



University of
Lancashire

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CA

Winter Scientific Meeting

Hosted by the University of Lancashire

Tuesday 16th December 2025

Conference & Abstract Booklet

Welcome

Welcome to the Winter Scientific Meeting of the British Association of Clinical Anatomists hosted by the University of Lancashire.

The meeting is held at the Harrington Social Space, Harrington Building, University of Lancashire, Preston Lancashire, PR1 7BE on Tuesday 16th December 2025.

Location entry details are on the following pages.

The **Association Dinner** is at 19:30 (GMT) at **Angelo's**, 31-35 Avenham Street, Preston, PR1 3BN.

Please purchase tickets in advance.

BACA Council

Monday 15th December

HA301, Harrington Building, University of Lancashire, Preston Lancashire, PR1 7BE

Trustees of BACA Meeting: 15:00-16:00 (GMT)

Council of BACA Meeting: 16:00 (GMT)

Wi-Fi Access

To connect to the internet on your device, please access either 'eduroam' with your institutional login or you can access the free University Wi-Fi by clicking 'UniversityGuestWiFi' and following the instructions from there.

Social Media

Please do share your thoughts and photos of the conference, and engage across our Social Media, using the hashtag #BACAWinter25.

X (Twitter): [@baca_anatomy](https://twitter.com/baca_anatomy)

LinkedIn: [The British Association of Clinical Anatomists](https://www.linkedin.com/company/the-british-association-of-clinical-anatomists/)

Welcome from the Lancashire Anatomy Team

We would like to welcome you to the, newly named, University of Lancashire, where we are proud to host the British Association of Clinical Anatomists' Winter Meeting.

We hope you enjoy the mix of talks and workshops, hoping to keep you engaged and hold your attention throughout the day. Please do engage with our sponsors and poster presenters, ask as many questions as you like!

On hand to assist you at the University we have our Anatomy Team and Student Ambassadors who will be able to help you with any questions you have about your visit, as well as escorting you around the venue and making sure you're in the right place at the right time.

We very much hope you enjoy your time here and take at least one thing away from your conference attendance. Feel free to ask any questions of us or your fellow delegates, and get involved, chat to people, and be curious.

Thank you.

Kris, Liam, Maryam, Caitlynn, Lois, & Valentina

Welcome from the BACA President

It is a pleasure for BACA to be at the University of Lancashire for our winter scientific meeting. We wish to thank the University of Lancashire School of Medicine Team (Kris, Liam, Maryam, Caitlynn, Lois, and Valentina) for extending the invitation to host our BACA meeting. Congratulations to all the presenters for getting your work accepted for presentation today. Please make the most of the opportunity, enjoy the day, and get to know others in the field. We look forward to seeing you again at future BACA meetings!

Best Wishes,

Phil Adds (BACA President)

Andy Ginty (BACA Meetings Secretary)

Venue Details

The conference will be held in the Harrington Social Space, a space between the Harrington and Greenbank Buildings.

These are located in the North Campus (green on the map) and are marked 'HA' and 'GR' on the Preston Campus map on the next page. The Social Space is marked between these buildings by a Cup/Mug symbol.

The best way to enter is through the Social Space entrance, for which you should follow signs for Greenbank Building or Harrington Social Space.

If coming from the South Campus, you should go along Adelphi Street, where you would then cut diagonally between Harrington and Whitendale Car Parks. This path will lead you directly to the glass frontage of the Harrington Social Space entrance.

All oral presentations and the AGM will take place in the Greenbank Lecturer Theatre.

All posters, sponsors, breaks, and wine reception will be based in the Harrington Social Space.

All in-conference workshops will take place in these buildings. Our Student Ambassadors will escort you to and from there.

The Association Dinner will be held in an **Angelo's**, an Italian restaurant, on Avenham Street in the city centre. It is located just off Church Street, which is along from the main shopping street and near to the Preston Flag Market and Harris Museum.

Parking

If you are planning to drive, you are welcome to use any Pay & Display car parks at the university or nearby. The nearest Pay & Display is Victoria II (V24 on the map on the next page).



Can't find what you're looking for?

You can also use the MazeMap app to navigate our campus. Find in-building destinations such as toilets, parenting rooms, our pharmacy and more.



Buildings and outdoor spaces

North Campus

AL	Allen Building	IW	The Ironworks
BB	Brook Building	SVM	School of Veterinary Medicine
ER	Eden Building	VB	Victoria Building
GR	Greenbank Building	VE	Vernon Building
HA	Harrington Building		

Central Campus

AB	Adelphi Building	OFS	Oasis Faith and Spirituality Centre
AC	St Peter's Arts Centre	SPC	St Peter's Court
CM	Computing and Technology Building	STU	Student Centre
HR	Hanover Building	SU	Students' Union
KM	Kirkham Building	US	University Square
LIB	Library	14-16M	14 - 16 Maudland Road
ME	Media Factory	53	53 Degrees

South Campus

CB	Chandler Building	JBF	JB Firth Building
DB	Darwin Building	LE	Leighton Building
EB	Edward Building	LH	Livesey House
EIC	Engineering Innovation Centre	MB	Maudland Building
FB	Foster Building	PSC	Pre-School Centre
HB	Harris Building	STF	Sir Tom Finney Sports Centre
HH	Heatley House	WB	Wharf Building

University Accommodation

DW	Derwent Hall	RI	Ribble Hall
DR	Douglas Hall	RR	Roeburn Hall
PN	Pendle Hall	WR	Whitendale Hall

University car parks

P1	Adelphi / 53 Degrees	P14	Leighton
P2	Askew	P15	Livesey
P3	Beattie	P16	Pendle
P4	Brook	P17	Pollard Street
P5	Computing and Technology	P18	Ribble
P6	Darwin	P19	Roeburn I
P7	Douglas	P20	Roeburn II
P8	Fylde Road	P21	Vernon (Berkeley Street)
P9	Hanover	P22	Vernon (Moorbrook Street)
P10	Harrington (Pay and display)	P23	Victoria I (reserved spaces for visitors)
P11	Harris	P24	Victoria II (Pay and display)
P12	Heatley	P25	Whitendale
P13	Hope Street		

(Please note: University car parks require permits)

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BACA Prizes & Awards

Did you know BACA offers a range of prizes and scholarships? Apply for these now our webpage: <https://www.baca-anatomy.co.uk/pages/15-prizes-awards>

BACA Sponsorship

BACA will sponsor other events that it deems suitable that promote the dissemination of clinical anatomy and anatomical education research.

Conference Prizes

Member and open prizes are awarded at every meeting.

BACA Scholarships

Awards will be made available twice yearly to aid research into clinical anatomy and anatomical education.

Public Engagement Awards

Awards of £50 will be made available to those who wish to carry out public engagement events related to human anatomy. Events will primarily be aimed at members of the general public.

Conference Programme

Please arrive at the Harrington Social Space and our staff and Student Ambassadors will direct or escort you to the talk and workshop locations.

Timing/Talk	Content Information	Location
08:15-09:00	Arrival & Registration Breakfast items and refreshments provided.	Harrington Social Space
09:00-10:30	Session 1: Imaging & Education Chaired by Dr Philip Adds	Greenbank Lecture Theatre
09:00-09:10	Welcome & Introduction - Kris Phillips & Liam Young - BACA President & Meetings Secretary	
Conference Plenary	Lancashire Showcase – Integrating Clinical Anatomy - Dr Josh Lauder – University of Lancashire & East Lancashire Hospital Trust, England - Prof. Peter Driscoll – University of Lancashire, England	
S01	In the Air Tonight: Pathological Gas as Nature’s Contrast Amin Arshad – East of England Imaging Academy	
S02	Virtual Technology in Anatomy Teaching: A Systematic Review Abdelhadi Elsayed – University Hospitals Dorset	
S03	Does Simulation-based Ophthalmology Teaching Improve Knowledge, Skills, or Confidence Compared to Traditional Teaching: A Systematic Review Akshayan Manoranjan – Lancaster University	
S04	One Anatomy, Many Curricula: Mapping Learning Outcomes for Unified Teaching Marcela Cardenas-Serna – University of Liverpool	
10:30-11:00	Morning Break Posters & Sponsors	Harrington Social Space

Timing/Talk	Content Information	Location
11:00-12:00	Session 2: Education & Musculoskeletal Chaired by Dr Bip Choudhury	Greenbank Lecture Theatre
S05	Integrating Etymology into Anatomy Education: A Pilot Curriculum at Stanford School of Medicine <i>Madelyn Mauro – Stanford School of Medicine</i>	
S06	Investigation of the Use of Clay-based Modelling and 3D-printed Skeleton as a Teaching Method for Early Years of Medical Learning: A Pilot Study <i>John M Delieu – Aston Medical School</i>	
S07	Patient-Specific Safe Zones for Shoulder Arthroscopy and Arthroplasty: A Cadaveric Study <i>Dave Duru – University of Cambridge</i>	
S08	Localization of the Motor Entry Point of Adductor Pollicis Muscle Using Surface Landmarks <i>Sheryll Garg – University of Birmingham</i>	
S09	Clinical Role of Extraocular Muscle Anatomy in Slipped and Lost Muscles During Strabismus Surgery: A Dissection-Based Study <i>Vinesh Mistry – Anglia Ruskin University</i>	
12:00-14:00	Lunch Posters, Sponsors, and BACA AGM	Harrington Social Space
12:30-13:30	Poster Session Poster presenters should be by their posters.	Harrington Social Space
13:30-14:00	BACA Annual General Meeting All attendees welcome to attend.	Greenbank Lecture Theatre
14:00-16:00	Conference Workshops	Harrington Social Space
14:00-15:00	Workshop Choice A	
15:00-16:00	Workshop Choice B	
16:00-16:30	Afternoon Break Posters & Sponsors	Harrington Social Space

