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(ABSTRACTS)

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(ABSTRACTS)

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XXIX CONGRESS OF THE SPANISH ANATOMICAL SOCIETY (ABSTRACTS)

CASTELLÓ DE LA PLANA, 15-17 SEPTEMBER, 2021

European Journal of Anatomy

Volume 26 - Supplement 1 June 2022

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XXIX CONGRESS OF THE SPANISH ANATOMICAL SOCIETY

PRESENTATION

After one year of delay because of the pandemic situation, we meet again in the XXIX Congress of the Spanish Anatomical Society between September 15 and 17 of the current year. We have had, once again, the opportunity to meet, to discuss and to contrast all those aspects that concern us as scientific anatomists and instructors. It will, finally, be an opportunity to afford ourselves with tools with which to face the challenges that society demands of us.

Our objective was to guide the debate in 3 senses, an anatomical investigation that generates basic knowledge in biomedicine, an anatomical teaching that solidly establishes the specific knowledge of each professional in the health sciences and, finally, our own anatomical training that provides the elements necessary to address the two previous objectives.

The scientific sessions contained four plenary readings that provide some of the relevant challenges of anatomical research. Oral sessions and posters were scheduled in the major blocks of Development, Neuroanatomy, Locomotor System, Splanchnology, Physical Anthropology and Clinical Anatomy. These sessions allowed us to know our own lines of work and to establish the necessary interactions for their progress.

Special attention has been paid to the educational aspect that included the dissection room as the fundamental axis of our activity. The adaptation of curricula to the European Higher Education Area is posing a major challenge for the modernization of our discipline, which, however, already had a high practical component that, in this context, has been systematized. The ethical aspects constitute an essential element that implies a deep discussion. In the same way, anatomy is a basic element in the updating processes of medical and health science professionals with the incorporation of new techniques that involve practical and simulation tests. Finally, the technical aspects of handling and management of the dissection room has been incorporated into the analysis.

In addition to the scientific and teaching sessions, this congress has held 3 round tables on the three lines of work already carried out, research, teaching and training. In these round tables it was intended to expose and discuss specific aspects of these lines of work with academic authorities, managers, and other agents of our activity.

Teresa Vázquez Osorio
President of the Spanish Anatomical Society, SAE

Francisco E. Olucha Bordonau
President of the XXIX Congress of the SAE

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David Fernández Moreno

SCIENTIFIC PROGRAM OF THE XXIX CONGRESS OF THE "SOCIEDAD ANATÓMICA ESPAÑOLA"

Castellón, September 15-17, 2021

Wednesday, September 15, 2021

8,30:	Registration and documents delivery
9,00-9,30:	Plenary welcome
9,30-11,30:	Oral session. Topic: Neuroanatomy and development
11,30-12,00:	Coffee break
12,00-12,30:	Poster session. Topic: Neuroanatomy and development
12,30-13,15:	Plenary lecture. PLN-1. *Analgesic effects of the relaxin family peptides in a mouse model of inflammatory pain. Marc Landry Université de Bordeaux, France*
14,00:	Social program

Thursday, September 16, 2021

9,00-11,00:	Oral session. Topic: Teaching and locomotor system
11,00-11,30:	Coffee break
11,30-12,00:	Poster session. Topic: Teaching, viscera and locomotor system
12,00-12,45:	Plenary lecture. PLN-2. *The thalamus that speaks to the cortex: spontaneous activity in the developing brain.* Guillermina López-Bendito. Instituto de Neurociencias de Alicante. CSIC. Universidad Miguel Hernández, Elche, Spain
14,00-15,30:	Lunch
15,30-16,00:	Plenary lecture. PLN-3. *Anatomic underpinnings of lung surgery.* Sara Castillo-Acosta. Servicio de Cirugía Torácica, Hospital Universitario de Gran Canaria Doctor Negrín, Las Palmas de Gran Canaria, Spain
16,00-17,00:	Round table. *The anatomic research in Europe's horizon. Challenges, burdens and financing.*
17,00-17,30:	Coffee break
17,30-18,30:	Round table. *Teaching anatomy in the context of an integrated learning: A new concept with advantages and risks.*

Friday, September 17 2021

9,00-9,45:	Plenary lecture. PLN-4. An incontinence and intestinal failure surgeon's view of anatomy of the abdomen and pelvis. Carolynne Vaizey. St Mark's the National Bowel Hospital London
09,45-10,15:	Poster session. Topic: Clinic Anatomy and Physical Anthropology
10,15-10,45:	Coffee break
10,45-12,45:	Oral session. Topic: Clinic Anatomy and Physical Anthropology
12,45-13,30:	Plenary lecture. PLN-5. *The development of the fingers.* Juan A Montero y Juan Hurlé. Universidad de Cantabria, Spain
13,30-15,00:	Lunch
15,00-16,00:	Round table. *Scientific and teaching career in Anatomy.*
16,00:	General SAE assembly.

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SCIENTIFIC SESSIONS

XXIX CONGRESS OF THE SPANISH ANATOMICAL SOCIETY

SCIENTIFIC SESSIONS

Plenary Lectures

Wednesday, September 15

12,30 h. PLN-1. Analgesic effects of the relaxin family peptides in a mouse model of inflammatory pain.

Marc Landry

Université de Bordeaux

Thursday, September 16

12,30 h. PLN-2. The thalamus that speaks to the cortex: spontaneous activity in the developing brain.

Guillermina López-Bendito

Instituto de Neurociencias de Alicante-CSIC; Universidad Miguel Hernández, Elche

15,30 h. PLN-3. Anatomic underpinnings of lung surgery.

Sara Castillo-Acosta.

Servicio de Cirugía Torácica, Hospital Universitario de Gran Canaria Doctor Negrín, Las Palmas de Gran Canaria, España

Friday, September 17

09,00 h. PLN-4. An incontinence and intestinal failure surgeon's view of anatomy of the abdomen and pelvis.

Carolynne Vaizey

St Mark's the National Bowel Hospital London

12,30 h. PLN-5. Digit morphogenesis.

Juan A Montero and Juan M Hurlé

Dpto. de Anatomía y Biología Celular, Universidad de Cantabria, Santander.

Neuroanatomy and Development

Oral communications (O-NAD)

Wednesday, September 15, 2021

Chairs: Esther Castillo-Gómez and Eduardo Puelles

9,30-9,40h. O-NAD-1. **The structural and functional importance of the thalamus in migraine processes with and without aura. A literature review**
Orellana-Donoso Mathias; Suazo-Santibañez, Alejandra; Gold Semmler, Marjorie; Cariseo-Avila, Carolina; Santana-Machuca, Edmundo; Valenzuela-Fuenzalida, Juan José

9,40-9,50h. O-NAD-2. **The sensory innervation of the human lips**
Martín-Cruces, José; García-Mesa, Yolanda; Garrido, Andrea; Muriel, Juan D.l; Cobo, Juan L.; Maranillo, Eva; Vázquez, Teresa; Vega, José A

9,50- 10,00h. O-NAD-3. **The acquisition of mechanoreceptive competence by human digital merkel's cells and sensory corpuscles during development: an immunohistochemical study of piezo2**
García-Mesa, Yolanda; Cobo, Ramón; Martín-Cruces, José; García-Piqueras, Jorge; Feito, Jorge; Iván, Suazo; Vega, José A.; García-Suárez, Olivia

10,00-10,10h. O-NAD-4. **Wnt1 role in the habenular complex and its fasciculus retroflexus development**
Company, Verónica; Moreno-Cerdá, Ana; Murcia-Ramón, Raquel; Andreu-Cervera, Abraham; Almagro-García, Francisca; Martínez, Salvador; Echevarría, Diego; Puelles, Eduardo

10,10-10,20h. O-NAD-5. **The habenular complex afferent topographic distribution correlates with its transcriptomic subdivision**
Juarez-Leal, Iris; Carretero-Rodríguez, Estefania; Almagro-García, Francisca; Martínez, Salvador; Echevarría, Diego; Puelles, Eduardo

10,20-10,30h. O-NAD-6. **Nucleus incertus projections to the medial septum and entorhinal cortex**
Gil-Miravet, Isis; Navarro-Sánchez, Mónica; Núñez-Molina, Ángel; Ros Bernal, Francisco; Mañas-Ojeda, Aroa; Castillo-Gómez, Esther; Olucha-Bordonau, Francisco

10,30-10,40h. O-NAD-7. **Seasonal and circannual topographic morphometry of the pineal gland of albino rat**
Martínez-Soriano, Francisco; González-Soler, Eva; Blasco-Serra, Arancha; Valverde-Navarro, Alfonso

10,40-10,50h. O-NAD-8. **Short and long-term consequences of maternal separation-induced stress on the amygdala microcircuitry of male and female mice and its correlation with socio-affective disorders**
Mañas-Ojeda, Aroa; Zineb Bourgane; Gil-Miravet, Isis, Navarro-Sánchez, Mónica; Ros Bernal, Francisco; Olucha-Bordonau, Francisco; Castillo-Gómez, Esther

10,50-11,00h. O-NAD-9. **The overexpression of NRG1-type III does not ameliorate ALS clinical outcome in hSOD1G93A mouse model**
Hernandez Estañol, Sara; Casanovas, Anna; Salvany, Sara; Tarabal, Olga; Blasco, Alba; Gras, Silvia; Piedrafita, Lidia; Schwab, Markus; Caldero, Jordi; Esquerda, Josep

11,00-11,10h. O-NAD-10. **Dynamic changes of proteins in c-type synapses associated with motoneuron injury**
Casanovas Llorens, Anna; Salvany, Sara; Tarabal, Olga; Piedrafita, Lidia; Hernandez, Sara; Santafe, Manuel; Caldero, Jordi; Schwab, Markus; Esquerda, Josep

11,10-11,20 O-NAD-11. **Abscisic acid treatment can rescue mrna levels of bdnf and irs2 in transgenic mice model of alzheimer´s disease**
Espinosa Fernández, Verónica; Mañas-Ojeda, Aroa; Ros Bernal, Francisco; Sánchez-Sarasua, Sandra;

Meseguer, María; Castro-Salazar, Ernestina; Herrero-Pacheco, Mar; Sánchez-Pérez, Ana M.

Poster communications (P-NAD)

Wednesday, September 15, 2021; 12-12'30h

P-NAD-1. **Lis1 function in inhibitory parvalbumin expressing neurons on the mouse hippocampus**

Andreu-Cervera, Abraham; Jiménez, Ana María; Moreno-Cerdá, Ana; Company, Verónica; Almagro-García, Francisca; Echevarría, Diego; Puelles, Eduardo; Geijo-Barrientos, Emilio; Martínez, Salvador

P-NAD-2. **Evolutionary comparative anatomy of the middle ear in three mammalian species**

Vallejo Valdezate, Luis Ángel; De Paz Fernández, Félix Jesús; Gil-Carcedo, Elisa; Gil-Carcedo, Dolores; San José Crespo, Isabel; García-Atarés, Natividad; García-Suárez, Olivia; Cabo Pérez, Roberto; Pérez Herrero, María

P-NAD-3. **Interneuron heterotopia in the Lis1 mutant mouse cortex underlies a structural and functional schizophrenia-like phenotype**

Pombero, Ana; García-López, Raquel; Estirado, Alicia; Geijo-Barrientos, Emilio; Martínez, Salvador

P-NAD-4. **Developmental specification and adult cellular plasticity of oxytocin and vasopressin systems**

Madrigal, M. Pilar; Jurado, Sandra

P-NAD-5. **Neurochemical and anatomical characterization of the insular cortex in mice**

Lemus, Alejandro; Santana-Cordón, Laura; Carstensen, Luisa; López Fernández, Jonathan; González Gómez, Miriam; Castro Hernández, Javier; Afonso Oramas, Domingo; Barroso Chinea, Pedro Javier

P-NAD-6. **The human insular cortex: a histological and anatomical study**

Lemus, Alejandro; Santana-Cordón, Laura; Carstensen, Luisa; López-Fernández, Jonathan; González-Gómez, Miriam; Castro-Hernández, Javier; Barroso-Chinea, Pedro; Afonso-Oramas, Domingo

P-NAD-7. **Fibroblast growth factor receptor 1 is required for the development of the retrosplenial cortex in mouse**

García López, Raquel; Pombero, Ana; Estirado, Alicia; Martínez, Salvador

P-NAD-8. **Dynamic microRNA expression profiles during embryonic development provides novel insights into cardiac "sinus venosus" differentiation**

García-Padilla, Carlos; Franco, Diego; García-López, Virginio; Dueñas, Angel; Aranega, Amelia; García-Martínez, Virginio; López-Sánchez, Carmen

P-NAD-9. **Kaempferol protects against the activation of complement C3 protein and the induction of reactive A1 astrocytes by 3-Nitropropionic acid in rat brain**

García-López, Virginio; Gutiérrez-Merino, Carlos; García-Martínez, Virginio; López-Sánchez, Carmen

P-NAD-10. **Anatomical regionalization of early reactive A1 astrocytes induced by neurotoxin 3-nitropropionic acid in rat brain**

García-López, Virginio; Gutiérrez-Merino, Carlos; López-Sánchez, Carmen; García-Martínez, Virginio.

P-NAD-11. **Morphological changes of the choroid plexus in prenatal development and hydrocephalus**

Carmona-Calero, Emilia Mª; González-Toledo, Juan M.; Castellano-Santana, Ivan; Hernández-Abad, Luis G; González-Marrero, Ibrahim; Castañeyra-Perdomo, Augustin

P-NAD-12. **Intravascular replenishment method of whole cadavers using natural latex**

Alfosea-Cuadrado, Gloria M.; Cabanes-Vila, José; Rams-Almenar, Carmiña; González-Soler, Eva M.; Blasco-Serra, Arantxa; Valverde-Navarro, Alfonso A.

P-NAD-13. **Determination of AQP1 and AQP4 concentrations in human aqueous humors and their relationship to the occurrence of ocular pathologies**

G. Hernández-Abad, Luis; Lozano-López, Virginia; Cruz-Muros, Ignacio; Carmona-Calero, Emilia M; Castañeyra-Perdomo, Agustín; González-Marrero, Ibrahim

P-NAD-14. **AAV-mediated overexpression of alpha-synuclein in substantia nigra induces progressive neurodegenerative changes in a rat model of Parkinson´s disease**

Bengoetxea Odriozola, Harkaitz; Vaquero Rodríguez, Andrea; Ruíz Ortega, José Angel; Depay, Ben; Ortuzar Markes, Naiara; Lafuente Sánchez, José Vicente

P-NAD-15. **Molecular and morphological analysis of the dopaminergic neurons in human substantia nigra: new citopathological findings in Parkinson's disease**

Cara-Esteban, Mireia; Martínez-Alonso, Emma; Martínez-Martínez, Narcisa; Marín, María del Pilar; Martínez-Menárguez, José Ángel; Tomás, Mónica

P-NAD-16. **Characterization of the microglial response in the aged 3xtgad model**

Lucerón-Morales, Jorge; Mañas-Ojeda, Aroa; Espinosa-Fernández, Verónica; Castillo-Gómez, Esther; Gil-Miravet, Isis; De Castro-Salazar, Ernestina; Sánchez-Pérez, Ana María; Pacheco-Herrero, María del Mar; Olucha-Bordonau, Francisco; Ros-Bernal, Francisco

P-NAD-17. **Targeting neuroinflammation as a potential therapeutic intervention for altered pain sensitivity in Attention-Deficit Hyperactivity Disorder mouse model.**

Meseguer-Beltran, Maria; Sánchez-Saraúsa, Sandra; Sánchez-Pérez, Ana Maria

P-NAD-18. **Role of relaxin3 innervation of the retrosplenial cortex in contextual fear conditioning**

Navarro-Sánchez, Mónica; Gil-Miravet, Isis; Mañas-Ojeda, Aroa; Castillo-Gómez, Esther; Ros-Bernal, Francisco; Olucha-Bordonau, Francisco

P-NAD-19. **Putative modular tripartite circuitry between the relaxin 3 NI, serotonergic raphe and the entorhinal cortex**

Imam, Aminu; Gil-Miravet, Isis; Laassili, Chaimaa; Bouargane, Zineb; Navarro-Sánchez, Mónica; Olucha-Bordonau, Francisco

P-NAD-20. **The nucleus incertus-relaxin3 innervation of the supramammillary nucleus**

Laassili, Chaimaa; Gil-Miravet, Isis; Bourgane, Zineb; Navarro-Sánchez, Mónica; Mañas-Ojeda, Aroa; Imam, Aminu; Castillo-Gómez, Esther; Ros-Bernal, Francisco; Olucha-Bordonau, Francisco

P-NAD-21. **Effects of AM or PM forced wheel exercise on orexigenic/anorexigenic hypothalamic gene expression of adolescent rats**

Y. Kutsenko, A. Barreda, A. Toval, D. Garrigos, M. Martínez-Morga, S. Gagneja, B. Ribeiro Do-Couto, J. L. Ferran

Education, Visceral and Locomotor Systems

Oral communications (O-DELM)

Thursday, September 16, 2021

Chairs: Miguel Ángel Fernandez-Villacañas, Verónica Gumbau-Puchol

09,00-09,10h. O-DELM-1. **Distribution of sensory formations in human shoulder joints**
Gago, Abel; García-Mesa, Yolanda; Menéndez-González, Agripino; Viña, Eliseo; Cabo, Roberto; Muriel, Juan D.; Vega, José A

09,10-09,20h. O-DELM-2. **Can an Instagram profile be useful for teaching Anatomy?**
Sánchez Zuriaga, Daniel; Zaragozá Colom, Rosa; Gimeno Monrós, Amparo; Alberola Zorrilla, Pilar

09,20-09,30h. O-DELM-3. **Drawing as a tool for medical students to learn Anatomy: design and implementation of a method**
Martínez Carracelas, Elena; Moreno Cascales, Matilde; Fdez-Villacañas Marín, Miguel Ángel

09,30-09,40h. **O-DELM-4. Methodological innovations in practical anatomy with the use of 3D printing models**
Mayordomo Acevedo, Raquel; Mingorance Álvarez, Esther; Rodríguez Villar , Julia; Pérez Pico, Ana Mª

09,40-09,50h. O-DELM-5. **Learning of human anatomy through gamification: comparison of three experimental studies**
López González,Laura; González Sequeros, Ofelia; López Jiménez, Juan José; Fernández Alemán, Jose Luis; Yolanda Guerrero, Sánchez

09,50-10,00h. O-DELM-6. **Modification to the Thiel method**
Sánchez del Campo, Francisco; Ortuño, Hernandez

10,00-10,10h. O-DELM-7. **Preservation of corpses with solutions free from formaldehyde**
Sánchez del Campo, Francisco; Ortuño, Hernandez

10,10-10,20h. O-DELM-8. **Formaldehyde filtration equipment overview**
Pérez Crespo, Juan; Grima Murcia, Maria Dolores; Sánchez del Campo, Francisco

10,20h-10,30h. O-DELM-9. **Lessons learned on non-presential teaching in human anatomy at the University of Granada**
Picón-Ruiz, Manuel; Jiménez, Gema; López-Ruiz, Elena; Carrillo, Esmeralda; Graván, Pablo; Peña, Jesús; Ruiz Espinares, Jesús; Boulaiz, Houría; Perán, Macarena; Marchal, Juan Antonio

10,30-10,40h. O-DELM-10. **Mobile learning in human anatomy: a study on applications market and a review of present evidence**
Montaner Sanchis, Andrés; Davins Riu, Meritxell; Gumbau Puchol, Verónica

Poster communications (P-DELM)

Wednesday, September 15, 2021; 11,30-12,00h

P-DELM-1. **Exploring the use of an Instagram account in anatomy education: an emerging experience**
Morales-Delgado, Nicanor; Echevarría, Diego; Puelles, Eduardo; Madrigal, M. Pilar

P-DELM-2. **The impact of change from traditional teaching to online teaching in anatomy due to the Covid-19 pandemic: Our experience at the University of Cadiz**
Pérez Arana, Gonzalo Martín; Ribelles García, Antonio; Carrasco Molinillo, Carmen; Camacho Ramírez, Alonso; Fernández Vivero, José; Vargas Delgado, José Jesús; Prada Oliveira, José Arturo

P-DELM-3. **Integration of the final degree projects in basic research in anatomy. Our experience over 8 years**

Pérez Arana, Gonzalo Martín; Ribelles García, Antonio; Carrasco Molinillo, Carmen; Camacho Ramírez, Alonso; Fernández Vivero, José; Vargas Delgado, José Jesús; Prada Oliveira, José Arturo

P-DELM-4. **Doing Radio. A new communication strategy to learn Anatomy**

Pérez-Arana, Gonzalo; Ribelles-García, Antonio; Carrasco-Molinillo, M Carmen; Camacho-Ramirez, Alonso; Vargas-Delgado, Jose Jesús; Almorza-Gomar, David; Prada-Oliveira, Jose Arturo

P-DELM-5. **Gamifying anatomy education with socrative during the covid-19 pandemic**

Pombero, Ana; García-López, Raquel; Monge, Juan Francisco; Morales-Delgado, Nicanor

P-DELM-6. **Early introduction to musculoskeletal sonoanatomy in the degree of physiotherapy**

González-Soler, Eva M.; Blasco-Serra, Arantxa; Alfosea-Cuadrado, Gloria M.; Higueras-Villar, Cynthia; Rams-Almenar, Carmiña; Valverde-Navarro, Alfonso A.

