The Official Daily Newspaper of the
AMERICAN ASSOCIATION OF ANATOMISTS
at Experimental Biology (EB) 2017

The Anatomy Voice

Monday, April 24, 2017

Don't Miss...

8:30am – 5:30pm
Vertebrate Paleontology Mini-Meeting
Room 176AB

10:30am – 12:00pm
Novel Function of Fibrinolysis in Tissue Repair
Room 175AB

10:30am – 12:00pm
Biomechanics of Multicellular Organization
Room 175C

12:30pm – 1:00pm
Career Networking Lunch
(Advance registration required)
Room 178B

2:00pm – 3:30pm
Molecular Signals in Cardiovascular Biology
Room 175C

2:00pm – 3:30pm
Anatomy Education Roundtable
Room 178A

4:00 pm – 5:30 pm
Reproducibility in Experimental and Preclinical Research
Room 175AB

4:00pm – 5:30pm
Novel Roles for Mesenchymal Cells in Cardiovascular Cell Fate Decisions and Patterning
Room 175C

5:30pm – 6:30pm
AAA Members Meeting
(formerly called the Business Meeting)
All AAA members are encouraged to attend.
Room 176AB

6:15pm – 7:15pm
Graduate Student/Post-doc Poster Reception
Anatomy Foyer

Anatomy Lounge

Visit room 176C for networking, coffee, and free wi-fi! Open daily, 7:30 a.m. – 5:30 p.m. Snacks provided during the 3:30 p.m. session break.

Introducing Young Investigator Award Symposium Speakers

C.J. Herrick Award in Neuroanatomy

Dr. Florian Merkle of the University of Cambridge is our 2017 recipient of the C.J. Herrick Award in Neuroanatomy. He will present his award lecture, "The Impact of Neuroanatomy on My Career: From Adult Neurogenesis to in vitro Disease Modelling," on Tuesday, at 8:30am in Room 175AB. On Tuesday night he will be presented with a plaque and honorarium for his contributions to the field of comparative neuroanatomy at the Closing Awards Ceremony.

Dr. Merkle received his B.S. in biology from the California Institute of Technology, and his Ph.D. in neuroscience from the University of California, San Francisco (UCSF). He postdoced at Harvard University where he worked to develop efficient gene editing tools for human embryonic stem cells and assembled a collection of over 100 deeply sequenced and characterized human embryonic stem cells to facilitate disease modeling and transplantation studies.

Dr. Florian Merkle

"As a teenager, I first became fascinated with the question of how something as complex as the brain could develop, and how different neurons regulate behaviors. When I discovered neuroanatomy and developmental neuroscience, I was hooked," shared Dr. Merkle.

Dr. Merkle's laboratory is interested in dissecting the molecular and cellular mechanisms by which hypothalamic human neurons regulate feeding behavior in health and disease. "We are focusing on the melanocortin pathway that is pivotally important for body weight regulation.

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Visit the Selfie Station at the AAA Booth (#402) today from 11:00 am - 3:00 pm.

Emily Caggiano, Ohio University, discussses her research during Sunday's undergraduate poster reception.

Is Bigger Always Better?

Scientists must sometimes push the envelope in their pursuit of understanding human anatomy. Panelists during Sunday's "EXTREME Anatomy: Living Beyond the Edge" presented comparisons between man and mammals as a means to prove there is a vast difference in structure and severity of size. Bigger is sometimes better, however, it can prove harmful to other species as far as long term survival.

Timothy Smith served as the session chair, opening with a discussion about how natural selection promotes risk taking, citing comparisons to the daily pet, i.e. dog.

Kenneth Catania spoke about how the nose acts like a visual system in the star nose mole. He reported that the skin surface does not detect odor, and is covered with 22 appendages that are made up of sensory organs. As to appearance, it was formed in place, then reverses its orientation during the course of development. Catania also provided the audience a visual brain map, which carved out the brain into eleven subdivisions. The mole's brain is, by observation, disproportionate to the number of nerve and sensory organs of a man.

Catania then elaborated upon the possible evolution of this curious creature, and made a reference to Darwin's origin of species dated in 1866. Along with explaining how the mole began, he went on to examine possible reasons for their extinction. The habitat of the star nose mole is full of competitive species as it relates to food supply.

Joy Reidenberg, Icahn School of Medicine at Mount Sinai, discussed adaptations that have enabled mammals to stay safe within water. Her presentation focused on two types of whales – moustached and toothed. Reidenberg focused on the substantial size of their head, nose, larynx, and mouth. These are some of the parts which provide the most protection to this animal. Sizable strength in vocals and suction capability allow the animal to keep their prey at bay. Reidenberg also brought up some qualities unique to this animal, such as it is the deepest diver

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Inside This issue...

