34th Annual Meeting

American Association of Clinical Anatomists

www.clinical-anatomy.org



Hosted by the University of Minnesota

July 17–21, 2017 | Minneapolis, MN

Dear Fellow AACA Members,

The University of Minnesota is proud to be the host institution for the 34th Annual Meeting of the American Association of Clinical Anatomists, July 17 through 21, 2017. We look forward to seeing our friends and colleagues during conference events and to welcome you all to the beautiful city of Minneapolis. The meeting's scientific sessions will take place in downtown Minneapolis. The post-graduate course will be nearby on a short light-rail ride over the Mississippi River to the campus of the University of Minnesota. For those of you attending, as well as for those who wish to partake in some sightseeing while you are in town, the following information may help you plan your visit.

Weather- The middle of summer can bring very mild temperatures to Minnesota. Contrary to popular belief, you'll be safe leaving your winter parkas at home. Precipitation is at a low risk, and day time temps average in the mid 80's. Evening temps may fall into the mid 60's.

Transportation- Both terminals of the Minneapolis-St Paul Airport (MSP) are conveniently located close to downtown Minneapolis. There are many transport options to get you to Marriott City Center, the conference hotel.

Bus service is available and will take 25 minutes to Nicollet Mall station, with a 0.25 mile walk to the hotel. The cost is only $2.25

The light-rail train runs from the airport to downtown every 7 minutes. Take the blue line to Nicolette mall station. The entire trip will take 23 minutes and cost $2.50.

Taxis are the fastest option and the approximate cost is $30. The airport supports all internet including ground transportation services (Uber, Lyft, etc).

Renting a car is very convenient. The airport supports all rental car companies (https://www.mspairport.com/GroundTransportation/car-rentals.aspx)

Most of the local attractions are easily accessible via the light-rail train system, by walking, or by biking. Minneapolis has a robust bike sharing program. Nice Ride bike stands are available through the area.

Minneapolis & St. Paul sites of interest- The hotel is on a pedestrian walkway that runs through the heart of downtown Minneapolis known as Nicollet Mall. The Mall is packed with restaurants, bars, and shopping.

Minneapolis has many art museums including the Weisman Art Museum, Walker Art Center and the Minneapolis Museum of Art. Theater fans may want to check out the shows at the Orpheum, Guthrie, State, or Hennepin. Two renowned music venues are within a few blocks of the conference venue. First Avenue and Dakota Jazz Club often bring in high caliber musicians. Orchestra Hall is also a quick walk from the hotel.

St. Paul, the quieter of the twin cities, hosts the Science Museum of Minnesota as well as the Minnesota Children's Museum. Riding the light rail system is an easy way to get to St. Paul from Minneapolis.

The Nation's largest indoor shopping mall is a short light-rail ride away. The "Mall of America" has shopping, an aquarium, amusement park, restaurants and bars all under one roof.

For Prince fans, tours of Paisley Park, Prince's extraordinary private estate and production complex, are available. Paisley Park is located in Chanhassen which is located about 30 minutes from Minneapolis.

The hotel is only a short taxi ride from the Chain of Lakes. The Chain of Lakes has swimming beaches and recreation paths. Canoes and paddle boards are available for rent. There are food stands around the area. This is a very Minneapolitan thing to do.

Brewery tours are a big deal in Minneapolis. Minnesota's breweries just keep growing; there are more than 100 Dangerous Man and Surly Breweries are fun hangout spots.

For those interested in X-games, after three years in Austin Texas, Minneapolis will host the games on July 13-16, 2017, at new U.S. Bank Stadium (in the heart of downtown).

Post-Graduate Course – July 21st, 2017- On Friday, the post-graduate course will take place in the Academic Health Center of the University of Minnesota. The course has been designed to appeal to anatomists, clinicians, and anatomical services staff. Attending this course will give participants the opportunity to implant the world's smallest pacemaker, the Medtronic Micra, during a hands-on lab with an unpreserved cadaveric model utilizing a unique perfusion method which maintains vascular pressure. Staff from the Jessie E. Edwards Registry of Cardiac Disease will be presenting some of the rare and unusual cardiac specimens from their extensive collection of over 21,000 hearts. There will be a cardiac 3D ultrasound module. Additionally, there will be a module focusing on the identification of implanted biomechanical devices in the cadaver lab setting including information on how to safely remove implanted devices, and how to determine which situations warrant removal in order to mitigate risk. One special feature of the course will be a tour of the Visible Heart Lab, which will present an amazing opportunity to see a world-renowned physiological research laboratory in action. We hope you will be able to join us. (Separate registration is required for this course)

Sincerely,

Anthony Weinhaus, Angela McArthur
University of Minnesota Medical School
AACA 34th Annual Meeting local hosts

American Association of Clinical Anatomists

President's Report

July 17-21, 2017
Minneapolis Marriott City Center
Minneapolis, MN

PO Box 2945
LaGrange, Ga 30241
Ph: 706-298-0287
www.clinical-anatomy.org

Welcome to the AACA's 34th Annual Scientific Meeting in Minneapolis! The beautiful state of Minnesota has played an integral role in the history of the AACA – the very first Annual Scientific Meeting of the AACA was held less than 90 miles down the road in Rochester at the Mayo Clinic! In fact, Mayo hosted the AACA Annual Scientific Meeting on three occasions – the last being in 1995!

Our Local Hosts - Anthony Weinhaus and Angela McArthur, along with Greg Smith and Jennifer Burgoon - our Annual Meeting Co-Chairs, Caitlin Hyatt – our Executive Director, and David Porta – our Program Secretary, have worked tirelessly to assemble a special week for you. When you see them at the Meeting, please offer them a special "thanks." Additionally, I would like to thank all of the AACA committees and Special Interest Groups! They have been busy this year (as they always are) and I know you will enjoy the various programs they have produced for you.

Our Regional Meeting initiative has been very successful. Kurt Gilliland welcomed over 70 registrants to the University of North Carolina in Chapel Hill for the AACA's 2nd Regional Scientific Meeting this past October! Kurt organized a spectacular program and incorporated presentations from five Universities from the surrounding area (Campbell, Duke, Eastern Carolina, UNC, and Wake Forest). The afternoon was highlighted by a workshop on Ultrasound Imaging. This October, Wayne Cottam is hosting the 3rd Regional Meeting of the AACA at A.T. Still University in Mesa, Arizona.

I am pleased to announce that the AACA has named James D. Collins, as our Honored Member. The title of his Presidential presentation is, "Fibrosis and Scarring of the Brachial and Sacral Plexus as Displayed by MRI/MRA/MRV." Each year, Dr. Collins is known for bringing his clinical research to our AACA Meetings and mentoring our students. In fact, I first met Dr. Collins in the 1980s. I remember walking up to his poster and he immediately offered example copies of his work and sage advice to a young graduate student trying to learn how to navigate the scientific world. He still does that to this day!

I am equally pleased to announce that the AACA will be awarding the R. Benton Adkins, Jr. Distinguished Service Award to Ronald (Ronn) S. Wade. I have known Ronn for nearly 20 years and during that entire time, Ronn has always provided his talents for the betterment of the AACA. Today, the AACA is known for its commitment to Anatomical Services – it is hard to imagine where that would be without the pioneering work of Ronn! When the AACA was founded in 1983 – one of the original concerns was the declining role of gross anatomy in medical education and clinical training. At that time, anatomical donation was not a major part of the AACA's agenda. Ronn helped spearhead the efforts to create the Willed-Body Program Directors' Special Interest Group (SIG). With Ronn's hard work, the AACA established the Anatomical Services Councilor – in fact, he was the inaugural Councilor in that role!

On a personal note, these past 2 years have flown by! It has been my distinct honor and privilege to serve as your President! The AACA has worked hard to grow as an organization – especially financially. As a former AACA Treasurer – this has been a long-term goal! In my President's Welcome Message last year, I noted the hard work of Brian MacPherson and Anne Agur to establish both our Sponsorship initiative and Endowment Plan. This year, we were able to take advantage of these programs and I am pleased to provide you with exciting information about a new chapter in the financial growth of the AACA at the State of the Association presentation on 18 July – stay tuned!!!

Last, I want to thank all of you for everything that you have done to make the AACA the great organization that it is today! We would not be there without you. I am excited for another amazing week and I look forward to seeing all of you. Have a great meeting!!

Neil S. Norton, Ph.D.

The AACA believes that each conference attendee should be treated with respect and dignity and that any form of sexual harassment is a violation of human dignity. The AACA condemns sexual harassment and maintains a "zero - tolerance" for sexual harassment. All conference attendees have the right to participate and learn free of sexual harassment. The AACA will take all reasonable efforts to prevent and promptly correct instances of sexual harassment. Any conference attendee who believes himself or herself to be a victim of sexual harassment is encouraged to report the information to the Program Secretary.

AACA on Social Media

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News

Events

Connect

Like AACA on Facebook to stay up-to-date on all the latest news and events and to connect with other members.

American Association of Clinical Anatomists

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or scan the code with your phone!

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To stay up to date with the news

Discover new job opportunities

Connect to other members

Go to https://www.linkedin.com/company/american-association-of-clinical-anatomists

Or scan with your phone using any QR code reader

American Association of Clinical Anatomists

Tweet with Us!
@AACAnatomy

@AACAnatomy is the Association's official Twitter account. Using a simple and sustainable model for publishing daily tweets, we strive to increase engagement with our Membership and the public. Since August 2016, we have increased our followers from 70 to over 500! Learn more about analytics from this Brand Promotion project at poster #A28.

New to Twitter?
Use these steps to make an account!

1. Go to **www.twitter.com**
2. Click Log-in
3. Select Sign Up under "New to Twitter?"
4. Create username and password
5. Sign Up!
6. Find our account @AACAnatomy and follow
7. Tweet away! Share tweets all conference long using the conference hashtag **#ClinAnat17**

Already on Twitter?

Follow @AACAnatomy and share conference tweets using the hashtag **#ClinAnat17**! Feel free to tweet anything that interests you during the conference – sessions, events, what you learn, posters, social gatherings, meetings, photos, etc. You can also tweet anytime using the hashtag #ClinAnat.

Don't forget to ask your colleagues if they have an account. Follow members to make our Twitter community even larger!

Pick up your "**I Tweet**" ribbon at the registration desk!

Save the Date!

ATSU

A.T. STILL UNIVERSITY

2017
AACA Regional Meeting

Saturday, October 7, 2017
A.T. Still University
Mesa, AZ

More information can be found online at
www.clinical-anatomy.org









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American Association of Clinical Anatomists

ANNUAL MEETING



Hosted by Morehouse School of Medicine

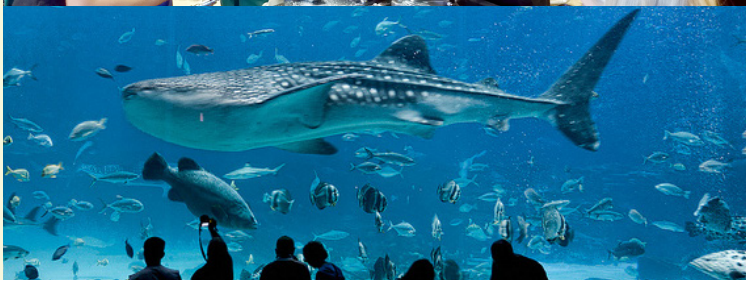
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2018 JULY 8–12



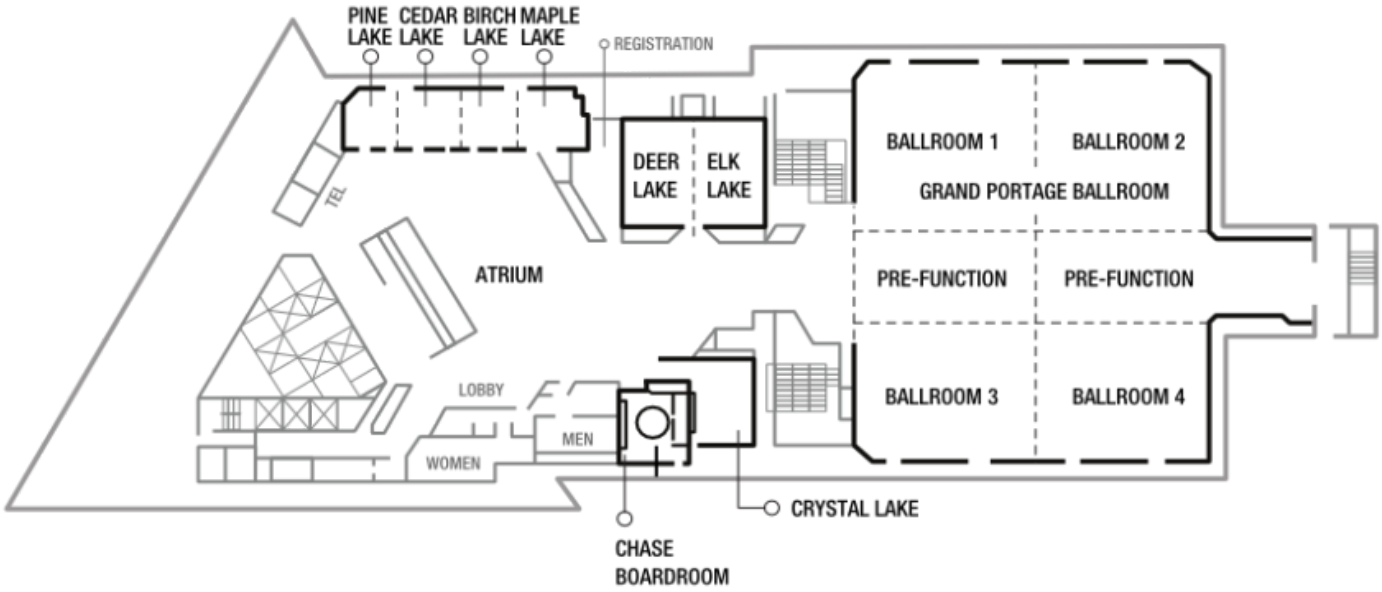


ATLANTA, GEORGIA

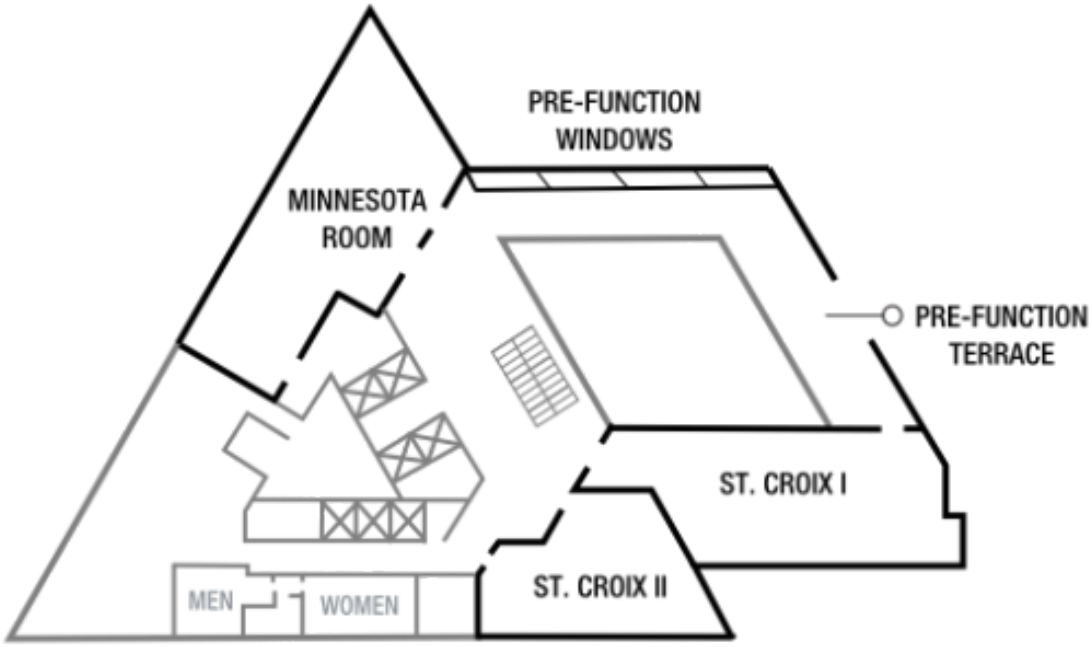
GRAND HYATT BUCKHEAD

Minneapolis City Center Floor Plan

FOURTH FLOOR



SIXTH FLOOR



Block Schedule

2017 American Association of Clinical Anatomists Mtg Schedule

rev. 6/20/17

Monday, July 17th	Tuesday, July 18th	Wednesday, July 19th	Thursday, July 20th	Friday, July 21st
7:30	**Career Development Committee Breakfast Meeting - All invited** Sarah Greene 7:30 - 9:00 am	**Educational Affairs Committee Breakfast Meeting - All invited** Vaughan Lee 7:30 - 9:00 am	**Anatomical Svcs Committee Breakfast Meeting - All invited** Brandi Schmitt & David Conley 7:30 - 9:00 am	
7:45				
8:00				
8:15				
8:30	Breakfast/Posters/Exhibitors	Breakfast/Posters/Exhibitors		
8:45				
9:00	Welcome, Program Comm, & State of the Assn by Neil Norton	Opening Announcements	Breakfast/Posters/Exhibitors	
9:15		**Poster Session B** **Education n=36** 9:15 - 10:30 am		
9:30			Opening Announcements	
9:45	**Presidential Speaker** **Jim Collins** **Honored Member 2017** 9:45 - 10:45 am		**Poster Session C** **Head, Neck & Limbs n=42** **9:45 - 11 am**	
10:00				
10:15				
10:30		**Platform Session 3** **Upper Limb n=3** 10:30 - 11:15 am		
10:45	BREAK			
11:00	**Platform Session 1** **Tech Fair n=4** 11 - 11:30 am		**Platform Session 6** **Lower Limb n=3** 11 - 11:45 am	**Postgraduate Course:** The Anatomist's Role in Biomedical Device Desgn and Enhancing Patient Outcomes (Add'l Reg $ Req) 8:30 am- 3 pm
11:15		**Platform Session 4** Tech Fair n=3 11:15 - 11:45 am		
11:30				
11:45	**TECH FAIR & Lunch Break** 11:30 am - 1:00 pm On your own (*Clinical Anatomy* Editorial Board Lunch Mtg)			
12:00		**Tech Fair & Lunch Break** On your own 11:45 am - 1:00 pm	**Lunch Break** On your own 11:45 am - 1:00 pm	
12:15				
12:30				
12:45				
1:00	**CDC Symposium: "Journeys Through a Career in Anatomy - Glancing Back and Looking Forward"** 1 - 2:30 pm	**Platform Session 5** **Education n=5** 1 - 2:30 pm	**CAT Symposium: "The History, Present Condition and Future Direction of the Anatomical Lexicon"** 1 - 2:30 pm	
1:15				
1:30				
1:45				
2:00				
2:15				
2:30	BREAK	BREAK	BREAK	
2:45	**Platform Session 2** **Head & Torso n=5** 2:45 - 4 pm	ASC Special Session **"The Legal and Ethical Considerations of Being the Guardian of the Gift"** 2:45 - 4:15 pm	**Business Mtg** **All Members are encouraged to attend!** 2:45 - 4 pm	
3:00				
3:15				
3:30				
3:45				
4:00	**Poster Session A** **Torso, etc & ASC n=39** 4 - 5:15 pm		**Mtg of the New Council** 4 - 4:30 pm	
4:15		**Clinical Anatomical Terminology (CAT) Committee Mtg** Evan Goldman & Tom Gest 4:15 - 5:30 pm		
4:30				
4:45				
5:00	**Mentor Reception** 5:15 - 6:15 pm		**Reception** 5 - 6 pm	
5:15				
5:30				
5:45				
6:00			**Awards & Banquet** 6 - 8 pm	
6:15				
6:30		**Social with Light Dinner** Minnesota Room Windows/Terrace 6:30-8:30 pm		
6:45				
7:00	**Yankees vs Twins** 7:10 pm			
>7 pm				

Registation OPEN
Mon: 1 - 5 pm
Tues - Thurs: 7:30 am - 5 pm

AACA Council Meeting
9 am - 5 pm

Judges Meeting
5 - 6 pm

Welcome Reception
6:30 - 8:30 pm

Sponsors/Commercial Exhibitors

Generous donations and/or commercial exhibitor fees paid by the following companies and organizations have substantially reduced the Association's expenses in presenting this meeting.

You are encouraged to visit the exhibits available for viewing in Ballroom 1/3

Exhibit hours:

7:30 am – 11:30 am and 1:00 pm – 5:00 pm Tuesday

7:30 am – 11:45 am and 1:00 pm – 5:00 pm Wednesday

7:30 am – 11:45 am Thursday

TEAR DOWN is from 12:00 – 4:00 pm on Thursday
(all exhibitors must be vacated from the hall at 4:00 pm)

The hall will be closed for lunch for one hour each day (12:00 – 1:00 PM).

LIST OF EXHIBITORS *as of 6-15-17*

1&2
3D4Medical

445 Marine View Dr.
Suite 110
Del Mar, CA 92014
USA
www.3d4medical.com
866-514-3755

Anatomical Education Application.

3
Touch of Life Technologies

12635 E Montview
Suite 350
Aurora, CO 80045
USA
www.toltech.net
720-505-2831

VH dissector and Sectra visualization table.

4
MOPEC

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Oak Park, MI 48237
USA
www.mopec.com
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5&6
Bone Clones, INC

21416 Chase Street, #1
Canoga Park, CA 91304
USA
www.boneclones.com
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7
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USA
www.lww.com
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8
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Christchurch Court
10-15 Newgate Street
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United Kingdom
www.primalpictures.com
44-207-017-5000

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11
William Carey University

710 William Carey Parkway
Hattiesburg, Mississippi 39401
USA
www.wmcarey.edu
601-318-6051

Medical Education

continued on next page

12
Education Management Solutions

436 Creamery Way
Exton, PA 50325
USA
www.simulationiq.com
610-701-7002

Simulation solution for medical field.

13
Holt Anatomical, Inc.

P.O. Box 370749
Miami, FL 33137-0749
USA
www.holtanatomical.com
800-642-4658

Anatomical Models: SOMSO; Denoyer; 3B; Microscopes and other products.

14
MedTutor

1501 S. 40th Ave
Hattiesburg, MS 39402
USA
www.medtutor.com
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15
The Dodge Company

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16
InfoSight Corporation

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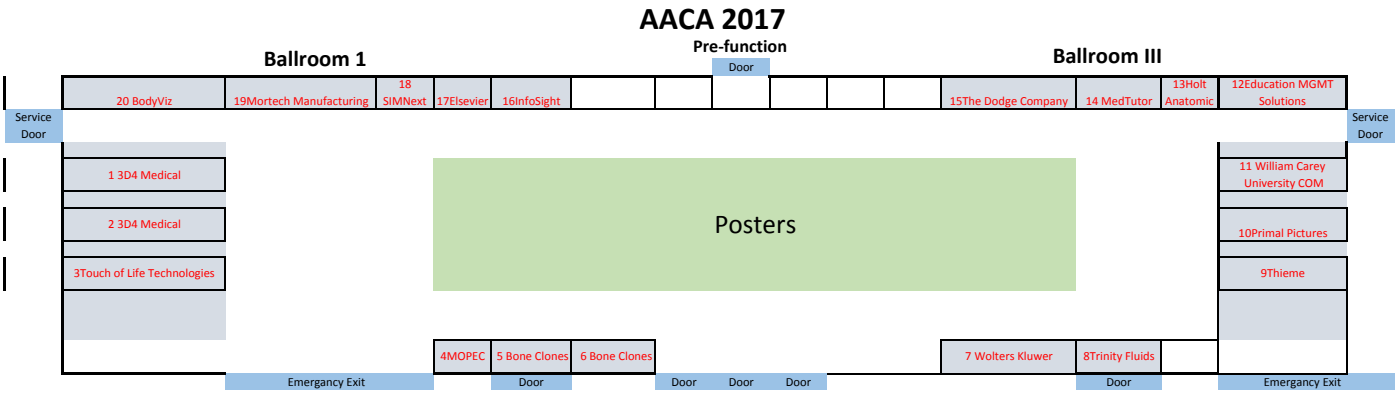
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Casual dress
612-349-4000

Nearby

Seven Sushi Ultralounge
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0.1 miles
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612-238-7777

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American
0.3 miles
Open for lunch and dinner
Casual dress
612-332-1010

Zelo
Italian
0.2 miles
Open for lunch and dinner
No Jeans
612-333-7000

Hell's Kitchen
American
0.2 miles
Open for breakfast, lunch and dinner
Casual
612-332-4700

Chipotle
Mexican
0.1 miles
Open for lunch and dinner
Casual
612-333-0434

Freshii
Healthy
0.1 miles
Open for lunch and dinner
612-333-1877

Starbucks
0.1 miles
Open for breakfast, lunch, and dinner
Casual
612-333-9944

Jimmy John's
Sandwiches
0.1 miles
Open for lunch and dinner
Casual
612-333-6677

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Soup, Salads, and Sandwiches
0.1 miles
Open for lunch and dinner
Casual
612-338-9850

Potbell Sandwich Shop
Sandwiches
0.1 miles
Open for lunch and dinner
Casual
612-332-1144

Subway
Sandwiches
0.1 miles
Open for breakfast, lunch and dinner
Casual
612-338-4254

D. Brian's Deli
Sandwiches
0.1 miles
Open for breakfast and lunch
Casual
612-455-1600

Pre Meeting Events

Monday, July 17th

9:00 AM – 5:00 PM	AACA Council Meeting (Invitation Only)	Crystal Lake
8:00 AM – 5:00 PM	Exhibitor Set-Up	Ballroom 1/3
1:00 PM – 5:45 PM	Registration	Atrium Lounge
3:00 PM – 5:00 PM	Poster Presenter Set-Up	Ballroom 1/3
5:00 PM – 6:00 PM	Judges' Meeting	Deer/Elk Lake
6:30 PM – 8:30 PM	Welcome Reception	Atrium

Scientific Program

Tuesday, July 18th

7:30 AM – 9:00 AM	Career Development Committee Breakfast Meeting – Open to all	Deer/Elk Room
7:30 AM – 9:00 AM	Breakfast with Exhibits/Posters	Ballroom 1/3
8:00 AM – 5:00 PM	Registration	Atrium Lounge
8:00 AM – 10:00 AM	Poster Presenter Set-Up	Ballroom 1/3
9:00 AM – 9:45 AM	Opening of Scientific Session - Welcome Neil S. Norton, Ph.D. President, American Association of Clinical Anatomists Tucker W. LeBien, Ph.D. Associate Vice President for Research University of Minnesota Academic Health Center	Ballroom 2/4
9:45 AM – 10:45 AM	Presidential Speaker: Honored Member: James D. Collins, MD Sponsored by WILEY	Ballroom 2/4
10:45 AM – 11:00 AM	Break with Exhibits/Posters	Ballroom 1/3
11:00 AM – 11:30 AM	Platform Session I – Tech Fair Moderator: Greg Smith	Ballroom 2/4

11:00 AM — Photogrammetry of Human Specimens: A Digital Innovation in Anatomy Education. **PETERSON**, Ashley S., Vivien JONES, William P. BROWN, Miguel ANGELES, Sakti SRIVASTAVA, and Sung Joo PARK. Stanford Department of Surgery, Palo Alto, CA 94305, USA. **(GER)**

11:05 AM — Developing and Using a Computer-Based Program for Learning Sectional and Radiological Anatomy. **SEVERSON**, Arlen R. Department of Biomedical Sciences, University of Minnesota Medical School, Duluth Campus, Duluth, MN, 55812, USA.

11:10 AM — Archiving 3D Models of Anatomical Variations using Hololens and zSpace Technologies. **LOZANOFF**, Scott, Jaskirat TAKHAR, Trudy M. HONG, Jesse THOMPSON, Beth K. LOZANOFF, and Steven LABRASH. Department of Anatomy, Biochemistry & Physiology, John A. Burns School of Medicine, University of Hawaii at Manoa, Honolulu, HI 96813, USA.

continued on next page

Tuesday, July 18th continued

11:15 AM	Peritoneum Model. Surgeon: "I Always Knew the Facts, Only Now Do I Understand Them". **GOBÉE**, Oscar P. Department of Anatomy and Embryology, Leiden University Medical Center, Leiden, Zuid-Holland, 2333 ZC, the Netherlands.
11:30 AM – 1:00 PM	Lunch (On Your Own) – See page 6 for options
12:00 PM – 1:00 PM	Exhibit Hall closed for lunch ..... Ballroom 1/3
11:30 AM – 1:00 PM	*Clinical Anatomy* Editorial Board Lunch (Invitation Only) ..... Pine/Cedar Lake
1:00 PM – 2:30 PM	Career Development Committee Symposium ..... Ballroom 2/4 *"Journeys though a Career in Anatomy: Glancing Back and Moving Forward"*
2:30 PM – 2:45 PM	Break with Exhibitors/Posters ..... Ballroom 1/3
2:45 PM – 4:00 PM	Platform Session 2: Head & Torso ..... Ballroom 2/4 Moderator: Stephen Carmichael
2:45 PM	Anatomical Study Using the Auriculotemporal Nerve with Application to Treating Keratisis Sicca. **IWANAGA**, Joe[1, 2], Koichi WATANABE[1], Tsuyoshi SAGA[1], Yoko TABIRA[1], R. Shane TUBBS[2], and Koh-ichi YAMAKI[1]. [1]Department of Anatomy, Kurume University School of Medicine, Kurume, Fukuoka 830-0011, Japan. [2]Seattle Science Foundation, Seattle, WA 98122, USA.
3:00 PM	Inferior Mesenteric Ganglia in the Adult Cadaver. **CRISP**, Zeni, Thomas M. DAGG, Zoltan A. KRUDY, Dana GALVAN, Gabriel R. SCOTT, and Thomas R. GEST. Department of Anatomy, Texas Tech University Health Sciences Center Paul L. Foster School of Medicine, El Paso, TX 79905, USA. **(GER)**
3:15 PM	Age-Related Changes in the Thoracic-Abdominal Vasculature and Viscera from 0-18 Years of Age. **HARRISON**, Katrina H-T. , Hannah L. CONNOLLY, Sean J. BOTHAM, Charles E. HUTCHINSON and Richard G. TUNSTALL. Warwick Medical School, University of Warwick, Coventry, West Midlands, CV4 7AL, United Kingdom. **(GER)**
3:30 PM	Diffusion Tensor-MRI (DTI) Tractography in Periprostatic Nerves Imaging: Anatomical Evaluation. **BESSEDE**, Thomas[1, 2], Ardeshir R. RASTINEHAD[1], Bachir TAOULI[3], Balaji N. REDDY[1], Mathieu DURAND[1], Georges K. 3rd HAINES[4], Stephanie J. HECTORS[3], Cheuk Y. TANG[3], and Ashutosh K. TEWARI[1].[1]Department of Urology, Icahn School of Medicine at Mount Sinai, New York, NY, 10029, USA. [2]U1195, University Paris Sud, Le Kremlin Bicetre, 94270, FRANCE. [3]Department of Radiology, Icahn School of Medicine at Mount Sinai, New York, NY, 10029, USA. [4]Department of Pathology, ISMMS, New York, NY, 10029, USA.
3:45 PM	Anatomy of the Bronchial and Esophageal Arteries with Special Reference to Cancer Surgery (DVD). **SATO**, Tatsuo. Tokyo Ariake University of Medical and Health Sciences, Tokyo, 135-0063, Japan.
4:00 PM – 5:15 PM	Poster Session A: Torso, etc. & ASC ..... Ballroom 1/3
5:15 PM – 6:15 PM	Mentor Reception ..... Minnesota Room (6th Floor)
7:10 PM	New York Yankees vs. Minnesota Twins baseball game ..... Twins Ballpark *Pre-registration Required*

Scientific Program

Wednesday, July 19th

7:30 AM – 9:00 AM	Educational Affairs Committee Breakfast Meeting – Open to all ..... Deer/Elk Room
7:30 AM – 9:00 AM	Breakfast with Exhibits/Posters ..... Ballroom 1/3

continued on next page

Wednesday, July 19th continued

8:00 AM – 5:00 PM	Registration ..... Atrium Lounge
9:00 AM – 9:15 AM	Opening Announcements ..... Ballroom 2/4
9:15 AM – 10:30 AM	Poster Session B: Education ..... Ballroom 1/3
9:15 AM – 10:30 AM	Break with Exhibits/Posters ..... Ballroom 1/3 Sponsored by: ELSEVIER
10:30 AM – 11:15 AM	Platform Session 3: Upper Limb ..... Ballroom 2/4 Moderator: Natalie Langley
10:30 AM	Assessment of Anatomical Variation of the Ulnar Collateral Ligament in Athletes. **PAGE**, Trevor S.[1], Amelie BRUYA[1] and Jonathan J. WISCO[1,2]. [1]Brigham Young University, Provo, UT 84604, USA; [2]University of Utah School of Medicine, Salt Lake City, UT 84132, USA. **(GER)**
10:45 AM	Effects of Median, Radial, and Ulnar Biased Neurodynamic Testing on Cervical Spinal Nerves. **LOHMAN BONFIGLIO**, Chelsea M.[1], Kerry K. GILBERT[2], Jean-Michel BRISMEE[2], Stéphane SOBCZAK[3], Phillip S. SIZER[2], Miles DAY[2], C. Roger JAMES[2], and Krista M. HIXSON[1]. [1]Department of Interdisciplinary Health Sciences, Arizona School of Health Sciences, A.T. Still University, Mesa, AZ 85206, USA. [2]Clinical Anatomy Research Laboratory, Texas Tech University Health Sciences Center, Lubbock, TX, 79430, USA. [3]Département d'anatomie, Université du Québec à Trois-Rivières, Québec, G9A 5H7, Canada.
11:00 AM	In Search of the Thenar Raphe: Using a Multi-Modal Approach to Understand the Detailed Anatomy. **FOGG**[1], Quentin A., Nick MARSON[1], Casper THORPE LOWIS[1] and Neil ASHWOOD[2]. [1]Centre for Human Anatomy Education, Monash University, Melbourne, Victoria, 3800, Australia. [2]Department of Trauma and Orthopaedics, Burton Hospitals NHS Foundation Trust, Burton-upon-Trent, DE13 0RB, United Kingdom.
11:15 AM – 11:45 AM	Platform Session 4: Tech Fair ..... Ballroom 2/4 Moderator: Greg Smith
11:15 AM	The All-in-One Anatomy Exam Review: Image-Based Questions and Answers. **SUÁREZ-QUIAN,** Carlos A.[1], and Joel A. VILENSKY[2]. [1]Department of Biochemistry, Georgetown University Medical Center, Washington, DC, 20057 USA; [2]Indiana University School of Medicine, Fort Wayne, IA 46805 USA.
11:20 AM	Open Anatomical Learning Platform 'AnatomyTOOL' and International Student Contest. **GOBÉE**, Oscar P.[1], Daniël JANSMA[1], Andreas E. HERRLER[2], Marco C. DERUITER[1], and Eleonore KOEHLER[2]. [1]Department of Anatomy and Embryology, Leiden University Medical Center, Leiden, Zuid-Holland, 2333 ZC, the Netherlands; [2] Department of Anatomy and Embryology, Faculty of Health, Medicine and Life Sciences, Maastricht University, Maastricht, Limburg, 6229 ER , the Netherlands.
11:25 AM	A Comparison of Kinesthetic Teaching Devices for Teaching the Pterygopalatine Fossa. **NAZE**[1], Garrett, Matt HAZZARD[2], Brian MACPHERSON[3], and April RICHARDSON-HATCHER[3]. [1]Department of Rehabilitation Sciences, University of Kentucky, Lexington, KY, 40536, USA. [2]Information Technology Services, University of Kentucky, Lexington, KY, 40536, USA. [3]Department of Neuroscience, University of Kentucky, Lexington, KY, 40536, USA. **(GER)**
11:45 AM – 1:00 PM	Lunch Break (On Your Own) – See page 6 for options
12:00 PM – 1:00 PM	Exhibit Hall closed for lunch ..... Ballroom 1/3
1:00 PM – 2:30 PM	Platform Session 5 – Education ..... Ballroom 2/4 Moderator: Jennifer Burgoon

continued on next page

Wednesday, July 19th continued

1:00 PM — Evolving Anatomical Sciences Curricula in Medicine and Implications on Preparedness for Residency. **LEE**, Lisa M.J.[1,2], Matt STERITZ[2], and Rachel KLAUS[2]. [1]Department of Cell and Developmental Biology, University of Colorado School of Medicine, Aurora, CO, 80045, USA. [2]Master of Science in Modern Human Anatomy Program, University of Colorado Graduate School, Aurora, CO, 80045, USA.

1:15 PM — Addressing EPAs 1-6 During a First Semester Anatomy Course: The Cadaver as the "First Patient". **FOSTER**, James D., Philip D. REYNOLDS, Stephen MILLER, Maria A. DANZIE, and Emmanuel SEGUI. Alabama College of Osteopathic Medicine, Dothan, AL 36303, USA.

1:30 PM — Creating Virtual 3D Data Sets of Human Specimens with a Cryomacrotome Slicing Technique. **PLAZA**, Jessica T., Miguel ANGELES, William P. BROWN, Jimmy KAO, Philip MANSOUR, Sakti SRIVASTAVA, Kris THOMSON, and Jack CHOI. Division of Clinical Anatomy, Department of Surgery, Stanford University School of Medicine, Stanford, CA 94305, USA. **(GER)**

1:45 PM — Multimodal Review Sessions for Undergraduate Anatomy Education. **WELLEFORD**, Andrew S., Lauren WEAVER, Kristen M. PLATT. Department of Neuroscience, College of Medicine, University of Kentucky, Lexington, KY 40536, USA. **(GER)**

2:00 PM — Preparing Scholar Educator Leaders–Curriculum Development of a New PhD Program in Anatomy Education. **TERRELL**, Mark and Randy KULESZA. Department of Anatomy, Lake Erie College of Osteopathic Medicine, Erie, PA 16509, USA.

2:30 PM – 2:45 PM — Break ..... Ballroom 1/3

2:45 PM – 4:15 PM — Special Session ..... Ballroom 2/4
"*The Legal and Ethical Considerations of Being the Guardian of the Gift*"

4:15 PM – 5:30 PM — Clinical Anatomical Terminology Committee Meeting - Open to all ..... Ballroom 2/4

6:30 PM – 8:30 PM — Social - Medical Illustration and Invention over the Years ..... Minnesota Room (6th floor)
Sponsored by: 3D4MEDICAL Transforming Medical Learning

Scientific Program

Thursday, July 20th

7:30 AM – 9:00 AM — Anatomical Services Committee Breakfast Meeting - Open to all ..... Deer/Elk Room

7:30 AM – 9:30 AM — Breakfast with Exhibits/Posters ..... Ballroom 1/3

8:00 AM – 4:30 PM — Registration ..... Atrium Lounge

9:30 AM – 9:45 AM — Opening Announcements ..... Ballroom 2/4

9:45 AM – 11:00 AM — Poster Session C–Head, Neck & Limbs Ballroom3/4

11:00 AM – 11:45 AM — Platform Session 6: Lower Limb ..... Ballroom 3/4
Moderator: Wayne Cottam

11:00 AM — Innervation of the Lateral Knee Joint Capsule: An Anatomic Study**.** **HASSAN**, Syed A.[1], John TRAN[1], Michael GOFELD[2], Philip W.H. PENG[2], and Anne M.R. AGUR[1]. [1]Division of Anatomy, Department of Surgery and [2]Department of Anesthesia, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada. **(GER)**

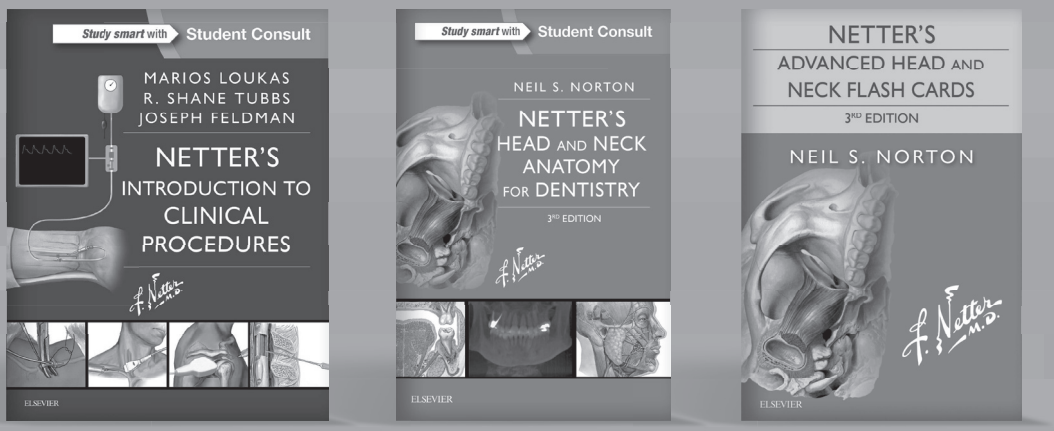
11:15 AM — A Comparative Study of the Innervation of Vastus Medialis Longus and Obliquus. **SHAKERI**, Shayan, Syed A. HASSAN, Valera CASTANOV, and Anne M. R. AGUR. Division of Anatomy, Department of Surgery, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada. **(GER)**

continued on next page

Thursday, July 20th continued

11:30 AM	Ultrasound-Guided Injection of Psoas Major Muscle for Clinical Management of Hip Flexor Spasticity. **DUONG**, Allen[1], Satyendra SHARMA[2], and Anne M.R AGUR[1,2]. [1]Division of Anatomy, Department of Surgery and [2]Division of Physical Medicine & Rehabilitation, Department of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada. **(GER)**
11:45 AM – 1:00 PM	Lunch Break (On Your Own) – See page 6 for options
12:00 PM – 4:00 PM	Exhibitor Tear Down/Poster Tear Down ..... Ballroom 1/3
1:00 PM – 2:30 PM	CAT Symposium "The History, Present Condition, and Future Direction of the Anatomical Lexicon"..... Ballroom 2/4
2:30 PM – 2:45 PM	Break
2:45 PM – 4:00 PM	Business Meeting – Everyone is encouraged to attend! ..... Ballroom 2/4
4:00 PM – 4:30 PM	New AACA Council Meeting..... Birch/Maple Lake
5:00 PM – 6:00 PM	Reception ..... Atrium Foyer
6:00 PM – 8:00 PM	Banquet..... Ballroom 2/4

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The 2017 Presidential Speaker

Tuesday, July 18th at 9:45 AM

Sponsored by WILEY

James D. Collins, MD



FIBROSIS AND SCARRING OF THE BRACHIAL AND SACRAL PLEXUS AS DISPLAYED BY MRI/MRA/MRV.

Bilateral rounding of the shoulders (laxity) associated with kyphosis of the thoracic spine causes costoclavicular compression and brachial plexopathy. This form of thoracic outlet syndrome is usually not amenable to surgical treatment in older patients, particularly in severe kyphosis of the thoracic spine. Surgery alters fascial planes within the thorax and pelvis that causes fibrosis and scarring of the blood supply to the brachial and sacral plexus. The objective of this presentation is to display the sites of landmark anatomy compressing the brachial plexus that decreases venous return supply to the nerves causing a shortage of oxygen and glucose needed for cellular metabolism causing fibrosis and scarring of the soft tissues marginating the brachial and sacral plexus. Magnetic Resonance Imaging (MRI) is the only modality that displays fibrosis and scarring of fascial plane anatomy obstructing venous and lymphatic return not possible with ultrasound or Computerized Axial Tomography (CAT). The longer venous obstruction transient ischemia or permanent obstruction ischemia if unrelieved, progressively affect the nerve fibers increasing numbers to an increasing degree. Pathology develops with edematous swelling and vascular congestion. If the pressure is unrelieved and continues to increase, the nerve(s) suffer a first degree or a conduction block injury. Compression ischemia with degeneration and fibrosis develop. In absence of relief, the endoneurial tubes and funniculi atrophy increasing ischemia, fibrosis becomes marked. This presentation displays costoclavicular compression of the brachial and sacral plexus with fibrosis and scarring in two patients. One patient post multiple fractures of the thorax and pelvis complicated by thoracic outlet syndrome, and the second patient post cervical fusion and bilateral total shoulder and hip replacement with foot drop. Monitored bilateral MRI, MRA and MRV of the brachial plexus is the only modality of choice to display costoclavicular compression and fibrosis, and scarring of the brachial plexus.

Honored Member 2017

The American Association of Clinical Anatomists

Recognizes and Awards Honored Membership to

James D. Collins, MD



Dr. James Collins was born in 1931 in Los Angeles. He attended local public schools. He completed Jefferson High School in 1949 where he lettered in gymnastics and swimming. He entered UCLA where he played football, enjoyed being a member of the swim team and won the Light Heavyweight Boxing Championship. While half way through his undergraduate studies, he was drafted by the Army and served two years. He was stationed in Texas then deployed to Ansbach, Germany for 18 months as a First Sergeant Medic where his wife Cecilia "Edith" and young son Keith accompanied him. Following an honorable discharge from the Army, Dr. Collins completed his undergraduate studies at UCLA and then earned his Master's in Zoology from UCLA. During graduate school, his daughter Jelana was born and he worked in the Radiology Department to fund his graduate studies. Dr. Collins attended Meharry Medical School from 1959 to 1963. He completed his internship at the Los Angeles County General Hospital. In 1964, Dr. Collins was the first African American Radiology Resident to attend UCLA. Dr. Collins became the first African American Professor of Radiology at UCLA in 1968 the same year he became Board Certified in Radiology. His third child, Jenine, was born the following year. At the request of Dean Mellenkoft, Dr. Collins formulated a recruitment team for disadvantaged students to enter the UCLA School of Medicine. Dr. Collins has trained numerous medical students, interns and residents during his tenure at UCLA. During his 54 years of being a physician, 53 years have been spent at UCLA. In fact, with the exception of serving in the military, attending medical school and completed one year of internship, Dr. Collins has walked the campus of UCLA since the age of 16 for a total of 62 years.

James D. Collins, M.D. is a full-time Professor and General Radiologist in the UCLA Department of Radiological Sciences. He specializes in bilateral 3D MRI/MRA imaging of the brachial plexus, and has been performing these studies since 1985. The bilateral 3D MRI/MRA has provided anatomic evidence of Thoracic Outlet Syndrome (compression of the bicuspid valves within the internal jugular and subclavian veins) for neurological evaluation and corrective physical therapy and surgery.

Dr. Collins has published extensively in journals such as Clinical Anatomy, National Medical Association, and Family Practice Recertification. He is a member of many professional societies, including the American Association of Clinical Anatomists (AACA), the British Association of Clinical Anatomists (BACA), the American Association of Anatomists (AAA), the Radiological Society of North America (RSNA), the California Radiological Society (CRS), the Los Angeles Radiological Society (LARS), the Radiology Section of the National Medical Association (NMA), and the Alpha Omega Alpha (AOA) Honor Medical Society. Dr. Collins is currently the radiology editor for the Journal of National Medical Association.

Previous Honored Members of the AACA

*W. Henry Hollinshead, 1984
*Chester B. McVay, 1985
*Donald James Gray, 1986
*Russell T. Woodburne, 1987
*Oliver Beahrs, 1988
*N. Alan Green, 1989
*Frank H. Netter, 1990
*Ralph Ger, 1991
M. Roy Schwartz, 1992
*Carmine D. Clemente, 1993
Keith L. Moore, 1994
*Ray J. Scothorne, 1995
Robert A. Chase, 1996
Tatsuo Sato, 1997
*John E. Skandalakis, 1998
Donald R. Cahill, 1999
*Sandy C. Marks, Jr., 2000
David G. Whitlock, 2001
*Robert D. Acland, 2002
Arthur F. Dalley, II, 2003
*John V. Basmajian, 2004
Ian Whitmore, 2005
Peter H. Abrahams, 2006
Gary G. Wind, 2007
Vid Persaud, 2008
Richard S. Snell, 2009
Ray Gasser, 2010
Harold Ellis, 2011
Ronald A. Bergman, 2012
John T. Hansen, 2013
Victor M. Spitzer 2014
Carol E. Scott-Connor 2015
Carlos A. G. Machado 2016

** deceased*

R. Benton Adkins Jr.
Distinguished Service Award 2017

The American Association of Clinical Anatomists
Recognizes and Awards the
R. Benton Adkins Jr. Distinguished Service Award to



Ronald S. Wade

Since 1974, Ronn has served as the Director of the Maryland State Anatomy Board, Public Health Services, Department of Health and Mental Hygiene and Director of the Anatomical Services Division, University of Maryland School of Medicine in Baltimore, Maryland. His personal and professional interests in advancing and promoting anatomical Science, medical education, clinical, surgical and allied training, and research study has been his dedication to contribute toward improving public health.

