

**A selection of abstracts presented at the 46th annual conference of the
Anatomical Society of Southern Africa (ASSA),
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ABDULKADIR, A.,^{1,2} E.F. MBAJIORGU.¹ ¹School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa, ²Department of Anatomy, College of Health Sciences, Federal University Birnin Kebbi, Kebbi, Nigeria. **The renal histopathological changes caused by concurrent chloroquine and ethanol administration in protein malnourished rats.**

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The aim of our research was to investigate the renal histopathological damage arising from the hazard of concurrent ingestion of antimalarial chloroquine and ethanol on a background protein malnourished state using a rat experimental animal model.

Sixty-four rats were randomly distributed into eight groups of eight rats each as follows: 1) Control groups that received neither chloroquine nor ethanol while on either normal or low protein diets (NPC, LPC). 2) Chloroquine treatment groups while on either normal or low protein diets (NPQ, LPQ). 3) Ethanol treatment groups while on either normal or low protein diets (NPE, LPE). 4) Chloroquine and Ethanol treatment groups on normal or low protein diets (NPQE, LPQE). Chloroquine was administered weekly to NPQ, LPQ, NPQE, and LPQE. NPE, LPE, NPQE and LPQE received 6% ethanol in drinking water ad libitum. NPC and LPC received saline. After 60 days, the rats were terminated, kidneys were harvested and fixed for analyses. Routine H&E histology, Masson's trichrome for collagen, kidney volume, glomeruli count and immunofluorescence for aquaporin 2 (AQP2) were conducted.

The results showed a decreased mean relative kidney weight ($p=0.0158$) and kidney volume ($p=0.0001$) in

the LP-treated rats compared to NPC. Glomeruli number reduced ($p=0.0195$) in the LP-treated rats compared to control. There was upregulation of the AQP2 water channel with increased collagen fibre deposition and distortion of normal renal histology in the LP-treated rats.

In conclusion, concurrent ingestion of chloroquine and alcohol causes histopathological changes in the kidney of low protein fed rats and has the potential to cause kidney failure.

AKASI, J.,¹ A.I. PETER,^{1,2} ¹Discipline of Clinical Anatomy, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, KwaZulu-Natal, South Africa, ²Department of Anatomy, Faculty of Basic Medical Science, University of Uyo, Akwa Ibom State, Nigeria. **Immuno-histochemical effects of sodium fluoride and vitamin-E co-administration on the cerebellum of Albino Wistar rats.**

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This study was designed to investigate the effects of sodium fluoride (NaF) and vitamin E co-administration on the histology and histochemistry of the cerebellar cortex of Wistar rats. Thirty albino Wistar rats weighing 120-180 g were randomly divided into six groups of five animals each and labelled A-F. Groups A and B served as the controls and were administered with 1 ml of distilled water and 1 ml of Tween 80 respectively, group C was administered with 5 mg/kg of NaF, group D 20 mg/kg body weight of NaF while groups E and F were administered with 5 mg/kg and 20 mg/kg body

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weight of NaF in addition to vitamin E at 14.3 mg/day orally respectively.

After 45 days histological cerebellum of groups C and D showed neurodegenerations, pyknosis and vacuolar spaces indicating excitotoxicity and oxidative stress with decrease expression to glial fibrillary acidic protein whereas groups E and F showed mild neurodegenerations and increase expression to glial fibrillary acidic protein compared with the control.

Sodium fluoride can alter the normal histology and immunohistochemistry of the cerebellum of Wistar rats through excitotoxicity and oxidative stress leading to neurodegenerations and decrease expression of glial fibrillary acidic protein whereas vitamin E has potency to ameliorate such changes.

BOTHA, D., A. BHAGWANDIN, N. LYNNERUP, M. STEYN. School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Histological age-at-death estimation in the South African black population: A re-assessment using 3D sampling methods.**

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Age-at-death estimation is difficult in adults. In this study, histological sections of the anterior femur were analysed for the estimation of age-at-death using stereology. The aim was to assess specific bone microstructures that change with progressing age and use these variables to create revised regression formulae applicable to the black population of South Africa.

A total of 99 bone sections (n=60 males and n=39 females) that had previously been analysed using 2D methods, were re-analysed using design-based

stereological methods (optical fractionator and nucleator). Single and multiple regression analyses were performed to assess the strength of the relationship between the known age of the individuals and all independent variables.

For sex-pooled data, the average number of osteons per grid area (Avg_OPD) showed the highest correlation with age ($r=0.528$; $r^2=0.278$), followed by average osteon volume (Avg_Ost_Vol; $r=-0.383$; $r^2=0.146$). The remaining variables reflected a low correlation with age. Pooled as well as sex-specific single regression formulae were constructed. Multiple regression formulae were constructed for pooled sexes only, as there were no significant difference between males and females overall. Although the employment of stereological methods ensured that the results were accurate and unbiased, the outcome was similar to previously reported SEE's and SD's for this population using a 2D approach.

The results reflected that much variation exists in the bone microstructure and intra-cortical remodelling of South African blacks, most likely influenced by lifestyle and socio-economic status.

DANGAREMBIZI, R.,^{1,2} S. NKOSI,¹ G.S. DLAMINI,¹ R. NDOU¹ ¹School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa, ²Department of Human Anatomy and Physiology, Division of Basic Medical Sciences, Faculty of Medicine, National University of Science and Technology, Bulawayo, Zimbabwe. **The Zucker Diabetic Sprague Dawley rat: A potential model for investigating mechanisms underlying the development of Type 2 Diabetic skeletopathy.**

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Type 2 Diabetes is associated with diabetic skeletopathy characterized by poor bone health, increased fractures and osteoporosis. Delineating the mechanisms underlying diabetic skeletopathy remains challenging due to the lack of an appropriate diabetic model that correctly mimics the clinical development of diabetes. We therefore designed a study to determine whether the Zucker Diabetic Sprague Dawley (ZSDS) rat could be a good model to characterize the mechanisms underlying the development of diabetic skeletopathy.

Twenty-four, 15-week old, male ZSDS rats were given a high fat diet for 13 weeks to induce diabetes mellitus. An equal number of normal Sprague Dawley rats were given normal rat chow and served as controls. The development of diabetes mellitus was determined by monitoring glucose handling through oral glucose tolerance tests, insulin levels, metabolic profiles (fasting glucose, triglycerides and cholesterol) and changes in body mass.

The ZSDS rats exhibited significantly greater fasting glucose levels (19.45 ± 5.36 mmol/L) than controls (6.53 ± 0.67 mmol/L). Additionally, the ZSDS rats had impaired blood glucose regulation as indicated by oral glucose tolerance tests (peak glucose level 28.14 ± 4.14 mmol/L; which remained elevated for more than two hours). Progressive weight loss occurred in the ZSDS rats from 22 weeks of age. Insulin resistance was observed as hyperinsulinemia which coincided with hyperglycemia.

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Sydney, New South Wales, Australia, ²Deans Unit, School of Computing, Engineering and Mathematics, New South Wales, Australia. **Students perceptions of 3D printed functional anatomical foot models: A thematic analysis.**

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Palpation skills in the clinical health sciences is an important skill based on the comprehensive knowledge of anatomy and its relevance to disease, pathomechanics, assessment and clinical reasoning. While commercially available static anatomical models exist for educational purposes, these models lack functionality, which could assist learners to further understand anatomical landmarks and movements that occur in the real world. Many newly developed resources are mostly found on digital devices, thus students learning palpation skills have to imagine what is being palpated. Therefore, we developed three identical and functional 3D printed foot models with different graded densities of transparent and opaque material. The objective of this project was to evaluate the effectiveness of these models (or this model) as a teaching tool in a clinical palpation skills workshop. Seventeen podiatry students participated in the project. Students rated their experience through a survey, indicating that the 3D model improved their clinical knowledge and palpation skills.

Three unique theme headings were identified: 1) comparison between models, 2) functionality of models, and 3) confidence in learning and translation to practice. An overarching student comment was “allows greater gain in understanding what you are feeling and allow(s) easy transition to real feet.”

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Overall the students thought that the 3D printed models were much better than the commercially available models, allowing greater functionality and palpability for translation into practice.

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¹Department of Anatomy, School of Medicine, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa, ²Department of Anatomy, School of Medicine, Sefako Makgatho Health Sciences University, Gauteng, South Africa, ³School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Aspects of facial features in a South African sample as applicable for facial approximations.**

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Identification of unknown individuals remains a challenge in the South African context. When it is not possible to identify the unknown individual with primary identifiers, forensic facial approximations (FA) are often used. The aim of this study was to evaluate existing guidelines on the nose, mouth and ears for FA on a sample of South Africans of African ancestry (SAA).

Forty-nine cadavers were dissected and evaluated for the relationship between the features of the anterior nasal spine and the shape of the nasal tip. Gerasimov's two-tangent method for determining the position of the nasal tip was performed on lateral view photographs of the dissected nose. Dental predictors of the width of the mouth and the philtrum were evaluated. Lastly, previously published formulae for the prediction of ear length were tested

and population specific formulae designed, taking sex and age into consideration.

A non-projecting nose with a bulbous tip was the most common finding, while no clear and consistent information on predicting nasal projection, as described by the two-tangent method of Gerasimov, existed. The cheilia corresponded to the canine/first-premolar junction, while the inter-canine width constituted 60% of the mouth width. The philtrum was mostly undefined and flat. A shorter ear than elsewhere predicted should be used, and the possible influence of sex and age should be taken into consideration when using population specific formulae.

With this study, possible limitations of the existing guidelines for approximating facial features in SAA were investigated and adaptations suggested.

