ANZACA
AUSTRALIAN AND NEW ZEALAND
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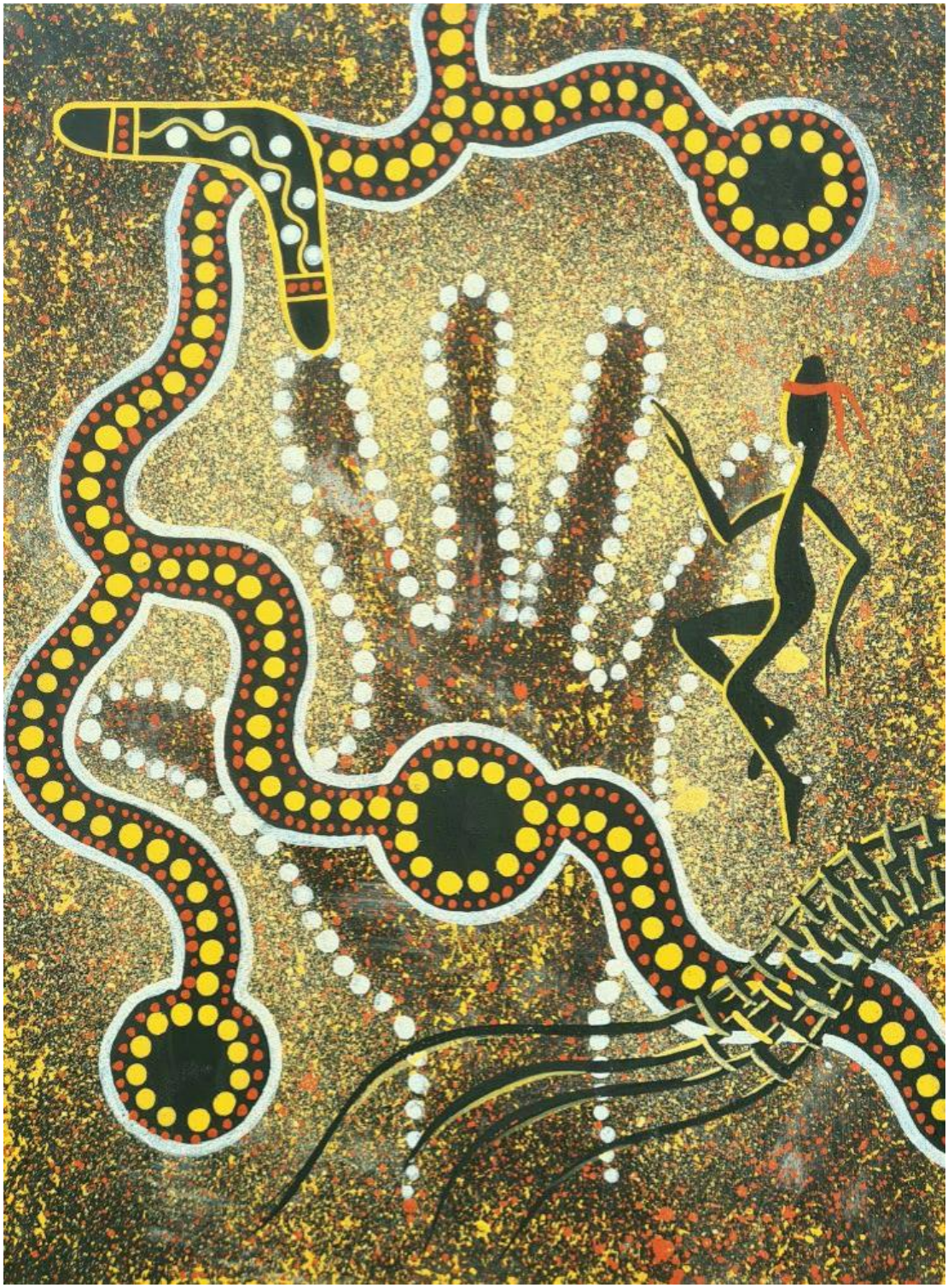
Inclusive Anatomy



Artwork by Nathan Peckham https://www.yuranacreative.com

21st Annual ANZACA Conference
Dubbo RSL Memorial Club
Dubbo, NSW
3-5th December 2024

2024 ANZACA Conference WhatsApp group link

https://chat.whatsapp.com/JiFlwTQYRMEDDicRxNujne

Conference Venue

RSL Memorial Club
178. Brisbane Street, Dubbo
+61268824411

Dinner Venue

Taronga Western Plains Zoo
Obley Rd, Dubbo
+61268811400

Internet access - **Wifi password**: functionrsl123

Social media: @ANZACA_Inc, #2024ANZACACONFERENCE

Presenters to bring USB stick to upload their presentation files at conference reception

ANZACA
AUSTRALIAN AND NEW ZEALAND
ASSOCIATION OF CLINICAL ANATOMISTS

THE UNIVERSITY OF
SYDNEY
SCHOOL OF RURAL HEALTH

ELSEVIER

Tuesday 3rd December: 12 pm – 7 pm

10 am – 5.30 pm: Registrations - Starlite hallway.

12 pm – 1.30 pm: Workshops 1

- Starlite room 1: James Wickham - Teaching anatomy to rural medical students using plastinated specimens.
- Starlite room 3: Natalia Bilton & Monique Pointon - Creative teaching in anatomy in a regional setting.

1.30 pm – 3.00 pm: Workshops 2

- Starlite room 1: Debbie Beahan - Feltman and Magnetic Man Workshop.
- Starlite room 3: Sam Webster - How to set up and run an effective YouTube channel for anatomical sciences education

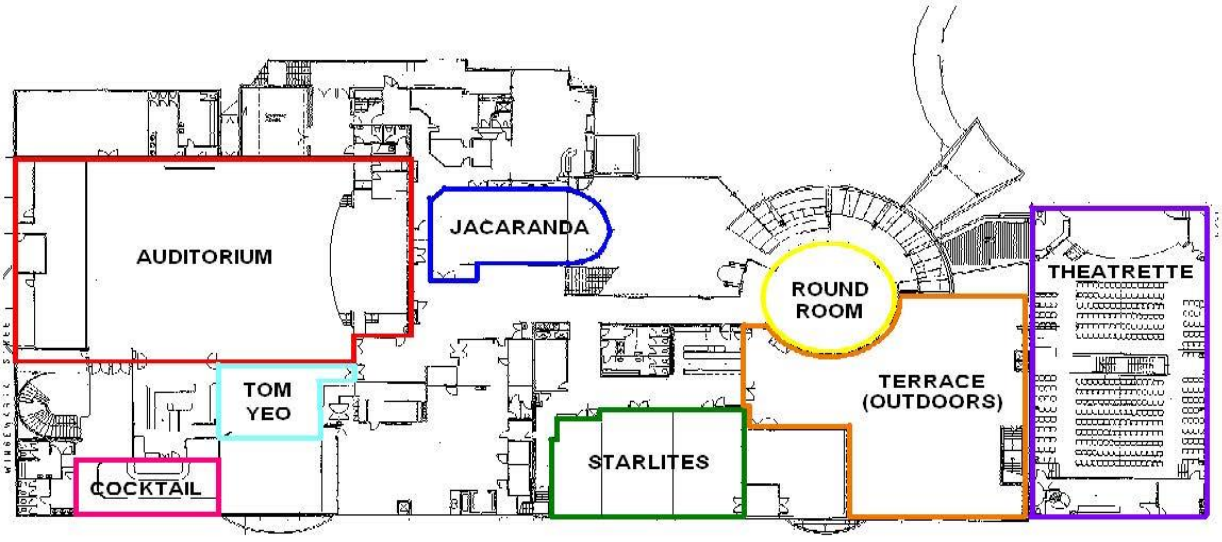
2.45 – 3.30 pm: Afternoon tea - Starlite hallway, Bar

If you signed up for any of the Workshop 3 sessions, please feel free to grab a refreshment and join the workshops.

3.00 – 5.00 pm: Workshops 3

- Starlite room 1: Claudia Diaz - Body painting exhibition.
- Starlite room 3: Michelle Lazarus - The invisibility cloak: the influence of cultural hegemony, uncertainty tolerance, and cultural literacy on sustainable diversity, equity and inclusion.

5.00 – 7.00 pm: Welcome drinks – Restaurant (room 178)



Wednesday 4th December

6.00 – 7.00 Yoga in Jacaranda room

7.00 – 8.30 Registration (Starlite hallway) and Hanging posters (Starlite rooms)

8:30 – 9.00 Welcome to Country, Welcome to Dubbo - Theatrette

9.00 – 9.45 Session 1: Online Education Resources

Chair: James Wickham & Saeed Shokri

Keynote presentation 1
Dr Samuel Webster**,** Swansea University, UK
A teaching toolbox.

9.45 - 10.15 Rapid Fire Poster Session 1: Education

Chairs: Monique Pointon & Ethan Creswell

- Anneliese Hulme, UNSW - *Review of non-cadaveric resources in medical education.*
- Saeed Shokri, USyd - *The hierarchy of learning: the pyramid of anatomical education tools.*
- Kajaal Prasad, UWS - *Enhancing surgical pathology training: development of a 3D printed mastectomy model prototype, Simpleware VS 3D*.
- Ahmed Elsir Mokhtar Abd Elmagid, Saudi Arabia - *Perceptions of selected undergraduate medical students in Najran University on the effectiveness of the combined use of plastinated and formalin-fixed specimens.*
- Joseph Aziz, UIT, NZ - *Enhancing radiographic anatomy education: integrating higher-order questioning in anatomy assessment.*
- Latika Samalia, University of Otago, NZ - *Is high school background associated with the academic performance of Pasifika and New Zealand European anatomy students at the University of Otago?*
- Will Harvey, UMelb - *From tradition to technology: perceptions of cadavers vs. technology in medical education*.
- Russell Young, UoW - *Student feedback on a group-based video assessment: enhancing authentic assessment for first-year anatomy subjects*.
- Ali Msayer, UQ - *Extrapolating the role of surface electromyography (sEMG): a protocol for standardised data normalisation for surgical research*.

10.15 – 11.00 Morning tea

- Starlite Rooms: Poster Session 1 - Education posters
- Theatrette: Mentoring Session - Information and networking

11.00 - 12.45 Session 2: Educational Research

Chairs: Aaron McDonald & SO HYUN PARK

11.00 - 12.00 Jason Organ, IU, US
Peer review process works at Anatomical Sciences Education Journal.

12.00 - 12.15 David Gonsalvez, Monash University.
How can we best manage examiner bias and leniency in authentic assessments?

12.15 - 12.30 Fatemeh Chehrehasa, QUT
Enhancing podiatry students understanding of foot anatomy through footprint analysis.

12.30 - 12.45 Brooke Huuskes, LaTrobe University
Evaluation of an asynchronous "Kickstart" program for students entering second year anatomy.

12.45- 1.45 Lunch

- Dr Christina Byun and Dr Thomas Duncan, UNSW - Complete Anatomy (Elsevier presentation)
- Poster session 1: Education posters

1.45 – 3.00 Session 3: Gamification

Chairs: Annemiek Beverdam & Roeya Eshaghimoghaddam

1.45 – 2.00 Jan Morgiewicz, USyd
Generation of an anatomy laboratory video game co-designed by students at the University of Sydney Medical School.

2.00 – 2.15 Russell Young, UoW
Redesigning curricula in first year anatomy subjects: the role of authentic learning experiences using digital technologies.