Timing/Talk	Content Information	Location
16:30-17:30	Session 3: Head & Neck Chaired by Dr Andy Ginty	Greenbank Lecture Theatre
S10	When Neural Crest Cells Go Rogue: A Case Series Analysing Morphometric Features of Aortic Arch Variants <i>Ali Forookhi</i> – Norfolk and Norwich University Hospital	
S11	What is the Optimum Incision for Superficial Temporal Artery Biopsy? A Cadaveric Anatomical Study <i>Oliver Vij</i> – King's College London	
S12	An Investigation into the Thalamostriate Vein and its' Relationship to the Subthalamic Nucleus <i>Joastin Naidoo</i> – Nelson Mandela University	
S13	Morphometric Analysis of the Human Hypoglossal Neuronal Nucleus During Late Gestation <i>Sreeja Mannickal Thankappan</i> – Buckinghamshire New University	
S14	Morphometric Variability of Ethmoid Foramina - Revisiting the Rule of Halves and the Relevance of Accessory Ethmoidal Foramina in Orbital Surgery <i>Cezar Octavian Morosanu</i> – University of Liverpool	
S15	Anatomical Variability of the Mastoid Foramen and Its Clinical Implications for Retrosigmoid Skull Base Approaches <i>Amy Manson</i> – University of Liverpool	
17:30-17:45	Meeting Close	Greenbank Lecture Theatre
	Thanks from the Dean <i>Prof. Alison Carr</i> – Dean of the School of Medicine & Dentistry	
	Raffles Prizes & Closing Remarks <i>BACA President & Meetings Secretary</i> <i>Kris Phillips & Liam Young</i>	
17:45-19:00	Drinks Reception Optional Tour of School of Veterinary Medicine	Harrington Social Space
19:30-Onwards	Association Dinner <i>Angelo's, 31-35 Avenham Street, Preston, PR1 3BN</i>	

Poster Presentation List

1. Harnessing artificial intelligence for the development of high-quality MCQs in anatomy assessment
2. Defining the Deltoid Tubercle: A Novel Landmark for Suprascapular Interventions
3. Femoral Malrotation and Patellofemoral Osteoarthritis: Human Donor Study
4. Unlocking the Pedagogical Potential of Research Tools in Neuroanatomy Education for Pre-Clinical Medical Students and Early Career Anatomy Educators
5. Collateral Evolution and Delayed Arteriogenesis Following Uterine Artery Embolisation: A Case Series on Vascular Adaptation
6. Replaced left hepatic artery arising from the left gastric artery "Hyrtl's artery": a case study
7. Anatomy of the Peritoneal Reflections Using CT Peritoneography
8. A narrative literature review on the automation of echocardiographic measurements using artificial intelligence.
9. Tailoring Ocular Surgery Education: Perceptions Across Medical Training Stages
10. Anatomical Determinants of Suprascapular Nerve Involvement in Brachial Plexus Injury
11. Addressing how bias in AI systems contributes to inequitable health outcomes amongst under-represented groups
12. Anatomical Variations of the Anterior Cruciate Ligament Complex and Their Implications for Imaging and Reinnervation
13. Anastomosis of terminal branches in the brachial plexus and clinical implications: A body donor case study
14. Peering behind the pia: anatomical considerations of the subpial space within a five-compartment model of the meninges
15. Coracobrachialis Variation in a Human Body Donor Resembling Ligament of Struthers: A Case Study
16. Racism, diversity, and equity in maternal health: a scoping review of Black women's experiences in the UK and USA
17. Do hepatic artery variants influence the technical success of transarterial chemoembolisation (TACE)? A Retrospective Single-Centre Analysis
18. Dual Palmaris Longus Muscles in a Human Donor: Anatomical Variation with Implications for Compressive Neuropathies of the Hand
19. Can you find the vomeronasal organ?
20. An Unusual Anatomical Branching Pattern of Foramen Rotundum: Case Report and Clinical Implications
21. An Additional Head of the Adductor Magnus: A Cadaveric Case Study
22. Accessory Superficial Flexor Muscle Medial to Palmaris Longus: Incidence and Clinical Considerations in Human Body Donor Upper Limbs
23. Morphological Analysis of the Supinator Crest and Tubercle of the Ulna for Lateral Ulnar Collateral Ligament Reconstruction
24. Fenestration of the axillary vein associated with a high bifurcation of the axillary artery in human body donor: A body donor case report
25. Anatomical Variation of the Palmaris Longus Muscle: Distal Accessory Belly and Clinical Implications
26. Perception of Artificial Intelligence and Computer Skills Among First-Year Medical Undergraduates: A Comparative Analysis of Two Cohorts
27. A New Anatomical Approach to Ultrasound-guided Regional Anaesthesia Training Using the Anatomage Table

Conference Plenary



Dr Josh Lauder

University of Lancashire & East



Prof. Peter Driscoll

University of Lancashire

Talk Title: Lancashire Showcase - Integrating Clinical Anatomy

About the Speakers

Professor Peter Driscoll is the Lead for Clinical Anatomy at the University of Lancashire, having previously worked as a Emergency Medicine Consultant. Peter's first degree was in anatomy, followed by a medical degree, and he later acted as Professor and Dean of the Royal College of Emergency Medicine.

Dr Josh Lauder is a Consultant Radiologist with East Lancashire Hospital Trust and the Radiology Lead at the University of Lancashire. Josh has worked closely with the anatomy team to fully integrate radiology into the anatomy curriculum, emphasising the clinical reasoning and context of anatomy in clinical practice.

Josh and Peter work together on multiple projects, including a recent book (Diagnostic Imaging and Anatomy in Acute Care), several projects integrating anatomy and imaging for the European Trauma Course, and imaging research involving students and qualified doctors.

Talk Abstract

This presentation explores the rationale for embedding anatomy teaching within the clinical years of undergraduate medical education. As students transition from pre-clinical learning to patient-facing practice, revisiting anatomy in a clinically relevant context helps students integrate foundational knowledge with patient assessment, supports diagnostic reasoning, and imaging interpretation. We will describe four examples of planned applied anatomy and radiology teaching, identifying the underlying education principles we tried to use to maximise the educational experiences. We discuss the main findings from the implementation of these sessions, highlighting perceived benefits for student confidence and clinical understanding, alongside identified challenges and areas for improvement. Finally, the presentation offers practical tips for clinicians and educators teaching applied anatomy to clinical medical students. Together, these insights provide a pragmatic framework for enhancing anatomy education within the clinical undergraduate curriculum.

Conference Workshops

In the afternoon of the conference, you will have the opportunity to attend 2 workshops. At



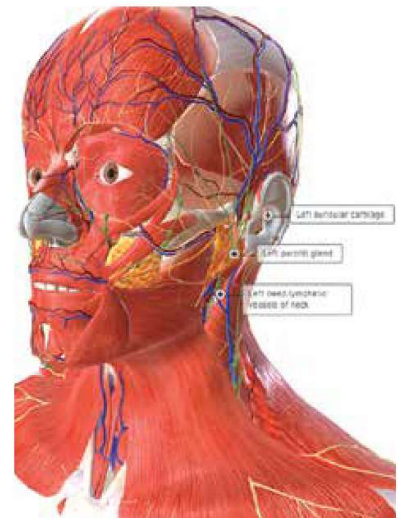
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registration you will select which 2 to attend from a choice of 3.

Workshop Choice 1

Workshop Title:

Trauma CT

About the Workshop Lead

Dr Josh Lauder is a Consultant Radiologist with East Lancashire Hospital Trust and the Radiology Lead at the University of Lancashire. Josh has worked closely with the anatomy team to fully integrate radiology into the anatomy curriculum, emphasising the clinical reasoning and context of anatomy in clinical practice.

Workshop Abstract

This workshop will focus on how to approach a trauma case from a clinical and imaging perspective. You will learn how to use the ABCD clinical assessment tool as part of a trauma team as a table top exercise. You will also learn about how CT is used in trauma and be shown how to navigate through a trauma CT scan and pick up life threatening pathology in the chest and abdomen.

Workshop Choice 2

Workshop Title:

Sketching It Out: Drawing as a Tool for Anatomical Education

About the Workshop Lead

Dr Lois Holt is a Lecturer in Anatomy at the University of Lancashire. She trained as a medical doctor at the Hull York Medical School but has moved away from clinical work to pursue a career in education. She is a passionate artist, having displayed her work at a variety of places across the North West. She is currently studying Medical Illustration with the Medical Artists Education Trust.

Workshop Abstract

This workshop is a fun and interactive session, designed to build confidence in drawing as a practical and accessible tool for anatomical education. Originally developed for our teaching fellows during their induction, the session emphasises drawing as a means of simplifying complex ideas and supporting learning.

Through a variety of activities, attendees will consider their own use of drawing within their teaching and learning practice. We will look at ways to break down complex anatomical structures into simple shapes while maintaining educationally important landmarks. We will practice different approaches to showing depths and highlighting opposing structures using everyday classroom materials. Finally, we will practice drawing recognisable structures under a time pressure.

By the end of the session, attendees will have gained confidence in representing anatomical structures in various ways that are directly applicable to their own educational practice.

Conference Workshop 3

Workshop Title:

Learning That Sticks: Applying Cognitive Science Principles
to Clinical Anatomy Teaching

About the Workshop Lead

Dr Lisa Quinn is an Associate Professor in Medical Education and Clinical Anatomist. She has worked at Leicester Medical School since 2015, and in Clinical Education since 2008. She leads the Head and Neck Anatomy module and has developed and led innovative approaches to the summative assessment of clinical anatomy in Undergraduate medicine. In addition to clinical anatomy, she is particularly interested in developing pedagogical expertise and in translating principles from the science of learning into educational practice. She holds a Master's degree in Clinical Education, is a Senior Fellow of the Higher Education Academy, and is the Director of Taught Postgraduate Programmes in Clinical Education at Leicester Medical School.