ELS, K., K.A. KEET, C. WARTON. Division of Clinical Anatomy and Biological Anthropology, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Western Cape, South Africa. **A qualitative assessment of the sulci and gyri of the orbitofrontal cortex.**

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The orbitofrontal cortex (OFC) is the anterior part of the prefrontal cortex (PFC), and its vast connections with other neuroanatomical structures are involved in emotional and executive processing, goal-directed behaviour and decision-making. Research reports an association between lesions of the OFC and socioemotional withdraw and executive impairments.

The sulci and gyri of the OFC form an H-shaped pattern. There are three patterns described in the

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literature, with type I being the most common. The association between patterns and functionality of the OFC are of interest to researchers as type III appears to be more common in schizophrenia. The aim of the study was to document the sulci and gyri patterns of the OFC in the cadaveric collection of 2017 at the University of Cape Town.

The sulcal and gyral patterns of the OFC were studied in 43 formalin-fixed brains at the University of Cape Town. The frequency of each type was documented and any association between pattern type and sex was investigated.

Type III pattern was most frequently observed (36%), type II was present in 33% of brains, while type I was least frequently observed (31%). Statistical analysis revealed no association between sex and the pattern type in this sample.

Type III pattern, more common in schizophrenia, was the most observed pattern in this study. Due to the lack of medical history of the individuals studied, no association with neuropsychiatric disorders could be made. Further studies on living individuals are indicated.

GIBBON, V.E. Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Western Cape, South Africa. **History and composition of the archaeological and forensic skeletons in the human skeletal collection at the University of Cape Town.**

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The Division of Clinical Anatomy and Biological Anthropology at the University of Cape Town (UCT) houses the UCT Human Skeletal Collection. In this presentation, the archaeological and forensic aspects

of the collection will be showcased with focus on its composition and value for research. The biological anthropology staff and our forensic service provider, Forensic Anthropology Cape Town (FACT), is authorized to excavate or hold human remains uncovered during construction, erosion, an investigation, or any other activity. Subsequently, these remains can be accessioned into the collection for safe storage and used in teaching and research.

There are 674 boxes of skeletal remains in the UCT designated collection; 67% (454/674) are archaeological and 21% (144/674) are from forensic contexts. The bulk of the archaeological material was derived from controlled archaeological excavations; however, some are from accidental discoveries. Of these 32% (149/454) are from the Late Stone Age period, and 34% (158/454) from the historic period. The forensic material originated through FACT via unidentified/unclaimed remains under investigation by the South African Police Services or Forensic Pathology Services.

There is an increase in forensic material in the collection after 1981, which correlates with recognition of the value forensic anthropology adds to the forensic death investigation. This collection is important for teaching and research on African culture and heritage; the forensic cases provide engaged scholarship by addressing social and criminal justice, as well as provide internationally recognized training and unique opportunities for our students.

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KwaZulu-Natal, South Africa. **Morphometric evaluation of the adult orbit in a select South African population.**

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Morphometric dimensions of the human orbit play a significant role in the field of anthropology and craniofacial reconstructive surgery. Knowledge of standard orbital osteology prove advantageous as these dimensions allow for demographic differentiation of human remains as-well-as for the determination of the distance of vital soft tissue structures from the orbital rim in cases of orbital pathology and trauma. Therefore, this study aimed to document the morphometric dimensions of the adult orbit in a select South African population.

Bilateral morphometric examination was carried out on the orbit of 30 adult dry skulls (n=60), using a Mitutoyo digital Vernier calliper. Specimens were obtained from the osteological bank Clinical Anatomy, University of KwaZulu-Natal, South Africa. Any specimens displaying signs of trauma to the orbit, were consequently excluded from the study. Morphometric analysis included orbital breadth, height, index, inter-orbital and bi-orbital breadth.

Mean orbital height for the right and left sides was 39.74±2.47 mm and 39.71±3.05 mm, while the orbital breadth was 39.62±2.69 mm and 40.28±2.52 mm, respectively. Orbital breadth of the right compared to the left side showed statistical significance. The mean orbital index of the data series was 99.44 and therefore, categorized as megaseme. The mean bi-orbital and interorbital breadths was 99.02±4.25 mm and 24.64±3.69 mm, respectively.

The orbit osteological index of the South African population in this sample was found to be much larger than that reported in literature and displayed great variability from the norm. Consequently, it is imperative that orbital dimension standards be applicable to the geographic locality.

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The vertebral triangle is formed by the borders of the anterior scalene laterally, longus colli medially, and subclavian artery inferiorly. The vertebral artery forms the most prominent structure within this triangle, along with the cervical sympathetic chain and the lower roots of the brachial plexus. Other structures of less prominence, but equally important, include the inferior thyroid artery, the ascending cervical artery, and the vertebral vein. This study aims to quantitatively analyse the size, position, content and anatomical structures in relation to the vertebral triangle in a South African population.

Both the left and right vertebral triangles of 26 formalin-fixed cadavers were exposed and examined. Measurements included the triangle's width and height; determining the closest distance between C8 spinal nerve to the apex of the triangle; the distance of the vertebral artery from its origin to the anterior scalene muscle; as well as observing and noting the presence of the sympathetic ganglia, the

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C7 spinal nerve, the phrenic nerve and any other neurovascular structures that were encountered within the triangle. All variations of the commonly accepted anatomy were noted.

The mean height and width was found to be 31.5 mm and 18.8 mm respectively. The C7 spinal nerve and inferior sympathetic ganglia was present in more than 80% of the triangles studied.

Due to the numerous procedures in this area, understanding the vertebral triangle and the content is important and of great interest to neurosurgeons, in order to avoid these important neurovascular structures and prevent iatrogenic complications during surgery.

GOVENDER, S., A.N. VAN SCHOOR, Z.N. TSHABALALA, D, MOHR. Department of Anatomy, School of Medicine, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa. **Clinical analysis of the ultrasonic anatomy of the brachial plexus.**

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Supraclavicular nerve blocks are usually performed by using anatomical landmarks to approximate the exact position of the target nerve(s). Although this technique has been reported to be successful, anatomical variation does occur frequently, therefore increasing the risk of complications. Indications for this approach include surgery of the shoulder region and upper extremity. The aim of this study was to investigate the ultra-sonographic anatomy of the brachial plexus in the supraclavicular fossa when performing nerve blocks. The brachial plexus – and associated anatomical structures within the supraclavicular fossa – was bilaterally scanned on 60

student volunteers. From these scans the anatomy of the brachial plexus was studied. Various measurements such as the distance of surrounding structures to the brachial plexus and the skin to structure distances were taken.

Results showed that the average skin to brachial plexus depth was 0.89 cm. The minimum distance to the hypothetical injection site for left and right sides were 1.95 cm and 2.08 cm, respectively. Positive correlation was reported between independent demographic variables (sex, weight, height, hand dominance) and the measurement. The entire process was documented and a standard, step-by-step guide to performing ultrasound-guided supraclavicular brachial plexus blocks were developed.

In conclusion, ultrasound guidance in regional anesthesia is clinically beneficial for nerve localization, reducing the number of needle attempts and thus, decreasing failure rates. The step-by-step guide for the supraclavicular approach provides an accurate representation of the actual procedure and can be used for training or increasing confidence of anesthesiologists prior to the procedure.

HEMINGWAY, J. Human Variation and Identification Research Unit, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Patterns of integration in the human cranium and its implications for biological anthropology.**

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Studies of the human cranium often utilize multiple anatomical features, whether for uncovering extinct hominin phylogeny, or estimating population affinity

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and sex from remains in a forensic context. The problem with this approach is the potential non-independence of morphological characters. Strongly integrated characters, if not recognized as such, will bias results and disproportionately overinflate the similarity or dissimilarity between groups or individuals. The aim of this analysis was to assess the pattern of integration in the human cranium and identify potential semi-independent regions (modules).

Seventy-four 3D landmarks were digitized from 73 modern human crania, and triangular polygons were established between these landmarks based on anatomical adjacency. After superimposition and negating the effect of allometry, Escoufier's R_v coefficient was used to measure the strength and significance of the association among all pairs of polygons. Two novel techniques were applied to the coefficients. The first clustered the polygons using the coefficient as a measure of similarity. The second sought 'community structure' within a network constructed using the presence or absence of covariation between polygons.

In both analyses, the cranial vault, maxilla and palate each separated out clearly from the rest of the cranium. Much of the remaining facial skeleton and basicranium formed a single 'complex' using clustering, while the network analysis separated it into multiple independent units. Modularity of the cranial vault, maxilla and palate is supported by current knowledge of development and recent experimental studies, and thus these regions should be treated as semi-independent units during analyses utilising the cranium.

HENKE, Z.,¹ L. SAHD,¹ S. MATTHEE,² S.H. KOTZÉ.¹ ¹Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, Stellenbosch University, Western Cape, South Africa, ²Department of Conservation Ecology and Entomology, Faculty of AgriSciences, Stellenbosch University, Western Cape, South Africa. **The comparative morphology of the gastrointestinal tract of four African muroid rodent species.**

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The family Muridae includes a vast array of different rodent species. Of interest are four muroid rodent species found across southern Africa, all of which are reported to have an omnivorous diet consisting of plant, seed and insect material. This study aims to provide a detailed comparative morphological description of the gastrointestinal tract (GIT) including stomach content analysis of each species. Fixed GIT specimens (n=5 each) of wild caught *Rhabdomys dilectus* (Mesic four-striped grass mouse), *Rhabdomys pumilio* (Xeric four-striped grass mouse), *Aethomys chrysophilus* (Red rock rat) and *Lemniscomys rosalia* (Single-striped grass mouse) were weighed and measured. Histological sections of each GIT region were processed to wax, sectioned and stained with haematoxylin and eosin. Stomach content was analysed.