Plenary Presenters Discuss Research Advancements

We as humans have a very open and ongoing curiosity about our own bodies. Understanding our makeup and mechanical functionality requires scientific study within both hospitals and laboratory settings. On Sunday morning, presenters during "Organoids: Recapitulating Anatomy in a Dish Plenary Session" discussed how stem cells, organoids and embroyo research brings us closer to fully understanding our genetic profile.

The session opened with in-depth discussion on using dish experimentation to determine organoid functionality. Hans Clevers, Hubrecht Institute, spoke at length about experimental testing of the small intestine. Clevers pointed out that each human being processes about 20,000 cell divisions over the course of their lifetime. To further explain this theory, he produced slides of 15 lgr5 stem cells in each crypt dividing each day. He reported that "when we lose stem cells, they are easily replaced by daughter cells." Clevers then reviewed visual diagrams of his experimentation of extensive plasticity in crypts, explaining that daughter cells can revert to LGR5 stem cells upon damage.

He then provided an overview of intestinal stem cell discoveries. In our view, a stem cell is not a hard wired element. He explained that they do not divide asymmetrically, and intestinal stem cells are not quiescent. They are also not rare, and stem cell hierarchy is not uni-directional, he added.

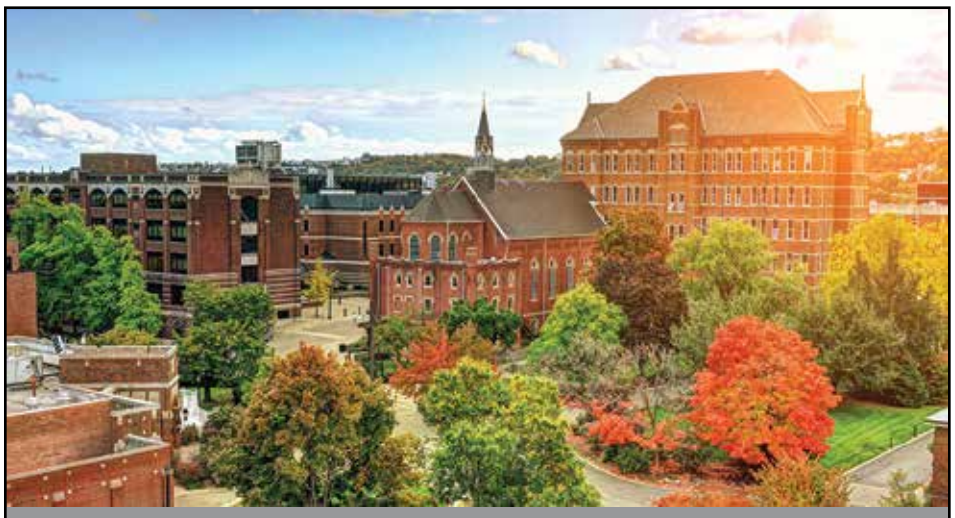
Eri Hashino, Indiana University, spoke about his research on 3D analyzation of inner ear development. She elaborated on the inner works of the ear, explaining that both areas of our ears contain sensory parts with hair cells that are very sensitive and easy to damage. They are interconnected, and there are a total of three chambers. Hashino identified two types of neurons within the ear, one being bipolar and the other is unipolar.

Hashino also provided the audience with updates on clinical trials in progress related to CHD7, TMC1 and TMPRSS3. She is hopeful to have updates on their progress in the near future.

Jason Spence, University of Michigan, discussed embryotic research as a method for molding more successful human lung development. He opened with a basic lesson learned from embryo experiments: growth factor signaling induces and patterns the endoderm. By conducting decades of model organism research, it allows us to build road maps of lineage induction. Spence showed the attendees an array of laboratory embryos used for testing, along with their accompanying results. Spence also shared a basic background on the human lung, its parts and their functions.

Spence also looked at the impact of both the FGF7 and FGF10 genes on the respiratory system. He pinpointed how FGF10 promoted the growth and expansion of spheroids and lung organoids. FGF7 is really required for the growth and expansion of isolated lung buds, and we can explore its usage for tissue expansion.

Attendees listen to speakers during Sunday's plenary.



Save the Date: 2017 Fall Regional Meeting

Fall Regional Meeting
at Duquesne University
Pittsburgh, Pennsylvania
Saturday, November 4, 2017

Planning Committee:
Anne Burrows, Duquesne University

Rebecca German, Northeast Ohio Medical University (NEOMED)

Timothy Smith, Slippery Rock University

Seth Weinberg, University of Pittsburgh

Follow Everything Anatomy on Twitter

Don't miss any of the action: keep up-to-date on sessions, announcements, discussions and more via Twitter. Follow @anatomymeeting - hashtags #anatomy17 and #xBio for constant updates about everything anatomy and more.