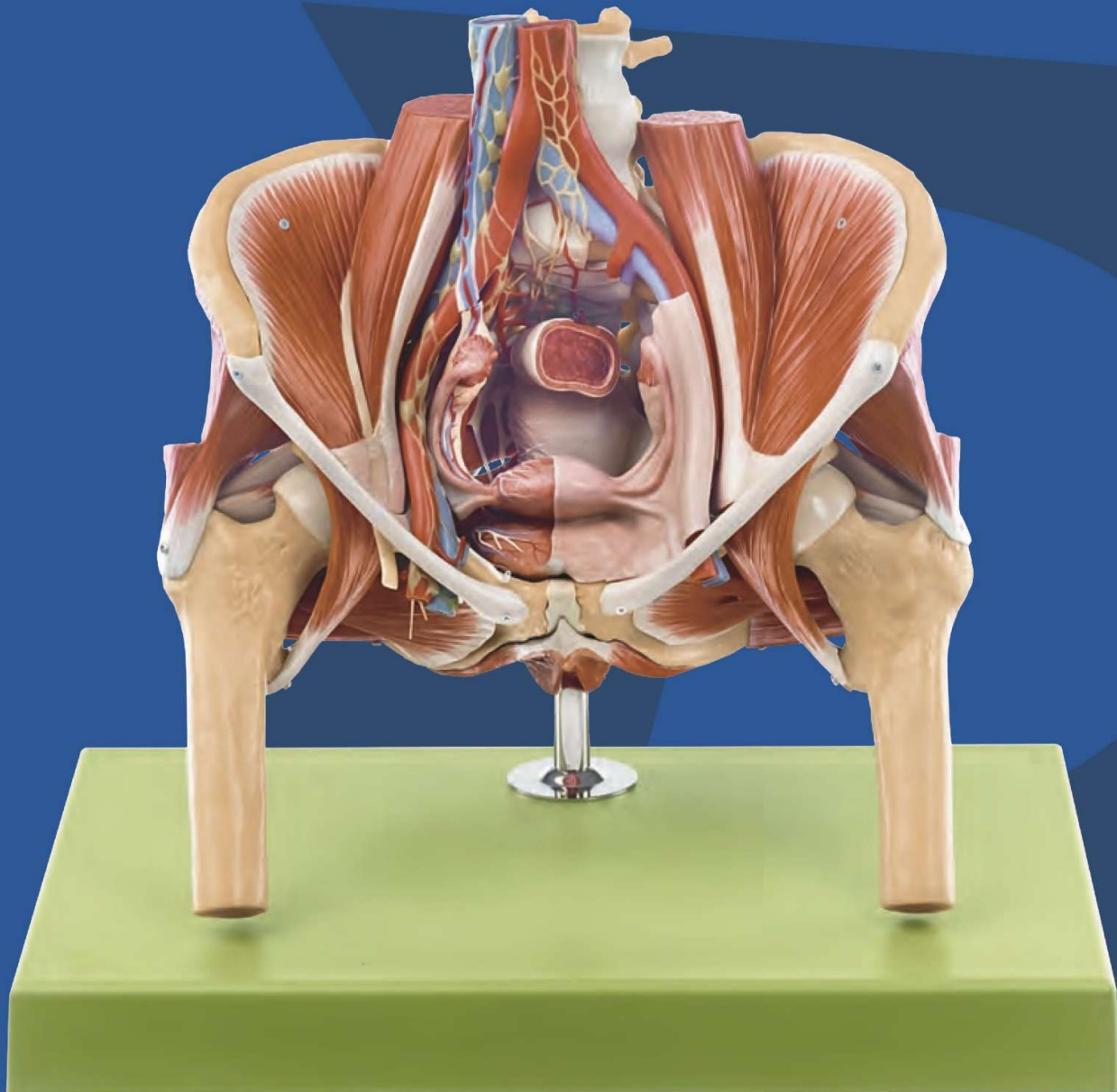
Workshop Abstract

This workshop is designed for clinical anatomy educators seeking to enhance their teaching through the practical application of learning science principles. Drawing on Cognitive Load Theory and Mayer's Cognitive Theory of Multimedia Learning, the session will explore how evidence-based strategies can inform the design and delivery of instructional materials to optimise student understanding and retention.

Participants will examine common challenges in anatomy education such as content overload and visual complexity and learn how to mitigate these through purposeful instructional design. Through collaborative activities and discussion, educators will gain practical insights and techniques to align their teaching practices to better support meaningful learning in their students.

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Oral Presentation Abstracts

S01 – In the Air Tonight: Pathological Gas as Nature’s Contrast

ARSHAD, Amin

East of England Imaging Academy, Norfolk and Norwich University Hospital, Norfolk, UK.

In an age of advanced imaging, we sometimes need to think outside the box to appreciate anatomical relationships that are not always visible. A “normal” abdominal CT often conceals the hidden passages and boundaries of the body, yet pathological gas can transform radiology into a living anatomy lesson. This study illustrates how gas entering abnormal spaces redefines how abdominal compartments and fascial planes are visualised.

When air outlines fibrous attachments between the parietal and visceral peritoneum, adhesions otherwise imperceptible on imaging become visible. At the junction of the sigmoid and descending colon, gas entering both intra- and retroperitoneal spaces reveals the peritoneal reflection separating these compartments, showing how a single perforation can bridge two domains. Retroperitoneal gas, confined by fascial layers, may track along diaphragmatic and neurovascular planes into the mediastinum and even the epidural space, demonstrating potential anatomical communications. Pneumoperitoneum in a patient with a hiatus hernia shows the herniated stomach drawing peritoneum and gas upward into a confined pocket, reinforcing its intraperitoneal nature. Gas limited to the renal fascia outlines the enclosed perirenal compartment, confirming the kidney’s retroperitoneal position.

Collectively, these examples show how pathological gas acts as nature’s contrast—turning abnormal radiology into an exploration of living anatomy.

S02 – Virtual Technology in Anatomy Teaching: A Systematic Review

ELSAYED, Abdelhadi ¹, Khalid Mohamed ², Eram Yousif ³, Mohamed Abdelrahim ³

¹ *University Hospitals Dorset NHS foundation Trust, Poole, United Kingdom*

² *Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, United Kingdom*

³ *St. George's University, St. George, Grenada*

Human anatomy has traditionally been taught through human donor dissection and textbooks. Recent advances in three-dimensional (3D) visualization, virtual reality (VR), and augmented reality (AR) have introduced interactive approaches that may enhance spatial understanding. This systematic review evaluated the effectiveness of these virtual technologies (VT) compared with conventional methods in anatomy education. Following PRISMA 2020 guidelines, 27 randomized controlled trials were included, comparing VT modalities – 3D visualization, immersive VR, AR, mixed reality (MR), and simulator systems – with traditional teaching tools such as human donor dissection, atlases, and 2D images. Overall, VT achieved comparable or superior learning outcomes, with the greatest benefits seen in complex spatial topics including neuroanatomy, cardiac anatomy, and the middle and inner ear. Interactive 3D and immersive systems significantly improved conceptual understanding and examination performance. MR achieved equivalent outcomes to human donor dissection while reducing teaching time by approximately 40%. Students with lower visual-spatial ability particularly benefited from stereoscopic 3D displays, and across all modalities, virtual technologies consistently outperformed traditional methods in subjective outcomes, including engagement, motivation, and

spatial clarity. Virtual technology represents an effective, efficient, and inclusive complement to traditional anatomy teaching. No primary data collection was undertaken, and ethical approval was not required.

S03 – Does simulation-based ophthalmology teaching improve knowledge, skills, or confidence compared to traditional teaching. A systematic review.

MANORANJAN, Akshayan, Karuna Katti

Lancaster Medical School, Lancaster University, UK

Hands-on ophthalmology training remains limited in medical education, prompting interest in integrating simulation-based teaching. This review aimed to determine whether simulation-based ophthalmology teaching improves medical students' knowledge, skills and confidence compared to traditional teaching.

A systematic search was conducted following PRISMA guidelines across PubMed, Embase and Cochrane databases. Eligible studies compared simulator-based training with traditional training quantitatively, involving medical students or early trainees. Studies focused solely on residents or lacking measurable outcomes were excluded. Of 35 identified studies, 12 met inclusion criteria, comprising RCTs, cohort studies and pre-post interventional designs. Simulation interventions included the "EyeSi" models, synthetic eye models, and hybrid approaches combining simulation with patient or peer practice. Traditional methods included didactic teaching and training with a direct ophthalmoscope.

Across studies, simulation-based groups consistently outperformed traditional groups. Confidence scores were significantly higher in simulation groups compared to the traditional (mean 3.58 vs 2.19), and 80.6% of students preferred simulation-based learning. Five studies demonstrated measurable improvements in technical skill, while five reported simulation as a preferred teaching modality.

Simulation-based ophthalmology bridges the gap between theoretical anatomy and real-world clinical skill. Larger, standardized studies are required to validate these findings and guide anatomy and clinical development.

S04 – One Anatomy, Many Curricula: Mapping Learning Outcomes for Unified Teaching

CARDENAS-SERNA, Marcela

Human Anatomy Resource Centre, Technology, Infrastructure and Environment Directorate, Faculty of Health and Life Sciences, University of Liverpool

The Human Anatomy Resource Centre (HARC) supports anatomy teaching across diverse programmes, including Medicine, Dentistry, Nursing, and Allied Health. Although learning outcomes (LOs) often overlap across curricula, differences in depth and focus pose challenges for resource and session design, vastly increasing staff workload. This project aimed to explore the feasibility of homogenising LOs and aligning educational resources across programmes.

A total of 268 unique LOs were collated and classified into structural (167), functional (38), and clinical (63). Validation of this classification was conducted via an anonymous questionnaire completed by 14 anatomy educators, with 27 out of 28 randomly selected LOs receiving majority agreement. Resource

preferences varied by LO type: structural LOs were best supported by human donor material; functional and clinical LOs favoured digital resources. Cardiovascular LOs showed the greatest cross-programme overlap, suggesting a potential starting point for harmonisation. The main challenges highlighted by this work were the classification of imaging-related LOs and the issue of granularity: how detailed LOs should be to serve multiple programmes effectively. Recommendations include reassessing LO granularity, treating imaging LOs as a distinct category, and prioritising human donor material for structural teaching. These findings offer a framework for streamlining anatomy education while maintaining pedagogical integrity across disciplines.