Ronn's preparation for his vocation came early in his formative years. His father served as WWII Navy Medical Corpsman and followed his life spent in funeral service. With a library at home filled with books on anatomy, first aid, field surgery, hygiene, micro, pathology, embalming and funeral directing his education began early. Working alongside his father at the funeral home rendering care to the deceased and the bereaved and aggrieved survivors, his empathic caregiving internalized. After one college semester, Ronn enlisted in the US Air Force Medical Service with assignments both hospitals and a field hospital. With the enlistment over, he returned to college, majoring in biology and mortuary science. Ronn then went on to earn a Certificate in Mortuary Science, National Board Certification and a Maryland Mortician's License in 1976, an AA degree in 1977, BS degree in 1981. During his tenure as Director, he held faculty positions as instructor and associate professor teaching health and thanatology courses. In 1975-76, he proposed and amended State Anatomy Board laws and reformulated the State's Body Donation Program to gain more public participation, then numbering only several hundred pre-death donations to the 75,000+ today, designed and developed various anatomical preparation methods for cadavers and specimens for gross and clinical study use.

In 1978-79, Ronn established the protocols for the use of decedent bodies for clinical training for EMT and Paramedical programs and the first "hands-on" trauma ATLS courses. In 1983, licensed in plastination, he began introducing polymer preserved specimens enhance gross anatomy courses, allied health and student/adult education. Today, under Ronn's leadership, the Board administers one of the largest and most successful willed body programs in the country and receives 2,600 decedent bodies per annum.

In 2010 Ronn established a state of the art Clinical Surgical Training Laboratory that is used daily and widely by many disciplines of surgery, trauma and allied health programs in Maryland and beyond. In the mid 1980's Ronn was invited to attend a meeting in NYC by Dr. Andy Payor; the group later formed the AACA. The meeting and discussions were eye-opening. Ronn has been a member of AACA since 1998. From 2001-2007, he served as the first co-chair of the Anatomical Services Committee, previously a Special Interest Group (SIG) and as Councilor / Board Member from 2003-2006.

Previous R. Benton Adkins Jr. Distinguished Service Award Recipients

2004 – Robert J. Leonard
2006 – Daniel O. Graney
*2007 – Ralph Ger
2009 – Arthur F. Dalley
2011 – Carol Scott-Conner
2012 – Keith L. Moore
2013 – Stephen W. Carmichael
*2015 - Lawrence M. Ross
2016 - Thomas Quinn

** deceased*

Career Development Committee Symposium

Tuesday, July 18th
1:00 PM – 2:30 PM

"Journeys Through a Career in Anatomy – Glancing Back and Looking Forward"

During this symposium, we will have three speakers representing three different levels in an academic career. Dr. Lela Giannaris is an assistant professor at University of Massachusetts Medical School, Dr. Jonathan Wisco is an associate professor at Brigham Young University, and Dr. Robert Spinner is a full professor at the Mayo Clinic. Topics to be discussed include (1) developing as an educator, (2) establishing scholarly activity, (3) balancing a career and personal life, (4) lessons learned, and (5) path to academic promotion.

Eustathia Lela Giannaris, Ph.D.



Lela Giannaris, PhD, is an Assistant Professor in the Division of Translational Anatomy in the Department of Radiology at the University of Massachusetts Medical School (UMMS). She joined the UMMS faculty in 2010 after earning a PhD in Anatomy and Neurobiology from Boston University School of Medicine. Dr. Giannaris serves as a core anatomy faculty member in the Development, Structure and Function (DSF) and Brain: Clinical Neuroanatomy courses for first and second year medical students, respectively. Dr. Giannaris is also the Director of the Summer Anatomy Enrichment Program for rising second-year medical students who are interested in further study of anatomy, preparation of cadaveric prosections, and development of educational materials. In addition, Dr. Giannaris is a Co-Course Leader of the Capstone Scholarship and Discovery course, a longitudinal course that engages students in a scholarly project related to medicine during all four years of medical school. Dr. Giannaris has conducted neuroscience research on various topics such as gene therapy for neurodegenerative diseases and quantitative neuroanatomy in aging, and has recently shifted to medical education research. She is interested in curriculum development related to the use of 3D visualization methods and the development of self-directed learning resources to enhance the gross anatomy and neuroanatomy curricula. Dr. Giannaris serves on the Educational Affairs Committee of the AACA.



Jonathan J. Wisco, Ph.D.

Dr. Jonathan J. Wisco is Associate Professor and Director of the Laboratory for Translational Anatomy of Degenerative Disease and Developmental Disorders, College of Life Sciences, Department of Physiology and Developmental Biology, and Neuroscience Center at Brigham Young University, Provo, UT. He is also Associate Director of the BYU MRI Research Facility. Dr. Wisco holds an Adjunct Associate Professor position in the Department of Neurobiology and Anatomy at the University of Utah, School of Medicine, Salt Lake City, UT.

Dr. Wisco's research encompasses three primary themes: 1) improving diagnostic and prognostic technologies for Alzheimer's disease, cerebrovascular disease, autism and schizophrenia; 2) understanding the anatomical etiology for dysphonia disorders and synovial joint injuries; 3) examining the impact and role of service-learning through Anatomy Academy on the development of life-long learning skills at the undergraduate pre-professional, and graduate professional education levels. Dr. Wisco is currently the primary mentor for nearly 30 undergraduate students and four graduate students, and supervises the training of 80 teaching assistants for the BYU Human Anatomy course.

continued on next page

Career Development Committee Symposium continued

Dr. Wisco earned his B.S. in Biology at the University of Washington, Seattle, WA in 2004, and Ph.D. in Anatomy and Neurobiology from the Boston University School of Medicine in 2003. He completed postdoctoral work in Radiology at the Athinoula A. Martinos Center for Biomedical Imaging and Massachusetts General Hospital, Cambridge, MA in 2006. He was an Assistant and an Associate Professor of Integrative Anatomy at the David Geffen School of Medicine, Department of Pathology and Laboratory Medicine, University of California, Los Angeles (UCLA) until 2012.

Robert J. Spinner, MD



Robert J. Spinner, MD, is chair of the Department of Neurologic Surgery at the Mayo Clinic in Rochester, Minnesota. He is the Burton M. Onofrio, MD Professor of Neurologic Surgery and a Professor of Orthopedics and Anatomy. He is chair of the Academic Appointments and Promotions Committee at Mayo. He is board certified in both orthopedics and neurosurgery. His clinical practice is limited to peripheral nerve surgery. He completed full residency programs in orthopedics (Duke University) and neurosurgery (Mayo Clinic) and a 1 year peripheral nerve fellowship with David Kline and a 6 month traveling fellowship to several international centers as a CNS Cushing Fellow. He just served as the President of the American Society for Peripheral Nerve.

Special Session by Anatomical Services Committee

Wednesday, July 19th
2:45 PM – 4:15 PM

"The Legal and Ethical Considerations of Being the Guardian of the Gift"

Academic departments and anatomical donation programs may have custody of or responsibilities for anatomical collections that do not have a clear paper trail of origin or consent. Skeletal collections, embryo and fetal collections, and other historical collections may present risks or be subject to specific laws. Moreover, such collections may be most appropriately used, curated, or disposed of by personnel who are familiar with the ethical considerations, regulations and policies that apply. For example, does the recent focus to again ban fetal tissue research apply to existing collections at your institution? Are your skeletal collections comprised of specimens from protected cultures? Does your institution have a policy for documenting, using, or disposing of collections that may fall under state or federal regulations? Come to the ASC special session on ethical and legal considerations of osteology, embryology, and historical anatomy collections to hear about the value these collections bring to teaching and research, what risks they may present, applicable laws, ethical considerations, documentation and proper final disposition. The University of Minnesota will share their experiences. A panel of experts will present in their field and a moderated interview will take place using questions submitted by the ASC as well as questions from the floor. If you would like to submit your question in advance, please contact the moderators: David Conley; dmc@wsu.edu or Brandi Schmitt; brandi.schmitt@ucop.edu.

Topic introduction by **Angela McArthur**, Director of the Anatomy Bequest Program, University of Minnesota.



Michele Bratcher Goodwin

Professor Goodwin is a Chancellor's Professor of Law at the University of California, Irvine with appointments at the School of Law, Program in Public Health, Department of Criminology, Law, & Society, Department of Gender and Sexuality Studies, and Center for Psychology and Law. She is the founder and director of the Center for Biotechnology and Global Health Policy and its Reproductive Justice Initiative. She researches and writes about legal concerns with regard to the human body. She is an acclaimed bioethicist and prolific author. Professor Goodwin has published with Forbes, Salon.com, the L.A. Times, Chicago Sun Times, Houston Chronicle, Christian Science Monitor, and the NY Times among others. She is the author of several highly acclaimed books, including the much anticipated, Policing The Womb, which chronicles how women's reproduction has become the political scapegoat in Congress and legislatures across the U.S., resulting in the rise of personhood measures, practices that force women to undergo cesarean births under threat of court order, abuse of prosecutorial discretion that results in the criminalization and punishment of pregnant women for falling down steps, refusing bed rest or attempting suicide, and policies that dramatically erode reproductive liberty.

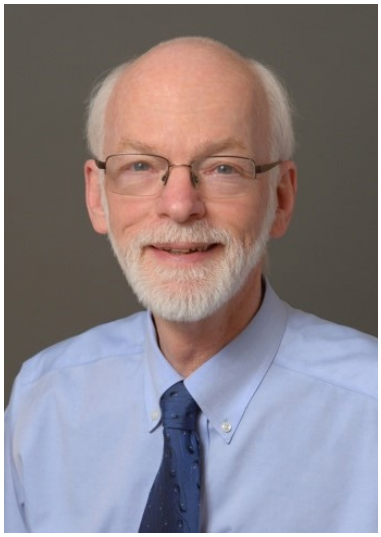
Michele frequently lectures world-wide on issues involving human rights, reproductive justice, bioethics, and health law. She served as a Visiting Professor at the University of Chicago and as a Visiting Scholar at the University of California-Berkeley and Columbia University Law School.



Susan Myster, MA, Ph.D.

Professor Susan Myster teaches in two departments, Criminal Justice and Forensics Science and Anthropology, in Hamline's College of Liberal Arts. She has been teaching at Hamline since 1990. In 1996, Professor Myster and Professor Maggie Jensen (Professor Emeritus) designed and implemented the Forensic Sciences Certificate Program. Dr. Myster has worked on several grants from the National Institute of Justice that have focused on developing and testing a methodology for analyzing and interpreting saw marks on bone (with colleagues at Mercyhurst College) and the analysis of unidentified skeletal remains, submitting bone/tooth samples for DNA analysis, and entering relevant information in the NamUs Unidentified Persons database (with colleagues at the Minnesota Bureau of Criminal Apprehension). She has consulted as a Forensic Anthropologist in Minnesota and other states since 1991 and is the only American Board of Forensic Anthropology certified forensic anthropologist in Minnesota. Professor Myster's research interests in forensic anthropology include age estimation, traumatic injury, and the ethical issues in the practice of forensic science. Dr. Myster holds a BA in Anthropology from Hamline University and an MA and PhD in Anthropology from the University of Tennessee, Knoxville.

Don C. Postema, Ph.D.



Don Postema is the Program Director for Medical Bioethics at HealthPartners, a non-profit integrated health care organization in Minnesota and he is the Ethicist-in-Residence for Gillette Children's Specialty Healthcare in St. Paul. Dr. Postema is a Professor of Philosophy at Bethel University as well as Affiliate Faculty at the Center for Bioethics at the University of Minnesota.

Dr. Postema received his Ph.D. and M. Phil from Columbia University, a M.T.S. from Gordon – Conwell Theological Seminary and a B.A. from Wheaton College. His areas of specialization include Ethics and Clinical Ethics, Health Care Ethics, Aesthetics, Philosophy and Culture and Film Studies. He is a member of the American Philosophical Association and the American Society for Bioethics and Humanities.



Caroline Rowe

Caroline Rowe holds a BS degree from the University of Illinois-Chicago, where she double majored in chemistry and microbiology, as well as a BA from the University of Minnesota-Twin Cities where she majored in anthropology. She is currently enrolled as a PhD student in biological anthropology at the University of Minnesota-Twin Cities and was recently awarded a Graduate Research Fellowship from the National Science Foundation (NSF GRFP). She has taken courses at the University of MN in osteology, zooarchaeology and human anatomy and has attended short courses at University of TN-Knoxville which focused on bone pathology/trauma and forensic anthropology methods. For her dissertation Caroline is researching the microbial degradation of bone and applying it to forensic and archaeological settings to help reconstruct behaviors surrounding time of death. Caroline also works as a teaching assistant and laboratory administrator for introduction to anthropology and as a teaching assistant for human anatomy.

Social:
"Medical Illustration and Invention Over the Years"

Wednesday, July 19th
6:30 PM – 8:30 PM

Minnesota Room and Foyer - 6th floor

This years' social is once again dedicated to the memorial of Dr. Robert Acland.

Places of Invention is a current exhibit at the Smithsonian American History Museum in Washington, D.C. Medical innovations discovered by Minnesotans in the 1950's are a prominent part of the Smithsonian exhibit.

Similarly, this event will pay tribute to Minnesota's longstanding history as a pioneer in cardiac surgery and cardiac rhythm management device design, by showcasing several exciting exhibits. The Bakken Museum, which was founded by Earl Bakken, the inventor of the first wearable pacemaker and a co-founder of Medtronic, will be curating an interactive exhibit. The Owen H. Wangensteen Historical Library of Biology and Medicine, Midwest's pre-eminent library for historical medical research, will exhibit a number of its rare books, including a few related to the heart and cardiology. 3D4Medical, a platinum sponsor of tonight's event, will also be offering attendees an opportunity to explore cardiac anatomy in the immersive world of augmented reality. Please come and see a range of clinical pathologies and procedures with their line of health care products directed at patient health and comprehension to understand how 3D4Medical truly is transforming medical learning.

3D4MEDICAL

Transforming Medical Learning

Clinical Anatomical Terminology Committee Symposium "The History, Present Condition, and Future Direction of the Anatomical Lexicon"

Thursday, July 20th
1:00 PM – 2:30 PM

The History of Terminologia Anatomica



Ian Whitmore, MB, BS, MD, LRCP, MRCS

Ian Whitmore was born in England of an English father and an Icelandic mother just before the end of the second world war. He was educated in the United Kingdom, graduating with MBBS and LRCP MRCS from Guy's Hospital Medical School (University of London) in 1968.

Following two years of clinical experience as a junior hospital doctor, he started teaching Anatomy in Manchester in 1970. He was granted the MD degree in 1980 following submission of a thesis on research into Oesophageal Striated Muscle. The textbook and color atlas “Human Anatomy” with Ian Whitmore as one of the five authors was published in1985 and has now reached the sixth edition.

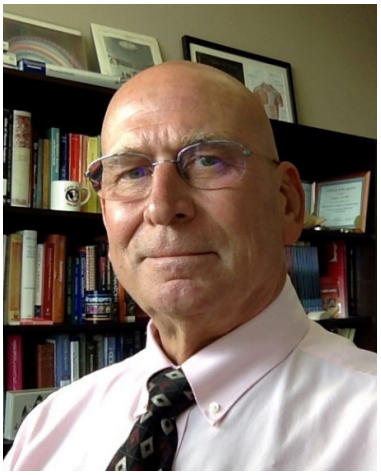
In 1990 he moved to Queen Mary & Westfield College in London as Senior Lecturer in Anatomy, taking early retirement in 1996.

Having been a Visiting Professor at Stanford several times since 1984, he has been teaching there every year since 1996, and was made a Full Professor in 2002. He continues to teach in Stanford.

Between 1989 and 2009 Ian was Chairman of the Federated International Committee on Anatomical Terminology, which published Terminologia Anatomica in 1998, Terminologia Histologica in 2007 and Terminologia Embryologica in 2013.

In 2005 the American Association of Clinical Anatomists awarded him Honored Member status for his work in Terminology. He has similarly been made an honorary member of the anatomical societies in South Africa, Costa Rica, Italy and Russia. In 2010, he was awarded the Jubilee Medal "For the great contribution to Morphology” by the All-Russian Scientific Society of Anatomists, Histologists and Embryologists. In 2012 The Anatomical Society appointed him as Fellow.

His other achievements include a Commercial Helicopter License with Helicopter Instructor Rating.



The Second Edition of Terminologia Anatomica and Other FIPAT Terminologies

Thomas R. Gest, Ph.D.

Dr. Thomas Gest is a Professor of Anatomy in the Department of Medical Education at Texas Tech University Health Sciences Center Paul L. Foster School of Medicine. Dr. Gest currently teaches clinical anatomy and embryology within a clinical scheme based integrated curriculum. Dr. Gest has served as a member of FIPAT, the Federative International Programme for Anatomical Terminology, since 2012, and he currently serves as the Secretary and Chair of the Gross and Clinical Anatomy Working Group of FIPAT. Dr. Gest is a dedicated teacher who has received nine teaching awards and has published seven textbooks of anatomy, as well as numerous articles, abstracts, software packages, and web sites for anatomy and embryology.



AnatomicalTerms.Info (ATI) and the Initiative to Create Definitions

O. Paul Gobèe, MD

Paul Gobèe MD, is assistant professor at the department of Anatomy and Embryology of Leiden University Medical Center (LUMC), the Netherlands. He spearheaded the development of online anatomical e-learning at the department, his interest is in anatomical open educational resources. He coordinates and teaches the anatomy education regarding the abdomen. He is a long-standing active member of the CAT committee of AACA and also member of the informatics section of FIPAT. His present project is an open anatomical educational platform supported by the Dutch and Flemish departments of anatomy and the Dutch Ministry of Education http://anatomyTOOL.org.

Previously he developed

- a series of interactive tutorials under the acronym CASK (http://www.caskanatomy.info/)
- the obligatory anatomy e-learning for Dutch transplant procurement surgeons (https://www.mod-surgery.org/website/)
- a wiki site for anatomical terminology (in close collaboration with CAT-AACA): www.AnatomicalTerms.info
- open source virtual microscopy http://www.caskanatomy.info/microscopy
- a major part of a MOOC regarding abdominal anatomy https://www.coursera.org/learn/abdomen-anatomy



An Online System for Developing and Vetting Anatomical Definitions

Evan Goldman, Ph.D.

Evan Goldman, PhD, is an anatomist at Cooper Medical School of Rowan University. He is currently the director of the anatomy lab and runs the school's ultrasound training and the advanced surgical anatomy and radiology fourth-year elective.

Dr. Goldman's research includes development and implementation of 3D virtual reality and computer technologies in medical education. His team is developing modules for teaching and assessing anatomy, radiology, and laparoscopy skills. He also has interests in robotics and medical simulators.

Evan Goldman has served as co-chair of the Clinical Anatomical Terminology (CAT) committee of the American Association of Clinical Anatomists for one year. Working with the group, he has developed an online interactive system for creating and vetting anatomical definitions.

Evan Goldman has served as co-chair of the Clinical Anatomical Terminology (CAT) committee of the American Association of Clinical Anatomists for one year. Working with the group, he has developed an online interactive system for creating and vetting anatomical definitions.

Post Graduate Course - Friday July 21, 2017

The Anatomist's Role in Biomedical Device Design and Enhancing Patient Outcomes

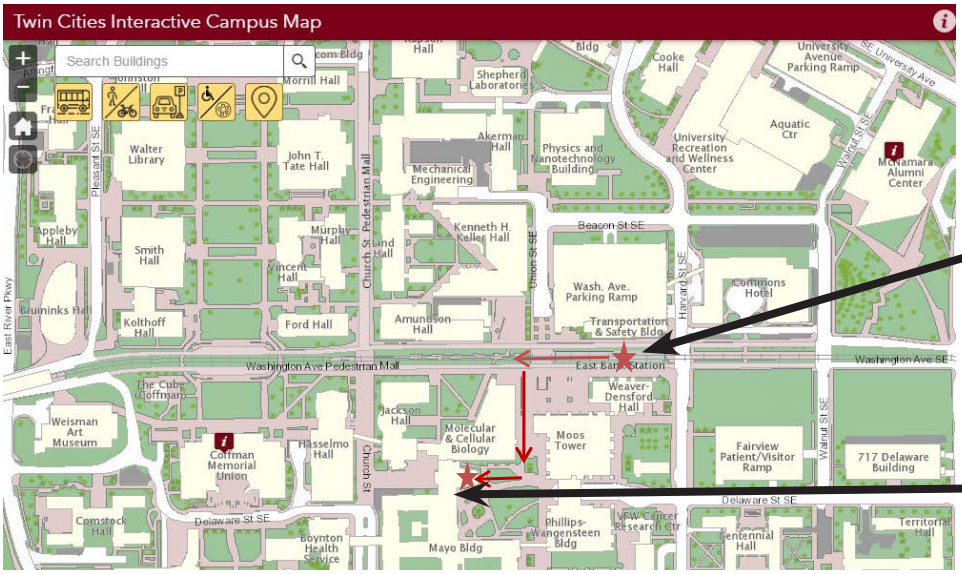
University of Minnesota
321 Church Street SE
Minneapolis, MN

The University of Minnesota has been on the forefront of advancing cardiac medicine for more than half a century. During this full day course, participants will tour the Visible Heart Laboratory, a premiere cardiac research facility which performs translational systems research ranging from cellular and tissue studies to organ and whole body investigations. This tour will offer participants the hands-on opportunity to explore a large mammalian in-vivo heart demonstration, explore a heart tissue library, tour a 3D printing lab, and learn about Minnesota's history in heart rhythm management in the very laboratory space where the first pacemaker was innovated.

In the afternoon, course participants will be able to implant the world's smallest pacemaker, the Medtronic Micra, a novel, leadless pacemaker using a fluoroscopic, femoral artery catheter approach on cadaver models which are continuously perfused using a peristaltic pump. Other afternoon laboratory modules include viewing a range of rare congenital cardiac specimens from the Jessie Edwards Heart Registry, learning how to identify and safely remove implanted biomedical devices, and a 3D cardiac ultrasound module.

8:30 am	Arrive at University of Minnesota
8:30 - 9:00 am	Breakfast and check-in
9:00 - 10:15 am	Lectures
10:15 - 10:30 am	Walk to the Visible Heart Lab
10:30 am - 12:00 pm	Tour Visible Heart Lab
12:00 - 12:10 pm	Walk to Mayo Auditorium
12:10 - 12:40 pm Lunch sponsored by Mopec Better By Design™	Lunch with Jessie Edward Heart Registry Lecture
12:40 - 1:00 pm	Walk to Anatomy labs/change into scrubs
1:00 - 3:00 pm	Lab with 4 modules
3:00 - 3:10 pm	Lab tour
3:10 - 3:30 pm	Change and walk to the Light Rail, depart

Due to the close proximity of the University of Minnesota to the Marriott, we will encourage attendees to utilize the Light Rail. **If you selected that you wished for us to purchase a Light Rail ticket on your registration, then please pick up your ticket at the registration desk in the atrium foyer at the Marriott. Also, if you require special assistance during travel, please let us know so that we can assist you with another form of transportation.**



Poster Listings

Poster Session A – Tuesday, July 18, 4:00 PM – 5:15 PM

**Denotes publication in Clinical Anatomy.*

Poster # Abstract Title/Authors

A1* Anatomy of the Thoracic Spine to Elucidate the Validity of the Thoracic Rule of Threes.
OAKLEY, Clayton K.[1], Sarah A. KEIM JANSSEN[1], Joseph P. PANKRATZ[1], Kevin D. TREFFER[2], Travis L. MCCUMBER[3], Anthony B. OLINGER[1]. [1]Kansas City University of Medicine and Biosciences Division of Clinical Anatomy, Kansas City, MO 64106, USA; [2]Kansas City University of Medicine and Biosciences Division of Osteopathic Manipulative Medicine, Kansas City, MO 64106, USA; [3]University of Nebraska Medical Center Department of Genetics, Cell Biology and Anatomy, Omaha, NE 68198, USA.

A2* Anatomic Variations of the Interchondral Joints of the Thorax with Clinical Relevance.
GEISLER, Amaris[1], Samantha SYLDORT[1], and Anthony V. D'ANTONI[2]. [1]CUNY School of Medicine, City College of New York, New York, NY 10031; [2]Department of Molecular, Cellular and Biomedical Sciences, CUNY School of Medicine, City College of New York, New York, NY 10031.

A3 Lung Dehydration in Multiple Stages of Inhalation for Computed Tomography Imaging.
HILL, Paul R., Andrew A. ASHTON and Jake D. ANDERSON. Anatomy Bequest Program, University of Minnesota Medical School, Minneapolis, MN, 55455, USA.

A4* The Variation in Size and Shape of the Seventh Costal Cartilage: Reconstruction of the Midface.
LAMBERT, H. Wayne[1], Adam N. BENDER-HEINE[2], Michelle L. RUSSELL[3], Hannah L. LYNCH[3], Maria R. GANOE[3], Allen A. RICKARDS[1], J. Scott HOLMES[1], Mark A. ARMENI[2], and Matthew J. ZDILLA[3]. [1]Department of Neurobiology and Anatomy, West Virginia University School of Medicine, Morgantown, WV 26506, USA; [2]Department of Otolaryngology, West Virginia University School of Medicine, Morgantown, WV 26506, USA; [3]Department of Natural Sciences and Mathematics, West Liberty University, West Liberty, WV 26074, USA.

A5* An Integrated Anatomy-Pathology Lab Session to Enhance the Diagnostic Approach to Breast Neoplasms.
HASSAN Sherif S[1, 2], Fauzia NAUSHEEN[1], Rajunor ETTARH[1], Robert SUSKIND[1], Alfred TENORE[1], Ghaith Al-EYD[1]. [1]Department of Medical Education, California University of Science and Medicine, School of Medicine, Colton, CA 92324, USA; [2]Anatomy Department, Faculty of Medicine, Cairo University, Cairo, Egypt.

A6* Atorvastatin Preconditioning Can Ameliorate Renal Ischemic-Reperfusion Injury in Diabetic Rats.
HASSAN Sherif S[1, 2], Ayman RIZK[2], Ahmed MOTAWEA[2], Shereen ABDELFATTAH[2]. [1]Department of Medical Education, California University of Science and Medicine, School of Medicine (CalMed-SOM), Colton, CA 92324, USA; [2]Anatomy Department, Faculty of Medicine, Cairo University, Cairo, Egypt.

A7* Digital Anatomy to Improve Caregiver Understanding in Pediatric Aerodigestive Clinic.
BENJAMIN, Hannah K.[1], Joel FRIEDLANDER[2], Sparrow HELLAND[2], and Emily DEBOER[2]. [1]Modern Human Anatomy Program, University of Colorado Anschutz Medical Campus, Aurora, CO 80045, USA. [2]Aerodigestive Program, Children's Hospital Colorado, Aurora, CO 80045, USA.

A8* Middle Mesenteric Artery: An Anomalous Source of Arterial Supply to the Transverse Colon.
MANYAMA, Mange[1], Avelin MALYANGO[1], Ameed RAOOF[1], Nurru L. MLIGILICHE[1], Charles MSUYA[1], Nasnass NASSIR[1], and Estomih MTUI[2]. [1]Medical Education Division, Weill Cornell Medicine-Qatar, Qatar Foundation, P.O. Box 24144, Doha, Qatar. [2]Radiology Program in Anatomy, Weill Cornell Medicine, New York, NY 10065, USA.

A9* Variations of the Celiac Trunk in a South African Cadaveric Sample.
NDOU, Robert, Shaun D. NISCHK, and Diana S. PILLAY. Morphological Anatomy Division, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, Gauteng, 2193, South Africa.

A10* The Anatomy of the Pedicled Anterolateral Thigh Flap for Phalloplasty in Transitioning Males.
TERRELL, Mark[1], Wallisa ROBERTS[2], Charles PRICE[2], Marios LOUKAS[2], and Justine SCHOBER[3]. [1]Lake Erie College of Osteopathic Medicine, Erie, PA, 16509, USA; [2]School of Medicine, St. George's University, Grenada, West Indies; [3]Pediatric Urology, University of Pittsburgh Medical Center – Hamot Hospital, Erie, PA, 16503, USA.

A11* The Anatomy of the Free Fibula Osteoseptocutaneous Flap in Neophalloplasty in Transgender Surgery.
TERRELL, Mark[1], Andre GRANGER[2], Angelica ORTIZ[2], Marios LOUKAS[2], and SCHOBER, Justine[3]. [1]Lake Erie College of Osteopathic Medicine, Erie, PA, 16509, USA; [2]School of Medicine, St. George's University, Grenada, West Indies; [3]Department of Pediatric Urology, University of Pittsburgh Medical Center – Hamot Hospital, Erie, PA, 16503, USA.

continued on next page

Poster Session A

A12* The Anatomy of Musculocutaneous Latissimus Dorsi Flap in Neophalloplasty.
TERRELL, Mark[1], Andre GRANDER[2], Angelica ORTIZ[2], Marios LOUKAS[2], and JUSTINE SCHOBER[3]. [1]Lake Erie College of Osteopathic Medicine, Erie, PA, 16509, USA; [2]School of Medicine, St. George's University, Grenada, West Indies; [3] Pediatric Urology, University of Pittsburgh Medical Center – Hamot Hosptial, Erie, PA, 16503, USA.

A13* The Anatomy of Abdominal Flap Phalloplasty for Transgender Surgery.
TERRELL, Mark[1], Seunghwan KIM[2], Jessica HOLLAND[2], Marios LOUKAS[2], Justine SCHOBER[3]. [1]Lake Erie College of Osteopathic Medicine, Erie, PA, 16509, USA; [2]School of Medicine, St. George's University, Grenada, West Indies; [3] Pediatric Urology, University of Pittsburgh Medical Center – Hamot Hospital, Erie, PA, 16503, USA.

A14* The Anatomy of the Forearm Free Flap Phalloplasty.
TERRELL, Mark[1], Seungwan KIM [2], Jessica HOLLAND[2], Marios LOUKAS[2], and SCHOBER, Justine[3]. [1]Lake Erie College of Osteopathic Medicine, Erie, PA, 16509, USA; [2]School of Medicine, St. George's University, Grenada, West Indies; [3]Department of Pediatric Urology, University of Pittsburgh Medical Center – Hamot Hospital, Erie, PA, 16503, USA.

A15* Persistent Double Dorsal Aorta: A Systematic Review of the Literature.
MILLS, Brandy W. and Thomas R. GEST. Texas Tech University Health Sciences Center, El Paso Paul L. Foster School of Medicine, El Paso, TX, 79905, USA.

A16* Anterior Region of the Anal Canal: Transanal Ultrasonography and Histological Study.
MURO, Satoru, Yasuo NAKAJIMA, Hisayo NASU, Kumiko YAMAGUCHI, and Keiichi AKITA. Department of Clinical Anatomy, Tokyo Medical and Dental University, Tokyo, 1138519, Japan.

A17* Innervation of the External Urethral Sphincter: An Immunohistochemical Elucidation.
KRUDY, Zoltan A., Cynthia PERRY, Ellen DUDREY, and Thomas R. GEST. Department of Anatomy, Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center, El Paso, TX, 79905, USA.

A18* A Variant Blood Supply to the Descending Colon from an Aberrant Left Accessory Colic Artery.
STORM, Andrew, Marc TRUBIN, Max RUGE, Alex SU, Adam WILSON, and Jeff NELSON. Department of Cell and Molecular Medicine, Rush Medical College, Chicago, IL 60612, USA.

A19* The Anatomy of Vaginoplasty: Using Penile Skin Graft with Scrotal Flaps.
TERRELL, Mark[1], Bernard SHENELL[2], Vinaja XOCHIT[2], Marios LOUKAS[2], and SCHOBER, Justine[3]. [1]Lake Erie College of Osteopathic Medicine, Erie, PA, 16509, USA; [2]School of Medicine, St. George's University, Grenada, West Indies; [3]Department of Pediatric Urology, University of Pittsburgh Medical Center – Hamot Hospital, Erie, PA, 16503, USA.

A20* Construction of a Prototype 3D Model of the Pelvic Diaphragm in situ at the Fibre Bundle Level.
KUNDU, Rupanjali, Lauren MACARTHUR, John TRAN, Valera CASTANOV, and Anne M.R. AGUR. Division of Anatomy, Department of Surgery, University of Toronto, Toronto, ON M5S 1A8, Canada.

A21* Unilateral Multiple Sacral Plexus Variations and their Clinical Relevance.
OWINGS, Dakoda R., Blair FREED, Mercedes FOSTER, Terrence KELLY, and Alla BARRY. Missouri Southern State University, Joplin, MO 64801, USA.

A22* The Branching Pattern of the Internal Iliac Artery: The Myth and the Evidence-Based Truth.
TUNSTALL, Richard G. Warwick Medical School, University of Warwick, Coventry, West Midlands, CV4 7AL, United Kingdom.

A24* The Phenomenon of Tortuosity: Literature Review with Case Descriptions.
FREED, J. Blair, Terrence KELLY, Andrew BUCKNER, and Alla BARRY. Missouri Southern State University, Joplin, MO 64801, USA.

A26 Adenosine Receptor Antagonist Effectiveness in Preventing Apoptosis caused by DNA Damage.
VILDE, Tomas A., Kyung CHOI, Philippe DONOFRIO, and Paulo KOEBERLE. Division of Anatomy, Department of Surgery, University of Toronto, Toronto, ON M5S 1A8, Canada.

A27* Elevated Observation of Paget's Disease of the Bone with Literature Review and Case Descriptions.
FOSTER, Mercedes, Dakoda OWINGS, Terrence KELLY, Blair FREED, and Alla BARRY. Missouri Southern State University, Joplin, MO 64801, USA.

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Poster Session A

A28* @AACAnatomy Twitter Account Goes Live: A Sustainable Model for Outreach of Professional Societies.
BENJAMIN, Hannah K.[1], and Danielle F. ROYER[2]. [1]Modern Human Anatomy Program, University of Colorado Anschutz Medical Campus, Aurora, CO 80045, USA. [2]Department of Cell and Developmental Biology, School of Medicine, University of Colorado Anschutz Medical Campus, Aurora, CO 80045, USA.

A29* Advancing the Mission of Body Donation Programs Using Written Medical Records-A Novel Approach.
HESSMAN, Casey, Angela MCARTHUR. University of Minnesota, Anatomy Bequest Program, Minneapolis, MN 55455, USA.

A30* Two Major Events in the History of Body Donation Programs in Japan.
SATO, Tatsuo. Tokyo Ariake University of Medical and Health Sciences. 135-0063, Tokyo, JAPAN.

A31* Anatomist and Anatomical Gift Program Director Collaboration: An Ethical/Moral Approach to Donation.
PAPPAS[1], Kathleen M. and Dianne PERSON[2]. [1]Department of Physical Therapy, Springfield College, Springfield, MA 10019, USA. [2]Anatomical Gift Program, School of Health Sciences, Elon University, Elon, NC 27224, USA.

A32* Exposure Monitoring of Formaldehyde In Anatomy Lab: Our Experience At Weill Cornell Medicine-Qatar.
RAOOF, Ameed[1], Thomas A. DOYLE[2], Henriette OOSTHUYSEN[2], Avelin MALYANGO[1], Mange MANYAMA[1], Nurru L. MLIGILICHE[1], Charles MSUYA[1], Nasnass NASSIR[1], and Estomih MTUI[3]. [1]Medical Education Division; [2]Environmental Health, Safety and Security Division, Weill Cornell Medicine-Qatar, Qatar Foundation, P.O. Box 24144, Doha, Qatar. [3]Radiology Program in Anatomy, Weill Cornell Medicine, New York, NY 10065, USA.

A33* Factors Contributing to the Limited Participation of African Americans in Body Donation Programs.
THOMPSON, Brent J. [1], and Ayoda WEREDE[2]. [1]Department of Biomedical Sciences, Oakland University William Beaumont School of Medicine, Rochester MI, 48309, USA. [2]Oakland University William Beaumont School of Medicine, Rochester MI, 48309, USA.

A34* Salt Packs for Edematous Cadavers and Mitigation of Student and Staff Exposure to Chemicals.
BROOKS, H. Mark, S. Michael DHUY, and Kristina K. BENSON. Willed Body Program, School of Medicine, University of California at Irvine, Irvine, CA 92697, USA.

A35* Considering Donor Occupation when Making Unpreserved Tissue Assignments.
ANDERSON, Jake D. and Paul R. HILL. Anatomy Bequest Program, University of Minnesota Medical School, Minneapolis, MN 55455, USA.

A37* An Engagement Opportunity: Connecting Donor Families with Faculty and Researchers.
SEIDELMANN, Linnea L., and Sarah J. PAULSEN. Anatomy Bequest Program, University of Minnesota Medical School, Minneapolis, MN 55455, USA.

A38 Bovine Arch.
FRANCISCO, Margarida F.Centro Académico de Medicina de Lisboa, Lisboa, 1600, Portugal.

A39 Coronary Dominance and the Pattern of Left Anterior Descending Artery in American and Dutch Hearts.
NNAJI Chimere W., Jacob A. MOUSSA, Ijoma A. NWOSU, Daniel J. GARCIA, Edvard DAVTYAN, Rahman AKINLUSI, and Jessica S. BAEK.
Department of Anatomy, Embryology and Histology, American University of the Caribbean School of Medicine, Cupecoy, St. Maarten.

A40 Nutcracker Phenomenon Coincident with Celiacomesenteric Trunk Variation.
PETERSON, Joshua M.[1], Anthony HAGE[1], Stephan DILJAK[1], Benjamin LONG[1], Daniel MARCUSA[1], John STRIBLEY[2], David W. BRZEZINSKI[2], Jonathan ELIASON[3]. [1]University of Michigan Medical School, Ann Arbor, MI 48109, USA; [2]Division of Anatomical Sciences, Department of Surgery, University of Michigan, Ann Arbor, MI 48109, USA; [3]Section of Vascular Surgery, University of Michigan Health System, Ann Arbor, MI 48109, USA.

A41 Morphometric Analyses of Cadaveric Lungs Using 3-Dimensional Modeling.
LEWIS, Christina C.[1], Jena ANDERSON[2], and Ciara SALMON[2] [1] Department of Basic Sciences, Samuel Merritt University, Oakland, CA 94609, USA; [2] Program of Occupational Therapy, Samuel Merritt University, Oakland, CA 94609, USA.

A42* Unusual Origin of a Right Vertebral Artery Branching from a Right Aortic Arch.
LIU, Benfie, Samuel MARTHINSEN, Helena PRIETO, and Bruce SILVERMAN, David J. ELIOT. Department of Basic Science, Touro University California, Vallejo, CA, 94589, USA.

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Poster Session B – Wednesday, July 19 9:15 AM – 10:30 AM

* denotes publication in *Clinical Anatomy*

B1* Introducing Bedside Ultrasound in Human Anatomy Laboratory - A Quantitative Feasibility Assessment.
HARMON, James V.[1,2], Andrew N. SUNDIN[1,2], Philip ROBAN[1], Victor R. VAKAYIL[2], Malavika CHANDRASHEKAR[2], Brent D. BAUMAN[2], Anthony J. WEINHAUS[1], Mary Ann MCNEIL[3], and Peter J. KERNAHAN[1,2]. [1]Department of Integrative Biology and Physiology, [2] Department of Surgery, [3] Department of Emergency Medicine University of Minnesota, Minneapolis, MN, 55455, USA.

B2* Does Near Peer Supplemental Instruction Improve Gross Anatomy Scores?
MESSER[1], Diana L., Saskia D. RICHTER[1], Doug DANFORTH [2], and Laura C. BOUCHER[3]. [1]Department of Biomedical Education and Anatomy, College of Medicine, The Ohio State University, Columbus, OH, 43210, USA. [2]Department of Obstetrics and Gynecology, College of Medicine, The Ohio State University, Columbus, OH, 43210, USA. [3]School of Health and Rehabilitation Sciences, College of Medicine, The Ohio State University, Columbus, OH, 43210, USA.

B3* Incorporating Clinical Skills in the Anatomy Laboratory: Can Students Document Their Dissections?
DUNN, Ashleigh P. and Krista S. JOHANSEN. Biomedical Sciences, Edward Via College of Osteopathic Medicine – Virginia Campus, Blacksburg, VA, 24060, USA.

B4* Post-mortem CT Scan Movies Utilized in Self-Directed Clinical Cases for Medical Students.
MOOTZ, Allison A., Calvin L. MCNELLY, Stephen W. MORELAND, and Thomas R. GEST. Texas Tech University Health Sciences Center, El Paso Paul L. Foster School of Medicine, El Paso, TX, 79905, USA.

B5* Development of a Programmed Learning Approach to Prosection-Based Gross Anatomy.
MacPHERSON[1], Brian R., Samuel R. FRANKLIN[1], Jennifer K. BRUECKNER-COLLINS[2], and Jerry TIEMAN[1]. [1]Department of Neuroscience, University of Kentucky College of Medicine, Lexington, KY 40536, USA. [2]Department of Anatomical Sciences and Neurobiology, University of Louisville School of Medicine, Louisville, KY 40202, USA.

B6* Functional Anatomy Sessions: An Innovative Method for Teaching Musculoskeletal Form and Function.
GILROY, Anne M.[1], Eustathia L. GIANNARIS[1], Yasmin CARTER[1], and Nicola A. DEANGELIS[2]. [1]Division of Translational Anatomy, Department of Radiology, [2]Division of Sports Medicine, Department of Orthopedics & Physical Rehabilitation, University of Massachusetts Medical School, Worcester, MA 01655, USA.

B7* Applications of Three-Dimensional Photogrammetry in Anatomy Education.
WELLS, Chin Y., Awab U. KHAN, and Adam KOLATOROWICZ. School of Mathematics and Sciences, DeBusk College of Osteopathic Medicine, Lincoln Memorial University, Harrogate, TN, 37752, USA.

B8* Allied Health Students' Utilization and Perceptions of Human Anatomy Learning Resources.
GILMER, Lesley K., Chelsea M. LOHMAN BONFIGLIO, Cailee E. WELCH BACON, and Kellie C. HUXEL BLIVEN. Department of Interdisciplinary Health Sciences, Arizona School of Health Sciences, A.T. Still University, Mesa, AZ 85206, USA.

B9* Cadaver Dissection as a Clinical-Based Patient Case in Undergraduate Pre-Professional Program.
KELLY, Terrence, Blair FREED, Mercedes FOSTER, Dakoda OWINGS, and Alla BARRY. Missouri Southern State University, Joplin, MO, 64801, USA.

B10* Benefits of Implementing Weekly Table Check Assessments into a Gross Anatomy Laboratory.
HEISE, Natascha, Brendan A. GARBE, Tod R. CLAPP and Carolyn A. MEYER. Biomedical Sciences, Colorado State University, Fort Collins, CO 80523, USA.

B11 Enhancing Clinical Relevance of Anatomy for Dental Students Through the Use of Surgical Dissections.
HERRING, Nicole R., Kathryn M. DEVEAU, and Jennifer K. BRUECKNER-COLLINS. University of Louisville School of Medicine, Louisville, KY 40202, USA.

B12* Introducing an Array of New Teaching Measures to Enhance Medical Students' Performance in Anatomy.
RAOOF, Ameed[1], Avelin MALYANGO[1], Mange MANYAMA[1], Nurru L. MLIGILICHE[1], Charles MSUYA[1], Nasnass NASSIR[1], Lotfi CHOUCHANE[1], Thurayya ARAYSSI[1], and Estomih MTUI[2]. [1]Medical Education Division, Weill Cornell Medicine-Qatar, Qatar Foundation, P.O. Box 24144, Doha, Qatar. [2]Radiology Program in Anatomy, Weill Cornell Medicine, New York, NY 10065, USA.

B13* Using Integrated Neuroanatomy Laboratory to Enhance Clinical Skills Training and Long-Term Retention.
HASSAN Sherif S[1, 2], Rajunor ETTARH[1], Robert SUSKIND[1], Alfred TENORE[1], Shaheen LAKHAN[1], Fauzia NAUSHEEN [1]. [1]Department of Medical Education, California University of Science and Medicine, School of Medicine (CalMed-SOM), Colton, CA 92324, USA; [2]Anatomy Department, Faculty of Medicine, Cairo University, Cairo, Egypt.

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Poster Session B

B14* A Novel Approach to Pelvic Dissection for Medical Students: A Clinical Perspective.
MOSLEY, Claudia F., Leah D. HUNTER, and Kirk M. MCHUGH. The Department of Biomedical Education and Anatomy, The Ohio State University, Columbus, OH, 43210, USA.

B15* Online Modules that Use Principles of Spaced Repetition Improve Anatomy Learning.
RICKS[1], Elizabeth T., Thomas GEST[2], and Dolgor BAATAR[2]. [1]Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center El Paso, El Paso, TX 79905, USA. [2]Department of Medical Education, Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center El Paso, El Paso, TX 79905, USA.

B16* Anatomical Sciences Education among Biological Anthropology Graduates.
LANGLEY, Natalie R.[1], and Lauren N. BUTARIC.[2] [1]Department of Anatomy, Mayo Clinic School of Medicine, Scottsdale, AZ, 85259, USA. [2]Department of Anatomy, Des Moines University, Des Moines, IA, 50312, USA.

B17* Design & Implementation of a Distinction in Anatomy Track at a Clinically Integrated Medical School.
SHAPLEIGH, Benjamin L. and Thomas R. GEST. Department of Anatomy, Texas Tech University Health Science Center, Paul L. Foster School of Medicine, El Paso, TX 79905, USA.

B18* Understanding Video and Screencast Usage Statistics in Medical Education Research.
GREENE, Sarah J. Department of Pathology and Anatomy, Morehouse School of Medicine, Atlanta, GA 30310, USA.

B19* Comparison of Student Learning Experiences Using Embalmed Versus Plastinated Specimens.
HANCOCK, Ty[1], and Jonathan J. WISCO[1,2]. [1]Brigham Young University, Provo, UT 84604, USA; [2]University of Utah School of Medicine, Salt Lake City, UT 84132, USA.

B20* Application of a Creative Assignment and Subsequent Learning Outcomes in Large Undergraduate Courses.
PLATT, Kristen M., Amy R. SESSIONS, and April R. HATCHER. Department of Neuroscience, College of Medicine, University of Kentucky, Lexington, KY 40536, USA.

B21* Learning Gross Anatomy: Is There Another Way?
FOSTER, Allison A., Melissa M., QUINN and Eileen L. KALMAR. Department of Biomedical Education & Anatomy, College of Medicine, The Ohio State University, Columbus, OH, 43210, USA.

B22* Anatomy Education in an Integrated Curriculum: A Case Study.
JUHNG, James[1], Dolgor BAATAR[1], Heather BALSIGER[1], Elmus BEALE[2], and Thomas GEST[1]. [1]Department of Medical Education, Paul L Foster School of Medicine, Texas Tech University Health Sciences Center, El Paso, TX 79905, USA. [2]Department of Medical Education, University of Tulsa Health Sciences, Tulsa, OK 74119, USA.

B23* Optional Anatomy Practicals - Predictor of Student Success and Continued Interest in Gross Anatomy.
ECKELBARGER, Julie, Joshua HAHN, and Thomas GEST. Texas Tech University Health Sciences Center El Paso, Paul L. Foster School of Medicine, El Paso, TX 79905, USA.

B24 Students' Perceptions of Lecturing Approaches: Traditional versus Interactive Teaching.
ABDEL MEGUID, Eiman M.1 and Matthew COLLINS2. 1Centre for Biomedical Sciences Education, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, County Antrim BT9 7AE, United Kingdom. 2Centre for Computer Science, School of Electronics, Electrical Engineering and Computer Science, Queen's University Belfast, Belfast, County Antrim BT9 5BN, United Kingdom.

B25 Incorporating Cultural Competence into Medical Gross Anatomy Instruction.
ALLEN, Cecily, and Jennifer BRUECKNER-COLLINS. University of Louisville School of Medicine, Louisville, KY 40202, USA.

B26* Free Anatomy Book, Full of Mnemonics and Schematics.
CHUNG, Beom Sun, and Min suk CHUNG. Department of Anatomy, Ajou University School of Medicine, Suwon, Gyeonggi, 16499, Republic of Korea.

B27* Student Coping Strategies for Adjusting to Anatomical Dissection.
GREENE, Sarah J. [1] and Lee ROSEN[2]. [1]Department of Pathology and Anatomy, Morehouse School of Medicine, Atlanta, GA 30310, USA; [2]Department of Psychiatry, Larner College of Medicine at the University of Vermont, Burlington, VT 05405, USA.

B28* Learning Orbit Anatomy with Cerego: An Online Learning Program in Medical Education.
TRINH, Sean Q., Dolgor BAATAR, Thomas GEST, and Thwe HTAY. Department of Medical Education, The Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center El Paso, El Paso, TX 79905, USA.

continued on next page

Poster Session B

B29* Applying Knowledge to Practice: Integrated Ultrasonography in the Undergraduate Medical Curriculum.
BROWER, Gregory L., Thomas A. PRESSLEY, Fiona R. PRABHU, and Vaughan H. LEE. Department of Medical Education, School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX 79430, USA.

B30 Individual Students' Dissection Engagement & Dissection Quality Effect on Overall Course Performance.
DALY, Frank J. and Geoffrey BOVE. University of New England College of Osteopathic Medicine, Biddeford, ME 04005, USA.

B31 Surgical Dissections: A Novel Approach to Clinical Anatomy in Medical Gross Anatomy.
NASH, Joseph, Jennifer BRUECKNER-COLLINS, and Nicole HERRING. University of Louisville School of Medicine, Louisville, KY 40202, USA.

