal copy of the gene from an unaffected parent.[1] All cells of affected individuals who inherit the genetic trait contain a mutated copy of the VHL gene. However, in order for tumor formation to occur, the following conditions must be met: (1) based on Knudson's two-hit hypothesis of tumorigenesis, cells must undergo a deletion or mutation of the remaining normal gene copy, and (2) these cells must reside in susceptible target organs (i.e., the CNS, kidneys, adrenal glands, pancreas, epididymis).[1] In approximately 20% of cases, VHL disease results from de novo mutations.[1]

Possible mechanisms of tumorigenesis caused by VHL gene mutations include disruption of normal cell cycle, increased angiogenesis, alterations in cellular metabolism, and abnormalities in the extracellular matrix.[1,3] Patients with VHL disease have a high frequency of developing multiple types of tumors across multiple organ systems, and often also develop multiple tumors of the same type,[1,2] both of which occurred in the patient in this

case study. The earliest manifestation of VHL disease tends to be CNS or retinal hemangioblastomas – benign cystic tumors that appear as an over-proliferation of blood vessels with intervening neoplastic stromal cells.[2,3] Hemangioblastomas are a hallmark of VHL disease, with 57-60% of affected individuals developing hemangioblastomas in the cerebellum, 41-59% in the retina, and 13-14% in the spinal cord.[2] Grossly, hemangioblastomas are well defined, contain a thin capsule, are typically bright red in color, and may include fluid-filled cysts.[1,5] In CNS hemangioblastomas, the tumor usually grows inside the parenchyma of the cerebellum, brain stem, or spinal cord, and is often attached to the pia mater, with its extensive vascular supply provided by the pial vessels.[5] Histologically, hemangioblastomas consist of a rich capillary network surrounded by polygonal, lipid-laden stromal cells, and a general absence of mitotic figures.[1,5] While hemangioblastomas are benign, they can cause significant morbidity due to their location.[6] Symptoms vary depending on size and location, and may include headache, gait disturbances, dysmetria, nausea and vomiting, nystagmus, dysarthria, and dysphagia.[7] Therapy for hemangioblastomas is typically directed at symptom alleviation, with surgical resection being a standard of treatment for cerebellar and spinal hemangioblastomas.[3,5] Additional therapies include laser therapy for retinal hemangioblastomas.[3]

Compared to hemangioblastomas as a whole, the development of renal cysts and renal cell carcinoma is less common in patients with VHL disease, but is still relatively frequent, occurring in approximately 30% and 40% of VHL cases, respectively.[8,9] Both are considered cornerstones among the clinical criteria for the diagnosis of this disease.[8] Renal cell carcinoma is the primary cause of morbidity and mortality in individuals with VHL disease,[9] and accounts for approximately 50% of VHL-associated deaths.[10] Though the patient in this case study was not found to have renal cell carcinoma, imaging did show the presence of multiple bilateral renal cysts. Renal cysts are typically asymptomatic in patients with VHL disease, and seldom need treatment;[1] however, it has been proposed that renal cysts are the cancer-predisposing lesions in VHL-associated renal cell carcinoma.[11,12] Therefore, it is of critical importance that individuals with VHL disease receive routine surveillance if renal cysts have been found.

The development of pancreatic cysts, which include both simple cysts and serous cystadenomas, is common in patients with VHL disease, occurring in approximately 70% of affected individuals.[4] Serous cystadenomas are benign neoplasms characterized by multiple small, fluid-filled cysts (Figure 1); histologically, they appear as variable cystic spaces lined by a layer of glycogen-rich cuboidal epithelial cells (Figure 2).[3] Generally, both simple cysts and serous cystadenomas are asymptomatic in patients with VHL disease, though in cases where complete cystic replacement of the pancreas has occurred, pancreatic insufficiency may be seen.[13] Additionally, neither are associated with malignancy, and therefore rarely need treatment.[1,4] Conversely, pancreatic neuroendocrine tumors, which arise in 8-17% of patients with VHL disease, have malignant potential and thus are of greater clinical significance than simple cysts or serous cystadenomas.[14] Pancreatic neuroendocrine tumors can co-exist with serous cystadenomas in patients with VHL disease, as was the circumstance in this case study, though there appears to be no relationship between the presence of pancreatic cystic lesions and pancreatic neuroendocrine tumors in affected individuals.[4] Pancreatic neuroendocrine tumors are formed from pancreatic islet cells, and are encapsulated and well circumscribed. Histologically, they show trabecular architecture, small nuclei, and abundant eosinophilic cytoplasm, with nests of tumor cells surrounded by stromal collagen bands (Figure 2).[1] The majority of pancreatic neuroendocrine tumors in VHL disease are clinically non-functional and tend to be slow growing, and thus are a relatively uncommon cause of death in affected individuals.[15] However, due to their malignant potential, there is growing recognition of the potential consequences of these tumors if left untreated, making early identification important.[13] Metastatic spread occurs in up to 20% of VHL cases,[14] with the liver being the most common site of metastasis.[1] The presence of metastases appears to correlate with the size of the primary tumor, and therefore surgical resection of pancreatic neuroendocrine tumors is based on size criteria in an effort to prevent metastatic spread.[15] If tumors are less than 1 cm, patients are monitored with CT and MRI imaging every 12 months. If tumor size reaches 2 cm in the head of the pancreas, or 2-3 cm in the body or tail, then removal is recommended.[15] Whenever possible, an organ-sparing strategy is utilized, where only the tumor is removed in an effort to preserve any remaining normal pancreatic tissue. However, even after resection, the remaining pancreatic tissue is still susceptible to the development of new lesions.[15] In rare cases, the entire pancreas is resected with subsequent hormone replacement therapy.[1] This latter approach was utilized in this case study, but unfortunately the pancreatic neuroendocrine tumor had reached a size greater than 5 cm at the time of resection, with liver metastases already present.

In the present case study, the diagnosis of VHL disease is not only important for the clinical management of the patient, but due to the inherited nature of the disease has significant implications for the members of her family. Along with affected individuals, relatives found to be carriers of the VHL gene mutation require comprehensive, life-long surveillance to enable early detection of manifestations, particularly renal cell carcinoma and pancreatic neuroendocrine tumors.[2] The morbidity of VHL disease varies depending on the organ systems involved and the extent of the organ-system insult, and the average life expectancy in affected individuals is 49 years of age, due in large part to the high incidence of renal cell carcinoma.[9] However, early detection and treatment of tumors can help to reduce morbidity and increase life expectancy in patients with VHL disease. Even so, clinical management of these patients is complex because of the high frequency of multiple neoplasms in various organ systems, and therefore a multi-specialty team is necessary for optimum assessment and treatment.[1]

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BOOK REVIEW

Body by Darwin: How Evolution Shapes Our Health and Transforms Medicine

Written by Jeremy Taylor

REVIEW BY CHET SLOSKI

Chet Sloski

"Medicine without evolution is like engineering without physics."