S05 – Integrating Etymology into Anatomy Education: A Pilot Curriculum at Stanford School of Medicine

MAURO, Madelyn, Sakti Srivastava

Stanford School of Medicine, Stanford, CA, US

Medical students face the challenge of mastering an anatomical vocabulary heavily rooted in unfamiliar ancient languages. In a world where full classical language instruction is no longer feasible, etymology offers a modern solution: it teaches the meanings of terms by exploring their linguistic and historical context. At Stanford School of Medicine, we piloted an elective centered around an open-source 3D model of human anatomy annotated with the etymological roots of anatomical structures. After the course, students (n=26) reported increased confidence with anatomical terminology, greater interest in the ancient languages that form the foundation of this terminology, and stronger endorsement of etymology as a useful part of anatomy instruction. The course was rated uniformly excellent, and the 3D model was consistently valued for learning both anatomical structures and terminology. By uniting linguistic history with modern visualization, this pilot offers a new approach to anatomy education and a model that can be scaled across institutions.

S06 – Investigation of the use of clay-based modelling and 3D-printed skeleton as a teaching method for early years of medical learning: a pilot study

DELIEU, John Michael ¹, Noor Al-Antary ¹, Lucas. P. L. de Souza ¹, Tom Pidgeon ², Francis Peart ², Claire Stocker ¹, Sami A. Al-Ani ¹

¹ *School of Medicine, College of Health & Life Sciences, Aston University, Birmingham, UK.*

² *Surgical Sculpture Workshops Ltd.*

Anatomy is widely recognised as a foundational discipline for medical practice. However, recent years have seen a reduction in traditional human donor-based anatomy teaching, partly due to the shift towards integrated, system-based curricula. This change has driven the development of alternative, active-learning approaches that are both efficient and effective. The present study explored the usability of clay-based sculpting, combined with 3D-printed plastic skeleton models, for teaching musculoskeletal anatomy to early-year medical students.

Twelve MBChB students (aged 18-25) participated in a one-day Anatomy Sculpting Workshop. Pre- and post-session questionnaires assessed their perceptions of this learning method. During the session, students worked collaboratively in groups of four, with pairs sculpting muscles, tendons, and ligaments onto one side of a pre-made 3D-printed skeleton using standard sculpting tools.

Findings showed a clear positive shift in students' views of 3D models as valuable tools compared to traditional 2D resources. They found the multisensory, hands-on, and collaborative aspects of the activity improved engagement, confidence, and understanding of spatial relationships. The use of clay on 3D skeletons created memorable learning experience. Overall, this creative, multimodal approach highlights the potential of innovative methods to make anatomy education more dynamic, enjoyable, and effective.

Ethical approval was obtained from Aston University pertaining to the reference HLS21274.

S07 – Patient-Specific Safe Zones for Shoulder Arthroscopy and Arthroplasty: A Human Donor Study

DURU, Dave ^{1,2}, Niel Kang ^{1,3}, Gavin Jarvis ⁴, Salma Chaudhury ^{1,3}, Cecilia Brassett ¹

¹ Human Anatomy Centre, Department of Physiology, Development and Neuroscience, University of Cambridge, Cambridge, UK

² Gonville & Caius College, University of Cambridge, Cambridge, UK

³ Department of Trauma and Orthopaedics, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

⁴ University of Sunderland, UK

Suprascapular nerve (SSN) injury is a serious complication of arthroscopic procedures and reverse shoulder arthroplasty (RSA), leading to pain and functional deficit. Current safe zone guidelines are limited, not accounting for anatomical variation. This study aimed to define patient-specific safe zones for arthroscopy and RSA. Ten human donor shoulder pairs (20) were dissected. For arthroscopy, distances from the superior transverse scapular ligament (STSL) to lateral acromion and acromioclavicular joint were measured. For RSA, superior (supraglenoid tubercle-SSN) and posterior (glenoid rim-SSN) safe zones were recorded. Scapular dimensions (height, width, spine length) were correlated with safe zones. STSL was 76.9 ± 9.9 mm from lateral acromion and 45.3 ± 6.5 mm from AC joint, both distances correlating with scapular dimensions ($r = 0.45-0.77$; $p < 0.05$). The superior safe zone (29.5 ± 4.8 mm) strongly correlated with scapular dimensions ($r=0.78-0.86$, $p<0.0001$), whereas the posterior safe zone (18.9 ± 5.6 mm) did not. Scapular dimensions reliably predict patient-specific safe zones for arthroscopy and RSA, enabling personalised preoperative planning to reduce SSN injury risk. Donors had provided written consent for use of their bodies for research, in compliance with the Human Tissue Act 2004.

S08 – Localization of the Motor Entry Point of Adductor Pollicis Muscle using Surface Landmarks

GARG, Sheryll ¹, Rebekah Sasha Mary Aranha ¹, Femina Sam ^{1,2}

¹ Human Anatomy Unit, Department of Biomedical Sciences, School of Infection, Inflammation and Immunology, College of Medicine and Health, University of Birmingham, UK

² Department of Anatomy, Christian Medical College, Vellore, Affiliated to the Tamil Nadu Dr. M.G.R. Medical University, Chennai, India

Adductor pollicis (AP) hyperactivity in upper motor neurone lesions causes thumb-in-palm deformity, which can be treated with botulinum toxin (BoNT) injection at the muscle's motor entry point (MEP). However, there is limited evidence defining surface landmarks for effective BoNT administration. This study aimed to identify reliable surface landmarks for MEP localisation. A total of 21 adult human donor hands were dissected. The surface landmarks were used to create a grid dividing into four

zones. Morphometric measurements of the hand and muscle, and distances from landmarks to the MEP, were recorded using digital callipers. In 13 specimens, the MEP was located between zones 1 and 2 along the third metacarpal axis; in 8 specimens, the MEP was in zone 2 and medial to the third metacarpal. Interestingly, while most MEPs were located along the axis of the third metacarpal, some were found medial to the bone, suggesting that the muscle's origin may extend beyond the third metacarpal, thereby challenging current literature on its anatomical origin. These findings provide an anatomical reference to guide BoNT injections, nerve blocks, and reconstructive surgery. Consent for use of human donor specimens and images was obtained through the University of Birmingham Donor Registration Programme (Licence No. 12236).

S09 – Clinical Role of Extraocular Muscle Anatomy in Slipped and Lost Muscles During Strabismus Surgery: A Dissection-Based Study

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Slipped or lost extraocular muscles are challenging complications of strabismus surgery, requiring precise knowledge for accurate correction. Anatomical variations may influence surgical landmarks, yet specific morphometric data in Caucasian populations is lacking. This cross-sectional dissection study examined six orbits from three formalin-embalmed Caucasian body-donors at the University of Birmingham. Each globe was inflated with ultrasound jelly, and extraocular muscle dimensions measured using a string-and-ruler technique. Data on muscle length, width, limbal distance, and inter-recti spacing were compared with Thai, Mexican, Indian, and Taiwanese datasets using Welch's t-tests. Muscle length followed inferior rectus (IR)<inferior oblique (IO)<medial rectus (MR)<lateral rectus (LR)<superior rectus (SR)<superior oblique (SO), with IR and LR significantly shorter than Thai populations ($P<0.05$). Recti insertion width followed $IR<MR\approx LR<SR$, with highly significant IR narrowing versus Thai and Mexican cohorts ($P<0.001$). Limbal distance followed $LR<MR<IR<SR$, with SR more posterior than Thai, Indian, and Taiwanese populations ($P<0.05$); IR more posterior than Thai and Taiwanese ($P<0.05$); and MR more posterior than the Indian cohort ($P<0.05$), with highly significant differences from Thai and Taiwanese cohorts ($P<0.001$). Inter-recti spacing followed $MR-IR<IR-LR<SR-MR<SR-LR$, showing variation across studies. These findings provide novel morphometric data on Caucasian extraocular muscles, highlighting differences that may improve surgical outcomes.

All specimens from body donors were obtained through the University of Birmingham Human Anatomy Unit in accordance with the UK Human Tissue Act (2004). Donors had provided informed written consent for the use of their bodies for research and education.

S10 – When Neural Crest Cells Go Rogue: A case series analysing morphometric features of aortic arch variants

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Aortic arch anomalies arise when neural crest cell migration is disrupted during weeks 3-8 of embryonic development. These variants may form vascular rings with potential for tracheo-

oesophageal compression. We analysed morphometric features and clinical significance of ten arch variants to characterise their anatomical impact.

Ten patients with arch anomalies on cross-sectional imaging were reviewed in this case series. The cohort comprised right aberrant subclavian arteries (n=4), double aortic arches (n=2), right-sided aortic arches (n=2), one left aberrant subclavian artery, and one double SVC. Each case was evaluated for complete ring formation, compression of adjacent structures, Kommerell diverticulum, associated anomalies, and arch diameter at the left inferior pulmonary vein.

Three cases (30%) formed complete vascular rings. Interestingly, while oesophageal compression was common (60%), we found no evidence of tracheal compression. Kommerell diverticula were absent throughout. Eight patients (80%) had additional anomalies, ranging from congenital heart defects (Tetralogy of Fallot, VSD) to vascular variants and malrotation.

Our findings reveal that arch variants predominantly affect the oesophagus rather than trachea, with most patients harbouring additional anomalies, emphasising the need for cross-sectional imaging when arch anomalies are suspected.

S11 – What is the optimum incision for superficial temporal artery biopsy? A human donor anatomical study

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Superficial temporal artery (STA) biopsy remains the diagnostic gold standard for giant cell arteritis. Incisions should optimise STA exposure while avoiding the temporal branch of the facial nerve. However, the widely used Gillies incision, a 2 cm temporal incision 2.5 cm anterior and superior to the auricular helix within the hairline, is inconsistent for STA access.

In this study of 20 hemi-faces from 10 body donors (mean age 87.1; range 75-93; n=3 females), STA branches were mapped using a Cartesian grid referenced to the anterior crus–lateral canthus axis. Four 2 cm incisions were modelled: Gillies, pre-auricular, and two optimised incisions targeting frontal and parietal branches. Access was defined as incision-to-vessel distance of ≤ 0.5 cm or ≤ 1.0 cm.