Here's a few top tweets from Sunday:

@vdoloughlin - #Anatomy17 #Karpicke: #students believe repeated #reading better.than #retrieval for #learning, but data shows opposite! @APSEducation

@AnatomyRoyer - Fleagle: med students who watched animated #anatomy lab prep videos for longer scored higher in the course. Cause or effect? #Anatomy17

@LLCoolProf - .@hortschm there is a global demand for virtual #histology slide collections for teaching and learning #Anatomy17

@krebs_claudia - Can a species become too specialized? Extreme anatomy #Anatomy17 @anatomymeeting @expbio

@FranzOdendaal - @anatomymeeting learning how to culture human cells in a dish to make organs #ExpBio #anatomy17 @expbio - Some very cool science!

@jasonmussell - Alcock: seeing an abnormality and fixing it is short sighted in treating patients without understanding the evolutionary process. #Anatomy17

@Klodiana23 - How much attention are we paying to student cognitive load when introducing diverse learning tools? #EB2017 #Anatomy17

@akhenisis - Now I know who I need to check my stats. The spectacular @amandameyerphd #Anatomy17 Always ask yourself #isthereallyadifference

@MadeOfBones - If med students treat TBL and PBL discussions like they are talking to patients, overall experience improves. #anatomy17 #meded

@mpascoe - Students don't attend when lectures are recorded. They reprioritize that time. What r u doing in lecture to draw them in? #anatomy17

Microfuildics, 3D Cultures Offer Access to New Research Platforms

Sunday's "Body on-chip and 3D culture" session provided attendees with a closer look at what can be achieved using new technologies, and how they differ from animal models. Each of the three speakers presented research to support the thinking that these technologies will significantly impact how research is conducted.

Aloysius Klingelhutz, University of Iowa, opened the session with a review of relevant terminology, including definitions for 3D culture, organ/tissue on-chip and body on-chip.

The Anatomy Lounge bustles with activity on Sunday afternoon.

He explained that in 3D culture, cells permitted to grow and interact in three dimensions, as opposed to two dimensions.

"Why is 2d culture often inadequate? The conditions of 3D culture are rarely seen in vivo, such as gradients, attachment to surfaces and matrices, polarity and cell junctions," said Klingelhutz. "2D cell cultures may not be physiological relevant vs. model."

There are challenges when using animal models, he explained, which include cost (very expensive) and the time it can take to make certain mouse strains. "It is well known that drugs that often work in mouse and other animal models fail in humans," he said.

3D and on-chip technologies have a range of practical applications, including drug testing, toxicity testing, cancer biology, modeling infections, personalized medicine, immune responses, and visualization of cell processes.

"There have been a lot of recent advancements to make this technology possible," said Klingelhutz. Those advancements include the ability to identify, isolate and culture relevant cell types; better 3D culturing methods; and advancements in visualization and imaging methods.

Looking at 3D cell culture methods, he explained there are two approaches: top-down and bottom-up. In the latter you rely on the cells to self-organize.

Presenting a 3D Human Adipose Model, Klingelhutz explained the process, which uses hanging drop spheroids that are transferred to ultra-low adherent plates. It's important that they not attach, or the spheroids will become 2D again.

"One problem in the spheroid system is that sometimes the spheroids metabolize the medium," he said. "We're developing a system where we are trying to use perfusion and feed the spheroids."

Megan McCain, University of South Carolina, took a closer look at engineering microphysiological models of human cardiac and skeletal muscle disease.

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Awards

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In particular, neurons that produce the neuropeptide pro-opiomelanocortin (POMC) normally inhibit feeding behavior, in part due to their responsiveness to the adipose tissue-derived hormone leptin. We are studying how human POMC neurons respond to leptin, and how environmental and genetic perturbations might alter their activity in ways that might be relevant for human obesity."

H.W. Mossman Award in Developmental Biology

Dr. Maria Barna of Stanford University is honored with the 2017 H.W. Mossman Award in Developmental Biology. She will receive a plaque and honorarium for her contributions to the field of developmental biology at the Closing Awards Ceremony. She presents her talk, "Specialized Ribosomes: A New Frontier in Gene Regulation, Organismal Biology, & Evolution," Tuesday at 8:30am in Room 176AB.

Maria Barna is an Assistant Professor in the Departments of Developmental Biology and Genetics at Stanford University. She obtained her B.A. in Anthropology from New York University and her Ph.D. from Cornell University, Weill Graduate School of Medicine. She completed her thesis work in the lab of Dr. Lee Niswander in the Developmental Biology Department at Sloan Kettering Institute in 2007. She was subsequently appointed as a UCSF Fellow through the Sandler Fellows program, which enables exceptionally promising young scientists to establish independent research programs immediately following graduate school.