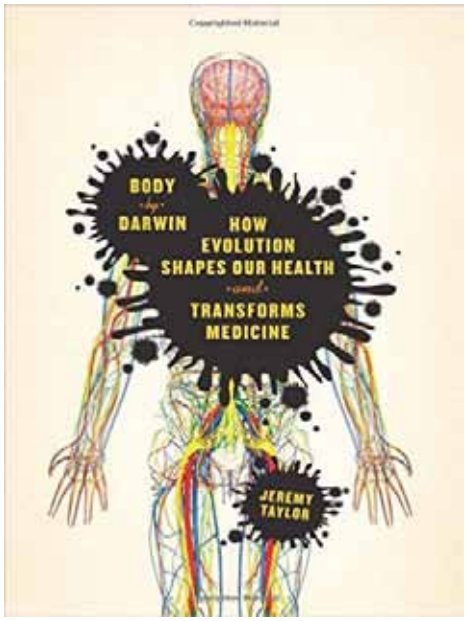
~ Randolph Nesse, coauthor of *Why We Get Sick: The New Science of Darwinian Medicine.*

In his new book, *Body by Darwin, How Evolution Shapes Our Health and Transforms Medicine*, Jeremy Taylor lays out the unmistakable link between human evolution and our health. Taylor argues that while the goal of human evolution is to maximize reproduction, evolution leaves us with human bodies that are chockfull of compromises, trade-offs, and constraints. And because we are living so much longer, and because biological evolution is so much slower than cultural change, much disease is owing to the mismatch of our bodies to modern environments and the vicissitudes of contemporary life. Taylor believes that evolutionary medicine allows us to look at the human body in a novel way that can lead to insights that run counter to the conventional wisdom about what illness is.

At the fundamental level, all evolution "cares" about is getting an organism to reproduce and pass on its genes to its offspring. To this end, evolution has invested in mechanisms designed to keep us alive into reproductive age, but often at the expense of negative effects on health as we get older. The unromantic truth is that evolution does not care about you once you segue into your forties or fifties; you are past your prime childbearing years.

Taylor describes the evolutionary background to some human medical conditions and explains why they exist in the first place. For instance, he believes that many oncologists fail to grasp that cancer cells behave much like bacteria and are therefore similarly capable of dynamic and brisk evolution against chemotherapy agents. Indeed, he speculates that cancer may never be curable and that perhaps our best shot is to make cancer a chronic disease.

In the chapter entitled, *Absent Friends, How the Hygiene Hypothesis Explains Allergies and Autoimmune Disease*, Taylor introduces us to the hygiene hypothesis, first postulated by Stewart Johnson. The



hygiene hypothesis suggests that the bacteria, fungi, and helminths in our guts, on our skin, and in our airways, are linked to a host of autoimmune and allergic diseases. There is increasing evidence that the sum of all these organisms, living on us and inside us—collectively known as our microbiota—can afford us protection against a formidable list of autoimmune diseases, including Crohn's disease, ulcerative colitis, type 1 diabetes, rheumatoid arthritis, and multiple sclerosis.

Humans and our microbiota have evolved together; we are dependent on one another. The current problem is that manifest improvements in hygiene, sanitation, and water quality, as well as extensive use of antibiotics and vaccination—all of which have raised the quality of life and life expectancy—has led to new epidemics of autoimmune and allergic disease not seen before. Modern sanitation has proved nocuous to most helminths, but the protection afforded by these organisms has also gone with it. How did these organisms evolve a symbiotic relationship with humans?

The original form of the hygiene hypothesis put forth suggested that exposure to a variety of bacteria, fungi, and helminths work the same way as childhood vaccination. In 1873 Charles Harrison Blackley noted that hay fever was associated with exposure to pollen but that farmers rarely experienced the condition. However, over the last ten years, a number of clues have arisen that suggest there is something more shrewd going on.

According to Taylor, the new spin on the hygiene hypothesis is that early exposure to a variety of childhood microbial infections from brothers and sisters, other children, and animals, somehow conditions the immune system such that it becomes more tolerant of potential allergens later in life. A hookworm infection may be no picnic, but it would not likely kill its host. However, a hyperaggressive immune response to the hookworm would eventually be more pernicious to the human host than to the worms. (Elephantiasis, for example, is caused by an immune response to a nematode parasite leading to lymphatic blockage.) The hookworm would have to be tolerated; our immune response toned down. Humans and hookworms have had time to evolve together—we have coevolved. So then, this new spin on the hygiene hypothesis is that due to improvements in sanitation and subsequent loss of widespread infection by helminths and other organisms, our immune system is no longer held in check, hence more autoimmune diseases—the body attacking itself.

For proof that we have coevolved with microorganisms, one needs only to look at our gut. The number of microbes in our guts exceeds the total number of cells in our bodies by a factor of ten; our gut microbiota weighs more than either our brain or liver. Scientists now refer to the existence of a meta-genome to represent the combined genomes of human and microbiota, a superorganism in which we humans could no longer exist without.

In the chapter entitled *A Fine Romance, How Evolutionary Theory Explains Infertility and Diseases of Pregnancy*, Taylor tells us that about 30 percent of embryos are lost prior to implantation and a further 30 percent are lost inside the first six weeks of gestation. Even if a pregnancy proceeds, other roadblocks such as preeclampsia must be dealt with. Preeclampsia is the leading cause of maternal mortality worldwide and accounts for up to 20 percent of all deaths.

With all this, one wonders how it is that there are millions of successful births a year.

The immune system, of course, recognizes and attacks the antigens present on grafted or transplanted tissue, and yet the maternal immune system seems willing to tolerate and host embryos and fetuses, despite the fact that they present foreign paternal antigens. Why does the mother not reject the "semi-allogeneic" fetus? The mother's immune system must somehow remain ignorant of the father's antigens. But how? Taylor tells us that it has long been noticed that women are more likely to suffer preeclampsia if they get pregnant after a short period of cohabitation with a sexual partner than if they cohabit for more than six months before conceiving. Also, subsequent pregnancies with the same partner tend to be at lower risk of preeclampsia. This suggests that components of the semen or sperm can communicate with the woman's immune system, and that through repeated exposure to her partner's ejaculate, it learns to recognize her partner's antigens and develop a tolerance to them.

It turns out that the vagina is an ideal route for getting chemicals into a woman's bloodstream. Within an hour or two of insemination, you can measure elevated levels of semen chemicals in a woman's blood circulation. Semen also contains chemicals which have known immunosuppressant properties and are associated with making the uterus receptive to implantation.