B32 Preferred Learning Styles of First-Year Dental Students.
QUINN, Melissa M., Allison A. FOSTER, and Eileen L. KALMAR. Department of Biomedical Education & Anatomy, College of Medicine, The Ohio State University, Columbus, OH, 43210, USA.

B33 YOGAnatomy: Mastering Anatomy While Managing Stress.
BRUECKNER-COLLINS, Jennifer, and Sabine EID. Department of Anatomical Sciences, University of Louisville School of Medicine, Louisville, KY, 40202, USA.

B35* Anatomical Mental Rotation Abilities Across Anesthesiology Practitioners.
ROYER, Danielle F.[1], Molika KEELER[2], and Adrian HENDRICKSE[3]. [1]Department of Cell and Developmental Biology, School of Medicine, University of Colorado Anschutz Medical Campus, Aurora, CO 80045, USA. [2]Modern Human Anatomy Program, University of Colorado Anschutz Medical Campus, Aurora, CO 80045, USA. [3]Department of Anesthesiology, University of Colorado School of Medicine and University of Colorado Hospital, Aurora, CO 80045, USA.

B36* 3D Printed Models and a Digital Case Study Improve Student Learning of Pelvic and Perineum Anatomy.
SOLIS, Laura J., and Omid B. RAHIMI. Department of Cell Systems and Anatomy, The University of Texas Health Science Center at San Antonio, San Antonio, TX 78229, USA.

B37 Incorporating Laparoscopic Anatomy into the First Year Medical School Anatomy Curriculum.
KERNAHAN1,2, Peter J., Michael WALKER1, Anthony J. WEINHAUS1, and James V. HARMON1,2. 1Department of Integrative Biology and Physiology and 2Department of Surgery, University of Minnesota, Minneapolis, MN, 55455, USA.

Poster Session C – Thursday, July 20 9:45 AM – 11:00 AM

* denotes publication in *Clinical Anatomy*

C1* An Extreme Case of Alveolar Bone Resorption in an Edentulous Mandible.
JERGENSON, Margaret A., Gilbert M. WILLETT, Barbara J. O'KANE, Laura C. BARRITT, Neil S. NORTON. Department of Oral Biology, Creighton University School of Dentistry, Omaha, NE, 68178-0729, USA.

C2* Removal of Brain with Dura Mater and Eyeballs Intact.
WILT, Steven D., Caroline M. MUELLER and David J. PORTA. Department of Biology, Bellarmine University, Louisville, KY 40205, USA.

C3* Anomalous Channels Between the Anterior Superior Alveolar and Nasopalatine Canals in the Maxilla.
HANSEN, Nathaniel S., Timothy F. WALKER, Jeffrey C. KNORR, and Neil S. NORTON. Department of Oral Biology, Creighton University School of Dentistry, Omaha, NE 68178, USA.

C4* Comparing Two Techniques in Rhinoplasty for Straightening the Lower Lateral Nasal Cartilage.
MELARA, Erick E.[1], Sami P. MOUBAYED[2], Sam P. MOST[2], and Sakti SRIVASTAVA[1]. [1]Division of Clinical Anatomy, Stanford University School of Medicine, Stanford, CA 94305, USA; [2]Division of Facial Plastic and Reconstructive Surgery, Department of Otolaryngology-Head and Neck Surgery, Stanford University School of Medicine, Stanford, CA 94305, USA.

C5* Autologous Cartilage Grafting for Facial Reconstructive Surgery: A Question of "True or False."
LAMBERT, H. Wayne[1], Adam N. BENDER-HEINE[2], Allen A. RICKARDS[1], J. Scott HOLMES[1], and Matthew J. ZDILLA[3]. [1]Department of Neurobiology and Anatomy, West Virginia University School of Medicine, Morgantown, WV 26506, USA; [2]Department of Otolaryngology, West Virginia University School of Medicine, Morgantown, WV 26506, USA; [3]Departments of Natural Sciences and Mathematics and Graduate Health Sciences, West Liberty University, West Liberty, WV 26074, USA.

continued on next page

Poster Session C

C6* Comparison of the Musculoaponeurotic Architecture of Masseter Muscle of an Infant and Adult.
LI, Zhi[1], Eric EBRAHIMI[1], Cristina FALCINELLI[2], and Anne M.R. AGUR[1]. [1]Division of Anatomy, Department of Surgery, University of Toronto, ON M5S 1A8, Canada; [2]Orthopaedic Biomechanics Lab, Sunnybrook Health Sciences Centre, Toronto, ON M4N 3M5, Canada.

C7 Gross Anatomical Observation of the Spatial Relations Between the Branches of the Hypoglossal Nerve.
SAKAMOTO, Yujiro. Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University,Tokyo 113-8549, Japan.

C8* Examination of the Vertebral Artery and Anatomical Variations in our Facility Over 27 Years.
WATANABE, Koichi, Tsuyoshi SAGA, Yoko TABIRA, Joe IWANAGA, and Koh-ichi YAMAKI. Department of Anatomy, Kurume University School of Medicine, Kurume, Fukuoka, 830-0011, Japan.

C9* Investigating the Effects of Rigid Cervical Collars on the Internal Jugular Vein Dimensions.
KROEKER, Jenna[1], Jay KEITH[1], Hailey CARRUTHERS[1], Natasha QURESHI[1], Meagan KAYE[1], Marissa SOLOW[1], Cherry HANNA[1], Masa CALIC[1], James COEY[1,2], and Sara SULAIMAN[3]. [1]St. George's International School of Medicine, Keith B. Taylor Global Scholars Program, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK. [2]Department of Anatomy, St. George's University, Grenada, W. I. [3]Department of Applied Sciences, Faculty of Health and Life Sciences, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK.

C10* Aberrant Branching of Bilateral Common Carotid Arteries - A Case Report.
CHAVEZ, Brandon J., Stephanie M. MORALES, Ramona BAEZ, Carlos QUINTEROS, and Sumathilatha SAKTHI VELAVAN. Department of Anatomy, Touro College of Osteopathic Medicine, New York, NY 10027, USA.

C11* Three-Dimensional Morphology of the Sternoclavicular Joint Articular Disc with Clinical Relevance.
ALI, Ayesha[1], Daniella ALVIAR[1], Pamela PEREZ[2], John ARBUCCI[3], Estomih P. MTUI[4], and Anthony V. D'ANTONI[5]. [1]CUNY School of Medicine, City College of New York, New York, NY 10031; [2]Student at Lyman Briggs College, Michigan State University, East Lansing, MI 48824; [3]Student at Boston University, Boston, MA 02215; [4]Weill Cornell Medicine, New York, NY 10065; [5]Department of Molecular, Cellular and Biomedical Sciences, CUNY School of Medicine, City College of New York, New York, NY 10030.

C12* Variant Scalene Muscles and Their Role in Thoracic Outlet Syndrome.
MARUSHCHAK, Olga[1], Amanda L. MILAM[1], Kathileen J. OROZCO[1], Kelvin Y. SOEWONO[1], Rachel J. BAIYEE-CADY[1], Hersh RIMLER[1], Eric W. BAKER[2], and Sumathilatha SAKTHI VELAVAN[1]. [1]Department of Anatomy, Touro College of Osteopathic Medicine, New York, NY 10027, USA. [2]Department of Basic Science and Craniofacial Biology, New York University College of Dentistry, New York, NY 10010, USA.

C13* Osteophytes in the Cervical Vertebrae Vertebral Bodies' (C3-C7) - Demographical Perspectives.
EZRA, David[1,2], Israel HERSHKOVITZ[1], Khalil ,SALAME[3], Deborah ALPEROVITCH-NAJENSON[1], and Viviane SLON[1]. [1]Department of Anatomy and Anthropology, Sackler Faculty of Medicine, Tel-Aviv University, Tel Aviv, 69978, Israel; [2]School of Nursing Science, Tel Aviv Jaffo Academic College, 6818211, Israel; [3]Department of Neurosurgery, Tel Aviv Sourasky Medical Center, Sackler Faculty, Tel-Aviv, 69978, Israel.

C14* Innervation of the Glenohumeral Joint Analyzed by Anatomical Observation and Sihler's Staining.
TABIRA, Yoko, Koichi WATANABE, Tsuyoshi SAGA, Joe IWANAGA, and Koh-ichi YAMAKI. Department of Anatomy, Kurume University School of Medicine, Fukuoka, 830-0011, Japan.

C15* Prevalence of Bifid Median Nerve and Persistent Median Artery: An Ultrasound Study.
HUI, Patricia[1], Ruthy TAM[1], Zhe Fu TU[1], Melody SARTIPI[1], James COEY[1,2] and Sara SULAIMAN[3]. [1]St. George's International School of Medicine, Keith B. Taylor Global Scholars Program, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK. [2]Department of Anatomy, St. George's University, Grenada, West Indies. [3]Department of Applied Sciences, Faculty of Health and Life Sciences, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK.

C16* Surgically Relevant Variations of the Oblique Cord at the Elbow.
MASHRIQI, Faizullah[1], Khadija KHAN[1], Marios LOUKAS[2], R. Shane TUBBS[2,3], Estomih P. MTUI[4], and Anthony V. D'ANTONI[5]. [1]CUNY School of Medicine, City College of New York, New York, NY 10031; [2]Department of Anatomical Sciences, St. George's University, Grenada; [3]Seattle Science Foundation, Seattle, WA 98122; [4]Weill Cornell Medicine, New York, NY 10065; [5]Department of Molecular, Cellular and Biomedical Sciences, CUNY School of Medicine, City College of New York, New York, NY 10031.

C17 Encountering the Chondroepitrochlearis Muscle in the Gross Anatomy Lab.
WARD, Peter J, and Aaron L. HAAG. Department of Biomedical Sciences, West Virginia School of Osteopathic Medicine, Lewisburg WV, 24901. USA.

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Poster Session C

C18* A Comparison of the Distal Biceps Tendon Footprint and the Length of the Radius: a Cadaveric Study.
BAXA, Alexander J., Anthony OLINGER. Division of Anatomy, College of Osteopathic Medicine, Kansas City University, Kansas City, MO, 64106, USA.

C19* The Biomechanics of Subsynovial Connective Tissue in Health and Its Role in Carpal Tunnel Syndrome.
FESTEN-SCHRIER, Verena J.M.M.[1,2,3], and Peter C. AMADIO[1].[1] Biomechanics Laboratory, Division of Orthopedic Research, Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN 55901, USA; [2] Department of Plastic and Reconstructive Surgery and Hand Surgery, Erasmus MC, Rotterdam 3015CE, the Netherlands; [3]Department of Rehabilitation Medicine, Erasmus MC, Rotterdam 3015CE, the Netherlands.

C20* Clinical Significance of Multiple Variations of the Brachial Plexus.
ROSENOW, Mica J. and Alla BARRY. Missouri Southern State University, Joplin, MO 64801, USA.

C21* A Dynamic In Vivo Ultrasound Study of the Superior, Middle, and Inferior Parts of Infraspinatus.
VILDE, Tomas A., Allen DUONG, Valera CASTANOV, and Anne M.R AGUR. Division of Anatomy, Department of Surgery, University of Toronto, Toronto, ON M5S 1A8, Canada.

C22* Innervation of the Glenohumeral Joint: A 3D Anatomical Study for Radiofrequency Ablation.
TRAN, John[1], Philip W.H. PENG[2], and Anne M.R. AGUR[1]. [1]Division of Anatomy, Department of Surgery and [2]Department of Anesthesia, University of Toronto, Toronto, ON, M5S 1A8, Canada.

C23 Literature Review of Botulinum Toxin-A Treatment of Post-Stroke Shoulder Pain.
SHAKERI, Sheiban, Liza PAIN, and Anne M.R. AGUR. Division of Anatomy, Department of Surgery, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada.

C24* Proximal Interphalangeal Joint Ligaments Revisited: Bi-Layer Interconnection of Key Supports.
FOGG[1], Quentin A., Rachel REBECCA[1], Saad REHAN[1], Casper THORPE LOWIS[1], and Neil ASHWOOD[2]. [1]Centre for Human Anatomy Education, Monash University, Melbourne, Victoria, 3800, Australia. [2]Department of Trauma and Orthopaedics, Burton Hospitals NHS Foundation Trust, Burton-upon-Trent, DE13 0RB, United Kingdom.

C25* The Anatomical Relationship between the Sural Nerve and Small Saphenous Vein: An Ultrasound Study.
GARAGOZLO[1], Cameron A., Omar KADRY[1], Mina ATALLA[1], Cleon GARDONIS[1], Fernando POLANCO[1], Andrew MASSABAND[1], James COEY[1,2], and Sara SULAIMAN[3]. [1]St. George's International School of Medicine, Keith B. Taylor Global Scholars Program, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK.[2]Department of Anatomy, St. George's University, Grenada, West Indies. [3]Department of Applied Sciences, Faculty of Health and Life Sciences, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK.

C26* Anatomic Evaluation of the Vastus Medialis Obliquus: A Cadaveric Study.
HAHN, Joshua, Nathan THOMAS, Thomas GEST, and Herb JANSSEN. Texas Tech University Health Sciences Center El Paso, Paul L. Foster School of Medicine, El Paso, TX, 79905, USA.

C27* Obturator and Accessory Obturator Nerves: Contribution to Hip Joint Innervation.
PENG, Michael, Jessi Jo BARNETT, Shayan SHAKERI, John TRAN, and Anne M.R. AGUR. Division of Anatomy, Department of Surgery, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada.

C28* Articular Branches of the Femoral Nerve: A Morphological Study to Clarify Innervation Patterns.
PENG, Julia F., Jessi Jo BARNETT, and Anne M.R. AGUR. Division of Anatomy, Department of Surgery, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada.

C29 An Accessory Muscle of the Deep Compartment of the Posterior Leg: A Case Report.
YOUNG, Matthew R[1], Armando ROSALES[2], and Rustin REEVES[2]. [1]Texas College of Osteopathic Medicine, University of North Texas Health Science Center, Fort Worth, TX 76107, USA. [2]Center for Anatomical Sciences, University of North Texas Health Science Center, Fort Worth, TX 76107, USA.

C30* Thickness of Calcaneal Tendon in Asymptomatic Subjects: An Ultrasound Study.
WEBER, Lauren[1], Zeeshan ISMAIL[1], Leora FRIMER[1], Harish GIDDA[1], Roshan BOODRAM[1], Sagar SUDAN[1], Praveen THEVARAJAH[1], Sara SULAIMAN[2], and James COEY[1,3]. [1]St. George's International School of Medicine, Keith B. Taylor Global Scholars Program, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK. [2]Department of Applied Sciences, Faculty of Health and Life Sciences, Northumbria University, Newcastle-upon-Tyne, NE1 8ST, UK. [3]Department of Anatomy, St. George's University, Grenada, West Indies.

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Poster Session C

C31* Morphological Variations in the Anterior Talofibular Ligament.
WHITAKER, Amy[1], Christina D. LEE[1], Clark V. STEPHENSON[1], Matt C. DAGGETT[2], Travis L. MCCUMBER[3], and Barth W. WRIGHT[1].[1]Division of Clinical Anatomy, Kansas City University of Medicine and Biosciences, Kansas City, MO 64106, USA; [2]Advanced Orthopedic Medicine, Lee Summit, MO, 64063, USA; [3]Department of Genetics, Cell Biology and Anatomy, University of Nebraska Medical Center, Omaha, NE 68198, USA.

C32* Aponeurotic Architecture of Biceps Femoris and Semimembranosus: Implications for Muscle Injury.
CASTANOV, Valera, Allen DUONG, Maxine VIENNEAU, and Anne M.R. AGUR. Division of Anatomy, Department of Surgery, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada.

C33* Capsular Thickness Variability in Relation to the Anterolateral Ligament.
LEE, Gene, Roy ESPINOSA, Ivan RAMIREZ, Omar BAKER, and Thomas GEST. Department of Medical Education, Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center, El Paso, TX 79905, USA.

C34* Comparison of Musculotendinous Morphology of Extensor Hallucis Brevis and Extensor Digitorum Brevis.
KAMINKER, Jennifer[1], Amanda LEE[1], Valera CASTANOV[1], Takamitsu ARAKAWA[2], and Anne AGUR[1]. [1]Division of Anatomy, Department of Surgery, University of Toronto, Toronto, ON M5S 1A8, Canada; [2]Department of Rehabilitation Sciences, Kobe University Graduate School of Health Sciences, Kobe, Japan.

C35* Innervation of the Anterior Hip Joint: A Blast to the Past.
BARNETT, Jessi Jo[1], Julia F. PENG[1], Anthony SHORT[2], Michael GOFELD[2], Philip W.H. PENG[2], and Anne M.R. AGUR[1]. [1]Division of Anatomy, Department of Surgery and [2]Department of Anesthesia, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada.

C36* Comparison of Force Generating Capabilities of Intramuscular Parts of Gluteus Medius and Minimus.
VIENNEAU, Maxine, Valera CASTANOV, Allen DUONG, and Anne M.R. AGUR. Division of Anatomy, Department of Surgery, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada.

C37* Illustration of the Morphology of Vastus Medialis from 17th Century to Present.
PEER, Munawar S., Syed A. HASSAN, Valera CASTANOV, Shayan SHAKERI, and Anne M.R. AGUR. Division of Anatomy, Department of Surgery, University of Toronto, Toronto, ON M5S 1A8, Canada.

C38 Anatomy of the Anterolateral Ligament and the Capsulo-Osseous Layer of the Iliotibial Tract.
STEPHENSON, Clark V.1, Matt C. DAGGETT2, Amy WHITAKER1, John R. DOBSON1, Anthony B. OLINGER1 and Barth W. WRIGHT1. 1Division of Clinical Anatomy, Kansas City University of Medicine and Biosciences, Kansas City, MO 64106, USA; 2Advanced Orthopedic Medicine, Lee Summit, MO, 64063, USA.

C39 A Cadaveric Study of the Levator Palpebrae Superioris Aponeurosis.
CAUBLE, Jae E.1, Viren RANA1, Hannah HONG1, Blake WESTLING1, J. Quinten TUCKFIELD1, Joseph PANKRATZ1, Jason SOKOL2, Barth WRIGHT1, and Anthony OLINGER1. 1Division of Anatomy, Kansas City University of Medicine and Biosciences, Kansas City, MO, 64106, USA. 2University of Kansas Eye Center, Kansas City, KS, 66208, USA.

C40 Concomitant Anomalous Exit of Chords Tympani via Foramen Spinosum and Canalis Musculotubarius.
BRZEZINSKI, David W.1, Sarah N. DUDGEON1, Andrew ROSKO2, and Joshua M. PETERSON3. 1Division of Anatomical Sciences, Department of Surgery, University of Michigan, Ann Arbor, MI 48109, USA; 2Department of Otolaryngology-Head and Neck Surgery, University of Michigan Health System, Ann Arbor, MI 48109, USA; 3Univerity of Michigan Medical School, Ann Arbor, MI 48109, USA.

C41 Cadaveric Presence and Morphological Variation in the Inferior Tarsal Muscle.
WESTLING, Blake D.1, Viren RANA1, Anthony OLINGER1, Hanna HONG1, Jae CAUBLE1, Quinten TUCKFIELD1, Joseph PANKRATZ1, Barth WRIGHT1, and Jason SOKOL2. 1Kansas City University-Division of Anatomy, Kansas City, MO, 64106, USA. 2University of Kansas Eye Center, Kansas City, KS, 66208, USA.

C42 Onto-Phylogenetic Dissection of the Human Neck Utilizing Soft-Embalmed Cadavers: Clinical Anatomy.
BOAZ, Noel T.1,2,3, Raymond BERNOR2,4, and Keiko MESHIDA4. 1Emory and Henry College, School of Health Sciences, Marion, VA 24354, USA; 2Laboratory of Biological Anthropology and Anatomy, Integrative Centers for Science and Medicine, Martinsville, VA 24114-1086, USA; 3Anthropology Program, Virginia Commonwealth University, Richmond, VA 23284-2021, USA; 4Department of Anatomy, Howard University School of Medicine, Washington, DC 20059, USA.

American Association of Clinical Anatomists

Annual Business Meeting

Agenda
Thursday, July 20, 2017
Minneapolis Marriott City Center
Minneapolis, Minnesota

PO Box 2945
LaGrange, Ga 30241
Ph: 706-298-0287
www.clinical-anatomy.org

CALL TO ORDER: 2:45pm

Approval of Minutes of 2016 Annual Business Meeting (ABM) and the 2017 ABM Agenda

1. **President's Report** – *Neil Norton*
   a. 2017 Election Results
   b. 2018 Election – Positions open to the AACA Membership
   c. Presidential Committee Appointments

2. **Treasurer's Report** – *Tom Gest*

3. **Membership Committee Report** – *Marios Loukas*
   a. Remembrance of Deceased Members – H. Wayne Lambert

4. **Journal Committee Report** – *Marios Loukas*
   a. Report of Editor-in-Chief of *Clinical Anatomy* – *R. Shane Tubbs*

5. **Meeting Organization & Program Planning Comm. Report** – *David Porta*
   a. Report of 2016 and 2017 Annual Meetings – *David Porta and Greg Smith*
   b. Future Meetings:
      i. AACA Annual Meeting in 2018, Atlanta, GA – *Larry Wineski*
      ii. AACA Annual Meeting in 2019, Tulsa, OK – *Elmus Beale*

6. **Committee Elections**[1] – *Neil Norton*
   a. Election of Members-at-Large for Bylaws: 2 vacancies
   b. Financial Affairs Committee: 1 vacancy
   c. Nominating Committee: 2 vacancies

7. **Annual AACA Awards** – *Neil Norton*
   a. 2017 AACA Honored Member – Dr. James "Jim" Collins
   b. 2017 R. Benton Adkins, Jr. Distinguished Service Award – Ronn Wade

8. **Old Business**

9. **New Business**

ADJOURNMENT: 4:00 pm

[1]The membership of Special Interest Group (SIG) Committees (Educational Affairs, Career Development, Clinical Anatomical Terminology, and Anatomical Services) elects members at their committee meetings.

American Association of Clinical Anatomists

PO Box 2945
LaGrange, Ga 30241
Ph: 706-298-0287
www.clinical-anatomy.org

Minutes
2016 Annual Business Meeting

American Association of Clinical Anatomists
Tuesday, June 14, 2016
Marriott Oakland City Center
Oakland, California

Call to Order: 4:06 pm

After referring the AACA members to the 2015 Annual Business Meeting (ABM) Minutes located on Pages 39-40 and the 2016 ABM Agenda on Page 38 of the 2016 AACA Annual Program, these Agenda and Minutes were approved by general consent at 4:07 PM.

1. **President's Report** (Neil Norton – AACA President)
   a. 2016 Election Results – Neil announced the winners of the 2016 AACA Election to include: Tom Gest, Treasurer; Rob Spinner, Special Councilor – Clinical; Anne Gilroy and Peter Ward, Councilors at Large. Rob Spinner and Anne Gilroy were re-elected to their positions by the AACA membership.
   b. 2017 AACA Election – The five positions open to the AACA Membership for next year's election include President-Elect, Association Secretary, Special Councilor - Allied Heath, and two Councilor-at-Large positions.
   c. Presidential Committee Appointments – Neil listed the 2016 presidential appointments to the AACA committees, which included:
   Anatomical Services – David Conley, Academic Co-Chair
   Career Development – Sarah Greene (Chair)
   CAT Committee – Sherry Downie and Brad Martin (Co-Chair)
   Educational Affairs – Mohammed Khalil
   Financial Affairs – Tom Gest will replace Carol Lomneth as Chair (non-voting)
   Journal – Tom Gest will replace Carol Lomneth
   Nominating – Brian MacPherson, Laura Barritt, and Greg Smith (Chair)
2. **Treasurer's Report** (Carol Lomneth – AACA Treasurer)
   Carol reported that the AACA had a net meeting profit of $40,259, which is a slightly higher number than previous years due to the funds donated by AACA members for Sponsorship. Carol went over the breakdown of expenses for the Oakland meeting, and she mentioned the exorbitant AV costs and food and beverage expenses at the hotel. She also reviewed the funds currently in the AACA accounts and the cyclic nature of our balance in relationship to the time of our Annual Meeting. Our current balance is $296,954, but this amount will decrease as we pay more of our meeting expenses. She also reviewed the major categories of our income in 2014 and 2015, and she mentioned that the AACA is currently in negotiations to increase the operating budget for our journal. She also broke down the operating expenses for our professional association into individual categories. She highlighted her goals and accomplishments as Treasurer during her three-year term.

   Motion (Norton/Carmichael) – The American Association of Clinical Anatomists would like to show their extreme appreciation for Carol Lomneth and her three-year service as AACA Treasurer. The motion passed unanimously, and Carol received applause from the membership.

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3. **Membership Committee Report** (Marios Loukas – AACA President-Elect)
   Marios highlighted the Membership Committee report on Pages 50-51 of the 2016 AACA Meeting Program, which lists the 184 new AACA members who joined from July 1, 2015 – April 22, 2016, including 65 regular, 112 associate, 3 affiliate, 2 senior, and 2 postdoc members. He invited Shane Tubbs to present the Journal Committee report.
4. **Journal Committee Report** (Shane Tubbs – Editor-in-Chief of Clinical Anatomy)
   Shane introduced the editorial board and shared current and future topics for special issues in Clinical Anatomy. Shane emphasized the importance of publishing special issues, and he mentioned that there has been an approximate 50% increase in full-text downloads in 2014 due to one specific special issue. In 2015, the full-text downloads were lower than 2014, but the number of downloads still shows a trend in the increase in interest and readership. Finally, Shane shared the 2015 impact factor for the Clinical Anatomy, which stayed virtually the same at 1.316. He also compared the performance of Clinical Anatomy to similar journals in our field.
5. **Remembrance of Deceased Members** (H. Wayne Lambert – Association Secretary)
   After listing and mentioning some of the accomplishments of three AACA members (Drs. Robert "Bob" D. Acland, John A Negulesco, and Aaron Ruhalter) who passed away since the 2015 AACA Annual Meeting in Henderson, a moment of silence was observed for these beloved AACA members, colleagues, mentors, and friends.
6. **MOPP Committee Report** (David Porta – Program Secretary)
   David mentioned the MOPP Committee report was located on Pages 51-53 of the Annual Program and quickly summarized some of its content. He also listed the future destinations for our annual meetings, and he thanked Greg Smith and Sherry Downie for their help in preparing for the 2016 AACA Meeting in Oakland.
7. **Election of Members-at-Large for AACA Committees*** (Neil Norton)
   a. Election of Members-at-Large for Bylaws: Wayne Cottam, Larry Wineski
   b. Financial Affairs Committee: Carol Lomneth
   c. Nominating Committee: Tom Quinn and Todd Olson

8. **Old Business**
   Neil recognized Carlos Machado, the 2016 AACA Honored Member, and Tom Quinn, the 2016 R. Benton Adkins, Jr. Distinguished Service Award.
9. **New Business**
   Todd Olson emphasized the importance of attending the AACA Annual Business Meeting, and he encouraged the members in attendance to work to increase attendance at this session.

ADJOURNMENT: 5:20pm

Respectfully submitted,
H. Wayne Lambert, Ph.D., AACA Secretary

* The membership of Special Interest Group (SIG) Committees (Educational Affairs, Career Development, Clinical Anatomical Terminology, and Anatomical Services) elects members at their committee meetings.

2016 – 2017
Officers of the AACA Council

President - Neil S. Norton, Ph.D.

President-Elect - Marios Loukas, M.D.

Secretary - H. Wayne Lambert, Ph.D.

Treasurer – Thomas R. Gest, Ph.D.

Past-President - Brian R. MacPherson, Ph.D.

Program Secretary – David J. Porta, Ph.D.

Councilors

Robert J. Spinner, MD
Anthony V. D'Antoni, DC, PhD
Lisa M.J. Lee, Ph.D
Stephen W. Carmichael, PhD, DSc
Alan Detton, PhD
Philip Fabrizio, M.S., PT, MPT, DPT
Angela McArthur, MPH
Anne M. Gilroy, MA
Peter J. Ward, Ph.D.
R. Shane Tubbs, Ph.D.

Clinical Anatomy

The Official Journal of the American Association of Clinical Anatomists, the British Association of Clinical Anatomists, the Australian and New Zealand Association of Clinical Anatomists, and the Anatomical Society of Southern Africa

Editor-in-Chief – R. Shane Tubbs

Editor Emeritus – Stephen W. Carmichael

AACA Co-Editors – Senior Editor: Robert J. Spinner; Anthony V. D'Antoni, Thomas R. Gest, John T. Hansen, Joe Iwanaga, Marios Loukas, Susan Standring

BACA Editor – Philip Adds

Assistant BACA Editor – Jenny Clancy

ASSA Editor – Graham Louw

ANZACA Editor – Stephanie Woodley

Founding Editors: Ralph Ger and Ray J. Scothorne

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Sarah Mackay
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Rajani Singh
Jonathan Spratt
Mark D. Stringer
Richard Tunstall
Albert van Schoor
Ivan Varga
Joel Vilensky
Huan Wang
Robert Ward
Koichi Watanabe
Peter L. T. Willan
Bülent Yalçin
Anna Żurada

Committee Reports

Anatomical Services Committee
Brand Promotion and Outreach Committee
Career Development Committee
Clinical Anatomical Terminology Committee
Educational Affairs Committee
Journal Committee
Listserv Report
Membership Committee
MOPP Committee
Nominating Committee

2017 Anatomical Services Committee Report

The Anatomical Service Committee (ASC) represents both academic and technical members of the Association who are active in the operations and administration of institutional whole body donation programs. ASC functions to serve the AACA membership by developing symposia, special sessions, courses, and guidance documents and promoting technical and academic aspects of human anatomical tissue use in health care, university education and research. The group advocates for the informed, ethical, and safe operation of body donation programs in order to support the human anatomical tissue requests of students, faculty, staff and researchers who contribute to the advancement of medicine through education and research. The ASC meets monthly to focus on topics relevant to the operation of whole body donation programs including current practices, compliance, ethics, public relations, and to plan future Association annual meeting activities.

During 2016-2017, ASC has been hard at work on several projects:

- Revision of the Association's **Best Practices Guide for Anatomical Gift Programs** with standardized language and the inclusion of definitions.
- Creation of a **Checklist for Institutional Self-Review of an Anatomical Gift Program** to guide new programs in developing best practices and to assist established programs in taking stock of their current practices and procedures.
- Discussion of the feasibility of an AACA certification program for academic anatomical gift programs.
- Review of the 2016 ASC Breakfast Meeting and planning for the 2017 meeting.
- Planning of an ASC Special Session for the 2017 AACA annual meeting.

Information about ASC, including position statements, best practices, contact information, and links can be accessed from the Association's website: http://clinical-anatomy.org/Committees

Anatomical Services Committee events at the 2017 AACA Annual Meeting:
Members of the Anatomical Services Committee will be present at the **Welcome Reception** on **Monday, July 17th from 6:30 – 8:30 PM**. AACA meeting attendees and members interested in anatomical services are encouraged to attend, meet the committee members, and learn what we do and how to get involved.

Although 2017 is not a symposium year for the ASC, we are excited to offer a timely **Special Session** titled **The Legal and Ethical Considerations of Being the Guardian of the Gift** on **Wednesday, July 19th from 2:45 to 4:15 PM**. The session will feature a four member panel of experts in health law, biomedical ethics, and forensic anthropology, who will speak on their areas of specialty and respond to questions from the ASC and audience. The session will be introduced by Angela McArthur, Director of the Anatomy Bequest Program at the University of Minnesota. Details of the session are at: http://clinical-anatomy.org/Anatomical_Services_Committee_Special_Session

The **ASC Breakfast Meeting** takes place on **Thursday, July 20th from 7:30 to 9:00 AM**. The agenda for this year's meeting features our popular *Lessons Learned* session where real case studies in academic donation programs will be presented and a new item called *Ask an Expert* where questions concerning anatomical donation programs will be posed and advice solicited from AACA colleagues in attendance at the breakfast. Other agenda items include a report on the work of the ASC during the last year and discussion of current topics, future meetings, and symposia. Active AACA members will also be electing a new ASC member. All meeting attendees are welcome to attend! Details of the meeting are at: http://clinical-anatomy.org/Anatomical_Services_Committee_Breakfast_Meeting_

The current Anatomical Services Committee includes:

Presidential Appointees:	2014-2017: Andrew Corson, University of California, San Francisco
	2015-2018: Brandi Schmitt, University of California, Technical Co-Chair - brandi.schmitt@ucop.edu
	2016-2019: David Conley, Washington State University, Academic Co-Chair – dmc@wsu.edu
Elected Members:	2014-2017: Heather Balsiger, Texas Tech University, El Paso
	2015-2018: Bobbi Morgan, West Virginia School of Osteopathic Medicine
	2016-2019: Nicole Herring, University of Louisville
Ex Officio:	Angela McArthur. University of Minnesota - ASC Special Councilor

Brand Promotion and Outreach Committee

AACA Council Meeting Report 2017

Presidential Appointments

Appointee 2015-2018: Jonathan Wisco (Chair)

Members Recommended by Chair and Approved by President

Dolgor Baatar, Ken Jones, Christina Lewis, Danielle Royer, Peter Ward

BPOC Activities

The by-laws governing the committee are as follows:

The Brand Promotion and Outreach Committee is responsible for the promotion and maintenance of strategic initiatives of the AACA. The committee shall consist of six members. The President shall appoint three members, with the approval of the Council, and designate one nominee as the Committee's Chair. Two members shall be nominated and elected by the membership at the Annual Business Meeting.

- Providing oversight of regional meeting proposals and selecting hosts, in conjunction with the MOPP committee; and providing logistical support in conjunction with the AACA's professional management service;
- Establishing a promotional and collaborative presence with other professional organizations with complementary missions (particularly those involved with initiatives related to clinical anatomy research and educational scholarship);
- Maintaining and updating the AACA website and social media outlets to reflect current events, connect members, and seamlessly tie the efforts of the standing committees together in order to unify the public presentation of the Association;
- Soliciting information from the membership and monitoring current trends and emerging issues in the field of clinical anatomy to determine how AACA can best meet members' needs; this information will be communicated with the standing Committees and Council;
- Soliciting information from the membership regarding their perception of: events at the annual meeting, interface of the Society's social media outlets, events that would benefit the Association in the future;
- Interacting with media on behalf of the Association and directing inquiries to an appropriate member or member of Council;
- Selectively promoting products or services offered by or endorsed by the Association;
- Working with each of the standing committees to promote their initiatives to the public and other stakeholders;
- Recommending further suggestions, as needed, to Council to improve promotion of AACA as a clinically oriented, scientific and educational scholarly institution.

Subcommitee Work

We have organized our committee into four subcommittees (Regional Meetings, Community Outreach, Social Media, Website) in accordance with the objectives stated in the by-laws, and report herein:

Regional Meetings Subcommittee

- Members: Jon Wisco
- Purpose: Works with Association Services Group to promote and select regional meeting sites and support program committees.
- The Regional Meetings Subcommittee has achieved the following milestones this year:
- Successful Regional Meeting in Chapel Hill, North Carolina in 2016! Kurt Gilliland from University of North Carolina, and colleagues from Duke University, Wake Forest University, Campbell University, and East Carolina University hosted an excellent program.
- The next Regional Meeting will be hosted by A.T. Still University of Health Sciences, Arizona School of Dentistry & Oral Health in Mesa, AZ. Dr. Wayne Cottam leads a multi-disciplinary team of AACA members and non-members to host a meeting focusing on technological and pedagogical advances in anatomical sciences education, with a particular emphasis on dental, and head and neck Anatomy.
- We are poised to work with you and your institution if you would like to host a Regional Meeting. Come visit with us to learn more!

Community Outreach Subcommittee

- Members: Christina Lewis and Peter Ward
- Purpose: Identifies and establishes collaborations with professional and avocational groups to promote AACA and serve the community.

The Community Outreach Subcommittee has achieved the following milestones this year:

- We partnered with Anatomy Academy on Thursday, May 18, 2017 to teach concepts of anatomy, physiology and nutrition to up to 500 middle and high school students at The Intel International Science and Engineering Fair (Intel ISEF) in Los Angeles, CA.
- We are working with the following community outreach partners to provide anatomical sciences education opportunites: Mutter Museum (Philadelphia, PA) and Bone Clones (Los Angeles, CA). Program proposals are currently being discussed. When finalized, we will provide information through the AACA website, Facebook, Twitter, and LinkedIn.

Social Media Subcommittee

- Members: Dolgor Baatar and Danielle Royer
- Purpose: Determines strategies for and implements AACA social media presence

The Social Media Subcommittee has achieved the following milestones this year:

- We now have a very strong Twitter, LinkedIn and Facebook presence. You can follow on any of these outlets by clicking on the appropriate icon on the AACA website. We encourage you to participate in the opportunity to stay connected through social media!
- Tweet with us! @AACAnatomy and use the hashtag #ClinAnat17. Pick up your "I Tweet" ribbon at the registration desk!
- Follow us on LinkedIn! Stay up to date with AACA news, discover new job opportunities, connect to other members: go to
- https://www.linkedin.com/company/american-association-of-clinical-anatomists.

Website Subcommittee

- Members: Ken Jones
- Purpose: Works with Association Services Group to maintain content and relevancy of our AACA website

The Website Subcommittee has achieved the following milestones this year:

- Check out the most recent Member Spotlight on the AACA website! We are currently highlighting Dr. Oliver Beahrs.
- Our inaugural Member Spotlight featured Dr. Bob Acland.
- We have updated descriptions of the Sandy Marks and Ralph Ger Associate Member presentation awards.

We thank everyone for their support! If you are interested in getting involved, ask how!

Career Development Committee

The role of the Career Development Committee (CDC) is to support career growth and the advancement of clinical anatomy knowledge for an individual at any stage of their career. Additionally, the CDC strives to encourage high quality anatomical research and scholarly educational work. The committee accomplishes these goals through numerous activities, including: coordinating the judging of student posters (Sandy C. Marks, Jr. Award) and platform presentations (Ralph Ger Award) at the annual meeting, planning and implementing the mentor social at the annual meeting, and planning the Career Development Symposium.

The CDC has been working hard on expanding mentorship opportunities both within and outside of the annual meeting platform. We will be reaching out to our registered mentees ahead of the 2017 meeting to begin to help new and early career members navigate the meeting and network with mentors. The Mentor Reception is a time when we will encourage networking between mentees and mentors.

In 2017, our symposium, entitled "Journeys though a Career in Anatomy: Glancing Back and Moving Forward," will include three speakers from different academic levels. Speakers will focus on (1) developing skills as an educator, (2) establishing scholarly activity, (3) balancing career and personal responsibilities, (4) lessons learned during one's academic career, and (5) path to academic promotion.

If you are interested in serving, have a passion for mentoring, or have innovative ideas to promote career growth, please consider becoming a member of the CDC. We will be electing one new member at our breakfast meeting on Tuesday, July 18th from 7:30 am - 9:00 am. We also look forward to an exciting round table discussion on what it means to be an "*Effective Mentor*", so don't miss out!

Presidential Appointees

Sarah Greene (sgreene@msm.edu)
Anthony Olinger (aolinger@kcumb.edu)
Nirusha Lachman (lachman.nirusha@mayo.edu)

Members Elected at Annual SIG Meeting of Committee

Alan Detton (adetton@gmail.com)
Yasmin Carter (yasmincarter@gmail.com)
Eileen Kalmar (Eileen.Kalmar@osumc.edu)

Clinical Anatomical Terminology (CAT) Committee

Clinical Anatomical Terminology Committee

Report to the Interim Council Meeting of the AACA

May 3, 2017

Co-chairs: Tom Gest and Evan Goldman

Members: Sherry Downie, Paul Gobee, Chelsea Lohman, Brad Martin, Alan Richards, Ian Whitmore, John Hansen

The CAT committee has held biweekly meetings since June, 2016 to further develop a "Guidelines and Patterns for creating anatomical definitions" document that was initiated by CAT member, Paul Gobée. Members of FIPAT (Pierre Sprumont and Paul Neumann) frequently attended these meetings, but by November, 2016, the focus of the meetings changed from finalizing the patterns document to creating definitions.

The CAT committee continued creating definitions through December, 2016 and used the process as a means of testing and refining the patterns that specified the syntax of how definitions are constructed for specific structures (e.g. muscles, tubes [arteries, veins, duct], bones, bone processes, etc.). In December, 2016, Paul Gobee forged an agreement with Incision (www.incision.care), a company creating a 3D video-learning platform for improving surgical skills, to create definitions based on CAT's patterns and guidelines. The definitions created by Incision became the '1st draft" of a definition. Two CAT committee members independently reviewed each definition then the CAT committee as a whole vetted these and made final revisions.

By March, 2017, Incision had created over 400 definitions and CAT had reviewed approximately 100. At that point, the CAT committee began the process of developing the patterns for defining central and peripheral nervous system terms.

To facilitate the creation of definitions, CAT committee member, Evan Goldman, developed a software interface that was then used by members of CAT and Incision to create definitions. The interface consists of a series of drop-down menus and fill-in-the-blank boxes that guide the user through creating a definition. The boxes and drop-down menus are organized according to the patterns, terminologies, and syntax described within the "Patterns and Guidelines" document. After the 1st-draft of a definition is created in this semi-automated fashion, each reviewer uses the form to adjust the definition. The form automatically tracks each step of the process and provides visual responses to help the CAT committee knows the status, and work towards completion of each term. Once a term has been finalized, the completed definition is copied to a master list and archives are created of the steps used to create each definition.

Educational Affairs Committee

Purpose of Committee

The Educational Affairs Committee (EAC) shall promote the teaching of clinical anatomy, track national and international curricular changes, and develop educational initiatives that will benefit the Association's members, health care professionals, the education community, and the general public. The Committee shall disseminate data and recommendations for best practices for all aspects of anatomical education as it relates to clinical practice. The Committee shall plan and implement the Educational Affairs Symposium when scheduled by the Meeting Oversight and Program Planning Committee.

The Committee shall consist of six (6) members, each serving a three (3) year term. The President-Elect shall appoint one (1) member in the second year of his/her term, and the President shall appoint one (1) member in the first year of his/her term. One (1) member shall be nominated and elected by the Active Members in attendance at its annual open meeting.

EAC Members

Presidential Appointees

2014-2017: April Richardson-Hatcher (arich3@uky.edu)

2015-2018: Peter Ward (pward@osteo.wvsom.edu)

2016-2019: Mohammed Khalil: (KhalilMK@greenvillemed.sc.edu)

Members-at-Large Elected at Annual SIG Meeting of Committee

2014-2017: Vaughan Lee (vaughan.lee@ttuhsc.edu)

2015-2018: Elmus Beale (elmus-beale@utulsa.edu)

2016-2019: Lela Giannaris: (EustathiaLela.Giannaris@umassmed.edu)

At the EAC breakfast during the 2016 annual meeting elections were held for the member-at-large for the 2016-2019. Lela Giannaris was elected to this position and Mohammed Khalil was announced as the presidential appointment for 2016-2019. After completion of EAC business, Dr. Marios Loukas (Department of Anatomical Sciences, St. George's University School of Medicine) lead a discussion regarding certification for anatomist and questions on how such a program might be organized and implemented.

The EAC symposium was held at the 2016 AACA meeting on Tuesday, June 14, 2016, 1:00 – 2:30 pm. The topic was Competency-based Anatomical Education and the symposium consisted of presentations and a panel discussion with Dr. Markku T. Nousiainen (Department of Surgery, University of Toronto), Dr. Wojciech Pawlina (Department of Anatomy, College of Medicine, Mayo Clinic), and Dr. Nirusha Lachman (Department of Anatomy, College of Medicine, Mayo Clinic). Dr. Nousiainen described his experiences in competency-based assessment of orthopedic surgery residents at the University of Toronto since 2009. This presentation discussed (i) how the training program developed its CBME training program; (ii) the lessons learned in implementing the program, and (iii) the future direction of CBME as it relates to orthopaedic surgery residency training programs in Canada. Dr. Pawlina and his colleague Dr. Nirusha Lachman presented a talk regarding assessment of competencies in the anatomical sciences. They discussed assessments of cognitive and non-cognitive competencies in anatomical sciences. For millennial students finding the right assessment tools with use of multifactorial assessment strategies is a key element for promoting authentic learning.

During the monthly EAC meetings, discussion and planning for the 2017 breakfast meeting program have continued. Current plans are to followup on questions related to the 2016 discussions, certification for anatomical educators. Dr. Marios Loukas will present a preliminary proposal and address questions raised at the 2016 EAC breakfast meeting.

Journal Committee

Committee Members: Marios Loukas (ex officio), Stewart McDonald (ex officio), Neil S. Norton , Brian MacPherson, Tom Gest, Tiffany McKerahan, Shane Tubbs (ex officio).

Three Special Issues have been published in the Journal over the last year. The topics for these were Cardiac Anatomy, Surface Anatomy and the Ethics of Anatomy.

The *Clinical Anatomy* app is now available for Android as well as for the iPhone.

Submissions to the Journal continue to grow with well over 500 over the last year.

Listserv Report

AACA's Education Issues Listserv was moved from the mailserver at Einstein to being hosted on Google Groups in February of 2016. There are currently 1, 388 subscribers to AACA's Listserv. Since its inception in 1995, The Education Issues List distributed over 10,600 message on a wide variety of topics. From May 1, 2016 to April 30, 2017 there were 37 subjects posted. At the bottom of this report is a table of those posts that received the most responses.

AACA Education List

Total Subscribers (as of 5/3/17) = **1,388**

Activity 5/1/17-4/30/17 = 37 messages

Most Commented upon Threads
Professor Tatsuo Sato's Dissection videos (12 posts)
Problem with yeast (11 posts)
Odd tissue in the knee (10 posts)
Lightly embalmed cadavers (10 posts)
Ultrasound efficacy on embalmed species (9 posts)
How to act against plagiarism (7 posts)

May 2016 – April 2017 Monthly Email Activity

May '16 = 4

June '16 =

July '16 = 4

August '16 = 4

September '16 = 4

October '16 = 3

November '16 = 2

December '16 = 0

January '17 = 2

February '17 = 10

Membership Committee

Committee Members: Marios Loukas, Brian MacPherson, Rachael George

The membership committee is pleased to that the following new members have joined the AACA from May 5th, 2016 to May 5, 2017. This translates to approximately 12% increase in our new members. The total number of active members in the association is 610.