P-DELM-7. **First visit to the dissection room in the Health Sciences Degrees**

Mohedano Moriano, Alicia; Romo Barriento, Carmen; Viñuela, Antonio; Ubeda Bañon, Isabel; Flores Cuadrado, Alicia; González- González, Jaime; Martín Rodríguez, Francisco; Martín Conty, Jose Luis; Martínez Marcos, Alino; Criado Álverez, Juan Jose

P-DELM-8. **Circulating miRNAs profile in Limb-girdle muscular dystrophies: potential biomarkers for diagnosis and prognosis**

Zaragozá, Rosa; Avilés-Alía, Ana I.; Picher, Carmen; García-Giménez, Jose Luís; Pallardó, Federico V; Bas, Teresa; García-Trevijano, Elena R.; Viña, Juan R

P-DELM-9. **Open educational resources as a teaching tool in the area of health sciences**

Carrillo Delgado, Esmeralda; Jiménez González, Gema; López Ruiz, Elena; Picón Ruiz, Manuel; Peña Martí, Jesús; Marchal Corrales, Juan Antonio ; Boulaiz Tassi, Houria

P-DELM-10. **Development of tutorial videos to support the teaching of Human Anatomy: a teaching innovation project**

Boulaiz Tassi, Houria; Jiménez González, Gema; López Ruiz, Elena; Picón, Manuel ; Jiménez Martínez, Yaiza; Marchal Corrales, Juan Antonio ; Carrillo Delgado, Esmeralda

P-DELM-11. **A novel board game to reinforce health sciences students' knowledge on Human Anatomy**

Perán Quesada, Macarena; López Ruiz, Elena; Chocarro, Carlos; Martínez, Daniel; Jiménez, Gema; Picón, Manuel; Boulaiz, Houria; Carrillo, Esmeralda; Barungi, Shivan; Marchal, Juan Antonio

P-DELM-12. **3D printing in Human Anatomy, ¿the latest teaching revolution?**

Jiménez, Gema; López-Ruiz, Elena; Picón-Ruiz, Manuel; Boulaiz, Houria; Carrillo, Esmeralda; Perán, Macarena; Marchal, Juan Antonio

P-DELM-13. **Immunohistochemical localization of piezo1 and piezo2 in human urinary system**

García-Mesa, Yolanda; Feito, Jorge; M. Gago, Abel; Cabo, Roberto; Pérez-Moltó, Francisco J; De Paz, Félix; Gutiérrez-Villanueva, Marcos; García-Suárez, Olivia

P-DELM-14. **Postraumatic Pseudoaneurysm of the Superficial Palmar Arch: a clinical case**

Garrido, Jose Félix; Gázquez, Gemma

Clinical and Surgical Anatomy and Physical Anthropology

Poster communications (P-AQA)

Friday, September 17, 2021; 09,45-10,15h

P-AQA-1. **Pain or no pain? The role of blood vessels in diabetic neuropathy**

García-Mesa, Yolanda; González Gay, Mario; García-Martínez, Irene; Noval, Ana; García-Álvarez, Ana Gabriel; Viña, Eliseo; Cabo, Roberto; García-Suárez, Olivia

P-AQA-2. **The readaptation of the intestine after anatomical rearrangement due to Roux-en-Y gastric bypass as a key to relapse in T2DMin a rodent model**

Pérez Arana, Gonzalo Martín; Ribelles García, Antonio; Carrasco Molinillo, Carmen; Camacho Ramírez, Alonso; Fernández Vivero, José; Díaz Gomez , Alfredo; Prada Oliveira, José Arturo

P-AQA-3. **There is no correlation between Body Mass Index and Corneal Thickness in emmetropic individuals**

Hasrod, Nabeela; Nalla, Shahed; Sanchis-Gimeno, Juan Alberto

P-AQA-4. **Facial recognition from the past**

Martín-Ruiz, Julio; Tamarit-Grancha, Ignacio; Moya-Mata, Irene; Torres-Tamayo, Nicole; Nalla, Shahed; Ruiz-Sanchis, Laura; Ros, Concepcion; Sanchis-Gimeno, Juan Alberto

P-AQA-5. **Prevalence of Arcuate Foramen in dry cadaveric vertebrae: Own results and meta-analysis**

Llido-Torrent, Susanna; Nalla, Shahed; Sanchis-Gimeno, Juan Alberto

P-AQA-6. **Ex vivo anatomic-morphometric study of mandibular intraoral bilateral sagittal osteotomy (obwegeser-dal pont technique) for improving cervical spine approach**

Díaz-Tapiador, Sebastián; Blasco-Serra, Arantxa; Puche-Roses, Miguel; Torres-Gayá, Jorge; González-Soler, Eva M.; Valverde-Navarro, Alfonso A.; Puche-Torres, Miguel

P-AQA-7. **Importance of the fusion fascia of Fredet as an anatomical landmark for complete mesocolic excision with D3 lymphadenectomy in right colon cancer**

Hernández-Gil-de-Tejada, Tomás; García-Granero, Álvaro; Blasco-Serra, Arantxa; González-Soler, Eva M; Pellino, Gianluca; Frasson, Matteo; Fletcher Sanfeliu, Delfina; Bonilla, Fernando; Sánchez Guillén, Luis; Valverde-Navarro, Alfonso A

P-AQA-8. **The concept of the splenic flexure box: five access methods to the splenic flexure**

Pérez-Moltó, Francisco José; García-Granero, Álvaro; Blasco-Serra, Arantxa; González-Soler, Eva M.; Primo-Romaguera, Vicent; Millan, Mónica; Pellino, Gianluca; Fletcher Sanfeliu, Delfina; Frasson, Matteo; Valverde-Navarro, Alfonso A

P-AQA-9. **Laparoscopic anatomo-surgical approachofthecolonbasedon3D-morphometric analysis in a cadaveric model**

Fernando-Trebolle, Jose; Escolar, Juan; García-López, Virginio; Sánchez-Margallo, Francisco; Uson, Jesus; López-Sánchez, Carmen; García-Martínez, Virginio.

P-AQA-10. **Evaluation of radiological anatomy of the retromolar canal and clinical importance of its presence**

Puche-Roses, Miguel; Díaz-Tapiador, Sebastián; Blasco-Serra, Arantxa; González-Soler, Eva M.;

Alfosea-Cuadrado, Gloria M.; Rams-Almenar, Carmiña; Valverde-Navarro, Alfonso A.; Puche-Torres, Miguel

P-AQA-11. **Comparative vascular anatomy of the canine prostate: angiographic analysis**

López-Sánchez, Carmen; García-López, Virginio; Lucas-Cava, Vanesa; Sánchez-Margallo, Francisco-Miguel; Sun, Fei; García-Martínez, Virginio

P-AQA-12. **3D reconstruction using free open source software (3D Slicer) for liver surgery planning**

Montaner Sanchis, Andrés; Redondo Cano, Carlos; Mir Labrador, José; Eleuterio Cerveró, Germán; Gumbau Puchol, Verónica

P-AQA-13. **Review of anatomic concepts in relation to Waldeyer's fascia and the rectosacral fascia**

Gumbau Puchol, Verónica; Martínez Soriano, Francisco; Roig Vila, Jose Vicente; García Armengol, Juan

Oral communications (O-AQA)

Friday, September 17, 2021; 10,45-12,45h

Chairs: Carme Rissech Badalló, Alba Coret Franco

10,45-10,53h. O-AQA-1. **The sensory innervation of the human palmar aponeurosis in normal conditions and in palmar fibromatosis disease**

Cabo Pérez, Roberto; García-Martínez, Irene ; M. Gago, Abel; García-Mesa, Yolanda; Jorge, Feito; Suazo, Iván; García-Suárez, Olivia; Vega, José A

10,53-11,01h. O-AQA-2. **Anatomical variations of the mandibular canal and their clinical implications in dental practice: a literature review**

Valenzuela, Juan; Cariseo, Carolina; Gold, Marjorie; Orellana, Mathias; Diaz, Daniela; Iwanaga, Joe

11,01-11,09h. O-AQA-3. **A minireview: Sleeve gastrectomy and Roux-en-Y gastric bypass. Two sculptors of the pancreatic islet**

Pérez Arana, Gonzalo Martín; Ribelles García, Antonio; Carrasco Molinillo, Carmen; Camacho Ramírez, Alonso; Fernández Vivero, José; Díaz Gomez , Alfredo; Prada Oliveira, José Arturo

11,09-11,15h. O-AQA-4. **Is it possible to predict nail consistency by immunohistochemical analyses?**

Mingorance Álvarez, Esther; Rodríguez-León, Joaquín; Pérez Pico, Ana María; Mayordomo Acevedo, Raquel

11,15-11,23h. O-AQA-5. **Right mesocolic "sail" as a new quality standard for a correct d3 lymphadenectomy in right colon cancer**

Valverde-Navarro, Alfonso A.; García-Granero, Álvaro; Blasco-Serra, Arantxa; González-Soler, Eva M; Pellino, Gianluca; Fletcher-Sanfeliu, Delfina; Giner, Francisco; Frasson, Matteo; Grifo-Albalat, Isabel; Sánchez-Guillén, Luis

11,23-11,31h. O-AQA-6. **The CYBORG experimental centre - Miguel Hernández Univ. of Elche**

Borras Rocher, Fernando; Sánchez del Campo, Francisco

11,31-11,39h. O-AQA-7. **Embalming with modified Larssen solution for improving surgical training techniques in the anatomy Lab**

Asso, Marçal; Hidalgo, Miriam; Carrera, Anna; San Millán, Marta; Tudor, Ioana Valeria; Reina, Francisco

11,39-11,47h. O-AQA-8. **New insights on the anatomy of the elbow lateral ulnar collateral ligament (LCUl). Anatomical variability, E12 sheet plastination description, and radiological correlation**

Noriego, Diana; Carrera, Anna; San Millán, Marta; Cateura, Aida; Reina, Francisco

11,47-11,55h. O-AQA-9. **The posterolateral corner of the knee. Anatomical description by macro/microdissection and E12 sheet plastination technique**

Reina, Francisco; Franco, Marc; Angelats, Xavier; San Millán, Marta; Cateura, Aida; Carrera, Anna

11,55-12,03h. O-AQA-10. **Bioprinting to fabricate cell-laden constructs for personalized repair and regeneration of articular cartilage**

López-Ruiz, Elena; Chocarro-Wrona, Carlos; Jiménez, Gema; Martínez-Moreno, Daniel; Perán, Macarena; Antich, Cristina; Carrillo, Esmeralda; Boulaiz, Houria; Gálvez-Martín, Patricia; Marchal, Juan Antonio

12,03-12,11h. O-AQA-11. **Clinical potential of novel bioinks derived from decellularized extracellular matrix for 3D bioprinting of biomimetic organs**

Marchal Corrales , Juan Antonio; López Ruiz, Elena; Jiménez González, Gema ; Antich Acedo, Crisitina; López de Andrés, Julia; Chocarro Wrona, Carlos; Perán Quesada, Macarena; Carrillo Delgado, Esmeralda; Boulaiz Tassi, Houria; Picón Ruiz, Manuel

12,11-12,19h. O-AQA-12. **Anatomic sphincteroplasty with combined reconstruction of internal and external. Anal muscles in the anal incontinence surgical treatment. Description of a new technique**

Martínez Pérez, Carolina; García Armengol, Juan; Roig Vila, José Vicente; Valderas, Guillermo; García Gausí, María; Báez Burgos, Celia; García Coret, Maria José; Navarro Moratalla, Carla; Zaragoza Fernández, Cristóbal

12,19-12,27h. O-AQA-13. **Anatomic landmarks for a safe ambulatory Nissen Fundoplication**

Coret Franco, Alba; Pastor Mora, Juan Carlos; Villarín Rodríguez, Álvaro; Planells Roig, Manuel

12,27-12,35h. O-AQA-14. **Thickness differences in the deep plane of the abdomen in post-stroke: implications on the respiratory pattern. Observational study**

Dominguez Sanz, Natalia; Bays Moneo, Ana B.; Blázquez Lautre, Lucas; Yárnoz Irazábal, Concepción; Balén Rivera, Enrique M.; Alfaro Adrián, Jesús; Trandafir, Camelia; Insausti Serrano, Ana María

12,35-12,43h. O-AQA-15. **The acetabulum as adult age marker. a test in a colombian sample**

Rissech Badalló, Carme; Muñoz Silva, Vanessa; Sanabria, Cesar

ABSTRACTS

XXIX CONGRESS OF THE SPANISH ANATOMICAL SOCIETY

ABSTRACTS

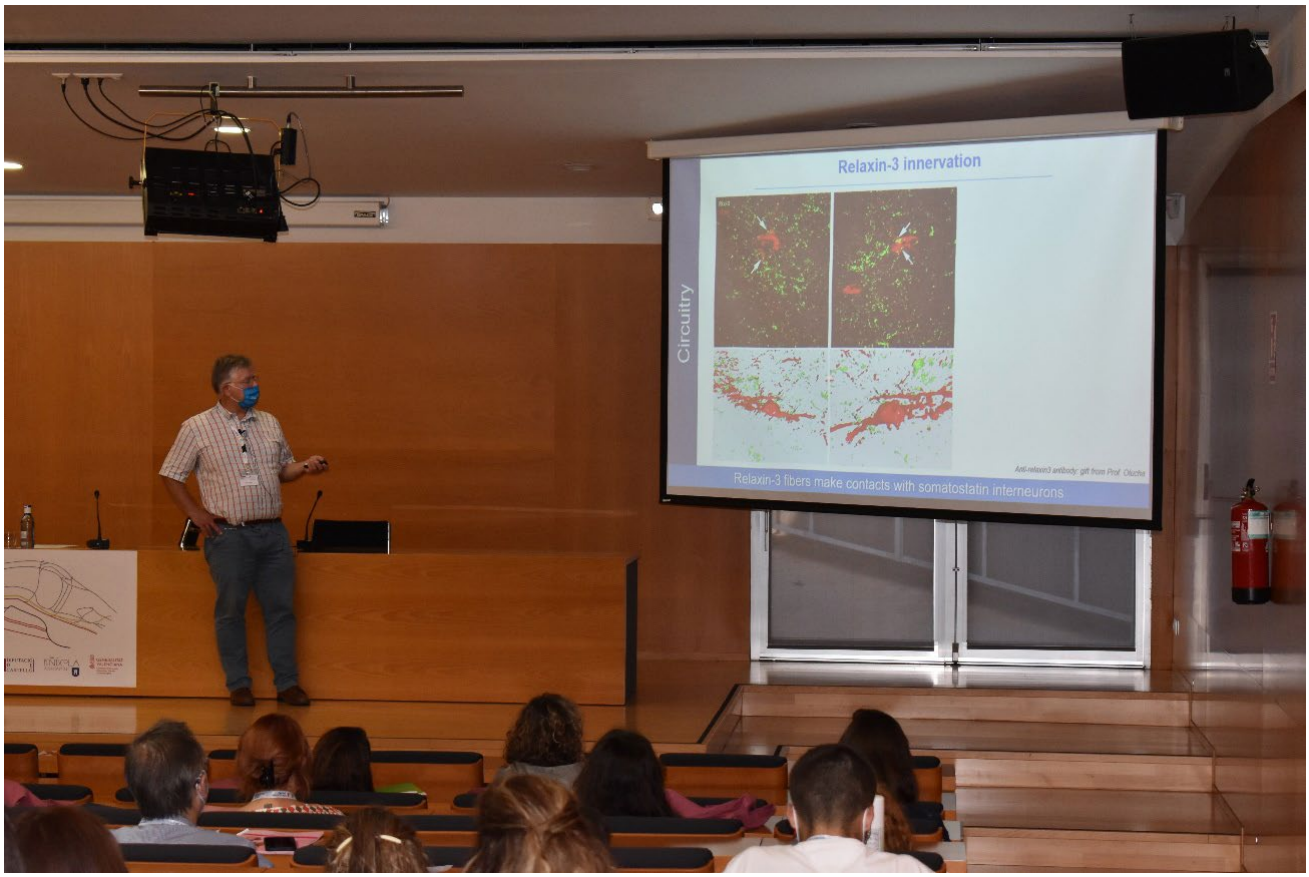
Plenary lectures

PLN-1. **ANALGESIC EFFECTS OF THE RELAXIN FAMILY PEPTIDES IN A MOUSE MODEL OF INFLAMMATORY PAIN**

Marc Landry

University of Bordeaux, Institute of Neurodegenerative Diseases, UMR CNRS 5293, Centre Broca-Nouvelle Aquitaine, 146 rue Léo Saignat, 33076 Bordeaux, France

Chronic pain, often accompanied by anxiety and depression, is a global scourge. The modulation of pain by neuropeptides is well established at the spinal level. However, little data is available on neuropeptide role on pain in the brain. The relaxin family comprises the neuropeptides relaxin and relaxin-3. Relaxin is widely expressed in various organs including the central nervous



system (CNS) and has antifibrotic properties. In contrast, relaxin-3 is neuron-specific and exhibits anxiolytic and antidepressant effects.

Relaxin and relaxin-3 signaling is mediated by the G protein-coupled receptors RXFP1 and RXFP3, respectively. Because of the prominent expression of these receptors in pain processing areas of the brain, we aimed at studying the possible pain modulatory effects of relaxin and relaxin-3 by using pharmacological, behavioural and anatomical approaches in a mouse model of persistent inflammatory pain obtained by the injection of Complete Freud´s Adjuvant in the hind paw.

We have studied the sensory and affective components of pain and our results show that both the relaxin-3/RXFP3 and relaxin/RXFP1 systems have transient analgesic effects in inflammatory pain. We further identified the neurochemical phenotype of RXFP1/RXFP3-expressing neurons and proposed that the sites of action of these peptide systems include cortical (cingulate cortex, claustrum) and subcortical (amygdala) regions that regulate descending pathways and sensory integration in the spinal cord. Interestingly, the analgesic effects depend on the pain modalities (mechanical vs thermal) that were investigated. Our data highlight a novel role for this peptide family and suggest their therapeutic potential in persistent pain conditions.

PLN-2. **THE THALAMUS THAT SPEAKS TO THE CORTEX: SPONTANEOUS ACTIVITY IN THE DEVELOPING BRAIN**

Guillermina López-Bendito

Instituto de Neurociencias de Alicante-CSIC. Universidad Miguel Hernández, Elche

Our research team runs several related projects studying the cellular and molecular mechanisms involved in the development of axonal connections in the brain. In particular, our aim is to uncover the principles underlying thalamocortical axonal wiring, maintenance and ultimately the rewiring of connections, through an integrated and innovative experimental program. The development of the thalamocortical wiring requires a precise topographical sorting of its connections. Each

thalamic nucleus receives specific sensory information from the environment and projects topographically to its corresponding cortical. A second level of organization is achieved within each area, where thalamocortical connections display an intra-areal topographical organization, allowing the generation of accurate spatial representations within each cortical area. Therefore, the level of organization and specificity of the thalamocortical projections is much more complex than other projection systems in the CNS. The central hypothesis of our laboratory is that thalamocortical wiring influences and maintains the functional architecture of the brain. We also believe that rewiring and plasticity events can be triggered by activity-dependent mechanisms in the thalamus.