In the chapter entitled, *The Downside of Upright, The Relationship Between Bipedalism and Orthopedic Illnesses*, Taylor tells us that human bipedalism came with crippling costs that today manifest themselves as everything from lower back pain to foot pain to hemorrhoids; all because we have turned our spines ninety degrees into the vertical.

Several evolutionary theories persist on the emergence of bipedalism. There is the "watching out" hypothesis that suggests bipedalism would have allowed individuals to stand up and look out over the long grasses and spot predators. The "freeing up the hands" hypothesis would have allowed us to use tools and gather food. Whatever the cause, it seems bipedalism has left us with a number of contemporary maladies costing billions in medical expenses and human suffering.

But Taylor tells us that some evolutionary anthropologists believe that the human spine has been unjustly maligned. John O'Dowd is an orthopedic surgeon at St. Thomas Hospital, London, and a world expert on backs. He does not gainsay that lower back pain is prevalent worldwide, but explains that back pain is notoriously difficult to pin down. You can have a bum spine without lower back pain, and you can have lower back pain without a bum spine. It may be that the source of the pain is in some muscle or ligament that is difficult to image on a scanner. Or the pain may be in the brain, rather than the back.

Comparative anatomists tend to agree that there is nothing particularly singular about the human erect spine and that many of the problems we have with it we share with animal species that are quadrupedal, particularly if they live long enough. Added to this, our spine was not designed by evolution to sit in chairs all day or to stand stationary and upright for long periods. As mentioned, evolution does not care about us in old age, and back pain, foot problems, and the like are more prevalent in old age.

Taylor tells us that another advantage to bipedalism is that humans can run long distances. Dan Lieberman, a professor of human evolutionary biology at Harvard, postulates that long distance running could have helped us during hunting; not by outrunning our prey, but by outlasting them. Any hair or fur-covered animal that has to pant in order to cool down is at a disadvantage to humans because they cannot pant and gallop at the same time. Over long distances we could catch them. Call it persistence-hunting by endurance running.

So then, the rise of bipedalism by evolution has served its purpose well. As far as foot and back problems, perhaps we have only ourselves and our lifestyles to blame. Coincidentally, as I type this at my desk, I suddenly notice how bad my posture is.

In the chapter *Hopeful Monsters, Why Cancer is Almost Impossible to Cure*, Taylor introduces us to scientists who study evolution in cancer and who see cancers as miniature ecosystems, composed of many genetically variable entities, or clones, distributed throughout the cancer mass. These clones battle with one another for survival in the same way that animal or plant species compete with one another, where climate, nutrients, and other factors act as selection pressures allowing evolution to commence. Cancer cells compete for food and oxygen, and develop resistance to attack by our immune systems and toxic chemotherapy. Evolution selects for those cancer clones that will survive and become the dominant "species." This genetic heterogeneity is synonymous with aggressive malignancy and the more heterogeneous a tumor—the more genetic variability there is between cancer clones—the more difficult it will be to eradicate. The evolution of cancer clones, within the mass of a single tumor, is Darwinian evolution in miniature.

Cancer researchers tell us that chromosomal instability is the engine of tumor progression and tumor heterogeneity, guaranteeing that no two tumors are exactly alike and that no single tumor is composed of genetically identical cells. This is an obvious problem for oncologists as well as those seeking a cure for cancer.

The most dreaded behavior of cancer cells is metastasis. If tumors were homogeneous masses of cells, there would be no metastasis. But there is fierce competition between cancer cells for resources so they tend to grow and divide more rapidly, using up to two hundred times the amount of glucose required by normal cells. Researchers tell us that the breakdown of sugars inside the cancer leads to buildup of acid, and this is also a strong promoter of the invasiveness and metastasis that we associate with the later stages of malignancy. Oxygen gets depleted toward the center of tumors, and the resulting hypoxia is also a prime mover. According to cancer researcher Athena Aktipis, cancer cells move on to a new location or they will starve to death. These selective pressures move evolution.

Once cancer cells spread to new regions, they encounter different environments with different selection pressures. Each metastasis will soon evolve different characteristics from any other metastasis, and to the parent cancer. Any drug selection to the parent cancer will be less efficient at killing the metastases. According to cancer researcher Mel Greaves, in many cases, all chemotherapy does is provide the selection pressure to push cancers toward malignancy, not away from it.

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BOOK REVIEW

Body by Darwin: How Evolution Shapes Our Health and Transforms Medicine

Written by Jeremy Taylor

REVIEW BY CHET SLOSKI

> continued from page 11

So what to do? Cancer researchers are experimenting with drug regimens aimed at stabilizing cancer rather than eradicating it. At the Moffitt Cancer Center in Florida, Bob Gatenby, Ariosto Silva, and Bob Gillies, have been mathematically modeling cancer to get a handle on why chemotherapy so often fails to eradicate it. In a move to contain rather than to smash it in submission, they have come up with an idea called adaptive therapy by which chemo is not given at the same dose every day, but pulsed periodically. The experiment was performed on mice, one group given regular doses of chemo and the other group periodic adaptive therapy. The standard group responded well, but eventually the tumor recurred and they died. The adaptive therapy group received modulated doses that gradually decreased with time so that, by the end of the experiment, the mice proved able to survive indefinitely with a small, stable burden of tumors that were held in check by a reduced dosage of chemo. Of course, mice are not humans, but nonetheless this is an intriguing line of research that is certain to be continued.

In summary, Jeremy Taylor's book is a solid introduction to those unfamiliar with the relatively new field of evolutionary medicine. With this book, and others like it, the general public can be educated that evolutionary theory is not some abstract concept to be accepted or rejected depending on one's personal leanings, but a real theory with real-world implications. ■

Seeking Nominees for Board of Trustees Seats

Term: 2017-2019

The AAPA is looking for qualified Fellow members who are interested in leading the profession by serving on the AAPA Board of Trustees (BOT). The BOT is the governing body of the AAPA and is responsible for the policies, strategic planning, and overall well-being of the organization.

Individuals may nominate themselves or be nominated by a Fellow member in good standing. BOT terms run on a staggered three-year schedule and seats currently held by Michael Mazzotta, Jon Wagner, and Lisa Whitehead are up for election.

Characteristics, Attributes, and Requirements of an ideal Board Member

Leadership requires knowledge, talent, skill, and the ability to make a difference. The nominee must be a Fellow member in good standing for a minimum of three years prior to being nominated. Preference will be given to members with AAPA volunteer experience. Other attributes to consider are education, background, and areas of expertise. First-time board members will be assigned a mentor.

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Serving on the Board of Trustees requires a three (3) year commitment of service, and a demonstrated commitment to the AAPA, its mission and goals. The BOT meets in person twice a year and monthly by teleconference.

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Questions?