Dr. Barna has received a number of distinctions including being named a Pew Scholar, Alfred P. Sloan Research Fellow, and top '40 under 40' by the Cell Journal.

Dr. Maria Barna

Dr. Barna's lab delves deeply into an exciting, newly-discovered program for controlling how the mammalian genome is converted into final effector proteins, which execute all of the decisions that a cell makes during its life.

Dr. Barna elaborates, "Employing an unbiased forward genetic screen, we realized that the activity of core components of the ribosome machinery were unexpectedly tailored to execute highly specific developmental decisions and were "tuned" to translating specific subsets of key developmental mRNAs. While it is known that millions of ribosomes in every living cell translate the transcripts encoded by DNA to create the proteins essential for life, they have been viewed as backstage participants in translating the genetic code. Our research has fundamentally changed this view by demonstrating that not all of the millions of ribosomes within each cell are the same, and that ribosome heterogeneity provides a novel means for diversity of the proteins that can be produced in specific cells, tissues, and organisms from the same DNA sequence. Collectively, we have termed this additional layer of gene regulation as a "ribocode," which adds important diversity to how gene products can be converted into proteins in time and space."

R.R. Bensley Award in Cell Biology

Dr. Gloria Brar of the University of California, Berkley is the recipient of the 2017 R.R. Bensley Award in Cell Biology. She will receive a plaque and honorarium for early contributions to the field of anatomy through discovery, ingenuity and publication in the field of cell biology at the Closing Awards Ceremony. She will present on her research, "Unraveling Gene Regulatory Mechanisms in Meiotic Differentiation," Tuesday at 10:30 am in room 175C.

Dr. Brar received her B.S. in biology from the University of California, Berkeley and her Ph.D. in biology from MIT, where she worked with Angelika Amon, studying the regulation of meiotic chromosome segregation. "I joined Jonathan Weissman's lab at University of California, San Francisco in 2008 as a postdoctoral fellow supported by the American Cancer Society. In the Weissman lab, I used ribosome profiling to define the complex regulation of gene expression that underlies meiosis."

Dr. Brar is currently an Assistant Professor of Molecular and Cell Biology at UC-Berkeley and her lab aims to do work that uncovers principles that are broadly applicable to diverse organisms and processes using the study of the complex gene regulation that underlies meiosis as a starting point.

Dr. Gloria Brar

"While we are using the simplest eukaryotic organism (budding yeast) and studying basic principles in how genes are turned on and off, we have been able to uncover fundamental and important biological mechanisms by using new technologies and quantitative analysis of samples over time," explains Dr. Brar. "Three of the most surprising findings thus far from our studies include 1) the pervasive synthesis of short, previously unannotated proteins in cells undergoing meiosis, 2) an altered mechanism for the highly conserved process of translation in a meiosis-specific manner, allowing for example, protein synthesis to initiate at non-canonical start sites, and 3) the meiotic cooption of canonical stress response pathways to drive changes in cellular morphology and function in a coordinated and precisely timed manner."

Morphological Sciences Award

Dr. Shigeki Watanabe of Johns Hopkins University is the recipient of the 2017 Morphological Sciences Award. He will present his award lecture, "Ultrafast Recycling of Synaptic Vesicles," on Tuesday, at 10:30am in Room 176AB. He will receive a plaque and honorarium for his contributions to biomedical science through research in the morphological sciences at the Closing Awards Ceremony.

Dr. Watanabe received his undergraduate and Ph.D. degrees from the University of Utah. For his postdoctoral work with Dr. Christian Rosenmund, he applied novel techniques in electron microscopy to mouse hippocampal neurons and studied how synaptic vesicles are consumed and recycled at mammalian central synapses.

Currently in his own lab at Johns Hopkins, his research focuses on understanding the mechanisms underlying the rapid reorganization of membranes, proteins, and organelles that mediate synaptic plasticity.

In his research, Dr. Watanabe is more excited about being able to visualize tiny structures and figure out what they may be doing. "When people think of electron microscopy, they think of gray static images with no molecular or temporal information. But for me, the image generated in electron microscopy contains everything we would like to know. I can visualize where the proteins are. I can visualize how these proteins or membranes move. And I can figure out the mechanisms underlying those changes. What is really exciting is sometimes I find structures that I have no ideas about what they are. I really enjoy designing experiments and figuring it out."