Here in this talk, I will present our recent data on the activity-dependent mechanisms involved in thalamocortical guidance and cortical development. I will also present data on the role of this activity in the thalamus in promoting neuroplastic cortical changes following sensory deprivation. Within these projects we are using several experimental programs, these include: optical imaging, manipulation of gene expression in vivo, cell and molecular biology, biochemistry, cell culture, sensory deprivation paradigms and electrophysiology.

PLN-3. **ANATOMIC UNDERPINNINGS OF LUNG SURGERY**

Sara Castillo-Acosta

Servicio de Cirugía Torácica, Hospital Universitario de Gran Canaria Doctor Negrín, Las Palmas de Gran Canaria, España

The lack of treatment to control tuberculous infection led to the development of surgical techniques that resulted in the birth of the Thoracic Surgery by the end of the 19th century, through procedures such as therapeutic pneumothorax. Subsequently, thoracic surgical methods progressed in parallel and promoted by the evolution of anesthesiology, as well as asepsis and antisepsis.

This review is aimed at highlighting the anatomical features in the practice of Thoracic Surgery. It is provided an historical revision of the evolution of particular methods ranging

from open and video-assisted to robot-assisted surgeries, which are the techniques used at present. Open surgery for thoracotomy results in longer hospital stays, worse control of the postoperative pain and further complications. Otherwise, the benefits of the robot versus video-thoracoscopic surgery are related to the surgical technique (greater accuracy and angle of movement, 3D view, image magnification).

The anatomic variations of the pulmonary hilium is a major challenge for surgeons in our daily surgical practice. Due to this situation, it is necessary, in many cases, a 3D reconstruction prior to surgical intervention in order to complete segmentectomies and avoid iatrogenic troubles and reduce surgical time.

A particular challenge in the resection of anterior mediastinal lesions when performing minimally invasive surgery is the visualization of the contralateral phrenic nerve. To this purpose, setting up a system for indocyanine green perfusion from the peripheral blood has been developed.

PLN-4. **An incontinence and intestinal failure surgeon's view of anatomy of the abdomen and pelvis**

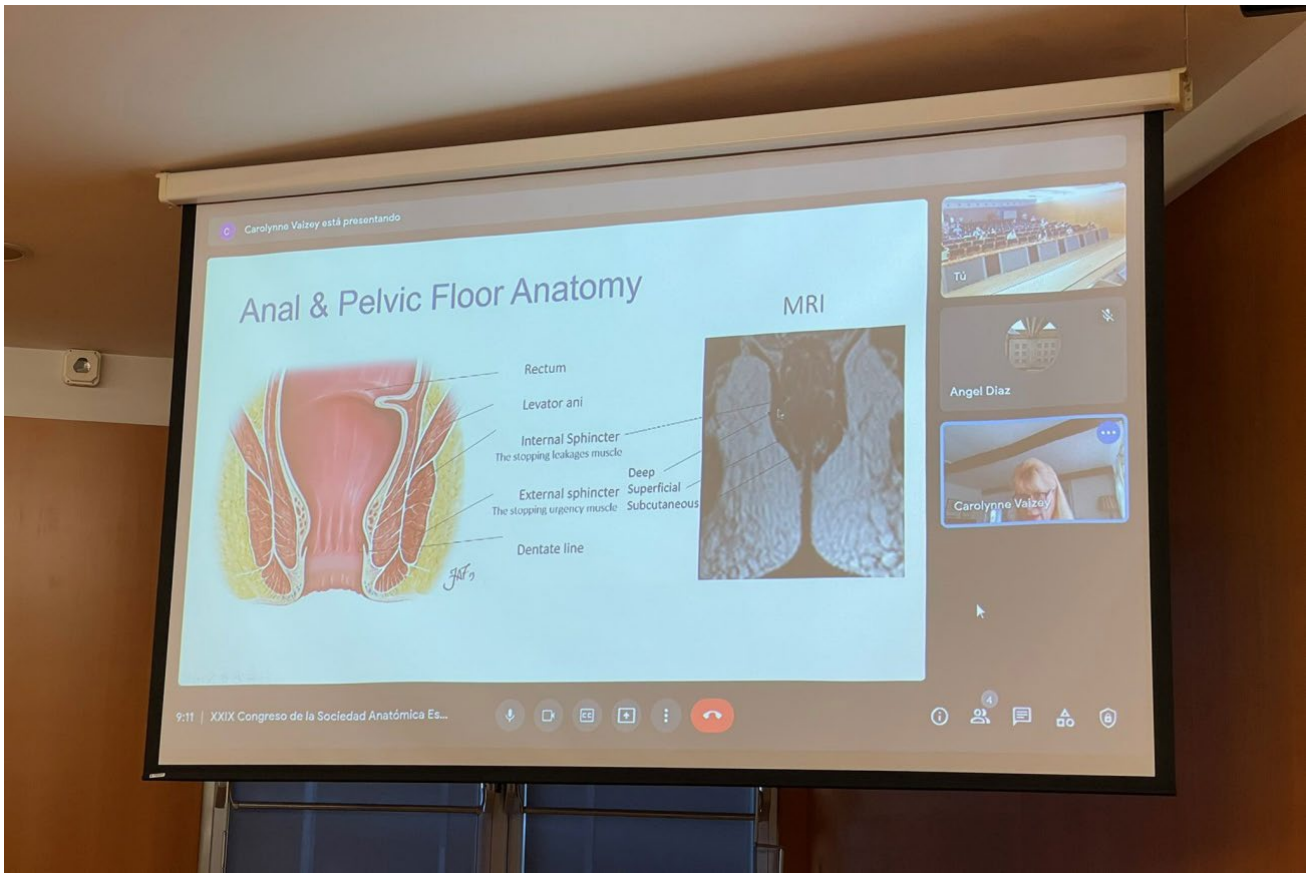
Carolynne Vaizey

St Mark's the National Bowel Hospital London

My talk will start with an overview of the amazing anus – what other organ is so finely designed that it can selectively release solid, liquid and gas? The most heart-breaking damage to the anus is done to young people by surgeons and obstetricians.

Surgeons have reduced the damage they do to the anus – obstetricians have not. Obstetric tears to the anal sphincter muscles are increasing – we will look at why this is. Once damaged even the best of repair to the anatomy is of limited functional benefit.

The worst outcome of anorectal trauma is a rectovaginal fistula – there are many operations to repair these degrading injuries – the more operations there are for a condition – the more you know they are not successful. We have developed a new and exciting operation for this



using condition the policeman of the abdomen – the omentum – all will be revealed!

I will touch on the increasingly trendy pelvic floor and the conditions associated with a weakened pelvic floor. More about the pelvis - my cancer colleagues are doing some amazing work planning for cancer surgery around and sometimes involving the anatomical structures. 3-D modelling allows them to plan surgery down to the last millimetre. In contrast an intestinal failure surgeon's operation on the bowel is not so planned and the challenge is changing the plan in the middle of an operation. Preventing bowel disasters is done by avoiding repeated surgery and closing the abdomen over the fragile bowel to protect it whenever possible. The real challenge is restoring the chronically open abdominal wall - 6 pack to wide gap and onto closure again – how can we do this successfully?

I will finish with the quote from my anatomy professor when I first started my medical training in Cape Town – it's a wonder I ever became a surgeon!

PLN-5. **DIGIT MORPHOGENESIS**

Juan A Montero & Juan M Hurlé

Departamento de Anatomía y Biología Celular; Universidad de Cantabria. Santander

The digits are fundamental elements of the locomotor system that confer most functional properties to the vertebrate limbs. The morphology of the digits responds to a general pattern in all tetrapods, but their specific anatomy varies enormously due to the specialization of each species. Anatomical variations include the reduction of the number of digits, as occurs in cursory animals such as the horse, the modification of their spatial distribution in the autopodium to form prehensile structures as occurs in the chameleon and other reptiles and birds, or, the presence of interdigital membranes that facilitate their use as paddles in aquatic mammals and webbed birds, or as wings in flying mammals such as the bat.

The digits develop in the distal segment of the limb bud termed the autopodium. This region has the appearance of a paddle that contains

a core of undifferentiated mesodermal cells of somatopleural origin covered by ectoderm. The ectoderm directs the distal growth of the autopod through a specialized region, termed the Apical Ectodermal Ridge (AER), which runs along the distal margin of the autopod and produces growth factors, especially FGF8, which keep the underlying mesodermal cells undifferentiated and proliferating. The mesodermal cell population, is initially uniform and expresses the HoxA13 homeobox gene. In the course of development, the mesoderm is segregated in a modular fashion into two populations of distinct significance. On the one hand, cells aggregate into radial structures that differentiate into cartilage and form the primordia of the digits. On the other hand, the cells that separate the digital rays form interdigital spaces that undergo a degenerative process whose intensity determines the formation of free or webbed digits.

Over the last decades, we have investigated the molecular mechanisms that regulate the anatomical characteristics of the digits. The data that we present in our talk summarize the results obtained from our studies:

1.- We have observed that the interdigital cells destined to die are skeletal progenitors, able to form “extra” digits until the beginning of the degeneration process.

2.- Members of the Activins and Tgfβ family of secreted factors are expressed in the autopodium in domains that precede the appearance of the digits and, most remarkable, the local application of those factors into the interdigit results in the formation of an extra digit.

3.- Members of the family of bone morphogenetic proteins (BMPs) are expressed in the interdigits and trigger interdigital cell death. Furthermore, local administration of BMP antagonists leads to the formation of webbed digits. This phenomenon occurs physiologically in species (duck and bat) that express in the interdigits a BMP antagonist called GREMLIN.

4.- Surprisingly, BMPs are also signals responsible for cartilage outgrowth, and their local inhibition results in the formation of truncated digits.

5.- The degeneration of interdigital tissue takes place by convergent processes that include apoptosis, lysosomal activation and cell senescence, and, more importantly, these degenerative processes are preceded by DNA breaks that cells fail to repair, thus initiating the distinct degenerative cascades.

6.- The specificity of BMPs to induce death in the interdigital tissue while promoting growth in the digital rays is due to a differential sensitivity of both cell tissue components to DNA breakage, which in turn is due to differences in their epigenetic profile.

Neuroanatomy and Development

Oral communications (O-NAD)

O-NAD-1. THE STRUCTURAL AND FUNCTIONAL IMPORTANCE OF THE THALAMUS IN MIGRAINE PROCESSES WITH AND WITHOUT AURA. A LITERATURE REVIEW

Orellana-Donoso, Mathias; Suazo-Santibañez, Alejandra; Gold Semmler, Marjorie; Cariseo-Avila, Carolina; Santana-Machuca, Edmundo; Valenzuela-Fuenzalida, Juan José

Universidad Finis Terrae; Universidad Andrés Bello; Universidad de las Américas, Chile

The thalamus plays an important role in different brain functions which could include the following functions: memory, emotions, mediator in general cortical alert responses, sensorimotor control and one of the main ones which is to be a nucleus for processing sensitive information (including taste, somatosensory, visual and auditory) carrying all this towards the somatosensory cortex, which could explain the role of the thalamus in algesic processes. The exact mechanism for the generation of migraine is still a matter of research, although there is evidence that migraine pain originates in the trigeminovascular system, still it's not clear what are the morphofunctional connections of the thalamus that are implied on migraines. Therefore, the objective of this review is to know the morphofunctional alterations of the thalamus in the processes of migraine. A systematic search was carried out in the following electronic databases: MEDLINE, SCIELO, WOS, CINHAL, SCOPUS and GOOGLE SCHOLAR, using as search terms Anatomy Thalamus, Function thalamus, Migraine, Pain head, Headache pain, for which the following Boolean connectors "AND" "OR" and "NOT" were used. After having applied the inclusion and exclusion criteria, we were left with 27 articles for the analysis of the results. 8 studies that reported the participation of nuclei of the thalamus in the process of migraine, 1 study that related the pulvinar of the thalamus with migraine; 2 articles that makes the relationship between the limbic system, thalamus and migraine; 3 articles that mention the trigeminovascular pathway and its relationship with the thalamus; 22 articles that relate the thalamocortical pathway with migraine. We found in this review that the functional components and connection with other structures from the thalamus to the cortex or neighboring structures are altered or disrupted, expressed as the thalamocortical pathway. We believe that new studies must be made with a thorough analysis of the structural and functional role of the thalamus with larger samples could be crucial to integrate in theoretical frameworks in order to give a better conceptualization of migraine which could translate into a better management of it.

O-NAD-2. THE SENSORY INNERVATION OF THE HUMAN LIPS

Martín-Cruces, José; García-Mesa, Yolanda; Garrido, Andrea; Muriel, Juan D.l; Cobo, Juan L.; Maranillo, Eva; Vázquez, Teresa; Vega, José A.

Departamento de Morfología y Biología Celular, Grupo SINPOS, Universidad de Oviedo; Departamento de Cirugía y Especialidades Médico-Quirúrgicas, Universidad de Oviedo, Oviedo, Spain

The lips are muscle-cutaneous-mucous folds that surround the oral aperture. The surface of the lip is comprised of four zones: hairy skin, vermilion border, vermilion and oral mucosa. The normal shape of the lips varies with age and is influenced by ethnicity. The lips surround the entrance to the oral cavity. They function to provide competence to the oral cavity during mastication and at rest. The lips affect uttered sounds that facilitate spoken language and provide changes of facial expression that facilitate unspoken language. They provide sensory information about food prior to its placement in the oral cavity. To accomplish the multitude of functions, lips require a complex sensory system. In the present

study we investigated the immunohistochemical profile of the sensory corpuscles present in all covers of the human lips. A battery of antibodies against S100 protein, neuron-specific enolase, CD34, Glut-1 and PIEZO2. In the glabrous skin, vermilion border and vermilion typical Meissner corpuscles and glomerular corpuscles were found with a distribution of the assessed antigens identical to that known for the digital ones. These corpuscles were capsulated (CD34+ cover) and the axon display PIEZO2. Furthermore, complex sensory formations, especially Ruffini's like corpuscles, were found associated to the hairs. Regarding the oral mucosa of the lips free nerve endings were found. Present results demonstrate a rich mechanosensory innervation of the skin and vermilion of the human lips.

O-NAD-3. **THE ACQUISITION OF MECHANORECEPTIVE COMPETENCE BY HUMAN DIGITAL MERKEL'S CELLS AND SENSORY CORPUSCLES DURING DEVELOPMENT: AN IMMUNOHISTOCHEMICAL STUDY OF PIEZO2**

García-Mesa, Yolanda; Cobo, Ramón; Martín-Cruces, José; García-Piqueras, Jorge; Feito, Jorge; Iván, Suazo; Vega, José A.; García-Suárez, Olivia

Departamento de Morfología y Biología Celular, Grupo SINPOS, Universidad de Oviedo, Oviedo, Spain

Recently it was demonstrated that development of human digital Pacinian corpuscles starts at 13 weeks of estimated gestational age (wega), and it is completed at 4 months of life, although their basic structure and immunohistochemical characteristics are reached at 36 wega. On the other hand, Meissner's corpuscles start to develop at 22 wega and complete their typical morphology and immunohistochemical profile at 8 months of life. No data are available about the developmental changes in digital Merkel cells. Furthermore, the morphological maturity of sensory corpuscles does not necessary imply they are functionally mature. Thus, to elucidate this topic we have analyzed immunohistochemically the expression of PIEZO2, a mechanoprotein required for mechanotransduction. Merkel cells were identified immunohistochemically (CK20+, ChrA+, NSE+, Synap+) by 22 wega and at this time they also express PIEZO2. Meissner corpuscles were identified by 22 wega and about 60% expressed PIEZO2, reaching 100% at 2 postnatal months. Regarding Pacinian corpuscles, axonal PIEZO2 was detected perinatally (from 36 wega to 7 days). These results strongly suggest that while Merkel cells are potentially able to mechanotransduce earlier in foetal development, Meissner and Pacinian corpuscles started mechanotransduction later in the perinatal and postnatal life.

O-NAD-4. **WNT1 ROLE IN THE HABENULAR COMPLEX AND ITS FASCICULUS RETROFLEXUS DEVELOPMENT**

Company, Verónica; Moreno-Cerdá, Ana; Murcia-Ramón, Raquel; Andreu-Cervera, Abraham; Almagro-García, Francisca; Martínez, Salvador; Echevarría, Diego; Puelles, Eduardo

Instituto de Neurociencias (UMH-CSIC), Alicante, Spain

The neuroblasts of the developing neural tube require the activity of precise regions to direct their specification and differentiation programs. The isthmic organizer has been described as an organizing center. They produce secreted signaling molecules named morphogens. These include Fibroblast growth factor 8, Wingless (Wnt1) and Sonic Hedgehog. Wnt1 also participate in the dorsalization of the neural tube from the roof plate. Based on our interest in the limbic system development, we studied the Wnt1 role in the habenular complex and its main afference the fasciculus retroflexus development. We analyzed in a Wnt1 loss of function murine model the embryonic development of this neuronal complex. This study has included different approaches that have included proliferation, immunohistochemistry, axonal tracing dyes and iDisco techniques. The lack of function of this morphogen produced a severe alteration in the proliferation rates and a dramatic extension in the anteroposterior dimension of the habenular complex. The subnuclei subdivision lateral and medial habenula maintained a similar distribution. The isthmic territory in the absence of Wnt1 was not able to properly induce the surrounded territories triggering a dramatic

alteration of the correct pathway cues needed for the fasciculus retroflexus axons. Therefore, Wnt1 is necessary for the correct habenular complex growth but not for their specification and differentiation.

O-NAD-5. **THE HABENULAR COMPLEX AFFERENT TOPOGRAPHIC DISTRIBUTION CORRELATES WITH ITS TRANSCRIPTOMIC SUBDIVISION**

Juarez-Leal, Iris; Carretero-Rodríguez, Estefania; Almagro-García, Francisca; Martínez, Salvador; Echevarría, Diego; Puelles, Eduardo

Instituto de Neurociencias (UMH-CSIC), Alicante, Spain

The Limbic System is composed by circuits that regulate emotional sensations and self-protective behaviours and circuits that correlate expressive states and feelings. The Habenula (Hb) seems to play a crucial centred role in this system. The Hb is constituted by the medial and the lateral Habenula (mHb, lHb). The afferences to the habenular complex, despite having different origins, are concentrated in a single tract, the stria medullaris (sm). This fascicle can be subdivided depending on their final target. Recently, the subnuclear organization of both domains has been deeply analysed and correlates with transcriptomic analysis. Our hypothesis is that the transcriptomic subdivision of Hb has a functional role in the limbic system circuits. We analysed the sm different innervation terminations by means of Hb transcriptomic subdivision. We used the Mouse Brain Connectivity section of the Allen Mouse Brain Atlas (www.allenbrainatlas.org) and selected eleven origin nuclei that project into the Hb complex. Our results suggest that septal nuclei would innervate the ventral portion of the mHb. Meanwhile, pallidal nuclei would innervate the dorsal aspect on the mHb. Finally, the hypothalamic nuclei would innervate the lHb in a less compartmentalized manner. We may conclude that afferences to the Hb display a topographic-transcriptomic distribution. This distribution may underlay the still poorly understood internal circuitry in the Hb complex.