The Gillies incision accessed the frontal branch in 11/20 (55%) ≤ 1.0 cm and 3/20 (15%) ≤ 0.5 cm; parietal access was 8/19 (42%) ≤ 1.0 cm and 4/19 (21%) ≤ 0.5 cm. Pre-auricular incision improved access: ≤ 1.0 cm for frontal 13/20 (65%) and parietal 19/20 (95%) branches. Optimised frontal and parietal incisions achieved 19/20 (95%) and 18/19 (94.7%) access of ≤ 1.0 cm respectively.

The Gillies incision provided inconsistent STA access. A pre-auricular incision improved dual-branch exposure. Optimised incisions achieved high, branch-specific access, but require clinical validation. All donors provided written consent under the Human Tissue Act 2004.

S12 – An investigation into the thalamostriate vein and its relationship to the subthalamic nucleus

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The thalamostriate vein (TSV) has emerged as a vascular route for endovascular deep brain stimulation (DBS) in advanced Parkinson's disease (PD), as it drains the subthalamic nucleus (STN), a principal DBS target. Understanding the TSV's morphology and its spatial relationship to the STN is essential for safe and effective stentrode placement. In this study, high resolution T2 and SWI MRI scans of 30 patients (n=60 cerebral hemispheres) were retrospectively analysed. The presence, drainage pattern and diameter of the TSV, as well as its distance from the posterolateral aspect of the STN were recorded. Presence of the lateral direct vein (LDV) was also documented. Ethical approval was obtained (BREC/00008748/2025). The TSV was identified in 96.7% of hemispheres, with a mean diameter of 1.28 ± 0.32 mm. One case demonstrated contralateral drainage into the internal cerebral vein. The mean TSV-STN distance was 12.27 ± 3.43 mm, with no statistically significant relationship between this distance and laterality ($p=0.525$). LDV presence was 25%. This study provides key morphometric data on the TSV and its proximity to the STN, offering neuroanatomical insights that may be relevant to the development of endovascular DBS approaches in advanced PD patients. These findings may minimise iatrogenic injury, guide stentrode positioning and optimize electrical field delivery.

S13 – Morphometric Analysis of the Human Hypoglossal Neuronal Nucleus During Late Gestation.

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The hypoglossal nerve (cranial nerve XII) plays a critical role in motor functions such as mastication, deglutition, vocalization, and respiratory modulation. Despite its clinical relevance, human developmental studies of its neuronal nucleus remain limited. This morphometric study aimed to analyze the structural maturation of the hypoglossal neuronal nucleus in late gestational human fetuses. Following ethical approval and maternal consent, 12 fetuses (19-40 weeks gestation) were grouped by gestational age and crown-rump length. Medullary sections containing the hypoglossal nucleus were processed using standard histological techniques and stained with hematoxylin-eosin and Holmes' silver nitrate. Neuronal cell and nuclear dimensions were measured to assess growth patterns. Results revealed that hypoglossal neurons transitioned from oval to pyramidal shapes between 18-24 weeks, with rapid early growth followed by shrinkage indicative of maturation. Dendritic processes were observed in later stages, suggesting functional readiness. These findings contribute to understanding the histogenesis of cranial motor nuclei and may inform clinical approaches to neonatal neurodevelopmental disorders.

S14 – Morphometric Variability of Ethmoid Foramina - Revisiting the Rule of Halves and the Relevance of Accessory Ethmoidal Foramina in Orbital Surgery

MOROSANU, Cezar Octavian, Alice Davies, Neil P. Thomas, Craig Molloy-Humphreys, Alistair Bond

A detailed understanding of orbital anatomy is essential for safe surgical dissection. The *Rule of Halves* (24-12-6mm) is widely used as a surgical guideline for identifying ethmoidal foramina, proposing specific distances between the anterior lacrimal crest (ALC), anterior ethmoidal foramen (AEF), posterior ethmoidal foramen (PEF), and optic canal (OC). However, reported anatomical variation raises questions regarding its universal reliability. This study aimed to reassess these relationships in a human donor cohort.

Ninety dry skulls (171 orbits) were examined. The distance between the ALC to AEF, AEF to PEF, PEF to OC, ectoconchion–dacryon (EC-DC), OC-inferior orbital rim (IOR), the horizontal (HOD) and vertical orbital (VOD) diameter were measured. The presence and number of accessory ethmoidal foramina (ACEF) were recorded.

The mean distance for ALC-AEF was 24.18 ± 1.8 mm, AEF-PEF 15.33 ± 2.36 mm and PEF-OC was 5.76 ± 1.12 mm. ACEF were found in 39% of orbits and ranged from 1 (31.6%) to 3 (1.17%) foramina. Statistical analysis revealed that the ALC–AEF and AEF-PEF distances and the number of ACEF are significantly correlated with the OC-IOR distance.

Our findings show that the *rule of halves* should be interpreted with caution during surgical dissection as the length of the orbit and the presence of accessory foramina can influence the interforaminal distance.

S15 – Anatomical Variability of the Mastoid Foramen and Its Clinical Implications for Retrosigmoid Skull Base Approaches

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The mastoid foramen (MF) is an anatomical variant located near the occipitomastoid suture (OMS), transmitting an emissary vein connecting sigmoid sinus to the suboccipital venous plexus. Understanding MF variability is crucial for neurosurgical procedures, particularly retrosigmoid approaches, where unrecognized emissary veins can lead to intraoperative bleeding. This study analysed 105 skulls from our departmental historical osteological collection. The size, number and position of intracranial and exocranial MF openings were assessed in relation to surgical landmarks relevant for retrosigmoid craniotomy. Mean distances between MF and asterion, zygomatic root, digastric groove, and foramen magnum were determined.

MF were found in 81 skulls (77%), of which 34 were unilateral and 47 bilateral. One single exocranial and endocranial MF opening was most common (72%, 96%). Diameters ranged from 0.40 mm to 6.04 mm. Most MF (78%) were located anterior to OMS, and MF on the left side were significantly closer to the digastric groove than those on the right ($p=0.026$).

This study reveals a high incidence of MF in our cohort and identifies statistically significant morphometric variability between specific surgical landmarks. Recognising these spatial relationships between structures and the differences in laterality can enhance surgical planning for retrosigmoid approaches and potentially prevent operative complications.

Poster Abstracts

P01 – Harnessing artificial intelligence for the development of high-quality MCQs in anatomy assessment

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Effective assessment in medical education requires structured, fair, and reliable tools. Multiple-choice questions (MCQs), particularly in the single best answer (SBA) format, remain central because they are objective, scalable, and effective for testing both factual recall and applied knowledge. Yet developing high-quality MCQs that align with learning outcomes is resource-intensive and often limited by faculty time. Artificial intelligence (AI), particularly large language models, offers a transformative opportunity to support this process. When used as a collaborative assistant, AI can generate draft questions, stems, distractors, and explanations that academics refine, validate, and approve. The effectiveness of this approach depends on structured prompt design, specifying the learning outcome, cognitive level (recall, application, or reasoning), format, difficulty, and adherence to institutional style. For clinical items, patient scenario templates further enhance consistency and authenticity. We propose a structured workflow: (1) define scope with learning outcomes, (2) apply house style, (3) generate AI-assisted drafts, (4) evaluate for difficulty and educational value, and (5) validate accuracy and fairness. Early experience suggests this method accelerates item bank development, identifies content gaps, and improves distractor plausibility. With careful human oversight, AI becomes a powerful partner in expanding high-quality, clinically relevant MCQs for anatomy assessment.

P02 – Defining the Deltoid Tubercle: A Novel Landmark for Suprascapular Interventions

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The deltoid tubercle (DT) is a palpable prominence along the scapular spine, yet its precise anatomical definition and clinical value remain undefined. This study aimed to characterise the location of DT and evaluate its reliability as a landmark for suprascapular nerve (SSN) localisation. Twenty shoulders (10 human donors) were dissected to identify DT and SSN. DT's relative position along the scapular spine was measured, and distances to SSN were recorded at the (1) suprascapular notch, (2) SSN exit from the supraspinous fossa, and (3) spinoglenoid notch. Measurements were correlated with scapular height, spine length, and width. DT positioned $22 \pm 5\%$ along the scapular spine from its root. Mean distances from SSN to DT were (1) 49.5 ± 6.9 mm, (2) 53.7 ± 8.0 mm, and (3) 58.7 ± 9.7 mm, respectively, all correlating significantly with scapular dimensions ($r = 0.71-0.79$; $p < 0.05$). DT was validated as a landmark for SSN injections. DT, positioned $\sim 1/5$ along the scapular spine, represents a consistent landmark for SSN localisation. These findings may enhance accuracy and safety in shoulder

interventions. All donors had provided written consent for use of their bodies for anatomical research, in compliance with the Human Tissue Act 2004.

P03 – Femoral Malrotation and Patellofemoral Osteoarthritis: Human Donor Study

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Femoral version influences lower limb alignment and may contribute to patellofemoral joint degeneration. This study examined the relationship between femoral version and the compartmental distribution of patellofemoral osteoarthritis. An observational study was conducted on 15 human donor specimens. Femoral version and patellofemoral osteoarthritis were assessed. The findings demonstrated that low femoral version was strongly associated with medial facet osteoarthritis (85.7%), while high femoral version correlated with lateral facet osteoarthritis (80.0%). Normal version cases showed a more balanced distribution. The relationship was statistically significant (Pearson Chi-Square = 14.743, $p = 0.005$). No significant sex or side predilection was observed. Abnormal femoral version, in either direction, alters patellofemoral biomechanics shifting loads toward one patellar facet selectively. As a result, the stressed facet becomes at risk of degeneration and osteoarthritis. Optimal assessment of femoral version should be integrated in the clinical evaluation and treatment planning of patellofemoral disorders.