2.30 – 2.45 Sarah Scealy, USyd
Narrative review of existing board and card games to teach clinical neuroscience.

2.45 – 3.00 Jaimie Polson, USyd
Enhancing respiratory and cardiovascular anatomy learning through gamified digital resources.

2.30 – 3.00 Session 4: Feature Presentation

Chair: Saleem Babri

Claire Aland, UQ
Manage with Reverence: Historical Histology / Histopathology Slide Collections.

3.00 – 3.30 Afternoon tea

Starlite Rooms: Poster Session 1 - Education posters

3.30 – 4.45 Session 5: Rural Education

Chairs: Manisha Dayal & Jan Morgiewicz

3.30 - 4.15 **Keynote presentation 2**
Mark Arnold, USYD
How can the contemporary teaching of anatomy meet the needs of the future medical workforce? A health system's perspective.

4.15 - 4.30 Russell Young, UoW
Redesigning curricula in first year anatomy subjects: the role of authentic learning experiences using digital technologies

4.30 - 4.45 Saleem Babri, UQ
Enhancing inclusivity in anatomy education through MR Imaging repository

5.00 – 7.00 AGM

7.00 - late Student get-together

Down The Lane, Dubbo

https://www.downthelanedubbo.com.au/

Thursday 5th December

8.30 – 10 Session 6: Anatomy visualization

Chairs: Krisztina Valter & Kajaal Prasad

8.30 – 9.15 **Keynote Presentation 3**
Claudia Diaz, CSU
The human canvas: the use of innovative education approaches in rural Australia.

9.15 – 9.30 Joseph Aziz, UIT, NZ
Improving neuroanatomy learning: integrating clay modelling as an educational tool for understanding CT anatomy.

9.30 – 9.45 Reza Shirazi, UNSW
Australian science and medical students perception of embryology education.

9.45 – 10.00 Christina Byun, UNSW
Evaluation and redesign of innovative learning packages for a new integrated anatomy and physiology course

10 – 10.30 Rapid fire poster session 2: Anatomy & Clinical Research

Chairs: Erik Wibowo & Patrick Topp

- Ntombifuthi Ngubane, UoKwaZulu-Natal, South Africa - *The antipsychotic potential of Salix Mucronata on ketamine-induced rats.*
- Amaneh Mohammadiroushandeh, UNSW - *Mitochondrial transplantation in animal model of traumatic brain Injury: a new therapeutic strategy.*
- Connor Blythe, QUT - *Quantifying the growth and fusion of the 5th metatarsal apophysis.*
- Thomas Duncan, UNSW - *Blurred lines and binary bias: reporting on sex and gender in recent anatomy education research.*
- Seung-Ho Han, Ewha Womans University, South Korea - *Navigating through the anatomy of the accessory parotid gland: prevalence, distribution, and relationships.*
- Hare Krishna, All India Institute of Medical Sciences, India - *Anatomical variation of quadratus plantae along with flexor digitorum longus tendon along with unilateral polydactyly of toes: a case report.*
- Onyemaechi Okpara Azu, Uo KwaZulu-Natal, South Africa - *Renal histological changes in spontaneously hypertensive rats following adjuvant hypoxis hemerocallidea in highly active antiretroviral therapy.*
- Kirsten Rutten, University of Otago, NZ - *Unearthing perceptions: health and social viewpoints during the Otago gold mining period in New Zealand.*
- Awais Saleem Babri, UQ - *Unpacking the nursing curriculum: is there room for pathology?*

10.30 – 11 Morning tea

Starlite Rooms: Poster Session 2 – Anatomy & Clinical Research

11 – 12.45 Session 7: Clinical anatomy research

Chairs: Quentin Fogg & Ali Msayer

11.00 - 11.15 Roeya Eshaghimoghaddam, ANU
Comparing size and fat infiltration as measures for detecting pathological changes in cervical flexor muscles in patients with disease/injury.

11.15 - 11.30 Patrick Topp, University of Otago
Clinical anatomy of the fibularis longus and brevis muscles.

11.30 - 11.45 James Oashaolu, Bowen University, Nigeria
Pes anserinus structural framework and constituting tendons are grossly aberrant in Nigerian population.

11.45 - 12.00 Rekha Lalwani, All India Institute of Medical Sciences, Bhopal, India
Support system of Lisfranc joint complex: an anatomical investigation with an evolutionary perspective.

12.00 - 12.15 Sunita Athavale, All India Institute of Medical Sciences, Bhopal, India
Re-visiting the inferior supports of Chopart joint complex: new insights in causation of progressive collapsing flatfoot deformity.

12.15 - 12.30 Sheetal Kotgirwar, All India Institute of Medical Sciences, Bhopal, India
Subcutaneous dorsomedial triangle of forearm: surgical anatomy and clinical implication.

12.30 - 12.45 Jerin Mathew, U of Otago
Cortical brain correlates of chronic pain in knee osteoarthritis; a cross-sectional, source localised neuroimaging investigation.

12.45 - 1.45 Lunch

Poster session 2: Anatomy & Clinical Research – Starlite rooms
Yoga Session – Jacaranda room

1.45 – 3.15 Session 8: Indigenous anatomy health care, education and research

Chairs: Natalia Bilton & Kirsten Rutten

1.45 – 2.30 **Keynote presentation 4**
Debbie Beahan, NSW
Improving communication and relationships between Aboriginal patients, clients and health professionals.

2.30 - 2.45 Erik Wibowo, USyd
Comparison of learning strategies for anatomy courses among Pasifika and New Zealand European students at the University of Otago.

2.45 - 3.00 Brenda de Gama, Uo KwaZulu-Natal, South Africa
Influence of religio-cultural beliefs on whole-body donation: a quantitative analysis of a predominantly South African Pedi community.

3.00 - 3.15 Natalia Bilton, CSU
A novel framework for the teaching of anatomy and physiology to first year undergraduate students.

3.15 – 3.45 Afternoon tea

Starlite Rooms: Poster Session 2 – Anatomy and Clinical Research

3.45 – 4.45 Awards and Close of conference

6 – 10.30 Transport and conference dinner at zoo

Keynote 1

A teaching toolbox

Dr Samuel Webster BSc (Hons) PhD FHEA
Senior Lecturer in Anatomy & Embryology
Swansea University Medical School

Abstract

Human anatomy is an old subject always with new challenges. In the UK medical student training numbers are increasing but teaching resource budgets rarely keep up. Anatomy is a three dimensional subject and students with different abilities need different ways of learning efficiently within knowledge intensive medicine programmes. As tools for teaching (and not for teaching) have developed, evolved, been used and misused, how have they been added to anatomists' toolboxes? Which ones are still shiny because they are rarely used and which tools are getting scuffed and marked because they are so useful? YouTube has become a mainstay of education by video online, whether learning how to change a washer on a tap to stop it dripping or the anatomy and physiology of the blood supply to the brain. Is online video a step on the way to something else or will it be here forever?

Biography

Sam was part of the group that created the Graduate Entry Medicine Programme at Swansea University Medical School and he holds a BSc in Anatomical Sciences and a PhD in molecular, cell and developmental biology. This 4 year medicine programme chose to not include cadaveric dissection in teaching, but uses prosections, plastic anatomy models, computer generated models, handheld ultrasound, 3D printing, stereoscopic tools, interactive software, video and podcasts to give students and teachers a wide range of tools for teaching and learning. The programme has been running for 20 years and new tools have been tried and tested as technology developed.

Keynote 2

How can the contemporary teaching of anatomy meet the needs of the future medical workforce? A Health System's perspective

Prof Mark Arnold
Chief Medical Officer Western NSW Local Health District

Abstract

The Medical Students of the 80s were taught (and arguably, learned) anatomy with a one-size-fits all approach irregularly integrated with other clinical sciences and in particular, clinical practice. Advances in diagnostic imaging, point of care diagnostic and therapeutic techniques have changed medical practice. How should contemporary teaching enable students - regardless of choice of sub-speciality - to function in the Health System in 2034 and beyond?

Biography

Mark is a rheumatologist by training, in consultant practice since 1990. He initially 'learnt' his anatomy between 1978-9, and has relearnt it many times since. He is also a bioethicist(Masters and PhD) and currently serves as the Chief Medical Officer for the Western NSW Local Health District, with a long history in Research Ethics Governance (Chair of University HRECs) and regulation of the profession (NSW Health Care Complaints Commission, Medical Council, and the Professional Services Review). He has served as the president of the NSW Branch Australian Rheumatology, Association, the Chair of the Rural and Regional Committee and as a Board Member.

Rheumatology is an internal medicine sub-speciality that is founded on a sound knowledge of musculoskeletal gross and functional anatomy. Hence, he has a vested interest in ensuring that medical education focusses on a sound foundation in the most fundamental Medical Science.

Keynote 3

The Human Canvas: the use of innovative education approaches in rural Australia.

Dr. Claudia M. Diaz, Senior Lecturer, Biomedical Sciences, School of Dentistry and Medical Sciences, Charles Sturt University.

Abstract

Objectives: Although the use of human prosections is invaluable for learning anatomy, this can be complemented with innovative approaches that are pro-active, *non*-didactic, "hands-on", engaging, experiential and fun. This includes the use of whiteboards, Play-Doh, movements and surface anatomy. Body painting (BP) is the most popular, engaging and experiential approach for students to learn surface anatomy and physical examination skills that are important for future health professionals.

Methods**:** Innovative approaches, including BP, were used at three Regional Universities in Australia – University of Newcastle, James Cook University in Townsville/Cairns and Charles Sturt University (CSU) and one Metropolitan (RMIT). At CSU in 2020, anatomy was delivered exclusively online using pre-recorded videos and encouraging students to use innovative learning approaches at home. Students were surveyed regarding their experiences with innovative approaches.

Results: BP activities produced high-level bonding and interaction with peers and tutors as they were engaged in meaningful, collaborative learning activities that provided motivation and enjoyment and development of their 'learning-how-to-learn' skills. Online students were also very receptive to the innovative learning challenge while in self-isolation and lockdown.

Conclusions**:** BP is a motivating and creative experience for students in both rural and metropolitan settings that provides memorable visual images and encourages multisensory and active participation. Students become pro-active, confident and self-directed learners and BP activities help students to integrate knowledge, reach a deeper understanding and remember their anatomy.

The inclusion of BP in Anatomy teaching provides new perspectives towards teaching anatomy to students who prefer hands-on, visual, kinaesthetic and/or group learning activities.

Keywords: innovation, body painting, experiential learning

Ethical Approval and funding: RMIT Human Ethics Committee (ASEHAPP 16-13); JCU School of Medicine, RMIT University STeLR Grant.

Biography:

Dr. Claudia Diaz completed her PhD at the University of Sydney, specializing as a developmental visual neuroscientist. She has worked at 5 Australian universities and one online university including as Head of the Anatomy & Pathology Department and Coordinator of the Human Bequest Program at James Cook University (JCU) in Townsville.

Dr Diaz discovered her passion and affinity for anatomical education research as a way to compliment her innovative learning and teaching approaches. She is known for her enthusiastic

and pro-active novel teaching approaches to engage and enhance student learning using pro-active, non-didactic, experiential, “hands-on” approaches. She believes that students should become self-directed, life-long learners, through their motivation and inspiration to learn. The resources that she uses include the invaluable human cadaveric tissues, complemented by the use of models, bones, “whiteboarding”, use of Play Doh, art, music and body painting. Dr Diaz has been awarded several National (ALTC) and university teaching awards. She has a world-wide reputation for excellence in teaching Anatomy through innovation, which has been published in The Australian, The Age, local newspapers, television and radio in Australia, in over sixty countries all around the world, extensively on social media, and have almost half a million views on YouTube

(https://www.youtube.com/watch?v=GLluS-b2XE4;
https://www.youtube.com/watch?v=EbAKRYfVg0I).