O-NAD-6. **NUCLEUS INCERTUS PROJECTIONS TO THE MEDIAL SEPTUM AND ENTORHINAL CORTEX**

Gil-Miravet, Isis; Navarro-Sánchez, Mónica; Núñez-Molina, Ángel; Ros Bernal, Francisco; Mañas-Ojeda, Aroa; Castillo-Gómez, Esther; Olucha-Bordonau, Francisco

Universitat Jaume I, Castellón, Spain; Universidad Autónoma de Madrid, Madrid, Spain

The nucleus incertus in the pontine tegmentum displays a widespread pattern of connections over telencephalic centres involved in cognition processing including the medial septum, the hippocampus and the entorhinal cortex. Part of these connections are mediated by the neuropeptide relaxin3 and its receptor RXFP3. Hippocampal and entorhinal activity may be driven from the medial septum and the nucleus incertus projects to the three centres at the same time. In this work we have analyzed the pattern of collateralization from the nucleus incertus to the medial septum and the medial entorhinal cortex. To this end we have combined immunolabeling for relaxin3 with injections of the retrograde tracers fluorogold (FG) and cholera toxin B (CTB) in the medial entorhinal cortex (MEnt) and in the medial septum (MS) to study the percentage of retrograde neurons projecting to both or to single targets. We have observed that the weight of the incertal projection to the medial septum is 3 times more relevant than to the medial entorhinal. Moreover, most of the nucleus incertus neurons project independently to the medial septum or the medial entorhinal cortex. In addition, we observed that approximately 30% of the NI-MS and 45% of NI-MEnt projections were relaxin3 positive. These results show the importance of the relaxin3-NI projections over the medial septum and entorhinal cortex.

O-NAD-7. **SEASONAL AND CIRCANNUAL TOPOGRAPHIC MORPHOMETRY OF THE PINEAL GLAND OF ALBINO RAT**

Martínez-Soriano, Francisco; González-Soler, Eva; Blasco-Serra, Arancha; Valverde-Navarro, Alfonso

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The study of the pineal gland has been gaining interest over the last decade. Its anatomy and location vary significantly among all species of vertebrates, but if we focus on the analysis of the pineal of rodents, the special complexity of its characteristics can be observed. Some authors have pointed to a possible division of rodents' pineal parenchyma in various regions and layers, also observing variations in nuclear sizes that could depend on luminosity cycles, but more evidence is needed to confirm this.Our study has focused on analyzing the morphological changes that occur in the pineal gland of albino rats during different hours of the day, seasons and photoperiods, taking into account the different layers and regions, in order to find differences in karyometric indices that could be a consequence of varying conditions in natural luminosity. Results showed significant differences in general karyometric values in between layers and regions. Moreover, there are significant evolutionary circadian, photophasic and seasonal differences between regions and pineal layers analyzed. The three regions and two layers of the rat pineal gland are functionally different.

O-NAD-8. **SHORT AND LONG-TERM CONSEQUENCES OF MATERNAL SEPARATION-INDUCED STRESS ON THE AMYGDALA MICROCIRCUITRY OF MALE AND FEMALE MICE AND ITS CORRELATION WITH SOCIO-AFFECTIVE DISORDERS**

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Neglect is the most common form of child abuse. It has been related to serious socio-affective disorders that can emerge either immediately or later in life, although the underlying neural mechanisms remain poorly understood. Recent studies in humans suggest that males and females respond differently to similar situations of neglect but whether these differences can be observed at the microcircuitry level is unknown. Socio-affective and aggressive behavior is highly dependent on the amygdala and the correct balance between excitatory and inhibitory neurotransmission (E/I) is crucial for these functions. Somatostatin expressing (SOM+) interneurons in the amygdala innervate the distal dendrites of pyramidal cells and are considered the most important GABAergic neurons for controlling dendritic information processing in a feedback manner. By using a mice model of perinatal stress (maternal separation with early weaning, MSEW) we demonstrated that SOM+ interneurons change their plasticity and local connectivity in different nuclei of the amygdala. Age and sex-specific E/I imbalances could also be found in these regions as a consequence of MSEW (CeA: increased ratio in males $p=0.011$; BLA: increased ratio in females $p=0.0132$). We also found these specific effects on behavior (males: increased aggression and decreased sociability in pups and adults; females: increased aggression in pups and depressive-like behavior in adults). These results suggest that the inactivation of SOM+ interneurons located in the amygdala is sufficient to modify critical period plasticity in that region allowing a reshaping of neuronal circuitry that could induce gender-specific and long-lasting effects on socio-affective and aggressive behavior.

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O-NAD-9. **THE OVEREXPRESSION OF NRG1-TYPE III DOES NOT AMELIORATE ALS CLINICAL OUTCOME IN HSOD1G93A MOUSE MODEL**

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Amyotrophic Lateral Sclerosis (ALS) is an adult onset disease that affects motor neurons (MNs) in the cerebral cortex, brainstem and

spinal cord. Most of ALS cases (~90%) are sporadic, but ~10% of the cases are inherited. In approximately 20% of familial cases, the disease is caused by mutations in the gene encoding Cu/Zn-superoxide-dismutase1(SOD1). Transgenic rodents overexpressing this mutated gene develop a neuromuscular disorder similar to human ALS. Afferent inputs to MNs are crucial in regulating their excitability. Among different types of synaptic afferents, MNs receive prominent cholinergic C-type ("C-bouton") inputs from spinal interneurons. C-boutons modulate MN excitability, and synaptic transmission throughout C-boutons is involved in the regulation of MN vulnerability. Some C-bouton-associated molecules appear to be relevant in ALS, like the sigma1 receptor (which mutations cause a juvenile familial form of ALS and its pharmacological activation prolongs lifespan of $SOD1^{G93A}$ mice). We have previously observed that neuregulin-1 (NRG1) accumulates in C-boutons, and described C-bouton alterations in a mouse model of ALS. NRG1 signaling has been directly targeted in SOD1-ALS mice by virus-mediated delivery of NRG1 type III to the spinal cord, resulting in extended survival time and reduced C-bouton loss. By cross-breeding $hSOD1^{G93A}$ mice and NRG1-type III overexpressor mice, we created a double transgenic mouse line and examined changes in body weight and survival, and performed behavioral and histopathological studies in spinal cord and skeletal muscles showing no improvement in either motor phenotype or lifespan. Our results indicate that the endogenous overexpression of NRG1-typeIII the does not ameliorate the $SOD1^{G93A}$ mouse phenotype.

O-NAD-10. **DYNAMIC CHANGES OF PROTEINS IN C-TYPE SYNAPSES ASSOCIATED WITH MOTONEURON INJURY**

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C-Type synapses, that provide cholinergic afferents to spinal motor neurons (MNs), are anatomically intriguing structures that present a subsynaptic cistern (SSC) adjacent to the postsynaptic membrane, derived from the endoplasmic reticulum. These C-type synapses are the ones that most modulate the excitability of MNs. A constellation of postsynaptic proteins accumulates in the C-bouton, including muscarinic M2 receptors, potassium channels, and σ-1 receptors. In addition to these proteins, in our laboratory we described that Neuregulin (NRG1) is associated with postsynaptic SSC, while it receptors, called ErbBs, are found in the presynaptic compartment. Given the relevance of C-boutons in MN pathology and their potential as a possible therapeutic target, we have studied in more detail the functions mediated by NRG1 on C-boutons and their impact to certain experimental lesion conditions. In axotomized MNs, the loss of C boutons coincides with microglial activation and recruitment. The analysis of transgenic mice overexpressing specific NRG1 isoforms in MNs allow us to conclude that different NRG1 isoforms orchestrate distinct aspects of the architecture and functional organization of C-boutons and may regulate the activity and recruitment of perineuronal microglial cells during normal and disease conditions. All these data provide new perspectives related to the pathology at the molecular and cellular level of the C-boutons in MNs affected by some process of neurodegeneration, as occurs in the pathology of Amyotrophic Lateral Sclerosis.

O-NAD-11. **ABSCISIC ACID TREATMENT CAN RESCUE MRNA LEVELS OF BDNF AND IRS2 IN TRANSGENIC MICE MODEL OF ALZHEIMER´S DISEASE**

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Neuroinflammation and brain insulin resistance are intimately associated to neurodegenerative disorders, including Alzheimer's disease. Even though traditionally Alzheimer´s disease has been associated to Aβ deposits and intracellular neurofibrillary tangles of hyperphosphorylated Tau, several studies show that neuroinflammation may be the initial cause that triggers degeneration. Recently, several studies focused on natural supplements to improve brain insulin sensitivity and reduce neuroinflammation as prevention/therapeutic intervention to ameliorate cognitive decline. In our study, using a triple transgenic mouse model of Alzheimer's disease, we have shown that the phytohormone abscisic acid, (also an endogenous hormone), a PPARγ agonist rescue memory impairment and neuroinflammation markers (pro-inflammatory cytokines) in this mice model. Moreover, ABA can rescue BDNF and insulin receptor substrates expression. Altogether this result indicates that ABA maybe a potential treatment for syndromes of neuroinflammation etiology via the modulation of several genes involved in inflammation, insulin sensitivity and neurotrophic factors expression.

Poster communications (P-NAD)

P-NAD-1. **LIS1 FUNCTION IN INHIBITORY PARVALBUMIN EXPRESSING NEURONS ON THE MOUSE HIPPOCAMPUS**

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Type I lissencephaly is a severe developmental brain disorder caused by mutations in the Lis1 gene. Despite the recent advances in understanding its functions, it is not fully understood the roles of Lis1 in specific neuronal populations during development and how these roles may modulate the maturation and function of the central nervous system (CNS). Inhibitory GABAergic interneurons are important players in regulating the correct migration and activity of excitatory pyramidal neurons necessary for a proper functional maturation of the cortex. These interneurons express Lis1 and it is well known that a disruption of the balance and coordination between excitatory pyramidal neurons and inhibitory interneurons result in deep alterations of the brain functions such as epilepsy. To address the unexplored role of Lis1 in GABAergic interneurons and its contribution to neurological disorders etiology and associated brain malfunctions, we generated a new mouse model specifically targeting the loss of Lis1 at the parvalbumin positive (PV+) GABAergic interneurons (Lis1cKO-PV+). The hippocampus of postnatal (P15-P21) Lis1cKO-PV+ mice displayed a severe phenotype characterized by the presence of neuronal heterotopia affecting to the CA2/CA3 regions. In this hippocampal area the pyramidal cell layer was disorganized and there was an abnormal placing of pyramidal neurons from the stratum oriens to the stratum radiatum. These histological data highlighted, for the first time, that the specific role of Lis1 on the hippocampal GABAergic PV+ interneurons had a non-cell autonomous impact on the surrounding neural population of this cortical region.

P-NAD-2. **EVOLUTIONARY COMPARATIVE ANATOMY OF THE MIDDLE EAR IN THREE MAMMALIAN SPECIES**

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Introduction and Aims: The mammalian ear has three bones to have two joints, each of which serves a specific muscle. We want to better understand their role and possible clinical implications. Material and methods: We dissected, analyzed and photographed the middle ear of 18 specimens of three species of mammals: 10 guinea

pigs (Cavia porcellus), 4 rabbits (Oryctolagus cuniculus) and 4 sheep (Ovis aries). Results: These three species phylogenetically upcoming show substantial morphological differences. We study the tympanic membrane and its position on the external auditory canal (EAC). We define the position and shape of the malleus, its handle, the incus and the stapes. We describe the shape of the promontory, the situation of the oval and round windows relative to the set. And finally, we refer to the volume and characteristics of the middle ear muscles. Conclusion: The EAC of these mammals appears well developed, it is sinuous and it is situated on an elevated plane to the tympanic membrane, so the bony canal hidden for the most part. The angulation of the tympanic membrane with the EAC is more pronounced than in humans. In rabbits the tympanic membrane is flat, in guinea pigs and sheep are conical as in humans. The ear bones show a similar basic morphology, but have significant differences in size, shape and relative position in the eardrum. Malleus muscle in mammals studied, has a great development, much larger than the stapedial muscle.

P-NAD-3. **INTERNEURON HETEROTOPIA IN THE LIS1 MUTANT MOUSE CORTEX UNDERLIES A STRUCTURAL AND FUNCTIONAL SCHIZOPHRENIA-LIKE PHENOTYPE**

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LIS1 is one of the principal genes related to Type I lissencephaly, a severe human brain malformation characterized by an abnormal neuronal migration in the cortex during embryonic development. This is clinically associated with epilepsy and cerebral palsy in severe cases, as well as a predisposition to developing mental disorders, in cases with a mild phenotype. Although genetic variations in the LIS1 gene have been associated with the development of schizophrenia, little is known about the underlying neurobiological mechanisms. We have studied how the Lis1 gene might cause deficits associated with the pathophysiology of schizophrenia using the Lis1/sLis1 murine model, which involves the deletion of the first coding exon of the Lis1 gene. Homozygous mice are not viable, but heterozygous animals present abnormal neuronal morphology, cortical dysplasia, and enhanced cortical excitability. We have observed reduced number of cells expressing GABA-synthesizing enzyme glutamic acid decarboxylase 67 (GAD67) in the hippocampus and the anterior cingulate area, as well as fewer parvalbumin-expressing cells in the anterior cingulate cortex in Lis1/sLis1 mutants compared to control mice. The cFOS protein expression (indicative of neuronal activity) in Lis1/sLis1 mice was higher in the medial prefrontal (mPFC), perirhinal (PERI), entorhinal (ENT), ectorhinal (ECT) cortices, and hippocampus compared to control mice. Our results suggest that deleting the first coding exon of the Lis1 gene might cause cortical anomalies associated with the pathophysiology of schizophrenia.

P-NAD-4. **DEVELOPMENTAL SPECIFICATION AND ADULT CELLULAR PLASTICITY OF OXYTOCIN AND VASOPRESSIN SYSTEMS**

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The neuropeptides oxytocin (OXT) and arginine vasopressin (AVP) are closely related neurohypophyseal peptides that play critical roles in regulating complex animal behaviors and homeostatic functions. Both neuropeptides are mainly synthetized at specific hypothalamic nuclei, such as the paraventricular and suprachiasmatic nucleus (PVN and SON) among others. Our previous work (Madrigal & Jurado, 2021) revealed that distinct OXT and AVP nuclei are developed independently and most of them show a significant number of neurons co-expressing OXT and AVP during early postnatal stages (PN7) coinciding with a critical period for social interaction. This mixed population, of OXT+/AVP+ neurons, drastically decline in the adult brain suggesting cellular plasticity is developmentally regulated. Using brain clearing techniques (iDISCO+) and 3D imaging we analyzed whether OXT and AVP systems also exhibit plastic

properties in the adult brain. Our results indicate that certain nuclei undergo cellular plasticity in a sex and motherhood dependent manner obtaining the most prominent phenotypes in the periventricular nucleus (PeVN) (sex-dependent), and the SON and retrochiasmatic area (RCH) in which OXT and AVP plasticity is mainly motherhood-dependent. Furthermore, sexual experience induces an increase of tyrosine hydroxylase (TH) expression levels in a subpopulation of OXT and AVP neurons in the RCH. Our findings provide new information to understand the specification of neuropeptidergic systems during development and their plastic properties upon critical life events in the adult animal.

P-NAD-5. **NEUROCHEMICAL AND ANATOMICAL CHARACTERIZATION OF THE INSULAR CORTEX IN MICE**

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The insular cortex (IC), and richly connected cortical center that interacts with bodily states and sensorimotor, environmental, and limbic activities. In primates, including humans, the IC lies folded deep within the lateral sulcus of each hemisphere, hidden below parts of the frontal, parietal and temporal lobes, which form the so-called opercula. Macroscopically, the human IC is divided into an anterior and posterior part by the central insular sulcus. In rodents, such as mice and rats, the IC is exposed on the lateral surface of the hemisphere, mostly above the rhinal fissure. Currently, there is great interest in the IC as a region associated with many psychiatric and neurological disorders, highlighting its role in anxiety and addictions. Interestingly, advances in new technologies for dissecting functional microcircuits, especially in rodents, have placed IC at one of the centers for understanding the neural mechanisms underlying emotions and motivated behavior. However, it is a poorly characterized region at the anatomical level, of which its neurochemical profile is barely known. Therefore, a better anatomical characterization of the different neuronal populations that compose the adult mouse IC is needed. This study focuses on the identification and classification of the different neuronal populations according to their anatomy. The anatomical study was carried out in adult male mice C57BL/6. Histological staining and immunohistochemistry for different neuronal markers were used to characterize the mouse IC. These data will provide a more complete anatomical picture of this center of the limbic system.

P-NAD-6. **THE HUMAN INSULAR CORTEX: A HISTOLOGICAL AND ANATOMICAL STUDY**

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The insular cortex (IC) is a cortical region, which in humans is not superficially visible, located deep to the lateral fissure, and has been widely related to the limbic system. From an anatomical and functional point of view, the anterior region of the IC is among the areas of the neocortex with the greatest expansion concerning other primate species and has reciprocal connections with limbic centers such as the anterior cingulate cortex, the prefrontal cortex, the amygdala, and the ventral striatum, while the posterior region receives sensory afferents coming from the spinal cord and the brainstem. Because its location is more difficult to access than the rest of the cortical regions, it has not been given the importance it deserves within the field of neurology or psychiatry and today remains poorly studied. Due to the evidence of its relationship with addictions, the IC has begun to be a potential target of study in neuroscience, which makes it an important target for biomedical research. Due to the scarce data currently available on the

phenotypic profile of IC, this work aims to study its anatomical characterization based on its neurochemical profile. The immunohistochemical and histological study has been performed in human brains donated for research, using different neuronal markers for the anatomical characterization of IC. These data will provide a more complete anatomical picture of this center of the limbic system.

P-NAD-7. **FIBROBLAST GROWTH FACTOR RECEPTOR 1 IS REQUIRED FOR THE DEVELOPMENT OF THE RETROSPLENIAL CORTEX IN MICE**

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The retrosplenial cortex (RSP) is located in a medial and caudal region of the brain between the neocortex and the archicortex. This cortical region is part of the limbic circuit and has been implicated in a range of cognitive functions such as emotion, attention, and spatial memory. The RSP has reciprocal connections with the anterior and dorsomedial thalamic nuclei, the hippocampal formation, the amygdaloid complex, and widespread neocortical areas. The RSP has been implicated in the pathophysiology of schizophrenia in both human studies and animal models with hyperactive behavior. Fibroblast growth factors (FGFs) and their receptors (FGFRs) are expressed in the developing and adult central nervous system and they have important roles in the morphogenesis of the mammalian cerebral cortex. Fgfr1gene is expressed in the dorsal VZ, the primordium of the cerebral cortex, also in upper layers of RSP cortex in postnatal stages (Allen Brain Atlas). Previous studies demonstrated that disruption of the Fgfr1 gene causes a decrease in cortical interneurons, decrease of pyramidal neurons in frontal and temporal cortical areas and locomotor hyperactivity. To understand the role of Fgfr1 in RSP development, we conditionally inactivated Fgfr1 in neuroepithelial cells of the CNS (Fgfr1f/f;NesCre+). Our analyses of volume estimation of cortical layers and the quantification of pyramidal neurons and parvalbumin-positive interneurons in the RSP, suggested that the proper formation of the RSP depends upon the function of Fgfr1.

P-NAD-8. **DYNAMIC MICRORNA EXPRESSION PROFILES DURING EMBRYONIC DEVELOPMENT PROVIDES NOVEL INSIGHTS INTO CARDIAC "SINUS VENOSUS" DIFFERENTIATION**

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The role of microRNAs has been explored in different organisms and involved as molecular switches modulating cellular specification and differentiation during the embryonic development, including the cardiovascular system. In this study we analyze the expression of different microRNAs during early cardiac development, with special emphasis on those displaying enhanced expression in the sinus venosus. Using whole mount in situ hybridization in developing chick embryo with microRNA-specific LNA probes, we carried out a detailed study of miR-15a, miR-23b, miR-130a, miR-106a and miR-100 expression during early stages of embryogenesis (HH3 to HH17) and correlate those findings with putative microRNA target genes by means of MirWalk analysis. Our results demonstrate a dynamic expression pattern from the primitive streak to cardiac looping stages for miR-23b, miR-130a and miR-15a, with enhanced expression in the sinus venosus. Interestingly, miR-100 is not detectable at early developmental stages, while miR-106a is broadly expressed except in the cardiac anlage, however, both displayed enhanced expression in the sinus venosus at HH15-17. Shared target prediction analyses support a role of these microRNAs modulating transcription and growth factor expression in the posterior secondary heart field, such as. Apln, Prrx1 or Hox genes, thus acting

as necessary modulators during sinus venosus differentiation.