AFFILIATE

Robert Ndou

ASSOCIATE – ELECTRONIC

Thomas Adams
Ayesha Ali
Cecily Allen
Anthony Bastian
Alexander Baxa
Hannah Benjamin
Hailey Budnick
Jae Cauble
Brandon Chavez
Zeni Crisp
Jameson Davis
Stacey Dunham
Allen Duong
Julie Eckelbarger
Verena Festen-Schrier
Mercedes Foster
Blair Freed
Cameron Garagozlo
Amaris Geisler
Joshua Hahn
Ty Hancock
Nathaniel Hansen
Katrina Harrison
Natascha Heise
Patricia Hui
James Juhng
Khadija Khan
Jenna Kroeker
Zoltan Krudy
Benfie Liu
Olga Marushchak
Faizullah Mashriqi
Mary McGinn
Calvin McNelly
Erick Melara
Diana Messer
Amanda Milam
Brandy Mills
Allison Mootz
Stephanie Morales
Satoru Muro
Joseph Nash
Chimere Nnaji
Clayton Oakley
Dakoda Owings
Trevor Page
Julia Peng
Michael Peng
Ashley Peterson
Joshua Peterson
Jessica Plaza
Elizabeth Ricks
Mariel Rogozinski
Mica Rosenow
Sheiban Shakeri
Charles Shaller
Benjamin Shapleigh
Ashley Simons
Laura Solis
Melissa Ann Sorrells
Clark Stephenson
Andrew Storm
Ruthy Tam
Sean Trinh
Katherine Van Winkle
Tomas Vilde
Alexander Walker
Rachel Wallace
Lauren Weber
Christopher Wellbrook
Andrew Welleford
Chin Wells
Blake Westling
Amy Whitaker
Mary Whittle Gribbin
Matthew Young
Patrick Zawadski

ASSOCIATE POST DOC – ELECTRONIC

Jared Davis
Rupanjali Kundu
Nicolas Ernesto Ottone
Adi Pinkas

REGULAR ELECTRONIC

Shinichi Abe
Kamal Abouzaid
Andrew Abue
Terri Ach
Altayeb Ahmed
Noor Al-Attar
Fernando Alonso
Peter Amua-Quarshie
Francine Anderson
Offiong Aqua
Pugazhandhi Bakthavatchalam
Aaron Beger
Kristina Benson
Thomas Bessede
Bharti Bhusnurmath
Shivayogi Bhusnurmath
Erika Blanck
Noel Boaz
Garvin Bowen
Darren Brow
David Brzezinski
Leon Budrie
Tiffany Carpenetti
Melissa Carroll
Anthony Clary
Mark Clunes
Marcus Cox
Grisseel Cruz-Espaillat
Dylan Dalip
Jamie Decker
Doniel Drazin
Ashleigh Prince Dunn
Osama Elkhider
Christian Fisahn
Christina Fojas
Maria Frank
Patrick William Frank, D.C.
Oded Goren
Andre Granger
Clara Greaney
James Harmon
Kelly Harrell
Coenraad Hattingh
Gary Holly
Jessica Ibarra
Michael Ibiwoye
Stuart Donald Inglis
Lee Lovino
Hisako Iwanaga
Saravanan Jagadeesan
Akash Jain
Susan Jeno
Jaspreet Johal
Okpe JOHN
Xenia John
Sherese Joseph
Peter J. Kernahan
Joshua Kerns
Matthew Kesterke
Seunghwan Kim
Brenda Kirkby
Walter Kolbinger
Theofanis Kollias
Sushil Kumar
Kimberly Latacha
Susan Lawrence
Tyler Laws
John Leard
Macario Llamas, Dr.
Rehana Lovely
Shawn Macauley
Neeraja Maddirala
Ahmed Mahgoub

continued on next page

Christopher Martinez
Wakoto Matsuda
R. Trigg McClellan
Claudio Rodrigo Molina
Michael Montalbano
Nadeira Mumin
Vivek Nuguri
Rod Oskouian
Valerie Dean O`Loughlin
Jeni Page
Kathleen Pappas
Chirag Patel
Teresa Patitucci
Marc A Pizzimenti
Kristen Platt
Kristamarie Pratt
Rebecca Ramdhan
Kyle Rarey
Jason Refsland
Laura Richardson
Wallisa Roberts
Tarush Rustagi
Linda Sahlin
Erfanul Saker
Raghu Sampath
Deepak Sharma
Sarvy Sheikh
Vajinder Singh
Lorena Smith
Thomas Stowell
Ayesha Sultana
Alexis Takasumi
Derek Talbot
Gabrielle Tardieu
Maria Thomadaki
Zach Throckmorton
Nitsa Topale
Isaiah Tubbs
Kevin Tubbs
Susan Tubbs
Diane Tyczynski
Randle Umeh
Sameera Usman
Vlad Voin
Adam Wilson
Steven Wilt
Patricia Wisenden
Ahmed Yaqinuddin
Mustafa Ahmad Mohamed Abuelnaga
Katherine Alvarado
Jake Anderson
Andrew Ashton
Jesse Boyd
Howard Brooks
Casey Hessman
Paul Hill
Ruth A. Lopriore
Sarah Paulsen
Matt Piringer
Daniel Schlegel
Linnea Seidelmann

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Pawan Aggarwal
Bhavya Bs
Daniel Erb
Paul Herbert
Bader Khawaji
Jorge Lazareff
Travis McCumber
Shawn Parcells
William Saltarelli
Dale W. Saxon
Andrew Zubinas

MOPP Committee Annual Report, 2016-2017

Members:

Executive Committee
President – Neil Norton
President-Elect – Marios Loukas
Past President – Brian MacPherson
Treasurer – Tom Gest
Association Secretary – H. Wayne Lambert
Program Secretary – David Porta, MOPP Chair

Special Interest Committees

Anatomical Services Co-Chairs - Brandi Schmitt & David Conley
Career Development Committee, Chair – Sarah Greene
Educational Affairs, Chair – Vaughan Lee
Clinical Anatomical Terminology Committee Co-Chairs– David Conley & Tom Gest

Meeting Managers (Formerly known as Annual Meeting Committee Co-Chairs)
Greg Smith 2016-2017
Jennifer Burgoon 2017-2018
Sarah Greene 2018-2019

Local Hosts
Anthony Weinhaus & Angela McArthur- Minneapolis, 2017

ASG Representatives (contracted professional organization management company)
Caitlin Hyatt, Executive Director
Ashley Shamp, Program Services Coordinator

The Meeting Organization and Program Planning (MOPP) Committee has worked diligently to bring you the best possible 2017 annual scientific conference. Immediately after the 2016 Conference in Oakland, the MOPP began reviewing the Post-Conference Surveys to look for ways to improve. The committee held telephone conference calls on the third Thursday of each month. The program you are reading is the result of many hours of service by the members listed above as well as professional support by ASG. The committee is extremely grateful to our Executive Director, Caitlin Hyatt. She and Ashley Shamp have been highly responsive to the AACA needs and they have done an excellent job guiding us through the process of putting together what we hope will be a great scientific conference. Special thanks is also due to our local hosts, Angela McArthur and Tony Weinhaus. They have done a fantastic job especially in serving as liaisons with the hotel, organizing the social, and planning the postgraduate course. Their great efforts are truly appreciated.

As most of the MOPP members are responsible for steering other committees, etc., much of the program planning responsibilities fall on the Meeting Managers. Greg Smith, Jennifer Burgoon, and I have spent many additional hours working with ASG on a large number of tasks with, and on behalf of, the committee including:

Sites Visits and Contract reviews for future Annual Meetings

- 2018 meeting in Atlanta, GA. Local hosts will be Larry Wineski & Sarah Greene.
- 2019 meeting in Tulsa, OK. The local host will be Elmus Beale.
- 2020 meeting: A joint meeting with BACA is being proposed.
- 2021 meeting: Rusty Reeves has proposed Fort Worth, TX.

Supporting the Regional AACA Meeting

- The MOPP supported the work of Kurt Gilliland, Terry Mitchell, Tom Perrault, Kelly Harrell and Matt Velkey in offering the second AACA Regional conference. It was held at the University of North Carolina in Chapel Hill on October 15, 2016 and was, by all accounts, a highly successful meeting that focused mainly on the presentation of student work. The conference was the result of collaboration between Campbell University Duke University, East Carolina University, University of North Carolina, and Wake Forest University and was supported by Carolina, Thieme, InfoSight, and Elsevier. Approximately 65 faculty and students enjoyed 2 keynote speeches, 22 ePosters, 5 different concurrent Education Workshops, and a hands-on ultrasound session.
- Future Regional AACA Meetings at Georgetown University and Bellarmine University have been discussed. If you are interested in hosting a regional meeting, please contact us.

Abstract Submissions

- Each year, the committee reviews the Abstract Submission Guidelines in an effort to improve clarity. Changes were made to the guidelines that we hope helped. The AACA only accepts completed, original, previously unpublished work. Discussion will continue regarding what particular matter is appropriate for our conference, especially in light of what material is accepted for publication by our journal. Specifically, recent submissions in the fields of molecular and animal biology have resulted in questions that will be considered for next year.
- Check boxes were added to the submission software asking authors if their work had been presented or published previously. There have been recent cases of work presented at the AACA meeting that was previously published elsewhere. This is unacceptable and the committee will be on guard for these rare instances.
- Check boxes were added to the submission software asking authors if their work involves animals or live human subjects. If so, they were asked to indicate if the work has been approved by the appropriate Institutional Review Board.
- In the calls for abstracts this year, a special request for Embryology and Histology abstracts was issued. Unfortunately, the response was insufficient to warrant a separate platform session.
- The MAJOR task for ASG and the Meeting Managers this year was the replacement of the StarChapter abstract submission software. This archaic platform was never intended for this purpose. ASG had cobbled together various forms to make the system work, but it was time consuming and inefficient. Options for a new, flexible, dedicated submission software system that could better interface with other software were explored. ASG narrowed the choices and the Meeting Managers ran several simulations on these systems in order to recommend the best and most cost-effective system to the Executive Committee. The software package offered by PLANSTONE corporation was selected and approved. ASG diligently shared information and instructions with the membership about the changes prior to the submission deadlines. These efforts appeared to result in a relatively smooth transition. The MOPP will be eager to read the post-conference surveys this year to consider the opinion of the membership.

- Abstract Review Process. The Program Committee (the 2 Meeting Managers and Program Secretary) perform the initial FORMAT Review of abstracts. Those abstracts that meet the guideline standards are then sent for blinded CONTENT REVIEW by at least 3 AACA members. The Program committee then determines which abstracts will be accepted or rejected, which will be presented from the platform or poster, and which will be published in the journal. Please note that the highest rated abstracts are considered for platform presentations, as long as the author has indicated his or her desire to present from the platform. The Program committee then works closely with ASG to set the actual program details. It is believed having this small program committee provides for better oversight than merely having the lone Program Secretary make all the decisions. I was quite pleased to work with Greg Smith and Jennifer Burgoon this year and look forward to working with Jennifer Burgoon and Sarah Greene for the 2018 program.
- ASG has over 1,200 profiles of members and former members. Over 600 are active, dues-paying members. As of 5/18/17, there are 286 people registered for the meeting- a number that will likely rise in the coming weeks. At this point last year, there were 350 registrants (but the meeting was held in June vs July for 2017). In May of 2014, the # of registrants was 279 for the July Meeting.
- There were 135 abstracts submitted for the 2017 conference (vs 192 in '16, 147 in '15, 139 in '14). Only 19 abstracts were returned to authors for formatting issues (vs 70 in '16, 51 in '15 and 20 in '14). Recall that these authors had to pay a $20 resubmission fee. Three abstracts were submitted by email after the initial deadline. None of these was resubmitted by the late-breaking deadline. There were 10 late-breaking abstract submissions (vs 4 in '16, 21 in '15 and 25 in '14). Late-breaking abstracts are accepted for poster presentation only and are ineligible for award and will not be published in the journal.

2017 AACA Program Highlights

- In Minneapolis, you will be able to enjoy 16 platforms (vs 19 in '16), 7 Tech Fair offerings (vs 5 in '16), 97 posters (vs 115 in '16) whose abstracts will be published in the journal (along with those from the platforms and Tech Fair) and 22 posters (vs 26 in '16) whose abstracts will not be published. There were 2 (vs 4 in '16) withdrawals and 1 rejection (vs 23 in '16).
- Aside from the scientific program content, there will also be special symposia by the Anatomical Sciences (ASC), Clinical Anatomical Terminology (CAT), and Career Development (CDC) committees as well as breakfast meetings sponsored by the CDC, ASC and Educational Affairs (EAC) committees. More information about the activities of these committees can be found in the reports enclosed in this program. All AACA members are welcome at all events!
- In 2016, the Tech Fair was moved to the first day of the conference in order to highlight this special presentation format. This year, there were 7 abstract submissions for the Tech Fair and there will be 2 sessions spanning the first 2 lunch periods. The Clinical Anatomy luncheon was not renewed this year.
- In 2016, the Banquet was moved to the last day of the conference in order to encourage attendees to stay for the entire scientific program and provide sufficient time for the collation and determination of conference awards. This is continued for 2017.

In closing, we wish to express our sincere gratitude to the numerous members who have served as peer reviewers for abstracts. You serve a critical role in upholding the standards of our scientific conference. As always, the MOPP committee welcomes your comments and suggestions on how to improve our annual scientific meeting.

Respectfully submitted on behalf of the committee,

David Porta, Program Secretary

2017 Nominating Committee Report

The Nominating Committee consisted of Greg Smith (Chairperson), Laura Barritt and Brian MacPherson as Presidential Appointees, and Todd Olson and Tom Quinn as elected Members-at-Large.

In December, Caitlin Hyatt sent the committee the annual meeting attendee lists for the past three years. The lists were used to see who had regularly attended the meetings thus giving the Committee an idea who was active in the AACA. On December 19, 2016, Greg Smith checked with Neil Norton and Wayne Lambert as to the eligibility for reelection of Anthony D'Antoni and Lisa Lee (Counselor-at-Large) and Philip Fabrizio (Special Counselor-Allied Health). They are all eligible.

On December 21, Greg Smith sent the Committee all of the information related to the charge of the Committee, this included the current eligible members and the criteria of eligibility for the open positions – President-Elect, Association Secretary, Counselor-at-Large and Special Counselor-Allied Health. One question arose regarding the eligibility for reelection of a member who was appointed as a replacement for a vacated seat. Neil Norton and Wayne Lambert confirmed that a person in this position would be eligible.

On January 6, 2017, the Committee met on a conference call for the first time (all members were present). Greg Smith urged the Committee to consider newer members who have been active in the association as a way to get them involved. Several suggestions were made for each position. Greg Smith contacted the members put forward to see if they wanted to be considered for the respective positions.

On January 13, the Committee met for the second time (all members were present). Greg Smith informed the Committee of the potential candidates' responses. Additional potential candidates were added to the conversation and the Committee deliberated upon the list. Some of the potential candidates were suggested for two positions. A healthy conversation ensued and the meeting ended with Greg Smith telling the Committee members that he would communicate with the potential candidates to make sure they would be willing to serve.

On January 20, the Committee met again (all members were present). Some of the candidates that Greg Smith talked with indicated that they did not want be considered for nomination. Additional candidates were suggested. The Committee candidly shared their thoughts and the slate was refined. The Committee agreed to adjourn and think about the list of candidates to prepare for the final Committee meeting.

On January 27, the Committee met for the final time (all members were present, except for Tom Quinn who had a conflict but indicated that he was comfortable with all of the suggested candidates). Greg Smith made sure that all of the Committee members felt that their input had been considered. The Committee then put forth a slate to forward to Neil Norton and Wayne Lambert.

Greg Smith sent the slate for Counselor-at-Large, Association Secretary and Special Counselor-Allied Health to Wayne Lambert, Association Secretary. The slate for President-Elect was sent to Neil Norton, Association President, to avoid a conflict of interest regarding the solicitation of the biographies from the candidates.

Respectfully submitted,

Greg Smith, Chairperson of the Nominating Committee

Assistant/Associate/Full Professor of Preclinical Sciences (Anatomy)

William Carey University COM is looking for anatomists interested in combining and leveraging their knowledge and experience of anatomy with the development of innovative methods for anatomical teaching and curricular design towards supporting comprehensive anatomical support primarily for the first-year (OMS1) but including supporting services for OMS2 through OMS4. Active interaction with both the basic sciences and clinical faculty will be expected.

Under the respective course director(s) and the Associate Dean, Preclinical Sciences, the successful candidate will provide instruction in one or more of the anatomical sub-disciplines, including embryology, histology, gross anatomy, neuroanatomy and medical imaging. The ultimate goal is to form a solid foundation in this critical science, and create testable inter-dependencies with other disciplines, such as biochemistry, physiology, pathology and clinical skills, including osteopathy using the curricular model database. In particular, we are interested in the thorough inclusion of medical imaging (i.e.: x-ray, CT, MRI, US) into both lecture and laboratory sessions of our anatomy program. The radiology software application OSIRIX currently plays an active role in this in the dissection laboratory. Live ultrasound demonstrations will have significant representation in our courses based on the application of our kiosk machines. Additionally, ultrasound student simulators will expand the direct experience with standard US cases. The Radiology SIG will have a role in tutoring basic imaging concepts and cases to all interested students across all four years with their website which will accumulate cases and RSNA journal concept papers relevant to each anatomical region and system.

Please visit
https://wmcarey.peopleadmin.com/postings/91430
or contact Dr. Cal Hisley, Senior Anatomist at chisley@wmcarey.edu for more information.



WILLIAM CAREY
UNIVERSITY

Abstracts – Platform Presentations

(listed by presenting author last name)

BESSEDE, Thomas[1, 2], Ardeshir R. RASTINEHAD[1], Bachir TAOULI[3], Balaji N. REDDY[1], Mathieu DURAND[1], Georges K. 3rd HAINES[4], Stephanie J. HECTORS[3], Cheuk Y. TANG[3], and Ashutosh K. TEWARI[1].[1]Department of Urology, Icahn School of Medicine at Mount Sinai, New York, NY, 10029, USA. [2]U1195, University Paris Sud, Le Kremlin Bicetre, 94270, FRANCE. [3]Department of Radiology, Icahn School of Medicine at Mount Sinai, New York, NY, 10029, USA. [4]Department of Pathology, ISMMS, New York, NY, 10029, USA.

Diffusion Tensor-MRI (DTI) Tractography in Periprostatic Nerves Imaging: Anatomical Evaluation.

INTRODUCTION. Neural pathways can be imaged by tractography on Diffusion Tensor (DT) MRI sequences. The objective was to correlate the outcomes of tractography with the anatomy of the periprostatic neurovascular bundles (NVBs). METHODS. In a non-randomized IRB-approved clinical trial, ten patients eligible for radical prostatectomy had a DT sequence during pre-operative MRI (3 Teslas). After surgery, prostate specimens were scanned overnight (7 Teslas, T2 and DT sequences) and then processed whole-mount in Pathology. A Hematin-Eosin-Safran and a PS100 slice were obtained every 5 mm. Tractographies were generated with a custom-developed software "TMII" under Matlab®. The number and position of nerve fibers identified in each peri-prostatic sector by DT-MRI and immunohistochemistry were compared. SUMMARY. Pre-operative DTI-tractography at 3T-MRI was not able to distinguish nerve fibers. Post-operative DTI-tractography at 7T-MRI generated tracts with a 58% correlation rate as compared with histology in the postero-lateral sector. Correlation between tractography and histology was below 30% in the lateral and in the antero-lateral sectors. When the periprostatic nerve fibers were identified on pathological slides and the correlated 7T-T2 sequences, it was subsequently possible.

CRISP, Zeni, Thomas M. DAGG, Zoltan A. KRUDY, Dana GALVAN, Gabriel R. SCOTT, and Thomas R. GEST. Department of Anatomy, Texas Tech University Health Sciences Center Paul L. Foster School of Medicine, El Paso, TX 79905, USA.

Inferior Mesenteric Ganglia in the Adult Cadaver.

INTRODUCTION. The inferior mesenteric ganglion (IMG) is derived from preganglionic sympathetic axons from the intermesenteric plexus (IMP) and the second lumbar splanchnic nerve. It is located on the abdominal aorta near the origin of the inferior mesenteric artery (IMA). The IMG has been described with a high level of variability in the literature. The purpose of this study was to clarify the nature of the IMG. METHODS. Thirty-seven human cadavers were dissected along the abdominal aorta near the origin of the IMA. Six were excluded due to disrupted anatomy. The IMG was looked for within the network of fibers at the point that the aortic plexus is continuous with IMP. The ganglion was identified by its tough, bulky consistency and difficulty to detach from its mesh of nerves. The tissues were then excised for histological analysis and verification. SUMMARY. From the final 31 cadavers, 25 had a grossly observable IMG. All but one IMG were confirmed with histological analysis. The gross structure of the IMG was variable, with the shape being oval or stellate. The size of the ganglia ranged from 0.5 to 2 cm in width and 1 to 4 cm in length. Unlike the celiac and superior mesenteric ganglia, which consist of a multi-ganglia network, only one IMG was found in each cadaver. The IMG is located in close proximity to the IMA, approximately 0.6 to 1.3 cm from the budding of the artery. The location of the ganglion is variable. It may be anterior, superior, inferior, medial or lateral to the root of the IMA. CONCLUSIONS. One of the most important findings in our study is the amount of variability in IMG location and appearance. Six cadavers did not have a distinguishable IMG while the others had IMG that were very difficult to distinguish from the rest of the IMP. This extreme variability raises questions regarding the need to define the IMG separately from the plexus itself. Our conclusion is the IMG is merely an extension of the IMP and not a separate entity.

DUONG, Allen[1], Satyendra SHARMA[2], and Anne M.R AGUR[1,2]. [1]Division of Anatomy, Department of Surgery and [2]Division of Physical Medicine & Rehabilitation, Department of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada.

Ultrasound-Guided Injection of Psoas Major Muscle for Clinical Management of Hip Flexor Spasticity.

INTRODUCTION. Hip flexor spasticity can impede activities of daily living, personal hygiene and range of motion. Botulinum Toxin A (BT-A) injections have been found to decrease muscle tone and increase range of motion. Psoas major (PM) plays a significant role in hip flexor spasticity, however the accuracy of BT-A injection of PM has not been investigated using a lumbar approach. Currently, iliopsoas injection inferior to the inguinal ligament is the procedure of choice. However, psoas is mainly tendinous in this region. The purpose of this cadaveric study was to investigate the feasibility and safety of PM injection using an ultrasound (US) guided lumbar approach. METHODS. Eight lightly embalmed specimens were injected with 2ml toluidine blue dye using the US guided lumbar approach. Following injection, the abdominal contents were removed and the surface of PM, quadratus lumborum, abdominal aorta, inferior vena cava (IVC) and bony landmarks were digitized using a Microscribe® MLXDigitizer. By serially excising the fibre bundles of PM, the outline of the dye was digitized throughout the muscle volume. The data was modelled in 3D (Autodesk® Maya®) and the location and volume of dye spread was documented. Distance of the dye from the aorta and the IVC was quantified. SUMMARY. The dye spread in all specimens was within the volume of PM with a mean area of 24.37 ± 2.83cm2. In all specimens, the dye was located between the superior margin of vertebral body of L4 and inferior margin of vertebral body of L5, with spread extending to L3 in 6 specimens and to S1 in 3. The medial border of dye spread had a mean distance of 3.19 ± 1.24cm from the aorta, and

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a mean distance of 1.81 ± 0.38cm from the IVC. CONCLUSIONS. The US guided lumbar approach to inject PM was found to be feasible and safe as the dye remained within the muscle belly and did not extend to the abdominal aorta or IVC. Further clinical studies are required determine the efficacy of this approach.

FOGG[1], Quentin A., Nick MARSON[1], Casper THORPE LOWIS[1] and Neil ASHWOOD[2]. [1]Centre for Human Anatomy Education, Monash University, Melbourne, Victoria, 3800, Australia. [2]Department of Trauma and Orthopaedics, Burton Hospitals NHS Foundation Trust, Burton-upon-Trent, DE13 0RB, United Kingdom.

In Search of the Thenar Raphe: Using a Multi-Modal Approach to Understand the Detailed Anatomy.

INTRODUCTION. Recent work has suggested that the opponens pollicis muscle of the human thumb may be attached radially to a fibrous structure instead of directly to the metacarpal bone. This structure has been termed the thenar raphe. Other recent work details multiple heads of the muscle without clearly describing the radial attachment, leaving a void in the advanced understanding required in the surgical restoration of thumb functionality. The aim of the current study is to validate this claim through a thorough, multi-modal approach. METHODS. Embalmed human (n=72) and unembalmed macaque (n=8) hands were dissected using a fascicular mapping model. A selection of specimens was imaged using CT and microCT, and also sectioned macroscopically. Virtual models of the radial attachment were created using a digital microscribe, allowing for quantification of the attachment (relative to hand size). SUMMARY. The combined modes of exploration provided detailed imagery of the radial attachment of the opponens pollicis muscle. The thenar raphe had small proximal and distal attachment points (mean cumulative indexed area = 1.12±0.04mm2/mm), significantly less than the macaque enthesial attachment into the metacarpal (mean indexed area = 2.6±0.13mm2/mm; $p<0.05$). These external observations were supported by internal differences in cortical bone deposition; macaques had significantly greater mean relative bone deposition along the enthesis (mean indexed area = 1.6±0.2mm2/mm) than the comparable length of the human metacarpal (mean indexed area = 0.5±0.03mm2/mm; $p<0.05$). CONCLUSIONS. The thenar raphe is a distinct feature of the human thumb, and is not found in a phylogenetically similar primate with comparable thumb functionality. Further research is required to determine if it is unique to humans. These findings are of clinical importance when considering the reconstruction of the severely damaged thumb or the transposition of other tissue to recreate a functional thumb.

FOSTER, James D., Philip D. REYNOLDS, Stephen MILLER, Maria A. DANZIE, and Emmanuel SEGUI. Alabama College of Osteopathic Medicine, Dothan, AL 36303, USA.

Addressing EPAs 1-6 During a First Semester Anatomy Course: The Cadaver as the "First Patient".

INTRODUCTION. Entrustable Professional Activities (EPAs) are tasks or responsibilities that medical school trainees are expected to perform unsupervised before entering residency. The 13 EPAs are a part of curriculum design, delivery, and assessment throughout medical education. RESOURCES. Our Anatomical Sciences course has incorporated a first semester "First Patient" experience using cadaveric dissection to contribute to curricular goals focused on student performance of EPAs 1-6. This approach provides medical knowledge required to understand human anatomy, and gives students a first look at discovery of pathological findings. The eight to ten students assigned to a cadaver are required to gather history and physical data on their cadaver (EPA 1). They develop potential scenarios that may lead to differential diagnosis (EPA 2). Through literature searches and other resources, students determine which diagnostic and screening tests (EPA 3), and potential orders and prescriptions (EPA 4) may have been used to treat their "First Patient". This data ultimately culminates in documentation of patient findings through formal poster (EPA 5) and oral (EPA 6) presentations. DESCRIPTION. Use of cadaver as "First Patient" affords students opportunities to practice these EPA skill sets, while providing basic science and clinical faculty opportunities to give students useful feedback concerning development of these skills. SIGNIFICANCE. While the assessments focus on a group grading rubric, the entire experience initiates the process for students to start thinking like physicians. Skills learned will be used in standardized patient encounters in their remaining pre-clinical training. This experience will continue through real patient encounters and presentations in their clinical training as they move from beginner, to novice, to expert diagnosticians. Through this process, they will achieve critical milestones for graduation and transition into residency training.

HARRISON, Katrina H-T. , Hannah L. CONNOLLY, Sean J. BOTHAM, Charles E. HUTCHINSON and Richard G. TUNSTALL. Warwick Medical School, University of Warwick, Coventry, West Midlands, CV4 7AL, United Kingdom.

Age-Related Changes in the Thoracic-Abdominal Vasculature and Viscera from 0-18 Years of Age.

INTRODUCTION. Knowledge of the size, position and growth of abdominal vasculature and viscera is fundamental to enabling the safe practice of paediatric procedures such as vascular catheterisation, surgical access or interventions. This study is the first to report the age-dependent morphometry and positions of the major abdominal arterial vasculature from 0 to 18 years of age. METHODS. Anonymised CT datasets of 108 patients aged 0 to 18 years (69 male, 39 female) were analysed using OsiriX MD (v8.0 for Mac). All statistical analyses was performed using SPSS Statistics 24 (for Windows). Exclusion criteria were applied. The vertebral level of origin and morphometry of the major abdominal vessels were assessed, as were the positions of key renal, hepatic and splenic features in relation to the vertebrae and ribs. Measurements were

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taken by 3 independent observers; outliers were reassessed and consensus reached. SUMMARY. From 0-18 years, the vertebral levels of origin of the main branches of the abdominal aorta, the aortic bifurcation, inferior vena cava formation and the common iliac artery bifurcation did not change. The linear distances between the main branches of the abdominal aorta increased by up to 225% and diameters of all the measured vessels grew by 182-228% from 0 to 18 years of age. With increasing age, the superior border of the liver showed a relatively small inferior movement, whereas the left kidney moved superiorly and the right kidney and spleen showed minimal movement, with respect to the vertebrae. No other differences were observed between the left and right sides or between males and females. CONCLUSIONS. From 0-18 years of age the vertebral levels of the major abdominal vascular structures did not change, despite an increase in vertebral column length and overall vessel size. Key abdominal viscera showed either no movement or a relatively small movement, despite changes in body morphology and organ volume.

HASSAN, Syed A.[1], John TRAN[1], Michael GOFELD[2], Philip W.H. PENG[2], and Anne M.R. AGUR[1]. [1]Division of Anatomy, Department of Surgery and [2]Department of Anesthesia, Faculty of Medicine, University of Toronto, Toronto, ON M5S 1A8, Canada.

Innervation of the Lateral Knee Joint Capsule: An Anatomic Study.

INTRODUCTION. Knee joint pain significantly impairs lower limb function. Ultrasound (US) guided radio frequency ablation (RFA) has been used as a pain management intervention. However, there is controversy regarding the target nerves and location of RF needle placement to denervate the knee joint capsule. The aim of this study was to document the innervation of the lateral aspect of the knee joint, in relation to landmarks visible with US. METHODS. Six formalin-embalmed cadaveric specimens were dissected. Articular nerves innervating the lateral aspect of the knee joint were exposed and traced to their termination sites. The trajectory of the nerves and frequency of the innervation patterns were documented. SUMMARY. Articular branches found to innervate the superolateral aspect of the knee joint include: 1) branches from the nerve to vastus lateralis (NVL), 2) branches from nerve to vastus intermedius (NVI) and 3) superolateral genicular nerve (SGN) from common fibular nerve. The innervation of the inferolateral aspect was from articular branches of the inferolateral genicular nerve (IGN). US landmarks to localize each of the nerves include: 1) aponeurosis between the vastus lateralis and intermedius just proximal to the quadriceps tendon (NVL); mid-coronal plane of femur at the junction of the epiphysis and diaphysis (NVI, SGN); inferior attachment of lateral collateral ligament to apex of head of fibula (IGN). CONCLUSIONS. The lateral aspect of the knee joint received innervation from four main branches. The articular branches from the NVL, NVI, SGN and IGN can be localized using US as each nerve is associated with an easily identifiable landmark. A needle placement study will follow to assess the feasibility of the proposed landmarks.

IWANAGA, Joe[1, 2], Koichi WATANABE[1], Tsuyoshi SAGA[1], Yoko TABIRA[1], R. Shane TUBBS[2], and Koh-ichi YAMAKI[1]. [1]Department of Anatomy, Kurume University School of Medicine, Kurume, Fukuoka 830-0011, Japan. [2]Seattle Science Foundation, Seattle, WA 98122, USA.

Anatomical Study Using the Auriculotemporal Nerve with Application to Treating Keratisis Sicca.

INTRODUCTION. Keratitis sicca (chronic dry eye) is a significant medical issue that in certain populations can result in corneal desiccation with the potential for blindness. We hypothesized that the parotid branches (Pb) of the auriculotemporal nerve (ATN) could be rerouted to its superficial temporal branches (STb) and the STb rerouted to the lacrimal gland. Such a surgical method could be used in treating patients with chronic keratitis sicca by allowing innervation or hyperinnervation of the Lacrimal gland. METHODS. A total of 20 cadaveric sides from 10 heads (ten embalmed sides and ten fresh sides) were dissected. For the embalmed cadavers, the number, branching point and distance from the tragus of the Pb from the main trunk of the ATN were documented. For fresh cadavers, the Pb was identified and anastomosed to the STb. The STb was then transposed anteriorly and sutured to the lacrimal gland. SUMMARY. The distance from the branching point of Pb and STb to the middle of the tragus was 7.9 and 7.7mm horizontally and 8.3 and 15.0mm vertically, respectively. Based on these results, the Pb and STb were easily identified on all sides. The former branch was disconnected at its entrance into the parotid gland and easily anastomosed with the STb distally. The latter branch had adequate length to be moved to the ipsilateral lacrimal gland on all sides. CONCLUSIONS. Based on our cadaveric study, rerouting secretomotor fibers of the parotid gland to the STb and then moving this branch to the lacrimal gland is a feasible surgical maneuver. Clinical application is now needed to demonstrate patient usefulness.

LEE, Lisa M.J.[1,2], Matt STERITZ[2], and Rachel KLAUS[2]. [1]Department of Cell and Developmental Biology, University of Colorado School of Medicine, Aurora, CO, 80045, USA. [2]Master of Science in Modern Human Anatomy Program, University of Colorado Graduate School, Aurora, CO, 80045, USA.

Evolving Anatomical Sciences Curricula in Medicine and Implications on Preparedness for Residency.

INTRODUCTION. Decreasing anatomical sciences contact hours in medical schools has been well documented over the years and consequences of this trend in health providers' competencies are under scrutiny. The goal of this project was to investigate the implications of the changing anatomical sciences curricula on the medical school graduates' level of preparedness for pathology and surgical residencies, two specialties that heavily utilize anatomical sciences. METHODS.

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Faculty and residents in ACGME accredited Pathology and Surgical Residency programs were surveyed to identify trends in the resident preparedness at the onset of each program, in terms various competencies including basic sciences knowledge. SUMMARY. 34% (pathology) and 50% (surgery) program directors reported a decline in the incoming residents' preparedness in the past 10 years. Most faculty members and residents in both programs identified anatomical sciences as the most important subject to acquire in medical school. Many programs in both specialties offer boot camps at the onset of their programs to bring the new residents up to speed in pertinent anatomical sciences and clinical skills. Interestingly, while most residents in both programs identified anatomical sciences knowledge as the biggest deficiency in the incoming residents, most faculty in both programs identified the intrapersonal, interpersonal, thinking and reasoning competencies as the biggest deficiency. CONCLUSIONS. The current findings demonstrate a possible link between the reduced anatomical sciences curricula in medical school and decreased preparedness in their graduates for residency training. These results emphasize the importance of vertical integration of anatomical sciences in medical curricula and reveal an opportunity to integrate objectives for building interpersonal, intrapersonal, thinking and reasoning competencies into course work thereby helping our students be more competent and prepared for residency training.

LOHMAN BONFIGLIO, Chelsea M.[1], Kerry K. GILBERT[2], Jean-Michel BRISMEE[2], Stéphane SOBCZAK[3], Phillip S. SIZER[2], Miles DAY[2], C. Roger JAMES[2], and Krista M. HIXSON[1]. [1]Department of Interdisciplinary Health Sciences, Arizona School of Health Sciences, A.T. Still University, Mesa, AZ 85206, USA. [2]Clinical Anatomy Research Laboratory, Texas Tech University Health Sciences Center, Lubbock, TX, 79430, USA. [3]Département d'anatomie, Université du Québec à Trois-Rivières, Québec, G9A 5H7, Canada.

Effects of Median, Radial, and Ulnar Biased Neurodynamic Testing on Cervical Spinal Nerves.

INTRODUCTION. Nervous system neurodynamics in the upper extremity can be complicated and difficult to quantify, due to brachial plexus complexity and the transient nature of neural pathology. It is not yet known whether neurodynamic testing (NT) with various nerve biases can load specific cervical spinal nerves based on nerve root contribution. This study examined the biomechanics of cadaveric spinal nerves C5-C8 with median (M), radial (R) and ulnar (U) nerve biased NT. METHODS. Radiolucent markers were placed into spinal nerves C5-C8 proximal and distal to the intervertebral foramen in 11 unembalmed cadavers (male=6; 80±13.2 years). Posteroanterior fluoroscopic images were taken while cadavers underwent NT with M, R and U biases. Images at rest and full tension were digitized. Marker displacement and strain were compared. SUMMARY. Perpendicular proximal displacement was 0.51±0.74mm (M), 0.24±0.93mm (R) and 0.16±0.66mm (U). Parallel proximal displacement was 2.21±1.07mm (M), 2.60±1.56mm (R) and 2.42±1.07mm (U). Perpendicular distal displacement was 1.02±1.12mm (M), 0.87±1.35mm (R) and 0.75±1.13mm (U). Parallel distal displacement was 3.70±1.33mm (M), 4.06±1.97mm (R) and 4.08±1.50mm (U). Strain was 9.47±4.39% (M), 9.48±5.82% (R) and 10.72±3.98% (U). No significant differences between bias techniques were found for distal displacement or strain. A significant difference in perpendicular proximal displacement was found between M and U biases ($t = 2.65$ (74), $p = 0.03$). CONCLUSION. There is no difference in extraforaminal cervical spinal nerve displacement or strain during NT with M, R and U biases. Clinically, these results suggest that NT with any nerve bias may be equally useful when screening for tension-related pathology, which may be useful when patients cannot tolerate M, R, or U bias positions. Greater proximal nerve segment displacement during NT with M bias demonstrates that this technique may be better suited to screen for pathology related to nerve sliding.

PAGE, Trevor S.[1], Amelie BRUYA[1] and Jonathan J. WISCO[1,2]. [1]Brigham Young University, Provo, UT 84604, USA; [2]University of Utah School of Medicine, Salt Lake City, UT 84132, USA.

Assessment of Anatomical Variation of the Ulnar Collateral Ligament in Athletes.

INTRODUCTION. Ulnar collateral ligament (UCL) reconstruction surgery has become an epidemic in overhand throwing athletes. The ability to predict or prevent damage to the fibers of the UCL has not been thoroughly studied. The UCL is composed of 3 fiber bundles: the anterior (AB), posterior (PB) and transverse bundles (TB). Our previous cadaveric study showed anatomical variation of the TB. We hypothesized that anatomical variations of the TB may be predictive of AB fiber damage and/or pain in throwers. METHODS. The elbows of 12 athletic subjects were imaged using a CISS (1mm iso) MRI protocol. Each subject was positioned supine with the elbow flexed to 90° and placed horizontally on the subject's forehead. Subjects were categorized as baseball/non-baseball player and prior/no prior injury to the UCL based on responses to a questionnaire. The dominant elbow UCL images were analyzed qualitatively. SUMMARY. All three UCL bundles were visualized on all subjects. Anatomical variation to the TB, noted as an elongation (transverse extension, TE) superior to the documented insertion on the olecranon, and posterior to the medial epicondyle, was viewed on 12/12 scans. 6/12 TEs were prominent, with 1 being unclear due to motion. Chi-square analysis of the presence of TE in baseball players, AB fiber damage, or reported pain were all non-significant. CONCLUSIONS. This elbow position is an effective position to view all three major UCL fiber bundles and the TE, after images were rotated to cardinal planes using the Horos image viewer. This positioning may provide easier visualization of damage to the UCL than other positions already in practice. The TE was present in all 12 subjects; however, its prominence was not unique to baseball players, UCL damage, or reported pain. This suggests that the transverse bundle extends beyond its conventionally described proximal insertion on the olecranon to the posterior medial epicondyle.

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PLAZA, Jessica T., Miguel ANGELES, William P. BROWN, Jimmy KAO, Philip MANSOUR, Sakti SRIVASTAVA, Kris THOMSON, and Jack CHOI. Division of Clinical Anatomy, Department of Surgery, Stanford University School of Medicine, Stanford, CA 94305, USA.

Creating Virtual 3D Data Sets of Human Specimens with a Cryomacrotome Slicing Technique.

INTRODUCTION. Recent advances in computer technology allow us to image, reconstruct, and interact with anatomical information that had been previously inaccessible. A process of stacking two-dimensional (2D) images to create three-dimensional (3D) models is utilized for computed tomography (CT) scan reconstructions. A similar practice has been tried with gross anatomical photographic data. RESOURCES. This innovative project was designed to develop techniques to create 3D microscopic data sets of specific human organs (specimens). Five individually dissected organs: kidney, spleen, eyeball, cerebellum, and a region of the anterior lower limb were harvested from a fresh cadaver donated to Stanford's Willed Body Program. To preserve shape, structure, and color the specimens were flash frozen in liquid nitrogen and stored in a -80°C freezer to avoid desiccation. The frozen specimens were milled from 20-30 micron units using the cryomacrotome and photographed after each slice was removed. These images were then aligned and reconstructed creating 3D interactive models that can be virtually segmented and dissected. DESCRIPTION. This project focuses on the individual organ structures, providing improved resolution of the organ and its internal structures. SIGNIFICANCE. With the addition of 3D organ models, students are provided with a virtual, hands-on anatomy resource that compliments cadaver labs and histology labs. Similarly, this project demonstrates that this cryomacrotome slicing technique can be effectively used to build libraries of high resolution, 3D data sets of individual organs. Users have the capability of annotating the virtual images and incorporating them into an anatomy/physiology curriculum. This project also illustrates that small animals, such as the frog (pilot specimen), can be similarly imaged, segmented, and used for virtual anatomy/physiology dissections in high school and college anatomy programs.

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Anatomy of the Bronchial and Esophageal Arteries with Special Reference to Cancer Surgery (DVD).

INTRODUCTION. For lung and esophageal cancer surgery, in addition to a comprehensive understanding of the anatomy of the mediastinal lymphatics, the significance of the bronchial and esophageal arteries must be recognized. The present study aimed to classify these arteries from the viewpoint of their origin, course and distribution and to demonstrate typical examples based on minute dissection of the mediastinum. METHODS. In addition to student practice cadaveric dissections special dissections of five male adult cadavers were made and the results were recorded on DVD. SUMMARY. Based on the origin, course and distribution and their mutual relationships the bronchial artery can be classified as the following types: (a) Arteries originating from the inferior thyroid artery or the internal thoracic artery. (b) Arteries originating from the concave side of the aortic arch. The right bronchial artery of this type crosses the initial portion of the left bronchus before reaching the right bronchus and often pierces the inferior tracheobronchial nodes. (c) Arteries originating from the right intercostal arteries and traversing the right wall of the esophagus to reach the right bronchus. (d) Esophageal arteries originating from the descending aorta. (e) The esophageal branch of the left gastric artery. Some typical examples of these types are demonstrated in DVD. CONCLUSIONS. A DVD demonstration of the dissections provides a unique view to visualize the 3-D relationships of the bronchial and esophageal arteries in terms of function preservation for cancer surgery.

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A Comparative Study of the Innervation of Vastus Medialis Longus and Obliquus.

INTRODUCTION. Vastus medialis (VM) plays an important role in patellar stabilization and has been implicated in patellofemoral joint pain. Two parts of VM have been identified in the literature, VM obliquus (VMO) and longus (VML). Neural partitioning is present if regions within the muscle volume receive distinct innervation from a single nerve branch. However, intramuscular (IM) innervation has not been investigated throughout the volume of VM to evaluate neural partitioning. Thus, the purpose of this study was to determine if VMO and VML are neural partitions of VM using digitization and 3D modeling of the IM innervation. METHODS. IM distribution of the nerve to vastus medialis (NVM) was digitized (Microscribe G2X®) and modeled (Autodesk® Maya®) in 7 formalin embalmed cadaveric specimens. All IM branches of NVM were exposed in short segments and digitized until no longer visible under a dissection microscope. 3D models and photographs were used to determine the innervation of VMO, VML and to assess neural partitioning of VM. SUMMARY. VML and VMO exhibited similar innervation patterns in all specimens. NVM divided extramuscularly into medial (MB) and lateral (LB) branches near the superior border of VM. LB entered the muscle, whereas MB continued inferiorly and entered near the lower third of VM. LB divided into 6-8 branches. The superior branches supplied VML and continued into vastus intermedius, whereas the inferior branches supplied VMO. MB coursed along the posteromedial surface of VM before dividing into 3-4 branches that supplied VMO. CONCLUSIONS. The innervation pattern of VM suggests that it has two neuromuscular partitions. One consists of VML and the lateral part of VMO supplied by LB. The other consists of VMO supplied by MB. Atrophy of VMO from denervation (e.g. via nerve compression) may result in patellar instability. Further ultrasound and electromyographic studies are needed to investigate neural partitioning of VM in vivo.

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TERRELL, Mark and Randy KULESZA. Department of Anatomy, Lake Erie College of Osteopathic Medicine, Erie, PA 16509, USA.

Preparing Scholar Educator Leaders–Curriculum Development of a New PhD Program in Anatomy Education.

INTRODUCTION. Anatomy education is perhaps experiencing the best and the worst of times. It may be the best of times because so much hard work has been done by many anatomists over the past three decades to develop more effective and evidence-based educational practices and technological tools to maximize student learning. The worst of times may be near as forces transform medical curricula and create a paucity of new anatomists as faculty retire and new schools are created/expanded. Using the arguments from both contexts, we sought to create a unique PhD program in Anatomy Education. RESOURCES. Applying Kern's six step approach to curriculum development in medical education, we successfully merged the strengths of two existing programs at our institution into a new PhD program that has a strong commitment to training a unique breed of new anatomists as education leaders and specialists in anatomy. DESCRIPTION. In addition to the actual curriculum, we discuss three critical components of this curricular endeavor, including the power of educational preparation for transforming teaching and learning practices in anatomy; tight coherence and integration among anatomical and pedagogical knowledge, skills, and behaviors through clinical and educational supervision; and strategies for meeting challenges facing program approval at the institutional and accreditation levels. SIGNIFICANCE. We argue against the pressures to water down the preparation of new anatomists, which ultimately undermines the training of new anatomy faculty, the reputations of programs, and the strength of the anatomical sciences profession.

WELLEFORD, Andrew S., Lauren WEAVER, Kristen M. PLATT. Department of Neuroscience, College of Medicine, University of Kentucky, Lexington, KY 40536, USA.

Multimodal Review Sessions for Undergraduate Anatomy Education.

INTRODUCTION. Students often assert that they have a preferred learning style. Instructor-organized review sessions, however, are usually structured with a single educational approach which may not be desired by students. This study examines if students, given the choice between multiple review sessions that engage different teaching modalities, will choose different sessions and whether these sessions are equally effective for review. METHODS. Three review sessions were designed for the muscle anatomy unit of a large undergraduate Anatomy and Physiology course. The first review was a kinesthetic experience in which students were cued through a sequence of body positions similar to yoga poses, with instruction of muscle anatomy relevant to each position. The second review was a tactile experience in which student were instructed how to shape clay into models of muscles and place them on a corresponding plastic skeleton. The third review was an audience-response question and answer (Q&A) session in which students responded to questions and received feedback about their collective performance. Students selected and attended their one preferred review session. Review effectiveness was assessed via performance on a post-review quiz, overall exam performance, and sub-score of muscle anatomy exam questions. These results were analyzed using one-way ANOVA. SUMMARY. 345 students consented to and completed all parts of the study. Session participation was as follows: Q&A n=180 (52.2%), tactile n=99 (28.7%), kinesthetic n=66 (19.1%). There was no significant difference in post-review quiz score (p=0.46), overall exam score (p=0.59), or exam muscle anatomy sub-score (p=0.46) between groups. CONCLUSIONS. Nearly half (47.8%) of a large undergraduate Anatomy and Physiology class preferred a tactile or kinesthetic review session to an audience-response Q&A review of muscle anatomy, and all groups performed equally well.

Abstracts – Tech Fair Presentations

(Listed by presenting author last name)

GOBÉE, Oscar P.[1], Daniël JANSMA[1], Andreas E. HERRLER[2], Marco C. DERUITER[1], and Eleonore KOEHLER[2]. [1]Department of Anatomy and Embryology, Leiden University Medical Center, Leiden, Zuid-Holland, 2333 ZC, the Netherlands; [2] Department of Anatomy and Embryology, Faculty of Health, Medicine and Life Sciences, Maastricht University, Maastricht, Limburg, 6229 ER , the Netherlands.

Open Anatomical Learning Platform 'AnatomyTOOL' and International Student Contest.

INTRODUCTION. An open anatomical learning platform AnatomyTOOL (Topic Oriented Open Learning), has been developed as part of a Dutch Ministry of Education incentive scheme for open online education. The platform is a mash-up of open, reviewed anatomical educational resources and learning tools that can be shared and reused across multiple institutions. It is meant to be a discipline ('topic') oriented platform next and supplementary to the usual institutional learning environments. In the latter the study resources of a discipline are fragmented over modules. AnatomyTOOL contains an initial set of 200 microscopic slides, 200 exam questions, newly created anatomical drawings, cross-sectional viewers, and tools to create a wide array of question types, learning paths and quizzes, all available under open licenses. RESOURCES. As

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opening activity we organized an international contest for students to create posters, videos, puzzles and images on a range of (clinical) anatomical subjects. The created products were made openly available on the platform. DESCRIPTION. A new platform for open anatomical educational resources and an international student contest to create anatomical resources which are freely available. SIGNIFICANCE. AnatomyTOOL enables sharing and reuse of reviewed open anatomical resources. These can be used freely and legally in your teaching. The database can be searched by anatomical structure, region and system. Cross-links between gross anatomy, microscopy, embryology and clinical applications are emphasized. Quizzes and learning paths can easily be generated. The international student contest generated freely available learning materials and increased students' interest in anatomy. (Sponsored by Grant No. 705AO-3537 from the Netherlands Ministry of Education, Culture and Science in Incentive Scheme Open and Online Education)

GOBÉE, Oscar P. Department of Anatomy and Embryology, Leiden University Medical Center, Leiden, Zuid-Holland, 2333 ZC, the Netherlands.
Peritoneum Model. Surgeon: "I Always Knew the Facts, Only Now Do I Understand Them".

INTRODUCTION. Understanding the anatomy of the peritoneum is a well-known challenge. Book illustrations cannot really well explain because they are two dimensional and omit adhered embryonic peritoneal layers. This hampers connecting in the mind the original embryonic to the adult configuration. RESOURCES. To better explain, the author hand-made a 1.2m high model of the intestines and peritoneum, with which the embryonic gut rotation and the resulting peritoneum transformation and its formation of adherences can be simulated. Also, common abdominal surgical procedures and access routes can be shown with the model. DESCRIPTION. The model has been used for 7 years in student teaching and in multiple surgical postgraduate training courses. The demonstration of the model was videotaped and included in the Massive Open Online Course 'Anatomy of the Abdomen and Pelvis' created by our department, of which the videos were also placed on YouTube under Creative Commons license. A survey amongst medical students (n=90) showed: 96% judged the model to have surplus value to drawings or animations, 99% voted for keeping it in the education program, the subjective self-reported level of understanding of peritoneal anatomy rose from 50 to 80% after the demonstration. A survey amongst an international group of surgical residents and consultants (n=22) showed: 91% found the model demonstration useful for themselves, 100% judged it as useful for surgical resident training. A surgeon with 10 years' experience remarked after the demonstration: "I always knew the facts, only now do I understand them", another exclaimed "I've waited for this for twenty years!" SIGNIFICANCE. Even though the videos cannot match the educational level of the life demonstration, they may help a wide audience understand the very difficult peritoneal anatomy.