All species presented with similar GIT morphology, namely a uni-locular, hemi-glandular stomach which was confirmed histologically. A large, loosely spiralled cecum was present in all species. In both *Rhabdomys* species, a narrowing of the cecal apex and lymphoid tissue observed on histological examination, indicated the presence of a cecal appendix. A single short colonic loop which was

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further folded on itself and attached with a mesenteric fold was present in the proximal colon of all species. The colonic mucosal surface showed adaptations such as V-shaped and longitudinal folds similar to those previously reported in murid rodents. Unique transitional S-shaped folds were present in three species (*R. dilectus*, *R. pumilio* and *L. rosalia*) between the V-shaped and longitudinal folds. Hindgut specialization was consistent with herbivory, despite the stomach content analysis which indicated omnivorous behaviour.

JOUBERT, L.C., A. MEYER, N. BRIERS. School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Evaluation of the Suchey-Brooks and Enhanced Computational methods of pubic symphyseal age estimation in a white South African population.**

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Age-at-death estimation is particularly valuable when analysing unidentified human remains, as it could minimize a considerable number of potential matches. Two age estimation methods, the commonly used Suchey-Brooks method, as well as the newly introduced Enhanced Computational methods, were investigated. Differences exist between males and females, as well as between populations, necessitating further research to ascertain whether these methods are accurate within a white South African population.

The sample consisted of 184 os coxae from white South African individuals. These os coxae represented male (n=99) and female (n=85) individuals of ages ranging from 15 to 84 years.

Phase analysis was applied to the pubic symphysis of each individual. During phase analysis, the symphyseal surface of the pubis was assigned a phase in accordance with descriptions provided by Suchey-Brooks and with the aid of 24 pubic symphyseal casts. Each pubic symphysis was then scanned using an Artec Spider 3D scanner. The 3D scans were processed using Artec Studio 10, and were uploaded into the ForAge program to obtain several point estimates of age for each individual. Preliminary results indicate that the Suchey-Brooks method performed fairly well in a white South African population with moderate positive correlations and significant p-values compared to the Enhanced Computational methods. Despite the poor performance of the Enhanced Computational methods, observer error decreased significantly. Therefore, with the development of South African population-specific formulae, the use of the Enhanced Computational methods would prove advantageous as it effectively addresses the problem of subjectivity often seen with traditional phase-based methods.

KEET, K.A. Division of Clinical Anatomy and Biological Anthropology, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Western Cape, South Africa. **Plastinated specimens: Do Anatomy undergraduate students prefer them to wet specimens?**

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Plastinated specimens are being increasingly utilized as teaching tools in Anatomical laboratories across South Africa. Plastinates have several advantages

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over wet specimens, for example no exposure to toxic chemicals, a dry surface that allows handling without gloves, and perhaps the most distinctive difference, a lack of odour.

The opinions of Anatomy students in South Africa regarding plastinated specimens has not been investigated. This study aimed to survey first and second year Physiotherapy and Occupational Therapy students who were completing an Anatomy module that did not involve dissection.

A five-point Likert scale with specific statements relating to the physical appearance of wet specimens and plastinated specimens was administered to the two classes. Both classes had adequate exposure to both plastinated and wet specimens in Anatomy practical classes. The questionnaire also included statements concerning the students' opinions about the use of these two types of specimens. The survey was anonymous and ethics approval was obtained from the Human Research Ethics Committee.

Approximately half of the students in both classes had heard of specimen preservation by plastination (51%). The majority of the students found the odour of plastinates to be less strong than that of wet specimens (83%) and supported the use of them in Anatomy practicals (80%). There was also motivation for the continued use of wet specimens in teaching Anatomy.

Students prefer to learn Anatomy from both plastinated and wet specimens as each type of specimen has distinct advantages.

KEET, K.A. Division of Clinical Anatomy and Biological Anthropology, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Western Cape, South Africa. **The**

amount of shrinkage that occurs in brain specimens during the S10 plastination process.

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Shrinkage of anatomical specimens, particularly of brain tissue, is known to occur during the plastination process. Lowering the temperature gradually from room temperature to -20 degrees Celsius during the dehydration step has been reported to reduce the amount of shrinkage that occurs in brain specimens. Two human brains that were fixed in formalin were selected for the study. One brain served as the experiment and underwent gradual temperature reduction over a period of one month from room temperature acetone to -20 degrees Celsius acetone. The second brain served as a control and was moved directly from room temperature acetone into -20 degrees Celsius acetone on the same day. Measurements were taken of both brains at the start of the process, after acetone dehydration, after silicone impregnation and finally, after curing, to determine the total amount of shrinkage that occurred in each specimen.

Gradually lowering the temperature during dehydration reduced the amount of shrinkage as the experimental brain was visibly larger than the control brain. The experimental brain had an average shrinkage of 12%, while the control shrunk by an average of 36%. The cerebrum appeared to be more affected by shrinkage than the cerebellum.

Reducing the temperature gradually during acetone dehydration of the plastination process yielded a higher quality specimen with reduced shrinkage when compared to the control. During plastination of brain specimens, the temperature should be reduced gradually from room temperature to -20

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degrees Celsius to reduce the amount of shrinkage that occurs.

KEET, K.A., G. GUNSTON, R. DA SILVA. Division of Clinical Anatomy and Biological Anthropology, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Western Cape, South Africa. **Fifty years of aortic arch research.**

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Variation in the anatomy of the aortic arch has intrigued anatomists for centuries as it reflects deviation from the usual embryological development of the aortic arches. Arches form and regress according to a specific sequence of events, however any changes in the timing or position of arches or intersegmental arteries results in a variant pattern. A study undertaken in 1933 by De Garis *et al.* suggested that variation in the anatomy of the aortic arch may be population specific, thus this study aimed to investigate variation of the aortic arch in a South African population.

Over the last 50 years in the Department of Human Biology at the University of Cape Town, 692 aortic arches from embalmed human bodies have been dissected and examined for variation. The standard pattern was considered to be a left sided aortic arch giving rise to three branches, namely the brachiocephalic trunk, left common carotid artery and the left subclavian artery. Variant patterns were observed in 35% of the sample, the most prevalent being a common origin of the left common carotid artery and the left subclavian artery, followed by the direct origin of the left vertebral artery from the arch. Other rare variations were present, such as an

aberrant right subclavian artery originating from the arch distal to the left subclavian artery, and subsequently passing posterior to the esophagus to reach the right upper limb. This variation may cause dysphagia in patients.

Variant aortic arches were observed in more than a third of the South African sample, including rare patterns which may be symptomatic.

KEET, K.A.,¹ T. PENNEL,² J. SCHERMAN.²

¹Division of Clinical Anatomy and Biological Anthropology, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Western Cape, South Africa, ²Division of Cardiothoracic Surgery, Groote Schuur Hospital, Faculty of Health Sciences, University of Cape Town, Western Cape, South Africa. **The diameter of commonly used peripheral blood vessels for access in minimally invasive cardiac surgery.**

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Peripheral vascular access for cardiac surgery is increasingly relevant in the minimally invasive era. Transcatheter delivery for percutaneous valve implantations, as well as peripheral cannulation for minimal access cardiac surgery, are reliant on adequate calibre vessels to accommodate large cannulae. The femoral vessels are the delivery access vessels of choice, where diameter, tortuosity and elastic compliance are independent predictors of access success.

Current delivery systems have been developed based on information obtained from Western populations and there is little information available about the size of access vessels in an African context. The study aims to determine the diameter of blood vessels that

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are commonly used as a pathway in minimally invasive cardiac surgery.

The internal diameter of the femoral arteries, femoral veins, iliac arteries, and descending aorta were measured in 40 embalmed bodies and compared for significant differences between left and right sides and sex.

There were no statistically significant differences in any of the measurements between right and left sides (right and left femoral artery: 8.9 ± 1.7 mm vs 8.9 ± 1.8 mm; right and left external iliac artery: 8.9 ± 2.1 mm vs 8.2 ± 1.8 mm; right and left common iliac artery: 10.9 ± 2.6 mm vs 10.5 ± 2.1 mm). The femoral artery (9.5 ± 1.7 mm vs 8.2 ± 1.3 mm [$p=0.013$]), external iliac artery (9.2 ± 2.0 mm vs 7.6 ± 1.2 mm [$p=0.005$]) and femoral veins (14.2 ± 2.9 mm vs 12.1 ± 2.3 mm [$p=0.013$]) were statistically significantly larger in males than in females.

This study provides valuable information about the diameter of peripheral blood vessels in a South African cadaveric population that has clinical application for minimally invasive cardiac surgery.

KÖNIG, A.,¹ J. MYBURGH,¹ F. JOSEPH,² N. KEOUGH.¹ ¹Department of Anatomy, School of Medicine, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa, ²Department of Radiology, Steve Biko Academic Hospital, Gauteng, South Africa. **Bone mineral density of South African lumbar spines using Computed Tomography scans.**

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Bone mineral density (BMD) is a potentially population specific material property influencing Orthopedic surgery success. This study aimed to

determine BMD values of healthy/normal lumbar spines to further define and investigate possible population variation/s.

Thirty-four CT-scans from Steve Biko Academic Hospital (Pretoria) were used (320/2017). The sample comprised of sixteen females (8 black; 8 white) and eighteen males (11 black; 7 white). Lumbar vertebrae (L1-L5) were analysed at the cortical region, including the superior (SEP) and inferior endplates (IEP) and the anterior (AB) and posterior borders (PB) as well as the medullary region, including three regions of interest (ROIs).