P04 – Unlocking the Pedagogical Potential of Research Tools in Neuroanatomy Education for Pre-Clinical Medical Students and Early Career Anatomy Educators

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Neuroanatomy is widely regarded as one of the most challenging areas for medical students due to the small size and spatial complexity of its structures. Its understanding is essential for both specialist fields (e.g., neurology, neurosurgery) and general practice. Often, many medical students struggle to visualise neuroanatomical spatial relationships and identify structures on prosected specimens and imaging scans. This is exacerbated by the limited availability of resources that support 3D learning and interpretation of medical imaging scans. Powerful research tools, including open-access neuroimaging datasets and visualization software, remain underutilized despite their potential to enhance spatial understanding and promote clinical integration through the identification of neuroanatomical structures on MRI and CT scans. This poster showcases how the free neuroimaging database Open Access Series of Imaging Studies (OASIS) can be used along the imaging computing platform 3DSlicer to visualize the morphology of individual neuroanatomical structures and their spatial relationships in MRI scans. It also offers recommendations for the thoughtful integration of these research tools alongside other educational resources within the pre-clinical anatomy curriculum. Overall, unlocking

the pedagogical potential of research tools can transform pre-clinical anatomy education, enriching medical students' learning experience and fostering more positive perceptions of neuroanatomy.

P05 – Collateral Evolution and Delayed Arteriogenesis Following Uterine Artery Embolisation: A Case Series on Vascular Adaptation

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Uterine artery embolisation (UAE) is an established, minimally invasive treatment for symptomatic uterine fibroids. Recurrence is not uncommon, often stemming from the dynamic nature of pelvic vasculature and failing to permanently obliterate all arterial supply. Mechanisms of recurrence involve recanalisation of previously treated arteries or recruitment of new collateral pathways.

We present two clinical cases demonstrating arterial adaptation - referred to as collateral evolution and delayed arteriogenesis - that led to fibroid recurrence following initially successful UAE, highlighting the need for comprehensive vascular identification during re-intervention planning.

Both patients experienced fibroid recurrence following successful UAE. In the first case, imaging revealed recanalisation of a previously embolised uterine artery with new collateral supply from bilateral ovarian arteries. Subsequent re-embolisation successfully addressed these sources. The second patient developed recurrence supplied by the left ovarian artery, which was embolised. Despite this, fibroids persisted, and further imaging demonstrated new collateral supply from the previously embolised uterine artery, necessitating ultimate surgical management.

These cases illustrate the adaptive nature of pelvic vascular remodelling after UAE. Recognising and mapping evolving collateral pathways (including ovarian and uterine arterial adaptation) is essential for accurate image interpretation and maximising technical success in managing recurrent uterine fibroid disease.

P06 – Replaced left hepatic artery arising from the left gastric artery “Hyrtl’s artery”: a case study

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The left hepatic artery usually arises from the proper hepatic artery and is responsible for perfusing the left lobe of the liver. However, the literature shows that the artery of origin for the left gastric artery can be variable with reports of both replaced and accessory vessels, originating from a variety of sites. The prevalence of replaced left hepatic artery arising from the left gastric artery (“Hyrtl’s artery”) has been reported as 13%. A classification system was produced in 1966 by Michels which has subsequently had several updates.

This case report discusses a patient who was found to have a replaced left hepatic artery arising from the left gastric artery. The patient was planned to have embolization of an iatrogenic bleed in the liver and this anatomical variant was identified on pre procedure imaging, and subsequently confirmed intraoperatively.

Knowing the specific hepatic vasculature of each patient is vital prior to procedure. In this case a replaced left hepatic artery meant that the haemorrhage in the left lobe of the liver was supplied by this anatomical variant as opposed to the common hepatic artery. This information was crucial when deciding on the site of embolization.

P07 – Anatomy of the Peritoneal Reflections Using CT Peritoneography

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Computed tomographic peritoneography (CTP) is an imaging technique that involves introducing a mixture of iodinated contrast and dialysate (typically 1 mL/kg of iodine, 300 mg/ml non-ionic contrast material is in with 30 mL/kg of dialysate) into the peritoneal cavity to visualise the abdominal contents and peritoneal boundaries. This method allows detailed evaluation of anatomical defects within the thoracic and abdominal walls, as well as assessment of displaced abdominal contents such as those seen in diaphragmatic hernias, intra-abdominal fluid collections (e.g., in peritonitis), and adhesions.

In clinical practice CTP is primarily utilised to evaluate intraperitoneal dialysate leakage in patients with renal failure undergoing peritoneal dialysis. The technique also facilitates assessment of catheter-related complications such as leakage, migration, or malposition information that can be important for surgical planning. We show examples of the examination, highlighting the normal peritoneal anatomy which can often be more difficult to appreciate on other cross-sectional imaging techniques.

P08 – A narrative literature review on the automation of echocardiographic measurements using artificial intelligence.

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Cardiovascular disease is the leading cause of death worldwide, with the World Health Organization estimating 19.8 million deaths in 2022. Early and accurate detection of cardiovascular conditions is strongly associated with reduced mortality risk. Echocardiography is a critical tool within diagnostics of cardiac conditions, using an ultrasound probe to image the heart's structure and function. Artificial intelligence (AI) is increasingly being discussed for integration into clinical practice to assist echocardiographers in image analysis and cardiac diagnosis.

This poster summarises 3 papers identified through an independent narrative review evaluating recent research on AI-assisted echocardiographic measurements. The broader review examined applications of AI in automated assessment of diastolic and systolic function, disease detection, and AI-supported training for echocardiographers. The selected studies demonstrate high reproducibility and accuracy in diagnostic performance, with potential benefits including reduced scanning and reporting time. However, challenges remain regarding external validation of the produced AI models, generalisability across populations and equipment, as well as ethical and regulatory considerations. The review highlights the promise of AI in enhancing echocardiographic practice whilst emphasising the need for multicentre clinical integration and continued evaluation of accuracy and patient outcomes.

P09 – Tailoring Ocular Surgery Education: Perceptions Across Medical Training Stages

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An ophthalmology-focused event, organised by the ‘Special Senses Society’ at Anglia Ruskin University (6th November 2024), aimed to enhance students’ anatomical and procedural understanding of ocular surgery. Directed by three independent doctors, the programme comprised a “How to Get into Ocular Surgery” careers talk and two simulated practical workshops: “Ocular Suturing” and “Ocular Dissection” utilising sheep eyes selected for their morphological resemblance to human specimens. Thirty-four medical students (years 1–5) participated and rated each session on a 5-point Likert scale. Friedman testing demonstrated no significant difference in delivery perception across the three sessions overall. Mann–Whitney analysis revealed no significant differences between pre-clinical and clinical students for any individual workshop. Nonetheless, observational trends indicated that clinical students rated the suturing workshop relatively higher, aligning with their procedural learning needs during placement. Notably, pre-clinical and clinical students showed similar appreciation for the dissection workshop, consistent with early anatomical training. These findings, supported by qualitative feedback, highlight that frozen sheep eyes offer a pragmatic and accessible platform for ocular surgery education. The lack of significant differences across learner stages suggest that practical, anatomically realistic teaching can be effectively integrated throughout undergraduate medical training, perhaps also in other under-represented surgical specialties.

P10 – Anatomical Determinants of Suprascapular Nerve Involvement in Brachial Plexus Injury

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Background: The suprascapular nerve (SSN) is a mixed peripheral nerve arising from the upper trunk of the brachial plexus. Brachial plexus injuries (BPI) involving the SSN profoundly compromise shoulder function. Consequently, SSN reconstruction is a key objective in upper limb reanimation following BPI; however, outcomes remain inconsistent, methods variably supported, and recovery comparatively poor. This has sustained debate over SSN-specific anatomical factors that may underpin these findings. **Accordingly,** this research examines the anatomical determinants of SSN involvement in BPI. **Methods:** Critical synthesis of current literature combined with advanced human donor dissection to identify detailed anatomical correlates. **Findings:** The SSN demonstrates five primary branches: two motor and three sensory, with marked variability in secondary divisions, often misrepresented in anatomical literature. Its constrained course toward distal targets, particularly around osseoligamentous structures, increases susceptibility to traction and compression forces characteristic of BPI. Collectively, these features likely account for SSN-specific vulnerability and the slower, suboptimal axonal recovery observed, relative to the other affected nerves in BPI. **Conclusion:** SSN involvement in BPI reflects a complex interplay of anatomical factors insufficiently recognised in peripheral nerve surgery. Strengthening anatomical understanding is essential to improving reconstructive strategies and optimising functional outcomes in BPI.

Appropriate ethical approval for this study has been received from the Leeds Research Ethics Committee. Compliance with ethical standards outlined by the Division of Anatomy, Leeds School of Medicine was maintained throughout.

P11 – Addressing how bias in AI systems contributes to inequitable health outcomes amongst under-represented groups

IHEME, Jeana

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Artificial Intelligence (AI) is revolutionizing health care, with applications in medical imaging, echocardiography, diagnostic screening, surgery etc. However, embedded bias within AI systems is resulting in inequitable health care outcomes amongst under-represented groups, resulting in delayed diagnosis, sub-optimal treatments, increased complications and higher mortality rates. This led me to explore: How does biased AI data contribute to inequitable health outcomes amongst under-represented groups? A review of current literature was conducted, outlining the Core concepts of AI technology and the mechanisms of bias within these systems. The analysis focused on four key areas of ethical consideration: 1) data bias in healthcare, 2) the impact of representation bias on AI diagnosis, 3) inequitable resource allocation, and 4) mitigation strategies. Findings show that poor representation of minority groups in datasets leads to diagnostic errors, with up to 83% misclassification of skin conditions in darker skin. Additionally, biased Algorithmic risk scoring can reduce black patients' induction into care programmes. AI bias threatens the integrity of equitable health outcomes; diversifying data and including ensemble methods shows potential to improve health equity in AI algorithms. This poster addresses the issues arising from data bias AI systems and proposes solutions to reduce its impact on under-represented groups.