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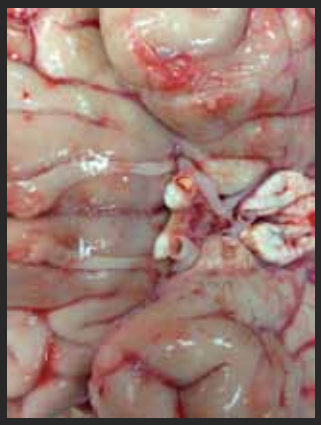
- ✓ Write articles, create content, serve as a peer-reviewer
- ✓ Submit your best work for our scholarships and photo contests
- ✓ Present a lecture or poster, recruit our speakers
- ✓ Attend our conferences, plan our conferences
- ✓ Volunteer within a range of micro opportunities such as staffing the PR booth, to participating in a task force such as the salary survey, to committee work, to serving on the Board of Trustees (BOT)

GROSS

Gross Photo Unknown

A 66-year-old man is status post knee replacement surgery. He is discharged from the hospital. While at home, he experiences chest pain and becomes confused, and his wife drives him back to the hospital. The patient continues to have worsening symptoms, including multiple seizures, and is unable to recover.



Quiz

1. The patient's knee surgery uncovered an unknown cardiovascular disease, which contributed to his demise.
    a. True
    b. False

2. What is the largest single cause of cardiac death?
    a. Spontaneous coronary artery dissection
    b. Atretic coronary osteum of the left coronary artery
    c. Atherosclerosis of the coronary arteries
    d. None of the above

3. The confusion and seizures indicate a possible brain injury or complication, which may be due to the following:
    a. The time lapse between the acute cardiac issue and the possible loss of blood to the brain can cause a seizure and possible confusion
    b. A clot could have traveled from a peripheral vessel to the brain, causing an acute brain injury, which may not be related to the cardiac issue at all
    c. A and B
    d. None of the above

Answers found on page 23 >

> continued from page 7

	Brief Description	JM [47-51]	JAAPA [30-38]	JNP [38-46]	AAPA [2-4]
Photo	Case challenge with a visual component	0 (0%)	11 (13%)	11 (8%)	3 (16%)
Case Study	A report on a single patient with a remarkable disease	2 (5%)	19 (22%)	1 (1%)	6 (32%)
Literature Review	Well-researched article on a specific disease, treatment, law, or method	4 (10%)	35 (40%)	68 (54%)	2 (10%)
Study	Study with broad participation completed by the authors	36 (85%)	12 (14%)	28 (22%)	1 (5%)
Quick Review	Quick refresher course on a disease	0 (0%)	8 (9%)	6 (5%)	0 (0%)
Instruction/Tips	Quick tip or longer "how-to" guide	0 (0%)	1 (2%)	1 (1%)	7 (37%)

Figure 4: Comparison of article type between four major publications: JM = *Journal of Midwifery and Women's Health*, JAAPA = *Journal of the American Academy of Physicians Assistants*, JNP = *The Journal of Nurse Practioners,* and AAPA = *The Cutting Edge*

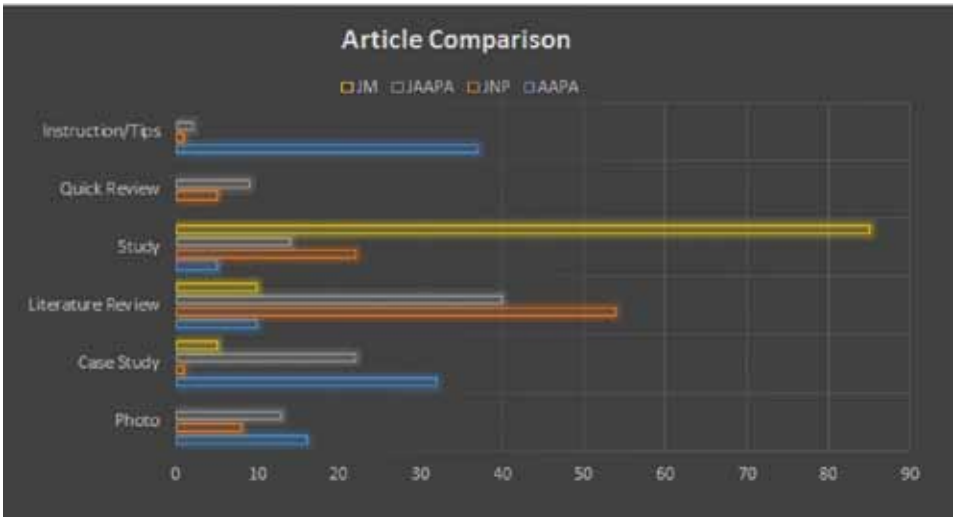


Figure 5: Comparison of article type between major physician extender journals, expressed as percentages

	Unique Authors	Possible Authors	Percentage Published in 2015
Midwives	133	5110[52]	2.6%
Pathologists' Assistants	12	1500[53]	0.8%
Nurse Practitioners	300	122050[54]	0.25%
Physician Assistants	172	86700[55]	0.20%

Figure 6: Publishing rates in major journals of physician extenders

Unknown included in every issue, but for *The Journal of Nurse Practitioners* it might include a radiology scan and practice quiz questions. In every case, though, it was a straight identification quiz with no CE attached. The "Case Study" category included any description of a single case grossed/attended by the author(s) of the article. This was usually, but not always, attached to CE credits. The "Literature Review" category included any well researched article on a specific disease, treatment, law, or method that was relevant to the article's audience, but did not necessarily correspond to a specific case with which the author was involved. This was sometimes tied to CE. The "Study" category referred to any personal study conducted by the authors of the article and could include testing the efficacy of a drug, comparing teaching modules, or reviewing data available from several hospitals. The "Quick Review" category included an article, usually no longer than a page, whose primary focus was to review a disease with which familiarity was assumed but details may have been forgotten. This was not for CE credits. The "Instruction/Tips" category is fairly self-explanatory and could take the form of either a quick tip or a longer how-to guide for a new or difficult procedure or conversation. All peer-reviewed articles from each journal available from January 2015 - September 2015 were analyzed and sorted based upon their abstract, with results (expressed as percentages) illustrated in Figure 5.

Results

The chart demonstrates some obvious drawbacks with the comparison. Pathologists' assistants are significantly less likely to interact with patients and be part of any clinical trials than the other three physician extenders, so it is not surprising that the number of Personal Studies is so low for PAs. On the flip side, it is also unsurprising that a greater percentage of PA articles tend to concentrate on Case Studies or Photographs, as the PAs interaction with a medical case tends to involve a tangible entity rather than a series of histories. However, there are two areas in which PA publication could be expanded: Literature Reviews and Quick Reviews.