Ranges (in Hounsfield units (HU)) were: Cortical region: black males, 420.14 – 670.91; white males, 420.36 – 654.43; black females, 394.13 – 511.81; white females, 398.65 – 640.25. Medullary region: black males, 209.95 – 237.75; white males, 192.74 – 235.29; black females, 192.00 – 222.08; white females, 180.68 – 210.68. No measurements correlated with age. At the endplates, L3 was the densest level for most individuals. IEP was denser than SEP at L4 and L5. PB was denser than AB for most individuals. Black female BMD surpassed white females at most locations. ROI2 was the lowest and ROI3 the highest for most measurements. At ROI2 and ROI3, black males showed higher BMD than white males. Males exhibited greater overall BMD values than females.

Overall, black individuals showed higher BMD values than white individuals, and males greater values than females. Awareness of differences in South African populations could aid in identifying vulnerable spines and allocating interventions suitable for specific patients.

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KOUAME, K.,¹ A.I. PETER,¹ E.A. AKANG,¹ U. OFFER,¹ R. MOODLEY, O.O. AZU.^{1,2} ¹Discipline of Clinical Anatomy, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, KwaZulu-Natal, South Africa, ²Department of Anatomy, School of Medicine, University of Namibia, Windhoek, Namibia. **Anti-diabetic activity of Cinnamon cassia silver nanoparticle in kidneys of Sprague-Dawley rats.**

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The aim of this study was to investigate the anti-diabetic activity of Cinnamomum-cassia Silver nanoparticles (CcAgNPS) and its effects on the histomorphology of the kidney of type 2 diabetic Sprague-Dawley rats.

Eighteen (18) Sprague-Dawley rats weighing 250 ± 20 g were induced with diabetes using Streptozotocin 60 mg/kg dissolved with citric buffer at a pH of 4.5 via I.P and divided into groups (A-C). Treatment lasted eight weeks via oral routing: group A was administered with normal saline, group B and C were administered with 5 mg/kg and 10 mg/kg of CcAgNPs, respectively. Body weight and blood glucose were measured. At the end of experiment, animals were sacrificed and kidneys were fixed in neutral buffer formalin and processed for light microscopy (H & E).

Body weight difference was significantly higher, and the kidney to body weight ratio was also significantly different after daily administration of (CcAgNPS) ($p < 0.05$). Fasting Blood Sugar (FBS) was significantly lower in groups B and C compared to control. Histology showed severe cellular perturbations. Tubules revealed vacuolization and loss of brush borders when compared with groups B

and C. Also, the renal levels of urea were significantly lower in groups (B-C), while creatinine was significantly lower in animals administered with 10 mg/kg CcAgNPs.

This study confirms the impact of diabetes on renal morphology and biochemistry with the potential of CcAgNPs to mitigate these derangements and act as anti-diabetic agent. However more studies are needed.

LAZARUS, L., C. SOOKOO. Department of Clinical Anatomy, School of Laboratory Medicine and Medical Science, College of Health Science, University of KwaZulu-Natal, KwaZulu-Natal, South Africa. **“Love at first cut”: The use of poetry in anatomy education.**

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Increasingly, medical and health science students are being encouraged to engage in written reflection as a means of handling their experiences, to achieve additional personal and clinical insight. Writing assists students to delve into perspectives other than the biophysical and helps them in deeper understanding. Textual formats such as poetry allows students access to language in the form of metaphors and symbolism, which is not applied in every day medical communication.

In this study, the complementary significance of literary activity in anatomy education is explored. First (n=62) and second (n=42) year Bachelor of Physiotherapy students were recruited to reflect on their cadaveric experiences; a total of 104 poems were written and analysed. Responses were recorded as individual categories as more than one type of response was recorded in one poem.

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Results were categorized accordingly into themes viz.: (i) positive emotion (102 responses); (ii) negative emotion (138 responses) and ambivalence (72 responses). Themes are further sub divided and will be elaborated upon during presentation.

This study is unique in that it was the first time that literature such as poetry was elicited from students in our setting. The use of poetry in medical education can increase empathic development in young health practitioners. Besides encouraging empathy, this type of reflection further develops cognitive and affective aspects of a student's personality. The integration of arts and humanities into medical curricula should be encouraged to train and mould holistic young minds, especially in a discipline such as anatomy where the "dead teach the living."

LOONAT, R., N. BRIERS. School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa.
Craniofacial superimposition in black South African females: The influence of the mandible.
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Craniofacial superimposition (CFS) is a technique used within the field of craniofacial identification. Discrepancies regarding the use of the mandible and the influence that it has on the process of CFS has been reported in literature. The aim of this study was to analyse the influence of the mandible on CFS in black South African females in a blind, retrospective study.

Computer tomography scans (CT) and photographs of ten individuals were retrospectively accessed. Superimpositions were conducted in three stages: Stage I involved conducting a superimposition using

the cranium only. Stage II involved conducting a superimposition using the whole skull. Stage III involved conducting a superimposition with only four facial landmarks and the entire morphological technique. The Fishers' Exact probability calculation was used to assess whether there was a significant difference between each stage.

There was no significant difference between the negative identification results obtained from any of the stages ($p > 0.05$). There was also no significant difference between the positive identification results between stage II and stage III ($p > 0.05$). There was a significant difference between the positive identification results obtained from stage I and II, and between stage I and III ($p < 0.05$).

In conclusion, the mandible had a significant influence on the CFS process with regards to positive identification. The cranium alone may not be used to conduct a CFS for the purpose of identification. However, the presence of the mandible and its landmarks made no difference with regards to exclusion.

LUCKRAJH, J.,¹ L. LAZARUS,¹ N. NAIDOO², C. RENNIE,¹ K.S. SATYAPAL.¹ ¹Department of Clinical Anatomy, School of Laboratory Medicine and Medical Science, College of Health Science, University of KwaZulu-Natal, KwaZulu-Natal, South Africa, ²Department of Basic Medical Sciences, College of Medicine, Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai Healthcare City, Dubai, United Arab Emirates. **An anatomical investigation of the dorsalis pedis artery.**
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The dorsalis pedis artery (DPA), a continuation of the anterior tibial artery, is the largest blood vessel distal to the ankle joint, running along the dorsum of the foot until the 1st intermetatarsal space. The DPA gives rise to five branches, viz. medial tarsal, lateral tarsal, arcuate, deep plantar and 1st dorsal metatarsal arteries. The aim of this study was to outline the course, origin, branching patterns and possible variations of the DPA.

Forty (left: 25; right: 15) cadaveric lower limb specimens were dissected (Ethical clearance number BE302/17). The origin, course and branching patterns of the artery were studied. These morphological parameters were further analysed with regard to laterality to determine if a correlation existed.

Although the DPA was present in 97.5% of cases, it followed the standard anatomical description in only 42.5% of cases. The DPA originated from the peroneal artery in 5% of cases. In 25% of cases, the DPA deviated laterally in its course. Variation in the branching pattern of the DPA, which was recorded in 50% of cases, was further classified according to Types 1 to 6. This study proposes a novel variation in branching pattern which has been termed Type 6, which displays a recurrent branch of the Type 5 variation.

DPA flaps have been employed extensively in reconstructive surgeries. Therefore, a thorough understanding of the anatomy of the DPA is of prime clinical importance.

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KwaZulu-Natal, South Africa, ²Department of Surgery, School of Clinical Medicine, College of Health Science, University of KwaZulu-Natal, KwaZulu-Natal, South Africa. **The anatomy of Rouviere's sulcus.**

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Despite advances in surgical techniques, injury to the common bile duct and blood vessels still occur when procedures such as laparoscopic cholecystectomy, partial hepatectomy and other hepatobiliary operations are performed. This is occasioned by difficulty in the identification of some landmarks that may guide the surgeons in locating the plane of the common bile duct. A common landmark used increasingly in recent reports is the Rouviere's sulcus (RS), which is defined as a naturally occurring cleft on the posterior surface of the liver, extending from the caudate process to the right lobe. This study aimed to describe the morphology of RS as well as provide measurements of the length, breadth and width of the sulcus.

A total of 75 formalin-fixed adult livers were dissected.

RS was present in 82.67% of cases. The morphology of the sulcus was classified into three types viz.: Type 1A (44%) describes RS as a deep sulcus that is continuous medially with the hilum of the liver; Type 1B (6.67%) describes RS as a deep sulcus that is fused medially. Type 2 (25.33%) was slit-like, superficial and narrow. Type 3 describes RS as a scar since it appears as a fused line. RS had an average length of 3.16cm, average breadth of 0.16cm and an average depth of 0.78cm.

RS has been identified as a significant extra biliary landmark for the accurate and safe execution of

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hepatobiliary surgeries. Therefore, a thorough understanding of the anatomy of RS is of vital importance to surgeons and hepatologists.

MAZENGENYA, P., A. BHAGWANDIN, A.O. IHUNWO, P.R. MANGER. School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Wide spread potential of adult neurogenesis in the brain of the Pied crow (*Corvus Albus*).**

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Studies of putative adult neurogenesis in non-mammalian vertebrates are not undertaken as regularly as in mammals. However, examining more species will enhance our understanding of the diversity and basic mechanisms underlying adult neurogenesis, its regulating factors, and its attributes. We examined adult neurogenesis throughout the brain of the pied crow (*Corvus albus*) using immunohistochemistry for, endogenous markers, proliferating cells and immature/migrating neurons. Qualitative analysis was performed on free floating sections of formalin fixed brains from two pied crows. Sections were immunohistochemically stained for the presence of proliferating cell nuclear antigen (PCNA) and doublecortin (DCX).

The distribution of PCNA and DCX labelled cells was widespread throughout the brain. The highest density of PCNA and DCX - immunoreactive cells was observed in the olfactory bulbs and the telencephalon, especially the song control nuclei. Proliferative hot spots, identified as dense areas of PCNA immunoreactivity, were identified in the dorsal and ventral poles of the rostral aspects of the lateral ventricles. Substantial numbers of PCNA

immunoreactive cells were observed in the diencephalon and brainstem, but DCX immunoreactivity was weaker in these regions, preferentially staining axons and dendrites, especially in the optic tectum. Interestingly, while PCNA immunoreactive cells were readily observed in the cerebellum, no DCX immunoreactivity was observed.