Dr. Watanabe shared how much his mentors and professors have changed the course of his life and work. "I became interested in this field in my senior year at college. I started working in the lab of Erik Jorgensen, (who later became my thesis advisor). His lab studies synaptic transmission in C. el-

Dr. Shigeki Watanabe

egans…Taking the undergraduate "genetics" course from Dr. Jorgensen was the turning point in my life. I was not thinking about doing science as a profession. His passion about science has led me into the field. Without his guidance and help from everyone in his lab and collaborators, I could not perform any of these experiments successfully, so I would really like send my gratitude to Dr. Jorgensen, Dr. Rosenmund (my post-doc advisor), and everyone who have worked with me."

Need a Headshot?

Stop by room 177 for a free professional headshot, today 8:00 am – 11:00 am & 12:00 pm – 4:30 pm. Next time someone asks for your headshot, you'll have one ready to go. It will also be great to use for your Anatomy Connected profile picture.

Attendees practice their communication skills during Sunday's Career Networking Lounge.

EXTREME Anatomy

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and holds the biggest brain, allowing it to recognize its same species.

Ali Nabavizadeh, Cooper Medical School of Rowan University, presented his work related to the study of craniofacial muscular adaptations in dinosaurs. He displayed a number of separate slides to the attendees, explaining the formation and foundation of each jawline. Ornithischian dinosaurs appear to hold a mechanical advantage for feeding, as they have advanced jaw motions. Hadrosaurs hold a jaw restriction in the joint, which meant reconstruction of the jaw itself. Nabavizadeh also explained that the facial musculature of the dinosaur differs from that of the human face. They have long tendons which run along the side of the nose, and their cheek muscles possess a multitude of functions.

Ali also discussed the evolution of the trunk and jaw of an elephant. The muscular set up of this animal, he explained, is more intertwined and intricate than our muscles. His hope is to continue further studies of this particular animal.

Jeffrey Laitman, Icahn School of Medicine at Mount Sinai, discussed primates and other close representations of our race. These included apes, monkeys and prosimians and their ancestors. "Our kind has walked through the ages, and it has been extraordinary," he said. Laitman shared an article from the 1700s, stating that Linnaeus Crowns Us (meaning primates) King. Each entity he spoke of is now extinct, however they held some magnanimous qualities as to bones and body structure.

Laitman looked at the gigantopithecus, which were known solely by their abundant number of jaws and teeth, deemed dragon teeth by some scientists. They were likely more than 10 feet tall and weighed approximately 1,000 pounds, making them the largest primate that ever lived. Their demise was said to be human contact and food availability affected by climate change. Laitman then discussed Neanderthals, who he explained appear to be the most similar to humans. Although their appearance is similar to ours, he said they have larger brain sizes and laryngeal positions than our kind.

AAA Members Meeting Today

All AAA members are encouraged to attend, 5:45 - 6:15 p.m., room 176AB.

Question of the Day:
What are you learning at the AAA Annual Meeting that you will take home?

Ai-Min Bao
Shejiang University School of Medicine
Hangzhou, China
"I've learned how important it is to connect with likeminded colleagues and exchange information. Being from another country, there is so much to learn while attending the conference. I am also speaking at the conference, so I am eager to exchange ideas with those who participate."

Wei-Ming Duan
Ohio University Heritage College of Osteopathic Medicine
Warrensville Heights, Ohio
"From Saturday's session, I learned how to better balance life while teaching anatomy. I also have gained some new techniques which I will be using while teaching my students. I have yet to attend more panels on research, but hope to gain more knowledge on what is being studied and discovered. I also like to network with other educators."

Peyon Reves,
University of Mississippi Medical Center
Madison, Mississippi
"I heard about some new research techniques that I had not heard of at my own institution. I was restricted in my medical studies, so being here has allowed me to learn more about anatomy, biology and medicine. I find the material offered here to be all-encompassing and covering a wide range of topics."

Take a Selfie!

Help us showcase the diversity in the anatomical sciences by telling us how you embody anatomy in your career, school, or life! #IAmAnatomy

Visit the Selfie Station at the AAA Booth (#402)
Monday: 11:00 am - 3:00 pm

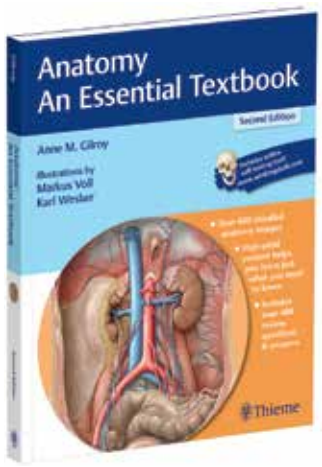
PAID LISTINGS

New Product Showcase

Anatomy – An Essential Textbook, Second Edition

Booth #562

www.thieme.com



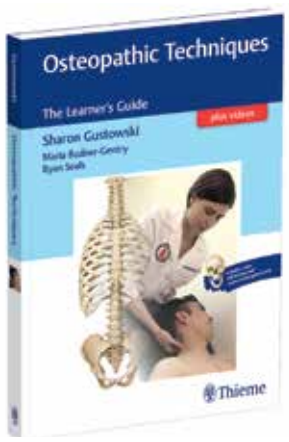
Anne M. Gilroy
Illustrations by: Markus Voll and Karl Vesker