P12 – Anatomical Variations of the Anterior Cruciate Ligament Complex and Their Implications for Imaging and Reinnervation

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The anterior cruciate ligament (ACL) complex is one of the most intricate anatomical and functional structures in the knee. Although commonly described as a double-bundle ligament, imaging studies and dissections have increasingly revealed the presence of triple-bundle variations, other common nearby structures include the ligamentum mucosum and the anterior meniscomfemoral ligament (AMFL). These variants often overlap normal boundaries, are less well documented and therefore their presence can lead to diagnostic confusion in trauma settings, especially when swelling or bleeding obscures the bundles on MRI. Such uncertainty can result in over- or undertreatment of partial tears or accessory fibres, affecting both surgical decisions and recovery outcomes.

Recently, there has been renewed interest in the sensory role of the ACL and its potential for neural regeneration. The ligamentum mucosum shares embryological roots and neural continuity with the ACL, suggesting a possible role as a pathway for reinnervation after injury. Recognising these subtle relationships challenges the traditional mechanical understanding of ACL function and opens new possibilities for regenerative and neurobiological approaches to ligament repair. The aim of this

presentation is to illustrate the variant anatomy of the ACL, ligamentum mucosum and AMFL, using MR images and to describe the confusion they may cause when assessing ACL injuries.

P13 – Anastomosis of terminal branches in the brachial plexus and clinical implications: A body donor case study

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The brachial plexus, formed by the anterior rami of C5-T1, provides the motor and sensory innervation of the upper limb and its complex branching pattern is of critical surgical and clinical relevance. Variations in its terminal branches can influence the outcome of nerve injuries, anaesthetic blocks, and reconstructive procedures. During routine dissection of an 87-year-old male body donor in the Anatomy Department at the University of Edinburgh, conducted in accordance with the Human Tissue (Scotland) Act 2006, bilateral variations of the brachial plexus were identified. Classically, the median nerve originates from both lateral and medial cords, whereas the musculocutaneous nerve arises from the lateral cord. In this case, the left axilla demonstrated an accessory communication between the cords over the axillary artery without forming a terminal branch. More strikingly, in the right arm, after piercing coracobrachialis, the musculocutaneous nerve anastomosed distally with the median nerve, continuing as three distinct terminal branches. This rare configuration carries clinical significance, as such an interconnection may alter typical innervation patterns, affect the manifestation of nerve injuries, and complicate surgical or anaesthetic procedures in the axilla and upper arm.

P14 – Peering behind the pia: anatomical considerations of the subpial space within a five-compartment model of the meninges

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The meninges form a multilayered covering around the brain and spinal cord, classically divided into the dura, arachnoid and pia mater. Recently, a fourth layer has been proposed to exist between the arachnoid and pia mater, known as the subarachnoid lymphatic-like membrane, prompting a re-evaluation of meningeal anatomy. Integrating this structure, and recognising the subpial space as an additional compartment containing collagen fibres between the pia and glia limitans, allows the meninges to be re-envisioned as a five compartment system.

We present a series of radiological cases demonstrating the various meningeal layers, including the subpial space, to define the distribution and boundaries of each anatomical compartment. By discussing the radiological features of subpial haemorrhage, we demonstrate how this fits in with a compartment-based interpretation of the meninges and illustrates how evolving concepts of additional meningeal layers can refine both anatomical teaching and radiological diagnosis.

P15 – Coracobrachialis Variation in a Human Body Donor Resembling Ligament of Struthers: A Case Study

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Anatomical variations of coracobrachialis are uncommon and may have important clinical implications due to their proximity to neurovasculature of the arm. During a routine human donor dissection of a 91-year-old male body donor at the Anatomy Department, University of Edinburgh, in accordance with the Human Tissue (Scotland) Act 2006, a rare variation of the coracobrachialis was identified. A tendinous sling was identified at the midshaft of the left arm, measuring 147 mm in length. It arose from the main body of the coracobrachialis muscle along with some muscular fibres, and inserted into the superior aspect of the medial epicondyle of the humerus. The structure superficially crossed over the median nerve and the brachial artery and its paired veins. Such a configuration may result in compression of the median nerve and brachial vessels during shoulder flexion or adduction, resulting in pain or paraesthesia along the medial forearm and palm. This variant structure closely resembles the ligament of Struthers in both course and neurovascular relationships, but is distinct in its origin from coracobrachialis rather than a supracondylar process of the humerus. Recognition of this rare variant is vital for clinicians and surgeons during evaluation of compressive neuropathies and planning of upper limb surgical interventions.

P16 – Racism, diversity, and equity in maternal health: a scoping review of Black women's experiences in the UK and USA

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This scoping review examines the impact of racism on Black maternal health in the United Kingdom (UK) and the United States of America (USA), highlighting stark disparities in outcomes. Evidence shows Black birthing individuals are four times more likely to die during pregnancy and twice as likely to experience severe maternal morbidity (SMM) compared to their white counterparts. Colonial history and its enduring legacy continue to shape healthcare experiences through structural, institutional, and interpersonal racism.

A comprehensive review of 32 sources was conducted, including reports from MBRRACE-UK and CDC-USA, as well as peer-reviewed studies. Databases searched included PubMed, Medline, NICE Guidelines, and One Search. Only UK and US literature was included, and selection was guided by relevance rather than publication date. Of the studies reviewed, three provided direct accounts from Black birthing individuals, while twenty-nine addressed systemic issues in healthcare.

Findings identify racism as a pervasive determinant of maternal health inequities, underscoring the need for intersectional approaches and culturally safe care. Addressing these disparities requires targeted research, meaningful government intervention, and amplification of Black voices. Dismantling systemic racism is essential to achieving equitable, compassionate maternity care across the UK and the USA.

P17 – Do hepatic artery variants influence the technical success of transarterial chemoembolisation (TACE)? A Retrospective Single-Centre Analysis

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Anatomical variation in the hepatic artery can complicate transarterial chemoembolisation (TACE) for hepatocellular carcinoma (HCC), but its effect on outcomes is unclear. This retrospective single-centre study examined whether hepatic arterial variants and arterial tortuosity (Types I–III) influence embolisation success (complete, partial, or failed). Adults with HCC who underwent TACE at the Royal Victoria Hospital, Belfast (June 2021–June 2024) were included (n = 65; 115 lesions). Dual-phase CT and digital subtraction angiography were used to classify hepatic arterial anatomy using Michels' classification and to assess tortuosity. Technical success was analysed with ordinal logistic generalised estimating equations to account for lesion clustering.

Arterial variants were present in 40% of patients, most commonly Type III (13.8%) and Type IX (7.7%); 60% had standard Type I anatomy. 59.1% had arterial tortuosity Type II. Technical success was complete in 90.4% of lesions, partial in 7.8%, and failed in 1.7%. No significant association was found between hepatic arterial variation or tortuosity and technical success, although Type II tortuosity showed a trend toward higher success than Type III. These findings suggest that, with careful angiographic recognition and microcatheter selection, arterial variation does not independently limit TACE outcomes. Larger multicentre studies are needed to refine patient selection.

P18 – Dual Palmaris Longus Muscles in a Human Donor: Anatomical Variation with Implications for Compressive Neuropathies of the Hand

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Variations of the palmaris longus tendon are well-documented; however, true duplication of the palmaris longus belly is exceedingly rare and its clinical significance remains unclear. Such variations may predispose individuals to compressive neuropathies of the median and ulnar nerves, yet the relative literature is lacking. The current study reports a case of dual palmaris longus identified during the routine dissection of a human donor at the Anatomy Department, University of Edinburgh, which is regulated by the Human Tissue (Scotland) Act 2006. Detailed anatomical assessment of the right forearm documented origin, insertion, course and relations. Two palmares longi, designated Muscle A and Muscle B, originated from the medial epicondyle of the humerus. Muscle A was inserted into the palmar aponeurosis, while Muscle B was inserted into the flexor retinaculum, adjacent to the ulnar nerve and artery. The anatomical course and proximity of Muscle B to the neurovascular structures suggest a potential role in compressive neuropathies of the hand. Recognition of such rare variants is crucial for clinicians and surgeons in evaluating unexplained neuropathies, planning reconstructive

procedures and performing nerve decompressions, emphasising the importance of anatomical awareness in surgical practice.

P19 – Can you find the vomeronasal organ?

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The vomeronasal organ is an accessory organ of smell in the mucosa overlying the vomer in the nasal septum. It is an epithelial tube, 2-10 mm long, opening anteriorly close to the nasopalatine fossa. It is found in many vertebrates and is believed to detect pheromones in activities ranging from reproduction to hunting. In humans it is well developed in the embryo, but vestigial in the adult. Specialist papers claim that the human vomeronasal organ can be demonstrated at all prenatal and postnatal stages of life. We took up this postnatal challenge, and examined 19 partly dissected nasal septa from subjects for which there was permission for retention and photography under the Human Tissue (Scotland) Act 2006. In 4 there was a well-defined nasopalatine fossa. A block of mucosa, around 1cm long, was taken from behind the fossa and embedded for histology. Roughly 1000 serial sections were cut from each block. In 2 blocks, likely profiles were identified, and adjacent sections confirmed an epithelial tube, roughly 4 mm long, resembling the vomeronasal organ as previously described. This shows that the vomeronasal organ can be demonstrated by routine anatomical techniques. Damage during septal surgery is not thought to be of significance.

P20 – An Unusual Anatomical Branching Pattern of Foramen Rotundum: Case Report and Clinical Implications

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The skull base undergoes complex morphological changes during embryogenesis to accommodate evolving intracranial and extracranial structures. Consequently, numerous anatomical variations may develop in this region, potentially complicating surgical interventions. Variations of foramen rotundum (FR) are rare but may have important clinical implications, particularly in the treatment of trigeminal neuralgia.

We report a rare case of duplicated foramen rotundum (FRD) in an adult skull from our departmental osteological collection. Detailed macroscopic examination and a systematic review of the literature were performed to assess morphology, prevalence, and potential clinical relevance. The FRD exhibited one pterygopalatine fossa opening and two distinct intracranial openings, separated by a thin bony bridge. The two intracranial openings were 3.94 mm and 2.09 mm in diameter. The distances between the extracranial opening and each of the two intracranial openings were 6.90 mm and 3.77 mm. We hypothesise that the accessory foramen might allow the communication of a branch of the maxillary nerve. A literature evaluation identified only seven studies describing FRD, including four single case reports and three original studies reporting prevalence rates ranging from 0.5% to 16.3%. Recognition of such variants emphasises the importance of detailed anatomical knowledge of the skull base to ensure safe surgical planning and accurate radiological interpretation.