Literature Reviews may not always have the immediate attraction factor of a Case Report, but they are useful to either disseminate new knowledge in a PA-focused manner or provide a more in-depth understanding of a common (or uncommon) specimen crossing a bench. Furthermore, encouraging greater submission of Literature Reviews could open the door to publication for a number of populations, including PAs working at smaller, non-academic labs who may not receive many "case study worthy" specimens, PAs working at institutions in

which publication permissions involving patients is an impossible or difficult process, and PA students who may not have yet come across many highly complex cases at the time of encouraged publication. The PA community at large would also benefit from increased Literature Reviews as they can often have a more direct application to day-to-day work than do case studies. After all, a paper explaining how a new finding could alter a grossing approach, or a review of a disease that clarifies a confusing section, has more practical application than a guide to grossing an unlikely exact replica of a complex and exciting specimen. Case Studies are absolutely essential to PA continuing education and make for exciting and interesting reads and should continue to be published. However, an increase in Literature Reviews could also greatly benefit the field.

Second, both *The Journal for Nurse Practitioners* and the *Journal of the American Academy of Physician Assistants* offered some sort of quick review. These tended to be about a page long, and highlighted a specific disease, in these cases focusing on the symptoms and cause. Something like this might be especially welcome to those in charge of teaching to use as a quick reference guide. For more experienced PAs, this could be an opportunity to write on something they've become an expert in over the years. Sharing experience and refreshing knowledge are two goals that can be easily met with some type of review.

As an interesting statistical side note, the four professions examined do have significantly different rates of publishing. When comparing the number of people who have published in the last year in the journals listed with the number of people in the respective field, nurse midwives were the most likely to publish (2.6%), followed by pathologists' assistants (0.8%), Nurse practitioners (0.25%), and physician assistants (0.20%) (Figure 6). The p-values for all comparisons were less than 0.05, suggesting significance. There are a few drawbacks to this data. First, both the fields of nurse practitioners and physicians assistants have multiple journals, meaning that the actual percentage of publication is likely much higher. Second, this study can only analyze what has actually been published, not how many articles are pending publication or were rejected. Finally, the percentages of both nurse midwives and pathologists' assistants are helped by the fact that they are relatively small fields, and need only a few articles to produce a relatively large percentage. However, the data does seem to suggest that PAs publish roughly in line with their fellow physician extenders, although there is obviously much room for expansion in all fields.

STUDY THREE: What is the Composition of the Currently Available PA-Generated Literature?

Calling for quantity is meaningless without an examination of quality. All material published and available on the AAPA website as of September 2015 was analyzed. This included *Beyond the Bench, The Cutting Edge*, and eBlasts. Case reports, gross photo reviews, and tips were considered, for a total of 83 unique documents with 62 authors.[2-28] Students published a combined 38% of the total articles available for CE during this period (Figure 7). Fellow contributions came from 14 states, as illustrated in Figure 8. For comparison, a heat map of the registered members of the AAPA is provided as well (Figure 9). Of course, this study looked at published works over only a limited amount of time, and it is very likely that additional states would have been represented if the scope were expanded. Furthermore, the location of some Fellow-published articles could not be determined. However, the map does serve to illustrate that the geography of publication is unevenly skewed.

The type of articles published were analyzed earlier in comparison with the offerings from the ASCP, but it is possible to take a closer look at the most common areas explored, as illustrated in Figure 10. Although every lab is different, these categories do tend to be somewhat universal, with the possible exception of a very large proportion of articles concerning soft tissue compared to head and neck. An analysis of the data demonstrates that the subject matter and quality of published articles is certainly present, but the volume, especially of Fellow-generated articles could be higher.

Conclusion

The PA community is still a small one, but an increasingly visible and respected one. Publishing offers an opportunity for greater visibility, better educational modules directed at this field, and the chance for professional growth. Following this article is a list of proposed article types that the AAPA could actively seek. The ability to learn something new each day is what attracted many to this field, and the very best knowledge, advice, and perspective tends to come from other PAs. It seems every PA has a story, body of knowledge, tip, or general advice just waiting to be told. Perhaps it's time to add yours.

continued on page 16 >

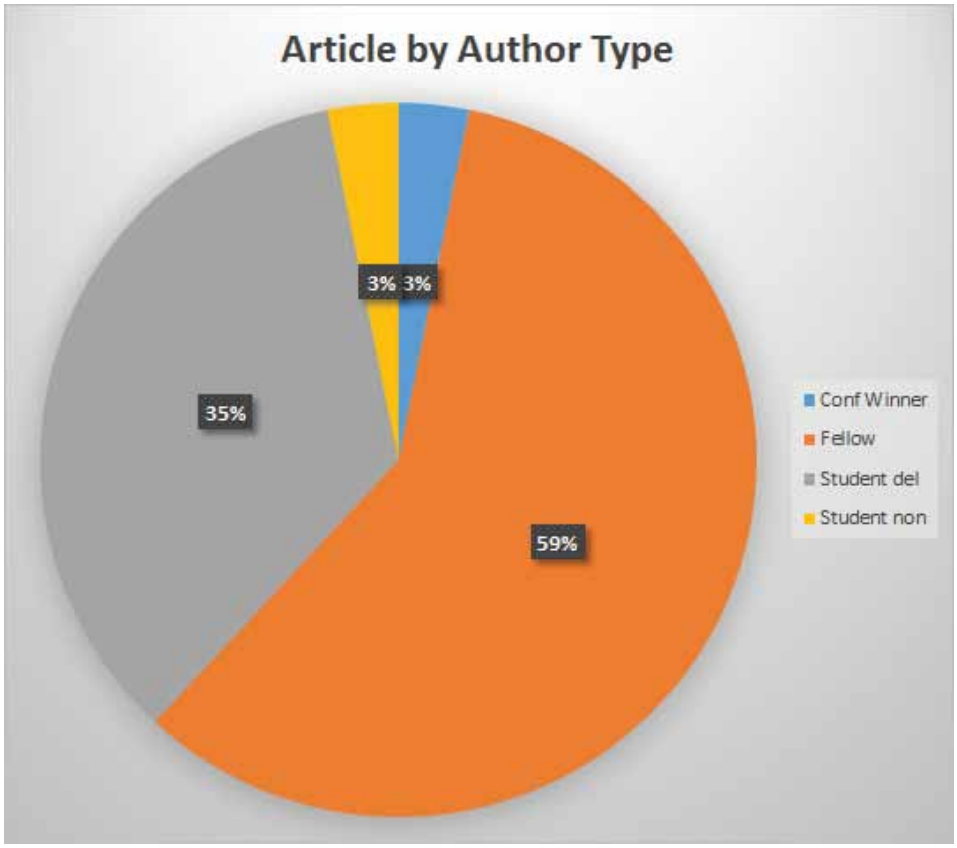


Figure 7: Published articles available on the AAPA website by author type

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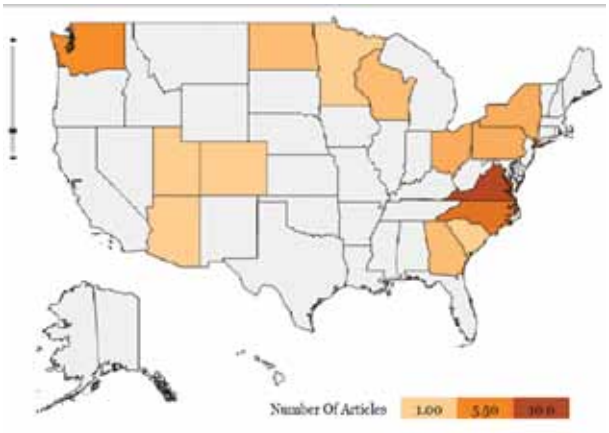