Anatomy – An Essential Textbook, Second Edition, by Anne M. Gilroy, maintains the tradition of the highly praised first edition even as it features noteworthy additions including radiographic representation of anatomy and illustrated clinical correlations. The introductory chapter lays a solid foundation with basic concepts and expanded coverage of the vascular and nervous systems. Each profusely illustrated regional unit includes an overview, clinical imaging, and comprehensive information on bones, muscles, and neurovasculature, followed by review questions. With online access to Thieme's student study portal, WinkingSkull.com, readers can easily self-test.

Osteopathic Techniques: The Learner's Guide

Booth #562

www.thieme.com



Written by: Sharon Gustowski, Maria Budner-Gentry, and Ryan Seals

This step-by-step instruction manual, which includes 160 online videos, introduces a spectrum of osteopathic manipulative techniques that incorporate principles of psychomotor learning to enable optimal skill acquisition during independent or supervised practice. Introductory chapters contain essential concepts for performing osteopathic manipulative techniques. Each technique chapter includes pertinent background and concept summaries, key features of somatic dysfunction diagnosis, an end-goal focus for technique performance, anatomic images, and performance steps to foster knowledge retention. With nearly 100 self-study questions available in the book and on WinkingSkull.com, this is a must-have evidence-based manual.

Wolters Kluwer

Booth 561

Grant's Anatomy Lab

Grant's Anatomy Lab, a customizable online lab manual, now includes more than 13 hours of dissection videos, following Grant's method and corresponding to *Grant's Dissector,* 16th edition.

Created by Dr. Alan Detton, author of *Grant's Dissector*, each of the 78 videos covers a specific dissection sequence with narration, text captions, and labelled structures. Videos contain footage of male and female cadavers and cover all body regions.

The customizable Grant's Anatomy Lab helps prepare students for lab, providing a visual preview, the specific steps required for each dissection with image references, and the information they'll need to learn for practical exams.

Exhibitor News

Exhibitor News features items provided by the companies who are advertising in *The Anatomy Voice*. CustomNEWS and the American Association of Anatomists are not responsible for this content.

SIMnext and von Hagens: Fast-Forward to Better Educational Training in Anatomical Learning

Anatomy has long been considered one of the cornerstones of medicine,[1,2] but it has become increasingly difficult for educators to justify the cost typically allocated to a traditional anatomy course, much less additional hours for new materials.[3,5]

The use of cadavers has been reduced or totally phased out in some teaching programs, due largely to operational costs.[5] Some institutions have switched to using living anatomy and imaging[1] or virtual learning packages.[6] More forward-thinking programs combine prosections or plastinated specimens.[7,8]

Plastination, a method invented by Gunther von Hagens, and solely distributed and marketed in the US by SIMnext, uses a revolutionary technique where anatomical specimens can be preserved permanently in their original state.

Real Anatomy for a New Way of Teaching

The shared mission of von Hagens Plastination and SIMnext is to enable teaching with unparalleled learning experiences through the use of authentic human specimens. The selection of teaching specimens includes silicone plastinates, sheet plastinates, anatomy glass (high resolution prints) and blood vessel configurations as well as bone specimens.

The detail and clarity of these anatomical teaching specimens promote a deeper understanding of anatomical relationships. This, together with their authenticity, enhances the learning experience for students, leading to better understanding and retention of the material.

Plastinated specimens allow for precise preparation, planning, and compliance with a specific curriculum. Traditional wet dissection can lead to unanticipated surprises such as collapsed organs or unwanted appearances of diseases. Because plastinates guarantee visibly clear anatomical structures or specific abnormalities, teaching with them is very effective and results-oriented.

The shift in attitudes toward evidence based results and better patient outcomes in hospitals has led to an accelerated focus on value-based learning by educators. SIMnext, in partnership with von Hagens, have embraced this new attitude and taken it further by providing technical and personalized value to users.

For more information on the benefits of SIMnext and von Hagens in education, visit us at stand 819 or visit www.simnext.com.