P21 – An Additional Head of the Adductor Magnus: A Cadaveric Case Study

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The adductor magnus, a key muscle of the medial thigh, traditionally comprises adductor and hamstring components originating from the ischiopubic ramus and ischial tuberosity and inserting along the linea aspera, medial supracondylar line and adductor tubercle. During routine cadaveric dissection of an 87-year-old male in the Anatomy Department, University of Edinburgh, conducted in accordance with the Human Tissue (Scotland) Act 2006, an additional muscle head of the adductor magnus was observed. This head originated from the insertion of the adductor portion and extended distally to insert into the upper posteromedial surface of the medial femoral condyle. To the best of knowledge, this configuration has not been previously reported in the literature. Recognition of such a variant is clinically significant, as an accessory head in this location may alter the muscular and tendinous relationships of the medial and posterior thigh, potentially affecting neurovascular structures and influencing the mechanics of hip and knee movement. Awareness of this variation is therefore essential for surgeons, radiologists and anatomists operating in this region.

The donor used in this case study was obtained from Anatomy Department, University of Edinburgh, in accordance with the Human Tissue (Scotland) Act 2006.

P22 – Accessory Superficial Flexor Muscle Medial to Palmaris Longus: Incidence and Clinical Considerations in Human Body Donor Upper Limbs

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The palmaris longus, though highly variable in presence and morphology, remains an important anatomical and surgical landmark within the distal forearm. During routine educational dissection of sixteen upper limbs from eight embalmed body donors (aged 65-91 years) in the Anatomy Department at the University of Edinburgh, conducted in accordance with the Human Tissue (Scotland) Act 2006, an accessory superficial flexor muscle located medial to the palmaris longus was identified in two limbs (12.5%), each from different donors. In one specimen (78-year-old male, left limb), the variant originated from the common flexor origin and inserted deep to the flexor retinaculum, measuring approximately 35.6 cm in total length with a 6.1 cm distal muscle belly. A second specimen (91-year-old male, right limb) demonstrated a similar configuration, measuring 30.5 cm in total length with a 9.2 cm muscle belly. Both exhibited predominantly tendinous courses and lacked continuity with the palmaris longus, suggesting an accessory palmaris-type muscle distinct from classical variants. Recognition of such a variation holds clinical importance during tendon graft harvesting, reconstructive surgery, and evaluation of superficial wrist masses, where misidentification could lead to diagnostic or procedural complications.

P23 – Morphological Analysis of the Supinator Crest and Tubercle of the Ulna for Lateral Ulnar Collateral Ligament Reconstruction

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The lateral ulnar collateral ligament (LUCL) is a key component which provides posterolateral stability to the elbow joint, originates from the tubercle on the lateral humeral epicondyle and inserts into the supinator tubercle. Accurate identification of the supinator tubercle is crucial for LUCL reconstruction; however, its position and prominence are variable. This study aimed to perform a detailed morphometric analysis of the supinator crest and tubercle. The morphological features of the supinator crest and tubercle were recorded in one hundred adult ulnae (50 right, 50 left). Morphometric measurements were taken with reference to nearby bony landmarks. The supinator crest measured 13.25-66.10 mm in length (mean: 39.0 mm) and was significantly wider on the left side ($p = 0.0002$). The distance from the crest to the upper border of the radial notch was greater on the left side (11.40 mm vs. 10.54 mm, $p = 0.003$). The supinator tubercle was present in 84% of specimens and its mean length was 9.29 ± 2.98 mm and mean projection 3.07 ± 1.03 mm, with no significant side differences. This research work provides the first detailed morphometric description of the supinator crest and tubercle, revealing considerable variability that may aid surgeons during LUCL reconstruction.

P24 – Fenestration of the axillary vein associated with a high bifurcation of the axillary artery in human body donor: A body donor case report

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The axillary vein and artery generally follow consistent anatomical patterns, with the vein draining into the subclavian vein and the artery giving three branches from its third part before continuing as the brachial artery. However, variations in these vessels, though rare, hold critical clinical significance. During routine dissection of a 90-year-old male formalin-fixed body donor in the Anatomy Department at the University of Edinburgh, conducted under the Human Tissue (Scotland) Act 2006, a unique vascular configuration was observed in the left axilla. The axillary vein exhibited a fenestration, dividing into two branches that reunited after approximately 6.34 cm. Concurrently, the axillary artery demonstrated a high bifurcation just after the venous fenestration: its first branch gave rise to the subscapular, anterior circumflex humeral, and posterior circumflex humeral arteries, while the second branch continued distally as the axillary artery, ultimately gave rise to the radial and ulnar arteries. Recognition of such an uncommon structural variant is essential, as it may complicate axillary catheterisation, surgical procedures, or trauma management. Anatomical awareness of these configurations is therefore critical to prevent iatrogenic injury and optimise clinical outcomes.

P25 – Anatomical Variation of the Palmaris Longus Muscle: Distal Accessory Belly and Clinical Implications

ALDARWEESH, Hasan, Abdelhadi Murhaf, Mohammadali Saiyad, Ben Carroll, Humayun Humayun, Abduelmenem Alashkham

The palmaris longus, a superficial flexor of the forearm, is highly variable and serves as an important tendon donor in reconstructive procedures, including distal radioulnar joint reconstruction and tendon repair in rheumatoid arthritis. The prevalence of this variation is reported as 8.3%. During routine dissection of an 88-year-old donor at the University of Edinburgh, conducted under the Human Tissue (Scotland) Act 2006, an accessory distal belly of the palmaris longus was identified in both forearms. The muscle exhibited a typical proximal belly originating from the medial epicondyle of the humerus, but at its distal insertion on the palmar aponeurosis and flexor retinaculum, an accessory belly was observed superficial to the median nerve. The left accessory belly measured 3.8 cm in length, 2.26 cm in width and 1.88 mm in thickness, while the right measured 4.32 cm in length, 2.3 cm in width and 1.7 mm in thickness. This distal accessory belly is clinically significant, as it may increase pressure within the carpal tunnel, irritate the median nerve, or be misidentified as a ganglion cyst or soft-tissue mass, potentially causing surgical complications. Recognition and documentation of such variants are essential to improve anatomical understanding and enhance the diagnostic and surgical precision of clinicians and surgeons.

P26 – Perception of Artificial Intelligence and Computer Skills Among First-Year Medical Undergraduates: A Comparative Analysis of Two Cohorts

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The integration of artificial intelligence (AI) and computer literacy into medical curricula is increasingly essential to prepare future physicians for technology-driven healthcare. This study compared perceptions of AI and computer skills among two cohorts of first-year MBBS students following structured awareness sessions. Two independent cohorts were surveyed after instructional sessions on AI in Medicine and Basic Computer Skills: Cohort 2024 (n = 128) and Cohort 2025 (n = 157). The questionnaire included Likert-scale and open-ended items. Quantitative responses were analysed descriptively using frequencies and percentages, and differences between cohorts were assessed using Chi-square tests. Cohort 2024 reported higher “Very good/Excellent” ratings for clarity of AI concepts (69.8% vs 62.2%; $\chi^2 = 4.12$, $p = 0.042$, significant) and perceived relevance of AI to medicine (76.7% vs 49.4%; $\chi^2 = 18.56$, $p < 0.001$, highly significant). Understanding of computer skills also declined significantly from 68.2% to 51.3% between cohorts ($\chi^2 = 6.37$, $p = 0.012$). Presentation quality improved in Cohort 2025, with Excellent ratings rising to 55–60% ($\chi^2 = 4.98$, $p = 0.026$, significant). Overall satisfaction remained high (>90%) across both groups ($p > 0.05$, not statistically significant),

and over 90% agreed that AI and computer literacy are essential to medical education and future practice ($p > 0.05$). Qualitative feedback indicated that Cohort 2024 found ChatGPT most relevant, whereas Cohort 2025 emphasized Notebook LM and displayed greater critical awareness of AI's limitations. In conclusion, student perceptions reflect sustained enthusiasm for AI, accompanied by growing awareness of its limitations and responsible application in clinical contexts.

P27 – A New Anatomical Approach to Ultrasound-guided Regional Anaesthesia Training Using the Anatomage Table

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Regional anaesthesia provides targeted analgesia, reduces opioid exposure, and may expedite recovery. While ultrasound guidance allows visualisation of anatomy, it remains operator-dependent and challenging for novices. This study evaluated the Anatomage Table (AT) as a 3D adjunct to traditional 2D ultrasound training to enhance understanding, reduce variability, and support competency development in Ultrasound-Guided Regional Anaesthesia (UGRA).

In November 2024, as part of the ESRA-approved North Wales UGRA Course ($n=9$), Anatomage technology was integrated into post-graduate anaesthetic core-trainee teaching. Customised Anatomage presets illustrating peripheral nerve block anatomy complemented ultrasound practice stations. Participants completed pre- and post-course 5-point Likert questionnaires, with primary outcomes assessing changes in confidence per block using paired two-tailed t-tests.

Post-course surveys demonstrated significantly improved confidence across most UGRA blocks and enhanced recognition of anatomical landmarks, with non-significant changes observed in only 12.5% of blocks. Participants rated the AT highly for relevance and usability, reporting improved mental mapping from 3D to ultrasound images. Benefits included repeatable exposure and opportunities to practise rare blocks.

Despite a small sample size and subjective outcomes, findings suggest that incorporating 3D visualisation tools like the Anatomage Table into UGRA education effectively fosters learner confidence and competence in anatomical landmark identification.

Notes

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**We Hope You Enjoyed Your Time at the
University of Lancashire!**

The next British Association of Clinical Anatomists meeting will be:

Summer Scientific Meeting 2026



City St George's, University of London

Thursday 9th July 2026

Details to follow in due course.

Find out more at www.baca-anatomy.co.uk