She currently works at Charles Sturt University in Albury, NSW. In 2023 she ran an anatomical Body Painting Art Exhibition – “The Human Canvas: How Art can Transform the way we learn Human Anatomy” which she plans to run at other locations in Australia.

Keynote 4

Improving communication and relationships between Aboriginal patients, clients and health professionals.
Debbie Beahan, NSW

Abstract
Good health communication is the foundation for better health and wellbeing. Non-Aboriginal clinicians often describe difficulty in knowing how to connect with Aboriginal people. Debbie, supported by Craig and Alicia will share ways Aboriginal people connect. Making time to connect involves yarning and humour to build a rapport. Finding comfortable common ground to share interests and experiences resulting in the establishment of trust. Trust is the foundation for better health communication. You will leave the session with a clearer picture about how to be yourself and work better with Aboriginal people.

Biography
Debbie is a Wiradjuri woman who grew up in central western NSW. Deb started work in health 42 years ago and continues to today as an Aboriginal Wellbeing Coordinator with the Western NSW Local Health District. Deb is dedicated to improving health outcomes for Aboriginal people with chronic diseases by improving communication and relationships between Aboriginal patients, clients and health professionals. To achieve this, Deb conducts one-on-one education and is actively involved in the Indigenous community through programs such as the Wellness Exercise Program, Koori Yarning Wellbeing Support Group, Elders Health Assessment Clinics and outreach foot clinics.

Feltman and Magnetic Man Workshop
Feltman and Magnetic Man are visual tools developed to help explain how type 2 diabetes works in the body. Understanding how diabetes works underpins better long-term management strategies and improves health outcomes. Today's workshop Debbie will share how she runs these sessions for Aboriginal people. She will demonstrate how to build rapport through establishing trust and connection. You will also learn how she uses storytelling and plain language to convey important concepts. You will leave the workshop brimming with ideas (and questions!) about how you can improve your own delivery of education to Aboriginal people.

ABSTRACTS - PLATFORM PRESENTATIONS

Session 2

How can we best manage examiner bias and leniency in authentic assessments?

Yasith Mathangasinghe[1], Benjamin Fox[1], Jack Mayhew[1], Chantal Hope[1], Georgina Stephens[1], David G Gonsalvez*[1]

[1]Centre for Human Anatomy Education, Department of Anatomy and Developmental Biology, Monash University, Clayton, Australia; * Presenting author

Objectives: Unacceptable levels of inter-rater variability, due to examiner bias, or leniency, can compromise or even hinder the validity of authentic assessments. We hypothesised that comprehensive examiner training, modifying examination structure, and post-hoc statistical modelling could all be used to effectively mitigate against examiner leniency and bias in oral viva voce exams. Aims: 1) to determine what effect, if any examiner training and exam structure had on assessment scores; and 2) to develop a freely available statistical application to help educators identify the impact of examiner leniency and mitigate it if required. **Methods:** Formative team-based, and individual summative viva voce anatomy examinations were conducted in Medicine and in Biomedicine respectively. The examiners, who were actively involved in student teaching, received extensive training: met weekly to discuss examination format and curriculum development, watched instructional videos, conducted mock vivas, independently provided marks, followed by discussions focussed on standardising marks. We also had the capacity to vairy the structure of distinct anatomy viva voce exams. **Results:** Examiners had a large effect on assessment scores, despite receiving extensive training (765 student-examiner encounters Kruskal-Wallis; $Chi2=76.196, p<0.001$). Examiners had a greater impact on scores (aligned-ranks-transformed ANOVA; $F=13.10$, partial-eta2$=0.40, p<.001$) compared to the design of the exam ($F=4.08$, partial-eta2$=0.05, p<0.05$). The effect of examiner leniency could be effectively mitigated using a newly developed statistical modelling application. **Conclusion:** Neither extensive examiner training nor altering examination structure, could mitigate against significant examiner leniency issues in anatomy viva voce assessments. Examiner leniency could be quantified and effectively mitigated using a newly developed statistical application.

Enhancing podiatry students understanding of foot anatomy through footprint analysis.

Angela Jacques[1], Joshua Amos Taylor[1], Fatemeh Chehrehasa[2*]

[1]School of Clinical Science, Faculty of Health, Queensland University of Technology, Brisbane, Australia

[2]School of Biomedical Science, Faculty of Health, Queensland University of Technology, Brisbane, Australia

Objectives: The aim of this study was to determine the impact of the Footprint Analysis Practical Activity (FAPA) on podiatry students' academic performance and understanding of foot arch

morphology. This was achieved by analyzing improvements in students' grades and comprehension. Additionally, the study aimed to assess student experiences of the newly introduced FAPA by evaluating student engagement and feedback. The study also investigated the prevalence of flatfoot among podiatry students. Methods: A student-centered footprint practical activity was introduced, combining hands-on analysis with anatomical study. The participants' footprints were collected using a standardized method involving talcum powder. Student feedback and engagement were evaluated, and footprint data were analyzed for flatfoot prevalence using Staheli's method and the Chippaux-Smirak index. The students' anatomical knowledge of the foot arches was assessed before and after the FAPA. The practical activity was performed with the understanding and consent of the subjects. Results: The combination of footprint analysis with detailed anatomical study resulted in significant improvements in students' grades and comprehension of foot arch morphology. The hands-on approach enhanced student engagement and provided a dynamic learning experience. Analysis of footprint data revealed insights into the prevalence of flatfoot among the student cohort. Conclusion: The footprint practical activity proved to be an effective educational method, enriching podiatry students' understanding of foot anatomy and morphology. This innovative approach not only improved academic performance but also increased student engagement and satisfaction. The study's findings support the integration of practical, hands-on activities in education to prepare students for clinical practice.

Keywords*:* Foot Arch, Footprint Analysis Practical Activity (FAPA), Flatfoot, innovative teaching.
Research funding**:** None declared.
Ethics approval statement**:** This study was approved by the Queensland University of Technology.

Evaluation of an asynchronous "Kickstart" program for students entering second year anatomy.

Brooke M Huuskes[1], Heath McGowan[1], Aaron McDonald[1], Laura Y Whitburn[1]
[1]Department of Microbiology, Anatomy, Physiology & Pharmacology, La Trobe University, Bundoora, Australia.

Objectives: The anatomy kickstart program (KSP) aims to prepare students transitioning from first to second-year anatomy. In 2023, attending our KSP was academically beneficial. However, attendance was low, with a major barrier to attendance being the synchronous delivery. This project aimed to assess the new delivery of the KSP involving a "check your knowledge" quiz, directing students to a series of interactive online videos and associated H5P questions based on quiz results, making it a self-led and individually tailored revision program addressing specific knowledge gaps. Methods: This mixed-methods study collected data from students in three clinical courses. Student marks were compared between participants and non-participants in both 2023 and 2024. An anonymous online survey explored students' perception of the reimagined program. Findings: The new KSP increased participation to 79.5%, a marked improvement from 2023 (33%) and included completing the quiz and either, watching a content revision video, or completing H5P questions or both. In 2024, no significant academic benefit was found between participants and non-participants. This may suggest that the flexibility and range of activities offered in the asynchronous KSP engaged our less capable students, thereby narrowing the performance gap. Over 90% of survey responders liked the asynchronous format, 88% agreed that it was engaging, and 72% agreed the length was appropriate. Qualitative

analyses highlighted a range of emotional and practical motivators for engaging with KSP. Conclusion: This personalised, flexible, student-led KSP significantly improved participation in pre-semester learning material. Students found it useful for revision and preparation for second-year studies.

Keywords: Anatomy, Education, Transition
Ethical approval and funding statement: This project is approved by the La Trobe Human Ethics Committee (HEC23020)

Session 3

Generation of an anatomy laboratory video game co-designed by students at the University of Sydney Medical School

Jan Morgiewicz[1], Lisa Hampshire[1], William Havellas[2], Claudio Corvalan Diaz[2], and Annemiek Beverdam[1]
[1] The School of Rural Health Dubbo/Orange, University of Sydney
[2] FMH Media Lab, University of Sydney

Objective: Generation of an Anatomy Laboratory Video Game co-designed by Students at the University of Sydney Medical School. Methods: For centuries, cadaver dissection has been the cornerstone of anatomy education. However, since the 1980s, digital tools have become increasingly available, and the growth of the internet allows for access to digital anatomy resources from any location. Furthermore, digital resources and handheld devices are now widely adopted in anatomy education. In contrast, the most common digital resources used by students in Australia are online or downloaded question banks. These question banks do not always align with the medical school curriculum, can be inaccurate, and often require paid subscriptions. Evidently, there is a void between the tools anatomy educators use to teach, and the resources students prefer to use. Gamification is an educational practice that improves student engagement by using video game design and competitive elements to maximise enjoyment and learning. It has been shown to increase academic performance compared to standard anatomy teaching methods. Results: Here we describe a concept video game of one Anatomy Laboratory Class for medical students at The University of Sydney Medical School. This serious video game was designed by a medical student in collaboration with academic and technical staff and an educational designer. The design was guided by the Olszewksi and Olowabi frameworks for developing and integration of serious games in medical education. Conclusion: We predict that the Anatomy Laboratory Video Game will improve Sydney medical students' content engagement, learning outcomes, and their future clinical practice.

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Narrative review of existing board and card games to teach clinical neuroscience

Sarah Ribeiro Milograna-Scealy[1], Paul Roth[1]
[1]Medical Doctor (MD) program, School of Rural Health, University of Sydney, Dubbo NSW, Australia

Objectives: “Neurophobia” is a phenomenon correlated with plummeting numbers of students pursuing Neurology/Neurosurgery careers, increasing the demand for innovative teaching strategies. Game-based learning (GBL) has been successful in improving learning motivational aspects, particularly, and in some cases student performance. We performed a narrative

literature review exploring existing serious card/board games to teach clinical neuroscience as a background to design a game to teach first-year MD students. Methods: We searched 7 publication databases using the keywords: medical education, serious, educational, card, board, game (gamification), clinical, neuro*. We triaged 38 papers, including 4 literature reviews that added 5 papers to our collection. 26 articles, describing pedagogical aspects only, online games, computer-based 3D models or other strategies/technologies were excluded. We included 16 articles describing/evaluating card, board games or other relevant gamification features. Results: The types of games found in the 16 included articles consisted of 1 puzzle (divisions of nervous system and neurotransmitters), 9 board games [physiology of neurotransmission (3), ANS pharmacology (1), neurophysiology of drug addiction (1), neuroanatomy (2), clinical neurology (2)], 2 card games [neuroanatomy (1) and clinical neurology (1)], and 4 articles describing other relevant gamification features. Conclusions: Gamification resources to teach neuroscience published in the literature are scarce. We did not find a game to teach clinical neuroscience that aligns with our curriculum. We propose the development of an original game based on a 3D construction of central nervous system, where students will be challenged to demonstrate how inferior structures are affected in a variety of clinical lesions.

Keywords: serious games, medical education, clinical neuroscience, neuroanatomy, literature review.