P-NAD-9. **KAEMPFEROL PROTECTS AGAINST THE ACTIVATION OF COMPLEMENT C3 PROTEIN AND THE INDUCTION OF REACTIVE A1 ASTROCYTES BY 3-NITROPROPIONIC ACID IN RAT BRAIN**

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Complement component 3 (C3) has demonstrated to be a relevant mediator of refinement and plasticity in the neuroanatomical structure and normal physiological functions of the brain. It has also proved to be involved in neurodegenerative disorders, including Huntington´s disease (HD). In particular, high expression of complement C3 has been observed in reactive A1 astrocytes obtained from HD postmortem human brain tissue. In a previous study we have observed that high upregulation of complement C3 protein in reactive A1 astrocytes is an early event in a neurodegenerative HD animal model in rats, induced by 3-nitropropionic acid (NPA) intraperitoneal (i.p.) injections. To analyze the protective effect of kaempferol against neurodegenerative processes induced by the neurotoxic 3-nitropropionic acid. Considering that high expression of complement C3 in reactive A1 astrocytes is a determinant factor in neurodegenerative processes, we analyze in the present work its immunohistological architecture in a HD experimental model in rats, based on NPA i.p. severe treatment. Our results show high expression levels of complement C3 protein not only in reactive A1 astrocytes, but also in neurons, mainly in the striatum and in the most recent phylogenetic area of the rat cerebellum. In this study we show that i.p. administration of kaempferol, an efficient natural antioxidant widely used in our experimental models, fully prevents against high expression levels of C3 protein and active C3α proteolytic fragments, preserving the histological structure of these brain areas analyzed.

P-NAD-10. **ANATOMICAL REGIONALIZATION OF EARLY REACTIVE A1 ASTROCYTES INDUCED BY NEUROTOXIN 3-NITROPROPIONIC ACID IN RAT BRAIN**

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Anatomically, and physiologically, reactive A1 astrocytes have been recently identified in several neurodegenerative diseases. Currently, it is known that 3-nitropropionic acid (NPA) administration to rodents produces degeneration of the “striatum”, accompanied by neurological disturbances that mimic Huntington’s disease motor neurological dysfunctions. Additionally, it has been shown that inflammation mediates NPA-induced brain degeneration, and that activated microglia, secreting cytokines interleukin-1α and tumor necrosis factor, can induce a specific type of reactive neurotoxic A1 astrocytes, detected in post-mortem brain samples of Huntington´s, Alzheimer’s and Parkinson’s diseases. To investigate the neurotoxin 3-nitropropionic acid effects on the astroglia in several areas of the rat brain. In this work we have used an experimental model based on NPA intraperitoneal administration to adult Wistar rats, at doses that can elicit extensive brain degeneration. Brain samples were taken before and after extensive brain damage and monitored thorough 2,3,5-triphenyltetrazolium chloride (TTC) staining. Immunohistochemistry, as well as Wester blots, of brain slice samples show that intraperitoneal NPA injections induce higher levels of complement C3α subunit, a neurotoxic A1 astrocytes generation marker. This neurotoxin also elicits an increase in cytokines interleukin-1α, tumor necrosis factor and complement C1q. All these expressions take place, not only in the “striatum”, but also in the “hippocampus”

and "cerebellum" prior to Huntington's disease detection, including its neurological dysfunctions and apoptotic neuronal death. NPA administration primarily induces A1 astrocytes generation in the more recent phylogenetic area of the rat´s "cerebellum". In conclusion, the activation of complement C3 protein is an early event in reactive astrocytes A1 generation in NPA-induced brain neurodegeneration.

P-NAD-11. **MORPHOLOGICAL CHANGES OF THE CHOROID PLEXUS IN PRENATAL DEVELOPMENT AND HYDROCEPHALUS**

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The choroid plexus consists of epithelial cells bound by tight junctions and highly vascularised stroma with fenestrated capillaries. The most important function of the choroid plexus is the production of CSF and forming part of the CSF-blood barrier. The aim of this study was to analyse the succession of morphological changes of the 4V choroid plexus during embryonic development. The variations in the development of the choroid plexus are analysed by histological and immunocytochemical methods (AQP1 and TTR) in control and hydrocephalic embryos of 19-22 GW. During development, the choroid plexus epithelium undergoes changes from a pseudostratified layer to a cuboidal layer corresponding to stage III of choroid plexus development. In the case of tetraventricular hydrocephalus the epithelium of the plexus is more immature than that corresponding to the same age in control foetuses. In the Arnold Chiari fetus, the nuclei are rounded and larger and centrally located (stage III). In the other two cases of hydrocephalus of unknown origin the epithelium has a pseudostratified appearance (stage I). During embryonic development, the choroid plexus epithelium shows morphological changes from a pseudostratified layer to a cuboidal layer corresponding to stage III. The integrity of the PC is essential for maintaining brain homeostasis and B-CSF barrier permeability (Solár et al., 2020). Aqp1 decreased in the choroid plexus of hydrocephalic fetuses. Our results are in agreement with the results obtained by Paul et al. (2009) in rats with congenital hydrocephalus.

P-NAD-12. **INTRAVASCULAR REPLENISHMENT METHOD OF WHOLE CADAVERS USING NATURAL LATEX**

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Intravascular filling via solidificable masses is an adequate technique for human dissection. However, there are few anatomy departments that use it because of the difficulty of reproducibility and handling. The aim of this study is to develop and standarizate a highly reproducible and simple intravascular arterial repletion methodology for whole cadavers, which will substitute potentially toxic substances for others that are more innocuous and resistant to the previous fixing solution. Our results shown that the use of the CALIVIS (Cabanes latex intravascular injection system) methodology, can introduce a natural latex repletion mass in the vascular tree of whole formalin-fixed cadavers with an optimus intravascular penetration, thereby which facilitates the visualization of the arterial vessels. In this system, mass is added immediately after fixation in order to avoid Thiel's penetration problems. These results are due to the protocol proposed for the injection of the intravascular filling mass, and to the physical characteristics of the filling mass obtained. The filling mass that we propose presents clear advantages compared to Thiel's: greater simplicity of preparation, low toxicity, optimal filling behavior and reduced economic costs. All of this makes it possible to propose the CALIVIS method as a routine procedure to be included in the preparation of cadavers for teaching or research purposes in the anatomy departments of our universities.

P-NAD-13. **DETERMINATION OF AQP1 AND AQP4 CONCENTRATIONS IN HUMAN AQUEOUS HUMORS AND THEIR RELATIONSHIP TO THE OCCURRENCE OF OCULAR PATHOLOGIES**

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Aqueous humor (AH) is a fluid responsible for nourishing and oxygenating the cornea and lens, as well as maintaining constant intraocular pressure. It is produced in the ciliary processes where it flows into the anterior chamber and drains through 2 routes, the conventional route, crossing the trabecular meshwork, and the unconventional route, crossing the uveal meshwork. Recently, many authors have been studying the analysis of HA to improve the understanding of ocular pathologies, as well as to search for new therapeutic targets. Aquaporins (AQP) are localized in both epithelia of the ciliary processes and are important in HA formation, and despite being membrane proteins, they have been identified in different human fluids. In this study, the concentration of AQP1 and AQP4 was determined by ELISA in the HA of 66 patients (29 women and 37 men) with different ocular pathologies and undergoing cataract, glaucoma or vitrectomy surgery. The participants were divided into five groups depending on their pathology, diabetic retinopathy, uveitis, primary open angle glaucoma (POAG), senile cataract and diabetic cataract. The results obtained showed a significant decrease in AQP1 in patients with POAG compared to the rest of the groups. As for AQP4, a significant reduction was detected in patients with uveitis, diabetic retinopathy and POAG with respect to senile cataract and diabetic cataract. The decrease in AQP1 concentration could be related to alterations in HA production and reabsorption in patients with POAG. The alteration of AQP4 levels in HA could be related to the appearance of different ocular pathologies.

P-NAD-14. **AAV-MEDIATED OVEREXPRESSION OF ALPHA-SYNUCLEIN IN SUBSTANTIA NIGRA INDUCES PROGRESSIVE NEURODEGENERATIVE CHANGES IN A RAT MODEL OF PARKINSON'S DISEASE**

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Parkinson's disease (PD) is a progressive, age-related neurodegenerative disorder, whose pathophysiology is characterized by a progressive loss of dopaminergic neurons in the substantia nigra pars compacta, leading to a striatal dopamine reduction. Surviving neurons contain α-synuclein -positive intracellular inclusions known as Lewy bodies and dystrophic neurites known as Lewy neurites. α-Synuclein is localized mainly in nerve terminals and it is the most significant protein present in fibrilar form in Lewy neurites and Lewy bodies in this pathology. Using adeno-associated viral (AAV) vector construct to drive the expression of human wild-type α-synuclein progressively along 2-4 months, we have now been able to achieve increased levels of α-synuclein in the substantia nigra enough to induce deficits in motor function, accompanied by reduced expression of proteins involved in dopamine neurotransmission and a time-dependent loss of nigral dopamine neurons. Nigral cell loss was preceded by degenerative changes in striatal axons and terminals, and the appearance of α-synuclein positive inclusions, supporting the idea that α-synuclein-induced pathology hits the axons and terminals first and later progresses to involve also the cell bodies. Changes seen in the AAV-α-synuclein treated animals define distinct periods of disease progression seen in PD patients. This model provides possibilities for studies of stage-specific pathologic mechanisms and identification of therapeutic interventions like enriched environment (EE) that could affect the progression of the disease along the time in early or late phases.

P-NAD-15. **MOLECULAR AND MORPHOLOGICAL ANALYSIS OF THE DOPAMINERGIC NEURONS IN HUMAN SUBSTANTIA NIGRA: NEW CITOPATHOLOGICAL FINDINGS IN PARKINSON'S DISEASE**

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Parkinson's disease (PD) is the most common movement disorder and the second chronic progressive neurodegenerative disease. Fragmentation of the Golgi ribbon is a common feature of many neurodegenerative diseases, including PD. However little is known about the causes of this alteration. Most of the cytopathological findings of this disease have been obtained from cellular and animal experimental models but studies in human tissue are scarce. Our previous studies, using cellular models of Parkinson ´s disease, demonstrate that fragmentation is an early event, previous to a-synuclein aggregation and cytoskeletal alterations. The purpose of this study was to analyze the Golgi complex of dopaminergic neurons in the substantia nigra of PD necropsies using morphological and biochemical techniques. At light microscopy, the Golgi apparatus appeared fragmented and distributed throughout the cytoplasm. Electron microscopy demonstrated that the Golgi ribbon is altered but the typical stacked appearance of this organelle is not lost. The biochemical analysis showed altered levels of GTPases and Golgi structural proteins. We also observed main alterations in the distribution of Rab1 and the SNARE protein syntaxin 5, which is accumulated mainly out of the cell in extracellular inclusions. We demonstrate for the first time that the expression of Golgi structural and transport regulatory proteins is altered in human samples of PD which may explain the fragmentation of this organelle. These alterations may disturb the trafficking of many proteins that are essential for neuronal function.

P-NAD-16. **CHARACTERIZATION OF THE MICROGLIAL RESPONSE IN THE AGED 3XTGAD MODEL**

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Alzheimer's disease (AD) involves severe impairment of cognitive and executive functions and represents 60-70% of all cases. Neuropathologically, it is characterized by the deposition of β-amyloid peptide in extracellular neuritic plaques and the formation of intraneuronal neurofibrillary tangles, which elimination has been the unsuccessful goal of different therapies. However, little is known about the progressing neuroinflammatory process, characterized by an increase in the number and morphological changes of microglial cells at different stages of the disease. The aim of this study is to characterize the morphological differences of microglial cells in the hippocampus of an aged murine model of Alzheimer's disease to elucidate whether, associated with age and tau and beta amyloid deposits, there is an active proinflammatory phenotype different from the physiological pattern. Twenty-four control and 3xTg female mice at 9, 12, 15 and over 19 months old were used (8 groups, n=6 per group). Ten cells were randomly selected from each animal and the AnalyzeSkeleton and FracLac extensions of the Image-J program were adapted to analyze the different morphological parameters. Number of microglia, beta amyloid and tau deposits were also quantified. A significant correlation between the age-associated increased number of microglial cells and tau deposits was found. 3xTgAD and control aged animals didn´t show the morphological differences detected at early stages. In sum, we must consider the age variable to understand the rol of microglial cells in AD neurodegeneration process. Understanding their morphological heterogeneity may be one of the keys of this neurodegenerative disorder.

P-NAD-17. **TARGETING NEUROINFLAMMATION AS A POTENTIAL THERAPEUTIC INTERVENTION FOR ALTERED PAIN SENSITIVITY IN ATTENTION-DEFICIT HYPERACTIVITY DISORDER MOUSE MODEL**

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Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder in children and adolescents worldwide. It often coexists with anxiety and aspects of the autism spectrum disorder, among others. Additionally, the prevalence of ADHD symptoms increases dramatically in children with chronic pain. Recent research suggests that increased inflammation during neurodevelopment can trigger ADHD symptoms and disturbances in pain transmission. Our hypothesis is that there are neuroinflammation in specific brain areas could underlie both processes and that targeting inflammation will reduce symptoms and comorbid pain sensitivity. To test the hypothesis, we aim to establish a mice model of ADHD through neonatal lesion with 6-OHDA, which is neurotoxic to dopaminergic neurons. The mice will be treated with Abscisic Acid (ABA) a phytohormone with anti-inflammatory properties as a therapeutic intervention, for a month. The dopamine injury model and ABA effect will be evaluated in various behavioural paradigms (memory, sociability, anxiety) as well as pain (thermal and mechanical sensitivity). In the post-mortem analysis we will analyse the morphology of reactive microglia as an inflammatory biomarker in specific areas involved in the DA projections from the ventral tegmental area and the substantia nigra. Preliminary results indicate that the lesion increases sensitivity to thermal stimulation in females and that treatment with ABA counteracts this effect. In addition, there are sex-dependent differences in response to lesion and ABA treatment, which opens interesting perspectives regarding the implication of estrogens in this neurodevelopmental syndrome.

P-NAD-18. **ROLE OF RELAXIN3 INNERVATION OF THE RETROSPLENIAL CORTEX IN CONTEXTUAL FEAR CONDITIONING**

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Fear memory is part of the typical adaptive response. However, dysregulated fear memories can be the basis of anxiety states. Context-conditioned fear (CxFC) has been used to replicate some of the events that lead to the development of these disorders. Several brain areas associated with cognition and emotion have been linked to CxFC, including the hippocampus and the restrosplenial cortex (RSC). We hypothesize that specific aspects of the CxFC process are mediated by modulatory projections from subcortical structures. Our aim is to establish an experimental model in which these aspects present a statistically robust framework for testing the involvement of subcortical projections. In this study in adult rats we evaluated two experimental models, with the difference between them being whether the extinction sessions were performed on the same day or on two different days, additionally we examined the effect of RSC manipulation on contextual fear conditioning CxFC, as this center receives specific relaxin3 projections from the pontine nucleus incertus. The results suggest that the extinction between days experimental model better reflects the processes of fear acquisition and extinction. As preliminary results, we observed that animals in which an AAV particle expressing constitutively the relaxin3 agonist R3I5 was injected into the RSC showed an adequate process of acquisition but not extinction of CxFC. Taken together, the present findings establish procedural and behavioural parameters that are amenable to neural systems analysis of three clinically relevant outcomes of fear conditioning: acquisition, maintenance and resistance to extinction.

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P-NAD-19. **PUTATIVE MODULAR TRIPARTITE CIRCUITRY BETWEEN THE RELAXIN 3 NI, SEROTONERGIC RAPHE AND THE ENTORHINAL CORTEX**

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The relaxin 3 rich nucleus incertus and the serotonergic raphe nuclei are midline brain stem modular units that influence various brain functions, including septo-hippocampal contextual behaviours. To investigate the cell to cell circuitry organizations of the counter modulations of the NI and raphe on the septo-hippocampus, adult male and female rats were anaesthetized, and fluorescent retrograde tracers fluorogold (FG) and Cholera toxin subunit B (CTB) were injected into the medial entorhinal and medial septum respectively. The animals were transcardially perfused with 4% PFA, the brain were removed and sectioned rostrocaudally in 40µ. Appropriate sections were stained with mouse anti-relaxin 3, rabbit anti-serotonin and goat anti-CTB to express relaxin 3 neurons, dendrites and boutons, serotonergic neurons and CTB-serotonin co-expressed neurons in the NI or the Raphe nuclei. A relatively high density of immunoreactive relaxin 3 projection fibers and boutons were found in the median and dorsal raphe regions. The topographic locations of a handful of the relaxin 3 positive boutons were seen in close proximity from the immunoreactive serotonergic neurons' soma double or triple labelled also for FG or CTB or both, while others are observed in synaptic-like connections to the cells. Few and sparsely distributed serotonergic neurons co-expressing with the CTB immunolabeling were revealed in the medial and dorsal raphe, and as a proof of concept, appreciable density of relaxin 3 immunoreactive boutons were also observed around their neurons. Together, these findings revealed cell to cell synaptic mapping of the modulator circuitry between the NI relaxin 3 and Raphe serotonin, and the interactions with the septo-hippocampus.

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P-NAD-20. **THE NUCLEUS INCERTUS-RELAXIN3 INNERVATION OF THE SUPRAMAMMILLARY NUCLEUS**

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Several brainstem areas all along with their ascending projections to the medial septum and the hippocampus play a key role in memory processing. Notably, an overlapping ascending bulk of projections arising from the nucleus incertus (NI), a pontine brainstem's nucleus, take a leading role in promoting and controlling hippocampal theta rhythm (HTR): a low amplitude synchronous oscillation associated with hippocampal outputs and spatial memory. In this regard, it was shown that septohippocampal system contributes to the control of HTR. It has been shown the relevance of the relaxin-3 (RLN3); a neuropeptide widely co-expressed in the NI's GABAergic neurons to several components of the septohippocampal system in memory processes. This study aims to emphasize the NI's relaxin-3 innervation to the mammillary bodies; a major relay between brainstem and forebrain structures, in order to study the involvement of the supramammillary nucleus in spatial memories processing. To this end, retrograde tracers fluorogold and cholera toxin B subunit were double injected in the medial septum and hippocampus in order to show the pattern of putative collateralization. Achieving that, we demonstrated the occurrence of this projection by showing that RLN3 fibers arising from the NI are positive to synaptic markers and make contact to hippocampal and medial septal projecting neuron. Our results show that a population of SuM's neurons send collateral projections to the

entorhinal/hippocampal system and the medial septal area. Furthermore, this same population is innervated by the NI's RLN3 cells. Based on this core of evidences, we can postulate that the SuM is a key component of the ascending NI's projections to the entorhinal-hippocampal circuit that is involved in the generation, coding and recall of spatial memories.

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P-NAD-21. **EFFECTS OF AM OR PM FORCED WHEEL EXERCISE ON OREXIGENIC/ANOREXIGENIC HYPOTHALAMIC GENE EXPRESSION OF ADOLESCENT RATS**

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Physical activity became an effective way to modify the adipose tissue content during adolescence. However, the literature on the neurobiological mechanisms of the exercise involved in these changes is controversial. In this study P20 adolescent rats (n=24) began a handling, habituation and training procedure until the age of P60. Different groups were trained at ZT13 (AM exercise, AM sedentary) or at ZT23 (PM exercise, PM sedentary). On P24 and P57, the whole body of the rats was analyzed through computerized tomography. Food and water intake were measured every 24 hours. On P60, the hypothalamic region was removed, and analyzed by qPCR. Statistical analysis and graphs were performed with GraphPad Prism 9. Only the PM exercise group showed lower adipose tissue content ($p<0.05$). Both exercise groups showed higher lean content than the respective control groups ($p<0.05$). No differences were observed regarding body weight or body volume between the groups ($p>0.05$). No differences were observed in the food intake or the orexigenic/anorexigenic gene expression of Pomc, Agrp, Npy, Cartpt ($p>0.05$). AM exercise groups showed higher Hcrt mRNA expression ($p<0.05$). Our results suggest that the effects of morning or evening exercise on the body composition are not related to intake differences. An impairment of the orexin system during exercise in the morning could be related to the accumulation of adipose tissue despite of the increased energy expenditure. Further studies are required to elucidate the molecular mechanisms responsible of these differential effects of exercise, dependent on the time of the day.