Figure 8: Heat map of location of non-student authors

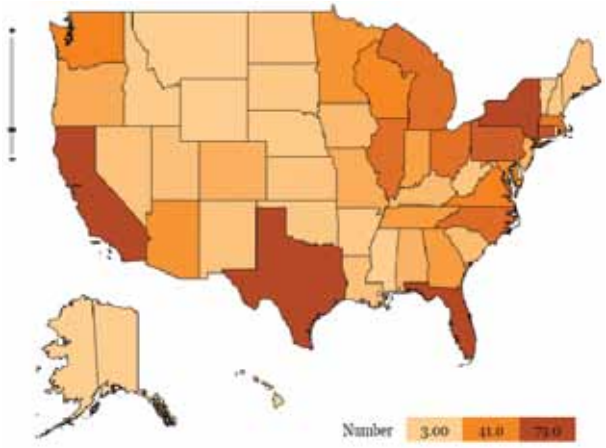

Figure 9: Heat map of AAPA Fellow members

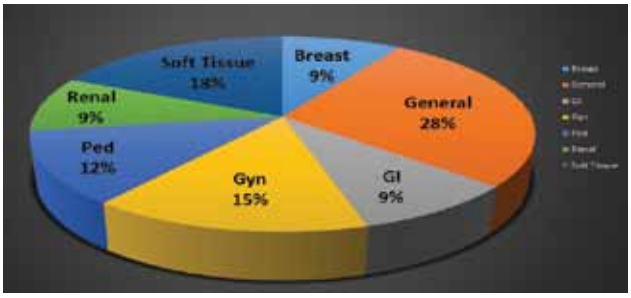

Figure 10: Most common subject areas offered by the AAPA

PROPOSED TYPES OF ARTICLES

Case Study:
Report on a specific case that crossed a bench with interesting findings. The specimen is followed from patient history through sign-out and implications are discussed. Gross and microscopic photos required.

Ideas: Anything with interesting gross and microscopic findings.

Original Research:
An analysis of available data or a trial run of a new method that would have interest for the broader PA community. This could be anything from a site-specific study on the best method for educating rotating students, to an overall analysis of PA standards across multiple institutions.

Ideas: Comparison of teaching methods, tracking turn-around times with different gross methods, fixation studies, PA responsibilities by region, prevailing attitudes in the literature toward PAs, etc.

Literature Review: Current Events
A well-researched and well-thought out presentation of a current topic in anatomic pathology that is specifically written for a PA audience.

Ideas: Headline-grabbing scientific discoveries, insights from other fields

Literature Review: In-Depth Analysis
A well-researched and well thought out presentation of a common specimen, disease, or issue encountered by PAs with implications relevant to a PA audience. Any new research should be highlighted.

Ideas: Any relevant topic, especially one with new findings

Refresher:
A quick summary of a specimen or disease that would be of use for a review or learning a new fact.

Ideas: Anything that could cross a bench somewhere is fair game! ■

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Product Review

The Kubtec Xpert 80-L is a stand-alone imaging system for pathology specimens. This unit is the largest of the Xpert series, with an available 17-inch by 17-inch detector. It is available as either a bench top unit or a mobile unit. This system is intended for imaging breast specimens, bone specimens, paraffin blocks, and for use in fetal autopsies.

Special thanks to Laurie Baxter and all the PAs at University of Rochester Medical Center. They have some experience with this product and were willing to answer a few questions about it.

RATING: 4.5 scalpels

PROS

- Excellent x-ray image quality – The images are as good, if not better, than typical radiology images.
- Extremely easy and fast to use; very user friendly – Calibration is a click of a button and takes less than a minute. The image pops up in less than a minute. Making notes on the image is extremely easy.
- Convenience – Our reviewers used the unit for specimens that they may not have otherwise. If you can't find the clip, just use the Kubtec and get an almost immediate answer.

CONS

- Cost – The unit is expensive, but it saves a Pathologists' Assistant's time which may offset the cost.
- The reviewed unit had a smaller detector, which doesn't allow imaging of larger specimens in a single field.
- Trackball instead of a mouse – Our reviewers were split on this. Some liked it, others did not.

FEATURES

- Largest available detector can image an entire mastectomy, full-term fetus, or adult femur
- Takes both x-ray and photo images which can be compared side-by-side
- Ability to make notes on the image, zoom in, and change contrast or brightness
- Images can be saved to the unit's hard drive for later viewing or importing to other software
- Available touch screen monitor

FINAL CUT

Overall, our reviewers loved the Kubtec Xpert 80-L. They found that they used it much more than they had anticipated. The reviewed unit had a smaller detector, which isn't even offered anymore. But even with that, they are able to take several adjacent images of larger specimens. The largest detector is recommended. The unit takes both x-ray and photo images. The images are viewable on a grid, which makes them easy to compare. Making notes on the images is easy and fast, with the ability to zoom in and adjust contrast and brightness. An image can even be made 3D, which helps to make small calcifications "pop out". The reviewed unit was not interfaced to an LIS, but it can be as the images are saved as jpeg files.

MEMBER SPOTLIGHT

Name: Dan Soderberg

Dan has been a PA for five years. He is employed by the Mayo Clinic in Rochester, MN.

Q: What's your favorite specimen to gross?

A: The big ovarian cancers.

Q: What's your least favorite specimen to gross?

A: Nasal contents.

Q: Where were you born and raised?

A: I grew up in Colorado.

Q: Last good book you read?

A: *John Adams* by David McCullough.

Q: Favorite restaurant?

A: Any good Indian/Turkish place.

Q: Where would we most likely find you on a Saturday night?

A: Playing a rousing game of *Sorry* or *Hide and Seek* with my wife and three kids!

Q: How did you get into the PA profession?

A: I started off as a med tech and knew pretty early on that I wanted something more exciting and hands on. I shadowed a couple of PAs (thanks Mark and Jaron!) who solidified my desire to pursue being a PA.

Q: If you weren't a PA, what other line of work would you enjoy?

A: Two of my other areas of interest in school were aerospace engineering and landscape architecture.

Q: What do you like most about being a PA?