Ethical approval and funding statement**:** this study is a narrative review and at this stage no ethical approval or funding were required.

Enhancing respiratory and cardiovascular anatomy learning through gamified digital resources.

Zhi Lin (Lincoln) Zhang, Inana Kako, Craig R. Campbell, Elizabeth M. Hegedus, Jin Y. Huang & Jaimie W. Polson

The University of Sydney, School of Medical Sciences

Objectives: Understanding functional anatomy is essential yet challenging for health sciences students. Traditional teaching methods, such as lectures and cadaver-based learning, are effective but often limited in terms of accessibility and engagement. Gamified digital learning resources (GDR) for serious gaming offer alternative learning opportunities. We hypothesized that GDR would improve learning outcomes, measured through quizzes and assessments, and enhance student engagement, measured by surveys. This study aimed to develop GDR to support learning of the respiratory and cardiovascular systems. Methods: Informed consent was obtained from all participants. Two GDR, “Breathless” (respiratory) and ,”CardiacStop” (cardiovascular), were developed using the Unity platform hosted on the Faculty’s Media Lab’s site. The games featured interactive mini-games and a 3D atlas of the heart and lungs, incorporating key gamification elements such as progression and challenge. The GDR were provided to first-year University of Sydney Health Science students. Effectiveness was assessed by comparing pre- and post-game quiz results and formal assessment results, while engagement was evaluated through qualitative feedback surveys. Results: Post-game quiz scores showed a 50% improvement (median [interquartile range] 57.1 [42.9-85.7] to 85.7 [71.4-100], $p<0.001$). In formal assessments, students who used the GDR scored 7% higher than non-users (80.5¬±0.09% vs. 73.2¬±0.08%, $p<0.01$). Survey feedback indicated students found the GDR fun, interactive, and helpful for retention. Conclusions: Serious games like "Breathless" and "CardiacStop" enhance student engagement and improve learning of functional anatomy. GDR provide a cost-effective,

accessible supplement to traditional teaching methods, improving retention of cardiovascular and respiratory anatomy concepts.

Keywords: Gamified learning, respiratory and cardiovascular anatomy, anatomy education, student engagement.

Approved by The University of Sydney Human Research Ethics Committee Approval No. 2024/093

Session 4

Manage with Reverence: Historical Histology / Histopathology Slide Collections

R Claire Aland[1], Rebecca Lush[1], Nicole Shepherd[2]
[1] School of Biomedical Sciences, Faculty of Medicine, The University of Queensland, Brisbane Australia, [2] Deakin University Medical School, Waurn Ponds, Australia

The University of Queensland has two histopathological and histology slide collections that include tissue of human origin. A recent audit raised issues about their curation and use. Legally, this tissue is considered property, but this did not provide adequate guidance for addressing ethical questions. We formulated an ethical framework using dignity and reverence to proactively guide us through the challenges and opportunities our collections pose.

Curation and use of human tissue must be respectful. However, respectful behaviour is difficult to define in all circumstances and sometimes is enforced through punitive measures. However, without an appreciation of why, we risk performative behaviour rather than authentic respect. We aimed to evoke authentic respectful behaviour through the recognition of human dignity.

Dignity for living humans is well-established in biomedicine, we extend this to material in our collections. Reverence recognises something greater than an individual - life, death, human existence; and inclines individuals to respect that which possesses dignity. Reverence is inextricably linked to awe and curiosity. Awe and curiosity drive the collection and use of human materials. However, indulging curiosity without recognising human dignity can result in non-respectful behaviour, including not obtaining informed consent. Tempering curiosity by cultivating the virtue of reverence encourages respect to emerge for materials that possess dignity, rather than result as behaviours caused by a desire to avoid punishment. Reverence connects to the wider communities from which human tissue is obtained.

Our framework informs respectful curation, and when collections are used for education, promotes reverence as a virtue.

Keywords: Curation, Ethics, Governance, Histology
Ethical approval was not required for this work. There are no funding sources to disclose.

Session 5

Redesigning curricula in first year anatomy subjects: the role of authentic learning experiences using digital technologies.

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Objective: This project aimed to design and implement two new practicals integrating digital anatomy with hands-on activities, addressing increasing student numbers in the anatomy lab.

These practicals emphasized work-integrated learning and soft-skill development to better prepare students for professional environments. Methods:A participatory action research and co-design framework engaged student partners and academics to design the practicals. Comparisons were made between students' experiences with traditional cadaveric anatomy and the new digital anatomy practicals. Anatomage Tables were used as the digital tool, alongside hands-on activities to encourage deeper learning. Focus groups were held with students from undergraduate and college anatomy courses at the University of Wollongong. Data were analysed using reflexive thematic analysis (Braun and Clarke 2006). Results: Thirty-eight students (n=7 college, n=31 undergraduate) participated in six focus groups. Key themes revealed mixed opinions on the Anatomage Table's role: 1) While praised for contextualizing anatomical structures, technical difficulties and insufficient training limited usability. 2) Students valued the Table for self-directed study but reported disengagement during its use. 3) The combination of Anatomage, plastic models, and hands-on activities was seen as beneficial for accommodating different learning styles. 4) Participants did not associate these activities with soft skill development and suggested incorporating objectives to highlight these skills and enhance engagement. Conclusion: Although Anatomage was appreciated as a self-directed learning tool, challenges such as usability issues limited its effectiveness in supporting first-year anatomy learning.

Enhancing inclusivity in anatomy education through MR Imaging repository.

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Introduction: As the landscape of medical education evolves, the need for inclusive learning environments becomes increasingly critical. Magnetic Resonance (MR) image repositories provide innovative solutions for enhancing anatomy classrooms by offering diverse, high-quality anatomical representations that cater to various learning styles and backgrounds. Materials and Methods: An MR imaging repository is under development, incorporating a wide array of anatomical scans from cadaveric specimens. These scans will be integrated into a digital platform accessible UQ wide. A pilot survey was conducted involving a cohort of full-time UQ students in health sciences, who might utilise the repository in conjunction with traditional anatomy resources. Surveys and focus groups were employed to assess usability, engagement, and perceived inclusivity. Preliminary Results: Initial findings indicate that students (N=52; M=18, F=34) believe a significant increase in confidence and understanding of anatomical variations when using the MR imaging repository is very likely. Approximately 80% of respondents expressed that the diversity of scans may help them relate better to their future patients. Furthermore, we believe this might improve classroom discussions, highlighting the importance of anatomical diversity in patient care. Conclusions: The MR imaging repository has the potential to transform anatomy education by fostering an inclusive environment that respects and acknowledges human diversity. By integrating these resources, educators can better prepare future healthcare professionals to approach patient care with cultural competence and sensitivity, ultimately improving healthcare outcomes. Future research aims to explore long-term impacts on student performance and attitudes toward diversity in medicine.

Keywords: Inclusive learning, Magnetic Resonance (MR) imaging, Anatomy education, Anatomical diversity, Cultural competence
Ethics Approval: This part reported is a feasibility study. While we are currently seeking approvals from relevant authorities at UQ there is no approval required for this.

Session 6

Improving neuroanatomy learning: integrating clay modelling as an educational tool for understanding CT anatomy.

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Background: Neuroanatomy is a complex subject that presents significant challenges for medical imaging students. A thorough understanding of spatial anatomy and cross-sectional imaging is crucial, yet traditional teaching methods, such as lectures and textbook diagrams, often fail to fully engage students or foster deep comprehension of three-dimensional structures. This study introduces the use of clay modelling as an innovative teaching approach aimed at improving students' ability to visualize neuroanatomy and correlate it effectively with CT brain imaging. Methods: Forty-three Year 2 medical imaging students participated in an interactive practical session. During the session, students created clay models of the brain, representing three key anatomical planes: sagittal, coronal, and axial. After constructing these models, students were tasked with correlating them to three corresponding CT images of the brain. This hands-on exercise was designed to reinforce the understanding of cross-sectional anatomy, improve spatial reasoning, and enhance their ability to interpret CT scans in a clinical setting. Results: The use of clay modelling significantly improved the students' understanding of neuroanatomical structures, particularly in their ability to identify and interpret these structures across different planes. Student feedback was overwhelmingly positive, and heightened confidence in pinpointing neuroanatomical landmarks on CT images. Conclusion: Integrating clay modelling into neuroanatomy education provides an engaging, interactive, and highly effective tool for learning neuroanatomy. This approach not only enhances understanding of anatomical planes but also promotes better clinical relevance in interpreting CT imaging.
Keywords: Neuroanatomy, Clay modelling, medical imaging education, Cross-sectional anatomy
Ethical approval & funding**:** ethic approval is not applicable for this research. It is student self-funding and received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Australian science and medical students perception of embryology education

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Objectives: Embryology is a keystone of science and medicine curricula and education, providing students with fundamental knowledge about human development and congenital anomalies. However, perceptions of embryology's relevance and the effectiveness of current teaching approaches remain under investigation in Australian universities. This study investigates

Australian science and medical students' perceptions of embryology education, focusing on its perceived value, relevance to clinical practice, and learning resources and preferences. Methods: A questionnaire-based survey was administered to UNSW current and graduated students who have completed embryology courses or attended embryology lectures as part of their courses. The survey explored students' attitudes towards embryology, preferred learning methods such as lectures, digital resources, practical applications, clinical cases, and perceived challenges in the curriculum. Results: Preliminary data analysis reveals a diverse range of attitudes toward embryology education. While most students acknowledge its importance in understanding human anatomy and pathology, many express difficulties in grasping complex embryological concepts. A strong preference for interactive and visual learning resources, such as 3D models and digital simulations, availabilities of the physical models of the human development at various stages was identified. Additionally, a gap between theoretical knowledge and applied embryology was reported. Conclusion: Our findings emphasize the need for pedagogical innovation, highlighting interactive and application-focused teaching strategies, and making the concepts more visualized. These insights aim to guide curriculum development, making embryology education more accessible and clinically relevant in Australian institutions.
Key words: Embryology, perception, science, medicine, education
Ethical approval: This study was approved by the ethical committee of UNSW.

Evaluation and redesign of innovative learning packages for a new integrated anatomy and physiology course

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Objectives: In 2023, an integrated anatomy and physiology course was developed for first-year students in new allied health programs to introduce fundamental concepts of the human body. To support student engagement and different learning preferences, the course combined innovative online learning packages with face-to-face practicals and tutorials, all in a weekly module format. Methods: The online learning packages, created using Articulate Rise360, included short lecture videos (aligned with specific learning outcomes), clinical cases, formative quizzes, and checklists. Based on student feedback, the 2024 iteration reduced the depth of content, improved alignment with course learning outcomes, and incorporated more interactive RECAP and case-based activities into weekly tutorials. Results: A total of 311 students (2023) and 404 students (2024) from five allied health degree programs completed the 10-week course covering the integumentary, musculoskeletal, nervous, special senses, and endocrine systems. In 2024, 261 students (65%) responded to the end-of-course survey, positively rating the learning package as 'interactive', 'engaging', 'motivating', 'relevant', and 'helpful' for understanding the content. The overall course satisfaction (% Agree broad) increased by 16.7% and the overall course mark (mean) improved by 4.8%. Conclusion: The comparison of student satisfaction and performance across two years suggests that integrating interactive weekly revision activities significantly enhances student engagement and understanding. Engaging and integrated course design and delivery of introductory anatomy and physiology, combined with reflective adaptations in response to student feedback may support students in their progression toward becoming successful health professionals.

