ANATOMICAL SOCIETY

Virtual Summer Meeting Programme

CUTTING EDGE ANATOMY

7th – 9th July 2021

WELCOME

Dear Colleagues,

On behalf of the University of Glasgow organising committee, it is my great pleasure to welcome you to the Anatomical Society Summer Meeting 2021. We are excited to hear from a diverse range of National and International speakers on "*Cutting Edge Anatomy*" across multiple anatomical themes.

Our ability to host online events has come a long way since the beginning of the COVID-19 pandemic, with this being the second virtual Anatomical Society meeting. We hope that you will enjoy the full schedule of invited presentations, young investigator talks, our special "*education in the time of COVID-19*" flash talk symposium, and broad range of posters across the course of the next few days. We understand the challenges of participating in conferences online from home, and so, all webinars will be available to view on-demand for 30 days following the meeting if you need to catch up in your own time.

This conference wouldn't be possible without the hard work and input of the many people involved in the conception, planning, and organisation of the main programme and associated social events. I would like to express my sincere thanks to everyone who has supported this conference, from the Anatomical Society, local organising committee, student volunteers, sponsors, speakers, and you, our delegates.

Although we cannot be in Glasgow to meet one another in person, we hope that you will engage in the Q&As with our speakers, participate in our virtual networking and social events, and take this opportunity to catch up with colleagues and friends, as well as forming new connections and potential future collaborations.

We hope to welcome you to Glasgow in the future and wish you an enjoyable and informative meeting.

Yours Sincerely,

Dr Eilidh Ferguson (Local Organising Committee Chair) he ascended to throne at a very young age. In the context of this reassessment, we also reconstructed KV55's face using up-to-date forensic techniques based on the application of soft tissues on the digital image of the skull acquired from photos dating back to Grafton Elliot Smith's pivotal 1912 publication *The Royal mummies*. Through this approach we also manage to bring back to 'life' the facial traits of one of the most controversial skeletons of antiquity, potentially those of a pharaoh that changed the course of history, although a final certain identification will only be possible thanks to the implementation of new genetic tests on the remains held in Egypt.

P26. Understanding the mechanisms underlying microtia using mouse models

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There are several human syndromes characterized by hearing loss with mutations affecting the development of the three ear components (inner, middle and outer ear), leading to malformation of the hearing apparatus. Microtia is a common feature and encompasses auricle defects with variable severity. Examples of syndromes associated with microtia and hearing loss include Branchio-Oto-Renal syndrome (BOR) and 22q11.2 deletion syndrome. We aim to uncover the genetic interactions between the main genes associated with these syndromes (*Eya1 and Tbx1)* during auricle development. Mice with homozygous mutations in *Eya1* and *Tbx1* display microtia, similar to that observed in BOR and 2q11.2 deletion syndrome patients. We found that *Eya1* is expressed in the mesodermally-derived auricle muscle and acts downstream of *Tbx1*. Loss of function of either gene led to a lack of cartilage differentiation due to a downregulation of Sox9 in the ectomesenchyme. However, *Sox9* deletion in Wnt1creSox9 floxed mice did not interfere with the initial stages of auricle development. In addition, *Eya1* and *Tbx1* were needed for auricle muscle differentiation, as shown by the downregulation of MyoD. We propose a model in which *Tbx1/Eya1,* expressed in mesodermal muscle, instructs the surrounding ectomesenchyme to induce auricle development and to differentiate into elastic cartilage by upregulation of Sox9.

All animal work was performed in accordance with the Animals (Scientific Procedures) Act 1986 and amendment regulations 2012, with Home Office approvals in place.

P27. Toughness as a criterion of resistance to deformation of rats' cancellous bone tissue in conditions of functional disorders.