The distribution of putative proliferating cells and immature neurons in the brain of the pied crow appears to be widespread, far more so than in mammals, and suggests that brain plasticity and neuron turnover is an important aspect of normal neuronal processing in birds.

MBAJIORGU, E.F.,¹ A.P. OPUTE,² A.O. UDOKO,² I.P. OBOH.² ¹School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa, ²Department of Animal and Environmental Biology, Faculty of Life Sciences University of Benin, Edo City, Nigeria. **Effects of Atrazine on the cytoarchitecture of the testes in African catfish, *Clarias gariepinus* (Burchell, 1822).**

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Aquatic ecosystems are known to receive a wide spectrum of pollutants, introduced to it directly or indirectly. The herbicide atrazine, an endocrine disrupting chemical (EDC), frequently contaminates potable water supplies and aquatic ecosystems. Studies suggest that atrazine poisoning alters the neuroendocrine system along the hypothalamus-pituitary-gonadal axis.

This study investigated the effects of atrazine (40 µg/l, 60 µg/l, 80 µg/l, and 100 µg/l for 28 days of

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exposure) on testosterone (TST) and prolactin (PRL) activity in *Clarias gariepinus* juveniles; simultaneously noting any effects it had on the histological morphometry of the testes and seminiferous tubules, using standard procedures. TST and PRL concentrations significantly decreased in all the atrazine exposed groups. Histologically, testes showed vacuolations, disruption and sloughing of basal germinal epithelium. There was a high correlation between testicular biopsy score count and results of seminiferous tubular morphometry. This study confirms that atrazine disrupts cytoarchitectural components of the testes which may interfere with spermatogenesis.

MEIRING, K.O., T.M.R. HOULTON, N. BRIERS. School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Facial soft tissue thickness and facial recognition in black South African adults.** kmeiring51@gmail.com

Forensic facial approximation is used when conventional methods of identification provide insufficient results. The aims of this study were to supplement existing South African facial soft tissue thickness (FSTT) data and investigate the reliability of facial recognition tests.

Sixty computed tomography (CT) scans were obtained retrospectively from the Wits Donald Gordon Medical Centre (Johannesburg) after obtaining ethical clearance. On each scan, FSTTs were measured at ten midline and ten bilateral landmarks. South African sex-specific & pooled data, as well as FSTT from the C-Table repository (available through

CRANIOFACIALidentification.com) were utilized to perform several facial approximations using the Manchester method. Assessors were then asked to study the facial arrays and indicate which photographs of the 20 presented to them matched the facial approximations.

The FSTT sample consisted of 47 females (78.3%) and 13 males (21.7%).

A statistical significance between sexes for FSTT was found to only exist at the mid-zygomatic landmark (t-test; $p < 0.05$). White females with experience of anatomy and/or art displayed the highest success during the facial arrays and indicated that the bridge of the nose and breadth of the nostrils were the most telling signs. Furthermore, the female reconstructions were positively identified more often (70%) by all sub-categories of assessors.

This study is novel as it is the first to document FSTTs on lateral landmarks in a black South African male population unlike previous South African studies. The results of this study intend to uncover if sub-categorization of FSTTs influence the recognition rates in conjunction with ancestral and sex biases.

MEYER, A.,¹ A.E. VAN DER MERWE,² M. STEYN.¹ ¹Human Variation and Identification Research Unit, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa, ²Department of Medical Biology, Section Clinical Anatomy and Embryology, Academisch Medisch Centrum, University of Amsterdam, Netherlands. **Testing the accuracy of the Acsádi-Nemeskéri Complex Method on a Dutch archaeological skeletal**

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population from the Grote Kerk cemetery, Alkmaar.

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The Acsádi-Nemeskéri Complex Method is an easy to perform multifactorial method for assessing age from adult human skeletal remains. This method is still often used in European countries to determine age-at-death in archaeological and modern skeletonised human remains. However, it has been suggested to contain a bidirectional systematic error of constant over-aging of younger individuals and under-aging of older individuals. The aim of this study was to test the accuracy of the Acsádi-Nemeskéri Complex Method on a late 18th to early 19th century Dutch archaeological skeletal population with known ages-at-death.

The Complex Method relies on the macroscopic scoring of four skeletal regions: the endocranial sutures, pubic symphyses, and the internal structures of the proximal humerus and femur. Mean ages from all or a combination of the above mentioned skeletal regions were averaged to obtain a combined total point estimate of age.

Spearman's rank correlation coefficient indicated a moderate positive correlation between estimated and true ages ($r_s=0.68$). Overall, the method performed slightly better in females ($r_s=0.73$) compared to males ($r_s=0.62$). Inter- and intra-observer agreement ranged from good ($\kappa=0.65$) to very good ($\kappa=0.84$) suggesting that some prior experience is needed in accurately utilising this method.

Preliminary findings indicate that this method can be used in European archaeological populations, however, it constantly overestimated the age of

individuals younger than 50 and underestimated the age of individuals older than 60 by ± 10 years.

MOODLEY, M.C., C. RENNIE, L. LAZARUS. Department of Clinical Anatomy, School of Laboratory Medicine and Medical Science, College of Health Science, University of KwaZulu-Natal, KwaZulu-Natal, South Africa. The morphology and morphometry of the foramen magnum in age and sex determination in a South African black population, using Computerized Tomography scans.

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The foramen magnum contains vital neurological structures and is related to many cranial pathologies. It is also considered an ideal structure in identifying unknown individuals with regards to age and sex. This study aimed to investigate the morphometry and morphology of the foramen magnum in age and sex determination within the South African Black population, utilizing Computerized Tomography (CT) scans.

The sample studied included 150 CT images (93 males; 57 females) arranged into age cohorts (children 1-12, adolescents 13-17; adults 18-25). The antero-posterior diameter, transverse diameter and area of the foramen magnum were analysed in relation to age and sex. The morphological variations of the foramen magnum were also observed between males and females and within the age cohorts, using the SLICER 3-D software version 4.7.0.

The mean antero-posterior diameter, transverse diameter and area of the foramen magnum were significantly greater in males. These morphometric parameters also showed significant differences

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within different age cohorts. The observed varying shapes of the foramen were egg-shape, oval, round, irregular, heptagonal, hexagonal, tetragonal and pentagonal. The egg-shape was the most frequent shape in males and females. The egg-shape was most common in children and adolescents, whilst the hexagonal shape was most common in adults. A statistical significance was found between the morphology of foramen magnum and age but not in sex. The morphometric diameters and area of the foramen magnum showed significant differences in age and sex.

These results suggest that the foramen magnum may be useful in age and sex determination when other methods of identification are inconclusive.

MPOLOKENG, K.S.,¹ G.J. LOUW,¹ J.H. POTGIETER,² M.J. LABUSCHAGNE.³

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Identification of the orbital arterial vessels using stamp-pad ink on embalmed cadavers.

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Vessel identification is important in the analysis of the vascular system in cadaveric studies and vital to avoiding intraoperative complications. A number of vascular injection products have been utilized over the past decades to facilitate identification and dissection of blood vessels. The use of coloured dye to demonstrate the branching patterns of the vascular

system was introduced by Jean Riolan. Although different techniques are available, some are used prior to embalming and dissection while others are suitable for specimens during or after dissection.

A total of 118 human eyes from 59 bodies were dissected and all blood vessels were exposed. The ophthalmic artery (OA) and its branches were exposed. Dissections were performed on the orbital arterial supply with the aid of a lighted magnifying glass. After removing the fat tissue around the blood vessels, the arteries were then smoothly painted with red stamp pad ink using a paintbrush. Specimens were then allowed to dry at room temperature.

An accurate identification of the arterial system was possible as the arteries were followed intra-orbitally from the point where the OA usually emerged from the optic canal on course with the optic nerve. All variations in the branching pattern of the OA were identified and documented.

Knowledge and accuracy in identification of the vascular anatomical structures, variations in branching pattern and their relations are important in avoiding intraoperative complications. The application of dye is useful in the training of anatomy for both undergraduate and postgraduate students.

PETER, A.I.,^{1,2} E.C.S. NAIDU,¹ E. AKANG,³ U OFFOR,¹ OO OGEDENGBE,¹ M .Y ADANA,¹ S. RAMBHAROS,⁴ R. KALHAPURE,⁴ T. GOVENDER,⁴ O.O. AZU.^{1,5}, ¹Discipline of Clinical Anatomy, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, KwaZulu-Natal, South Africa, ²Department of Anatomy, Faculty of Basic Medical Science, University of Uyo, Akwa Ibom State, Nigeria, ³Department of Anatomy, Faculty of Basic Medical Sciences, University of

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Lagos, Lagos State, Nigeria, ⁴Discipline of Pharmaceutical Sciences, School of Health Sciences, University of KwaZulu-Natal, KwaZulu-Natal, South Africa, ⁵Department of Anatomy, School of Medicine, University of Namibia, Windhoek, Namibia. **Effect of administration of Tenofovir nanoparticles on the histomorphology and epidymal seminal parameters in Sprague Dawley rats.**

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Tenofovir Nano particles (TDF-N) has better penetration in combatting Human Immuno Deficiency. Our study was designed to address safety concerns of this drug.

Fifteen adult male Sprague-Dawley (SD) rats were divided into Control animals (A) administered with Normal Saline. Therapeutic doses of Tenofovir (TDF) and TDF-N were administered to treatment groups B and C respectively. At the end of 30 days animals were sacrificed and testis were removed for sperm analysis using WHO standard protocol. The tissues were fixed in fixative processed and stained using H/E, PAS stains. Serum was obtained for hormonal assay using ELISA. Cell count and seminiferous tubular area was obtained using ImageJ and Leica software 2.0.