Keywords: anatomy, education, innovation, interactive, physiology
No funding or ethical approval.

Session 7

Comparing size and fat infiltration as measures for detecting pathological changes in cervical flexor muscles in patients with disease/injury.

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[2]University of Otago, Dunedin, New Zealand

Objective: Changes in cervical spine flexor muscle size and fat infiltration (FI) may be a useful indicator of disease and injury. However, magnetic resonance (MR) imaging studies show inconsistent results. Therefore, this systematic review aimed to determine whether muscle size or FI is a more sensitive MR measure for detecting changes in cervical flexor muscles in patients with disease or injury compared to healthy controls. Methods: A systematic literature search was conducted using MEDLINE, Scopus, and Web of Science databases. Eligible studies included those that used MR imaging to measure cervical muscle size and/or FI in adults with disease or injury compared to healthy controls. Data on participant demographics, study methodology, muscle size, and muscle FI were extracted. Methodological quality was assessed using the Newcastle-Ottawa Scale. Meta-analyses were performed using a quality-effects model to evaluate pooled data. Results: No significant difference was observed between disease/injury and healthy controls for longus colli and capitis muscle cross-sectional area (WMD 1.42, 95% CI -19.46 to 22.29) or FI (WMD 3.02, 95% CI ,Äì5.89 to 11.92) when segmented together. When segmented individually, there was a significant decrease in the cross-sectional area between disease/injury and healthy controls for longus colli (WMD ,Äì7.77, 95% CI ,Äì10.95 to ,Äì4.59) and longus capitis (WMD ,Äì4.77, 95% CI ,Äì7.52 to ,Äì2.02). Conclusion: The segmentation of cervical spine flexor muscles individually compared to together appears to be a more sensitive indicator of disease and injury. The results of this study may explain the inconsistent results of previous studies.
Keywords: cervical muscles, muscle size, MRI, neck pain, muscle fat infiltration.
Ethical approval: As this study is a systematic review that involves the analysis of previously published data, no ethical approval was required.

Clinical anatomy of the fibularis longus and brevis muscles.

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Objectives: Chronic ankle instability (CAI) is a debilitating condition, limiting physical activity in the affected 20% of the general population. The lateral leg muscles, fibularis longus (FL) and brevis (FB) are important stablisers of the ankle joint and therefore may be implicated in CAI. However, the relationship between the architecture of these muscles and the aetiology of CAI are not well understood, as detailed accounts of the anatomical parameters of these muscles are limited. This study aims to define the detailed architecture and innervation patterns of FL and

FB. Methods: Twelve cadaveric limbs (male, mean¬±SD age 77.8¬± 7.9 years) were dissected and whole musculotendon parameters measured. Pennation angles (PA), lengths and mass (FM) of individual fascicles were measured to determine muscle volume and physiological cross-sectional area (PCSA), and nerve entry points (NEPs) were recorded. Muscles were digitised for post-dissection analysis. Results: Mean musculotendinous junction lengths were 23¬±2.9cm (FL) and 19.6¬±3.2cm (FB). PA for FL was 7.8¬±4.4 O and 9.5¬±5.2 O for FB. Fascicle length was similar for both muscles (FL, 4.4¬±0.8cm; FB, 3.9¬±0.7cm). FL (36.25¬±10.3g) was approximately twice as large as FB (17.3¬±6.0g), comparable to mean PCSA (FL, 7.7 ¬±2.4cm2; FB, 4.1¬±1.8 cm2). Mean number of NEPs for FL and FB were 5.1¬±1.1 and 2.1¬±0.9, respectively. Conclusions: This research provides a better understanding of the anatomy of FL and FB. Innervation patterns are important for determining whether different muscle sections have different functions. These baseline data may inform future studies focused on the cause and management of CAI.
Keywords: Dissection, Fascicles, Nerves, PCSA
Ethical approval: This research has been granted ethical approval from the University of Otago health research committee.

Pes anserinus structural framework and constituting tendons are grossly aberrant in Nigerian population

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Objective: This study aims to analyze the structures, relative locations, and morphometric values of the pes anserinus tendons in Nigerian cadavers, proposing a new classification method. Methods: The morphological framework of the pes anserinus was evaluated in twenty adult knees of Nigerian cadavers. Tendon patterns and insertion methods were analyzed using descriptive and quantitative techniques. The study received ethical approval from the Board of Research Ethics, College of Health Science, Bowen University. Results: There is significant variability in pes anserinus morphology and location. Tendons generally inserted on the superior half of the medial border of the tibia, extending as far as 124.44 mm from the tibial tuberosity (prolonged insertion). Additionally, 90% of insertions were connected near the tibial tuberosity, and 10% were linked to the fascia cruris. The initial insertion point was consistently at the tibial tuberosity. Accessory bands of sartorius, gracilis, or semitendinosus were present in 95% of cases, with the pes anserinus not conforming to a layered pattern. Conclusion: These findings aid in the precise location and grafting of the pes anserinus. The study aligns with similar research globally and proposes a reclassification of pes anserinus morphology.
Keywords: pes anserinus, tendon grafting, variation

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Support system of Lisfranc joint complex: an anatomical investigation with an evolutionary perspective.

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Objectives: The anatomical arrangement of the Lisfranc joint between the midfoot and forefoot is complex and not just critical for bipedal gait but also for the prevention, management, and rehabilitation of injuries in this region. Methods: In forty adult cadaveric lower limbs, the Lisfranc mortise, the ligaments and supports were observed and noted. Results: The structural arrangement that accords stability to the joint has osseous, ligamentous, and tendinous components. A bony mortise, which is deep medially, disrupts the linearity of the joint line. An extensive Lisfranc ligament with confluent interosseous and plantar parts was observed. A unique arrangement of tendons forming a crisscross pattern supports the joint inferiorly. Conclusion: Demands of assumption of erect posture and bipedal walking in humans, like adduction of the first ray of the foot, maintenance of longitudinal and transverse arches of the foot and ability to stiffen midfoot for efficient forefoot take-off are well reflected in the joint structure and supports.
Keywords: Metatarsal Bone; Cadaver; Lower Extremity; Tendons; Gait
Ethical Statement: The ethical approval was received via letter no. IHEC-LOP/2019/ IM0228 dated 19.8.2019 from the Institutional Human Ethics Committee. The authors are indebted to the donors who have donated their bodies for the benefit of mankind. Funding: None

Re-visiting the inferior supports of Chopart joint complex: new insights in causation of progressive collapsing flatfoot deformity.

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Objectives: Chopart joint complex is a joint between the mid-foot and hindfoot. The joint's static and dynamic support system is critical for maintaining the medial longitudinal arch of the foot. Any dysfunction leads to Progressive Collapsing Flatfoot Deformity (PCFD). The present investigation explores the comprehensive anatomy of the support system of the Chopart joint complex to gain insight into the causation of PCFD. Methods: The study was conducted on forty adults embalmed cadaveric lower limbs. Chopart joint complexes were dissected, and the structures supporting the joint inferiorly were observed and noted. Results: The osseous supports predominate laterally while the ligamentous and tendinous supports medially. The larger part of the spring ligament is positioned medially than inferiorly, where the osseous triangular gap is widest and highest. The spring ligament is reinforced in the following manner: i) supero-medial part- the main tendon of tibialis posterior, ii) inferomedial part- the plantar slip of tibialis posterior, iii) The Master Knot of Henry is positioned just under the gap between the inferomedial and infero-plantar bundles. Conclusion: As a result of evolution during the transition to bipedalism, the anatomical arrangement prompts an alternative pathogenesis for the causation of PCFD. A sharp change in the direction of forces from medial to lateral impacts the spring ligament and Tibialis posterior. It is implied that the degeneration of the Tibialis posterior tendon and causation of PCFD is secondary to this altered fore transmission dynamics.

An alternative mode of intervention has been suggested, which focuses on reinforcing the supports.

Keywords: Flatfoot; Master Knot of Henry; Spring ligament; Talocalcaneonavicular (TCN) joint; Tibialis posterior.

Ethical Clearance & funding: The study had the approval of Institutional Ethics committee of All India Institute of Medical sciences Bhopal, vide letter no IHEC-LOP/2019/ IM0229 dated 19/August 2019. No funding was received from any source for the conduction of this study.

Subcutaneous dorsomedial triangle of forearm: surgical anatomy and clinical implication.

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Objectives: The purpose of the study was to provide a practical landmark for localizing the dorsal branch of the ulnar artery and nerve, to approach for microsurgical flaps, for harvesting nerve grafts. Methods: Forty adult cadaveric upper limbs (20 right and 20 left) were dissected for localizing the dorsal branches of the ulnar artery and nerve. The ramification patterns of the nerve were mapped. The wrist arthroscopy portals are located radial and ulnar to the tendon of extensor carpi ulnaris at the level of the wrist joint, and their designated names are '6R & 6U', respectively. The distance of branches of the nerve from the 6U and 6R portals for wrist arthroscopy was recorded. Results: The present study has delineated a subcutaneous dorsomedial triangular area in the distal forearm. The construction of this triangle uses palpable landmarks, i.e. pisiform bone, styloid process and subcutaneous border of the ulna. The dorsal branches of the ulnar nerve and artery are consistently given off in the triangle's upper third and middle third, respectively. Four branching patterns have been mapped, with one dominant pattern in 67.5% of limbs. In three-fourths of cases, one branch of the dorsal branch of the ulnar nerve consistently overlies the 6U portal and hence runs a higher risk of injury. Conclusion: The study suggests more practical, accurate, reliable and consistent surface landmarks for the localization of the dorsal branch of the ulnar artery and nerve for reconstructive microsurgery for distal hand defects.

Keywords: distal forearm, microsurgery, dorsal branch of ulnar nerve, dorsal branch of ulnar artery, arthroscopy

Ethical approval – The Ethical approval was obtained via letter number IHEC-LOP/2021/IMO416 by the Institutional Human Ethics Committee. We are indebted to our donors who have donated their body for benefit of Mankind. Funding Statement – Non Funded

Cortical brain correlates of chronic pain in knee osteoarthritis; a cross-sectional, source localised neuroimaging investigation.

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Objectives: Chronic painful knee osteoarthritis (OA) is a disabling physical health condition. Alterations in the cortical function may explain persistent pain in knee OA. This study investigated source localised, resting-state, full-band electroencephalography (EEG) features and evaluated the relationship between EEG and pain and physical function in people with knee OA, compared to matched healthy control (HC). Methods: Adults aged 44-85 with knee OA (n=37) and healthy controls (n=39) completed pain and physical function questionnaires. Resting-state EEG data (10 minutes, eyes closed) were collected, preprocessed, and analysed across frequency bands. Current source density of cortical regions' bilateral somatosensory cortices (SSC), dorsal anterior cingulate cortex (dACC), and pregenual anterior cingulate cortex (pgACC) was computed. Whole-brain mapping and correlations between CSD and outcomes were also analysed. Results: Whole-brain analysis showed increased Gamma activity in the right insula (RIns) in the OA group (p=0.01). The Mann-Whitney U-test revealed decreased (pÔÄº0.0001) Infraslow activity at pgACC and increased Theta, Alpha, Beta, and Gamma activity at dACC, pgACC, SSC, and RIns. Infraslow activity at dACC was positively correlated with neuropathic pain, physical function, and sensitivity to physical activity measures, while RIns activity in Theta, Alpha, and Beta bands negatively correlated with pain. Conclusions: Aberrations in cortical activities at sensory-discriminative, motivational-affective, and descending inhibitory cortical regions were demonstrated. Moreover, EEG cortical activities were correlated with pain experience, physical function and performance. The study highlights the cortical aberrations in people with knee OA and informs potential cortical targets for non-invasive, neuromodulatory interventions for managing pain experience.