1. McLachlan JC, Patten D. Anatomy teaching: ghosts of the past, present, and future. Med Educ 2006;40:243-53.

2. Hildebrandt S. Lessons to be learned from the history of anatomical teaching in the United States: the example of the University of Michigan. Anat Sci Educ 2010;3:202-12.

3. Rizzolo LJ, Stewart WB. Should we continue teaching anatomy by dissection when . . . ? Anat Rec B New Anat 2006;289:215-8.

4. Drake RL, McBride JM, Lachman N, Pawlina W. Medical education in the anatomical sciences: the winds of change continue to blow. Anat Sci Educ 2009;2:253-9.

5. Rizzolo LJ, Rando WC, O'Brien MK, Haims AH, Abrahams JJ, Stewart WB. Design, implementation, and evaluation of an innovative anatomy course. Anat Sci Educ 2010;3:109-20.

6. Durham JA, Brettell S, Summerside C, McHanwell S. Evaluation of a virtual anatomy course for clinical un- dergraduates. Eur J Dent Educ 2009;13:100-9.

7. Nnodim JO, Ohanaka EC, Osuji CU. A follow-up com- parative study of two modes of learning human anatomy: by dissection and from prosections. Clin Anat 1996;9: 258-62.

8. Cornwall J. The diverse utility of wet prosections and plastinated specimens in teaching gross anatomy in New Zealand. Anat Sci Educ 2011;4:269-74.

Stand up for Science

Now that the March for Science is over, don't let the excitement die out. There are many ways you can continue to advocate for robust science funding. Take an Advocacy Flyer from the Advocacy Wall outside of our session rooms.

Learn ways to access tools and information you can use to contact elected officials and learn more about how you can make a difference.

Teaching vs. Research: Weighing the Pros and Cons

The AAA 2017 Annual Meeting opened with "Is a Balanced Teaching/Research Career Fact or Fiction?" on Saturday morning. During this session, four speakers provided an in-depth look at challenges faced in the teaching profession, the importance of mentorship and how to incorporate research into a teaching career.

Lynne Opperman, Texas A&M Univ. College of Dentistry, discussed ways to succeed in the business of science. She began by sharing statistics related to wage and workforce projections. In 2017, the United States had approximately 40,000 Ph.D. graduates. Annual job creation for said graduates is about 3,000. Opperman shared her concerns about the term Ph.D. holding less significance in today's society. She said those with extensive experience and education hold more funding opportunities but added that NIH funding has flattened out and in general, grant renewals are becoming a serious struggle.

Opperman then provided an estimated comparison of current wage standards, citing her information from the AAMC Salary Book. At the instructor level, the rate of pay is approximately up to $62,000. A professor rate will vary, depending on status. Assistant professors average about $93,000, associate professors earn about $122,000 and a professor's salary ranges around $183,000.

Judith Venuti, Oakland University William Beaumont School of Medicine, focused on curriculum changes, which she said should focus more on cultivating competency. Class participants should also use problem solving and reasoning skills. Teachers, she said, should attempt to expand both their intelligence and level of initiative.

Venuti said there is a real necessity to employ more medical educators. The number of tenured teachers has decreased over the past 20 years. Educators fall within two different categories, she explained: scholarly teaching and scholarship teaching. Scholarship teachers examine how classroom learning affects a person's ability to do research. Scholarly teachers examine how teaching can enhance overall learning. She hopes that over time, teachers can pass an array of knowledge onto their predecessors.

Venuti also discussed the benefits of teaching intensive institutions. As to furthering educational development, Venuti mentioned options such as IAMSE webinars, Stanford training and book clubs/conferences.

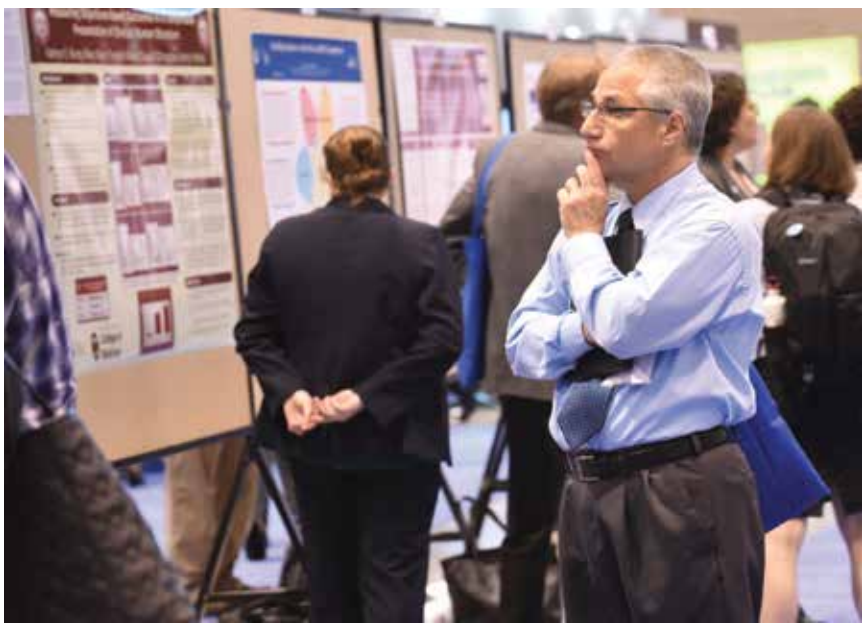
Kathryn Jones, Indiana University School of Medicine, offered the perspective of a chair of a research intensive institution. She believes that "picking your professional path prior to starting studies is vital." You must create a diversified profile, she said, as well as look at the research fundability factor of organizations. Jones also recommended finding a mentor who can provide guidance as you work towards your goals.