LOZANOFF, Scott, Jaskirat TAKHAR, Trudy M. HONG, Jesse THOMPSON, Beth K. LOZANOFF, and Steven LABRASH. Department of Anatomy, Biochemistry & Physiology, John A. Burns School of Medicine, University of Hawaii at Manoa, Honolulu, HI 96813, USA.
Archiving 3D Models of Anatomical Variations using Hololens and zSpace Technologies.

INTRODUCTION. Anatomical variations are frequently encountered in the gross anatomy dissection laboratory. A chance encounter is highly beneficial since it enables future recognition in a living patient that could be critical for proper diagnosis and treatment. Unfortunately, it is unlikely that a program can retain the novel finding for future students to observe. It would be beneficial to retain a model of the anatomical variation for future students to experience. The purpose of this presentation is to present a strategy for retaining novel variations of the piriformis muscle and sciatic nerve uncovered in a medical gross anatomy course. RESOURCES. Three variations of the piriformis muscle and sciatic nerve were identified during routine anatomy dissections and subjected to digital photogrammetry (agisoft.com). Three-dimensional meshes were generated and the polished based on quantitative measurements recorded from the original dissections using maya software (autodesk.com). The model was then ported to Unity based platforms including Hololens (Microsoft.com) and zSpace (zspace.com) and viewed. DESCRIPTION. The anatomical models were viewed from all perspectives and an understanding of anterior and posterior divisions of the lumbosacral plexus were observed due to the split sciatic nerve. Models could be viewed and manipulated in a collaborative fashion further promoting small group learning consistent with the approach commonly pursued in dissection. SIGNIFICANCE. This anatomical variation graphics pipeline represents a novel process for recording and archiving observations from year to year within a program. Models could be potentially shared between sites depending on the commonality of Unity platforms. Supported by XLR8UH and UCERA.

NAZE[1], Garrett, Matt HAZZARD[2], Brian MACPHERSON[3], and April RICHARDSON-HATCHER[3]. [1]Department of Rehabilitation Sciences, University of Kentucky, Lexington, KY, 40536, USA. [2]Information Technology Services, University of Kentucky, Lexington, KY, 40536, USA. [3]Department of Neuroscience, University of Kentucky, Lexington, KY, 40536, USA.
A Comparison of Kinesthetic Teaching Devices for Teaching the Pterygopalatine Fossa.

INTRODUCTION. The pterygopalatine fossa (PPF) is a small, deep area within the facial skeleton. The various communications of the fossa are not clearly visible on a standard skull model, making it a difficult area for students to conceptualize. The traditional method for teaching this region to the dental students at our university has been to use a hand-drawn, two-dimensional (2D) representation wire-diagram that maps the various nerve fibers types transmitted

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through the fossa. METHODS. Using materials easily accessible to educators (paper and craft supplies), our team collaborated to design two three-dimensional (3D) models representing the PPF. First-year dental students (n=59) were recruited and randomized into three groups for learning the PPF: (1) 2D hand-drawn wire-diagram (2) 3D paper inverted-cone model (3) 3D paper skull model constructed from sagittal, coronal, and transverse planes. Each group completed a pre-quiz, attended a standardized lecture, and constructed the assigned model of the PPF following along with the instructor. Wikki Stix™, wax-infused threads of various colors, were used to construct the different nerve fibers traveling in and out of the fossa. A post-quiz was then completed at the end of the session. SUMMARY. No significant differences in pre-quiz scores or prior course examination performance were found between groups. All groups significantly improved on the post-quiz with large effect sizes ($p<0.001$). Post-quiz scores favored the 3D paper skull model over the 3D paper inverted-cone model ($p=0.0091$). No other significant between group differences were found. CONCLUSIONS. In this study, a more spatial, detailed 3D model of the PPF improved student conceptualization to a greater extent than a more basic 3D representation of the region. Future research on this topic should better control for time of day of the learning session and the cognitive load of the subjects prior to the learning session.

PETERSON, Ashley S., Vivien JONES, William P. BROWN, Miguel ANGELES, Sakti SRIVASTAVA, and Sung Joo PARK. Stanford Department of Surgery, Palo Alto, CA 94305, USA.
Photogrammetry of Human Specimens: A Digital Innovation in Anatomy Education.

INTRODUCTION. Modern anatomy education consists primarily of cadaveric specimens (dissection and prosections), two-dimensional images (2D), and limited physical and digital 3D models. Often these computer generated and physical 3D models oversimplify anatomical structures, resulting in reduced accuracy and limited functionality. Photogrammetry, a process that uses overlapping photographs to create 3D models, can prove particularly valuable in bridging the gap between 3D models and physical specimens. RESOURCES. This study used photogrammetry with human specimens. Imaging equipment and reconstruction techniques were developed and built by Anatomage, Inc. Data from the high-resolution digital images were compiled and transformed into 3D interactive models. The specimens were donated from the Stanford Willed Body Program and included five prosections, a dissected torso, and a serially dissected unembalmed forearm. DESCRIPTION. This study aims to evaluate the viability of using photogrammetry with human specimens to create accurate and interactive 3D models. SIGNIFICANCE. Embalmed anatomical specimens are valuable resources for understanding anatomy, yet their use is constrained by tissue deterioration, storage space, and finances. Photogrammetry can offer realistic, innovative, and accessible 3D computer models with options for digital manipulation and labeling. This library of virtual models can also supplement students' comprehension with challenging areas of anatomy, as well as the study of abnormal pathologies and atypical morphologies. Easy access and widespread distribution can invite global collaboration through the creation of a modern digital anatomical library. This new generation of digital anatomy technology can enhance the knowledge and understanding of the human body for all students including allied health professionals and biomedical researchers.

SEVERSON, Arlen R. Department of Biomedical Sciences, University of Minnesota Medical School, Duluth Campus, Duluth, MN, 55812, USA.
Developing and Using a Computer-Based Program for Learning Sectional and Radiological Anatomy.

INTRODUCTION. An interactive computer-based learning tool with anatomical sections and radiological images is being used in an integrated medical school curriculum to facilitate learning anatomical structures, relationships, and significant morphological features of the body. RESOURCES. A male cadaver was embalmed, injected arterially with red latex, and frozen. Gross 1in. thick body sections were prepared and photographed. Community clinics and radiology departments contributed X-ray, CT and MR images. Significant anatomical structures were identified in the photographs and radiological images, and identified structures were overlaid with a transparent overlay using Photoshop. The overlaid images were then inserted in a locally developed computer program. DESCRIPTION. Anatomical structures are identified and listed on the right-hand side of the computer screen. Clicking on the name of a specific structure produces a transparent overlay of that structure. Moving the curser over the image and clicking on a specific structure can also identify the structure. Either approach provides a colored overlay of the selected structure. A dialog box at the bottom of the screen provides a brief description of the structure and its functional role. The computer-based program is available for use by students on the University of Minnesota web site entitled Blackbag. Independent learning time for the computer images is scheduled in the curriculum, but the images are available for study on the student's computers at their convenience. SIGNIFICANCE. The sectional and radiological images provide a readily accessible learning tool for the students to learn and study anatomical relationships, and enable the students to apply and correlate the gross anatomical structures seen in the dissection laboratory with clinically relevant radiological images. Furthermore, the computer program provides an interactive learning tool that enables students to learn at their own pace and convenience.

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The All-in-One Anatomy Exam Review: Image-Based Questions and Answers.

INTRODUCTION. The software, iBook Author, by Apple is ideal for self-publishing digital books. RESOURCES. We used this software to produce a seven book series of review books that first year medical and allied health students can use to prepare for the gross anatomy exam, both practical and written components. These books are designed around high quality photographs of cadaver dissections. DESCRIPTION. The series is entitled, The All-in-One Anatomy Exam Review: Image-Based Questions and Answers, and each volume focuses on a single region of the human body: Back and Upper Limb, Thorax, Abdomen, Pelvis and Perineum, Lower Limb, Head, and Neck. Each volume consists of six chapters: Chapter one is an introduction to the series; Chapter two is an atlas of dissections of the region; Chapter three consists of multi-labeled interactive flash cards of the Chapter two images; Chapter four involves first-order, multiple choice questions image-based identifications using the atlas images; Chapter five is a series of higher-order image-based questions with explanations; finally, Chapter six is an audio narrative in which we describe the anatomy of the region, pose questions, and then provide the answers. The multi-labeled flash cards, first order and higher order questions are all interactive, requiring students to answer the questions to assess their comprehension of the material. Whereas the flash cards and first-order questions help students master recall skills, the higher order questions prepare students for board type examinations. SIGNIFICANCE. Advantages to publishing original material in iBooks includes the following: inexpensive to students; no additional cost for image pages; interactivity; students can download material to their devices and not depend on functioning Wifi; and, typographical errors and/or revisions can be corrected immediately. Principal disadvantage of iBooks is that they can only be read using an Apple device.

Abstracts – Poster Presentations Session A

(Listed by presenting author last name)

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Considering Donor Occupation when making Unpreserved Tissue Assignments.

INTRODUCTION. The Anatomy Bequest Program (ABP) receives approximately 600 donations annually. In 2016, researchers and clinicians submitted 30 shoulder study protocols which required 67 unpreserved shoulder regions. Most of the requested shoulder regions were used for rotator cuff repair treatment research while the remaining specimens were part of shoulder arthroplasty and arthroscopy surgical training events. Based on end user feedback, donors who had worked as laborers, truck drivers, or painters were often found to have full or partial thickness tears to the tendons of the rotator cuff. This pathology was previously unreported and may be attributed to the donor being asymptomatic or failing to seek care. Often these incidental findings interfered with the study aims and were an undesirable outcome. RESOURCES. As part of the medical suitability practices endorsed by the ABP, written medical records are requested and reviewed for each donor. Additionally, the ABP collects demographical information, including donor occupation for use in registering each death with state authorities. Medical and demographical information are entered into an Oracle database and de-identified medical history report forms, with the donor's occupation listed, are made available to each person granted access to donor remains. DESCRIPTION. To analyze causal relationships between donor attributes and pathology, and develop a system for screening donor demographical and medical histories to determine suitability. SIGNIFICANCE. In order to better meet the needs of the end user community, ABP staff began proactively screening donors for occupation when making study assignments. Donors who had worked as laborers are not considered as candidates for studies requesting unaltered shoulder anatomy, even when their medical records are negative for past shoulder pathology.

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@AACAnatomy Twitter Account Goes Live: A Sustainable Model for Outreach of Professional Societies.

INTRODUCTION. Social media is a ubiquitous part of our society today. With its capabilities of fast information sharing and network building, social media provides a useful medium for academics and physicians to build their professional identify, connect and collaborate with peers, and engage with the public. The goal of this study is to analyze the use of Twitter for outreach and engagement of the American Association of Clinical Anatomists. METHODS. Under supervision of an Association committee member, an anatomy graduate student developed a simple and sustainable model for drafting and publishing daily tweets for the @AACAnatomy account. Five tweet categories were used: research, announcements, replies, engagement, and community. Analytics compiled for the initial 6-month period after implementation (9/1/2016-2/28/2017) show the growth and impact of the Association's new Twitter account. SUMMARY. Over 6 months, @AACAnatomy increased

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its followers by 193 (331 total), with steady growth of 32.7 new followers per month on average. Research tweets- based on papers from Clinical Anatomy with an abstract link- were the most shared category, and averaged 5,450.6 impressions, 31.2 link clicks, and 8.8 hashtag (#ClinAnat) clicks per month. For all tweet categories, monthly averages (33.4 retweets, 4.6 replies, 47.5 likes) show the consistent interaction of followers with the account. This data highlights the potential for engagement with the Association within the field and beyond. CONCLUSIONS. Daily tweet publication resulted in a 140% follower increase. By increasing the frequency of tweet publication, and enhancing content variety and quality, @ AACAnatomy successfully promotes consistent interaction and networking with its followers, as well as greater accessibility to clinical anatomy topics within the general community. This Twitter model has the potential for implementation by other societies as a medium for outreach, membership engagement, and career development.

BENJAMIN, Hannah K.[1], Joel FRIEDLANDER[2], Sparrow HELLAND[2], and Emily DEBOER[2]. [1]Modern Human Anatomy Program, University of Colorado Anschutz Medical Campus, Aurora, CO 80045, USA. [2]Aerodigestive Program, Children's Hospital Colorado, Aurora, CO 80045, USA.

Digital Anatomy to Improve Caregiver Understanding in Pediatric Aerodigestive Clinic.

INTRODUCTION. Caregiver understanding is challenging in fast-paced and information-heavy healthcare environments such as pediatric aerodigestive clinics (AERO). AERO encompasses a multidisciplinary team that treats children suffering from complex disorders of the respiratory and digestive systems. Families receive information from 6-8 healthcare providers regarding aerodigestive procedures, e.g. bronchoscopy and endoscopy. The goal of this study is to develop an anatomy-based, interactive digital resource for physician use in clinic to increase caregiver understanding of aerodigestive procedures and how procedure results connect and facilitate child's diagnosis and treatment plan. METHODS. 3D models of the respiratory and digestive systems were created in ScanIP using de-identified chest CT and MRI enterography. SimLab Composer was used to develop the digital resource. Study population is the parents or guardians of children undergoing aerodigestive procedures. Primary outcomes, perceived caregiver understanding and caregiver knowledge, are assessed using a questionnaire at the conclusion of the AERO visit. Caregiver understanding is measured on a Likert scale and knowledge is assessed using 5 multiple-choice questions about aerodigestive anatomy and procedures. Wilcoxon ranked sign test will be used to compare the medians of primary outcomes for families with and without the resource. SUMMARY. Baseline data reveals that only 65% of caregivers report understanding aerodigestive procedures very well. Caregivers scored 70% (median) on questions targeting caregiver knowledge. Data collection following use of the resource in clinic is in progress. CONCLUSIONS. Caregiver understanding of aerodigestive procedures is limited with the current standard of care. The digital anatomy resource aims to resolve these gaps to ensure adequate consent for procedures, enhance shared decision-making, and improve overall caregiver understanding of aerodigestive disease and therapies.

BROOKS, H. Mark, S. Michael DHUY, and Kristina K. BENSON. Willed Body Program, School of Medicine, University of California at Irvine, Irvine, CA 92697, USA.

Salt Packs for Edematous Cadavers and Mitigation of Student and Staff Exposure to Chemicals.

INTRODUCTION. The use of salt packs has several advantages in the operations of an anatomical preparation laboratory. These include the use of edematous cadavers that would not be selected for embalming and limitation of student and staff exposure to higher levels of formaldehyde and phenol. It also serves as an antimicrobial and mold inhibitor when embalming donors with anasarca, and provides a curative effect during storage that enables cadavers to be more quickly used. RESOURCES. Cadaver was embalmed with a 3% formaldehyde solution with Magnesium sulfate that utilized a total of 8 gallons of solution with an attached flexible tube cannulated to the right common carotid artery with open drainage through the internal jugular vein. A floor scale and measuring tape were used to calculate cadaveric size. Sheet plastic, a cloth sheet, and a durable pouch were used with the 50 lbs. of salt for storage. DESCRIPTION. 6.4 16 oz. bottles of Dodge Introfiant OTC, containing 30% formaldehyde, 1800 ml of 90% phenol, and 4 lbs. of Magnesium sulfate were used in the solution. After the perfusion of 8 gallons of solution, 60 ml of 37% formaldehyde were injected into the cranial cavity. Post-embalming weight was then measured at 135 lbs., and circumference of the superior right and left thighs were taken (R thigh at 57.1 cm and L thigh at 58.4 cm). Cadaver was placed in a plastic sheet; 50 lbs. of salt were packed around the perimeter of the cadaver, while the plastic and cloth sheets were tied at each end. The cadaver was placed in a durable pouch for 3 months of storage. Post-storage weight was 106.5 lbs. with the R thigh at 50.6 cm and L thigh at 48.3 cm. SIGNIFICANCE. The use of salt packs reduced the cadaveric weight and circumference of the thighs and reduced the volume and strength of the solution used in the arterial perfusion. The reduced moisture inhibited microbial growth and aided in the curative effect essential to perform dissections.

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FOSTER, Mercedes, Dakoda OWINGS, Terrence KELLY, Blair FREED, and Alla BARRY. Missouri Southern State University, Joplin, MO 64801, USA.

Elevated Observation of Paget's Disease of the Bone with Literature Review and Case Descriptions.

INTRODUCTION. Paget's Disease of the Bone (PDB) is a disorder characterized by uncontrolled osteoclast activity with subsequent abnormal remodeling. Research indicates that PDB is more prevalent in males than females. Additional statistics on a national and global scale indicate the occurrence of the disease has drastically decreased over the last several decades. Current literature indicates frequency of PDB in the US to be between 0.9% and 3.6% depending on study. RESOURCES. Three out of nine cadavers in the Missouri Southern State University cadaver lab, two females and one male, demonstrated significant visual evidence of PDB upon dissection. These observations were accompanied by widespread radiographically observed bone remodeling. DESCRIPTION. CT images were obtained as well as full body anteroposterior x-rays to confirm the diagnosis. DNA samples were collected and analyzed for mutations relevant to PDB and histological slides were prepared. SIGNIFICANCE. The observation of a higher prevalence of PDB prompted a literature review with detailed case descriptions and pathophysiological concurrent findings discussing the disease in relation to other chronic disease processes based on anatomical evidence. Significant occurrence of PDB at a specific institution compared to national statistics potentially indicates the prevalence of the disease may not in fact be decreasing, rather is masked by other symptoms during its slow progression and often late onset. The present findings indicate further research into the etiology and prevalence in the population is needed. This study provides a patient centered approach to the investigation of the disease process of a cadaver and demonstrates the capacity of how clinical approaches can be applied at the undergraduate level. A similar approach is recommended to fellow undergraduate institutions. Early exposure to the clinical approach supplements classroom materials and provides preparation for medical school.

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Bovine Arch.

INTRODUCTION. A "bovine arch" is commonly described as the most frequent anatomical variant of the aortic arch, characterized by a common origin of the brachiocephalic (innominate) and left common carotid arteries. It is present in 10-20% of the general population. RESOURCES. Based on a literature review, embryology and clinical significance of this common variant are presented emphasizing aspects of histology, imaging and surgery. DESCRIPTION. Although frequent in the general population, recent studies have suggested this variant is an important risk factor for aortic disease, considering it a marker of aortic pathology. Frequent association with aortic aneurysms and dissections makes it an important anatomical finding in the context of thoracic imaging and cardiothoracic interventions/surgery. SIGNIFICANCE. Although considered a frequent and benign anatomical finding of the aortic arch, recent studies suggest it should not be considered a normal benign anatomic variant. A more careful clinical follow up of this condition is indicated.

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The Phenomenon of Tortuosity: Literature Review with Case Descriptions.

INTRODUCTION. Vascular tortuosity in the population, particularly in older patients, is a common finding attributed to factors of which the etiology and mechanisms are largely unknown. Tortuosity can be asymptomatic or result in strokes, aneurysms, and ischemic attacks to organs. Hypertension, diabetes, and atherosclerosis are linked to the etiology of tortuosity in vessels, but instances have also been cited in the development of tortuosity in individuals with no history of these chronic conditions. Research suggests mechanical instability contributes to the development of tortuosity due to altered axial tension and blood flow directionality. Histology of tortious vessels reveals metaplasia in the tunica media resulting from elastin degradation and replacement by areolar connective tissue. The same metaplastic change is found in vasculature after limb lengthening surgeries unrelated to chronic conditions. Genetic mutations are suggested to play a role in triggering the development of tortuosity. RESOURCES. Cadaver dissection revealed the anatomy. Histology slides of normal and tortious vasculature were generated and samples of tortious vessels were sent for genetic analysis. DESCRIPTION. A 91-year-old female cadaver exhibited tortuosity in the right external and left internal carotid, in the left subclavian, the left external iliac, and coronary arteries. Left common iliac tortuosity was noted in an 83-year-old female cadaver. An 84-year-old male cadaver exhibited left external carotid artery tortuosity. SIGNIFICANCE. Multiple instances of tortuosity noted in cadavers prompted research into its etiology and clinical applications. Lack of literature and research regarding the phenomenon when compared to vascular remodeling like atherosclerosis necessitated a literature review and case descriptions with histological images and genetic analysis to bring awareness and future research into the development and treatment of a condition so common in the population.

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Anatomic Variations of the Interchondral Joints of the Thorax with Clinical Relevance.

INTRODUCTION. Interchondral joints of the anterior thorax are commonly found between ribs 5-10; specifically, between the costal cartilages of ribs 5-9 as synovial joints and the costal cartilages of ribs 9-10 by fibrous tissues. Seventy percent of ribs 8-9, 60% of ribs 5-6, and 60% of ribs 7-8 participate in gliding motions. The joint between ribs 7-8 is least moveable. In females, the interchondral joints are most frequently observed between ribs 5-6 as well as 7-8 bilaterally when compared to men. Furthermore, a higher number of joints are observed on the right side of the body compared to the left. Our purpose was to investigate the morphologic variations of the interchondral joints. Such data is relevant for physicians who traverse the thorax during interventional procedures. METHODS. Sixty-one joint dissections were performed on 11 cadavers (n=11), 6 females and 5 males. Of the 61 joints, 34 (55.7%) were female and 27 (44.3%) were male. Mean (range) death age was 81.49 (52 -99) years. The length and width-at-midpoint of the joints were measured using a digital caliper (Hawk, Inc.). The number and locations of the joints were recorded in relation to intercostal space, side of the body, sex, and death age. Statistics were calculated using SPSS Version 22.0 (IBM, Armonk, NY). SUMMARY. We observed joints between intercostal spaces 4 and 8 bilaterally. Most joints were found in intercostal space 6 (22/61, 36.1%) and on the right side (31/61, 50.8%). The mean width-at-midpoint was 7.03 mm (min: 2.52, max: 17.60). The mean length was 23.31 mm (min: 7.00, max: 67.93). There was a correlation between increased age and length (95%CI, p=.004) as well as female gender and length (95%CI, p=.006). CONCLUSIONS. Understanding the variations in morphology of the interchondral joints is prudent to physicians who traverse these joints in interventional thoracic procedures.

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Atorvastatin Preconditioning Can Ameliorate Renal Ischemic Reperfusion Injury in Diabetic Rats.

INTRODUCTION. Renal ischemic-re perfusion (I/R) injury may be complicated by acute renal failure (ARF) due to associated reactive oxygen species (ROS). The protective effect of atorvastatin (ATO) in I/R rat models has been related to a free radical scavenging effect which is attributed to the drug's anti-inflammatory and antioxidant properties. The aim of the current study was to investigate the role of ATO in ameliorating renal I/R injury in diabetic rats. METHODS. 24 adult male rats were divided into 2 groups: Group A (non-diabetic control), Group B (diabetic). Each group was further subdivided into 3 subgroups: Group A1 (non-diabetic sham I/R), Group A2 (non-diabetic I/R), Group A3 (non-diabetic ATO-treated + I/R), Group B1 (diabetic sham I/R), Group B2 (diabetic I/R), and Group B3 (diabetic ATO-treated + I/R). All groups underwent 45 minutes of bilateral renal ischemia followed by 24 hours of re perfusion. Each rat in Groups A3 and B3 was treated by a single dose intraperitoneal ATO (10 mg/kg), 30 minutes before the induction of bilateral renal ischemia. Assessments that act as proxy for the presence of free radical groups were performed on rats' serum and kidney tissues in all groups. Assessments included kidney function tests, oxidative stress markers, CD 44 immunoexpression for tubular injury, Caspase-3 for apoptosis, and histological analysis of the kidney tissue sections. SUMMARY. Treatment with ATO resulted in a decrease in kidney function tests, oxidative stress markers, CD 44 immunoexpression, and Caspase-3, in Groups A3 and B3.the improvement was obvious in group A3 than B3. Histologically, Groups A2 and B2 revealed marked tubular damage, cast formation, congestion of the renal vasculature, and extravasation of blood. Groups A3 and B3 revealed a reduction in the tubular damage and an improvement in the renal histological architecture. CONCLUSION. ATO preconditioning can ameliorate I/R renal injury in diabetic rats.

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An Integrated Anatomy-Pathology Lab Session to Enhance the Diagnostic Approach to Breast Neoplasms.

INTRODUCTION. At California University of Science and Medicine, School of Medicine, we have designed a clinical presentation-driven, active learning curriculum which is a blend of the best educational learning methodologies gathered from the world's most cutting-edge educational institutions. This integrated active-learning, system-based, and team-based curriculum necessitates appropriate hands-on multidisciplinary laboratory sessions to support the active learning methods used throughout the curriculum. RESOURCES. During the course "The Propagation of Life" (ie., the Reproductive System), an integrated lab session (breast neoplasms) has been designed that relates to the week's clinical presentation, clinical case, and clinical skills session. The implementation of a laboratory setting containing, multimedia applications, ultrasound, human cadavers, and simulators, allows to competently integrate the session learning outcomes of anatomy and pathology.

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DESCRIPTION. The four-hour lab session begins with readiness assessment tests (iRAT & tRAT), testing students' knowledge from online resources, textbooks, and PowerPoint presentations. This is followed by application exercises in a team-based setting where students learn the anatomy of the breast, and the pathology of breast neoplasms with its clinical diagnostic approach, including imaging. This lab session is followed by a hands-on experience in performing core needle biopsy and fine needle aspiration cytology procedures on cadaver tissues under the supervision of Anatomy and Pathology facilitators who will assure that students have achieved the lab-session learning outcomes. SIGNIFICANCE. This lab session is designed to provide students with the opportunity to apply and integrate knowledge across disciplines. This session will enhance the clinical exposure of medical students in the preclinical years to better prepare them for the challenging clinical requirements of the clerkships and future practice.

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Advancing the Mission of Body Donation Programs Using Written Medical Records-A Novel Approach.

INTRODUCTION: Many academically-housed body donation programs receive medical history information in the form of an oral report given by a family member or healthcare provider at the time of the donor's death. In 2010, the Anatomy Bequest Program implemented a policy requiring the review of written medical records for each donor. There were several reasons for the policy including: to provide a higher level medical suitability screening process in order to prevent the transmission of infectious disease to staff and end users who have access to unpreserved and preserved body donors; to provide staff with useful information when making study assignments; and to share the data with students and educators in order to provide a pathological context to anatomical findings encountered in the dissection laboratory. RESOURCES: Written medical records are requested for each donor using a standardized request form. Records are received electronically. Once received, each record is reviewed by a trained staff member. Medical information is entered into an Oracle database. A medical history report, organized by systems, is provided to end users. DESCRIPTION: To enhance body donation medical suitability practices and provide robust donor medical information to end users. SIGNIFICANCE: Although rarely utilized, body donation programs have access to written medical records under provisions of the Uniform Anatomical Gift Act. Donor health information can be de-identified and shared with end users without violating privacy laws. Beyond accomplishing the original goals, having access to robust medical information has enabled the creation of a novel population health component to the medical student anatomy lab, and provided researchers with the information needed to design retrospective case control cadaver studies.

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Lung Dehydration in Multiple Stages of Inhalation for Computed Tomography Imaging.

INTRODUCTION. A University of Minnesota faculty member in the department of Aerospace Engineering studying the airway mechanics of the bronchial tree when afflicted with cystic fibrosis needed a reliable method of obtaining high resolution CT imaging of both healthy and diseased lungs in average anatomical positioning during various stages of inhalation and exhalation. RESOURCES. A meeting between researcher and Anatomy Bequest Program (ABP) staff allowed for a precise understanding of the end user's goals and how different tissue preparation methods (formalin fixation, plastination) may negatively or positively affect those goals. Coordination with ABP office staff allowed for accurate estimation of the time frame for tissue support and timely processing of the tissues post-mortem. The lungs were flushed endotracheally with warm water. Compressed air was delivered via a common endotracheal tube to inflate the tissues approximating the desired state of inhalation and allowed to dehydrate. The volume of air flow approximating natural expiration was not ample enough to adequately dehydrate prior to the onset of dehydration so a series of acetone baths was used to displace normal cellular fluids prior to delivery of compressed air; the rapid evaporation of acetone allowed for dehydration without tissue degradation. DESCRIPTION. To create a method of preserving lung organs during various stages of inhalation in a static, dry, spatially accurate manner. SIGNIFICANCE. Communication between medical researchers and anatomical tissue providers leads to a greater understanding of the practical limitations of specific tissue processing methods and end user goals resulting in an uncommon method of tissue preparation and successful and novel data.

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Innervation of the External Urethral Sphincter: An Immunohistochemical Elucidation.

INTRODUCTION. The External Urethral Sphincter (EUS) is classically thought to be controlled by deep branches of the Perineal Nerve (PRN). We believe, however, a better candidate exists: the Dorsal Genital Nerve (DGN; a.k.a. Dorsal nerve of clitoris/penis). Despite the DGN having been classically described as a 'pure sensory nerve' and the EUS thought to have motor input from the PRN, we found no confirmatory studies for either of these dogmas. The PRN and DGN branch from the Pudendal Nerve posteriorly and course anteriorly over the EUS. However, the PRN has been described as sending fibers

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through the perineal membrane to communicate with the EUS, whereas the DGN travels directly through the EUS without separation by the perineal membrane. Also, the DGN has been reported in the literature to send fibers towards the EUS. This study aims to elucidate the innervation of the external urethral sphincter though immunohistochemical staining of the dorsal genital nerve. METHODS. Eight adult cadavers were dissected yielding one DGN each. A suprascapular nerve was harvested from an additional cadaver to serve as a positive control. The specimens were fixed, sectioned, and stained with Hematoxylin and Anti-Choline Acetyltransferase antibody by the TTUHSC El Paso Research Core Laboratories. The sections were then observed with brightfield microscopy and imaged. SUMMARY. On dissection, we noted fibers branching from the DGN and communicating with the EUS. Immunohistochemical staining revealed evidence of a motor component of the DGN in all specimens. CONCLUSIONS. This data suggests that the DGN is not just a 'pure sensory nerve'; it is likely involved in the control of the motor function of the EUS.

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Construction of a Prototype 3D Model of the Pelvic Diaphragm in situ at the Fibre Bundle Level.

INTRODUCTION. The pelvic diaphragm functions to support the pelvic organs and maintain continence. Ultrasound and MRI studies have reported an association between pelvic diaphragm muscle thickness and pelvic organ prolapse (POP). Musculoaponeurotic architecture is an important determinant of function. No studies have investigated the architecture of muscles comprising the pelvic diaphragm in 3D. Without understanding the normal structure of the pelvic diaphragm, it is difficult to assess pathological changes associated with POP. The purpose of this study was to determine the arrangement of the musculoaponeurotic elements and quantify architectural parameters of the pelvic diaphragm. METHODS. Coccygeus (CG), iliococcygeus (ICG), pubococcygeus (PCG), and puborectalis (PR) were serially dissected in one formalin-embalmed specimen. The muscle fibre bundles were digitized with a MicroscibeTM G2X Digitizer and reconstructed in 3D with Autodesk® Maya®. The architectural parameters analyzed included: fiber bundle length (FBL), pennation angle, physiological cross-sectional area (PCSA), and muscle volume. SUMMARY. There were no intramuscular aponeuroses in any of the muscles comprising the pelvic diaphragm. Therefore, fibre bundles extended the full length between attachment sites. Architectural parameters varied between muscles. PCG had the longest mean FBL (96.6mm±12.7), approximately two times that of CG. ICG and PR had comparable mean FBL (70.5mm±19.0 and 67.0mm±13.9, respectively). ICG had the greatest PCSA (252.9mm2). CONCLUSIONS. This pilot study was unique as a fibre bundle level in situ 3D model of the pelvic diaphragm was constructed. The methology to construct this prototype model could be used to digitize both male and female pelves to create a database of pelvic diaphragm architecture. This data could inform future simulation studies and aid in understanding of the functional implications of the anatomy of the pelvic diaphragm.

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The Variation in Size and Shape of the Seventh Costal Cartilage: Reconstruction of the Midface.

INTRODUCTION. The seventh costal cartilage is a commonly harvested for aesthetic and reconstructive facial surgeries to address deficits in the midface. However, there is scant data regarding the variation of the size and shape of the seventh costal cartilage. Therefore, morphometric analysis is warranted. METHODS. The thoracic cages of 16 cadavers (32 sides) were dissected with the intent of exposing the ribs, costal cartilages, and sternum with special focus on analyzing the size and shape of the seventh costal cartilage. SUMMARY. Geometric morphometric analysis was utilized to determine the contour of the seventh costal cartilage in the coronal and axial planes. Likewise, traditional morphometric measurements of the cartilage depth near the sternum, near the rib, and at its center were determined. Also, length and area measurements of the anterior surface of the cartilage were calculated. CONCLUSIONS. Together, the resulting data will provide a robust aid for surgeons to select the optimal seventh costal cartilage to address midface deficits during autologous grafting procedures.

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Morphometric Analyses of Cadaveric Lungs Using 3-Dimensional Modeling.

INTRODUCTION. Human airways are well recognized for their complex structure and function. Anatomical knowledge of the airways is essential for understanding normal lung function, pathogenesis of lung disease, and advancing pulmonary medical techniques and procedures. Comprehensive studies of airway anatomy are limited. Previous studies have utilized computational algorithms to study airways in living patients or have utilized CT imaging. However, these studies are limited by their inability to account for anatomic variation. The present study seeks to expand the working knowledge of variations in airway branching patterns in human lungs. METHODS. Fourteen lungs were harvested from embalmed cadavers (4F:

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3M, ages 64-93, mean 82), and carefully dissected. The causes of death varied, but none directly involved the lungs. The lungs were scanned using an HDI Advance R1X 3D Scanner (GoMeasure 3D, Amherst, VA) and the resultant 3-dimensional models analyzed via Geomagic Control software (3D Systems; Rock Hill, South Carolina). Airway segments were identified and observed for anomalous branching patterns, orientations, presence and/or absence of normal and extra segments. SUMMARY. A morphometric survey of airway branching variations is currently underway, using 3-dimensional modeling and high powered quantitative analysis tools. Quantitative analyses of the airway branching patterns and airway diameter are ongoing, and a combination of gross parameters, including length, height, width, internal dimension, and angulation will be determined. CONCLUSIONS. Morphometric analyses using 3D modeling reveals airway branching variations in human lungs. Inclusion and analyses of additional specimens is ongoing. Results from the current study will expand the knowledge base of the clinical anatomy of the airways, and potentially inform individual airway management procedures and approaches.

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Unusual Origin of a Right Vertebral Artery Branching from a Right Aortic Arch.

INTRODUCTION. Aortic arches are usually left sided with three branches: 1) the brachiocephalic trunk splitting into the right common carotid artery and right subclavian artery, 2) left common carotid artery, and 3) left subclavian artery. The vertebral arteries (VA) originate from the subclavian arteries. We encountered a right aortic arch with a right VA originating between the right common carotid artery and right subclavian artery. Right aortic arches are rare variants resulting from the persistence of the right fourth branchial arch during development. RESOURCES. Standard laboratory dissection of a 90-year-old female cadaver. DESCRIPTION. A right aortic arch was encountered. There was no situs inversus, a condition where major organs are in mirrored positions. Kommerell's diverticulum, which is a common feature of right aortic arch, was not present. Right aortic arches are rare, with a prevalence of 0.05-0.2%. We did not find studies or case reports of a RVA originating from a right aortic arch. Left VA branching from a normal left aortic arch is uncommon (reported incidences 2.4-5.8%). Right VA originating from a left aortic arch is extremely rare with few case reports. We estimate the probability of right aortic arch providing the source of RVA to be less than 0.01%. We hypothesize that during embryological development, a portion of the RVA degenerated distal to the seventh intersegmental artery, forcing patency of one or more intersegmental arteries cephalad to the seventh artery. This would result in the RVA branching directly from the aortic arch. SIGNIFICANCE. Knowing possible anatomical variations is important for surgical interventions especially as the VA supplies a significant portion of the brain. We wish to thank individuals who donate their bodies and tissues for the advancement of education and research and the UCSF Willed Body Program for providing anatomical specimens and services associated with them.

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Middle Mesenteric Artery: An Anomalous Source of Arterial Supply to the Transverse Colon.

INTRODUCTION. Anatomic variations involving the arteries that supply the large intestine are of clinical significance. The variations range from the pattern of origin, branching and territorial supply. RESOURCES. A middle mesenteric artery was observed in an eighty five-year-old female donor. During routine dissection of the supracolic and ifracolic viscera, the peritoneum covering the posterior abdominal wall was removed to expose the abdominal aorta and its anterior unpaired branches. DESCRIPTION. The celiac trunk, superior mesenteric artery (SMA) and inferior mesenteric artery (IMA) were identified originating from the aorta and their branching pattern evaluated. The celiac trunk had a normal branching pattern. The middle colic artery and the left colic artery were all missing from the SMA and IMA respectively. The other branches of the SMA and IMA were normal. A middle mesenteric artery was observed originating directly from the ventral surface of the abdominal aorta between the origin of the superior and inferior arteries. From its origin on the abdominal aorta, the middle mesenteric artery ran obliquely superiorly towards the left. It then gave rise to two branches. The first branch ascended between the layers of the transverse mesocolon and gave rise to several branches that supplied the distal part of the ascending colon and the transverse colon. The second branch ran transversally to the left to supply the proximal part of the descending colon. The two branches had free anastomosis within the mesocolon. Few cases of middle mesenteric artery have previously been reported. The presence of a middle mesenteric artery can be explained by the abnormal development of the ventral segmental vessels during embryonic period. SIGNIFICANCE. This anatomic variation is rare but the knowledge of this variation is very important for radiologists and surgeons in order to avoid both intra- and postoperative complications during surgical procedures involving the colon.

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Persistent Double Dorsal Aorta: A Systematic Review of the Literature.

INTRODUCTION. Our discovery of a case of persistent double dorsal aorta prompted us to systematically review the literature of all previously reported cases of this anomaly. For our case, we present a completely separated double dorsal aorta, with the right accessory aorta arising from the abdominal aorta and ascending through the aortic hiatus to supply posterior intercostal arteries to the 9th-3rd spaces bilaterally. RESOURCES. We utilized data from the ten previously reported cases of persistent double dorsal aorta as well as our recently discovered case to create a systematic review of all known cases of this anomaly. In addition to our case report and systematic review, we investigated the literature focusing on formation of the dorsal aorta in the embryo in order to postulate potential mechanisms for formation of this anomaly. Finally, to provide a visual representation of normal anatomy for comparison to the case of double dorsal aorta we discovered, the descending aorta of a body donor featuring an anatomically normal arrangement was thoroughly dissected and photographed. DESCRIPTION. Two variants of persistent double dorsal aorta have been reported in the literature. The first type is characterized by a double-lumen descending aorta with a central dividing septum, and the second features complete separation of the two dorsal aortae. The completely separated variant shows further heterogeneity in the origins of the posterior intercostal arteries and the iliac arteries, and the majority of the reported cases also demonstrate additional anatomical anomalies. SIGNIFICANCE. Understanding the pathogenesis and prevalence of vascular malformations is important in neonatal medicine, vascular and thoracic surgery, and diagnostic and interventional radiology.

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Anterior region of the anal canal: Transanal ultrasonography and histological study.

INTRODUCTION. To realize anatomical details of the anal canal and surrounding structures have been required for the intersphincteric resection for rectal cancer. In the region anterior to the anal canal, the existence of the perineal body has been classically described, and some other structures termed the rectourethralis muscle, the anterior bundle of longitudinal muscle, and the rectoperinealis muscle have reported in recent years. However, the details of these structures have remained unclear. The present study aimed to understand both three-dimensional structure and histological nature of the region anterior to the anal canal by using transanal ultrasonography and histology. METHODS. Transanal ultrasonography images of 70 patients (50 male and 20 female) at Tokatsu-Tsujinaka hospital were studied. In addition, immunohistological examination was carried out using 14 cadavers (7 male and 7 female). SUMMARY. According to the transanal ultrasonography, the anterior bundle of the longitudinal muscle was observed as a hypoechoic layer continuing with the longitudinal muscle, and the anterior bundle covered the anterior surface of the external anal sphincter both in males and in females. It was narrower and cylindrical shape in males, and was wider and plate shape in females. According to the histological examinations, the anterior bundle was observed to extend from the longitudinal muscle, and was consisted of smooth muscular tissue. CONCLUSION. The configuration and histological nature of muscles suggested “a complementary arrangement of smooth muscles and skeletal muscles” in the region anterior to the anal canal.(Supported by JSPS KAKENHI Grant No. 23590216)

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Variations of the Celiac Trunk in a South African Cadaveric Sample.

INTRODUCTION. The celiac trunk normally trifurcates into the common hepatic, splenic and left gastric arteries. However, variations in the configuration, length and diameter of the celiac trunk and its main branches often occur. Our aim was to assess the frequency of variations in celiac trunk configuration in a South African cadaveric sample. METHODS. The celiac trunk was assessed by visual observation in 66 Caucasian dissected cadavers at the School of Anatomical Sciences, University of the Witwatersrand. SUMMARY. Normal configuration of the celiac trunk was observed in 72.7% (48/66) of the sample whereas 27.3% (18/66) had variations. Of those with variations, the celiac trunk exhibited four branches due to the right inferior phrenic artery arising from the trunk in 7 specimens (10.6%). We observed that, the celiac trunk bifurcated into the common hepatic and splenic arteries in 2 specimens (3 %). The left gastric artery independently branched from the abdominal aorta in these 2 cases. In one cadaver, the celiac trunk bifurcated into the splenic and left gastric arteries. CONCLUSIONS. Our findings are comparable to other studies that report predominantly normal celiac trunk configuration and the inferior phrenic artery often branching off the celiac trunk. This is a clinically important blood vessel and knowledge of the variations seen in its configuration is relevant in the planning of surgical procedures such as stomach resections and liver transplantations.

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Coronary Dominance and the Pattern of Left Anterior Descending Artery in American and Dutch Hearts.

INTRODUCTION. The left anterior descending artery (LADA) is the main branch of the left coronary artery, which supplies most of the left ventricle and the anterior two- thirds of the interventricular septum. LADA is the most commonly occluded branch of the coronary arteries and the "widow maker." METHODS. We examined 34 American and 50 Dutch cadaveric hearts, of both sexes. The average age for Americans was 77.5 years, while for Dutch was 84.0 years. First, we exposed the coronary arteries by removing the pericardial fat; we then measured the coronary vessels using a digital micrometer. SUMMARY. Within the American population: 84.8% were right dominant, 4 exhibited myocardial bridging, 14.51 cm average LADA length, 78.79% of LADA originated with bifurcation, 18.18 % with trifurcation, and 3.03 % with tetra-furcation of the left coronary artery. On the other side, the Dutch, 88.0 % were right dominant, 11 exhibited myocardial bridging, 17.72 cm average LADA length, 62.75% of LADA originated with bifurcation, 35.29% with trifurcation, and 1.96% with tetra-furcation of the left coronary artery. CONCLUSIONS. Based on our findings, the Dutch population of cadaveric hearts on average displayed a longer LADA with an extensive branching pattern. Both populations displayed over 80% right dominance and also a predominant bifurcating branching pattern.

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Anatomy of the Thoracic Spine to Elucidate the Validity of the Thoracic Rule of Threes.

INTRODUCTION. The ability to accurately locate the transverse processes (TPs) is necessary for osteopathic physicians to diagnose thoracic spine somatic dysfunction and treat those dysfunctions with osteopathic manipulative medicine. The location of the thoracic spinous processes (SPs) are used to help physicians locate the thoracic TPs. In 1979, Mitchell et al. proposed the thoracic rule of threes (TRT) to describe the relationship of the SPs to the TPs in the thoracic spine. This rule is being taught at osteopathic medical schools. The TRT separates the thoracic vertebrae into 3 distinct groups, each with a different relationship between TPs and SPs. In 2006, Geelhoed et al. proposed a new relationship between the SPs and TPs for all thoracic vertebrae. Due to the inconsistencies in these rules and the importance of this information for osteopathic physicians, we set out to determine what anatomical relationship is most accurate in locating the TPs. METHODS. Using 44 embalmed human cadavers, we exposed, marked, and photographed the thoracic SPs and TPs. Measurements were made between SPs and TPs levels. Geelhoed's protocol was used to determine the validity of each rule. SUMMARY. Utilizing our measurements and Geelhoed's protocol, 0% (0/176) of the first group, 10.8% (19/176) of the second group, and 69.3% (122/176) of the third group followed the TRT. Only 26.7% (141/528) of vertebral relationships followed the TRT. Whereas, 62.3% (329/528) of vertebrae followed Geelhoed's Rule. CONCLUSIONS. According to our findings, the TRT is not accurate in locating the TPs of the thoracic spine. It is our belief that osteopathic medical schools should teach Geelhoed's rule rather than the TRT because it is more accurate anatomically for locating the TPs.

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Unilateral Multiple Sacral Plexus Variations and their Clinical Relevance.

INTRODUCTION. In the age of extensive documentation and readily available studies, there are still patients suffering from refractory pain and iatrogenic nerve injuries due to their unique anatomy. The purpose of this study is to describe a rare case of sacral plexus variation with noted anomalous nerve communications, review associated literature, and to discuss its clinical significance. RESOURCES. Gross dissection of the left gluteal region of an 83-year-old female was performed at Missouri Southern State University. DESCRIPTION. Dissection of the left gluteal region revealed that the sciatic nerve bifurcated proximal to the piriformis muscle. The left common fibular division pierced through the piriformis, dividing it into superior and inferior bellies, while the left tibial division passed deep to the piriformis muscle. Both divisions reunited 2 cm inferior to the lower border of the piriformis muscle and descended as a single trunk. The inferior gluteal nerve bifurcated at the inferior border of the piriformis muscle. The descending branch joined the posterior femoral cutaneous nerve when the second branch of the inferior gluteal nerve formed a communicating plexus with the common fibular nerve before supplying the gluteus maximus muscle. The posterior femoral cutaneous nerve was also joined by a branch of the sciatic nerve at the level of anastomosis with the inferior gluteal nerve. Communication between tibial and pudendal nerves was noted deep to the inferior belly of the piriformis muscle. SIGNIFICANCE. Knowledge of anatomical variations of the sciatic nerve and other branches of the sacral plexus provide more insight into the etiology of refractory pain and need for special care in patients resistant to traditional treatments. This study also demonstrates various anatomic sacral plexus variations for orthopedic surgeons to consider prior to performing posterior hip arthroplasty.

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Anatomist and Anatomical Gift Program Director Collaboration; An Ethical/Moral Approach to Donation.

INTRODUCTION. Responsibility for procurement of anatomical donors rests with anatomists and Anatomical Gift Program Directors. First person consent for donation to healthcare education is an ethical and morally acceptable guideline in the study of anatomy. Anatomical Gift Program Directors identify community concerns such as cultural influences, religious beliefs, negative press, and funeral traditions to provide comprehensive education on anatomical donation. The Anatomist instills values and professionalism in students working with donors. Resources. The Anatomical Gift Program Director identifies community venues of interest such as senior living, estate planning and palliative care facilities. The director and the anatomist collaborate to create a presentation demonstrating commitment to the respect and dignity in all aspects of donation and utilization. Anatomist's time collaborating and performing community outreach is a component of service to the profession. Description. Collaboration provides administrative and teaching perspectives in educating the public. Topics include a history of anatomical donation in the United States and the process of donation as suggested by Best Practices for Body Donor Programs by the Anatomical Services Committee of AACA. A student-organized memorial service allows students to reflect on their learning experience, offers closure for families of donors and is positively received by potential donors. Significance. This collaborative approach identifies cultural and geographical concerns and educates potential donors on how their gift will be utilized. Anatomist must consider the success of bequeathal programs to ensure adequate resources for the study of human anatomy. Reassuring the public affirms the potential donor's desire to contribute in death, for the anatomist to engage with students in experiential learning, and for the Director to succeed in program development.

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Nutcracker Phenomenon Coincident with Celiacomesenteric Trunk Variation.

INTRODUCTION. Celiacomesenteric trunk (CMT) is a very rare (<1%) anatomic finding where the superior mesenteric artery arises from the celiac trunk. The described clinical associations of this variant include arterial aneurysm, thrombosis, occlusive disease, celiac compression syndrome and compression from an abdominal aortic aneurysm. However, an association with a nutcracker phenomenon, a state of abdominal venous congestion caused by left renal vein entrapment, has not been previously described. METHODS. This variation was discovered by routine cadaveric dissection. Histologic tissue analysis was performed. Cadaver past medical history was retrieved. SUMMARY. Vascular anatomy is consistent with embryologic CMT subtype I-b. Nutcracker phenomenon was determined anatomically by engorgement of left renal vein relative to right (10.77 ± 0.13 mm vs. 4.49 ± 0.56) as well as engorgement of left ovarian vein relative to right (4.37 ± 0.15 mm vs. 1.06 ± 0.09 mm) in the setting of left sided ovarian varicocele. The aorto-celiac angle (the functional aortomesenteric angle) produced by the celiacomesenteric trunk approached zero degrees. CONCLUSIONS. Nutcracker phenomenon is here observed to be coincident with CMT. The anatomy of CMT type I-b produces a functionally acute aortomesenteric angle by displacing the origin of the SMA to the celiac trunk. Narrow aortomesenteric angle has been previously associated with nutcracker phenomenon, and it is likely that the acute angle produced by this variation predisposes its development. Awareness of this variation is important clinically in the workup and therapy of patients with nutcracker syndrome.