Keywords: chronic pain, electroencephalography, neuromodulation, musculoskeletal, neuroanatomy

Ethical approval and funding statement: This study was approved by the Health and Disability Ethics Committee, New Zealand (21CEN63), and the cultural consultation was obtained from the University Ngāi Tahu Research Consultation Committee (5828_22442).

Session 8

Comparison of learning strategies for anatomy courses among Pasifika and New Zealand European students at the University of Otago.

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Objectives: Learning anatomy can be influenced by many factors including socio-cultural and education background. In New Zealand, Pasifika students are overrepresented in poor academic outcomes. Here, we aimed to: 1) compare the academic stress of Pasifika and New Zealand European (NZE) anatomy students at the University of Otago, 2) determine if they have different preferred learning strategies, 3) investigate how learning strategies are associated with academic stress. Methods: We launched a brief (~10-15 minutes) online survey to Pasifika and NZE students. The survey includes basic demographics, Perception of Academic Stress Scale, VARK¬Æ questionnaire, and twenty learning strategies. Results: Pasifika students reported higher

perception of academic stress (t(83) = 2.624, P = .010) than NZE students. 62.8%, 67.4%, 53.5%, 95.3% of Pasifika students were visual, aural, reader, and kinesthetic learners, whereas the proportions were 54.8%, 71.4%, 64.3%, 85.7% respectively among NZE students. Similarly, 20.9%, 25.6%, 7.0%, 46.5% of Pasifika students were mono-, bi-, tri-, quad-modal learners, whereas the proportions were 26.2%, 14.3%, 16.7%, 42.9% respectively in NZE students. Pasifika students reported lower preference in studying in libraries than NZE students (t(80) = 2.64, P = .010). Preferences of reading online materials (ÔÅ¢ = -.298, P = .016) and group study (ÔÅ¢ = .269, P = .025) were associated with academic stress, after controlling for age, ethnicity, and gender. Conclusion: NZE and Pasifika anatomy students have similar learning strategies, but their learning strategy preferences may be related to their academic stress.

Keywords: Pasifika students; New Zealand European students; learning strategies; academic stress; ethnic differences.

Ethical Approval: The protocol for this research was approved by the University of Otago Human Ethics Committee (D23/212). Funding**:** This research is funded by the Kickstarter Fund from the School of Biomedical Sciences at the University of Otago to Dr Erik Wibowo.

Influence of religio-cultural beliefs on whole-body donation: a quantitative analysis of a predominantly South African Pedi community.

Brenda de Gama

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Objectives: This study sought to investigate factors that determine the disposition to participate in body donation and influence of religious and cultural beliefs on willingness to consent to donate one's body among a predominantly Pedi community of the Black African population of South Africa. Methods: 300 four-page questionnaires were distributed to conveniently sampled individuals from a village in the Limpopo province of South Africa. Descriptive statistics (frequency tables and Pearson,'s chi-square test for independence) followed by stepwise backward regression were conducted to obtain key factors determining willingness to donate one's body, influence of religious and cultural beliefs, and also likelihood of willingness to participate in body donation. A p-value of < 0.05 was considered statistically significant. Results: Age ($p = 0.001$), educational level ($p = 0.037$), belief in a higher entity ($p = 0.007$), ancestral ($p < 0.001$), and religious ($p < 0.001$) beliefs allowing for body donation were statistically associated with willingness to donate one's body. Respondents who understood religion allowed them to self-donate were 50 times more likely to agree to donate their bodies than those who did not. Conclusion: A high percentage of respondents were unaware of body donation, while a considerable number were willing to donate their bodies based on religious and cultural beliefs. Increasing awareness about body donation programs, especially among religious organizations is warranted in this community.

Keywords: culture, religion, whole body donation, willingness to self-donate, anatomical education

Ethical approval: Reference number: BREC/00000092/2019 Funding: National Research Foundation (TTK220214660416)

A novel framework for the teaching of anatomy and physiology to first year undergraduate students.

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Charles Sturt University

The work presented here is one educator's journey into the study of learning and teaching in anatomy and physiology. Three conceptual ideas (Indigenous pedagogies[1, 2], the Learning Cycle[3] and material thinking[4]) have been combined to create a teaching framework for the teaching of first year undergraduate university students. Many examples are provided to guide other educators on how this framework can be used to design effective learning materials and instructional activities to support inclusivity in education. The author's vision is to ensure that the learning of anatomy and physiology is accessible to any student that would like to study it, regardless of their socioeconomic background, mode of study or previous educational experience.

1. Yunkaporta T. Aboriginal pedagogies at the cultural interface. James Cook University, 2009.
2. Yunkaporta T. Sand Talk: How Indigenous Thinking Can Save the World. Melbourne Australia: Text Publishing, 2019.
3. Zull JE. The Art of Changing the Brain: Enriching the Practice of Teaching by Exploring the Biology of Learning. 1st ed.: Routledge, 2002.
4. Carter P. Material Thinking: The Theory and Practice of Creative Research. Melbourne: University Press, 2004.

ABSTRACTS - POSTER PRESENTATIONS

Rapid poster session #1

Review of non-cadaveric resources in medical education.

Anneliese Hulme, G. Strkalj
University of NSW

Introduction: Anatomy education has evolved in the last 30 years in parallel to major reform in curricula and pedagogical changes in medical education. Teaching anatomy has shifted from didactic and stand-alone dissection-based classes to student-centred, horizontally and vertically integrated curricula. These curricula have various pedagogy and an expanding repertoire of resources including human tissue prepared by various methods, and more recently, the rise of technologically advanced resources. Aim: The aim of this review is to outline the trends in the way non-cadaveric resources are being utilised to teach anatomy in medical education. Method: A literature search was conducted on studies published from 2018-2023, focussing on non-cadaveric resources utilised in teaching anatomy in medical programs. Results: The primary objective of analysed studies was the enhancement of learning/teaching anatomy via the inclusion of these resources. The impact to knowledge acquisition was impacted by numerous factors including the extraneous cognitive load, fidelity, and prior knowledge of the students. A secondary objective reviewed the resources additional benefit to learning. Three main themes emerged for inclusion of non-cadaveric resources. These were enhancing students' 1) ability to orientate and visualise structures and their relationships 2) Interpretation of medical imaging and transferrable skills, 3) Access to resources. Conclusion: The pedagogical evidence to support the utilisation of non-cadaveric resources in anatomy education is developing. Their educational strengths of these resources to enhance learning compared to cadaveric resources is being examined. Further research is needed on how they are best utilised.

The Hierarchy of Learning: The Pyramid of Anatomical Education Tools

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The pyramid of anatomical learning tools outlines the evolution of resources used in anatomy education, illustrating their progression from basic to advanced levels. As students advance in their studies, the sophistication of these tools enhances both comprehension and engagement. At the base, 2D static images provide a foundational view of anatomical structures, requiring significant cognitive effort for mental rotation. As we move up, 3D dynamic images offer improved depth perception but still necessitate mental manipulation.
Next, Monoscopic 3D Virtual Technology (3DVT) introduces a virtual environment with limited interaction, lacking true depth perception, so it still needs mental rotation as well. In contrast, Stereoscopic 3DVT immerses students in a more realistic space, enhancing spatial understanding without the need for mental rotation. Following this, anatomy models allow for tactile interaction, providing a hands-on experience that digital methods cannot replicate.

At the pinnacle of the pyramid, prosections—actual dissected tissues—offer the most authentic understanding of human anatomy, engaging multiple senses and providing insights unattainable through other tools. AI-powered resources, such as interactive simulations and adaptive learning platforms, occupy a high position due to their advanced capabilities. However, they cannot replace the irreplaceable value of direct experience with real anatomical structures.
Ultimately, the Pyramid underscores the importance of integrating various tools in anatomy education. While foundational resources are crucial, immersive, interactive experiences and hands-on learning are essential for achieving a comprehensive understanding of human anatomy. Therefore, integrating 3D digital representations with traditional teaching resources can offer a holistic and enriched learning environment.

Enhancing surgical pathology training: development of a 3D printed mastectomy model prototype, Simpleware VS 3D.

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Objectives: 3D printing is increasingly used in surgical planning and patient education, with softwares like Blender, 3D Slicer, Meshmixer, Mimics Innovation, TinkerCAD, and Simpleware in medical 3D printing. This study aims to develop a high-fidelity 3D printed mastectomy model for dissection training for anatomical pathology trainees, comparing the capabilities of two software platforms—Simpleware (paid) and 3D Slicer (free, open-source). Materials and Methods**:** We created two 3D mastectomy models using Simpleware and 3D Slicer, processing 192 DICOM images from a bilateral breast cancer MRI scan set extracted from Cancer Imaging Archive using the NBIA Data Retriever. Both software platforms created four masks for various breast tissues (skin, fat, fibrous tissue, and abnormalities) using paint, erasers, and thresholding tools. Masks were combined and exported as STL files for 3D printing. Results**:** Both platforms produced detailed breast models. Simpleware provided predefined workflows with segmentation tools, allowing precise differentiation of skin, fibrous, fat tissues, and abnormalities, allowing for easier visualisation and isolation of these structures. 3D Slicer, while customisable and user-friendly, required more manual input for segmentation, especially for fibrous and fat tissues. Conclusion**:** Both Simpleware and 3D Slicer effectively generate detailed breast models, with Simpleware offering automation with precise detection of different tissue types, and 3D Slicer providing a flexible, more manual-intensive approach. As a free, open-source tool, 3D Slicer increases access to advanced modelling techniques, benefiting institutions with limited resources. The next phase will explore optimal materials for replicating human tissue, enhancing the educational value of these models for anatomical pathology training.

Keywords: Anatomical Pathology, 3D Printing, breast, dissection
Ethics Exemption Approval: EX-H16013. Ethical approval for this study was waived by the Western Sydney Human Research Ethics Committee as the research is lower risk and the research involves the use of collections of information or data from which all personal identifiers have been removed prior to being received by the researchers.

Perceptions of Selected Undergraduate Medical Students in Najran University on the Effectiveness of the Combined Use of Plastinated and Formalin-preserved organs

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Introduction: The teaching of Anatomy in undergraduate medical education is pivotal in producing competent healthcare professionals. This study evaluates the perspectives of medical students regarding the efficacy of plastinated specimens and cadavers as teaching tools in Anatomy courses. Methods: A cross-sectional survey was conducted among 100 undergraduate medical students utilizing structured questionnaires to gather data on their learning experiences.

Results revealed that 85% of students preferred using plastinated specimens over traditional cadavers due to their durability and the ability to maintain anatomical fidelity. In contrast, 75% acknowledged the importance of cadaveric dissection for developing practical skills and understanding complex anatomical relationships and teaching method in enhancing their learning outcomes. The percentage of students favouring plastinated specimens (85%) versus cadavers (75%). These findings suggest a complementary approach to teaching Anatomy, where plastinated specimens offer a viable alternative to cadavers, particularly in resource-limited settings. This study underscores the necessity for curricula to adapt to evolving educational technologies and students' preferences, ultimately enhancing the quality of medical education. Future research should explore longitudinal outcomes of integrating these methods in Anatomy education.
Conclusion: Plastinated specimens would be an effective complement to formalin-preserved, and should be used by medical schools when designing anatomy learning activities for their students.
Keywords: Plastination, cadaver dissection, brain models, neuroanatomy.