A: I like the challenge of every specimen. I enjoy the feeling of contributing to someone else's care, solving a mystery for them. It's still fun for me to cut into diseased/cancerous tissue and see how everything looks on the inside.

Q: What's your favorite hobby?

A: Woodworking, sports, and reading. ■

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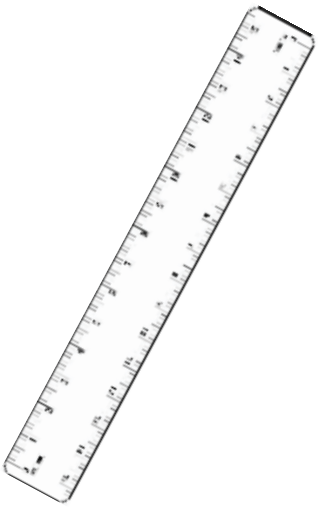

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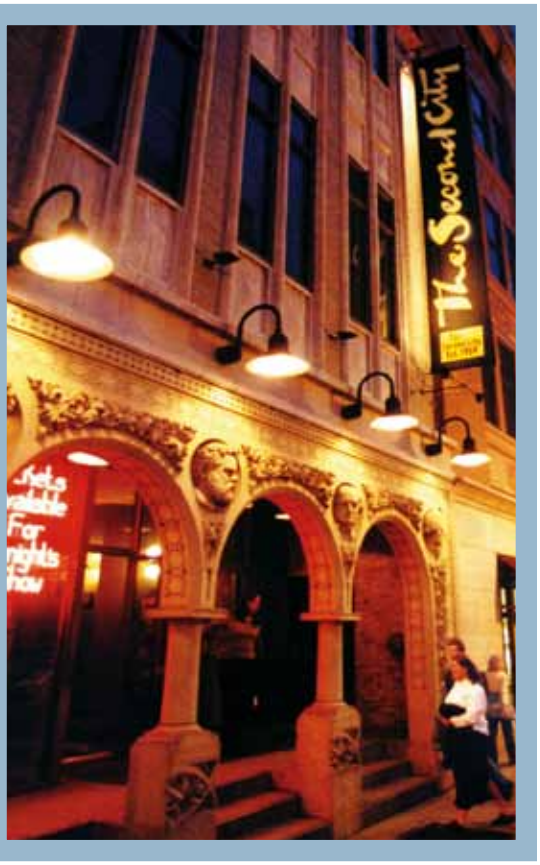


Spring Meeting: Chicago

by Becky Stankowski, Spring Meeting Chair

This year's Spring Meeting at the Fairmont Chicago Millennium Park will be held on April 11-13. We have great speakers lined up -- many of this year's speakers were recommended by local PAs. We even have some pathologists' assistants presenting lectures! In addition to lectures on topics such as GYN, bone and soft tissue, head and neck, and prostate, I'm also looking forward to lectures on biobanking, workplace engagement, and communication.

Breakfast and lunch are included with registration. Join us Monday night from 5-6 pm, for a cocktail reception before you head out for dinner. We've invited second year pathologists' assistant students from Rosalind Franklin University to join us for the cocktail reception and the last two lectures on Monday, to give them the opportunity to experience a continuing education meeting. On Monday, Avantik Biogroup and Genetics Associates will be our daily sponsors, and Tuesday, Nicklas Medical Staffing and Milestone will be our daily sponsors. Make sure to visit their tables to check out their products and services.

The Chicago Transit Authority's (CTA) Blue Line trains travel between downtown Chicago (the Loop) and O'Hare, 24 hours a day. The CTA's Orange Line trains travel between downtown Chicago and Midway. At both airports, taxis are available on the lower level. GO Airport Express offers daily, door-to-door service to/from O'Hare and Midway. Check out the Transportation section of the Spring Meeting webpage for a deal from GO Airport Express.

The Fairmont Chicago Millennium Park is a few blocks from Millennium Park, the Chicago Cultural Center, and the Art Institute of Chicago, and a short walk from the many shops on the Magnificent Mile, and Macy's historic flagship store on State Street. The Fairmont is just minutes from the Field Museum of Natural History, the Hancock Observatory, the Shedd Aquarium, Willis Tower, and Navy Pier. Also within walking distance you'll find the Chicago Riverwalk, AMC River East 21 theaters, Lucky Strike bowling, Graham Cracker Comics, the Lego Store at Water Tower Place, and the nearest location of my favorite Chicago pizza place, Giordano's.

The Windy City has plenty to offer sports fans as well. The Chicago Bulls have home games at the United Center on Saturday, April 9 and Wednesday, April 13. Can't wait for baseball? I know the feeling. The White Sox have afternoon games against the Cleveland Indians at U.S. Cellular Field on April 9 and 10. You can also cheer on the Cinncinati Reds as they face the Cubs at Wrigley Field in the Cubs' home opener on Monday night, April 11. The Cubs and Reds complete their three-game series Wednesday and Thursday night.

Discover one of Chicago's many neighborhoods, blues clubs, theaters, breweries, tours, comedy clubs, or restaurants. Not sure where to start? Try choosechicago.com. When you get to Chicago, visit the official visitor information center in Macy's on State Street.

I look forward to seeing you in Chicago for a great Spring Meeting! ■

Executive Director REPORT

Michelle L. Sok, CAE
Executive Director
executivedirector@pathassist.org

The New Year brings some exciting changes, including the restructuring of our committees. The primary reason for this change is to better align committees with our strategic plan initiatives. Benefits include streamlining committee work and opening up the lines of communication. This restructuring allows us to move out of our existing committee silo structure to a new model that allows for more engagement within and across our committees.

While the new structure being developed reduces our committee number from seven to four, we have built a stronger committee hierarchy, are able to more easily identify open volunteer positions, and are encouraging succession planning.

Administration
Committee Chair Lindsay McCarley and Vice Chair Karen Ron continue to lead this committee. BOT Oversight has been assigned to Lisa Whitehead. This committee has expanded into three subcommittees.

Administration Committee Overview:
- Governing Documents
- Nominations & Elections
- Volunteer Management

Education
Committee Chair Beth Obertino-Norwood and Vice Chair Jennifer Perez continue to lead this committee. BOT Oversight has been assigned to John Eckman and Steve Rath.

This new super committee, which previously included subcommittees for *Beyond the Bench* and Study Materials, has now expanded its structure by adding a subcommittee for CE Content Generation & Management, as well as bringing the Conference Committee and parts of Publications and IT under its umbrella.

Education Committee Overview:
- *Beyond the Bench*
- CE Content Generation & Management
  - PACE Compliance
  - Peer-Review
  - Quiz Creation
  - Scholarships
- Meetings
  - Exhibitor/Sponsor Recruitment
  - Food & Beverage
  - Posters
  - Production
  - Social Engagement
  - Spring Meeting
  - Speaker Recruitment
- Study Materials

Marketing/Communications "MarComm"
The PR Committee and parts of IT have merged to create a new MarComm Committee chaired by former PR Chair Charlene Gettings and Vice Chair Joel Wichmann. BOT Oversight has been assigned to Bill Ahlfeld and Michael Mazzotta.