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Exposure Monitoring of Formaldehyde In Anatomy Lab: Our Experience At Weill Cornell Medicine-Qatar.

INTRODUCTION. Since the beginning of anatomy lab sessions at Weill Cornell College of Medicine- Qatar (WCMC-Q) in 2004/2005 a thorough formaldehyde monitoring program was implemented to ensure compliance with the OSHA Formaldehyde Standard. This program includes 13 years of collected data totaling 600 personal formaldehyde monitoring sample results and 349 formaldehyde direct reading instrument area monitoring sample results. Monitoring has employed a representative sampling strategy as recommended by OSHA. RESOURCES. The sampling strategy has targeted select laboratory classes each academic year where there is reason to believe that exposure levels to formaldehyde could be elevated. During academic year 2016/17 a change in course curriculum was implemented and we decided to monitor each of the 29 anatomy lab sessions for the new Essential Principles of Medicine course. Personal formaldehyde monitoring consisted of monitoring one student at each of the 10 cadaver tables in addition to monitoring 1 faculty member. The engineering controls being used to reduce formaldehyde exposure is dilution ventilation with a 100% fresh air handling system. Work practice controls include training of all students and staff. Also, cadavers are placed in body bags to help reduce ambient formaldehyde vapor levels when laboratories are not in session. DESCRIPTION. The extensive monitoring results accumulated to date at WCM-Q has ensured that student and employee exposure to airborne concentrations of

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formaldehyde do not exceed the OSHA established 0.75 parts formaldehyde per million parts of air permissible exposure limit concentration based on an 8-hour time-weighted average. SIGNIFICANCE. The formaldehyde monitoring program has provided assurance that WCM-Q is not exceeding the OSHA PEL. It is also providing comprehensive data in an effort to evaluate each anatomy lab session so that monitoring can be targeted at lab sessions that present the most significant risk of exposure.

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Two Major Events in the History of Body Donation Programs in Japan.

INTRODUCTION. Body donation for student practice of anatomy began in 1955 in Japan. In the early years, body donation had an unpleasant impression for the public, because previously the bodies used for dissection practice had been dependent upon the socially disadvantaged people. DESCRIPTION. Registered members of body donation committee and professors of anatomy, continually petitioned the National Diet for promotion of body donation. The campaigns were realized in two forms. (1) In 1982, the system of providing a letter of appreciation to a body donor from the Minister of Education was established. In 1983, the Diet enacted the Body Donation Law. The law prescribes that the will of the body donor is respected. Since then the number of the registered donor members has markedly increased. In 1995, the Japanese Association of Anatomists celebrated its 100th annual meeting in Tokyo, and succeeded in inviting the crown prince and princess to attend. In his address, the crown prince expressed that body donation, a very respectable act, has been an important base of the development of Japanese medicine, and he stated his great esteem to the many donors. Just before this annual meeting, a commemorative postage stamp was issued. The design of the stamp was a picture by Seison Maeda "Dissection of a Human Body (1970)" which illustrates the first officially approved cadaveric dissection in Japan (1754). SIGNIFICANCE. These two events were historically significant from the view point of trying to increase public approval of body donation. The cultural differences between the Japanese body donation movement and that of the USA remain to be considered.

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An Engagement Opportunity: Connecting Donor Families with Faculty and Researchers.

INTRODUCTION: The University of Minnesota Anatomy Bequest Program has hosted an annual service of gratitude to recognize and honor program donors since 1997. The service has been well received with approximately 2000 donor family members, external and internal stakeholders attending annually. Based on a marked increase in donor families requesting formal reports on their loved one's study outcomes, the Anatomy Bequest Program coordinated an engagement session at the conclusion of the service. The engagement session created an environment to allow interested donor families the opportunity to hear directly from researchers and educators on how the gift of whole body donation impacted their mission. RESOURCES: Anatomy faculty, clinicians, researchers, biomedical device engineers, and surgical training lab staff from internal and external institutions were invited to interact with donor families around the topic of medical advancements and training made possible by the gift of whole body donation. In 2015, six groups participated in the engagement session. In 2016, seven groups participated. Groups were assigned space in the atrium of the event venue. They were also given some basic talking points and display suggestions. DESCRIPTION: Address the needs of the donor family community for information on general research and education accomplishments. SIGNIFICANCE: The engagement session offered both groups of stakeholders the opportunity to share their stories. Donor families valued the research and education outcomes shared and were impressed with the broad nature of projects presented. Those who displayed at the event reported feeling honored to be able to give back to the loved ones of the donors.

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A Variant Blood Supply to the Descending Colon from an Aberrant Left Accessory Colic Artery.

INTRODUCTION. We present a variant blood supply to the descending colon: a left accessory colic artery (LACA) that arose from the superior mesenteric artery (SMA). Classically, the descending colon is supplied by the left colic artery (LCA), which arises from the inferior mesenteric artery (IMA) and yields an ascending and descending branch. There have been few reports of an LACA arising from the SMA, with variant reported frequency, courses, and anastomoses. RESOURCES. This variant was identified during the routine dissection of an 87-year-old male cadaver in the gross anatomy component of a first-year medical school curriculum. DESCRIPTION. In this instance, the proper LCA was significantly smaller in diameter than its classical counterpart. It divided into an ascending and descending branch. The descending branch appeared to provide some degree of blood supply to the inferior-most aspect of the descending colon. The ascending branch of the proper LCA anastomosed with the descending branch of an aberrant LACA. The aberrant LACA, which arose from the SMA

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directly inferior to the pancreas, was considerably greater in diameter than the proper LCA and yielded an ascending and descending branch. The descending branch anastomosed with the proper LCA and the marginal artery of Drummond, and produced a terminal branch, which supplied the proximal descending colon superior to the level of the proper LCA pedicel. The ascending branch of the aberrant LACA anastomosed with the marginal artery of Drummond and provided blood supply to the distal transverse colon and proximal descending colon. SIGNIFICANCE. Recording the existence of aberrant abdominal blood supply is of clinical interest, particularly in abdominal surgeries in which the aberrant LACA could be compromised if its presence is not known.

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The Anatomy of Musculocutaneous Latissimus Dorsi Flap in Neophalloplasty.

INTRODUCTION. In transgender surgery, the ideal neophallus will be one that: (a) is constructed from a reproducible procedure, (b) possesses tactile and erogenous sensation, (c) is large and rigid enough (naturally, or by use of a prosthesis) to permit penetrative intercourse, (d) leaves satisfying donor-site morbidity, (e) results in a satisfying aesthetic appearance, and (f) allows for voiding while standing. RESOURCES. We created novel illustrations from standard surgical text descriptions to bring more clarity to this topic for surgical training and patient understanding and decision making. DESCRIPTION. The musculocutaneous latissimus dorsi (MLD) flap uses part of the latissimus dorsi muscle with branches of the thoracodorsal vessels and nerve to construct a neophallus. Only a thin strip of muscle around the pedicle is harvested, resulting in a slightly curved-linear scar. The blood supply is connected to the femoral artery and saphenous vein or the deep inferior epigastric artery and vein, while the nerve is connected to the ilioinguinal nerve. SIGNIFICANCE. The musculocutaneous latissimus dorsi flap has had good results in the area of neophalloplasty. Among its advantages are satisfactory donor site appearance, stiffness sufficient for intercourse (sometimes even without a prosthesis), and aesthetically adequate genital appearance. In this poster, we give an overview of the advantages and disadvantages of the procedure, as well as the anatomical details and surgical steps involved.

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The Anatomy of Free Fibula Osteoseptocutaneous Flap in Neophalloplasty in Transgender Surgery.

INTRODUCTION. The Free Fibula Osteoseptocutaneous flap is a reliable option when used in neophalloplastic procedures. It possesses intrinsic rigidity that is sufficient for penetrative intercourse, and it is well known for its satisfactory sensation. We review the pros and cons of this procedure, as well the anatomy and surgical steps involved. RESROUCES. Surgical text descriptions were enhanced by the creation of new anatomic illustrations. Anatomy of the donor and recipient sites, as well as the surgical technique leading to creation of the neophallus are demonstrated in detail with new relevant illustrations. DESCRIPTION. The free fibula osteoseptocutaneous flap provides the neophallus with many desirable characteristics. Its thick subcutaneous and fascial layer, along with the thicker fibula (compared to the radius), allows for a neophallus of greater diameter. Skin marking, flap lifting and transfer to the perineum with all relevant neurovascular anastomosis; fibular artery is anastomosed with the femoral artery, while the fibular veins are anastomosed to branches of the saphenous vein, as well as neurorraphy of the dorsal nerves of the clitoris and the LSCN are demonstrated. Osteomatized fibula fixed to the periosteum of the pubic symphysis is shown. SIGNIFICANCE. These anatomical traits allow intercourse without prosthesis. The donor-site scar in this procedure can be covered by a long sock, and donor site morbidity is acceptable.

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The Anatomy of Vaginoplasty: Using Penile Skin Graft with Scrotal Flaps.

INTRODUCTION. Gender reaffirmation surgery is the final step in an individual's transition to their preferred gender. RESOURCES. It comprises surgical procedures that will reshape the individual's body into their desired body habitus. Clear understanding of the pertinent anatomy is essential by the surgeon and patient. DESCRIPTION. In male-to-female transgenders, female genitalia is constructed using the individual's penile skin to form the neovaginal canal and their scrotal skin folds post orchiectomy to create the labia majora. The surgical precursors of the remaining anatomical structures of the female genitalia are as follows: the clitoris is crafted from the glans penis and hence retains its innervation; the labia minora is formed using excess penile skin tissue; and the long male urethra is shortened to that of its feminine counterpart. The main goal of these reconstructive methods is to create a functionally and aesthetically acceptable vagina and vulva, as well as normal voiding function and satisfactory sexual function. SIGNIFICANCE. There are numerous complications that may occur following reassignment surgery as the neovaginal squamous cell tissue is subjected to new stresses such as dilators

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and intercourse, leading to chronic inflammation and potential fistula formation. In addition, carcinomas such as squamous cell from the penile tissue or prostatic adenocarcinoma from the retained in situ prostate may occur, necessitating the need for screening methods to be developed and implemented for this population.

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The Anatomy of Abdominal Flap Phalloplasty for Transgender Surgery.

INTRODUCTION. Abdominal flap phalloplasty is the surgical construction of a neophallus with the use of an abdominal pedicled flap for persons transitioning female to male, for males whose penis is congenitally absent, or lost for traumatic reasons. It is a good choice for trans men who do not necessarily require urethroplasty or vaginectomy but would like a phallus suitable for male gender appearance. A prosthesis can be placed for penetrative sexual capability. RESOURCES. Surgical text descriptions were enhanced by the creation of new anatomic illustrations. Anatomy of the donor site, as well as the surgical technique leading to creation of the neophallus are demonstrated in detail with new relevant illustrations. DESCRIPTION. Significant structures of the donor site of the abdominal flap include the superficial external pudendal artery and ilioinguinal nerve that provide the blood supply and sensory innervation to the base of the flap, respectively. As a pedicled phalloplasty procedure, microsurgical nerve connection is not needed. Arteries, veins and nerves are left intact as tissue for the flap is raised and phallus created. Patients can expect to have tactile sensation but not innate rigidity. The dorsal nerve of clitoris (and sometimes the clitoris itself) are preserved and provide erogenous sensation. SIGNIFICANCE Abdominal flap phalloplasty makes it possible to maintain the natural blood supply and innervation to the neophallus. Abdominal flap phalloplasty may have the advantage of a more natural appearance of the neophallus due to homogeneous skin color and texture from the use of skin contiguous to the phallic site. The graft leaves a horizontal scar that runs from one side of the pelvis to the other along the lower abdomen representing less of a stigmatizing scar.

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The Anatomy of Forearm Free Flap Phalloplasty.

INTRODUCTION. Transgender surgeries are becoming more frequent and visual interpretation of anatomy is essential for both surgeons and patients. Since the forearm free flap phalloplasty was introduced in 1984, it has been known to provide reliable cosmetic and functional results for transitioning men compared with phalloplasty by different flaps. RESOURCES. Surgical text descriptions were enhanced by the creation of new anatomic illustrations. DESCRIPTION. Forearm free flap consisting of the anterior forearm skin, subcutaneous tissue, fascia containing the radial artery as the perforator and its venae comitantes, cephalic and basilic veins, and lateral and medial antebrachial cutaneous nerves are demonstrated in relation to the surgically derived flap. Song's forearm free flap phalloplasty requires two surgical stages with a three month interval between the stages: prelamination of a neourethra and construction of a neophallus. SIGNIFICANCE. The neophallus created by forearm flap phalloplasty has been reported to achieve acceptable aesthetical and psychological satisfaction, appropriate size and shape, and satisfying sexual intercourse. Despite increasing experiences in gender confirming surgery with modifications made by many authors, urethral complications including fistula and/or stricture formation are the leading causes of reoperation. The poor aesthetic outcome of the forearm donor site and a decrease in rigidity of the neophallus are the main limitations. Illustrations of anatomy help inform surgical choice and understanding of risks and benefits by patients.

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The Anatomy of the Pedicled Anterolateral Thigh Flap for Phalloplasty in Transitioning Males.

INTRODUCTION. Incidence of transexualism, and request for neophalloplasty is increasing. Currently, in the United States, the inherent prevalence of trans-male is 1:2500. Surgeons have explored various techniques to improve the outcome of neophallic construction, decrease the length of surgery, and decrease stigmatizing scars. The anterolateral thigh (ALT) flap is an alternative to the radial forearm flap for patients who do not want a forearm scar. RESOURCES. Surgical text descriptions were enhanced by the creation of new anatomic illustrations. Anatomy of the donor and recipient sites, as well as the surgical technique leading to creation of the neophallus are demonstrated in detail with new relevant illustrations. DESCRIPTIOThe Anterolateral Thigh (ALT) Flap is a skin, fat and fascia flap that has blood supplied by the descending branch of the lateral femoral circumflex vessels and innervation provided by the lateral femoral cutaneous nerve In the pedicled procedure, tissue is left partly attached to the donor site ('pedicle') and simply transposed to a new location; keeping the 'pedicle' intact as a conduit to supply the tissue with blood. SIGNIFICANCE. This flap offers a less obvious donor site, easily

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concealable with clothing. Additionally, the pedicled anterolateral thigh flap offers advantage over the traditional radical forearm free flap by decreased surgical time, preservation of erogenous sensation, and the preservation of the vascular supply of the flap without microsurgical anastomosis of nerves and vessels. The ALT flap can be quite thin, making it a good choice for sensation and urethroplasty; but for patients with thicker skin and more sub-cutaneous fat in the thigh, excess tissue bulk in the flap can be a contraindication for urethroplasty or may not provide aesthetically ideal results.

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Factors Contributing to the Limited Participation of African Americans in Body Donation Programs.

INTRODUCTION. Most medical schools utilizing dissection as part of their curriculum rely on whole body donors to provide cadavers for the anatomy laboratory. Although there have been few studies exploring the demographics of these donors, it appears that the majority of the donors are Caucasian leading to a lack of racial diversity amongst cadavers in the anatomy laboratory. This results in a lost opportunity for our students to begin discussions, within the dissection course, that are aimed at increasing cultural awareness and dispelling misconceptions students may have. In this study, we aim to identify common beliefs and perceptions held by African Americans that may influence their willingness to be a whole-body donor for medical education. Better understanding of their cultural beliefs surrounding body donation may allow us to provide community outreach/educational activities that result in increased participation of African Americans in body donor programs. METHODS. Ten focus groups, each consisting of 5 to7 African Americans, are being conducted at Optimist Clubs in the Metro Detroit Area. At each meeting, demographic data regarding gender, age group, education level, income level, marital status, and number of dependents is gathered prior to researcher-led discussions. Discussions focus on subjects such as: experiences with and opinions of the healthcare system and doctors, thoughts and knowledge about body donation, and factors influencing willingness to make a whole-body donation. This research has been reviewed and approved by the OUWB IRB. SUMMARY. Preliminary focus group results suggest that factors contributing to a lack of donations include: a mistrust of the medical system, a desire to be buried whole or donate organs, and they have never considered the possibility. CONCLUSIONS. The data collected in this focus group study will provide a baseline understanding of how the population of African Americans participating in this study view body donation.

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The Branching Pattern of the Internal Iliac Artery: The Myth and the Evidence-Based Truth.

INTRODUCTION: Multiple commonly used reference sources claim the internal iliac artery divides into anterior and posterior divisions with specific branches arising from each, yet practitioners often struggle to observe this. This study conducted a comprehensive review and meta-analysis of the literature relating to the branching pattern of the internal iliac artery. METHODS: Peer-reviewed primary research articles were searched for across all relevant databases. A total of 207 articles dating from 1813-2016 were subject to review and meta-analysis. SUMMARY: Multiple studies (n=22) were found to categorise internal iliac branching according to Adachi's 5-type system. This system assumes the internal iliac artery continues as the umbilical, and subsequently categorises branching according to the origin of the internal pudendal, superior gluteal and inferior gluteal arteries. Type 1 branching, where the superior gluteal artery branches first and the inferior gluteal and the internal pudendal arteries branch from a common trunk, was the most common (54.4% of 5331 specimens). A similar yet simpler classification system defined by Yamaki ignores the umbilical artery and as such defines four main branching patterns with the most common, where the internal iliac artery divides into the superior gluteal artery and a common trunk for the inferior gluteal and internal pudendal arteries, being observed in 76.1% of 6018 specimens (24 studies). The origin point of other common branches was too variable for inclusion into any categorisation system; for example, the obturator artery arose from the external iliac system in 28.7% of 5781 specimens (22 studies) and from the inferior epigastric artery in 23% of 7816 specimens (30 studies). CONCLUSIONS: The internal pudendal, superior gluteal and inferior gluteal arteries show sufficient regularity in their pattern of origin from the internal iliac artery to enable its branching patterns to be classified into 4 or 5 main groups.

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Adenosine Receptor Antagonist Effectiveness in Preventing Apoptosis caused by DNA Damage.

INTRODUCTION. Apoptosis is the cellular process that regulates aging cells and stops the proliferation of cancer cells. However, this process can become unchecked due to a number of factors, resulting in the death of cells that could recover from damage. This can result in neurodegeneration. In the nervous system, apoptosis can be mediated by the A1 and A2A adenosine receptors (ARs). Blockade of ARs with antagonists has been found to have neuroprotective properties in response to β-amyloid protein, which is associated Alzheimer's disease. However, these antagonists have not been studied against other stressors. The purpose of this study was to investigate neuroprotection by AR blockade in response

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to DNA damage. METHODS. Cultured central nervous system cells obtained from rat pups were exposed to etoposide; a topoisomerase inhibitor that results in DNA strand breakage. Cells were split into three groups: 1) normal, 2) control group exposed to etoposide, 3) treatment group exposed to etoposide and one of four treatments. The four treatments were: 672 βM and 896 βM caffeine, an antagonist of both ARs; 50 nM SCH 58261, an antagonist of A2AAR; and 50 nM Dipropylpentylxanthine (DPCPX), an antagonist of A1AR. Survival was assessed by an MTT assay. Pictures were also taken to assess qualitative differences.SUMMARY. Caffeine did not exhbit clear neuroprotective qualities. However, the SCH 58261 and DPCPX treatment group exhibited a mean increase of light absorbance by 10% relative to the control, suggesting some neuroprotection. CONCLUSION. This increased neuroprotective effect is small in vitro, and therefore A2A and A1 receptor blockade may not be effective in response to DNA damage. Further study of the potential uses for AR antagonists are necessary to determine their efficacy in response to various cellular stressors in vitro and in vivo.

Abstracts – Poster Presentations Session B

(Listed by presenting author last name)

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Incorporating Cultural Competence into Medical Gross Anatomy Instruction.

INTRODUCTION. Per the Liaison Committee on Medical Education (LCME), US medical students must demonstrate cultural competence upon graduation in order to mitigate biases and stereotypes that have the potential to compromise the quality of healthcare provided to minority populations. While most schools have made significant curricular progress in achieving this LCME standard in "doctoring" courses, the lack of integration of cultural competence into the biomedical curriculum remains a challenge and obstacle. RESOURCES. A series of learning objectives for the gross anatomy thread of the first semester integrated curriculum were developed to address both high yield clinical anatomy themes and cultural diversity issues as well. DESCRIPTION. These objectives were designed in a clinical vignette format with a patient presentation, including a cultural teaching point, followed by several multiple choice questions focused on the anatomy of the case. Cases include patients from a variety of cultural, minority and socioeconomic backgrounds and integration of communities, including African American, Amish, Cambodia, China, East India, Guatemala, Gypsy, Iran, Japan and LGBT (lesbian, gay, bisexual and transgender). SIGNIFICANCE. The integration of cultural competence into the medical curriculum beyond the introductory clinical medicine curriculum will promote and heighten awareness of cultural diversity throughout the biomedical sciences, such as anatomy, as well as in concurrent and subsequent clinical coursework.

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Applying Knowledge to Practice: Integrated Ultrasonography in the Undergraduate Medical Curriculum.

INTRODUCTION. Many first-year medical (Y1) students struggle to connect the fundamental knowledge of didactic coursework with clinical aspects of patient care. Accordingly, we have introduced multiple activities within our Y1 medical anatomy and physiology courses intended to develop student's diagnostic reasoning skills. METHODS. The first step in the sequential approach involves teaching point-of-care ultrasound (POCUS) assessment of anatomical structure. This involves interactive sessions in which Y1 students perform imaging of each of the major organ systems in Standardized Patients. A progressive increase in realism and clinical relevance is achieved by introducing simulated patient encounters using high-fidelity manikins to demonstrate the compensatory mechanisms evoked in physiologic responses to trauma, acute pancreatitis, and diabetic ketoacidosis. Patient interactions/examinations are challenging skills for Y1 students to master. However, assessment for abdominal injury or pathology with relevant POCUS images and laboratory values facilitates their parsing the potential differential diagnoses to arrive at the correct clinical diagnosis. SUMMARY. The use of clinical simulations of increasing complexity has allowed us to substantially reduce the number of formal lecture hours over the last 5 years without compromising students' performance on either in-house or standardized examinations. We have refined the delivery of content to require as few as 4 facilitators for 190 students. CONCLUSIONS. We found POCUS and clinical simulations to be a useful adjunct to traditional means of teaching anatomy and physiology to Y1 medical students. A distinct advantage of utilizing this innovative approach is the students become facile in integrating diagnostic imaging and results of laboratory tests to assessment of a clinical scenario in order to reach a definitive diagnosis. Finally, it contributes to providing our students with a solid foundation in performing POCUS.

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YOGAnatomy: Mastering Anatomy While Managing Stress.

INTRODUCTION. Because of the prevalence of stress and burnout in medical students, many medical schools are adopting wellness programs to help their students cope with the stressors of medical training. While some students embrace wellness initiatives, others are skeptical of their utility. Justifying wellness initiatives such as yoga through its dual benefit of mindfulness along with reinforcing the mastery of functional anatomy may encourage participation. This study combines the benefits of yoga as a means of mindfulness through movement, as well as a means by which to reinforce functional anatomy in the curriculum. METHODS. This study evaluates the impact of introducing 4, 1 hour functional anatomy yoga sessions on stress and burnout levels in 17 incoming medical students during a month long summer pre-matriculation program. The Cohen Perceived Stress Scale and Maslach Burnout Inventory were used to assess student stress and burnout and data was analyzed using SPSS. IRB approval was obtained to analyze the de-identified dataset. SUMMARY. A significant interaction between gender and program week was observed, where female students experienced a rise in stress over the 4 week program, whereas male students demonstrated a reduction. Male students also experienced a reduction in burnout, while female students exhibited a higher baseline level of burnout, which remained constant during the program. Older students exhibited lower baseline burnout levels than younger students. Personal achievement was measured as a dimension of the burnout scale; both male and female students demonstrated an increase over time, with a higher baseline in males. CONCLUSIONS. These findings suggest that incorporating mindfulness practices, such as yoga, into a medical prematriculation curriculum may have beneficial effects for student participants, particularly for male students.

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Free Anatomy Book, Full of Mnemonics and Schematics.

INTRODUCTION. In order for the medical students to learn anatomy with comfort, a cheerful book dealing with concise contents is needed. So the authors have elaborated a regional anatomy book fitting for the purpose. METHODS. Only anatomical facts essential for cadaver dissection were included. Not only the simplified figures but also the comics depicting mnemonics and humors of anatomy were contained. The electronic book (a PDF file) titled “Memory booster of Regional Anatomy” could be downloaded from the homepage (anatomy.co.kr) without payment or registration. SUMMARY. The creative work was utilized as the textbook in a medical school that the authors belong to; then its educational effect was evaluated. As a result, correlation between the reading times of book and the grades of written examinations (even the grades of lab examinations) was approved. The additional feedback from the students was relatively positive; but they also reported weaknesses of the book. The assessment of learning utility is being done in more medical schools in Korea. CONCLUSIONS. Hopefully, the presented book would function as a pleasant resource to help the medical students learn anatomy efficiently. Simultaneously, the book would inspire other anatomists to produce their own books. (Sponsored by Grant No. 2015R1A5A7037630 from the National Research Foundation of Korea.)

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Individual Students’ Dissection Engagement & Dissection Quality Effect on Overall Course Performance.

INTRODUCTION. As students per dissection number increases, there is less individual student engagement in the process. There is less personal responsibility in the quality of the dissection when there are many students participating. This study looked at how students ranked their own dissection engagement versus how faculty evaluated the dissection quality and correlated it with individual students’ course performance. METHODS. First year dental students (N = 127 over 2 years) were divided into dissection pairs to work on hemisected heads (and necks). Throughout the course, students were evaluated with multiple choice and practical examinations based upon their dissections. As part of the final exam, students were asked to report the percentage of effort that they individually undertook to move the dissections forward. Faculty analyzed the dissection quality at the end of the course, ‘grading’ dissections versus stated goals and prosected specimens. Faculty examined individual student performance on each of the course examinations to determine a correlation between dissection effort, dissection quality and student performance within the course. SUMMARY. From early analysis, dissection quality, dissection effort, and student performance in the course are independent of each other. Some of the best dissections were performed by mid-quality students, some of the best students only engaged minimally in dissections and some of the worst students put in the greatest effort towards dissection. CONCLUSIONS. Based on our findings, dissection engagement and dissection quality have little impact on overall student success within the course. The students’ choice for where they focus their efforts seemed to have more to do with their individual personality and work ethic (or specimen characteristics), than it did on their interest or comprehension of the material.

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Incorporating Clinical Skills in the Anatomy Laboratory: Can Students Document Their Dissections?

INTRODUCTION. With the advent of integration, technology and blended teaching environments, the gross anatomy laboratory has the potential to be an ideal platform for teaching clinical skills in addition to knowledge. Key to clinical reasoning includes the ability to observe and document findings. Our project investigated one method for using documentation in the laboratory with the purpose of improving clinical skills while emphasizing a key medical concept, anatomic variation. This study involved students dissecting the axillary artery, identifying the branches and diagramming their cadavers' arterial distribution. METHODS. First year medical students were randomly assigned to 32 cadaver stations with 5-6 students per station. Each lab station dissected, identified and diagrammed the branches of their cadaver's axillary artery. Dissections were compared to the diagrams of the cadaver's axillary distribution and scored based on a grading rubric. Dissection, documentation, and practical exam scores were analyzed using paired t-tests. SUMMARY. This study demonstrates that documentation can be taught and evaluated in the anatomy laboratory. Dissection score was 81% in contrast to documentation which was significantly lower 58% ($p<.000$). Documentation score correlated with practical scores ($p<.001$) while dissection completion ($p<.46$) surprisingly did not. Anatomic variation did not negatively impact the students' ability to dissect or document. CONCLUSIONS. First year medical students experienced difficulty in accurately documenting their dissection of the axillary artery. Documentation scores were a better marker for practical performance than group dissection completion. These findings suggest that there may be a need to teach and evaluate clinical skills such as documentation in the basic sciences.

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Optional Anatomy Practicals - Predictor of Student Success and Continued Interest in Gross Anatomy.

INTRODUCTION. In a longitudinal curriculum with gross anatomy integrated into each systems-based unit, students can choose the emphasis to place on clinical anatomy. When optional gross anatomy review is offered to first year medical students, using such a resource correlates with student interest in anatomy and general usage of supportive study aids. RESOURCES. Anatomy practicals were written and administered by second year medical students who had successfully completed a year-long integrated anatomy curriculum. Practicals were offered as a supplemental resource for first year medical students during the first semester of medical school in association with the timing of their unit exams. Three different practicals were given with material covering the nasal cavity and pharynx, gastrointestinal system, and musculoskeletal system. Second year medical students developed the questions based on curricular materials and personal experience of what gross anatomy concepts were most important to master for unit exams in the curriculum. Attendance at these optional practicals represented about one fifth of the class. Participation in exams was correlated to three major outcomes: performance in anatomy evidenced by unit exam scores, continued interest in gross anatomy indicated by applications to join the second-year cohort responsible for writing practicals, and tendency to utilize supplemental resources based on attendance at school sponsored review sessions in other subjects. DESCRIPTION. Anatomy practicals were intended to be used by students in need of improvement and review in anatomy as an assessment of anatomical knowledge. SIGNIFICANCE. Student participation in optional anatomy practicals was an indicator of a self-identified need for improvement in anatomy. Medical students who attended these optional practicals included those with a developing interest in anatomy and those with a tendency to utilize additional school-sponsored resources in aiding their studies.

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Learning Gross Anatomy: Is There Another Way?

INTRODUCTION. Undergraduate and professional gross anatomy courses are traditionally taught utilizing didactic lecture. Herein, we demonstrate the use of flipped classroom pedagogy. This blended learning model is characterized by "flipping" traditional in-person lecture-based knowledge acquisition and traditional homework. While current flipped classroom pedagogy typically occurs during lecture, we modified the flipped classroom directed discussion for implementation in laboratory. RESOURCES. Flipped classroom methods were refined from a pilot study to determine suitable practices to be implemented in parallel for two different populations of students; undergraduate (n=203) and professional (n=61). During the consent process, participants voluntarily self-selected the in-person (undergraduate n=132; professional n=40) or online (undergraduate n=71; professional n=21) lecture delivery method and were committed to this delivery method for the duration of the semester. DESCRIPTION. All students enrolled in the course completed the same content pre-test prior to the flipped classroom session in order to assess base of knowledge. Upon completion of the pre-test, the online group received access to a pre-recorded lecture. The in-person delivery method group received the same content during the traditional lecture session. Following content delivery, all students enrolled in the course participated in the same flipped classroom experience, utilizing guided small group discussion prompts and instructor interaction in the lab. At the completion of the

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flipped classroom session, all students enrolled in the course completed the same post-test to assess knowledge acquisition and mastery. SIGNIFICANCE. Facilitating increased and improved active interaction with content meets the need to multi-modally engage all populations of students. This aids in the development of deep learning and retention by requiring higher-order thinking consistent with upper levels of Bloom's Taxonomy.

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Allied Health Students' Utilization and Perceptions of Human Anatomy Learning Resources.

INTRODUCTION. Graduate students often present with varied anatomy experience and learning styles, stressing the need for diverse learning resources. This study examined students' utilization and perceptions of available resources that contributed to learning success. METHODS. Following multi-discipline anatomy courses, allied health students were invited to complete an online survey on frequency of resource utilization (often, occasionally, rarely) and perception of resource influence on learning success using a 4-point Likert scale (1=not influential at all, 4=extremely influential). Resources were labeled as passive (library web resources, atlas, lab computers, filmed lectures, textbook), active (prosections, models, 3D virtual lab, open lab), and collaborative (peers, teaching assistants, tutors, faculty). Descriptive analyses describe utilization and perceptions. SUMMARY. Respondents included 58 students (male=24, 32%; 27.3±5.9 years old). The most used passive resources were atlases (78.4%, n=40/51) and filmed lectures (69.2%, n=36/52) while lab computers were rarely used (75.1%, n=12/16). Prosections (85.8%, n=46/53) and models (85.8%, n=46/53) were the most often used active resource while 3D virtual lab was rarely used (30%, n=3/10). Learning with peers (90.4%, n=47/52) was the most often utilized collaborative resource while university tutoring (75%, n=36/48) and individual meetings with faculty (75%, n=33/44) were rarely used. All most frequently used resources were perceived as moderately to extremely influential on learning success. Active learning with prosections (3.8±0.4, n=52/58) and models (3.6±0.5, n=52/58) were perceived to have the greatest influence on learning success. CONCLUSIONS. Frequent use of active learning resources is perceived by allied health students to most positively influence learning success. As institutions make curricular and resource allocations, it is important to examine efficacy and frequency of use of learning resources.

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Functional Anatomy Sessions: An Innovative Method for Teaching Musculoskeletal Form and Function.

INTRODUCTION. The musculoskeletal component of many anatomy programs focuses primarily on memorization of muscle attachments, movements and innervation. While these are important, clinical practice requires a more functional understanding of musculoskeletal anatomy. Functional anatomy sessions were introduced into the UMass anatomy program in 2016 as a required problem-based learning exercise. Their goal was to help students understand the complex synergy of muscle groups and their actions in performing daily tasks. RESOURCES. Students rotated through a series of stations, each of which required them to perform a simple task. At most stations props such as scissors, step stools, and baseball bats were provided to facilitate the activity. DESCRIPTION. Small groups of students rotated through a series of 16-20 stations arranged around a large conference room. Each station was equipped with simple props and instructions regarding a task to be performed. Students were allowed 5 minutes to perform the task and answer a set of questions before rotating to the next station. The tasks described at most stations were designed to replicate those used in common daily activities such as climbing stairs or swinging a baseball bat. For each activity, students were asked to identify the actions occurring at specific joints and the primary muscles performing those actions, and to consider the functional deficits resulting from joint pathology or specific nerve lesions. SIGNIFICANCE. Medical students often focus only on discrete facts and fail to recognize the clinical context in which their knowledge will be applied. In these sessions, students were asked to analyze the contribution of individual muscles and actions to the performance of common tasks. Integration of physical activity with the cognitive experience helped students appreciate and anticipate difficulties encountered by patients with musculoskeletal limitations.

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Understanding Video and Screencast Usage Statistics in Medical Education Research.

INTRODUCTION. With the advancement of technology and the ability to create online media for students, methods for evaluation of such media have evolved. This might include evaluation of usage statistics provided by an online host platform. However, the meaning of these data must be fully understood when drawing conclusions about student use. The purpose of this study was to compare two sets of usage statistics across 28 videos and screencasts provided to 97 first-year medical students. METHODS. Screencast tutorials (n=9), lecture screencasts (n=5), and dissection videos (n=14), were posted to TechSmith Relay® (TSR) and linked via Blackboard Learn (BBL). Usage statistics were recorded simultaneously from both platforms. Total hits and the number of students that clicked each link were recorded in BBL. Total views and

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the number of students that clicked play, and viewed >10%, >25%, >50%, >75%, and >90% of each video were recorded from TSR. Paired t-tests were performed to compare total BBL hits versus TSR views, and the number of students with BBL hits versus TSR views. SUMMARY. Total BBL hits (mean 124.5 ± 47.4) were significantly higher than actual total views indicated by TSR (mean 86.9 ± 66.2) across videos ($p<0.0001$). BBL total number of students with hits (mean 42.5 ± 18.1) was significantly higher than both the total number of students that actually pressed play once reaching the TSR site (mean 36.1 ± 16.9; $p<0.0001$), and the number of students that watched >90% of each video in TSR (mean 28.9 ± 15.0; $p<0.0001$) across videos. BBL provided insight into multiple views, which was not provided by TSR. CONCLUSIONS. The results of this study have important implications for utilizing BBL and TSR usage statistics for evaluating the effectiveness of learning tools. Data are continuing to be analyzed to determine if video length or content has an effect on the differences between usage statistics from each platform.

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Student Coping Strategies for Adjusting to Anatomical Dissection.

INTRODUCTION. The first exposure to dissection can elicit varied emotional responses in students, and some kind of intentional meditative activity may provide a way for students to cope with this new experience. The purpose of this study was to evaluate engagement in mindful reflection (MR), meditation (MDN), and religion/prayer (R/P) in response to dissection. METHODS. First-year medical students were given a survey shortly after starting anatomical dissection during the 2015-16 (Y1; n=84) and 2016-17 (Y2; n=96) academic years. Y2 received a short introduction to MR, while Y1 did not. Students were queried on emotional responses to dissection and engagement in activities outside of the curriculum in response to dissection. Data were analyzed to explore relationships among coping strategies and emotional responses. SUMMARY. The response rate was 42.7% (n=77) across both years. There were no differences in engagement in these strategies by year. Across all respondents, 57.5% (n=42), 37.8% (n=28), and 18.1% (n=13) reported engaging in MR, R/P, and MDN, respectively, prior to initiating dissection in the laboratory, with no differences by gender. Students who practiced MR reported higher levels of feeling anxious ($p<0.01$), nervous ($p<0.01$), fearful ($p<0.05$), and saddened ($p<0.01$) about dissection than those that did not practice MR. In Y2, (n=39), 55.9% (n=19), 45.7% (n=16), and 11.8% (n=4) reported engaging in MR, R/P, and MDN, respectively, in general in response to dissection. Frequency of MR was correlated with feeling guilty about dissection ($r=0.348$, n=33, $p<0.05$), and frequency of MDN was correlated with the desire to work with donors ($r=0.352$, n=33, $p<0.05$). CONCLUSIONS. A subset of students engage in meditative coping strategies for adjusting to dissection, and these appear to be related to emotional responses to dissection. Data continue to be collected to evaluate responses across the first year, and connections to course performance.

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Comparison of Student Learning Experiences Using Embalmed Versus Plastinated Specimens.

INTRODUCTION. We examined student evaluations of using plastinated cadaveric specimens in undergraduate, prosection-based Gross Anatomy self-directed labs. We hypothesized that students' significant learning–within Dee Fink's Taxonomy domains of Foundational Knowledge, Application, Integration, Human Dimension, Caring, and Learning How to Learn–would be enhanced as a result of using plastinated specimens. METHODS. Students were exposed to various plastinated specimens for self-directed study sessions. Students were informed that the specimens were available for use as an alternative study method, but no incentives were offered for using them. An IRB-approved, Likert-style survey was administered to students after their midterm exam to gauge self-efficacy of significant learning after using plastinated specimens. One statement per Fink's Taxonomy domain was included in the survey. We analyzed responses using a grounded theory approach, beginning with constructing a word cloud to reveal the most frequent words used in responses that informed subsequent detailed thematic qualitative analysis. SUMMARY. We received an 80% response rate (556/693) students) to the survey, of which 77% used the plastinated specimens. We only analyzed the ratings of those who used the plastinates. Students' highest rating for the role of plastinated specimens in learning anatomical structures in a prosection-based course, and in accordance with Fink's domains were as follows: Foundational Knowledge (43.35% Somewhat Agree), Application (30.09% Strongly Agree), Integration (27.7% Strongly Agree), Human Dimension (29.14% Strongly Agree), Caring (25.54% Strongly Agree), Learning how to Learn (24.82% Strongly Agree). Across domains, students indicated their preference for the clarity, availability, and study efficiency with the use of plastinated specimens. CONCLUSIONS. Plastinated specimens provided a superior learning experience for students during self-directed study sessions.

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Introducing Bedside Ultrasound in Human Anatomy Laboratory - A Quantitative Feasibility Assessment.

INTRODUCTION: Rectus femoris muscle thickness (RFMT) measurement using point-of-care ultrasound (POC-U) is now being used to evaluate patient nutritional status. Introducing hands-on POC-U instruction in the medical school anatomy laboratory may be beneficial and clinically relevant to patient care. METHODS: Medical students were provided faculty-guided demonstrations in POC-U to measure the RFMT in the parasagittal (PS) and transverse (T) planes. Measurements were made at a point one-third the distance along a line between the superior border of the patella and the anterior superior iliac spine. Each measurement was repeated three times by each student. Subsequently, students manually measured the RFMT using calipers immediately following the anatomic dissection of the lower extremity. In order to assess the reproducibility and accuracy of the students' measurements, intra- and inter- observer reliability and inter-method reliability were analyzed using a repeated measure ANOVA and repeated measure factorial ANOVA. RESULTS: Two medical students measured the RFMT in 44 cadavers using POC-U and calipers. The average measure of RFMT using the POC-U in the T-plane was 7.8mm ± 2.7mm and 7.8mm ± 2.8 in the PS-plane. Average RFMT using calipers was 9.5mm ± 2.5mm. Comparative analysis of the students' POC-U and caliper measurements of the T- and PS- planes revealed no significant differences in intra- and inter- observer measurements ($P>0.05$). RFMT measurements obtained from POC-U significantly differed from those gathered manually with calipers ($P=0.001$). SUMMARY: POC-U may be used to accurately measure the RFMT to assess the clinical nutritional status of the patient. Observed differences between the two techniques may be due to (i) intrinsic differences in the two modalities, (ii) residual soft tissue, or (iii) increased muscle diameter from relaxation after dissection. Subsequent studies will directly compare POC-U and caliper measurements in the dissected specimen.

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Using Integrated Neuroanatomy Laboratory to Enhance Clinical Skills Training and Long-Term Retention.

INTRODUCTION. At CalMed-SOM, we have designed an integrated, active learning curriculum that is driven by clinical presentations and clinical cases, and utilizes a blend of validated evidence-based teaching methods. To complement this team-based, system-based curriculum, there was a need to create laboratory sessions that would support content integration and hands-on active learning practices. RESOURCES. The thematic topics of a specific week within the course "The Integration of Life's Processes" (Neurosciences), cover the structure, function, and disorders of the meninges. During this week, a procedural laboratory session has been designed, in which a lumbar puncture is performed to accompany the week's clinical presentation (headache), clinical case (meningitis), and clinical skills session (fundoscopic examination). DESCRIPTION. The four-hour laboratory session starts with a team-based approach that uses readiness assurance tests and clinical application exercises to test students' knowledge based on previously provided resources. This is followed by a demonstration of prosected brain specimens. Students will then undergo video-guided training on the procedure of lumbar puncture followed by a hands-on practice on simulators. This activity will be supervised by neurologists and neuroanatomists. A formative assessment using specific assessment rubrics will be conducted immediately following the procedure to evaluate its accuracy. The laboratory session will end with the students taking a survey to assess their learning experience and satisfaction with the laboratory session. Survey results will provide a basis for improving laboratory teaching in the course as part of the process of continued curriculum enhancement. SIGNIFICANCE. This laboratory session will help students apply neuroanatomical concepts in clinical settings, facilitate long-term retention of neuroanatomy knowledge, and enhance clinical skills training in preparation of the clinical years.

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Benefits of Implementing Weekly Table Check Assessments into a Gross Anatomy Laboratory.

INTRODUCTION. Cadaveric instruction in the anatomy classroom is a time consuming and expensive endeavor. However, the use of cadavers in teaching gross anatomy enhances student learning and thus is an essential tool in the laboratory. Several programs utilize supplementary resources to complement the dissection experience. The data presented here suggests that a model of incorporating weekly oral table check assessments encourages students to integrate detailed anatomical information and increases retention. RESOURCES. This approach focused on implementing an assessment tool in a graduate dissection class. The collected data spans several years, with approximately fifty students enrolled each semester. The course is organized into four, region-based dissection units with no lecture component. As such, this course requires independent learning that uniquely benefits from frequent assessment. DESCRIPTION. Student knowledge was evaluated in the form of weekly table check assessments focusing on identification, spatial relationships, and the quality of dissected structures. This systematic approach used integrative questions to encourage preparedness, promote critical thinking,

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and improve retention of material. Quantitative analysis showed a positive correlation between the weekly table check assessments and the corresponding exam grade in each unit, resulting in an overall improvement in student performance. SIGNIFICANCE. This study helps to address the need for more data in improving anatomical sciences instruction. In addition to evaluating the quality of dissection, the structure of these weekly table check assessments probes student understanding and increases depth of knowledge in human anatomy. Incorporating assessment techniques that emphasize critical thinking may improve student performance and outcomes in the dissection laboratory.

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Enhancing Clinical Relevance of Anatomy for Dental Students Through the Use of Surgical Dissections.

INTRODUCTION. Even though dental board examinations include anatomy beyond the head and neck, it is often difficult to inspire dental students to appreciate the potential clinical importance of these areas in dental medicine. Additionally, traditional cadaveric dissection approaches often do not highlight essential anatomical structures and relationships in the field of dental medicine. To address these challenges, we developed a series of surgical dissection activities customized for first year dental students. METHODS. Each dental student performed two surgical dissections, one surgical flap procedure for reconstruction and one head or neck procedure, in groups of three. Surgical procedures commonly performed by oral maxillofacial surgeons were chosen and modified for embalmed tissue. Each surgical dissection consisted of patient history and the surgical procedure with key clinical anatomical learning objectives. Based on feedback from the surgical dissection approach with UofL first year medical students, a dedicated upper level teaching assistant was first mentored with the procedural details and then independently directed all student surgical dissection activities. SUMMARY. Surgical flap procedures for reconstruction following head and neck procedures included pectoralis major myocutaneous flap, rectus abdominis myocutaneous flap, lastissimus dorsi myocutanous flap, scapular free flap, radial forearm free flap, and temporalis myocutaneous flap. Each group also performed one of the following surgical head and neck procedures: parotid gland resection, level IV/V neck dissection, submandibular gland resection, thyroidectomy, TMJ repair, and laryngectomy. CONCLUSIONS. Formative feedback from students highlights the efficacy of these exercises in mastering relationships, appreciation of performing a discipline-related procedural activity, and providing a unique opportunity to visualize relationships that are often times only provided in textbooks.

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Anatomy Education in an Integrated Curriculum: A Case Study.

INTRODUCTION. The Texas Tech University Paul L Foster School of Medicine (PLFSOM) uses a clinical-scheme based curriculum with common patient presentations integrated with the basic sciences. While this novel curriculum has produced well-rounded student-physicians, the effects on the anatomy component have been mixed. The PLFSOM curriculum presents a challenge to accomplishing quality anatomy education, similar to the University of Michigan Medical School when they adopted an integrated curriculum in 2003 which resulted in decreased anatomy competency due to lack of student accountability. Students at UM and PLFSOM were assessed on their ability to pass each integrated unit of the curriculum, but there was no requirement to attain any level of performance in any specific discipline. It is hypothesized that the lack of discipline accountability within the integrated curriculum has produced the phenomenon of 'gaming the system', whereby students preferentially study certain disciplines while neglecting others. Additionally, PLFSOM struggles with a paucity of contact hours for anatomy combined with an unequal number of exam items for each discipline. As is the case at many schools, each contact hour at PLFSOM has a set number of questions represented on each exam, and the number of exam questions dedicated to each discipline was positively correlated to exam scores and NBME Step 1 discipline specific results. Performance on anatomy-specific questions, both within PLFSOM courses and on NBME Step 1, has lagged. RESOURCES. Exam data collected and analyzed over the past six years from PLFSOM. DESCRIPTION. To assess the success of anatomy education in an integrated curriculum. SIGNIFICANCE. It is suggested that a mechanism combining student accountability and question-per-contact hour should be added to integrated curricula to prevent discipline neglect and ensure that students study all of the disciplines together as intended by the architects of integrated learning.

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Cadaver Dissection as a Clinical-Based Patient Case in Undergraduate Pre-Professional Program.

INTRODUCTION. Among fourth-year medical students, cadaver dissections are rated the most important tool for deeper and lasting understanding of human anatomy. Further studies indicate that between the second week and end of year one of cadaver exposure, a significant reduction in stress indicators occurs. These points illustrate the importance of utilizing cadavers and that exposure, over time, is essential in learning medical anatomy. In addition, the importance of critical

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thinking in anatomy education for student doctors is especially important as medical errors are suspected as the third leading cause of death in the United States. These points underscore the significance of undergraduate cadaver dissection in the edification of pre-professional students. RESOURCES. To this end, MSSU has incorporated a problem-based learning approach in a cadaver-based gross anatomy course titled Advanced Human Dissection (AHD). DESCRIPTION. The AHD course is taught in terms of the 'patient' by incorporating a clinical-based approach to dissection and pathophysiology. Four students are responsible for each cadaver's dissection, collecting and analyzing DNA, and preparing histological slides. Before dissection, CT scans are obtained at a local hospital and x-rays are taken in the University's radiology department. Each cadaver's findings are used to create a patient case which the dissection teams present at the end of the semester to faculty, students, and local physicians. SIGNIFICANCE. The critical thinking skills utilized as well as the pace of the course mimic the environment future doctors will experience in medical schools, thus creating smoother transitions from undergraduate to graduate education. A survey of former AHD students rated the course "very beneficial" in preparing them for professional school, indicating the need for this type of course in undergraduate institutions which seek to competitively place students in medical programs.

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Incorporating Laparoscopic Anatomy into the First Year Medical School Anatomy Curriculum.