Enhancing radiographic anatomy education: integrating higher-order questioning in anatomy assessment

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Introduction: Traditional anatomy assessments often emphasize knowledge recall through lower-order questioning, which may not adequately prepare students for clinical practice. Higher-order questioning involves deeper cognitive processes, requiring students to apply, analyze, and evaluate anatomical concepts. Objective: This study aimed to evaluate the impact of higher-order questioning in anatomy assessments for Year 2 medical imaging students over four years, compared to traditional lower-order questioning. Materials and Methods: The study analysed assessment results from 160 Year 2 medical imaging students over four academic years. Each year, 40 students were assessed using higher-order questioning techniques, including case-based scenarios and critical thinking prompts. Their performance was compared to previous cohorts who had been assessed with lower-order questions focused on structure identification. Data on student performance, engagement, and feedback were collected and analysed to assess cognitive development and alignment with clinical practice needs. Results: Students assessed with higher-order questions consistently showed improved cognitive abilities, demonstrating

better application of theoretical knowledge to clinical scenarios. These students exhibited higher engagement and confidence in translating anatomy knowledge into practice. The results aligned with learning outcomes, demonstrating the effectiveness of higher-order questioning in bridging the gap between theory and clinical practice. Conclusion: Higher-order questioning enhances cognitive development and prepares students more effectively for clinical practice. This approach supports learning outcomes and promotes its broader adoption in medical imaging education.

Keywords: Higher-order questioning, Anatomy assessments, medical imaging education
Ethical approval**:** ethic approval is not applicable for this research.

Is high school background associated with the academic performance of Pasifika and New Zealand European anatomy students at the University of Otago?

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Objectives: Pasifika students in New Zealand are overrepresented in poor academic outcomes including in anatomy courses. Many factors may influence their academic performance, including socio-economic background. Schools in New Zealand has equity index (EQI) to distribute equity funding and resources. A school with a high EQI means that the school has a high proportions of students who face socio-economic barriers. We aimed to: 1) compare the academic performance and high school background of Pasifika and New Zealand European (NZE) anatomy students at the University of Otago, and 2) determine if high school EQI is associated with performance in anatomy courses. Methods: Demographic and student academic performance data in ten anatomy courses (four second-year and six third-year undergraduate courses) were collected from the University of Otago internal database. Students' high school names were matched with their EQI from the Ministry of Education website. Results: In all ten anatomy courses, Pasifika students received on average lower final marks than NZE students. The average high school EQI was higher in Pasifika students than in NZE students in five anatomy courses. Univariate regression analyses indicated that higher school EQI was associated with lower academic performance in all four second-year anatomy courses, and one third-year biological anthropology course. After controlling for age, gender,
ethnicity, and anatomy major, high school EQI was associated with lower marks in one second-year anatomy course. Conclusion: Our findings highlight the importance to support Pasifika students during their education journey in universities in New Zealand, especially those who face greater socio-economic barrier.

From tradition to technology: Perceptions of Cadavers vs. Technology in Medical Education.

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Objectives: This study explores the ongoing debate between teaching a medical anatomy curriculum, particularly in rural Australia, with cadaveric specimens or technology-based resources. Cadavers have traditionally been the cornerstone of medical anatomy education, but recent technological advances are prompting many educators to reassess the cost/benefit of

these more traditional teaching resources. This study aims to gather responses from medical practitioners, medical/anatomical educators, and medical students and examine their perceptions of these different approaches to anatomy education. Methods: This survey-based study has been distributed through the Federation of Rural Australia Medical Educators (FRAME) network, leveraging its wide-reaching influence to recruit participants across Australia. We also hope to garner responses from experts in anatomy education and students via a poster presentation at the ANZACA conference. This study focuses on factors such as lived experience of learning and/or teaching anatomy content, educational background, and vocational setting. Results: This study is expected to identify key factors influencing preferences for cadavers versus technology. These findings will provide insight on how best to balance the pedagogical benefits of either approach based on the variables inevitably unique to each medical school. Conclusion: The findings will contribute to developing medical anatomy curricula, with implications of particular importance for rural medical education where access to certain teaching resources may be limited. Findings from this study will support graduate competencies and the highest possible standard of clinicians for rural areas.

Keywords: Anatomy Education, Cadaver Dissection, Medical Education, Prosection.
Ethical Approval & Funding Statement: Ethical approval was obtained from The University of Melbourne Human Research Ethics Committee (Reference Number: 2024-28014-57305-6), and the study is funded by the Australian Government under the Murray-Darling Medical Schools Network.

Student feedback on a group-based video assessment: enhancing authentic assessment for first-year anatomy subjects.

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Objective: This project aimed to gather student feedback on a new group-based anatomy video assessment, introduced to replace the traditional didactic approach in first-year anatomy. The assessment promoted workplace-relevant skills like collaboration and critical thinking, while encouraging deeper learning through the practical application of anatomical knowledge. Methods: A participatory action research and co-design framework involved students, learning designers, and academics in developing the assessment framework, student handbook, and rubric. Groups of four to six students created a 5-minute video covering the anatomy, function, and clinical testing of three cranial nerves. The assessment contributed 20% of their final grade. Students from undergraduate and college anatomy courses at the University of Wollongong completed a 15-item survey evaluating preparedness, skill development, and experience. Results: Thirty students (n=11 males, n=18 females, n=1 non-binary) completed the survey. Most students (81%) felt prepared (mean=4.10/5) and found the rubric clear (mean=4.24/5). They reported improved understanding of cranial nerves (mean=4.41/5) and believed the assessment supported future learning (mean=4.17/5). Collaboration skills were enhanced (mean=4.10/5), with 80% agreeing it fostered workplace-relevant skills. Themes included group dynamics, video creation, and time management. Suggestions for improvement included assigned groups, longer videos, and exemplar access. Conclusions: The group-based assessment enhanced students'

understanding of cranial nerves and clinical testing, effectively bridging the gap between theory and practical application.

Key Words: Authentic assessment, Group-based assessment, Soft skills, Video Assessment, Work Integrated learning

Ethics Approval: This study has received approval from the University's Human Research Ethics Committee (approval number: 2023/254).

Funding**:** This research was funded by an internal teaching innovation grant from the University of Wollongong

Extrapolating the role of surface electromyography (sEMG): a protocol for standardised data normalisation for surgical research.

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Introduction: Surface electromyography (sEMG) in surgical literature has been limited to ergonomics of procedures. Moreover, surgical literature utilising sEMG has neglected fatigue and physiological concerns when normalising data. Furthermore, review of published work informs that methodologies for acquiring maximal voluntary isometric contraction (MVIC) tests for normalisation data are vague and scarce in surgical literature. Therefore, this study aims to propose a standardised method for using sEMG in surgical literature, and to propose the most optimum method for MVIC extraction by comparing manual resistance (MR) and stationary resistance (SR). Methods: Part 1: The first part was to determine the method that best derives MVIC by MR or SR. sEMG electrodes were placed on upper limb muscles of six (n=6; M=2 F=4) participants. Participants performed multiple MVIC tests by either the MR or SR method. The data was used to normalise against trocar insertion into a tissue mimic. Part 2: After establishing the optimum method for MVIC normalisation, the second part of the study involved applying the optimum method to two (n=2) in-house surgeons. The surgeons placed a trocar into a cadaver where their muscle activation was normalised with the optimum MVIC test. Results: In progress. Conclusion: This study will provide a standardised method for collecting normalising sEMG data for surgical procedures. This will enable a broader application beyond ergonomics. It will also show the optimum method for attaining normalising data for surgical procedures setting up further improving outcomes for surgeons.

Key words: Laparoscopy, sEMG, Electromyography, MVIC, Normalisation

Ethical approval: The paper was approved by The University of Queensland ethics board (Ethics ID No. 2024/HE000082)

Rapid poster presentation #2

The antipsychotic potential of Salix Mucronata on ketamine-induced rats.

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Objectives: *Salix mucronata* is a herbal plant offered by traditional health practitioners in KwaZulu-Natal, South Africa for the treatment of schizophrenia. This study aimed to investigate effects of repeated administration of ketamine on social interaction, novelty and motivation in adult, male Sprague Dawley rats. It also aimed to investigate the potential of risperidone and the herbal extract of *S. mucronata* to reverse impairments that are induced by ketamine. Methods: Experimental rats (n=45) received a dose of ketamine at 30mg/kg via intraperitoneal injection for 5 consecutive days. They were then allocated into their respective treatment groups and given risperidone and the herbal extract of *S. mucronata* at doses of 6,0mg/kg and 5,0mg/kg, respectively, for 7 consecutive days. Social behaviour was tested using the 3-chambered sociability test, and anhedonia was tested using the sucrose preference test. Results: Ketamine induction elicited social withdrawal and reduced social novelty which were later successfully reversed by risperidone and *S. mucronata*. Rats showed reduced preference to sucrose post-induction and post-treatment. Ketamine and mild stress caused by scruff restraint elicited reduced weight gain for the animals. After behavioural tests, animals were sacrificed using rapid non-pharmacologic euthanasia (decapitation). No differences were noted on brain mass between controls and experimental groups and also between risperidone and *S. mucronata* groups. However, reduced brain volume was noted in experimental groups. Dopamine and acetylcholine concentrations were high in groups which received risperidone and *S. mucronata*. Conclusion: These findings highlight that the antipsychotic potential of *S. mucronata* is similar to risperidone.

Keywords: Herbal medicine; Mental disorders; Schizophrenia; Risperidone; *Salix mucronata*

Ethical considerations: All research protocols in this study were adhered to in accordance to the guidelines approved by the Animal Research Ethics Committee of the University of KwaZulu-Natal (Ethics Clearance number: AREC/000/5188/2023). This study also received permission from the Department of Agriculture, Land Reform and Rural Development of the Republic of South Africa (Permit number: SDAH-Epi-23021009580).

Mitochondrial transplantation in animal model of traumatic brain Injury: a new therapeutic strategy

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Objectives: Traumatic brain injury (TBI) poses a major health challenge due to the limited availability of effective treatments to counteract free radical-induced brain damage. Given the brain's high energy demands, mitochondrial transplantation has emerged as a potential therapeutic strategy for TBI. However, identifying an optimal source of functional mitochondria remains problematic. This study investigates the therapeutic potential of mitochondria derived from senescent platelets, which are typically discarded three days after donation, offering a Good Manufacturing Practice (GMP)-compliant source for treatment. Methods: TBI was induced in rats via weight drop and confirmed through histopathological analysis. The rats were divided into four groups: a control group of healthy rats, a TBI group, a TBI+RB group treated with respiration buffer, and a TBI+Mito group treated with mitochondria. Sensorimotor performance was assessed using the beam walk, horizontal bars, grid-walking, and cylinder tests. Results: Mitochondrial transplantation significantly improved neurobehavioral function in TBI models. Moreover, brain tissue morphology in the treated group resembled that of the healthy controls, suggesting successful tissue repair following mitochondrial transplantation. Conclusions: These findings highlight the potential of mitochondrial transplantation in promoting tissue recovery after TBI. However, further studies are required to fully understand the broader implications and long-term effects of this therapeutic approach.
Keywords: Mitochondrial transplantation; platelets; Traumatic brain injury

Ethical approval and funding: This study was approved by Iran National Committee for Ethics in Biomedical Research in possession of ethical clearance (Approval Code: IR.NIMAD.REC.1400.003). This work was supported by the National Institute for Medical Research and Development (NIMAD) under grant number 996448.