This new super committee has greatly expanded its structure by adding several subcommittees to better align with our strategic plan.

MarComm Committee Overview:
- Ad Sales
- Advocacy
- Communication
- Marketing – External
- Marketing – Internal
- Media
- Website

Membership
Committee Chair Roseann Vitale and Vice Chair Leslieann Gilbert continue to lead this committee. BOT Oversight has been assigned to Karen Riviello.

This committee has expanded its structure by adding several subcommittees to better align with our strategic plan.

Membership Committee Overview:
- Recruitment
- Retention
- Specialty Groups
- Student Council
- Student Delegate Program
- Surveys

If you're interested in joining a committee and want to get involved, please contact a committee chair, contact our office, or visit the AAPA website to find out how.

Board of Trustees REPORT

Jon H. Wagner
Board of Trustees Chair
botchair@pathassist.org

My years of experience as a pathologists' assistant have demonstrated that changes in laboratory regulations and accreditation standards are the norm. It seems the ongoing reality is: what was expected yesterday is less than what is required today. While this circumstance creates an added burden for those responsible to accommodate the changes, it also creates opportunity for those willing to do the work of owning the responsibility.

Some of you may already know that the AAPA has been active in many regulatory environments. Just during my tenure as leader, we have been involved in licensing issues in California, Illinois, Minnesota, and Florida. And, we have continuing involvement in the licensure challenge in New York. In fact, we are hopeful to announce soon that the licensing issue in New York is settled and, with that announcement, direct members toward the mechanism to acquire a license to practice as a Pathologists' Assistant in New York.

While what happens at the state level is important, we disserve the membership if we ignore the other facets of regulations that confront our profession. And, returning to the initial thought, we must be ready to do the work of owning the responsibility of compliance. Doing so helps the profession, supports practitioners, and aids managers who take seriously the responsibility of maintaining quality laboratory practices. And, while crafting the support mechanisms requires a high level of commitment, seeing the work through creates the possibility of supporting pathologists' assistants in a unique way.

To that end, the AAPA is very close to launching an employer support package that is being crafted to help employers maintain compliance with CAP, and other regulators who employ pathologists' assistants. The packet represents a sizeable investment on our part, and will be offered for sale to employers, but, we feel the need for such a service is significant.

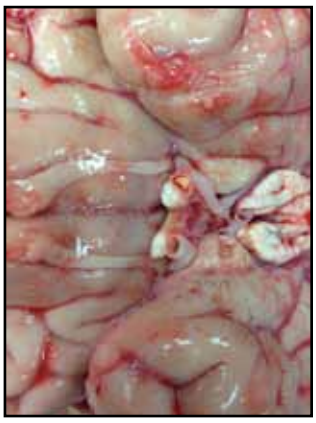
Our website analytics continue to show that a large number of the visitors viewing the AAPA website are employers or potential employers. Thus, anything we do to support this group, from helping to find a pathologists' assistant through supporting compliance with regulators is a plus. And while the AAPA may identify a new revenue stream through this offering, that revenue stream is attached to an objective to help laboratories employ certified pathologists' assistants. We, the AAPA, want to own the responsibility of regulatory compliance, but, we want to do so in a way that encourages the employment of certified pathologists' assistants. Thus our help offered to employers translates into support for our membership and profession!

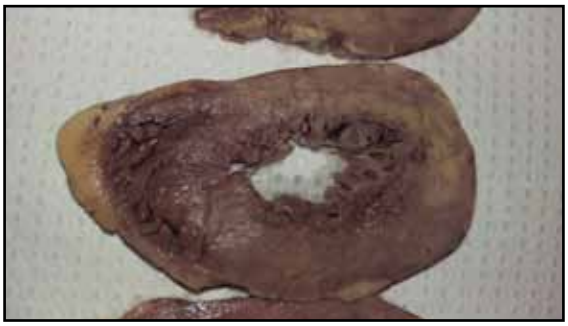
Did you know that in 2015 the quantity of job hotline posts for pathologists' assistants tied a record for the most postings in one year? Can you see where all this is headed? The AAPA is representing you, our membership, to the AJCC, we're collaborating with the CAP in crafting a guideline for the macroscopic processing of cancer cases, we are heading toward very specialized education, and we are targeting the marketplace - doing all we can for expansion and support of the pathologists' assistant job market. For several years we have devoted ourselves to the work of bringing this profession onto the radar screen of other major stakeholders in healthcare. We are close – really close!

The only way to conclude this report is by saying thank you to our staff and volunteers for their dedication. And, I must not neglect my debt of gratitude to you - our members. Our strength comes from you , and our resources come from your continued membership and purchases made from this association – thank you! ■

Gross Photo Tutorial

The patient in this clinical situation went through with a surgical procedure to fix his knees. Following the procedure, he suffered complications highlighting underlying disease in his body. An autopsy concluded that he had atherosclerosis throughout his body, and had embolized a piece of plaque, which settled into the Circle of Willis. There was severe carotid stenosis, which is thought to be the source of the embolized plaque. He also was found to have acute myocardial infarction. The largest single cause of cardiac death is coronary artery atherosclerosis. Acute myocardial infarction can cause a loss of blood pumping to the brain, especially with a large time lapse between the cardiac episode and resuscitation of the body. This blood loss can cause swelling of the brain and brain injury. Atherosclerotic plaque formed in more distal arteries, including carotid arteries, is more likely to embolize to the brain. In this situation the patient had an acute cardiac incident coupled with embolization of a fragment of plaque, so life-saving attempts were not successful. It is important to obtain a detailed clinical history to help make the findings of the autopsy procedure explain the symptoms leading to the demise of the patient. ■





Gross Photo Unknown

Quiz Answers:

> continued from page 13

1) A 2) C 3) C

NAACLS Accredited Pathologists' Assistant Training Programs

NAACLS
National Accrediting Agency for Clinical Laboratory Sciences

DREXEL UNIVERSITY COLLEGE OF MEDICINE (Pennsylvania)
MS Degree
Philadelphia, PA
www.drexelmed.edu

DREXEL UNIVERSITY COLLEGE OF MEDICINE (California)
MS Degree
Sacramento, CA
www.sacramento.drexel.edu

DUKE UNIVERSITY
MHS Degree
Durham, NC
http://pathology.duke.edu/academic-programs/pathologists-assistant-program

INDIANA UNIVERSITY
MS Degree
Indianapolis, IN
http://pathology.medicine.iu.edu/education/graduate/

LOMA LINDA UNIVERSITY
MS Degree*
Loma Linda, CA
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