Education, Visceral and Locomotor Systems

Oral communications (O-DELM)

O-DELM-1. **DISTRIBUTION OF SENSORY FORMATIONS IN HUMAN SHOULDER JOINTS**

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Joints are innervated by nociceptive and mechanosensory nerves fibers to serve different modalities of somatosensitivity and presumably also proprioception, which is essential for motor control and joint stability. Mechanosensory nerve formations transduce mechanical deformation into neural signals transmitting information about articular position and movement. Innervation of human glenohumeral joints is not completely know. Nevertheless, it is accepted that the surgery in the capsule and the labrum in an unstable shoulder disrupt the structure, orientation, distribution and concentration of sensory corpuscles present in those articular structures. Here we used immunohistochemistry for general nerve markers, both axonal and Schwann cells, to identify different morphotypes of sensory corpuscles and analyze their distribution along the capsule and the labrum of the glenohumeral joint. The study was aimed to develop a map of sensory innervation of these structures. The data obtained so far seem to indicate that these sensitive formations are located all around the capsule of the glenohumeral joint, including the anterior-superior part, anterior-inferior, posterior-superior and posterior-inferior. Also in a capsule of acromioclavicular joints. In addition, it's rather striking their presence in elevated numbers in the whole biceps tendon and the subscapular tendon. Present data basically agree with previous investigations in determining the existence of sensory structures in glenohumeral joints, and even identify in a rigorous way what type of sensory nerve formations are found in each studied zones. Furthermore, they offer a complete map of shoulder innervation than consent better understand what happens to patients with shoulder pathologies, which cause disability and pain.

O-DELM-2. **CAN AN INSTAGRAM PROFILE BE USEFUL FOR TEACHING ANATOMY?**

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Human Anatomy learning is hardly conceivable without a face-to-face teaching model, based on cadaveric dissection. However, even before the Covid-19 pandemic, teaching conditions made it interesting to develop new, more active methodologies, based on virtual platforms, that facilitate student autonomous learning. To promote its use, it is important to go to the most popular social networks, such as Instagram, although its scope is at first sight far removed from academic teaching. Our goal was the creation of new high-quality anatomical images, which followed the teaching programme of the Anatomy dissection lectures, and were opened to students through the use of questionnaires and the creation of an Instagram profile. The new anatomical images were generated using photographs of the actual structures, after careful dissection especially done for this project, and completed with new illustrations by an anatomical illustrator. This new graphic material has been used to create an Instagram profile, @eldeanato, and a series of questionnaires disseminated by the Instagram stories. The degree of satisfaction of the students with the new tools was evaluated through surveys sent through online forms. At this moment, the open Instagram profile @

eldeanato keeps followers from various academic years, universities and degrees in the biosanitary area, and an average of more than 150 active participants in the questionnaires published every week in stories. Evaluation surveys show high satisfaction scores in all fields. We think that the use of an Instagram profile has been particularly effective, and could be extended to other subjects of biosanitary education, especially those with an important visual and graphic component.

O-DELM-3. **DRAWING AS A TOOL FOR MEDICAL STUDENTS TO LEARN ANATOMY: DESIGN AND IMPLEMENTATION OF A METHOD**

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Anatomy is fundamental in medical education. There are different methods that can be combined to teach this subject. A quasi-experimental study was carried out with the participation of 67 volunteer first-year medical students to evaluate the influence of using a systematic drawing method during classes to improve the level of anatomical knowledge and three-dimensional understanding. The students attended a skull drawing workshop divided into four sessions to work on four anatomical projections. In each session they made one free drawing and another one following the method explained by the teacher. The drawings were evaluated with a maximum of 25 points. The evolution of the students was assessed by comparing the scores obtained at the beginning and at the end of the workshop with the Wilcoxon signed-rank test. These turned out to be significantly higher at the end of the workshop. Likewise, the mean scores of 'Anatomía General' of the workshop participants and the rest of the students who did not participate were compared with the Mann-Whitney U test. The participating students obtained better grades in the theoretical exam, in the practical exam and in the final grade, as well as in the questions on concepts related to the skull within each exam. The students rated the experience very positively through an opinion survey. We concluded that the drawing workshop had a positive influence on the learning of Anatomy and that attending the workshop improved the level of knowledge, the ability to discriminate details and the three-dimensional understanding of the skull.

O-DELM-4. **METHODOLOGICAL INNOVATIONS IN PRACTICAL ANATOMY WITH THE USE OF 3D PRINTING MODELS**

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The application of 3D printing in the field of anatomy is becoming more generalized and improves and increases the training in anatomy of students in the health sciences. In the same way, preclinical practices in Podiatry should be increasingly realistic and innovative, which will help students to acquire competencies, abilities, skills, and security before they practice with patients. We acquired 3D printing models of magnetic foot skeleton, foot sole and detachable nail. A total of 150 students of the Degree in Podiatry at the University of Extremadura were surveyed after participating in a practical session with each of the models. To verify its benefits in teaching practice, two student surveys were conducted. A survey collects the evaluation of the contents and another the opinion on them. The practical session for each model was the same for all students and was always carried out in the same room. The results showed that the use of the removable 3D models was more effective than the classic models, as it improved the identification of anatomical structures. Students who used 3D models showed greater motivation and spent more time working with these models. In addition, they considered that they were closer to real human structures than with classical models. The 3D printing models favour the autonomous learning of students and allow them to assimilate the basic anatomical concepts more easily or acquire greater practical skills. It is easier to replace the pieces at low cost, it offers the possibility of making variations that are impossible in other classic models and it opens infinite teaching possibilities in Anatomy. In addition, the magnetic mount improves learning by trial and error.

O-DELM-5. **LEARNING OF HUMAN ANATOMY THROUGH GAMIFICATION: COMPARISON OF THREE EXPERIMENTAL STUDIES**

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Gamification introduces game mechanics and techniques in other areas such as education and it is easy to add to Audience Response System (ARS), that have shown to improve the outcomes and promote conceptual knowledge of the student in addition to be an instrument for professor evaluation resource. This union leads to the keener focus and active participation of the students. A large number of studies have used gamification approaches in health education, but no other studies have compared different gamification element used in a ARS. This study assesses the impact of gamifying (G) and ARS on the perfections and educational performance of 182 students of General and Descriptive Human Anatomy course of the first year of the Medicine degree, comparing an ARS, called SIDRA, and two gamified systems, R-G-SIDRA (gamified SIDRA with ranking) and RB-G-SIDRA (gamified SIDRA with ranking and badges). Results: Statistically significant differences were found in final exam grades, between using RBG-SIDRA and SIDRA o R-G-SIDRA thus finding strong evidences with respect to the benefit of the badged used. Moreover, statistically significant differences were found in the students SIDRA system score between RB-G-SIDRA o R-G-SIDRA and SIDRA showing the improvement in the implementation of gamification in ARS. Significant correlations between individual and team score were also found in all of the test in RB-G-SIDRA and G-SIDRA. The student satisfaction with SIDRA, R-G-SIDRA and RB-G-SIDRA, has been very positive and most students would like to use in other subjects. Conclusion: Student perform better academically with gamified versus non-gamified ARS.

O-DELM-6. **MODIFICATION TO THE THIEL METHOD**

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Corpses preserved with the Thiel method meet optimal conditions for medical-surgical simulation, by preserving color, elasticity, consistency and friability, being aseptic, and indefinite preservation. We currently have problems acquiring ammonium nitrate, due to its use in the manufacture of explosives. And likewise, although the amount of formalin in this method is very low, the tendency is to eliminate this product. Achievement of formulas without these chemical products, without losing the characteristics of the original method. Dead Wistar rats have been used, coming from our University's animal facility, which had been sacrificed for the regulation of the animal facility. They were previously skinned to avoid interference from leather and dermal hair, thoracomized, catheterization of the left ventricle, and section of the right atrium, 100 ml of physiological serum were passed, then 100 ml of the different solutions to be tested, kept in containers wrapped in cloths of the same solution. Different solutions have been used, and as a control the Classic formula of W. Thiel. Of all the formulas tested, the substitution of glyoxal for formalin and ammonium nitrate for ammonium chloride showed characteristics as good as the controls. The variant that we propose represents greater savings, with results similar to the original technique. We provide a variant to the method of W. Thiel, in this case tested in small animals, which we intend to transfer to human corpses.

O-DELM-7. **PRESERVATION OF CORPSES WITH SOLUTIONS FREE FROM FORMALDEHYDE**

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The declaration of Formol as a type 1 carcinogen with permissible levels of exposure below 0.3 PM has made it necessary to try different methods for its suppression, although some of them have achieved it as fixatives in pathological anatomy,

its use in dissection rooms has not received a good acceptance. Wistar rats have been used, from our University's animal facility, which had been sacrificed for its regulation. They were previously skinned to avoid interference from leather and hair, thoracomized, catheterization of the left ventricle, and section of the right atrium, 100 ml of physiological serum were passed, then 100 ml of the different solutions to be tested, a total of seven, they were kept in containers wrapped in cloths of the same solution and the status of the individuals was checked at 6 months, at one year, and at 3 years, extracting organs for study. Of the different solutions tested, the one composed of Glioxal, Ethanol, ClK, Lugo, ac. acetic, Glycerin, Ac. Boric and Chlorocresol is, undoubtedly, the one with the best results. The variant that we propose, devoid of formaldehyde, with results similar to the classic ones, with better elasticity and friability, supposes a reduction in the risk of exposure to this agent. We provide a variant to the conservation methods, in this case devoid of formaldehyde, tested in small animals, which we plan to transfer to human corpses.

O-DELM-8. **FORMALDEHYDE FILTRATION EQUIPMENT OVERVIEW**

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In the dissection room, formaldehyde is used for the preservation of corpses and pieces. Formaldehyde has a relatively high vapor pressure at room temperature, so it tends to evaporate and enter the room atmosphere easily. Formaldehyde is a chemical product considered carcinogenic by Spanish and European legislation, so its concentration should be kept as low as possible. In addition, it is an irritant product with a VLA for short exposure that should not be exceeded either. To support the room air renewal system by reducing the average concentration of formaldehyde and the variability of concentrations over time. Methods: It consists of prismatic equipment that sucks the air from the room through the lower part and returns it to the room through its upper part. It is a system that recirculates the air in the room using a high-quality electric fan. The system has filters to collect particles, aerosols and especially for the adsorption of formaldehyde vapors. The filters are made of high impact polystyrene with SAAF OXIDANT technology and filled with activated carbon. During the measurements carried out in January and February 2020, it was observed that in the room reductions in the background concentration of around 30% are achieved. The equipment achieves a significant reduction in the average concentration of formaldehyde and reduces the possibility of punctually exceeding the short exposure values.

O-DELM-9. **LESSONS LEARNED ON NON-PRESENTIAL TEACHING IN HUMAN ANATOMY AT THE UNIVERSITY OF GRANADA**

Picon-Ruiz, Manuel; Jiménez, Gema; López-Ruiz, Elena; Carrillo, Esmeralda; Graván, Pablo; Peña, Jesús; Ruiz Espinares, Jesús; Boulaiz, Houría; Perán, Macarena; Marchal, Juan Antonio

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The extraordinary health situation caused by the COVID-19 pandemic forced us to hastily adapt teaching to a non-presential scenario. This work analyzes the quality and appropriateness of different methodologies used for Human Anatomy education and evaluation remotely. The methods applied for theoretical and practice teaching included asynchronous and synchronous classes supported by the use of different audiovisual material. In regards to online evaluation, a test was carried out prior to the official exams to establish the type of questions and the time to allow to answer each question. Our experience showed that the use of synchronous non-face-to-face videoconferences for theoretical teaching does not significantly affect student learning compared to face-to-face teaching. However, online practical teaching shows a deficiency in the acquisition of knowledge, although the use of videoconference showing a cadaver dissection was found to be the best methodology to use. Regarding to the evaluation, the higher mean scores and approved students compared to previous years demonstrate

the high difficulty of the remote evaluation. In conclusion, the theoretical teaching of Human Anatomy can be carried out remotely, maintaining quality standards, and allowing the acquisition of the knowledge and skills required by the students. However, non-face-to-face teaching considerably reduces the practical training and the evaluation of the knowledge acquired. In any case, videoconferencing is a very valuable tool for both theoretical and practical teaching, as it allows direct interaction between the teacher and the students, and it could also be applied to improve the quality of online assessment.

O-DELM-10. **MOBILE LEARNING IN HUMAN ANATOMY: A STUDY ON APPLICATIONS MARKET AND A REVIEW OF PRESENT EVIDENCE**

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Mobile learning (m-learning) has been introduced in classrooms as a complementary tool to traditional training of health science students. Human anatomy has been one of the sciences where its use has become most popular and nowadays there is a large offering of mobile applications that facilitate its learning. Describe the current market situation of mobile applications for human anatomy learning in health sciences students. Analyze the evidence of m-learning and its usefulness for human anatomy learning in health science students. A scoping review has been carried out on the Google Play marketplace following the PRISMA guidelines and looking for all applications aimed at academic human anatomy learning. At the same time, a systematic review has been carried out searching the PubMed and ScienceDirect databases for analytical studies from 2000 to the present moment that dealt with m-learning and its usefulness for human anatomy learning in health science students. 325 applications from 231 developers were found and classified into 8 categories, the 3D atlas being the most prevalent. 76.6% of the applications addressed anatomy in general and 23.4% some of its parts. 91.1% were free, 24.9% had in-app purchases, 70.2% had advertisements, and half had not been updated for more than a year. The leading apps were free and from 3D atlas category. 21 studies were found, mostly about applications and digital books, which showed the usefulness of m-learning to increase the attitude, participation and motivation of students, as well as to facilitate the study and increase grades. In most cases, the overall assessment was positive, although specific limitations of the technology and its use were evidenced. There is a wide and varied market for anatomy applications that can serve to supplement student education, although it requires assessment and in-app purchases, advertisements, and out-of-date can hinder the learning experience. The evidence speaks in favor of the benefits of m-learning for the learning of human anatomy in health science students. However, it is weak and more studies are needed to give robustness to the results and cover the entire spectrum of possibilities within m-learning.

Poster communications (P-DELM)

P-DELM-1. **EXPLORING THE USE OF AN INSTAGRAM ACCOUNT IN ANATOMY EDUCATION: AN EMERGING EXPERIENCE**

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Human anatomy is a challenging subject for many students in health sciences, potentially decreasing their engagement with this discipline. Instagram is one of the most popular social media visited by students daily. Consequently, it seems an appropriate web platform to integrate and supplement college Anatomy Education into social media. At the Department of Histology and Anatomy of the University Miguel Hernández (UMH), we created a public business account (@anathumumh) to promote the learning and dissemination of anatomy content among medical, podiatry, physiotherapists, occupational therapists, and pharmaceutical students. "Insights

metrics tool" was used to evaluate the level of engagement to our publications (number of likes, comments, or shares of each post/story) and some lifetime metrics (gender, age distribution and demographic data). We have almost obtained 800 followers throughout our first academic year, primarily women (18-34 years old; 69%) from the Valencian community. We generated different types of posts and stories (50 vs. 80): basic anatomical concepts, the etymology of anatomical terms, relevant scientific or academic news, curiosities about the history of Medicine, MIR questions, etc. In general, stories had a greater impact than posts since they had a more significant number of views, participation and impressions (550 on average). In addition, student perception was excellent from the beginning of this exploratory project. Therefore, Instagram may be a valuable supporting feature for creating and transmitting anatomical knowledge in a collaborative and constructive manner, being positive for the corporate image of our Human Anatomy Unit.

P-DELM-2. **THE IMPACT OF CHANGE FROM TRADITIONAL TEACHING TO ONLINE TEACHING IN ANATOMY DUE TO THE COVID-19 PANDEMIC: OUR EXPERIENCE AT THE UNIVERSITY OF CADIZ**

Pérez Arana, Gonzalo Martín; Ribelles García, Antonio; Carrasco Molinillo, Carmen; Camacho Ramírez, Alonso; Fernández Vivero, José; Vargas Delgado, José Jesús; Prada Oliveira, José Arturo

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Anatomy has traditionally been a subject with an important theoretical and practical face-to-face load in the studies of medicine, nursing and other disciplines. Despite there have been attempts to teach this partially ONLINE, not without great difficulties. In this sense, the expansion of SARS-CoV-2 has changed the world of teaching. Also in the case of teaching in Anatomy, limiting attendance and forcing the use of new ICT tools with more or less success. In this work we describe the adaptation by teachers and students to the immediate and intensive use of the new telematic tools for teaching in the subject of Anatomy. Specifically, the problems, benefits and drawbacks observed during the development of the Anatomy I subject throughout the second semester of 2020 at the Faculty of Medicine of the University of Cádiz. Implying as a final result a high number of approved students, an excessive volume of work for the teaching staff and some doubts about the capacity of the new ICT tools compared to the traditional methods of teaching in anatomy.

P-DELM-3. **INTEGRATION OF THE FINAL DEGREE PROJECTS IN BASIC RESEARCH IN ANATOMY. OUR EXPERIENCE OVER 8 YEARS**

Pérez Arana, Gonzalo Martín; Ribelles García, Antonio; Carrasco Molinillo, Carmen; Camacho Ramírez, Alonso; Fernández Vivero, José; Vargas Delgado, José Jesús; Prada Oliveira, José Arturo

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In 2007 the implementation of "Plan Bolonia" began in Spain by the RD 861 /2010. Within the development of this program is the obtaining of the degree or master title. In each case, it is necessary to carry out work throughout the last year of study on a specific topic at the end of the studies. Final degree project (TFG). In the area of study of medicine, the idea of assigning TFG framed in the work of university basic research groups quickly emerged. Our research group joined the experience back in 2013 within The Department of Human Anatomy and Embryology of the University of Cádiz. Carrying out work related to lines of research in basic medicine. The aim of this study is the analysis of the outcomes after these 8 years to determine which have been the main problems and synergies provided in the development of these TFG works. We base this study on 22 students who carry out their TFG work within the research lines of the group from 2013 to 2020. We measured the percentage of students who leave TFG work, Main problems exposed by the students during TFG development, average marks obtained, and percentage of TFG included in relevant scientific publications. The

results obtained indicate a high success rate with an average score of 8.89 and inclusion of more than 60% in relevant publications. But also problems such as an insufficient period of time, or an excessive workload during the course. We conclude that this type of work is very important to bring students closer to the world of research for the first time, but a review of normative and teaching schedules is necessary to avoid many of the problems that emerge during its development.

P-DELM-4. **DOING RADIO. A NEW COMMUNICATION STRATEGY TO LEARN ANATOMY**

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Communication is a common tool to whole educational process. It includes not only the oral communication between professor and student, but the communications between students too. In the Health Science students, we must implement the learning of communication skills. We need to incorporate this work strategy with the other aptitudes that are present in the grades. The health science students need to be able to communicate difficult and complicated message to the patients and families. This complex situation has an increased complication. In our discipline, communication includes a new code of technical words. Anatomy is a doctrinal corpus which includes a whole vocabulary and terms. And these new words and concepts should be included in the anatomy learning process. We designed a new strategy to work the anatomical vocabulary and concepts in order to facilitate the study of anatomy. Thus, we increase the communication capacity of students, with a correct and complex transmitting of the anatomical information. So we tried to reach these two objectives. The more active participation in the learning process of the student, the more quality in the learning process and acquisition of complex concepts. To these, we promoted an activity where nursing students must prepare a radio interview. A couple of students had to design a conversation about a list of anatomical topics. They had to act as a reporter and a specialist in this topic. The recorded interview was broadcasted for the whole class. Then, they could analyse the content of the topic, the correct information about anatomical structures or relationships. But in other ways, we analysed the information process, the way the words were selected and the correction of the message. The professors selected five items to evaluate the work of the students: 1. Structure of the message; 2. Original materials employed on the interview; 3. the anatomical structures and description; 4. Anatomical correlation to other structures; 5. Oral exposition. We designed this activity only in one of the first courses of the Nursing grades (Jerez de la Frontera), where the human anatomy subject has 65 students. As a result, almost all the students participate in the activity (62/65). All the participants showed a well-structured programme, with a relative-corrected content and anatomical relationships. These mistakes were corrected during the exposition by the professors. The student expressed a global acceptance of the activity, which was valued as an interesting task. The students considered the activity to increase the capacity to express anatomical data; the activity conducted them to prepare anatomical concepts in depth. Moreover, the students considered they reached a better knowledge of the subject and they were able to communicate more precisely anatomical references to other people. In conclusion, we hope this new strategy could be a useful way to facilitate the hard anatomy learning process. We take advantage of the use of the student codes and behaviour. Students are digital-born and they use different ways to transmit information between them. We can use it for learning.