Quantifying the growth and fusion of the 5th metatarsal apophysis.

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Objectives: Lateral foot pain or oedema approximating the base of the fifth metatarsal often results from injury or traction of the fifth metatarsal apophysis. While common in paediatric and subadult populations, understanding of the apophyseal development is limited due to the predominant use of plain radiography in current research. This study aimed to investigate the ossification and fusion of the fifth metatarsal apophysis using computed tomography, providing a detailed morphological description of development. Methods: A novel five-stage scoring system was applied to 295 multi-slice computed tomography scans (158 females, 137 males; 0 to 15 years of age) and 258 lateral, anteroposterior, and oblique radiographs (120 females; 138 males; 0 to 7 years of age) from the Queensland Children's Hospital. Results: Ossification of the apophysis began as early as 7 years for females and 8 years for males. It initially appeared as a thin fleck of bone, elongating into a crescent shape with the proximal aspect being wider and extending more medially compared to the distal aspect. Fusion commenced at a mean age of 10.3 years for females and 11.82 years for males, with the earliest age of complete fusion observed at 9 years for females and 12 years for males. Significant sexual dimorphism in ossification was observed with females commencing ossification and fusing earlier than males. Conclusion: This study provides a much needed and updated anatomical description of

apophyseal development for Queensland children, offering valuable insight into diagnosing lateral foot pain, such as apophysitis, and reducing misdiagnosis of fractures.
Keywords: Apophysitis, computed tomography, growth and development, Iselin's disease
Ethical approval was granted by The Children's Health Queensland Hospital and Health Service Human Research Ethics Committee (LNR/19/QCHQ/51243). No funding was received to undertake this research.

Blurred lines and binary bias: reporting on sex and gender in recent anatomy education research.

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Objectives: Recent shifts in societal recognition of sex and gender identity underscores the significance of acknowledging and reporting diversity in pedagogical research. Given the importance of understanding sex and gender as variables that affect generalizability and applicability of research findings, accurate reporting of this diversity in anatomy education research is imperative if it is to remain relevant and applicable for developing pedagogical practices. The aim of this study was to review the reporting of sex or gender in anatomy education research. Methods: An automated search identified 181 anatomy education primary research articles published international in 2022. A manual review found 98 of these publications reported the sex or gender of the participants featured in the respective studies. Results: The sex of participants was recorded in 92.9% of studies, while gender was recorded in 7.1% of studies. 91.8% of studies offered participants two binary categories for reporting their sex or gender, a non-binary option was offered in 7.1%, and a 'prefer not to answer option offered in 5.1% of studies. In studies that recorded participants' sex, 43.7% framed this question as relating to gender or gender identity. Finally, 69 studies utilized this data in their analysis, with 60% conflating sex and gender terms or using them interchangeably. Conclusions Gender identity is underreported in anatomy education research, and non-binary individuals remain significantly underrepresented. A high degree of conflation between sex and gender highlights the need for improved reporting guidelines, a challenge that is notably confounded by international cultural and linguistic differences.
Keywords: Anatomy, Education, Gender, Sex

Navigating through the anatomy of the accessory parotid gland: prevalence, distribution, and relationships.

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Objectives: The accessory parotid gland (APG), an additional gland separated from the parotid gland (PG), is reported to have more malignant tumors than PG. Furthermore, since tumors can also recur at the APG, removing the APG is needed during a parotidectomy. Nevertheless, little

has been reported about APG, particularly in cadavers. Due to its small size, it is hard to detect APG using medical imaging. This study aimed to examine the anatomical features of APG in cadavers. Methods: 28 hemifaces (mean age 81.21 years old; 7 females and 7 males) were dissected. Ultrasound examination was performed twice before and after dissection by a radiologist using the XCUBE60 with a 3,Äì19-MHz linear probe. Analyzing APGs was performed using a digital caliper. This study was approved by the Institutional Review Board (IRB) of Ewha Womans University (ewha-202405-0008-01). Results: Compared to ultrasound, the prevalence of APGs was higher in cadavers (US: 14.29%, cadaver: 35.71%). Among APGs, 57.14% were unilateral, and 42.86% were bilateral. With an average width of 14.45 ¬± 2.68 mm (average ¬± SD) and an average length of 22.05 ¬± 5.67 mm. The average distance from the anterior border of PG was 6.49 ¬± 4.21 mm. All specimens were above the parotid duct, and below the Frankfort horizontal line. An accessory duct was present in 30% of APGs. Conclusion: This study provides the prevalence of APG and anatomical guidelines, including potential landmarks, locations, and relationships between surrounding structures. This suggests clinicians should recognize the presence of APG with caution when performing medical procedures.
Keywords: Accessory parotid gland, Cadaver
Funding: This research was supported by a grant of the MD-PhD/Medical Scientist Training Program through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health & Welfare, Republic of Korea, and a grant from the Korea Health Technology R&D Project(HI23C0170) through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health& Welfare, Republic of Korea.

Anatomical variation of quadratus plantae along with flexor digitorum longus tendon along with unilateral polydactyly of toes: a case report.

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Objective: Various patterns of tendinous connections between quadratus plantae (QP) and flexor digitorum longus (FDL) have been reported in the literature. However, there is minimal information on the specific pattern of connection between QP and FDL in the case of polydactyly of the toe, particularly the insertion of this connection on the toe. Case Presentation: During routine lower limb cadaveric dissection, we observed a unique case of unilateral polydactyly in the left foot of a 61-year-old male cadaver at AIIMS, Jodhpur. The medial head of the QP gave off an additional tendinous slip before joining the lateral head of the QP. Then, this extra tendinous slip gave a thin tendinous connection to the 4th tendon of FDL. The 4th tendon of the FDL was bifurcated into two tendinous parts after receiving a thin fibrous slip from the tendinous slip of the medial head of QL. The medial division of the 4th tendon of FDL passed forward and attached to the base of the distal phalanx of the 5th toe. The extra tendinous slip from the medial head of QP was attached distally to the lateral division of the 4th tendon of FDL and formed a common anomalous tendon to the 6th toe. This anomalous tendon was attached to the plantar surface of the base of the distal phalanx of the extra sixth toe. Conclusion: The knowledge of this rare variation is of utmost importance, particularly in surgical contexts such as foot reconstructive surgery and correction of congenital deformities like clubfoot.
Keywords: Quadratus plantae, Flexor digitorum longus, Foot polydactyly, Foot tendon, Anatomical variation.

Ethical Approval- We have received the IEC waiver for the case report from the Institutional Ethical Committee, AIIMS Jodhpur. There is no need for ethical clearance for a case report.
Funding statement- It is a non-funded project.

Renal histological changes in spontaneously hypertensive rats following adjuvant hypoxis hemerocallidea in highly active antiretroviral therapy.

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Purpose: Highly active antiretroviral therapy (HAART) has been implicated in renal tubular injury, nephropathy, and renal failure with potential exacerbation in human immunodeficiency virus (HIV) infected and hypertensive persons which has remained underexplored. Methods: Thirty SHRs and five normotensive rats weighing 242.6 - 286g were divided into seven groups (A-G) of five rats each. Groups A and B were normotensive and hypertensive controls respectively and received normal saline. Groups C (HAART cocktail of Lamivudine, Stavudine & Nevirapine), D HAART + HH (100mg/kg), E HAART + HH (200mg/kg), while groups F and G, received HH at 100 mg/kg and 200 mg/kg respectively. HAART and HH were administered orally once daily. The rats were sacrificed by halothane inhalation and kidneys were harvested and processed for staining. Blood samples were analysed for blood urea nitrogen (BUN) and serum creatinine (SCr). Results: HH at both doses caused a significantly increased ($P<0.05$) body weight in groups F and G when compared to the hypertensive control. In hypertensive control (group B), there was atrophy and sclerosis with Bowman,Äôs capsular space loss. These features were exacerbated by HAART (C), and adjuvant treatment with HH did not prevent the derangements seen (D, E). SCr and BUN were significantly increased ($P<0.05$) in group E, decreased in F and G compared to the control. Conclusions: HH exacerbates renal injury in this model, and adjuvant use of HH and HAART does not mitigate renal morphological aberrations.

Unearthing perceptions: health and social viewpoints during the Otago gold mining period in New Zealand.

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Objectives: During the 1860s, gold rushes in Otago, New Zealand, led to substantial demographic shifts, accompanied by various maladies. The prevalence and health effects of these maladies, particularly the infections syphilis and gonorrhoea, remain poorly understood. This study aimed to explore the prevalence of these infections, understand who was affected, and outline social and medical treatments. Methods: Patient records from Dunedin and Dunstan hospitals

pertaining to syphilis and gonorrhoea cases from 1864,Äì1869 were aggregated and analysed to explore prevalence, medical treatments, and demographic data. Additionally, thematic analysis of archival newspaper excerpts from the Otago region was undertaken to determine how affected individuals were perceived. Results: There were rises and falls in cases of syphilis and gonorrhoea, with syphilis cases more frequently recorded. Hospital stays were longer for gonorrhoea patients than for syphilis, and treatments were provided to males more frequently than females. Demographically, most individuals were between 16,Äì44 years old, were predominantly from Great Britain; males worked in maritime industries in Dunedin and mining in Dunstan, while females were more involved in prostitution. Thematic analysis revealed three themes and 12 subthemes: rascals and reprobates (males and females), contributors to society (males), and characters of disrepute (female), showing that males were seen despite their infections, while females were stigmatised because of them. Conclusion: These insights into the social and biological contexts of the gold rush contribute to a richer understanding of public health responses and societal perceptions towards individuals with syphilis and gonorrhoea in colonial New Zealand.

Keywords: gold rush, gonorrhoea, Otago, stigma, syphilis
This study was not funded by external sources and ethical approval was not required.

Unpacking the nursing curriculum: is there room for pathology?

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Introduction: The nursing curriculum is evolving with an emphasis on holistic care and interdisciplinary collaboration. This collaborative project investigates whether there is sufficient integration of pathology within nursing education, considering its importance for future comprehensive patient care from nurse practitioners. Materials and Methods: A qualitative approach was employed, utilising surveys and interviews with nursing educators and students in a Master of Nursing program. The survey focused on curriculum content, while interviews explored perceptions of the importance of pathology in nursing practice. Data were analyzed to identify themes and gaps in the curriculum. Results: Findings indicate a significant variation in the inclusion of pathology content across programs. While educators acknowledged the importance of pathology, project partners reported inadequate coverage in the curriculum. Brief (3-5 min) interviews revealed that students often felt unprepared to apply pathological concepts in clinical settings, highlighting a disconnect between theoretical knowledge and practical application. Conclusions: This study underscores the need for a more robust integration of pathology within nursing curricula. Enhancing this aspect of education can better equip nursing students to understand and address complex patient conditions. Future curriculum development should prioritise interdisciplinary collaboration and include more comprehensive training in pathology to supplement theoretical understanding, ultimately improving patient outcomes and nursing practice. Addressing these gaps can foster a more holistic approach to nursing education, ensuring that graduates are well-prepared for the complexities of modern healthcare.

Keywords: Pathology, Curriculum, Application
Ethics approval: This is a pilot project and by UQ Policy does not require an ethics approval.