We reported significant reduction in sperm count in the TDF-N animals with significant reduction in sperm motility and dead sperms in both TDF-N and TDF animals. There was an increase in sperm abnormalities in the TDF-N and TDF animals. Histology of TDF-N and TDF animals showed atrophy of germ cells, widening of tubular lumen and widening of interstitial spaces in H&E. PAS staining revealed reduction in the thickness of

basement in the TDF-N animals. There was no significant reduction in seminiferous tubular diameter and area, and no significant differences in weight, organo-somatic index and reproductive hormones when compared with the saline control ($P < 0.05$).

TDF and TDF-N administration led to reduction in sperm count, motility and altered seminiferous series.

PILLAY, D.S., R. NDOU. School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Effects of intrauterine alcohol exposure on three week old rat (Sprague Dawley) humerus growth plate: An immunohistochemical investigation.**

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In addition to neurological disorders, intrauterine alcohol exposure causes delayed bone growth and development as well as increased osteoporosis and fracture risk. Most studies emphasize the former, with a lack of literature on the implications on osseous tissue. This study aimed to investigate the effects of prenatal alcohol consumption on the proximal and distal end of the growth plate of the humerus in 3-week old rats.

Time-mated (n=15) pregnant Sprague Dawley dams were assigned to either the ethanol (n=6), saline control (n=6) or untreated control (n=3) group. The former two groups were treated with 0.015ml/g of 25.2% ethanol and 0.9% saline for the first 19 days of gestation respectively. The untreated group received no treatment. Once born, the pups remained with their dams for 21 days before termination. Two pups from each dam were used so that the ethanol

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(n=12), saline control group had 12 pups each while the untreated control had six pups. From the pups, left humeri were processed for routine histology and serial sections cut with a microtome at 5 µm thickness. These sections were stained with Haematoxylin and Eosin (H&E) for normal morphology and immunolabelled with anti-Ki-67 antibody for cell proliferation.

Prenatal alcohol exposure resulted in adverse effects on the growth plate in respect of its general size, zone sizes and the number of cells in each zone. Fewer proliferative cells were found using the anti-Ki67 antibody.

These results indicate that gestational alcohol exposure may lower bone structural quality by inhibiting epiphyseal plate chondrocyte number and slowing cell proliferation.

PILLAY, D.S., R. NDOU. School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa.
Microarchitecture of the three-week-old rat (Sprague Dawley) humerus following gestational alcohol treatment.

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Gestational alcohol exposure inhibits neurological, as well as, bone growth and development both in fetal and postnatal life. Stunted stature, osteoporosis and fractures in adult life are some of the adverse effects. While the impact of intrauterine alcohol on the brain has been extensively investigated, studies on the effects on bone are relatively few. Therefore, our study aimed to examine the impact of prenatal alcohol exposure on bone microarchitecture in three-

week-old rats using micro-focus computed tomography.

Time mated pregnant Sprague Dawley dams (15) were randomly placed into three groups; ethanol (n=6), saline control (n=6) and untreated control (n=3). The former two groups received treatment with 0.015 ml/g of 25.2% ethanol and 0.9% saline, respectively, for the first 19 days of gestation. The untreated group received no treatment. The pups remained with their dams until termination at 21 days of age. From each dam, two pups were collected resulting in; ethanol (n=12), saline controls (n=12) and untreated Controls (n=6). The humeri of the pups were dissected, wrapped in styrofoam, placed in plastic tubes and scanned using a 3D-µCT scanner (Nikon XTH 225L) at 15 µm resolution. Trabecular and cortical parameters were analysed using Volume Graphics Studio® software following reconstruction.

Preliminary results showed a decrease in trabecular size, spaces, thickness and volume. There was a decrease in cortical bone area in the ethanol group compared to the controls. These findings suggest that osteoporosis and fractures seen as gestational alcohol effects may be due to compromised trabecular structure and bone shaft morphology.

PINHEIRO, C.,¹ M.L. VENTER,¹ G. BRONNER,² S.H. KOTZÉ.¹ ¹Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, Stellenbosch University, Western Cape, South Africa, ²Department of Biological Sciences, Faculty of Science, University of Cape Town, Western Cape, South Africa. **The abdominal gastrointestinal tract morphology of seven golden mole species found in South Africa.**

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Golden moles belong to the order Afrosoricida with most species being indigenous to South Africa. Ten species are categorized as threatened by the World Conservation Union. These fossorial mammals feed mainly on invertebrates and arthropods, though ingestion of small amounts of plant material has been reported. This study aimed to provide a detailed morphometric analysis of their gastrointestinal tracts (GIT), including stomach and intestinal content analysis.

Fixed archived GITs of *Chrysochloris asiatica* (Cape golden mole) (n=10), *Chrysospalax trevelyani* (Giant golden mole) (n=3), *Neamblysomus julianae* (Juliana's golden mole) (n=6), *Amblysomus corriae* (Fynbos golden mole) (n=4), *Calcochloris obrusirostris* (Yellow golden mole) (n=6), *Chlorotalpa duthiae* (Duthie's golden mole) (n=5) and *Chlorotalpa sclateri* (Sclater's golden mole) (n=3), were weighed and measured. Histological samples were stained using haematoxylin and eosin and alcian blue/periodic acid Schiff to study microscopic structures and mucin cell distribution respectively.

All species presented with a simple GIT consisting of a wholly glandular stomach and combined small and large intestine due to the absence of a cecum. In the stomach, neutral mucin cells were found on the luminal surface and gastric pits, while both mixed acid and neutral mucins were found in the gastric glands. Mixed mucin secreting goblet cells were found throughout the intestinal tract.

Stomach and intestinal content analysis revealed insect exoskeleton material in all species, supporting evidence for an insectivorous diet. The simple GIT

morphology is consistent with a protein rich diet while the mucin cell distribution is indicative of the nature of the intestinal biofilm in insectivorous mammals.

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The periorbital nerve blocks based on pediatric anatomy.

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In the pediatric population, the supraorbital and supratrochlear nerve blocks are predominantly used for surgeries of the superior eyelid and forehead while the infraorbital nerve block is most commonly performed during cleft lip repairs. The supraorbital and supratrochlear as well as the infraorbital nerves are cutaneous terminal branches of the first and second divisions of the trigeminal nerve respectively. This study aimed to formulate a standardized method of blocking the periorbital nerves (supraorbital, supratrochlear and infraorbital) in the pediatric population, based on the investigation of pediatric anatomical specimens.

The supraorbital, supratrochlear and infraorbital nerves were dissected and exposed in 50 pediatric cadavers (41 neonates and 9 infants), while the periorbital bony landmarks were evaluated in 25 pediatric skulls (9 neonates and 16 infants) from the

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Department of Anatomy, University of Pretoria. Measurements between the nerves, soft tissue- and bony landmarks were obtained.

After measurements and observations were taken from the osteological and cadaveric specimens, the supraorbital notch / foramen can be palpated 13 mm from the midline for the neonates, and 16 mm for the infants, on the supraorbital rim. The supratrochlear nerve can be located 5-6 mm medial to the supraorbital neurovascular bundle. The infraorbital nerve is

located on the same vertical plane as the supraorbital nerve and 3 mm inferior to the inferior orbital rim, for both the neonates and infants.

The study hopes to assist practising anesthesiologists and clinicians to successfully block the periorbital nerves in the pediatric population, based on the evaluation of applicable pediatric anatomical specimens.

SHAULI, M.M., K.D. MADIKIZELA, E.J. NDEBIA. Department of Anatomy, Embryology and Histology, School of Medicine, Walter Sisulu University, Mthatha, South Africa. **Oleanolic Acid effects on induced Gastro-Oesophageal Reflux Disease (GORD) in rats.**

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Gastro-oesophageal reflux disease (GORD) is a spectrum of disease which could be best defined as the symptoms of esophageal injury, secondary to the reflux of gastric contents into the esophagus, into the oral cavity and even the upper conducting region of the respiratory passages. This is a result of compromised function of the lower esophageal sphincter. Oleanolic acid (OA) is a plant derived

triterpenoid, natural compound found in many plants, fruits and herbs. It has shown various biological activities to include anti-inflammatory, anti-oxidant and anti-tumour. The objective of the study was to induce GORD in rats through oral administration of glacial acetic acid and to investigate the effect of OA on all treated animals.

GORD was induced in Wistar rats by daily oral administration with 25% glacial acetic acid and OA was orally administered at the concentration of 20 mg/kg.b.wt and 40 mg/kg.b.wt respectively for 30 days. The positive control received only the glacial acetic acid and the negative control received only normal saline. After the treatment period, all animals were sacrificed, the esophagus harvested and subjected to histological processing.

We observed complete detachment of keratinization in positive controls accompanied by thinning of the mucosa layer and regeneration of the barrier, as well as, the epithelium in OA-treated animals at both concentrations.

OA did show protective properties in all treated animals, with evident findings coinciding well with other studies that documents on the biological properties of the triterpenoid.

SHEIK ABDUL, R., L. LAZARUS, C. RENNIE, K.S. STAYAPAL. Department of Clinical Anatomy, School of Laboratory Medicine and Medical Science, College of Health Science, University of KwaZulu-Natal, KwaZulu-Natal, South Africa. **The foramen transversarium of typical and atypical cervical vertebrae: Morphology and morphometry.**

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The seven cervical vertebrae found in the human body are classified into typical and atypical. Their transverse processes contain foramina transversaria (FT) and traditionally there is one present on each side, of similar size. However, variations of this foramen have been documented in previous literature.