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The architectonics of spongy bone tissue is an individual integral response of the bone to the stresses and strains it undergoes under various loads. Spongy bone tissue by its mechanical properties is inhomogeneous, nonlinear and anisotropic. In addition, its mechanical properties can vary significantly depending on age, sex, structural and functional state of bone tissue, the presence of local and systemic pathological processes. The aim of this study is to adapt the method of determining toughness as a criterion for resistance to deformation of cancellous bone tissue in terms of functional disorders. 6 samples of rats' heel bone with perforated defect on the 24th day of reparative regeneration were fixed in aluminum frames of cylindrical shape with epoxy glue. Rodents were withdrawn from the experiment by cervical dislocation. Bone fixation was performed at the fixation-regeneration zone boundary. The experiment used a pendulum hammer weighing 5 kg. The MPB-2 microscope was used to measure the fracture plane of the bone formed by the action of pendulum hammer. The toughness a_n was determined by the formula $a_n = A_n / F$, where A_n is the work, F is the cross-sectional area. The main purpose of determining the toughness during bending is to assess the performance of the material in difficult load conditions and its susceptibility to brittle fracture. Fixing the mandrels with bone allows to determine the amount of fracture work, which is spent per unit area of the sample in the plane of impact. The values of toughness characterize the values of crack resistance of the cancellous bone, which varied in the range of 8.82-7.42 kg • m / cm ^{2}. The obtained values of toughness in terms of functional changes can be used in further investigations to study other pathological conditions.

P28. The Use of Ultrasound Imaging in Medical and Undergraduate Science Teaching

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Apart from teaching medical students the clinical practicalities of ultrasound (US) imaging, there is an obvious application in an educational setting for visualizing both gross anatomy and physiology. It is a non-invasive and painless technique that can be used to integrate anatomy and physiology teaching. A systematic review was conducted to gather information regarding current uses of US in medical and science education. Additionally, original research in the form of a survey of academics instructing on anatomy and physiology courses in the United Kingdom and Republic of Ireland was conducted (n=31). The aim was to provide a comprehensive guide to help establish possible applications for US as a teaching tool and assess any evidence for its effectiveness as a teaching method. Results from the literature review and survey reveal that US is being used in a variety of ways all over the body for physiology and anatomy purposes. A strong interest in learning about possible uses of US was reported by survey respondents, and barriers to implementing US were identified. From student feedback questionnaires in the literature, it is evident that US is popular and highly valued as a teaching modality by students. Analysis of reported quantitative knowledge-based tests suggests that US is a successful teaching tool, providing benefit to student learning. US is being used widely for all regions of the body and increasing in popularity, and further studies will help to increase exposure and assess any efficacy as a teaching method.
Ethical approval for the survey was granted by the Queen's University Belfast Faculty of Medicine, Health and Life Sciences Research Ethics Committee (Approval ID MHLS 20_155) and all survey participants gave their informed consent electronically via an itemised consent form.

P29. The Trajectorial Theory: Wolff's Human Hip Faux Pas

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One of the oldest and most confusing controversy in Orthopaedic Surgery is undoubtedly that of the functional anatomy of the upper femur. It is the one topic which can be guaranteed to produce dissention and argument in otherwise placid atmospheres. The structures which cause the most angst are the three internal condensations of trabecular bone which exist in the femoral neck of every physically normal human being viz. the two trabecular columns (vertical and horizontal) and the calcar femorale. These problem structures came to light some two centuries ago and have been argued about ever since. Although not the originator, the main initiating protagonist was Julius Wolff who propagated their functional concepts vehemently and proposed two theories – the Law of Bone Formation, that force through the bone stimulates bone formation and his Trajectorial theory, that bone formation aligns itself with the pathway of the force. It is alleged that the vertical column carries a compression force and the horizontal column a tension force. Today Wolff's concepts prevail and it is generally accepted that the two columns carry a compression and tension force respectively, but the role of the calcar is mostly conjecture. Nevertheless, in proposing these theories, Wolff seems to have committed a serious f*aux pas*. In the upper femur, the Law of Bone Formation and the Trajectorial Theory are mutually exclusive. How then does one explain the function of these internal trabeculae? Recent anatomical physical dissections of the upper femur gave insight of how these internal trabecular structures are formed and function. The essential understanding gleaned from the dissections is that anatomically and functionally these three internal trabecular structures are not separate entities but one single, continuous structure. The study suggests that, because of the femur's shape, this internal trabecular bone is deposited in the femoral neck to cope with an excessive internal