INTRODUCTION. We investigated whether a hands-on laparoscopic exercise reinforces abdominal anatomy for first year medical students. Laparoscopic procedures provide the student with a unique perspective on abdominal anatomy and simultaneously better prepare the student for surgical clerkships. The goal of this study was to determine if integrating laparoscopy into the curriculum enhanced student understanding of intraabdominal anatomy. METHODS. The first year anatomy course at the University of Minnesota is taught jointly by anatomical scientists and senior surgeons. The laparoscopic exercise was conducted at the conclusion of the abdominal module. A fresh donor model was used. Once pneumoperitoneum was obtained, the camera introduced, and additional ports placed, a senior surgeon demonstrated intraabdominal and pelvic anatomy, correlating this with the recent open dissection. Students took turns operating the camera and manipulating intraabdominal contents with instruments. In addition, students performed a camera guided percutaneous liver biopsy under the direction of a second surgeon. Students completed a survey at the end of the laparoscopic exercise. RESULTS. A total of 107 surveys were completed. 91% of respondents felt that they were strongly able or able to correlate images on the monitor with their dissection experience. 90% of respondents agreed or strongly agreed that the exercise had increased their understanding of intraabdominal anatomy. All respondents strongly agreed (78%) or agreed (22%) that the exercise had been interesting and informative. CONCLUSION. The inclusion of a laparoscopic demonstration in the first year gross anatomy course increases student understanding of anatomy. Further, it helps demonstrate the relevance of anatomy as a basic science to clinical medicine. The laparoscopic exercise also demonstrates that the collaboration of anatomical scientists and senior surgeons in teaching gross anatomy enhances the student experience.

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Anatomical Sciences Education among Biological Anthropology Graduates.

INTRODUCTION. Biological anthropology and anatomy are separate degree programs today, but they share an integrated past. The earliest physical anthropologists received much of their training from anatomists, and >50% of the American Association of Physical Anthropologists founding members were anatomists and physicians—8 were physical anthropologists. Biological anthropology programs gradually separated from anatomy departments to join the cultural, archaeological, and linguistic fields, following Boas' four-field approach. Still, biological anthropologists increasingly fill positions as anatomy faculty, particularly at medical schools. However, anatomy training varies depending on educational path and research interests. METHODS. To investigate anatomy training among biological anthropologists, a 22-question anonymous online survey was administered to biological anthropologists who obtained, or are in the process of obtaining, a graduate degree. Questions surveyed anatomy education received, graduate teaching experience in anatomical sciences, and opinions about the need for anatomy training among biological anthropology graduates. SUMMARY. The 269 survey respondents were mostly anthropology PhD graduates/candidates (86% anthropologists; 57% PhDs); 61% work/attend school in anthropology/social sciences departments and 21% in anatomy/health sciences departments. Most (72%) of employed respondents consider anatomy knowledge essential to their current position. Only 35% of PhDs reported that anatomy was/is a required course, but 72% took anatomy (63% gross anatomy with cadaveric dissection), and 48% of respondents felt prepared to teach anatomy upon graduating. Most respondents (77%) felt that an anatomy course should be required in biological anthropology graduate programs. CONCLUSIONS. Survey results indicate most biological anthropologists still value, seek, and receive anatomy training, making these graduates valuable teaching resources for anatomy departments.

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Development of a Programmed Learning Approach to Prosection-Based Gross Anatomy.

INTRODUCTION. The current trend toward reduction of instructional time in the basic sciences is pushing many programs toward the use of prosections. Increasing student numbers and a reduction in cadavers, involves faculty giving canned region-specific demonstrations at the prosection, rather than having students do discovery-based learning on their own. This programmed learning format was created to ensure that students were able to effectively navigate the prosections, in a specific time interval, with limited faculty intervention. RESOURCES. Initially the course dissector was rewritten into a prosector. Video clips were retained to show students how the prosected regions were dissected. The lab modules are used the session after the material was covered in the instructional format used. Each lab module has a prelab quiz based on material in the prosector. Prior to attending lab, students complete the Programed Learning Module for that session. Powerpoint storyboards for the module are integrated into Articulate Storyline 2 software. Questions reinforcing the lecture/prosector integrate feedback to emphasize relationships. 'High value information' icons display clinically-relevant, board-type infofacts. Final steps in each module have images of prosections in the lab. All questions answered are tabulated and the value recorded, they can redo the module for a better score. SIGNIFICANCE. The value of virtual anatomy is acknowledged, but the inherent touchable, 3D spatially demonstrated (optimally plastinated) specimens is integral to effective learning and relatable clinical associations. Continued use of small 'prosection groups' is encouraged to sequentially view the prosected specimens, in a timed format, the program can also be used after scheduled lab hours by individuals who value a differentially-paced learning experience. Beta-tested on second year dental students, we routinely heard how they wished the program had been available last year.

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Students' Perceptions of Lecturing Approaches: Traditional Versus Interactive Teaching.

INTRODUCTION. There is an increasing trend towards transcending from traditional to student-centered teaching. Mobile-based PollEverywhere Audience Response System (ARS) are not well known in preclinical dental schools of UK. Despite reports on the advantages of PollEverywhere, research on its effectiveness on knowledge gain and learning is scarce in UK although it is a highly effective interactive method. This study aimed to assess students' impression of the lecturer's efforts to incorporate interactivity by introducing PollEverywhere as it is of great help in facilitating students to pick up misunderstanding and in holding their attention. It aimed to describe PollEverywhere strategy and methods for assessing its success in facilitating active learning. METHODS. This system was introduced to undergraduate dental curriculum to increase students' motivation, attention and to give immediate feedback on their understanding during an Anatomy module. The lecturer strategically inserted questions using PollEverywhere. Students' perception of its usefulness and its effect on their engagement was evaluated using a questionnaire and focus group. SUMMARY. From the analysis of Likert response, it was clear that students preferred PollEverywhere lectures. Total mean score of the attitude towards interactive teaching was 83.08%. 95% reported that it increased their participation and clarified their thinking and helped them to focus on key points. 81.7% mentioned that it increased their motivation. Students regarded it as a useful method for giving real-time feedback which stimulated their performance. Reports from focus groups demonstrated that it was helpful in focusing students' attention, encouraging participation, clarifying information and in critical thinking. CONCLUSIONS. Students regarded PollEverywhere as an effective teaching innovation which encouraged deeper retention of information and an effective aid in monitoring their progress and identifying deficiencies.

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Does Near Peer Supplemental Instruction Improve Gross Anatomy Scores?

INTRODUCTION. Medical students who receive supplemental instruction have significantly increased test scores and decreased failure rates. While instructor-led reviews are most beneficial, this option is not always feasible. A common alternative is peer instruction, however, no studies demonstrate the benefit of supplemental instruction lead by Anatomy Graduate Teaching Associates (near peers). This study investigates effectiveness of near peer supplemental instruction (NPSI) on student performance in gross anatomy. METHODS. First-year medical students from The Ohio State University class of 2019 (n=203) were offered NPSI during the Bone and Muscle Disorders Block. Seven, two-hour NPSI sessions were offered. Pearson's correlation coefficient was used to examine the relationship of NPSI sessions to final block assessment

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scores. T-tests were used to compare assessment scores between students who utilized NPSI with students who did not attend. SUMMARY. More than half (57%) of students attended NPSI sessions. An average of 36 (±14.96) students attended each session. Overall class mean anatomy practical score was 86.13 (±10.5) and final written exam score was 87.1 (±6.4). Students who attended NPSI (n=116) had an average anatomy practical score of 87.9 (±8.3) while students who did not attend (n=86) had an average of 83.7 (±12.6) ($p<0.005$, $t=-2.85$). Students who attended NPSI had an average written exam score of 87.8 (±5.9) while students who did not attend had an average score of 86 (±6.8) ($p<0.05$, $t=-2.04$). CONCLUSIONS. This preliminary analysis indicates students who utilized NPSI scored significantly higher on both the anatomy practical and final written exam compared to their peers who did not use NPSI. This study suggests that NPSI may be an effective teaching strategy for medical students taking anatomy. NPSI may be a beneficial resource for students as a supplement to medical school curricula and may be beneficial to those students identified as high risk.

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Post-mortem CT Scan Movies Utilized in Self-Directed Clinical Cases for Medical Students.

INTRODUCTION. Medical student exposure to computed tomography (CT) is limited within the first two years of medical school. Integrating a variety of educational resources of various modalities provides students a greater understanding of anatomy's clinical significance. Our purpose was to increase the clinical relevance of anatomy, synthesize information between medical education disciplines, and enhance student ability to recognize anatomical structures and pathologies on CT they will likely see in practice. RESOURCES. A series of post-mortem CT scans of cadavers from 2009 through 2016 were collected and converted into high resolution QuickTime files using OsiriX Lite software for student use. Cases were written exposing interesting and unique anatomical findings as well as clinically significant pathologies. Each case is accompanied with relevant board-style questions and explanations. DESCRIPTION. In the fall of 2016, we began converting post-mortem CT scans of cadavers from the Texas Tech El Paso anatomy lab to QuickTime video files. Each CT scan was investigated thoroughly for pathological and anatomical findings. Cases were written for relevant pathologies observed on CT including summary of pathophysiology, vignette style questions and answers, as well as relevant treatments. The content is introduced to Texas Tech University Health Sciences Center El Paso first year through fourth year medical students via web-based, self-guided clinical scenarios. Students complete two surveys to assess for acquisition of anatomical and clinical knowledge as well as to evaluate the anatomy as a foundational learning tool for their course work and preparation for their board examinations. SIGNIFICANCE. Providing students opportunities to utilize anatomical knowledge enriches student interest in the clinical relevance of anatomy, improves ability to recognize structures on CT scans, and enhances general medical knowledge as it relates to anatomy.

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A Novel Approach to Pelvic Dissection for Medical Students: A Clinical Perspective.

INTRODUCTION. The concept of the perineal membrane, superficial and deep perineal pouches associated with the pelvis is often a point of confusion for medical students taking gross anatomy. Previous dissection instructions for the pelvis have resulted in a lack of tangible perineal structures, forcing students to reference images in texts and atlases solely in order to understand the complexity of the region. With our novel approach to the pelvis dissection, students will be able to dissect these structures en bloc and will better be able to see the progression of these pelvic structures and their relationships to one another. RESOURCES. An addendum was written describing a novel approach to the traditional pelvis dissection performed by medical students in the gross anatomy laboratory. This addendum will be implemented in our department as an alteration to the original pelvic dissection instructions published in Grant's Dissector, 16th Edition. DESCRIPTION. Our novel dissection removes the external genitalia en bloc, and provides simpler access to internal reproductive organs permitting cleaner hemisected pelves for further neurovascular dissection. SIGNIFICANCE. Our novel dissection approach will not only assist students in understanding a once considered abstract region of knowledge, but will also assist those looking to specialize in these specific areas of medicine to have a broader scope of knowledge in the field. This dissection closely mimics pelvic exenteration, a surgical salvage procedure used for recurrent pelvic cancers. (Supported by Department of Biomedical Education and Anatomy, The Ohio State University.)

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Surgical Dissections: A Novel Approach to Clinical Anatomy in Medical Gross Anatomy.

INTRODUCTION. Traditional cadaveric dissection provides a necessary framework for mastery of anatomical relationships but it lacks direct clinical application. The present study describes the development and evaluation of 14 surgical dissection application exercises for first year medical students, offered in conjunction with a traditional dissection curriculum. METHODS. Six students were assigned to each dissection team, but only 3 dissect in the traditional lab on any given day;

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the others complete different activities, including 1 of 14 different surgical dissections, performed in a small dissection lab separate from the traditional lab and supervised by a senior medical student who answered questions and helped with challenging procedural steps. Each procedure was organized into three sections: patient presentation, procedure, and peer presentation. SUMMARY. A post-semester survey was conducted to analyze the educational impact of surgical dissections. Students indicated a slight preference for traditional dissection (47%) over surgical dissections (37%). Eighty percent indicated that surgical dissections enhanced their understanding of anatomical relationships and positions of structures, while 76% indicated that surgical dissections enhanced their understanding of the surface anatomy in relation to the underlying anatomy involved in the procedure that they performed. Students were most satisfied with cricothyrotomy and thoracotomy (100%), appendectomy (96%) and central line placement (90%). Students were least satisfied with left hemicholectomy (45%), thoracic outlet (47%), Caldwell luc procedure (56%), and leg fasciotomy (63%). CONCLUSIONS. While students were more comfortable with conducting traditional dissections, many enjoyed the novel approach of critically thinking about anatomical relationships through a narrow skin incision, as well as relating surface anatomy to underlying structures.

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Application of a Creative Assignment and Subsequent Learning Outcomes in Large Undergraduate Courses.

INTRODUCTION. A common goal of undergraduate anatomy educators is to offer students a variety of ways to synthesize course material. Informal observation has suggested that students who produce creative work in an open-ended assignment regarding a clinical condition perform higher on the corresponding exam and in general than students who produce a text-only report. The current work aimed to formalize these findings. METHODS. Undergraduates in a system-based semester-long anatomy course were recruited (n=48) as well as students in the second semester of a year-long anatomy & physiology course (n=113). Students were randomly assigned to control (text-only) and experimental (creative project) groups. Students were instructed to turn in a one-page product that described how a specific clinical condition related to the anatomy they learned in class, symptoms, causes, and treatments. The creative groups had no limitations on the media to use and were encouraged to be as creative as possible in their submissions. Performance on test questions among the control and experimental groups was compared. SUMMARY. A Chi-square analysis of the data showed no significant difference ($p>0.99$, $p=0.42$) between the text-only and creative groups when comparing performance on content-related exam questions for the anatomy only and anatomy & physiology courses, respectively. CONCLUSIONS. Completion of the creative assignment resulted in no significant change in performance on a relevant exam question as compared to students in the control group. The authors note that the creative submissions this semester were unremarkable compared to past semesters that did indicate correlation regarding creativity and enhanced exam performance. Future trials will more strongly encourage creativity by offering more incentives, showing examples of creative work, and restricting the use of electronically generated submissions in effort to promote hand-generated products.

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Preferred Learning Styles of First-Year Dental Students.

INTRODUCTION. It is a general concept that our students learn in different ways but most are vaguely unaware of their learning style. Learning style instruments are useful as they allow instructors to learn more about students, as well as aid in the development and application of useful teaching approaches and techniques. Currently, there is a noticeable lack of research on learning style preferences of dental students. METHODS. The Index of Learning Styles (ILS) questionnaire, developed by Drs. Richard Felder and Linda Silverman, which indicates students' preferred learning styles in four dimensions, was administered to students enrolled in a first-year dental gross anatomy course to determine their preferred learning styles. SUMMARY. The preferred learning styles of students were voluntarily surveyed (n = 67 out of 112) enrolled in the first-year dental gross anatomy course were reflective (56.7%), sensing (80.6%), visual (86.6%), and sequential (67.2%). CONCLUSIONS. Understanding students' preferred learning styles should guide course design. Based on the preferred learning styles of the first-year dental students in this particular gross anatomy course, course activities should allow for contemplation (i.e., reflective), the course should be grounded in concrete information (i.e., sensing), the course should utilize visual representation such as images, figures, models, etc. (i.e., visual), and the course curriculum should move in small incremental steps that build on each topic (i.e., sequential).

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Introducing an Array of New Teaching Measures to Enhance Medical Students' Performance in Anatomy.

INTRODUCTION. The new integrated basic sciences curriculum was implemented at Weill Cornell Medicine-Qatar in the fall 2016. This process necessitated a thorough evaluation of available and required educational resources. In anatomy, emphasis has been made on introducing new measures that would facilitate students' understanding and promotes efficient use of lab time. An array of teaching measures has been introduced as a pilot during the fall semester of 2016. Measures included the use of audience response system; offering online learning resources; and promoting students' professionalism in the anatomy lab. Students' performance in quizzes was monitored and their satisfaction was surveyed anonymously at the end of the semester. METHODS. Measures introduced during the last 8 anatomy lab sessions included: Faculty videotaped review sessions using prosected specimens; Online labeling practice modules created with Softchalk; Relevant clinical cases for each lab session; Use of audience response system; and Measures to enhance students' professional attitude in the anatomy lab, including recording dissection findings and correlating with the cause of death, and cadaver care. Students' scores in quizzes have been assessed before and after introducing measures. A survey was administered to evaluate the measures and to gauge satisfaction. SUMMARY. Students' mean scores in written quizzes showed a slight improvement compared to those before the intervention. However, 95% of the class agreed that the new measures helped in understanding anatomical concepts; 86% agreed that measures helped in realizing relevance of anatomical concepts. CONCLUSIONS. Students have overwhelmingly welcomed the new measures. The impact of these measures on performance in quizzes was clear, though modest on the written quiz section. It is hoped that a more sustained and refined application of such measures will eventually achieve a more positive impact on knowledge retention and performance.

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Online Modules that Use Principles of Spaced Repetition Improve Anatomy Learning.

INTRODUCTION. Poor retention of anatomical knowledge is a major and persistent problem in medical education. Recent studies have shown that online courses that utilize principles of the learning method known as "spaced repetition" improve long-term retention of clinical knowledge by medical students and residents. In spaced repetition, after the initial information is presented, learners are repeatedly asked to recall the information at increasing intervals of time. The aim of this study was to evaluate whether spaced repetition-based online learning modules improve the acquisition and retention of anatomical knowledge by pre-clerkship medical students. METHODS. Using the online learning platform Cerego, we created two interactive modules covering high-yield anatomy topics. First-year medical students were given unlimited access to modules five weeks before their summative exams. The exams included module-related and module-unrelated questions. Student user statistics were recorded by Cerego and scores on anatomy summative exam questions were recorded by ExamSoft. Student attitudes towards Cerego were assessed through a survey. SUMMARY. Students who used the Cerego modules (Users) performed significantly better on module-related questions compared to students who did not use modules (Non-Users). No statistically significant difference was found between percent correct on module-unrelated questions by Users and by Non-Users. Surveyed students rated the overall usefulness of modules highly (7.7 out of 10 rating). CONCLUSIONS. Use of spaced repetition-based online modules is associated with improved short-term retention of anatomical knowledge. It remains to be seen if use of such modules improves long-term retention and application of anatomical knowledge in clinical problem solving. (Sponsored by the PLFSOM Scholarly Activity and Research Program (SARP) Mini-Grant to Dolgor Baatar.)

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Anatomical Mental Rotation Abilities Across Anesthesiology Practitioners.

INTRODUCTION. Anatomy requires skills broadly classified as spatial ability. Mental rotation (MR), one type of spatial ability, is influenced by factors like gender, age, and activities, and can be improved with training. The goal of this study was to compare MR abilities across anesthesiology practitioners who utilize MR heavily in their clinical practice. METHODS. Anesthesiologist Assistant students (AA, 5F;9M), Anesthesiology Residents (6F;8M) and Attendings (2F;1M) completed an IRB-exempt online survey including two tests of MR ability–the well-validated Mental Rotation Test (MRT) and a novel Anatomical Mental Rotation Test (AMRT). The MRT used cube figures while the equivalent AMRT used anatomical structures. Mann-Whitney U tests determined if MRT and AMRT scores differ based on gender, age, years of experience, scope of practice, or video gaming/visual hobby. SUMMARY. MRT and AMRT scores were significantly correlated (Spearman's rho, $p=0.0054$), demonstrating concurrent validity of the novel AMRT. Mean AMRT score for AA males (67%) was significantly higher than Anesthesiologist means (F=26%; M=24%, $p<0.05$), but not significantly different than the female AA mean (40%,

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p>0.05). Females who play video games or have other visual hobbies scored significantly higher on the AMRT compared to non-gaming females; no differences were seen among males. No significant differences in AMRT scores were observed between age cohorts or years of experience. However, significant differences (p<0.01) were documented in mean AMRT score with scope of practice: AA students scored significantly higher (57.4%) compared to all Anesthesiologists (25%) and Anesthesiology Residents only (26%). CONCLUSIONS. As shown elsewhere, males tend to have higher MR scores, and hobbies like gaming may be linked to higher MR abilities. Surprisingly, the AA students outperformed Resident and Attending Anesthesiologists. Further work is needed to link MR abilities and performance in a clinical setting.

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Design & Implementation of a Distinction in Anatomy Track at a Clinically Integrated Medical School.

INTRODUCTION. Paul L. Foster School of Medicine (PFLSOM) has taken an integrative, novel approach to medical education. The curriculum centers around organ systems, joining into cohesive units the relevant anatomy, physiology, microbiology, pathology, and clinical presentations that are related to the particular organ system of study. Anatomy is not taught in its entirety within the first semester of the MS1 year; rather, it is also integrated segmentally within the organ system units. Considering the growing prevalence of these integrated curricula, there is no single solution on how to revise anatomical sciences' teaching across institutions from conventional to integrated. In addition to basic training, advanced elective courses have the potential to benefit anatomy learning and knowledge retention. A fully integrated approach converts anatomy into longitudinal instruction, threatening its didactic continuity by dispersing it across multiple units. This change has been implicated in a decline of anatomical knowledge among students at integrated institutions. The purpose of this project is to design and implement an anatomy intensive elective track at PFLSOM while working within the confines of the clinically integrative approach. RESOURCES. The Distinction in Anatomy Track is a special curriculum designed for students who want to gain detailed anatomical knowledge. DESCRIPTION. Medical students elect to apply for the track late in the 1st year. There is a 6 week intensive dissection experience in the summer between 1st and 2nd year with selection of an anatomical research project. 2nd year duties include teaching 1st years using the dissections as prosection demonstrations. The 4th year ends with presentation of research at national meetings. SIGNIFICANCE. Creation of the Anatomy Track solves two problems:1) students get supplemental anatomy training through prosection, 2) an elective like this maintains anatomical proficiency within an integrated curricula.

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3D Printed Models and a Digital Case Study Improve Student Learning of Pelvic and Perineum Anatomy.

INTRODUCTION. The anatomy of the pelvis and perineum is complex due to the limited visibility of structures and its difficulty of dissection. Medical students at UT Health San Antonio study these regions using dissection, prosection, peer teaching, and radiology. This study examines the effectiveness of interactive sessions with a 3D printed model with simulated anatomical contents using arts and crafts material and a digital anatomy case study using BodyViz© software, as assessed by exam performance and a survey. METHODS. 220 first year medical students, divided into four groups, rotated through demonstrations of the perineum on prosected cadavers, and interactive sessions with the 3D pelvic model and the digital case study. The average percentage of points obtained on questions (practical exam tags) related to the pelvis and perineum were assessed for each of the four student groups and also those enrolled in the 3 years prior. SUMMARY. The overall practical exam performance of students in this study varied as compared to previous years: slightly higher as compared to 2015 and lower as compared to 2014 and 2013. However, student performance significantly improved on the identification of the obturator internus muscle tag, included in all four years (p<0.0001). The impact of the rotation order shows a slight advantage in viewing the prosections prior to attending the active learning sessions. Moreover, students attending the 3D model session before the digital case study obtained the highest average score and also had the highest percentage of students (82%) with a passing score on relevant tags (≥70). Survey results show 69% of students agreed that the learning lesson facilitated their understanding of the pelvic and perineum anatomy. CONCLUSIONS. The 3D interactive model and the BodyViz© digital case study helped improve student exam performance of specific practical tags and served as useful tools to enhance students' learning of the pelvic and perineum anatomy.

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Learning Orbit Anatomy with Cerego: An Online Learning Program in Medical Education.

INTRODUCTION. Cerego is an adaptive online quizzing program based on the principles of repeated test taking, spaced learning, and high metacognition. Students rarely have access to study aids designed to incorporate all three learning strategies, so we created five Cerego sets to help medical students learn more efficiently about orbit anatomy and visual pathways. Custom sets in Cerego can include text, images, and videos for teaching, and the quiz items can be multiple

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choice, image identification, or organizing events into the correct sequence. The learning platform is promising because it provides the educator extensive performance data, such as time spent on each quiz item, while allowing the student to create custom sets for areas they personally struggle with. METHODS. In this study, we gave second year medical students (n = 112) unrestricted access to five Cerego sets three weeks before their summative examination. No incentives were provided for using the learning platform. Students also completed a survey on their opinions of Cerego. We plan to perform a regression analysis to compare the time spent using Cerego with performance on the summative examination. SUMMARY. On average, 32% of students used Cerego with an average of 37 minutes spent on each set. For students who started the sets, 18% completed all quiz items. Of the 48 students who used Cerego and responded to our survey, 48% cited repetition as a strength and 19% cited excessive length as a weakness. Students rated Cerego's overall value at 7.6 out of 10 on average. CONCLUSION. As suggested by the survey, educators should curate the material they wish to present in order to boost student completion of all quiz items.

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Applications of Three-Dimensional Photogrammetry in Anatomy Education.

INTRODUCTION. There are various multimedia applications for anatomy education. However, many applications lack three-dimensional (3D) images and some even compromise accuracy. Furthermore, few applications include 3D study aids produced directly from anatomical donors. Photogrammetry utilizes photography to determine distances between objects and is an underutilized technology in anatomy education. Photogrammetry coupled with computer software can use two-dimensional images captured by a still camera to create 3D digital models. The software uses overlapping images to tie points together in order to generate a 3D model. RESOURCES. A protocol for photography of human anatomical models/specimens and subsequent digital construction of 3D models was developed using a Nikon® D7100 HDSLR camera and Agisoft PhotoScan© software. DESCRIPTION. This novel study aims to utilize photogrammetry to produce 3D models for anatomy education and to digitally curate specimens. SIGNIFICANCE. The resulting models can offer students the convenience of study from satellite locations, which would give students the option to study anatomy in a variety of settings as well as the ability to minimize distractions. They could also lessen and possibly phase out wait time to study in a cluttered model room or anatomy lab by directly affecting the number of students present. Additionally, anatomical specimens or whole body donors that cannot be permanently curated may be electronically recorded for future study. Finally, the relative cost effectiveness and portability of a photogrammetry setup make it a practical and viable option compared to other 3D model producing devices, such as laser scanners or medical imaging equipment. Future work will entail creating a repository of digital models and implementing them in anatomy classes.

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Electromyography and 3-Dimensional Kinematics to Assess Body Posture in Dental Students.

INTRODUCTION. Seated posture in dentistry is an important area, which has received little investigation. Poor postural seated positions have been long documented to cause musculoskeletal disorders (MSDs). Back pain is a common MSD and has been recorded as occurring on average in over 50% of dentists and dental hygienists. Recent studies have suggested that negative consequences of bad posture can be identified as early as undergraduate dental education. With a well-documented prevalence of MSDs in dentists, hygienists and dental students, it should be no surprise that posture and ergonomics demands more attention. METHODS We used Electromyography (EMG) and 3-Dimensional Kinematics to assess posture in dental students while standing (baseline) and while sitting in a standard and in an ergonomic operator chair. Measurements were collected at rest, initially and chronically while the subjects performed routine dental restorations. SUMMARY. Our findings showed marginal improvement in the right ($p = 0.088$) and left thoracolumbar erector spinae regions ($p = 0.101$) while sitting on the ergonomic chair versus the standard chair. However, we observed statistically significant differences in the degrees of trunk inclination relative to gravity and a reduction in body movement on individuals seated at a chronic position in an ergonomic chair as compared to sitting on a standard chair ($p = 0.046$). CONCLUSIONS. While preliminary in nature, this study provided proof of principle for a larger study involving dental students and dental professionals at different stages of their careers. Furthermore, it supports the need for improvement in the design of dental operator chairs to address and prevent chronic back pain.

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Abstracts – Poster Presentations Session C

(Listed by presenting author last name)

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Three-Dimensional Morphology of the Sternoclavicular Joint Articular Disc with Clinical Relevance.

INTRODUCTION. The sternoclavicular joint (SCJ) is an important structure that connects the upper limb to the sternum. Clinically, the SCJ can serve as an injection site for treatments that reduce pain and inflammation. The lack of research on the three-dimensional morphology of the SCJ articular disc has hindered efforts for disc replacement surgery. The purpose of this study was to investigate the morphology of the SCJ articular disc and analyze its 3D architecture. METHODS. The SCJs of seven cadavers (6F, 1M) were dissected bilaterally. The anterior sternoclavicular and interclavicular ligaments were exposed and articular discs removed bilaterally. The length, width and thickness of the discs were measured using a digital caliper (Hawk, Inc.). Alja-Safe silica and Smooth-Cast liquid plastic (Smooth-On, Inc., Easton, PA) were used to create plastic molds of the discs. Statistics were calculated using SPSS Version 20.0 (IBM, Armonk, NY). SUMMARY. Mean (SD) death age of the cadavers was 70.3 (20.39) years. Mean (SD) width of the right disc was 23.33 (2.67) mm and mean (SD) width of the left disc was 24.17 (2.70) mm. Mean (SD) length of the right disc was 22.57 (6.28) mm and mean (SD) length of the left disc was 21.70 (3.95) mm. Overall, the mean width was found to be longer than the mean length. The plastic molds demonstrated that the rims of the discs were thicker than the centers, and the discs had concave curvatures on the clavicular side. Differences in degeneration between older and younger cadavers were also noted. CONCLUSIONS. Studying the morphology of the SCJ can aid clinicians, such as orthopedists and rheumatologists, in better understanding trauma and may be useful for the proper placement of therapeutic injections and future SCJ disc replacement surgeries.

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Innervation of the Anterior Hip Joint: A Blast to the Past.

INTRODUCTION. Ultrasound guided radiofrequency ablation (RFA) of the hip joint (HJ) is an alternative treatment for chronic hip pain. The success of RFA relies on precise anatomical knowledge of the nerves innervating the HJ. In the literature, most studies were carried out from the late 1700's to mid 1900's. With the renewed interest in HJ innervation, it is necessary to review the literature to form a foundation for more current studies. The purpose of this study was to consolidate historical descriptions and images to determine patterns of anterior HJ innervation and compare the results to ongoing cadaveric studies. RESOURCES. Gerstein and Thomas Fisher Rare Books Libraries at the University of Toronto, and RACER interschool database were used to identify studies pertaining to the innervation of the HJ. The descriptions and illustrations were compared to observations from cadaveric specimens. DESCRIPTION. The accessory obturator nerve (AON), originating from a single lumbar nerve (L2-L5), was found to course deeply along the medial aspect of psoas over the iliopubic eminence to innervate the anterior HJ. AON was the primary focus of most studies from the late 1700's to early 1900's, whereas obturator nerve (ON) was the main focus of investigation in the mid 1900's. The ON was illustrated and described as providing the "greatest part" of nerve supply to the anterior HJ, via branches originating from the main trunk or its anterior and posterior divisions. The femoral nerve (FN) has been least studied with little emphasis on precise location of branches to HJ. Ongoing cadaveric dissection has revealed extensive fine networks of branches from the AON, ON, and FN that innervate specific quadrant(s) of the HJ capsule. SIGNIFICANCE. Innervation of the HJ has been studied sporadically since the late 1700's, with inconsistent results. It is essential to have a clear understanding of HJ innervation to develop new techniques that target the anterior HJ capsule.

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A Comparison of the Distal Biceps Tendon Footprint and the Length of the Radius: A Cadaveric Study.

INTRODUCTION. An understanding and familiarity with the structure and utility of an osteotendinous junction is important in proper surgical repair and restoration of full function after a rupture injury. The purpose of this study is to compare the location and anatomic parameters of the distal biceps tendon insertion with the length of the radius so that their relationship can be better understood and maximal function can be restored post-repair. METHODS. Bilateral radii and the corresponding distal biceps tendon of 60 cadavers were dissected and removed. Area, width, and length of the distal biceps tendon insertion as well as the length of the radius and distance from head of the radius to the insertion of the distal biceps tendon was measured using calipers and a transparent grid. SUMMARY. A positive correlation was found when comparing the total length of the radius to the following three anatomic measurements: (1) distance from the radial head to the distal

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biceps tendon insertion point (r=0.547), (2) the area of distal biceps tendon footprint (r=0.398), and (3) the length of the distal biceps tendon insertion (r=0.386). The mean ratio between the distance from radial head to the tendon insertion and the length of the radius is 1:10 or 0.100. The mean ratio between the length of the distal biceps tendon insertion and the length of the radius is 1:10.75 or 0.093. The average length of the tendon insertion was 22.4 mm, average width was 6.9 mm, average area was 134.3 mm2, and the average distance from radial head to tendon insertion was 24.2 mm. CONCLUSIONS. As the length of the radius increases, so does the distance of distal biceps tendon insertion point from the radial head, the area of the footprint, and the length of the tendon insertion. During surgical repair of a tendon rupture, it is important to keep in mind these anatomic parameters to best preserve and restore function to the biceps muscle and the distal forearm.

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Onto-Phylogenetic Dissection of the Human Neck Utilizing Soft-Embalmed Cadavers: Clinical Anatomy.

INTRODUCTION. Gross anatomists have struggled to integrate traditionally region-based dissection into increasingly systems-based health science curricula. Onto-phylogenetic dissection allows structures which share common embryological origins or configurations to be studied by using a permissive preservation method that allows much greater displacement of structures and enhanced facility to discern fascial planes. RESOURCES. Two cadavers embalmed using a modified Thiel soft-cure method were dissected. DESCRIPTION. The basic similarities in cross-sectional anatomy of the adult human neck, a body cross-section of a human embryo, and the body cross-sections of chordate ancestors are striking, indicating homology among structures observed. Dissection first encounters derivatives of Pharyngeal Arch II, the platysma muscle, innervated by CN VII; then hypobranchiomeric muscles innervated by CN XI; then prevertebral fascia surrounding somitic musculature, innervated by spinal nerve ventral rami (hypaxial) and dorsal rami (epaxial). Derivatives of splanchnic mesoderm and endoderm innervated by CN X are enveloped by visceral pretracheal fascia anteriorly. Muscular pretracheal fascia envelops somitic hypaxial musculature anteriorly. Gut derivatives innervated by CN X and autonomics are central in the cross-section and the vertebral column forms an orienting structure posteriorly. Embryological migration of the heart and thyroid gland inferiorly and of the larynx superiorly explain looping and recurrent neural structures. Midline degeneration of the primitive dorsal mesentery in the neck creates the retropharyngeal space and its lateral remnants form the carotid sheaths. SIGNIFICANCE. Ontophylogenetic dissection allows systems-based generalities to be applied to a region and establishes a clear pattern for understanding complex neuromuscular, vascular, and fascial anatomy, essential to accurate diagnosis and effective treatment of clinical conditions.

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Concomitant Anomalous Exit of Chords Tympani via Foramen Spinosum and Canalis Musculotubarius.

INTRODUCTION. The chorda tympani is the branch of the facial nerve which carries special taste afferents from tongue taste receptors and preganglionic parasympathetic fibers to submandibular and sublingual glands. Embryologically, it remains outside of the temporal bone during the totality of fetal development. Bony formation of the anterior canaliculus of the chorda tympani does not begin until age two and is not complete until age five. Two to five percent of persons have an extratemporal origin of the chorda tympani, which is the most common variation, and bilateral variations in its course are generally attributed to severe congenital malformation. Normal dissection during a medical school course revealed a bilaterally variant path for the chorda tympani nerve in a specimen without documented congenital malformation. RESOURCES. A cadaveric specimen was dissected using standard dissection and otoscopic assisted dissection. DESCRIPTION. On the left side the chorda tympani was discovered in the infratemporal fossa exiting the foramen spinosum posterior and medial to the middle meningeal artery. It was then observed to join the lingual nerve in the infratemporal fossa medial to the inferior alveolar nerve. On the right side the chorda tympani was discovered in the infratemporal fossa exiting the foramen spinosum immediately posterior to and medial to the spine of the sphenoid, coursing between the fascia covering the pharyngobasilar tube and the anterior-most portion of the canalis musculotubarius. It was then observed to join the lingual nerve in the infratemporal fossa medial to the inferior alveolar nerve. Bilaterally, otoscopy revealed a standard course of the chords tympani through the middle ear. They were not observed to enter the middle cranial fossa. SIGNIFICANCE. Surgical approaches to the area, and neurotology surgeries in particular, will benefit from this additional knowledge to potential variations of the course of the chorda tympani nerve.

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Aponeurotic Architecture of Biceps Femoris and Semimembranosus: Implications for Muscle Injury.

INTRODUCTION. Strains of the hamstring muscle complex (HMC) frequently occur in high-intensity sports. It has been reported that diagnosis is difficult and rehabilitation challenging due to the lack of detailed understanding of muscle architecture. The areas of musculoaponeurotic junction have been suggested as possible sites for muscle injury. Strains have been reported to occur most frequently in the long head of the biceps femoris (BFL) and semimembranosus (SM). The musculoaponeurotic architecture of BFL and SM has not been investigated throughout the muscle volume. Therefore, the purpose of this study was to document in 3D the arrangement of the musculoaponeurotic components of BFL and SM. METHODS. Fiber bundles and aponeuroses of BFL and SM were dissected, digitized using Microscribe™ G2X digitizer and reconstructed in 3D using Autodesk® Maya®. Fiber bundle length (FBL), physiological cross-sectional area (PCSA) and surface area (SA) of aponeuroses were calculated and compared. SUMMARY. BFL and SM were found to have extensive proximal and distal aponeuroses, which overlapped in the middle third of the muscle belly. In both muscles, the width of the proximal aponeurosis was less than that of distal. BFL had a total aponeurotic area of 86.3cm2 of which 62.7cm2 had FB attachment. FBs spanned between the aponeuroses with a mean FBL of 12±3cm. No FBs spanned the full length of the muscle. SM had a larger aponeurotic component (115.6cm2) of which 75.2cm2 had FB attachment. Mean FBL of SM was 7.3±2cm as most FBs spanned between aponeuroses. PCSA of BFL and SM were similar. CONCLUSIONS. BFL and SM were found to have large areas of musculoaponeurotic attachment sites. The FBs of these muscles attached to all surfaces of both the proximal and distal aponeuroses suggesting that abnormally large forces originating from any direction could result in micro tears of the FBs at the musculoaponeurotic junction. Further in vivo study is necessary.

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A Cadaveric Study of the Levator Palpebrae Superioris Aponeurosis.

INTRODUCTION. The levator palpebrae superioris (LPS) is a muscle superior to the eye, which aids upper eyelid elevation. Research has shown that the LPS extends into an aponeurosis once reaching the orbital superior transverse ligament where it attaches to the superior tarsus plate. Recent findings suggest additional LPS attachment points on the upper eyelid contributing to the etiology of ptosis. METHODS. Forty-seven eyelids from formalin embalmed adult human cadavers, with no previously known ocular diagnoses, were used. Using a supraorbital approach, orbicularis oculi, orbital fat, and orbital fascia were removed and the LPS exposed. Presence or absence of a fat pad superior to the LPS and attachment to the orbital septum or superior tarsal muscle were noted. Measurements of the upper eyelid from medial to lateral canthus were taken. The upper eyelid midpoint was determined and used as the landmark to measure the LPS muscle-aponeurosis junction (MAJ) starting point and its aponeurotic extension. SUMMARY. Measurements varied from right eye (OD) to left eye (OS). The percentage of orbital septum attachment (63.8%) exceeded attachment to the superior tarsus plate (36.2%). Average levator aponeurosis length was 10.43 mm (OD) and 9.62 mm (OS). MAJ average distance from the upper lid margin was 14.30 mm (OD) and 12.26 mm (OS) and fat pads were present in all specimens. CONCLUSIONS. Based on our cadaveric study, the average MAJ is 13.47 mm from the central upper eyelid, there is more than one attachment site for the LPS aponeurosis, and the length of this aponeurosis ranges from 9.39 to 11.20 mm. These findings will greatly inform oculoplastic procedures in the upper eyelid, and assist in reducing morbidities such as ptosis.

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Aberrant Branching of Bilateral Common Carotid Arteries- A Case Report.

INTRODUCTION. Classic anatomic knowledge describes the common carotid artery (CCA) bifurcating into the internal (ICA) and external (ECA) carotid arteries, without giving any branches. Variant cases have shown arteries originating from the CCA. During embryologic development, the third aortic arch forms the CCA, though little is known of any correlation to possible anomalies. The objective of this case is to further enhance the understanding of CCA variations. RESOURCES. Routine dissection of a 95-year-old female cadaver was performed during gross anatomy lab. Branches arising from the CCA bilaterally were found and detailed dissection of the arterial tree in the neck region was performed. DESCRIPTION. On the left side, the CCA bifurcated just above the upper border of the thyroid cartilage. Two branches arose 8 and 6 mm below the bifurcation. The first branch, along its course, bifurcated into a branch that entered the apex of the thyroid and another that continued down the lateral aspect to supply the lower part of the gland. The second branch (superior thyroid artery (STA)) entered the apex of the gland and split into three branches supplying the upper aspect. An inferior thyroid artery (ITA) from the subclavian artery (SCA) was absent. On the right side, the CCA bifurcated just above the upper border of the thyroid cartilage. The STA arose 4 mm below and trifurcated into the superior laryngeal artery (SLA), a main glandular branch, and a smaller glandular branch. The SLA pierced the thyrohyoid membrane, the main STA branch traveled to the anterosuperior aspect of the thyroid, and the smaller branch entered the apex and coursed the lateral aspect of the gland. The right SCA

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gave off the ITA. SIGNIFICANCE. Since aberrations arising from the CCA may vary, thorough understanding of normal anatomic arterial origin and course is clinically essential. Surgeons should be mindful of possible variations to prevent potential complications during head and neck surgeries.

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Osteophytes in the Cervical Vertebrae Vertebral Bodies' (C3-C7) - Demographical Perspectives.

INTRODUCTION: Osteophytes are bone spurs which can be advantage for load bearing and vice versa a disadvantage because they can cause clinical damage. In the cervical spine osteophytes may cause immobility and stiffness of the neck, osteoarthritis and headaches. Moreover, osteophytes can be involved in nerve entrapment syndromes, dysphagia and lead to the compression of the vertebral artery. METHODS: The study population was sampled from the collection of human skeletons housed in the Natural History Museum in Cleveland, Ohio, USA. The sample included 273 individuals, out of which 143 were African-Americans and 130 were European-Americans, 88 were aged between 20 and 39 years, 92 between 40 and 59 years; and 93 were over 60 years of age. The observations were made on the cervical vertebrae C3-C7. A total of 1365 cervical vertebrae were studied and measured. A grading system for osteophytosis of the articular surfaces of vertebral bodies was developed to assess the presence and severity of the phenomenon in each facet. Four categories of osteophytes were defined, as follows: Grade 1: Vertebral body with no or minor spurs. Grade 2: Vertebral body with small degree of osteophytosis. Grade 3: Vertebral body with a moderate degree of osteophytosis. Grade 4: Vertebral body with severe osteophytosis. SUMMARY: The highest osteophytes prevalence in total and in moderate and severe degrees was found in C5-C6 segment of motion. We assumed that it's probably for two reasons: 1. C5 located in the pick of the cervical lordosis. 2. C6 is situated like in a clamp between the cervical lordotic pick vertebrae (C5) and T1 which starting the thoracic kyphosa. Osteophytes prevalence is significantly higher in males in (C3-C4) and higher in European-Americans(C5-C7). CONCLUSIONS: The compression and tension on the discal surfaces of inferior vertebral body of C5 and the superior vertebral body of C6 causes the osteophytes formation in those vertebrae in total and severity prevalence.

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The Biomechanics of Subsynovial Connective Tissue in Health and Its Role in Carpal Tunnel Syndrome.

INTRODUCTION. Carpal tunnel syndrome (CTS) is a compression neuropathy affecting the median nerve at the wrist. Aside from the neuropathy itself, the most common associated finding is fibrosis of the subsynovial connective tissue (SSCT). While most cases of CTS are considered idiopathic, one hypothesis is that the SSCT fibrosis may cause CTS by altering tendon and nerve movement, thereby producing the pressure elevation. The most accepted treatment is surgical release of the flexor retinaculum. This in turn, while improving the neuropathy, often results in a permanent loss of gripping strength. RESOURCES. SSCT data from animal models, cadavers, and clinical trials. DESCRIPTION. The SSCT is a multilayer tissue interspersed among the tendons and nerve within the carpal tunnel. As the tendons move, successive SSCT layers are recruited, providing a limit to differential movement of adjacent tendons. When the tendon moves beyond this limit, the SSCT fails in both cadavers and animal models. Increasing tendon velocity increases the gliding resistance and may predispose the SSCT to injury with more rapid hand movements. This damage leads to progressive fibrosis, which in turn makes the SSCT more susceptible to injury resulting in a vicious cycle. Clinically, this fibrosis restricts both tendon and nerve motion within the carpal tunnel in CTS patients. This impedes the normal ability of the median nerve to move posteriorly when the tendons are loaded, which in turn results in compression when the tendons translate anteriorly and contact the flexor retinaculum. These pathomechanics are readily viewed sonographically. SIGNIFICANCE. The pathology of CTS is intricately related to altered tendon and nerve mechanics, induced by tenosynovial fibrosis. Therapies that improve nerve and tendon mobilization may avoid the need to release the flexor retinaculum, and thus improve patient outcomes. (Funded by NIH/ NIAMS Grant: 1R01AR062613-01A1)

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Proximal Interphalangeal Joint Ligaments Revisited: Bi-Layer Interconnection of Key Supports.

INTRODUCTION. The proximal interphalangeal (PIP) joints of the fingers are frequently injured, with more serious injuries requiring surgical management. The ligamentous supports of the joint margins also reinforce the palmar plate. Understanding of the detailed anatomy in this small region is limited. This is in part terminological, and also methodological. Most studies use different terms and fail to describe the criteria under which they remove or retain tissue; both lead to

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uncertainty in describing the anatomy. Further, the association between the palmar plate and the neighbouring pulleys is poorly understood, with many studies excluding the pulleys from their assessment. This study therefore aims to describe the anatomy of the PIP joint ligaments. METHODS. Embalmed (n=22) fingers were dissected under 10x magnification on both sides (n=44) using a fascicular mapping model. Mid-dissection the target surface of the specimens was bathed in alcohol and/or acetone to remove interfascicular fat. A digital microscribe was used under the same magnification to map the fascicular patterns. SUMMARY. A proper collateral ligament (PCL) and accessory collateral ligament (ACL) were observed on both sides of all specimens (n = 44; 100%), whilst a phalangoglenoidal ligament (PGL) was not as consistently found (n = 28; 64%). The PCL and ACL were attached to the palmar plate, whilst the PGL was more superficial and continuous with the A3 pulley. CONCLUSIONS. The PIP ligament complex is delicate and arranged in two distinct layers. The superficial layer contains the PGL and is often overlooked due to its continuity with the A3 pulley. The deep layer is more substantial and is made of the PCL and ACL. These are attached to the palmar plate and therefore provide direct support to the plate. Both the palmar plate and the flexor pulleys should be considered when repairing PIP ligament damage.

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The Anatomical Relationship between the Sural Nerve and Small Saphenous Vein: An Ultrasound Study.

INTRODUCTION. The relationship of the small saphenous vein (SSV) to the sural nerve (SN) has been previously described within published cadaveric studies. Despite SSV reflux being recognized as an important and often overlooked cause of superficial venous insufficiency (present in about one-sixth of patients with varicose veins), there have been few studies of the position of the SSV & SN in relation to surface landmarks. This study aims to investigate the relationship of the SN and SSV in vivo through the use of ultrasound. METHODS. Sixty four participants (34 males & 30 females, aged between 18 & 35 years), took part in this study. Transverse/short-axis ultrasound scans were taken by a single observer using a GE Logic e ultrasound system with a 12L-RS transducer. The SN was identified and traced from the level of the lateral malleolus to the popliteal fossa noting its course and proximity to the SSV. The distance between the SN and SSV was measured at the distal 50% and 25% of the total leg length which was defined as the distance between the medial tibial condyle and the inferior edge of the medial malleolus. SUMMARY. The SN and SSV were visualized in all participants. The SN pierced the fascia in the distal 25.9±5.3% (Range: 40-8.6%) of the total leg length. The distance between the SN and SSV was 4.06±1.8 mm and 3.4±1.4 mm in the distal 50% and 25% of the total leg length respectively. There was no significant effect of sex or body side. Atypical course of the SN in relation to the SSV was noted in 23.4% (30/128) legs including a medial position to the SSV (6.3%, 8/128 cases). Anatomical asymmetry was found in 15.6% (10/64). CONCLUSIONS. The SSV can be used for coronary artery bypass graft surgery and has a significant role in the pathogenesis of varicose veins. This study reinforces the role of ultrasound in delineating variations of the SN in relation to SVV prior to surgery which can potentially reduce iatrogenic complications and improve surgical outcomes.

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Anatomic Evaluation of the Vastus Medialis Obliquus: A Cadaveric Study.

INTRODUCTION. It is clinically appreciated that some individuals have increased susceptibility to patellar subluxation and patellar instability. Many times this is attributed to increased laxity of the patellofemoral joint. The vastus medialis obliquus (VMO) is one of the primary opposition structures to lateral displacement of the patella. The primary aim of this investigation is to further describe the morphology of the VMO. METHODS. The left thigh and knee were dissected to reveal the underlying musculature in 15 cadavers. Digital photography and computer software were used to make needed measurements in this study – specifically, the craniocaudal relationship of the VMO to the inferior aspect of the patella. SUMMARY. The distance from the most inferior aspect of the VMO to the most inferior aspect of the patella was measured. The median value was determined to be 26.9 mm. The interquartile range was determined to be 22.8mm – 28.2mm. It was noted that two data points stood out as clear outliers (38.4mm and 46.8mm). In order to factor in the relative size of each cadaver, a "distance ratio" was developed. CONCLUSIONS. The graphical pattern and the distribution of the distance ratio data were similar and consistent with the absolute distance data. This study supports the possibility that VMO variation exists among individuals and could play a role in patellar instability. It is possible that through further cadaveric studies, a range of "normal" values could be developed and compared clinically. Clinical studies are a logical next step for future investigations, since large sample size studies are lacking in respect to clinical outcomes of patellar instability, subluxation and dislocation. (We would like to acknowledge and thank the donors and donors' families who participated in the Willed Body Program affiliated with Texas Tech Health Science Center – Paul L. Foster School of Medicine.)