The current morphological and morphometric study was conducted on 126 cervical vertebrae (82 typical and 42 atypical) obtained from the osteological bank at the University of KwaZulu-Natal to produce a database which may serve as a useful guideline to medical personnel. The variables tested were shape of main FT, number, laterality, position of accessory FT, size appearance, and anteroposterior and transverse diameters.

There were many variations observed with regards to shape, number of FT, laterality and position, which have not previously been reported. The most types of variations were evident in the typical cervical vertebrae, then secondly, the seventh cervical vertebrae. The axis vertebrae did not display any variations. The most common shape found in the typical cervical vertebrae was round FT on both the left and right sides (34.15% and 32.93%, respectively).

When the shape of the right and left FT, as well as the position of the accessory FT, were analysed to the type of cervical vertebrae (typical and atypical), a p-value of <0.001 was obtained in both cases. There were also strong significance observed between shape (morphology) of main FT and the anteroposterior and transverse diameters (morphometry) (p=0.001).

SITHOLE, G.N., G. ROODE. Department of Anatomy, School of Medicine, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa. **Orbital floor morphology of a black South African population.**

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Orbital floor trauma, often needs corrective surgery for enophthalmos and releasing of entrapped extrinsic ocular muscles. Orbital floor mesh and preformed plates, are widely used for these procedures. The detailed morphology of the orbit is vital in repairing orbital floor damage. Previous studies have demonstrated differences between Turkish and Asian populations. Therefore, this study aimed to establish the degree of variation between male and female skulls of Black South Africans.

Twenty (10 male, 10 female) 3D CT scans of a Black South African population, were accessed from the Department of Anatomy at UP. Both left and right orbits were examined. Scans with damaged or fractured orbital floors, inferior orbital fissures and anatomical abnormalities were excluded. All measurements were taken with the Frankfurt Horizontal plane as a reference level. Point A was marked on the infraorbital rim at the maxilla-zygomatic fissure with points C&D marked 15 mm lateral and medial to point A. Lines from all three points were extrapolated posteriorly to form a converging point B at the start of the inferior orbital fissure and marked as left / right orbit. Lengths were measured and compared.

Male: LAB (34.05), LCB (33.87), LDB (34.88), RAB (33.63), RCB (34.22), RDB (34.31). Female: LAB (32.96), LCB (34.05), LDB (34.19), RAB (32.77), RCB (33.69), RDB (34.33). No significant

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differences observed between male and female, though comparing to the Turkish study, differences were demonstrated.

Existing plates may therefore not be suitable for different population groups.

SMALL, C., N. SCHEPARTZ, J. HEMMINGWAY. School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Three-dimensionally derived interlandmark distances for sex estimation in intact and fragmentary crania.**

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The skull is the element forensic anthropologists receive most often yet weathering, corpse maiming, and scavenger activity often result in damage and fragmentation. This fragmentation reduces the number of traditional calliper derived measurements that are obtainable for discriminant based sex estimation.

Forty-five homologous landmarks were digitized across 227 white South African crania sampled from the Raymond A. Dart Collection of Human Skeletons, housed at the University of the Witwatersrand. Three-dimensional geometric morphometrics was used to derive novel interlandmark distances across six regions of the cranium including the basicranium, basipalate, zygoma, orbits and the cranium globally to create functions to discriminate sex with high efficacy.

A total of 990 interlandmark distances (ILDs) were derived and filtered by region. Discriminant equations were derived for each region and achieved the following average sex estimation accuracies: basicranium- 74%; basipalate- 80.2%;

zygomatic- 82.4; orbits- 71.8%; nasomaxilla- 83.7%; global cranium- 88.2%.

Numerous ILDs used to derive the functions in this analysis are novel, demonstrating the efficacy of geometric morphometric methods and illustrating the need to re-assess previously described techniques. The results of this study provide an invaluable contribution to forensic anthropology in South Africa as it provides an accurate, practical means of assessing sex using fragmentary material that may otherwise have been disregarded.

SOOKOO, C., L. LAZARUS. Department of Clinical Anatomy, School of Laboratory Medicine and Medical Science, Faculty of Health Science, University of KwaZulu-Natal, KwaZulu-Natal, South Africa, **Negative Marking: The University of KwaZulu-Natal experience.**

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Due to the increase in the number of students per class at tertiary institutions and subsequent staffing numbers either remaining the same or being reduced, universities are currently experiencing dire administrative challenges. Hence, the type of assessments have shifted from essay and short answer questions to true/false and multiple choice questions. To avoid obvious guessing, negative marking (NM) was implemented to ensure that students study to attain a deeper understanding of the course content. NM alone does not deter the student from guessing; it is the number of questions together with the value of the negative mark that influences a student's decision making process. Therefore, a student's knowledge of the course content is controversial.

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A questionnaire was administered to students in the Discipline of Clinical Anatomy, UKZN. The value of NM to be deducted was 0.25 for each incorrect four option choice question and 0.5 for incorrect true/false questions. A zero mark was received for omitted answers. Questions covered student views on the administration of NM to their personal feelings when answering such type of questions.

Most students seem to be aware of questions that NM was applied to and the value of the negative mark. However, they were unhappy with the value of NM or not comfortable with NM itself, feeling nervous and agreeing to possibly forgetting information due to the stress of NM. It was apparent from their responses that they have a collective view on the NM process. NM was removed from assessments at UKZN following international trends.

SPIES, M.J., V.E. GIBBON, D.A.FINAUGHTY. Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Western Cape, South Africa. **Local skeletal scatter research assists in forensic investigation.**

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Vertebrate scavenging can significantly alter decomposition rate and cause skeletal scatter, hindering forensic recovery and identification. Patterns of scavenging and scattering are specific to different environments, with no known forensic data for South Africa. Improved understanding of these patterns can facilitate full-body recovery and aid identification.

Three small domestic pig (*Sus scrofa domesticus*) carcasses were used as analogues for sub-adult human decomposition in Delft, Cape Town, and observed by motion-activated photography to record

scavenging activity. This area of Cape Town is forensically significant, suffering from a high murder rate, poor socio-economic conditions and a dense population. A control pig was caged to prevent vertebrate but not insect access; the other two pigs were in the open, and scavenged by the Cape grey mongoose (*Galerella pulverulenta*). Scatter was recorded by measuring the distance and direction of skeletal elements from the center of each deposition site.

The experimental pigs showed notable patterns of scattering into dense undergrowth, a previously unobserved behaviour. This research has proven to be useful in forensic casework conducted by Forensic Anthropology Cape Town (FACT). The mongoose scavenging behaviour was confirmed during a forensic case, where the hands of an individual were scavenged and missing, but found ~5 m from the body, along with the watch, under dense bush.

The results from this study provided baseline scatter data for smaller components of an adult human skeleton and an improved understanding of locally relevant scatter patterns, resulting in better search methods for improved skeletal recovery in forensic case work.

UDOH, U.G., ¹ A.L. PETER.^{1,2} ¹Department of Anatomy, Faculty of Basic Medical Science, University of Uyo, Akwa Ibom State, Nigeria, ²Discipline of Clinical Anatomy, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, KwaZulu-Natal, South Africa. **The effects of co-administration of *Azadirachta indica* and *Gongronema latifolium* on the liver of *Plasmodium beigei* infected Swiss albino mice.**

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The effects of co-administration of *Azadirachta indica* and *Gongronema latifolium* on the liver of *Plasmodium beighei* infected Swiss albino mice was evaluated.

Thirty mice divided into six groups of five animals each were used. Healthy control group (A) was not infected with *P. beighei* and received distil water. Other groups were infected by intraperitoneal injection of *Plasmodium beighei*. Once parasitaemia was confirmed, animals were divided into: Group B was not given any extracts. Groups C was administered with *G.latifolium* extract at 500 mg/kg body weight. Groups D was administered with *A. indica* extract at 500 mg/kg body weight. Group E was administered with both extracts at 500 mg/kg each. Group F received Artemether at 1.6 mg/kg body. The extracts were administered orally for five days. The animals were sacrificed and blood was obtained for serum liver enzymes estimation. The liver was processed and stain using H and E histology of the liver showed sinusoidal congestion and hepatocyte necrosis in the diseased control and steatosis, loss of normal sinusoidal architecture, necrosis of hepatocytes and portal tract inflammation in the *Plasmodium beighei* and *A. indica* only group. The groups administered *G. latifolium*, both singly and in combination with *A.indica* had normal liver histology. The liver enzyme ALT was significantly ($p<0.05$) raised in *A. indica* treated group while it was normal in the *G. latifolium* groups. It will thus appear that *G. latifolium* ameliorated the hepatotoxicity of *Plasmodium beighei* while *A. indica* worsened the liver damage in *P. beighei* infected mice.

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¹Department of Oral Pathology and Oral Biology, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa, ²Department of Insurance and Actuarial Science, Faculty of Natural and Agricultural Sciences, University of Pretoria, Gauteng, South Africa, ³Human Variation and Identification Research Unit, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Age estimation in a South African population based on vertebral ring apophysis ossification using cephalometric radiographs.**

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Ossification of the anterior vertebral-ring apophysis of the cervical vertebrae can play an important role in age estimation in living individuals. These regions are easily visible on standard cephalograms and do not require additional radiography. The aim of this study was to decide whether a person is legally an adult, that is, the probability of an individual being younger/older than 18 years, based on cervical vertebrae development.

This study was designed to assess the development of the anterior ring apophysis associated with the inferior margins of C2, C3 and C4.

Retrospective cephalometric radiographs of Black and White individuals living in South Africa aged 15 to 23 were used. A newly developed four-stage classification with set criteria was used. The ossification stage for each individual was determined and scored according to these criteria. The probability of having reached a specific age between 15 and 23 years, at a given stage, was determined for

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each population and sex. This included a 95% confidence interval.