Securing researching funding was another topic that Jones discussed. Educators should work hand in hand with healthcare professionals, she said, as each group can learn from the other. Jones is a firm believer in the team science approach, as it could generate more balance. A team can take one core idea, expand upon it and grow it together.

Margaret McNulty, Indiana University School of Medicine, focused on the stability and security offered through teaching positions. McNulty stated teaching jobs are both easy to obtain and maintain over longer durations. During her time teaching, she has also conducted research, which she admitted is more difficult for her. She offered some tips on making research easier, such as using a team-science approach and peer/mentor collaboration. McNulty also suggested collecting on research data as you teach so as to save time.

McNulty also examined what she called the "tenure triangle." It used to be that teaching was at the top tier of the triangle, while service and research remained below. Today, it is more of a level playing field. All three carry the same importance and necessity.

AAA Poster Session: Sunday



Microfluidics

Continued from page 3

McCain's focus is cardiovascular disease. "When we start to think about conditions that cause the heart to fail, there is a lot of complex remodeling of the myocardium," she said, adding that myocardium infarctions cause a diverse remodeling of multiple tissue components.

She then looked at the key structural functions of the myocardium and reviewed the key functional outputs and architectural features.

Moving on to models, she said that existing myocardium models fall short.

"Animal models are beneficial because they are intact organisms but there is limited experimental control, they are non-human, have a low throughput and high costs," she said.

Conventional cell cultures, McCain said, do offer advantages compared to animal models, including more experimental control. But drawbacks to these cell cultures include the lack of native tissue structure, lack of physical cues and limited functional outputs.

McCain then reviewed different approaches that her lab uses, including engineering μmyocardium. She presented a diagram to illustrate this process then reviewed quantifying contractility of the μmyocardium.

She also took the audience through the ways to measure mitochondrial function in vitro. The challenge, she explained, is how to engineer cardiac tissues with microplates. McCain reviewed a diagram showing the step-by-step process used in her lab. They now have independent control over the stiffness of the material.

A new area of focus for her research group is engineering models of neuromuscular disease, with a specific focus on ALS/Lou Gerhig's disease. McCain looked at the challenges in ALS disease modeling , explaining that challenges exist because there are diverse genetic causes. She also said that animal models have limited relevance and it is difficult to co-culture motor neurons and skeletal muscle.

As she wrapped up, she introduced the audience to a skeletal-muscle-on-a-chip , with the goal being to engineer ALS on a chip. She provided a diagram that looked at how her team is working on reprogramming.

D. Dan Huh, University of Pennsylvania, provided an in-depth look at microfabricated cells designed to mimic human cells. He referred to these as human organs-on-a-chip. After walking the audience through the technology behind these cells, he looked at applications for this technology in the study of disease processes that impact the lung, eye and female reproductive system.

The goal, he said, was to mimic the multi-layered structure of the human lung, which is called human breathing lung-on-a-chip. To illustrate the possible applications, he took a detailed look at what happens during a lung infection.

Keeping the focus on the lung, he introduced the audience to "a smoking lung-on-a-chip," where the focus is on the impact of smoking on the lung's small airways. To do so, they built a cigarette smoking machine they developed to deliver the smoke to the lung-on-a-chip.

Dry eye disease (DED) is another focus for this technology, for which a human blinking eye-on-a-chip was created. DED, he explained, is a very common and prevalent disease that impacts quality of life. "We hope to address outstanding questions using our eye-on- a-chip platform," said Huh.

Another field that has suffered from the lack of predictability models, he said, is reproductive biology and medicine. The audience learned more about two devices developed for this field, placenta-on-a-chip and cervix-on-a-chip.

Using microfluidic technologies to build devices that mimic human cells, Huh feels these systems offer great potential.

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