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Anomalous Channels Between the Anterior Superior Alveolar and Nasopalatine Canals in the Maxilla.

INTRODUCTION. The anterior portion of the maxilla is considered a relatively safe surgical area. The only exception in this area is the nasopalatine (NP) canal. In dentistry, more clinicians are placing maxillary implants in the anterior maxilla. Thus, clinicians must have a superior understanding of the neurovascular anatomy to minimize complications. A diagnostic tool utilized by clinicians in implant placement and post surgical evaluation is cone beam computed tomography (CBCT). CBCT allows clinicians to visualize the osseous anatomy and identify anomalies which could potentially affect the outcome of clinical procedures. RESOURCES. A patient desiring dental implants in the anterior maxilla had a CBCT performed to evaluate their potential as a surgical candidate. The CBCT revealed the presence of bilateral anomalous osseous channels in the anterior maxilla. DESCRIPTION. Bilateral osseous channels connecting the ASA canal to the NP canal in the anterior maxilla were observed on CBCT. Normally, the ASA canal passes from the infraorbital canal inferiorly along the anterior maxilla terminating in the piriform aperture at the nasal floor. In this patient, the ASA canal terminated in both the piriform aperture and connected to the NP canal via bilateral anomalous osseous channels. SIGNIFICANCE. Both the NP and ASA canals allow passage of their respective nerves and vessels. The NP nerve provides sensory innervation to the mucosa and gingiva of the anterior hard palate. The ASA nerve provides sensory innervation to anterior teeth and associated gingiva. In this patient, the presence of the bilateral anomalous canals suggest a significant vascular anastomosis and possible sensory contribution from the ASA nerve to the mucosa and gingiva of the anterior hard palate and/or possible sensory contribution from the NP nerve to the anterior teeth and associated gingiva. Failure to recognize these neurovascular connections could result in significant clinical complications.

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Prevalence of Bifid Median Nerve and Persistent Median Artery: An Ultrasound Study.

INTRODUCTION. Anatomical variations of the carpal tunnel including; bifid median nerve (BMN) and persistent median artery (PMA) are purported to be risk factors in the etiology of carpal tunnel syndrome (CTS). Published literature reports the prevalence of BMN and PMA to range between 8.6% -19% and 1.5% -27% respectively. This study aims to investigate the prevalence of BMN and PMA in-vivo through the use of ultrasound. METHODS. Four-hundred-eleven wrists from 206 participants (114 males & 92 females, aged between 18 & 72 years), with no previous history of wrist injury were investigated in this study. Transverse/short-axis ultrasound scans of the wrist were taken at the level of the scaphoid bone using a GE Logic e ultrasound system with a 12L-RS transducer. Once confirmed, the cross-sectional areas of the medial and lateral branches of the BMN were measured. The presence of the PMA was confirmed using Doppler ultrasound. SUMMARY. BMN and PMA were found in 23 (17 unilateral, 3 bilateral) and 26 wrists (10 unilateral, 8 bilateral) respectively. Eleven wrists had both PMA and BMN. The presence of BMN was not influenced by ethnicity or sex. However, PMA was more prevalent in females (p-value<0.05). The lateral branch of the BMN was significantly larger than its medial counterpart (p-value<0.05). Cross sectional areas of the lateral and medial BMN branches found on the right side of the participants investigated were 5.5 ± 1.7 mm2 and 2.8 ± 1.1 mm2 respectively whereas the cross sectional areas of the lateral and medial branches found in the left side were 5.0 ± 1.4 mm2 and 3.2 ± 2.4 mm2 respectively. CONCLUSIONS. Anatomical variations such as BMN and PMA within the carpal tunnel may be risk factors for CTS that could also complicate surgical procedures if undetected pre-operatively. This study investigated the prevalence of BMN and PMA and further demonstrated the role of ultrasound as a diagnostic modality in the evaluation of a patient presenting with CTS.

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An Extreme Case of Alveolar Bone Resorption in an Edentulous Mandible.

INTRODUCTION. The alveolar processes of the mandible and maxilla develop in response to tooth eruption and serve as the principal mechanism of tooth support. When teeth are lost or extracted, the result is resorption of the alveolar bone. The rate of resorption is variable between individuals, but will progress over time. During dissection, varying examples of alveolar resorption are observed in edentulous donors. RESOURCES. A 76 year old female donor presented an extreme case of alveolar bone resorption during dissection in our Head and Neck Anatomy course. DESCRIPTION. The body of the mandible in this case was extremely short, with a vertical height in the molar region of 5mm and 8mm in the canine area. The dissection revealed the superior surface of the bone to have an open groove containing the inferior alveolar nerve and vessels. The maxilla also demonstrated severe resorption. SIGNIFICANCE. This loss of bone has significant implications for restoration of function by dental implants or removable prosthesis. It is not unusual to find resorption that has significantly reduced the height of the mandibular body to the extent that the mental foramen opens superiorly on the bone. However, an open mandibular canal with the neurovascular bundle exposed throughout the dental arch is much more unusual.

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Individuals with this degree of resorption present great challenges in treatment. There is no means to provide retention for a mandibular removable prosthesis. Pressure of prosthesis on the inferior alveolar and mental nerves would potentially produce pain and paresthesia and/or numbness. Placement of dental implants is complicated at best. To provide minimal requirements for implant placement would require vertical augmentation of the mandible along with transposition/reposition of the inferior alveolar nerve.

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Comparison of Musculotendinous Morphology of Extensor Hallucis Brevis and Extensor Digitorum Brevis.

INTRODUCTION. Weakness of the intrinsic muscles of the foot is a characteristic of many foot disorders. However, the assessment techniques used for diagnosis are not capable of isolating individual intrinsic muscle actions. Simulation of these muscles using finite element modelling has been limited due to lack of 3D architectural data. The purpose of this pilot study was 1) to determine the 3D architecture of the extensor hallucis brevis (EHB) and extensor digitorum brevis (EDB), and 2) to compare the architectural parameters of the digital components. METHODS. The EDB of 4 formalin embalmed cadaveric specimens with no visible lower-limb pathology were serially dissected and digitized with a Microscribe® G2X Digitizer. Digitization included fiber bundles, aponeuroses, and tendons of EHB and EDB. The data was reconstructed and modelled in 3D using Autodesk® Maya®. Muscle architectural parameters (fiber bundle length, FBL; pennation angle, and physiological cross-sectional area, PCSA) were computed and compared between digital components. SUMMARY. EHB had a single belly that was bipennate with a central internal tendon. Fiber bundles of EDB to digits 2-4 were unipennate but linked to each other via tendinous attachments. EHB or the 2nd digital component of EDB had the longest mean FBL. PCSA of EHB was greatest in 2 specimens, while the 2nd digital belly of EDB had greater PCSA in the other specimens. In all specimens, PCSA decreased from the 2nd to the 4th digital bellies. CONCLUSIONS. Based on the results of this study, EHB may act on the great toe independently. In comparison, the digital bellies of EDB are linked via tendinous attachments and as such may not be individually activated. Either EHB or the 2nd digital belly has the greatest relative force generating capability. Further ultrasound and EMG studies are needed to determine differential activation.

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Investigating the Effects of Rigid Cervical Collars on the Internal Jugular Vein Dimensions.

INTRODUCTION. Accepted protocol advocates the use of rigid cervical collars (RCCs) in patients suffering head trauma as they are at risk of having a concomitant cervical spine injury. RCCs have been implicated in published literature as a potential cause of venous outflow obstruction that may in fact elevate intracranial pressure and change the cross-sectional area (CSA) of the internal jugular vein (IJV). This study aims to investigate the effects of applying a RCC, for a period of 4 hours on the dimensions of the IJV, in healthy participants. METHODS. Seventeen participants (10 male, 7 female), between 22 to 29 years of age, took part in this study. Circumference and CSAs of the IJV on both sides of the neck at the level of the superior edge of the thyroid cartilage were measured by a single observer using a GE LOGIQ e ultrasound system with a 12L-RS transducer. Measurements were taken prior to the application of the RCC, immediately after, every hour over 4 hours, and after five minutes of collar removal. SUMMARY. The measured CSA of the IJV was 8.3±6.0 mm2 prior to application of the RCC. The CSA of the IJV doubled (18.92±10.55 mm2) after 4 hours and decreased back to 9.36±6.8 mm2 after 5 minutes of the collar removal. The measured circumference of the IJV was 17.29±6.03 mm prior to application of the collar, increasing steadily to 20.34±5.59 mm by the end of the 4th hour of application and returning to 16.14±5.16 mm after 5 minutes of collar removal. Related-samples Friedman's ANOVA test showed statistically significant differences for both left and right CSAs and circumferences of the IJV measured across the four hours (P-value0.05). CONCLUSIONS. Ultrasound assessment of CSA of the IJV could potentially be an indication of intracranial pressure. Further studies utilizing different collar types may provide insight into the effects of collar design and guide future trauma protocol to minimize intracranial pressure fluctuations.

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Autologous Cartilage Grafting for Facial Reconstructive Surgery: A Question of "True or False".

INTRODUCTION. Conventionally, the first seven ribs are considered "true" ribs, defined by their connection to the sternum via costal cartilage. The eighth, ninth, and tenth are usually considered "false" ribs due to their lack of direct connection to the sternum, instead joining their costal cartilages with adjacent costal cartilages. However, few studies have questioned the conventional classifications of "true" and "false" ribs. Misinformation regarding the costal margin has clinical implications for cartilage transfer operations commonly used in aesthetic and reconstructive facial surgeries to address deficits in the auricle, nose, or midface. Therefore, this study analyzed the costal cartilages that formed the costoxiphoid angles with the sternum in order to determine which ribs were "true" and which were "false." METHODS. The thoracic cages of 16 cadavers (32 sides) were dissected with the intent of exposing the ribs, costal cartilages, and sternum with special focus on the sixth, seventh, and eighth ribs. SUMMARY. Ten (62.5%) cadavers had the traditional definition of "true" ribs: bilateral 7th cartilages, but no 8th cartilages joining the sternum. However, the remaining six (37.5%) specimens were found to have either bilateral 8th cartilages (3:16; 18.75%), the 7th cartilage on one side and the 8th on the other side (2:16; 12.5%), or bilateral 6th cartilages (1:16; 6.25%) joining the sternum to form the costoxiphoid angles. CONCLUSIONS. This study suggests that the conventional definition of which ribs are "true" and which are "false" may not be as straightforward as previously described. Moreover, the results of this study may influence the method by which surgeons select costal cartilages for autologous grafting procedures.

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Capsular Thickness Variability in Relation to the Anterolateral Ligament.

INTRODUCTION. Recent anatomic studies of the "anterolateral ligament" ("ALL") describe the proposed structure as a capsular thickening running anterodistally from its origin at or near the lateral femoral epicondyle to its tibial insertion halfway between Gerdy's tubercle and the fibular head. Methods for identifying the "ALL" have been both varied and subjective, with "ALL" prevalence and anatomic dimensions varying widely between studies. Our anatomic study uses an axial approach to the lateral knee in order to assess for capsular thickness variation suggestive of a ligamentous structure. METHODS. We performed transverse dissection in twenty-two unpaired cadaveric knee specimens, leaving intact all lateral capsular aspects. Between Gerdy's tubercle and the fibular head, three equidistant areas along the lateral capsule were designated, from anterior to posterior, as Regions 1, 2, and 3. The meniscofemoral and meniscotibial aspects at each Region were assessed for thickness using a standardized approach. Capsular thickness variation by Region was assessed parametrically and non-parametrically, using repeated-measures ANOVA and the Friedman test. SUMMARY. Variability in capsular thickness among Regions 1 through 3 was statistically significant for both the meniscofemoral and meniscotibial aspects. Post-hoc pairwise differences were all significant except for between Regions 1 and 2, which had nearly identical mean thicknesses for both aspects. While the highest mean thickness was found at Region 3 for the meniscotibial aspect, the exact opposite was found for the meniscofemoral aspect, more consistent with a posterodistal course of lateral capsular thickening. Results were identical using both parametric and non-parametric methods. CONCLUSIONS. A systematic assessment of lateral capsular thickness variability does not support the existence of an "anterolateral ligament" as currently described.

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Comparison of the Musculoaponeurotic Architecture of Masseter Muscle of an Infant and Adult.

INTRODUCTION. Masseter (MM) has been shown in adults to have complex architecture consisting of a laminar arrangement of aponeuroses and fibre bundles (FBs). Architecture of the infant MM has not been documented. The purpose of this study was to: (1) investigate 3D spatial arrangement of the musculoaponeurotic components of MM in an infant; (2) compute architectural parameter of infant MM (FB length, FBL; pennation angle, PA; physiological cross-sectional area, PCSA; and muscle volume, MV); (3) compare infant and adult findings. METHODS. Serial dissection and digitization were used to capture the trajectory of FBs and the geometry of aponeuroses of MM from a 16-week old infant. A 3D model of MM was generated using Autodesk® Maya®, and registered onto the facial skeleton reconstructed from CT scans. FBL, PA, PCSA and MV were quantified. The architecture and morphology of infant MM was compared with adult data obtained in a previous study. SUMMARY. The adult and infant MM both had superficial and deep heads consisting of multiple laminae. Mean FBL of the infant MM was 46% shorter than that of the adult. However, the PCSA of the infant MM was only 16% of that of the adult and MV 9%. PA of the infant FBs were similar to the adult. During dissection, it was noted that the aponeuroses of the infant MM were thin and transparent. In contrast, in the adult the aponeuroses were thick fibrous sheets with visible

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collagen fibre bundles. CONCLUSIONS. At 16 weeks, the architecture of the infant MM already had a complex laminar architecture analogous to that found in the adult. The greatest differences between the MM of the infant and adult were MV, PCSA, and the structure of the aponeuroses. This suggests that developmental changes occur in the musculoaponeurotic tissues as masticatory function matures. The result of this study can be used for the development of in vivo ultrasound protocols in infants and children to investigate the developmental continuum of MM.

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Variant Scalene Muscles and Their Role in Thoracic Outlet Syndrome.

INTRODUCTION. The anterior and middle scalene muscles allow for the subclavian artery and the roots of the brachial plexus to pass through the scalene hiatus. The variations found in these muscles have clinical implications that involve the possible risk of compressing the subclavian artery when the muscles are hypertrophic and of developing neurogenic thoracic outlet syndrome due to the relation of the scalene muscles to the brachial plexus. RESOURCES. Routine dissection of a 70-year-old male cadaver was performed on the thoracic outlet region bilaterally. The trachea and esophagus were reflected, and the subclavian artery, brachial plexus, anterior, middle, and posterior scalene muscles were dissected. The dissection included exposure of origins and insertions of the scalene muscles as well as brachial plexus and subclavian artery. DESCRIPTION. Dissection revealed multiple distinctive variations of anterior and middle scalene muscles as well as brachial plexus bilaterally. The anterior scalene and middle scalene muscles were abnormally split into multiple bellies with multiple insertions into the first ribs. The middle trunk of the brachial plexus also exhibited anatomical variation by being separated from the upper and lower trunks of the brachial plexus by scalene muscles. The subclavian arteries were located between the bellies of the anterior scalene muscles. SIGNIFICANCE. The observed deviations could be a result of changes in the signaling between mesenchymal cells and neuronal growth cones via expression of chemoattractants and chemorepulsion during embryologic development. The clinical significance of this abnormality is possible risk of developing vascular or neurologic thoracic outlet syndrome and paralysis or anesthesia of the upper limb.

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Surgically Relevant Variations of the Oblique Cord at the Elbow.

INTRODUCTION. The oblique cord (OC), an inconstant ligament connecting the ulna to radius, has been described as a fascial band, membrane-like sheet and ligamentous cord. OC variants are of interest to surgeons because damage during repair of the distal biceps brachii tendon can lead to post-operative synostosis of the proximal radioulnar joint. Moreover, knowledge of OC variants allows accurate planning for graft placement during elbow reconstruction. Therefore, the purpose of this study was to describe and classify OC variations. METHODS. Fifteen elbows from eight embalmed adult cadavers (5F, 3M) were dissected. The mean (SD) death age was 79.9 (16.3) years. OC attachments and structural relationships were noted. The length, thickness and width were measured using a digital caliper (Hawk, Inc.). Statistics were calculated using SPSS Version 22.0 (IBM, Armonk, NY). SUMMARY. OCs were present in 53% of elbows. Half of the cadavers had bilateral OCs. Mean (SD) length of the OCs was 23.4 (5.2) mm. Because the OC tapered distally, three width measurements were taken along its length. Mean (SD) proximal, middle and distal widths were 3.5 (1.2) mm, 2.4 (1.1) mm, and 2.1 (0.9) mm, respectively. The OC was thickest at its proximal attachment yet thinner at its midportion and distal attachment. The mean (SD) proximal, middle, and distal thicknesses were 0.4 (0.2) mm, 0.3 (0.2) mm, and 0.3 (0.2) mm, respectively. Significant variation was observed amongst the specimen in morphology and position. Three types of OC were found: type 1 (tapered trapezoidal, 62.5%), type 2 (thin cylindrical, 25%), and type 3 (thick cylindrical, 12.5%). CONCLUSIONS. With the description of OC types, caution should be taken during repair of the distal biceps brachii tendon. Preventing damage to the OC during such operations can reduce post-operative synostotic lesions. Functionality of the tapered trapezoidal OC warrants further research.

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Comparing Two Techniques in Rhinoplasty for Straightening the Lower Lateral Nasal Cartilage.

INTRODUCTION. Two techniques used in rhinoplasty to straighten the lower lateral cartilage (LLC) are lateral crural strut grafts (LCSG) and lateral crural hinged flaps.The LCSGs were harvested and carved from autologous septal cartilage. The purpose of this study was to determine if the techniques significantly straighten the LLC and also to compare the two techniques. METHODS. An external rhinoplasty approach was used on four fresh adult human cadavers to expose the lower lateral cartilages and the septum. Both techniques were done bilaterally on each cadaver(n=8 LLCs). The vestibular mucosa was dissected from the LLCs. Septal cartilage was harvested and the LCSGs were carved measuring 18x4x2 mm. The LCSGs were placed with two mattress sutures of 6-0 Nylon on both sides. The LCSGs were then removed and the hinged flaps were created while keeping a continuous strip of 7mm of LLC. Photos of the LLCs were taken before and after each step, and standardized measurements were performed using GNU Image Manipulation Program (GIMP). SUMMARY. There was a significant difference between the LCSG and the hinged flap (p=0.049) with the LCSG straightening the LLC by an average length of 7.7 degrees more than the hinged flap technique. Both techniques significantly straightened the cartilage compared to the baseline average, with the LCSG straightening the LLC by 19.4 degrees(p=0.002) and the hinged flap straightening the LLC by 11.7 degrees (p=0.003). CONCLUSIONS. The two techniques significantly straightened the LLC with the LCSG increasing the LLC more than the hinged flap.

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Illustration of the Morphology of Vastus Medialis from 17th Century to Present.

INTRODUCTION. Musculoaponeurotic architecture is an important determinant of muscle function. Changes in musculoaponeurotic architecture of vastus medialis (VM) have been associated with knee pathologies. Illustrations of VM have evolved throughout history, revealing a more detailed representation of the muscle. The purpose of this study was to examine the accuracy of VM morphology in illustrations from 17th century to present day. RESOURCES. Anatomia database from the University of Toronto's Thomas Fisher Rare Books Library was used to search for illustrations of VM. Illustrations of VM from anatomical plates were found from 17th-19th centuries and were compared to observations from dissections and 3D models. DESCRIPTION. Throughout history, VM has been depicted as a teardrop shaped muscle. In the early 17th century, the muscle volume was shaded but no fiber bundles (FBs) were included. The first depiction of FBs (1605) was generalized so that FB direction was consistent across the entire surface of the muscle. In the early 1700s and mid-1800s, the detail of FB orientation was increased to show vastus medialis longus (VML) and obliquus (VMO), along with the curvature of the FBs as they coursed posterior to the femur. Present day cadaveric dissection and modelling of VM in 3D further improve accuracy by providing architectural parameters such as FB length and pennation angle that cannot be obtained from historical illustrations. SIGNIFICANCE. Surgeons, anatomists and illustrators have contributed to the evolution of illustration of VM morphology since the 17th century. As technology continues to evolve, more detailed depictions of musculoaponeurotic architecture of VM are possible. These advances enable more realistic 3D simulation.

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Articular Branches of the Femoral Nerve: A Morphological Study to Clarify Innervation Patterns.

INTRODUCTION. With an aging population, the prevalence of pain due to hip osteoarthritis (OA) has increased. Pain and stiffness associated with OA has been shown to decrease quality of life and increase the burden on heath care. New techniques, such as radiofrequency ablation (RFA) of sensory nerves innervating the joint capsule, depend on well-defined innervation maps. The anterior hip joint (AHJ) has been reported to be innervated by the obturator, accessory obturator and femoral (FN) nerves. However, in the literature, few studies have investigated the contribution of FN to AHJ innervation. The purpose of this study was to determine the innervation patterns of articular branches of FN. METHODS. Meticulous dissection of FN was carried out in 13 embalmed cadaveric specimens with no evidence of hip pathology. FN was exposed in segments and all branches traced to their termination. The articular branches were then documented, photographed and analyzed in 3D. SUMMARY. Numerous articular branches from FN were observed on all specimens. The branches were characterized as being either high or low femoral, corresponding to their origin superior or inferior to the inguinal ligament. High branches were found in 11 specimens, low branches in 5, with both in 4. The mean number of high and low articular branches was 5 (range 1-13) and 2 (range 1-6), respectively. The high articular branches supplied the entire AHJ, whereas the low branches primarily innervated the lateral and inferomedial aspect of the AHJ. Some articular branches of FN (high and low) were recurrent, coursing inferiorly before turning superiorly to terminate on the lateral aspect of the AHJ. CONCLUSIONS. FN was found to have a greater number of articular branches and to supply a larger area of the AHJ than previously documented in the literature. The number and location of FN articular branches need to be taken into consideration when developing new RFA procedures for denervation of the AHJ.

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Obturator and Accessory Obturator Nerves: Contribution to Hip Joint Innervation.

INTRODUCTION. The obturator nerve (ON) is associated with innervation of the hip adductor muscles. The precise distribution of articular branches from ON to the hip joint has not been an area of focus due to the generalized use of Hilton's law. Also, the relationship of the accessory obturator nerve (AON), a sensory nerve innervating the hip joint, and the articular branches of ON is not well defined. The purpose of this study was to delineate the course and innervation patterns of the AON and articular branches of ON to determine their area of supply of the hip joint. METHODS. Thirteen cadaveric specimens were used. AON was identified at the medial border of psoas major and traced proximally to the vertebral column and distally to the hip joint. ON was traced from the pelvis through the obturator canal into the thigh. Adductor brevis and obturator externus were dissected at the fiber bundle level to reveal the branches of ON. All branches were traced to their termination and their course documented. The areas of hip joint innervation by AON and ON were delineated. SUMMARY. ON had articular branches that were classed as high (n=10) or low (n=7) by their point of origin in the obturator canal or from the anterior/posterior branches of ON. High branches descended inferiorly then recurred to innervate the hip joint. The low branches either travelled directly to the capsule or formed a fine plexus. AON was a single nerve usually originating from L3-L4 nerves that coursed over the iliopubic eminence to the hip joint and in some specimens anastomosed with the ON prior to branching. The AON and low ON innervated the medial half of the capsule. Low ON also supplied the inferolateral aspect whereas, high ON supplied only the inferomedial aspect of the capsule. CONCLUSION. The ON and AON have unique trajectories that should be considered when describing articular branches innervating the hip joint. Generalized descriptions are not adequate for clinical procedure planning.

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Clinical Significance of Multiple Variations of the Brachial Plexus.

INTRODUCTION. Peripheral nerve entrapment of the upper limb is common at multiple sites through the shoulder and arm. Musculocutaneous nerve entrapment can be caused by excessive and repetitive exercise, hypertrophy, repetitive compression, and trauma. Variations are reported to occur in up to 63% of the population with variation of the terminal branches being the most common. Identification of unique variations to the brachial plexus is imperative for appropriate clinical analysis, treatment of upper extremity injury, and correct surgical technique. RESOURCES. Routine dissection of two embalmed male cadavers was completed in the Human Dissection Lab of Missouri Southern State University. DESCRIPTION. Bilateral variation was revealed in both cadavers. Communication between the musculocutaneous and median nerves began proximal to the innervation of coracobrachialis and merged distally with the median nerve in three limbs. Double innervation of the coracobrachialis muscle was observed in the limbs with terminal branch communication. Nerve filaments, extending from the musculocutaneous nerve in two limbs and the lateral cord in one limb, branched to insert at the proximal end of coracobrachialis. In the limb without terminal variation, the median nerve was formed by two roots of the lateral cord. In addition, the lateral cord gave a communicating branch to the radial nerve. SIGNIFICANCE. Damage to variated nerve communications and branches could cause symptoms like soft tissue injury and may include loss of sensation to the forearm. Knowledge of variations have implications for assessing and treating upper limb injuries and proper surgical procedure.

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Gross Anatomical Observation of the Spatial Relations between the Branches of the Hypoglossal Nerve.

INTRODUCTION. The muscles of the tongue are innervated by the lingual branches of the hypoglossal nerve, and the superior root of the ansa cervicalis and the thyrohyoid and geniohyoid branches are also delivered by the nerve. This study investigated these branches to clarify their spatial interrelationships. METHODS. The branches of the hypoglossal nerve, the extrinsic and intrinsic muscles of the tongue and the structures adjacent to them were examined under a binocular microscope in 20 Japanese cadavers. SUMMARY. The superior root left the hypoglossal nerve below the origin of the occipital artery. The thyrohyoid branch emerged at the side of the lingual artery and above the greater horn of the hyoid bone. The extrinsic muscles consisted of some secondary and tertiary components, and the geniohyoid branch and the lingual branches arose from the hypoglossal nerve while it traversed on the hyoglossus. The nerve gave twigs to the posterior part of the hyoglossus, and some of the lingual branches formed a plexus on its anterior part. The plexus supplied the two parts of the hyoglossus, the external bundle of the styloglossus and the superior longitudinal muscle. The proximal and distal rami of the plexus also supplied the middle and internal bundles of the styloglossus and the inferior longitudinal muscle, respectively. In addition, the distal one communicated with the lingual nerve. Some other lingual branches descended to supply the inferior part of the genioglossus, and the terminal branches gave intramuscular twigs to the compartments of its main part and the transverse and vertical muscles. CONCLUSIONS. The findings exhibited that the branches of the hypoglossal nerve have the spatial relations with some arteries and the components of the extrinsic muscles, and the relations between the lingual branches were complex because of the plexus. However, the configuration of the extrinsic muscles is applicable to identify the branches and their affected position.

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Literature Review of Botulinum Toxin-A Treatment of Post-Stroke Shoulder Pain.

Post-stroke shoulder pain (PSSP) has been reported to be present in up to 84% of stroke patients. Pain management is an important aspect of PSSP as it impacts quality of life and healthcare costs. One of the main causes of PSSP is post-stroke changes in tone, i.e. spasticity. Botulinum Toxin-A (BT-A) injections have been used clinically to treat spasticity related to PSSP to reduce pain and improve function. The effectiveness of BT-A has been assessed using many parameters. Pain and passive range of motion (PROM) are most indicative of functional improvement, however literature is scarce. The purpose of this study was to review the literature to assess the effectiveness of BT-A injections to decrease pain and increase range of motion in PSSP patients. RESOURCES. PubMed, Web of Science, Google Scholar, and OVID were searched to March 2017. Inclusion criteria: randomized, double-blind, placebo-controlled study design, documentation of pre- and post-treatment pain score and PROM of at least one shoulder joint movement. DESCRIPTION. Five studies (n=17-31 patients) met the inclusion criteria. The Pectoralis major was injected in 3 studies and subscapularis in 2. Pain scores ranged from no improvement in 1 study to a maximum of 4.5 on a 10-point scale in 4 studies in comparison to the placebo group. PROM of the shoulder joint was documented for external rotation (ER) in 5 studies, flexion (FL) in 2 and abduction (AB) in 3. When compared to placebo, post-treatment ER showed the most improvement in all studies (up to 33o) followed by AB (up to 10.5o). PROM of FL had minimal improvement. SIGNIFICANCE. All studies which met the inclusion criteria for this literature review demonstrated varying degrees of decreased pain and improved PROM (particularly in ER) following BT-A intervention. Further study is required to help isolate the specific muscle groups involved in PSSP, and the specific groups which will benefit from BT-A intervention.

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Anatomy of the Anterolateral Ligament and the Capsulo-Osseous Layer of the Iliotibial Tract.

INTRODUCTION. The purpose of this study is to show the existence, composition, and position of the anterolateral ligament (ALL) through dissection and histological preparation.The ALL has been a topic of recent discussion due to its debated existence in the anterolateral knee and significance in anterior cruciate ligament reconstruction. The ALL has been shown to support the knee in internal rotation especially during knee flexion. There is a similarly described structure mentioned in the literature called the capsulo-osseous layer of the iliotibial tract (ITT). The hypothesis for this study is the ALL and the capsulo-osseous layer are the same structure. The aims of this study are to determine the existence, composition, and position of the (ALL) through dissection and histological preparation. METHODS. 10 square en bloc sections were dissected from the anterolateral knee of fresh human cadavers. The en bloc specimen encompasses an area from Gerdy's tubercle to the posterior fibular head and both the posterior and anterior aspects of the lateral femoral epicondyle. The lateral meniscus was left attached and removed with the en bloc specimen. Horizontal cassette sections were obtained above the joint line where the ALL is overlapping the lateral collateral ligament (LCL). The ligamentous tissue and layers were stained with H&E and viewed by microscopy. Dissections of the contralateral knee on the capsulo-osseous layer of the ITT were carried out per Terry et al. and compared to ALL dissections. SUMMARY. Histologic analysis demonstrates the ALL originates from the ITT and lies superficial to the LCL. The dissections of the capsulo-osseous layer of the ITT and the ALL suggests they are the same structure. DISCUSSION. With the nomenclature and existence of the ALL being addressed, research on the significance of ALL reconstruction with ACL reconstruction can move forward.

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Innervation of the glenohumeral joint analyzed by anatomical observation and Sihler's staining.

INTRODUCTION. Nerves that cross a joint provide branches to the joint capsule. The glenohumeral joint (GHJ) is considered to be innervated by branches from the suprascapular, axillary, and subscapular nerves. Additionally, some reports have stated that the musculocutaneous and lateral pectoral nerves also innervate the GHJ. However, few anatomical studies have been performed to elucidate the nerve distribution of the GHJ. The purpose of this study was to clarify the innervation of the GHJ by gross anatomical dissection and Sihler's nerve staining. METHODS. We studied five GHJs of formalin-preserved cadavers that had been donated to our medical school for use in the gross anatomical dissection course of the medical students' 2016 curriculum. We resected the pectoral girdle and proximal end of the humerus with the brachial nerve plexus from the body and dissected it to identify the nerves that supplied the capsule and ligament of the GHJ. The bones were removed from the specimen. We performed Sihler's nerve staining on all tissue including the muscles, ligaments, capsules, and nerves. SUMMARY. The suprascapular nerve was the dominant nerve in the dorsal part of the GHJ capsule. The ventral part of the capsule was innervated by branches of the subscapular nerve, and the inferior part was supplied by the axillary nerves. We also confirmed a capsule-supplying axillary nerve branch that ascended on the intertubercular groove along the long head of the biceps. CONCLUSIONS. It is important for clinicians to understand the innervation of the GHJ when performing nerve blocks for shoulder pain.

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Innervation of the Glenohumeral Joint: A 3D Anatomical Study for Radiofrequency Ablation.

INTRODUCTION. Osteoarthritis of glenohumeral joint (GHJ) has been shown to negatively impact upper limb function. Managing moderate to severe GHJ pain is challenging. Radiofrequency ablation (RFA) is an emerging technique. In the literature, the target is the suprascapular nerve (SSN) as it is the only nerve with reliable landmarks accessible for ultrasound (US) guided intervention of the shoulder. RFA requires precise knowledge of the course of sensory nerves innervating the capsule. No studies to date documented the innervation of the GHJ in 3D space nor in relation to US landmarks. The purpose of this study is to examine the 3D innervation patterns of the GHJ in cadaveric specimens and the key US landmarks for potential RFA. METHODS. Five specimens were serially dissected. The muscle volumes, nerves, and bony surfaces associated with the GHJ were digitized with a Microscribe™ G2X Digitizer and reconstructed in 3D using Autodesk® Maya®. SUMMARY. The GHJ was found to be innervated by articular branches of the SSN, axillary nerve (AN), and nerves to subscapularis (NS). The SSN provided a significant contribution to the superoposterior aspect of the capsule providing 4-6 branches. The AN supplied the anteroinferior and posteroinferior aspects of the capsule. The AN provided 1-2 branches anteriorly and after coursing through the quadrangular space gave off 1-5 additional branches posteriorly. The superoanterior capsule was innervated by 1-2 branches of the NS. Landmarks to localize the articular branches innervating the GHJ included the spinoglenoid notch (SSN), superior border of the quadrangular space (AN), and inferior border of the coracoid process (NS). CONCLUSIONS. The results indicate that the spinoglenoid notch, superior border of the quadrangular space, and inferior border of the coracoid process could be used as landmarks to capture the nerves innervating the GHJ.To assess the feasibility of these landmarks a cadaveric needling study will follow.

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Comparison of force generating capabilities of intramuscular parts of gluteus medius and minimus.

INTRODUCTION. The gluteus medius (Med) and minimus (Min) are multi-part muscles that are important for gait. Med and Min are both abductors, external and internal rotators of the hip joint as reflected by the anterior, middle and posterior parts. The compartmentalization of Med and Min is further evidenced by localized atrophy post-hip surgery. Contributions of the individual parts and inter-partition balance have not been analyzed using volumetric reconstruction. The purpose of this study was to quantify and compare the architectural parameters and lines of action (LA) of each part of Med and Min to determine their relative contributions to hip abduction and internal/external rotation. METHODS. Med and Min were dissected, digitized (Microscribe™ G2X) and reconstructed in 3D (Autodesk® Maya®). Intramuscular parts were identified using the direction of fiber bundles (FB). LA and physiological cross-sectional area (PCSA) of each part was calculated and compared to investigate their relative contributions to hip movement. SUMMARY. The respective parts of Med and Min had similar lines of action. The LAs of the anterior parts was directed antero-superiorly, middle parts superiorly and posterior parts postero-superiorly. The middle part of both Med and Min had the largest PCSA. In Med, the PCSA of the anterior part was greater than that of the posterior part, whereas in Min the PCSA of the posterior part was greater than that of the anterior part. Cumulatively, the PCSA of the anterior parts of Med and Min was greater than that of the posterior parts. CONCLUSIONS. The respective parts of Med and Min had similar lines of action, but differing force generating capabilities. As indicated by LAs, the middle parts abduct the hip joint and have the greatest relative force generating capability. Based on LA and PCSA, the anterior part acts as an internal rotator and has greater relative force generating capability than the posterior part, which externally rotates the hip.

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A Dynamic In Vivo Ultrasound Study of the Superior, Middle, and Inferior Parts of Infraspinatus.

INTRODUCTION. The infraspinatus (IS) is an external rotator of the shoulder and acts as a synergist in preventing superior displacement of the humeral head. IS weakness results in muscular imbalance, increasing the probability of injury due to arthrokinematic changes. IS has three neuromuscular partitions, superior (SI), middle (MI), and inferior (II) which can be activated independently. In vivo ultrasound (US) has been used to study activation patterns in other muscles, but not in IS. The purpose of this study was to investigate the role of the three parts of IS in shoulder abduction and internal/external rotation using US. METHODS. Twenty participants with no previous shoulder injuries participated. The SI, MI, and II regions were scanned bilaterally using the acromion process and medial border of the scapula as landmarks. The three parts were first scanned in resting position with subjects seated. Contracted scans were all in 90o of shoulder abduction with: 1) no rotation (NR), 2) full internal rotation (IR), 3) full external rotation (ER). Muscle thickness (MT) and cross sectional area (CSA) of each part was quantified (ImageJ) and compared. SUMMARY. SI, MI, and II were active in all of the contracted positions, however greater increases relative to resting position were observed in certain movements, as indicated by MT and CSA. Greatest activation was observed in: 1) SI, shoulder abduction with NR and IR; 2) MI, shoulder abduction with

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ER; 3)II, shoulder abduction with IR. Mean CSA increased by 2.5 mm2-7.0mm2. Mean MT increased by 1.7mm-10.0mm. CONCLUSIONS. In this pilot study, SI, MI and II were found to be activated during all of the movements studied; however, the level of activation varied between the parts. Muscular imbalance due to weakness or other pathology could alter the normal arthrokinematic interactions, making the shoulder joint more susceptible to injury.

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Encountering the Chondroepitrochlearis Muscle in the Gross Anatomy Lab.

INTRODUCTION. During routine dissection of an anatomical donor in the 2016-2017 academic year, we encountered a relatively rare variation of the pectoralis major muscle, the chondroepitrochlearis muscle. RESOURCES. During a gross anatomy lab session on the axilla, a student group encountered this muscle called over the instructor to identify it. After consultation, it was identified as the chondroepitrochlearis muscle. It was then dissected, its dimensions noted, and its relationships with nearby anatomical structures were described. DESCRIPTION. This chondroepitrochlearis muscle originated from the inferolateral portion of the right pectoralis major muscle, coursed superiorly in the space just anterior to the axilla before turning inferiorly to insert on the medial epicondyle of the humerus. It was tethered to the axillary region by a stout band of connective tissue. Dissection of its proximal aspect demonstrated that it was innervated by the medial pectoral nerve. SIGNIFICANCE. Clinically, the chondroepitrochlearis muscle can cause restriction in motion of the upper limb as well as ulnar nerve entrapment. It might also present an unusual "stumbling block" in surgery of the area if its presence was unexpected. Current theories regarding the occurrence of this muscle propose that it is a developmental remnant that is more common in lower primates and conferred some advantage during quadrupedal movement. It became less advantageous as humans transitioned to bipedal movement. This muscle has been described previously but there is little data available regarding its typical length, girth, and overall characteristics. Even the name of this muscle is inconsistent, with at least three different names being used by various authors. We would like to acknowledge the donors who have made such investigations possible.

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Examination of the vertebral artery and anatomical variations in our facility over 27 years

INTRODUCTION. The vertebral artery (VA) usually arises from the subclavian artery and enters into the transverse foramen of the sixth cervical vertebra. However, the VA sometimes has an abnormal origin, entrance level of the transverse foramen, and number of arteries. The present study aimed to clarify the anatomical dispersion of the VA and apply our results to the clinical setting. METHODS. We examined the VA in the anatomical dissection course in our school for the past 27 years from 1990 to 2016. We analyzed 832 bodies and 1658 sides. We also investigated 15 cases of anatomical variations of the VA that we published previously. SUMMARY. The left VA arose from the left subclavian artery in 789/831 (95%) cases and from the aortic artery in 42/831 (5%) cases. The right VA arose from the right subclavian artery in 830/832 (99.8%) cases and from the brachiocephalic artery in 2/832 (0.2%) cases. The entrance level to the transverse foramen of the left VA was C3 in 4/831 (0.4%), C4 in 6/831 (0.7%), C5 in 59/831 (7%), C6 in 710/831 (85%), and C7 in 52/831 (6%) cases. The entrance level to the transverse foramen of the right VA was C3 in 3/832 (0.4%), C4 in 6/832 (0.7%), C5 in 57/832 (7%), C6 in 719/832 (86%), and C7 in 47/832 (6%) cases. In our previously published cases, the left VA cases were 14 and the right VA case was 1. Twelve left VA originated from the aortic arch. Among them, one case had communication of the left VA with a deep cervical artery. There was a left duplicated VA in five cases, origin of the aortic arch and the left subclavian artery in three cases, and origin of both the left subclavian artery in two cases. There was a case a right duplicated VA, and the right VA arose from the brachiocephalic artery and the right subclavian artery. Embryological causes are the most likely explanation for our findings. CONCLUSIONS. Accurate knowledge of the VA is important for neurosurgery, head and neck surgery, and radiological procedures.

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Thickness of Calcaneal Tendon in Asymptomatic Subjects: An Ultrasound Study.

INTRODUCTION. Calcaneal tendon (CaT) thickness has been linked to tendon rupture and ankle stability. Data on the effects of smoking, leg-dominance, gender, and body mass index (BMI) in asymptomatic subjects is limited. Establishing the morphologic characteristics of the normal CaT can aid physicians in monitoring the health of tendons, potentially preventing further degeneration and injury. This study aims to investigate the thickness of the CaT in-vivo through the

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use of ultrasound in asymptomatic subjects. METHODS. Ninety CaTs from 45 participants (22 male, 23 female), between 18 and 29 years of age, were scanned bilaterally using a GE LOGIQ e ultrasound system with a 12L-RS transducer by a single observer. The thickness of the CaT was measured at the midpoint of the distal, middle, and proximal thirds of the total tendon length (the distance between the musculotendinous junction and the calcaneal insertion). Participants' height, weight, and leg dominance was measured and recorded. SUMMARY. The thickness of the CaT was 3.74±0.53 mm, 1.67±0.46 mm and 0.81±0.37 mm at the midpoint of the distal, middle and proximal thirds respectively. The measured CaT thickness was significantly influenced by body side and leg dominance across all thirds. Smoking significantly affected the measured thickness in the proximal third, whereas a significant effect of BMI on the thickness of the CaT was observed in the distal third. Males (3.98±0.46 mm) showed a significantly thicker distal third than females (3.52±0.50 mm). A positive correlation was found between age and the CaT thickness at the distal third r=0.301 BCa CI [0.064-0.504] (All p-values <0.05). CONCLUSIONS. Ultrasound is a quick, non-invasive, and safe imaging modality that can be used in the investigation of tendons. CaT thickness can be influenced by a multitude of factors including smoking, gender, BMI, and leg dominance. Future studies investigating the influence of these risk factors can enhance clinical assessment.

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Cadaveric Presence and Morphological Variation in the Inferior Tarsal Muscle.

INTRODUCTION. The goal of this study is to classify the presence or absence of the inferior tarsal muscle in 46 formalin-fixed cadavers. Literature regarding the presence of the inferior tarsal muscle is inadequate; yet, the muscle has great relevance when conducting oculoplastic procedures to maintain the normal integrity of the lower eyelid. METHODS. Lower eyelids of 46 formalin-fixed cadavers were examined. Gross anatomical examination of muscle fibers was used to identify and classify variation. A tripartite classification scheme was devised: absence (grade 0), presence of few small fibers (defined as muscle fibers ≤ 1cm; grade 1) and presence of numerous large fibers (defined as muscle fibers > 1cm; grade 2). SUMMARY. After dissection of 46 lower eyelids, 26 revealed the presence of gross muscle fibers (56.52%). Of the 26 eyelids containing inferior tarsal muscle fibers, 17 (65.38%) were classified as present with few small fibers (grade 1), while 9 (34.62%) were classified as more numerous large fibers (grade 2). Five cadavers were found to have inferior tarsal muscle fibers on one lower eyelid while absent in the other eyelid (10.87%). A contingency analysis was performed to determine if the inferior tarsal muscle was dependent on laterality or gender. Chi-Square test for laterality revealed the presence of the inferior tarsal muscle was not dependent on whether the right or left eye was dissected (Chi-Square 0.13). Gender contingency analysis revealed that sex did not influence the presence of the inferior tarsal muscle (Chi-Square 0.63). CONCLUSIONS. The inferior tarsal muscle was found to run horizontally beneath the capsulopalpebral fascia, believed to be important for its role in lower eyelid movement, and was grossly present in 56% of cadavers. Given its presence in more than half of the cadavers, careful examination should be taken to avoid compromising the function of the inferior tarsal muscle during ectropion repair and blepharoplasty procedures.

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Morphological Variations in the Anterior Talofibular Ligament.

INTRODUCTION. Thirty-percent of the approximately 1.7 million annual inversion sprains of the anterior talofibular ligament (ATFL) require surgery that often results in decreased range of motion, persistent talar tilt, stiffness and recurrent instability. Given these complications and lack of morphological consistency in the literature, we sought to further detail morphological variations of the ATFL. METHODS. Length, width, and thickness of forty-five embalmed and eight unembalmed (106 bilaterally) ligaments were collected. Height, weight, age, handedness, sex, number of identifiable bands and the presence or absence of continuity with the posterior talofibular ligament (PTFL) were recorded. SUMMARY. We identified a breadth of novel morphological variations including ligaments consisting of four to six distinct bands. The first factor (47% total variance) of a principal component analysis (PCA) found that heavy and tall individuals have the largest ligaments regardless of band number. The second factor (15% total variance) revealed that left side ligaments from older individuals were smaller, whereas ligaments continuous with the PTFL were larger. Additional analysis revealed that the pattern of variation among measures were the same when comparing individuals with different band numbers, between sexes, and between embalmed and unembalmed tissues (ANOVA; $p > 0.05$). However, the unembalmed specimens were significantly larger in all measurements ($p>0.05$) than the embalmed specimens, and the fibular end of the ATFL had significantly thicker and wider mean measurements ($p>0.05$). CONCLUSION. Our findings suggest that ligament size and shape is influenced by body weight, height, age, sidedness, PTFL continuity, and embalming. By deepening our understanding of morphological variations in the ATFL, this study may aid in refining approaches to surgical reconstruction, optimizing outcomes and decreasing postoperative complications.

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Removal of Brain with Dura Mater and Eyeballs Intact.

INTRODUCTION. Brains from embalmed cadavers are often difficult to remove undamaged due to the fragility of the tissues or poor preservation. Here we describe a relatively simple technique to remove the brain with eyeballs and dura intact. RESOURCES. Bone saws, mallets and chisels are required in addition to traditional dissecting tools. DESCRIPTION. After the skin and soft tissues are removed from the underlying bone, shallow cuts are made circumferentially around the skull using an oscillating bone saw. Beginning at the supraorbital margin, a cut is made toward the superior part of the external auditory meatus and then inferiorly towards the foramen magnum. Care is taken during this process not to cut too deeply to prevent damage to the meninges. Removal of the skull cap is achieved with chisel cuts. With the cadaver in the supine position, the roof of each orbit is removed with a chisel back to the orbital fissures of the sphenoid, taking care not to the cut the optic nerves. The eyeballs with all the accompanying soft tissue are freed from each orbit. The cadaver is then placed in a prone position for easy access for a posterior detachment of the tentorium cerebelli. The dura is pulled from the periosteum and freed with the use of a scalpel as necessary until the spinal cord and vertebral arteries can be observed and cut. The cadaver is returned to a supine position and the brain is gently pulled dorsally to expose cranial nerves for cutting and to allow for optic nerves and eyeballs to be reflected onto the inferior surface of the frontal lobes. Once all cranial nerves, vasculature and meninges are detached, the brain should be free of the skull. SIGNIFICANCE. The method described here provides gross anatomy students the opportunity to further appreciate central nervous system anatomy as well as the relationships of vasculature and meninges to the cranial bones and foramina.

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An Accessory Muscle of the Deep Compartment of the Posterior Leg: A Case Report.

INTRODUCTION. A thorough understanding of muscular variations is important for a complete knowledge of anatomy. The awareness of anatomical variants is relevant to clinicians involved in the care of the musculoskeletal system and each new variation discovered warrants discussion. For this presentation, we will describe a novel accessory muscle recently found in the deep compartment of the posterior leg. RESOURCES. A routine dissection of the lower limbs of an 84-year old female cadaver was performed. On the left side, an accessory muscle was observed arising from the fascia of the muscles of the deep posterior compartment of the leg. After isolating the accessory muscle, photographs and measurements were obtained. DESCRIPTION. An accessory muscle of the deep compartment of the posterior leg was found to have two muscle bellies with different origins. The lateral belly originated from the deep fascia of the flexor hallucis longus muscle. The medial belly originated from the deep fascia of the flexor digitorum longus and tibialis posterior muscles, as well as the tibia. The two bellies came together to form a single tendon which bifurcated 2.8 cm before inserting into the deep fascia of the abductor hallucis muscle near its origin at the calcaneal tubercle. The total muscle length was 17.2 cm and was widest at its origin at 4.0 cm. SIGNIFICANCE. While it is impossible to predict the physiological impact of this muscle in a post-mortem cadaveric study, the exploration of previously undescribed anatomical variants of the musculoskeletal system is relevant to both anatomists and clinicians, such as surgeons and podiatrists.



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