P-DELM-5. **GAMIFYING ANATOMY EDUCATION WITH SOCRATIVE SOFTWARE DURING THE COVID-19 PANDEMIC**

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Learning human anatomy involves visualizing structures, understanding their 3D relationship, and memorizing new Latin terminology difficult for any one-year student doing health science courses. Teaching anatomy has become more difficult in the past year due to the COVID-19 pandemic needing to adapt classes to an online environment. New educational strategies are being implemented in health professions education to promote motivation for learning and student participation. Socrative teacher is a mobile application that allows students to participate as gamers, introducing fun to the learning process. We wanted to study whether the Socrative tool may improve students' learning and motivation in the subject "Human Anatomy" of the Degree in Podiatry at the Miguel Hernández University (UMH, Spain) during the 2020-2021 academic year. To this end, we throw three questionnaires at the end of each teaching unit using "Space Race" tool included in Socrative Software. Space Race allowed students to participate in groups and visualize their results and their partners' progress in real-time, promoting cooperation within the group and competition with the other groups. Finally, a satisfaction survey was passed. The results of the questionnaires were analyzed and compared with the final exam results. Although more studies are needed, we observed differences in the performance of Socrative tests between repeating and non-repeating students, suggesting that the engagement of repeating students was not as good as expected.

P-DELM-6. **EARLY INTRODUCTION TO MUSCULOSKELETAL SONOANATOMY IN THE DEGREE OF PHYSIOTHERAPY**

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Applicability of sonoanatomy in the study of musculoskeletal alterations is rapidly expanding to different disciplines of health sciences. However, the correct interpretation of the ultrasound image requires experience and training. The introduction of this technique in the early phases of the study of human anatomy could allow students to integrate the learning of the anatomy of the locomotor system with the ultrasound image. For all this, we proposed a teaching innovation project in which first-year physiotherapy students were introduced to the use of ultrasound anatomy. The aim of this project was to integrate the classical topographic learning of anatomy with the learning of sonoanatomy. Regarding the methods, students were introduced to an interactive ecography guide, and then they explored the handling of the ultrasound machine, and how the various anatomical structures are observed live. Results showed, in the sonoanatomy examination test, an average score of 7,39 (N = 95); also, a survey was carried out in which 54% of the surveyed students (N = 95) found this tool "very interesting" in the study of anatomy, considering it "quite adequate" in their first stage of learning. Likewise, 85% of the surveyed students answered that they would take an exclusive subject on imaging anatomy. For all this, we can discuss and conclude that the inclusion of sonoanatomy in the first stage of education in health sciences is a positive experience, which allows students to integrate sectional and topographic anatomical knowledge, always as a complement to classical anatomy.

P-DELM-7. **FIRST VISIT TO THE DISSECTION ROOM IN THE HEALTH SCIENCES DEGREES**

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In the programs of teaching human anatomy in the different Degrees of Health Sciences, practices are often carried out through the dissection of cadavers or prosection. However, exposure to dead bodies can cause anxiety for students, especially the first time. This study aims to explore the degree of anxiety of the Anatomy students of the Medicine, Occupational Therapy,

Speech Therapy, Physiotherapy, and Nursing programs at the University of Castilla-La Mancha (Spain) who are experiencing their first visit to the ward dissection. A total of 254 Health Sciences students participated in this study. The Trait-State Anxiety Inventory was used to assess anxiety before and after the first practice in the dissection room. The students with the highest levels of SA (state anxiety) were the students of the Degrees of Nursing and Medicine compared to the students of the Degrees of Speech Therapy, Physiotherapy, and Occupational Therapy. This difference between the different Health Sciences Degrees may be because doctors and nurses have in their care work the component of empathy associated with compassion and care in the last stages of patients' lives. The students are satisfied with the use of dissection or prosection as a methodology in their practice. It is important to look for coping mechanisms to lower anxiety levels. For this reason, in addition to carrying out these studies and knowing the emotional reactions, which will allow them to know how they can affect the attitude and quality of care towards the patient and to know how they should face it in their future professional practice.

P-DELM-8. **CIRCULATING MIRNAS PROFILE IN LIMB-GIRDLE MUSCULAR DYSTROPHIES: POTENTIAL BIOMARKERS FOR DIAGNOSIS AND PROGNOSIS**

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Limb girdle muscular dystrophy (LGMD, ORPHA 263) is a genetically and clinically heterogeneous group of rare muscular dystrophies, caused by autosomal dominant or recessive gene mutations. It is characterized by progressive muscle weakness with dystrophic muscle pathology and currently has no known cure or treatment. For the clinical diagnosis of LGMD, a comprehensive approach is needed, including clinical evaluation, serum creatine kinase measurements, genetic testing, and muscle biopsy. On a research basis, the molecular mechanisms underlying the disease remain unknown. The aim of this work was to study those epigenetic factors such as miRNAs that affect osteoblasts and myoblasts transcriptomes in LGMDs. Next-Generation Sequencing was used to discover a series of circulating miRNAs detected in peripheral blood samples of LGMD patients (n=7) and healthy controls. These miRNAs were then analysed using bioinformatics applications. The miRnome analysis identified 6 differential circulating miRNAs ($p < 0.05$) between both experimental groups (control vs. LGMD). Hierarchical clustering analysis was able to identify both groups in the datasets. Gender was found to be irrelevant in this clustering. Gene ontology (GO) enrichment analysis ($p < 0.05$) and Kyoto Encyclopedia of Genes and Genomes analysis (KEGG) showed that these differentially expressed miRNAs were associated with proliferative and differentiation pathways. We propose that these miRNAs participate in the epigenetic control of signaling pathways by regulating osteoblast and myoblast differentiation, thus modulating the genetic background of LGMD patients. Some of these miRs were already described in other muscular and scoliotic pathologies, reinforcing the relevance and specificity of our findings. Furthermore, miR-206 found to be up-regulated in LGMD group, is defined as a "myomiR" and can be easily measured in serum or plasma samples of patients. Consequently, this miRNA-signature might be a potential biomarker for diagnostic, prognostic, or disease stratification of LGMD patients.

P-DELM-9. **OPEN EDUCATIONAL RESOURCES AS A TEACHING TOOL IN THE AREA OF HEALTH SCIENCES**

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Open educational resources or OER are made up of documents or multimedia material whose purposes are related to education, specifically, to teaching, learning, evaluation and research. They are increasingly present in teaching processes. learning in the university environment. This work analyzes the training activity for teachers: Open educational resources as a teaching tool in Health Sciences for university teaching staff in Health Sciences. To improve university teaching in the area of Health Sciences using open digital resources as a tool. The classes have been taught by experts in the field, they have been held in person in the computer room of the Faculty of Medicine (UGR) so that they were fully active, participatory and practical for teachers in the area of Health Sciences. Attendees created and shared teaching and research resources with the appropriate digital licenses. They carried out practical cases and exercises proposed in relation to their interests. At the end of said activity, the university teacher has known: to create their own OER, knowing and identifying Creative Commons licenses and has been able to choose the one that best suits their teaching needs; looking for multimedia teaching content that responds to a certain license. The participants made a teaching website and some attendees adapted their own with Creative Commons content. They used the Google Business tools; They have also shared the materials created by them from networks as facilitating systems for the transmission of knowledge. The use of OER can be used by university teachers who teach in the area of Health Sciences as support for traditional pedagogical methodologies, as effective educational strategies for learning, supported by the use of new technologies, with the objective of improving the teaching and knowledge of our students.

P-DELM-10. **DEVELOPMENT OF TUTORIAL VIDEOS TO SUPPORT THE TEACHING OF HUMAN ANATOMY: A TEACHING INNOVATION PROJECT**

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Universidad de Granada; Universidad de Jaén, Spain

The European Convergence process has implied the need for an organizational change that encourages the development of new methodological strategies in the teaching of both theoretical and practical classes, increasing the number of hours that students dedicate to autonomous work and study hours. Hence, the development of strategies in which the student is the protagonist of their own learning acquires more and more relevance. For all the above, and to guarantee the quality of the training processes of students, it is essential to create new teaching and learning tools based on the use of new information technologies. Based on this, through a Teaching Innovation Project at the University of Granada, an innovative multimedia material was created based on tutorial videos to support the theoretical and practical teaching of human anatomy subjects. The videos consist of an explanatory narration visually accompanied by images of anatomical models and representations. These resources make it possible to optimize the performance of students in face-to-face classes, reducing learning time, since they previously have the didactic material. On the other hand, this new tool helps them to solve the doubts that arise regarding the content explained in class when they are doing their autonomous work or during their study hours. In addition, the images of anatomical models allow the student to access material that they can only have in hours of practice and under supervision. In conclusion, they facilitate the autonomous learning of students and serve to support teaching in times of pandemic.

P-DELM-11. **A NOVEL BOARD GAME TO REINFORCE HEALTH SCIENCES STUDENTS' KNOWLEDGE ON HUMAN ANATOMY**

Perán Quesada, Macarena; López Ruiz, Elena; Chocarro, Carlos; Martínez, Daniel; Jiménez, Gema; Picón, Manuel; Boulaiz, Houria; Carrillo, Esmeralda; Barungi, Shivan; Marchal, Juan Antonio

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The educational trends of recent years are leading to the development of new teaching methods that replace the traditional lecture

with methodologies that involve a more active participation of students in the learning process. Within the field of active learning, a branch known as "Gamification" has been developed, which encompasses the application of game concepts in contexts not related to it. In this context, we present an innovative methodological tool that can be used successfully for learning Human Anatomy. The main objective of our project was to facilitate the dynamic learning of Health Sciences students in the field of Human Anatomy. To do so we have designed and developed a board game to serve as an enjoyable support for the study of Human Anatomy. The game "Human anatomy: learn by playing" consists of different challenges in which winning is determined by a player's ability to answer questions and to draw or describe anatomical structures. Game cards have been classified by Apparatus or Systems of the human body and are distinguished by different colors to facilitate their use in the specific practical section of each subject. The surveys carried out with the students of Health Sciences of the University of Jaén showed a high acceptance of this pedagogical tool. The use of the novel board game: "Human anatomy: learn by playing" during human anatomy practical sessions stimulates and reinforces student learning.

P-DELM-12. **3D PRINTING IN HUMAN ANATOMY, ¿THE LATEST TEACHING REVOLUTION?**

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The teaching of human anatomy requires the support of several visual resources for a better understanding and motivation of students. 3D printing is one of the newest resources to provide anatomy laboratories with multiple models. The aim of this review is to analyze the usefulness and potential of printing as a teaching resource. To do so, a literature search was carried out in pubmed, scopus and scielo, among others. The studies highlight the great utility of the printing to facilitate the production of multiple highly representative copies, but in addition, an important feature is that it allows the generation of pathological models, and common and rare anatomical alterations. In addition, the analysis of the knowledge and skills acquired by the students with this methodology were significantly higher compared to conventional methodologies, especially compared with 2D resources. It also has several advantages such as avoiding problems associated with the use of cadavers, can cover the whole age period, can be dissected and reassembled, etc. But it is not all advantages, since being a resource generated by a technological system requires having the appropriate equipment at one's disposal, as well as a basic level of knowledge of the process, or else contracting the services of the increasingly numerous 3D printing companies. In conclusion, 3D printing is proving to have great advantages for teaching human anatomy, and furthermore, students are showing great interest and preference for these models, demonstrating their usefulness as a teaching resource.

P-DELM-13. **IMMUNOHISTOCHEMICAL LOCALIZATION OF PIEZO1 AND PIEZO2 IN HUMAN URINARY SYSTEM**

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The proper function of organs that make up the urinary tract depends on their ability to sense and respond to mechanical forces, including shear stress and wall tension. Both nephrons, collecting ducts and lower urinary tract are known to undergo changes in wall tension, and are reported to be mechanosensitive and respond to distension. In the last decade, a mechanical channel family with two members, PIEZO 1/2 has been identified as ion channel mediating mechanosensory transduction in mammalian cells and participated in physiological actions in the urinary system such as regulation of urine flow and bladder

distention. Due to the exposed data, our research group set out to study by immunohistochemical techniques, the distribution of PIEZO 1 and 2 channels, throughout the entire urinary tract in humans free of urinary diseases, obtained from autopsies with an age range between 25-50 years from the Hospital Universitario of Salamanca. Our results show that in the kidney, PIEZO 1/2 immunostaining was detected in the epithelium of proximal tubules and collecting duct and weakly expressed in distal tubule. In the ureter, the urothelium was positive whereas elastic fibers and connective tissue within the lamina propria were negative. In conclusion, the data obtained in our study show the existence of the PIEZO protein family throughout the urinary system, which could help to understand the appearance of urinary diseases whose mechanotransduction is affected, such as urinary incontinence and bladder distention, opening possible therapeutic targets and offering better disease control.

P-DELM-14. **POSTRAUMATIC PSEUDOANEURYSM OF THE SUPERFICIAL PALMAR ARCH: A CLINICAL CASE**

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A pseudoaneurysm of the palmar arch is an uncommon condition. After the study of a clinical case we will develop the diagnosis and treatment of it. It is a unique injury direct and external over the inner vascular layer that allows to form a cavity which grows and expands until it breaks and spreads its content. Usually they have a multifactorial origin and is not associated a a particular type of patient. Here we report a39 years old man, who shows an incised-contused wound on the thenar eminence of the left hand, develops a pseudoaneurysm of the superficial palmar arch. It was identified by an angiotomography and surgically treated with ligation and resection of the injury. Vascular traumatism needs monitoring of their complications. The physical exam with a clinical suspicion allows to approach the care of the damage. Nowadays, the surgical treatment is the one which provides the best results in the short and long term.

Clinical and Surgical Anatomy and Physical Anthropology

Oral communications (O-AQA)

O-AQA-1. THE SENSORY INNERVATION OF THE HUMAN PALMAR APONEUROSIS IN NORMAL CONDITIONS AND IN PALMAR FIBROMATOSIS DISEASE

García-Martínez, Irene; M. Gago, Abel; García-Mesa, Yolanda; Jorge, Feito; Suazo, Iván; García-Suárez, Olivia; Vega, José Antonio

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The human palmar aponeurosis is involved in hand mechanosensation, including proprioception, thanks to the different morphotypes of sensory corpuscles which it contains in a consistent manner. In palmar fibromatosis, classically referred to as Dupuytren's disease, the palmar aponeurosis undergoes structural fibrous changes that presumably also affect the nervous apparatus, causing pain and altered sensory perception. Here we studied the qualitative and quantitative changes of the sensory nerve formations in the palmar aponeurosis of patients suffering palmar fibromatosis. Our work used immunohistochemistry technics searching for corpuscular constituents, including putative mechanoproteins Piezo2 and ASIC2 in the panel. In both normal and pathologically affected aponeurosis, free nerve endings, as well as Golgi-Mazzoni's corpuscles, Ruffini's corpuscles, paciniform and Pacinian corpuscles were identified. We discovered an increase in the free nerve ending density and the Golgi-Mazzoni's corpuscle density in the pathologically affected aponeurosis. Furthermore, we noted that Pacinian corpuscles were enlarged, displaying an altered shape, as well as morphological and immunohistochemical evidence of occasional denervation. However, no increase in their number was observed. In these altered corpuscles both Piezo2 and ASIC2 were absent. Results indicate that the richly innervated human palmar aponeurosis undergoes quantitative and qualitative changes affecting the free nerve endings and sensory corpuscles in palmar fibromatosis. Such changes can explain the sensory alterations reported in this pathology.

O-AQA-2. ANATOMICAL VARIATIONS OF THE MANDIBULAR CANAL AND THEIR CLINICAL IMPLICATIONS IN DENTAL PRACTICE: A LITERATURE REVIEW

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Universidad Andres Bello; Universidad Finis terrae; Universidad de las Américas; Universidad de Tulane, Chile

The anatomical variations of the mandibular canal have been described according to the number of additional branches it presents, bifid and trifid. Within the bifid we can also find subtypes of variations such as the retromolar mandibular canal. These anatomical variations can have important clinical implications for the work of dental professionals. A systematic search of the literature was carried out in different databases that met the following criteria: articles published between 2000 and 2020, and articles that established a clinical correlation with variations in the mandibular canal. After applying inclusion and exclusion criteria, 32 articles were obtained, in which the variations of the mandibular canal were identified, their prevalence and incidence, which was very varied between the different articles, it was also found that the CBCT was the main technique to identify the anatomical variations of the mandibular canal. Lastly, the anatomical variations of the mandibular canal have a direct clinical correlation with pre-surgical, intra-surgical and postsurgical complications in

pathologies that require surgical intervention. The anatomical variations of the mandibular canal have a high incidence, so knowing them is of vital importance both for clinicians and anatomy professors who provide morphological training. We believe that research should focus on describing and diagnosing the causes of these anatomical variations. That said, there is also a continuous challenge for all health professionals to learn about the different anatomical variations that the human body presents and how these can affect clinical practice.

O-AQA-3. **A MINIREVIEW: SLEEVE GASTRECTOMY AND ROUX-EN-Y GASTRIC BYPASS. TWO SCULPTORS OF THE PANCREATIC ISLET**

Pérez Arana, Gonzalo Martín; Ribelles García, Antonio; Carrasco Molinillo, Carmen; Camacho Ramírez, Alonso; Fernández Vivero, José; Díaz Gomez , Alfredo; Prada Oliveira, José Arturo

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Several surgical procedures are performed for the treatment of obesity. A main outcome of these procedures is the improvement of type 2 Diabetes mellitus (DM2). Trying to explain this gastrointestinal hormone levels and their effect on organs involved in carbohydrate metabolism as liver, gut, muscle or fat have been studied intensively after bariatric surgery. Less studied have been these effects on endocrine-cell populations in the pancreas. The aim of the work is to determine the effect of the two most common types of bariatric surgeries as the Sleeve Gastrectomy (SG) and the Roux-en -Y Gastric Bypass. (RYGB), on the cell populations of the endocrine pancreas using a rodent model as Wistar rat. Valuable information to explain the pathophysiological mechanisms underlying this surgery and to improve its outcome. For this study, we assessed the expression of alpha, beta, delta and epsilon- cell populations in pancreas of Wistar rats subjected to SG or RYGB surgery in the short and long-term (4 and 24 weeks after surgery) using immunohistochemical techniques. Also we measured short and long-term insulin response after each surgery. The results obtained shown a long-term loss of beta-cell mass in the long- term and a replacement of this by alpha-cells in many cases, after SG or RYGB surgery. Also, in the case of SG surgery, a significant short and long-term increase in the epsilon-cell population and a decrease of delta-cell number. The insulin response appeared diminished in the long-term after both surgeries. We conclude that both surgeries have a powerful effect on endocrine pancreas-cells. These effects are different and probably mediated by different pathophysiological mechanisms. Finally, we think about the loss of beta cell mass could be behind relapses in DM2 in the long-term after surgery

O-AQA-4. **IS IT POSSIBLE TO PREDICT NAIL CONSISTENCY BY IMMUNOHISTOCHEMICAL ANALYSES?**

Mingorance Álvarez, Esther; Rodríguez-León, Joaquín; Pérez Pico, Ana María; Mayordomo Acevedo, Raquel

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The human nail apparatus is a structure of epidermal origin and comprises the nail plate made up commonly named nail. Nail plate comprises overlapped keratinised cells, with very few pyknotic nuclei. This cell compaction and its cornified nature difficult the experimental handle of this tissue. Nail consistency is a recent characteristic that could be very useful for clinical purposes like the colour or shape. Previous studies of our research group determined the presence of three types of nail consistencies: hard, intermedium and soft. To understand the possible relation between nail consistency and keratins in the nail plate we select 32 adult individuals (age 49.81±3.21 years) with nearly the same percentage of nail consistency types and gender. Immunohistochemical analyses were performed using two keratin antibodies: AE13 and cytokeratin 17, both of them against type I keratins. The results obtained demonstrated that the cytokeratin 17 antibody can identify different nail consistencies types. More specifically, the staining intensity with the cytokeratin 17

antibody showed significant differences between hard-consistency nails and soft-consistency nails (p-value=0.026). This work supplies evidence to demonstrate that hard-consistency nails and soft-consistency nails have different expression levels of K17. This new knowledge must be considered for health professionals and podiatrists because of its clinical implications during their foot examination to prevent and diagnose possible systemic or nail diseases.