Preliminary results indicate that Stage 1 ossification starts at age 15, and that ossification is complete in all individuals by age 20.

This method shows considerable promise in age estimation of the living, especially if used in conjunction with third molar development.

VAN TONDER, D.J.,¹ A.N. VAN SCHOOR,¹ M.L. VAN NIEKERK.² ¹Department of Anatomy, School of Medicine, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa., ²Department of Paediatric Surgery, School of Medicine, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa. **The position of the common facial vein in neonates for the use of placing a central venous catheter.**

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Central venous catheterisation is widely used in neonatal intensive care units to provide venous access as difficulty attaining venous access has been identified as the main limitation to providing nutritional support in neonates. Thus, there is a need for essential knowledge about the venous system, and related structures when a venous catheter (central or peripheral) is inserted. The aim of the study was to determine the location of the common facial vein in neonates.

The neck region of both the left and right sides of a sample of 20 neonatal cadavers were dissected. The skin of the neck was reflected laterally, platysma muscle reflected superiorly, and the structures of importance were pinned, cleaned and measured

using a mechanical dial caliper (accuracy of 0.01 mm).

It was found that the common facial vein lies inferior to the upper one third and just superior to half of the length of the sternocleidomastoid, indicating a possible “safe-zone” where a skin incision could be made over the anteromedial border of sternocleidomastoid without injuring the marginal mandibular branch of facial nerve.

From the results, considering the average length 9.05 mm ± 1.36 mm and diameter 1.60 mm ± 0.19 mm of the common facial vein, and with sound knowledge of the anatomy of the area, the common facial vein could be used as an alternative for central venous catheter insertion.

VORSTER, C. Department of Basic Medical Sciences, School of Biomedical Sciences, Faculty of Health Sciences, University of the Free State, Free State, South Africa. **Controversy regarding Da Vince’s gut feeling.**

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“The mesentery” is described by Gray’s Anatomy for students (Third Edition)as a large fan-shaped, double layered fold of peritoneum that connects the jejunum and ileum to the posterior abdominal wall. No reference is made to mesocolons on the right and left side. The transverse- and sigmoid mesocolon each are described as separate structures. In an article published by J.C. Coffey and D.P. O’Leary in May 2017, they describe the mesentery and the different mesocolons as a single continuous structure. Our aim was to compare the anatomy of the right mesocolons of 28 formalin-fixed cadavers, with the recent findings of Coffey and O’Leary by determining 1)

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The presence of a right mesocolon and 2) Whether there is a high incidence of right sided mesenteric lymphadenopathy.

Cadavers were inspected to note whether a right mesocolon is present and any mesenteric lymphadenopathy was noted.

Right sided mesocolons were observed in 23 cadavers and right-sided lymphadenopathy were observed in the mesenteries of four cadavers.

Our findings in 23 cadavers correlates with the findings of Coffey and O’Leary. Continuity between the small intestinal and right mesocolic mesenteries will contribute to the explanation of the significant amount of lymphatic tissue found at the ileocecal level. This may correlate with the development of right-sided pain in mesenteric adenitis, worse outcomes with right-sided colon cancer as well as the improved outcome in Crohn’s disease, if the mesentery is removed with the bowel during surgery for this disease.

WESSELS, Q., A.M. DU PLESSIS, D. BOUMAN, A. DU PLESSIS. Department of Anatomy, School of Medicine, University of Namibia, Windhoek, Namibia. **Learning from students’ reflections: Perspectives from a first year anatomy course.**

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The value of reflective assignments in assessment and promoting experiential and self-directed learning has been established. However, the value of students’ reflection in enlightening the educator, needs further exploring as we gathered from this assignment given to our first year, anatomy B.Pharm students.

The aim of the primary intervention was to survey students’ reflections on the challenges they face on

entering Namibian tertiary education. The study also tried to elicit students’ awareness of possible limitations in their learning approaches, through reflection. The reflective assignments (n=67) were thematically analysed in order to identify emerging themes.

The information gathered from our primary study led to an in depth evaluation of departmental and faculty practices. Results from the study indicate that the majority of students (n=59) found the first semester daunting which reflected through their description of the semester thus far e.g. “overwhelming”, “stressful” and “long hours”. Furthermore the results indicate that students struggled with academic workload (n=25) and their approach to anatomy; reflected in students’ poor use of provided resources (n=38).

Students require guidance on how to navigate the learner guides and recommended resources. Thematic content review of students’ comments revealed that they are ill-prepared for tertiary education and failed by the secondary schooling system. The findings from this study emphasizes the value of student-centered reflective practices as a resource to aid both students and academic staff at the early stages of an academic program.

WUCHERPFENNIG, K., V. GIBBON. Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Western Cape, South Africa. **Analyses of dental wear in urban and rural people living in 18-19th century Cape Town.**

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Analysing dental wear provides information about past populations, their dietary behaviour, food preparation techniques and cultural practices.

Teeth of individuals from four 18-19th century historic cemeteries in Green Point (n=42) and the Polyoak cemetery (n=13) in Diep River were used in the study. In the past, Diep River was far from the city center and a farming area, whereas downtown Green Point was right in the hub of the city port of Cape Town, thus representing an urban environment. The wear quantity and direction were scored using the Brabant index. Age and sex were estimated using dental development and cranial suture closure.

Dental wear patterns were different between the two sites. For wear quantity, Polyoak individuals showed less wear, which is interesting as the Green Point individuals were younger. This suggests a more abrasive dental environment for people living Green Point, possibly the result of consumption of fish with sand and grit as they lived by the coast. Within Polyoak, higher wear was found in males, however this reflects an age bias in the sample. In Green Point, higher levels of wear were recorded in males, and suggest a difference in diet between males and females. Wear direction patterns were different between the sites and among sexes, with females having dominant no wear and horizontal and plane wear, with males showing more oblique and plane and horizontal and concave. In Polyoak, this may reflect an age bias as the females were mostly younger adults and males were mostly old adults. These differences are explored and interestingly pipe wear facets were found in four individuals of Green Point burials.

XULU, K.,¹ R. DUARTE,² T. AUGUSTINE.¹

¹School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa, ²Department of Internal Medicine, School of Clinical Medicine, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Cell death in breast cancer cells following treatment with hormone therapy and antiplatelet therapy at different concentrations.**

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Cell death occurs by various mechanisms. Apoptosis is a programmed cell death mechanism whereby cells undergo molecular and physical changes which eventually lead to their demise. Necrosis, commonly regarded as a form of non-programmed cell death, is associated with inflammation; this may also promote tumour cell survival. The aim of this study was to investigate whether a hormone therapy drug, anastrozole; and antiplatelet therapy drugs; aspirin, clopidogrel and atropaxar, at a range of Cmax concentrations, induce cell death through apoptosis or necrosis in hormone-dependent breast cancer cells. Thromboembolic disorders are prevalent in cancer patients; therefore, antiplatelet therapy and hormone therapy may impact cell death or cell survival.

MCF7 and T47D cells were cultured under standard procedures then treated for 24 hours with increasing doses of anastrozole and/or antiplatelet drugs (Clopidogrel/ Atopaxar /Aspirin) based on their Cmax concentration. Cell morphology was investigated using a scanning electron microscope following fixation, dehydration and coating. Annexin-v apoptosis assays are underway to determine the amount of cells undergoing early and

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late stage apoptosis and necrosis. Data will be captured using the LSR Fortessa flow cytometer. For morphological assessment a scoring analysis was developed.

Distinct differences were seen between the treatment groups with respect to blebbing, microvilli shape and density, amount and integrity of cell contacts and cell shape. The majority of the morphological features reflect the presence of stressful stimuli within the cellular environment. Semi-quantitative statistical analysis will clarify whether the morphological changes are associated with apoptosis or necrosis.

ZAW, A.K.,¹ U. OFFOR,¹ E.C.S. NAIDOO,¹ O.O. AZU.² ¹Discipline of Clinical Anatomy, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, KwaZulu-Natal, South Africa, ²Department of Anatomy, School of Medicine, University of Namibia, Windhoek, Namibia.
Morphometric analysis of foramen transversarium variation in cervical vertebrae in KwaZulu-Natal, South Africa.

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Cervical vertebrae are recognized by the presence of foramen transversarium (FT), which is crossed by the vertebral artery, vein and sympathetic fibers. The objective of this study was to observe anatomical variations in the FT, as anatomical knowledge of these variations are helpful for surgeons to prevent injuries to vertebral vessels and sympathetic nerves while operating cervical spines.

Hundred-and-four typical cervical vertebrae were analysed macroscopically. The diameter and presence of the FT, as well as the presence of an accessory FT (AFT) were documented.

All cervical vertebrae presented with an FT, with a mean diameter of 7.24 mm x 6.31 mm on the right and 7.38 mm x 6.31 mm on the left. AFT were found in 37 vertebrae (35.58%), were unilateral in 18 vertebrae (17.31%) and bilateral in 19 vertebrae (18.27%). The AFT observed were either bilateral complete 4 (3.85%), incomplete 8 (7.69%) unilateral complete 7 (6.73%) or unilateral incomplete 11 (10.58%). Seven (6.73%) vertebrae showed the presence of complete AFT on one side and incomplete AFT on other side in the same vertebra. Bilateral FT were more common than unilateral one. Left and right occurrences of unilateral AFT were similar in our study. The AFT were smaller and more posteriorly placed compared to the regular FT. Knowledge of the variations of the presence of an AFT in typical cervical vertebrae is not only important to anatomists, but also to radiologists in identifying the presence of duplicate vertebral arteries, hence helping neurosurgeons in preventing accidental bleeding from the vertebral artery while performing surgeries on the cervical spines.