O-AQA-5. **RIGHT MESOCOLIC "SAIL" AS A NEW QUALITY STANDARD FOR A CORRECT D3 LYMPHADENECTOMY IN RIGHT COLON CANCER**

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Right hemicolectomy for right colon cancer involves the need for removing the lymphoadipose tissue along the superior mesenteric vein (SMV) and head of the pancreas known as D3 lymphadenectomy (D3-L). Especially important is to remove the surgical trunk of Gillot, the lymphoadipose tissue covering the SMV between the ileocolic vein and the gastrocolic trunk of Henle. The aim of this study was to define new, reproducible anatomopathologic standards of specimen quality assessment when an oncologic right hemicolectomy with D3-L has been correctly performed. The current research has been carried out in 2 different phases. The first part consisted of a cadaver-based study of right colon anatomy, and the second part consisted of a prospective assessment of a series of surgical specimens obtained after right hemicolectomy for cancer. In all of the cadavers an oncologic right hemicolectomy was simulated, attempting a D3-L. We identified an avascular mesocolic area, located between the surgical trunk of Gillot and the ileocolic vessels, which we named the right mesocolic sail (RMS) because of its shape. We found that the RMS were constantly present in the specimen if the D3-L had been correctly performed. We also examined 65 surgical specimens. We identified the right mesocolic sail in 32 specimens (49.2%). In conclusion, the present study showed an anatomic structure, the RMS, as one of the crucial parameters to classify as a correctly performed D3-L. This classification correlated with the number of nodes retrieved, and it might be associated with a survival benefit in the long term.

O-AQA-6. **THE CYBORG EXPERIMENTAL CENTRE - MIGUEL HERNÁNDEZ UNIVERSITY OF ELCHE**

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The current development of medicine with continuous innovations, diagnostic techniques and treatments requires training prior to acting on living individuals. To have a centre with an administrative and technical structure for the simulation of new diagnostic and treatment procedures. The "CYBORG" has an area for the use of Mannequins for simulation, and for recording the performances of the students, which will be subsequently discussed in debriefing sessions. There must be operating rooms to perform interventions in housed animals. Finally, we use corpses prepared by means of the generation of "Tanato-Cybors". Using microchips, we can simulate all kinds of situations in the corpse. We have developed a kit so that it breathes, presents independent arterial and venous circulation, being able to simulate alterations of everything. Thiel's technique allows abdominal distention for laparoscopic procedures and recovers circulation by means of Pseudo Blood, allowing bleeding and coagulation with an electric scalpel. The maintenance of this centre requires computer scientists, engineers, veterinarians, and administrative and management support for the admission control of donors and corpses and the organization of courses. In our centre various

courses are held with national and international participants and with an evaluation of excellence. The demand for the use of diagnostic and treatment mannequins, courses in medium-sized animals or in corpses prepared electronically, needs administrative infrastructure and technical support such as the Cyborg.

O-AQA-7. **EMBALMING WITH MODIFIED LARSSEN SOLUTION FOR IMPROVING SURGICAL TRAINING TECHNIQUES IN THE ANATOMY LAB**

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The use of fresh frozen human specimens is the best method to simulate surgical techniques in the anatomy lab. However, natural biological deterioration of these samples makes their use difficult, both in long-term learning activities and in central nervous system postgraduate courses. The aim of this work is to evaluate the properties and the utility of modified Larssen embalmed human specimens, for their use in postgraduate training activities. The study has been carried on 25 fresh human heads from adult cadavers belonging to the University of Girona's Body Donation Program. Through the carotid system, warm modified Larssen solution was injected after a physiologic serum intravascular rinsing. Then, coloured natural latex was injected. The specimens were stored and refrigerated at 4ºC immersed in Larssen solution. The preservation was optimal for all the embalmed specimens, and they showed a good general appearance. Texture, colour and tissues consistent were similar to those of frozen specimens, especially the subcutaneous tissue and the muscles. Moreover, central nervous system structure was maintained, and its consistency and organoleptic properties allowed the application of surgical techniques. After two years, no microbial contamination has been observed in containers. These Larssen embalmed specimens have been used in two postgraduate activities. Open surgery and endoscopic techniques have been applied and results were optimal for both training courses. This preservation technique provides optimal cadaver quality and good tissue handling (including the central nervous system) for its use in postgraduate learning activities and training in surgical techniques.

O-AQA-8. **NEW INSIGHTS ON THE ANATOMY OF THE ELBOW LATERAL ULNAR COLLATERAL LIGAMENT (LCUL). ANATOMICAL VARIABILITY, E12 SHEET PLASTINATION DESCRIPTION, AND RADIOLOGICAL CORRELATION**

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In the lateral ligament complex, the lateral ulnar collateral ligament (LCUl) has been considered the main stabilizer of the elbow. However, the precise description and the biomechanical role of this structure remain unclear. These facts make the identification of its injuries with radiological techniques difficult, which is essential for a correct surgical repair. To perform a precise morphological description of the LCUl, fifty-five fresh-frozen human elbows were studied by macro/microdissection. Before dissection, twenty of these specimens were studied by ultrasound and magnetic resonance imaging. In addition, ten more specimens were studied by the E12 sheet plastination technique. Ultrasound and magnetic resonance imaging enabled identification of the ligament, nevertheless the image was not optimal in all cases. The LCUl was identified by macro/microdissection in all specimens, setting three morphological types attending to the morphology of its insertion on the ulna. Its average length and thickness were determined at 90º of flexion. The maximum shortening of the ligament was observed during extension and supination of the elbow. Using E12 sheet plastination, the LCUl was identified as an individualized structure distally from the head of the radius, corresponding to the deepest of the lateral complex, and becoming a well-defined fascicle towards the supinator crest of the ulna. Macro/microdissection combined

with radiological techniques and E12 sheet plastination have allowed us to make a precise description of the LCUl. This ligament is constant in the lateral ligament complex of the elbow, and it can be identified either by ultrasound or magnetic resonance imaging.

O-AQA-9. **THE POSTEROLATERAL CORNER OF THE KNEE. ANATOMICAL DESCRIPTION BY MACRO/MICRODISSECTION AND E12 SHEET PLASTINATION TECHNIQUE**

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Posterolateral instability of the knee is usually associated with major traumas, such as anterior cruciate ligament avulsion or meniscal ruptures, and makes recovery more difficult. The better the anatomical reconstruction of the posterolateral stabilizers, the better the biomechanical outcome achieved. However, there is no consensus on their anatomical components, morphology, and topographic relationships. These facts make it challenging, not only to achieve an accurate diagnosis by imaging techniques, but also to apply a proper treatment. To enable a precise description of the main structures in the posterolateral corner of the knee, eight adult fresh-frozen human knees were studied. Six specimens were analyzed by macro/micro dissection, and two specimens were studied by the E12 sheet plastination technique. We observed that the biceps femoris tendon divided into two bundles that hugged the distal third of the lateral collateral ligament, isolating this ligament from the capsule. The collateral ligament of the fibula showed fibers joining its posterior border with the arcuate popliteal ligament, and fibers surrounding the popliteal tendon. Posterior fibers were observed connecting the popliteal tendon with the superior surface of the lateral meniscus, and anterior fibers connecting this tendon with the inferior face of the meniscus. Combined use of the macro / microdissection and E12 plastination technique has provided us with a better understanding of the posterolateral compartment of the knee. Our results show the complexity of this anatomical complex, therefore it requires a study with a larger sample.

O-AQA-10. **BIOPRINTING TO FABRICATE CELL-LADEN CONSTRUCTS FOR PERSONALIZED REPAIR AND REGENERATION OF ARTICULAR CARTILAGE**

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3D Bioprinting is a promising tool that seeks to fabricate implants that mimic the mechanical strength, structure, and composition of native tissues. The selection of a suitable material, in terms of mechanical properties and biocompatibility, is crucial for the development of functional personalized implants capable of sustaining high load-bearing environments to integrate into the surrounding tissue of the cartilage defect. In this study, we evaluated a novel 3D bioprinting material called b-TPUe to fabricate 3D printed scaffolds with application in cartilage tissue engineering. The mechanical behavior of this material in terms of friction and elasticity were examined and compared with human articular cartilage, PCL, and PLA. Furthermore, the bioprinted construct loaded with human mesenchymal stem cells (MSCs) was characterized using a live/dead assay and SEM to assess the biocompatibility, alamar blue assay to evaluate the proliferative potential, and RT-qPCR to study chondrogenic differentiation. In addition, in vivo biocompatibility and host integration were analyzed. This novel printing material showed a mechanical behavior closer to natural cartilage when compared with PCL and PLA. In vitro assays demonstrated the ability to support the growth and chondrogenic differentiation of MSCs, while in vivo assays revealed no toxic effects 21 days after scaffold implantation, extracellular matrix deposition, and integration within the

surrounding tissue. These results highlight the potential of b-TPUe as a 3D printing material for the automated biofabrication of artificial tissues and as an optimal candidate for cartilage tissue-engineering applications.

O-AQA-11. **CLINICAL POTENTIAL OF NOVEL BIOINKS DERIVED FROM DECELLULARIZED EXTRACELLULAR MATRIX FOR 3D BIOPRINTING OF BIOMIMETIC ORGANS**

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The high incidence of patients with chronic lesions in organs with low or null ability of regeneration, make necessary the development of new strategies based on tissue engineering. The development of several biofabrication strategies such as 3D bioprinting, allows the sequential printing of different layers that can be formed by materials with different properties, emerges as a viable alternative to mimic the multilayered and stratified structure. In this context we propose to obtain biomimetic bioinks derived from decellularized extracellular matrix (dECM) combined with biomaterials and with application in 3D bioprinting of trilaminar skin, and cartilage. We generate an early chondrogenic extracellular matrix (ECM) or trilayer ECM from both differentiated human mesenchymal stem cells (hMSCs) and from human primary fibroblasts. Then, we formulated several hydrogels based on collagen I and agarose with the intent to bioprint loaded with cells to generate biomimetic tissues. Moreover, cell viability and proliferation, histology and rheological characterization were performed. Finally, we evaluated in vitro and in vivo regenerative properties following pre-GMP conditions. We show that mdECM derived hydrogels possess excellent biocompatibility and suitable physicochemical and mechanical properties for their injectability. Furthermore, it is evidenced that after 3D bioprinting the different formulations are able to form hyaline cartilage-like tissue and a mature trilaminar skin. These findings demonstrate for the first time the potential of this hydrogel based on mdECM as formulation for applications as an injectable hydrogel and as bioinks useful in 3D bioprinting to biofabricate cell-laden structures for applications in both cartilage and skin repair and regeneration.

O-AQA-12. **ANATOMIC SPHINCTEROPLASTY WITH COMBINED RECONSTRUCTION OF INTERNAL AND EXTERNAL ANAL MUSCLES IN THE ANAL INCONTINENCE SURGICAL TREATMENT. DESCRIPTION OF A NEW TECHNIQUE**

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Overlapping anal sphincter repair is usually advocated for the treatment of fecal incontinence due to obstetrical, iatrogenic or accidental damage. The classic technique includes overlapping of the external anal sphincter with preservation of scar tissue and without attempting to separate the internal from the external sphincter muscles. Some groups introduced a separate repair of the internal and external muscles, attending to repair the damaged sphincter from a more anatomical point of view. The introduction of some modifications in the classic technique, named "Anatomic sphincteroplasty with combined reconstruction of external and internal anal sphincter muscles" may achieve a proper anatomic reconstruction of the sphincteric complex, being reproducible and safe. The main modifications are: 1- Wide dissection of anovaginal space until we visualized both puborectalis bundles. 2- Removing the fibrotic tissue from the damaged muscles. 3- Dissection of the intersphincteric space separating internal and external anal muscles. 4- Long imbrication of internal anal

sphincter from the puborectalis bundles until anal soft tissue. 5- Creation of an anal plastia with eversion and protrusion of anal verge creating an "hemorrhoid-like" effect. This technique was performed in 40 patients. Six patients presented a complication, and only 2 required a subsequent surgical intervention. 92.5% of the patients were satisfied or very satisfied after the surgery. 65.7% had restored the internal and the external anal sphincter in the follow up in the ultrasound assessment. The "Anatomic sphincteroplasty with combined reconstruction of internal and external anal muscles" is a reproducible technique with very low rate of complications.

O-AQA-13. **ANATOMIC LANDMARKS FOR A SAFE AMBULATORY NISSEN FUNDOPLICATION**

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The outpatient management of patients undergoing laparoscopic Nissen fundoplication requires that the surgical procedure be carried out to its maximum quality and efficiency. A precise knowledge of the anatomy is essential for surgical and outpatient management success. We review the anatomical keys and surgical maneuvers to achieve a safe fundoplication. We present the results of our prospective, observational study, over a period of 13 years. 100 patients were included on an intention-to-treat basis for the surgical treatment of gastroesophageal reflux disease (GERD). 65 patients were managed as outpatient surgery. Data were obtained referring to the evaluation of postoperative pain, quantitative impact in terms of analgesic consumption and recovery profile of activities of daily living. The median age was 41 years, with 38 women and 27 women. The median duration of the intervention was 106 minutes, and the average time to discharge was 5.6 hours. The mean pain-free time was 12.8 hours. Two minor postoperative complications were registered: a trocar hernia and a need for reoperation due to esophageal twist. Exquisite anatomical knowledge as well as the necessary maneuvers to perform a tension-free fundoplication are essential to achieve the success of the surgery and a safe outpatient management of these patients.

O-AQA-14. **THICKNESS DIFFERENCES IN THE DEEP PLANE OF THE ABDOMEN IN POST-STROKE: IMPLICATIONS ON THE RESPIRATORY PATTERN. OBSERVATIONAL STUDY**

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The abdominal muscles not only act as agonists during active expiration, but also play an important role during inspiration, directly contributing to the action of the diaphragm to maintain the tone of the abdominal wall. The abdominal compartment is the main predictor of diaphragmatic movement. In the case of the chronic patient with acquired brain damage, it is suspected that there are differences between the no paretic side and the paretic side, in the thickness of the abdominal wall muscles (transverse abdomen, internal oblique and external oblique) and in their muscle activation capacity. To estimate the structural differences in the deep abdominal wall between the healthy and unhealthy side in users with acquired brain damage. People middle age 73 years old, post-stroke and an evolution of more than 6 months after the injury. They will all be members of the Navarra Brain Injury Association (ADACEN). An ultrasound of the deep plane of the abdomen is performed at the mid-axillary line between the costal border and the iliac crest. N=24 were evaluated. Significant statistical differences were observed in the transverse abdominis in the state of maximum relaxation with a $p < 0.05$ between the paresic and no-paresic side. The transverse muscle presents differences in its thickness in people with brain damage in chronic phase that can influence the work of the diaphragm, although the sample is small and it is necessary to increase it to have data with external validity.

O-AQA-15. **THE ACETABULUM AS ADULT AGE MARKER. A TEST IN A COLOMBIAN SAMPLE**

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Estimating the age-at-death of human remains is important for both forensic and archaeological analyses. It is essential for accurate human identification and past population reconstructions. The acetabulum, a part of its locomotor implication, is important in anthropological studies due to its utility in sex estimation and because recently, it has been pointed as a good adult age marker. The acetabular ageing method was developed in a Portuguese population and tested in others (Spanish, English, and USA), giving good results. In this paper, we test its utility in a documented skeletal collection from Colombia (185 women and 378 men). The obtained morphological scores were analysed through IDADE2 web page, a Bayesian statistical program that estimates a relative likelihood distribution for the target individuals, produces age-at-death estimates, and provides 95% confidence intervals. Even though this method was developed in a European sample, the results show that it is also useful in modern Colombian samples with reasonable accuracy results, i.e., an average absolute error of 10.63 years in females and 9.44 years in males. Nevertheless, accuracy in females is slightly lower than in males, probably due to their higher morphological variability related to different factors than age. The results of this study are similar to the one obtained in other European and North American populations and significantly better than that obtained from the 3 traditional methods of ageing. New tests on other populations are necessary, however results from this acetabular method indicate that it can be included in anthropological laboratories routines.

Poster communications (P-AQA)

P-AQA-1. **PAIN OR NO PAIN? THE ROLE OF BLOOD VESSELS IN DIABETIC NEUROPATHY**

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The prevalence of diabetes mellitus is increasing to epidemic proportions. This will result in massive increases in diabetic distal symmetrical polyneuropathy (DPN) and its sequelae, including neuropathic pain (painful-DPN), which affects around 25% of patients with diabetes. Why these patients develop neuropathic pain is not clearly understood. Recently, it has been suggested a relationship between pain and angiogenesis. To investigate this association, we used finger toes glabra skin of control and patients affected by painful and non-painful DPN and immunohistochemical techniques. Using CD34 and CD31 antibodies we found an increase of blood vessels density remarkable in patients with DPN-painful. Double immunofluorescence with actin/CD34 markers showed that immature vessels are unstructured and their lumen are decreased. Numerous ion channels have been found in the blood vessels. Our group have focused on PIEZO 1, PIEZO 2 and TRPV1, since they were implicated in: mechano-transduction, regulation of vascular tone, proliferation and pain. Regarding the literature, it was reasonable to hypothesize a variation in blood vessels immunostaining pattern between three group, however we not appreciated changes in the blood vessels immunostaining in patients with neuropathy respect to control. In conclusion, this work seems to link angiogenesis with the appearance of pain in diabetic neuropathy. Moreover, Piezo2, Piezo1 and TRPV1 were localized in both immature and mature blood vessels of patients with DPN so could contribute to vascular pain mechanisms

and could open a new path to a therapeutic target to be able to treat pain through the use of antagonists of these ion-channels.

P-AQA-2. **THE READAPTATION OF THE INTESTINE AFTER ANATOMICAL REARRANGEMENT DUE TO ROUX-EN-Y GASTRIC BYPASS AS A KEY TO RELAPSE IN T2DMIN A RODENT MODEL**

Pérez Arana, Gonzalo Martín; Ribelles García, Antonio; Carrasco Molinillo, Carmen; Camacho Ramírez, Alonso; Férnadez Vivero, José; Díaz Gomez , Alfredo; Prada Oliveira, José Arturo

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Gastric bypass en Y-roux (RYGB) has become one of the most performed bariatric surgery today. Many outcomes report the RYGB short-term ability to improve glucose intolerance or even to solve Type 2 diabetes. But there is a significant percentage of cases that relapse in the medium and long- term. We are looking for a possible pathophysiological explanation beyond incretin influence in a long-term RYGB healthy rat model. Three groups of n=12 rats were performed: Fasting control, Sham-operated and RYGB-operated group. Glucose tolerance and Insulin secretion after OGTT were assayed in every group a long twenty-four weeks. Beta and alpha -cell mass, and Pdx-1, Pax 6 and Arx differentiation markers wear tested in pancreatic samples from each group at twelfth and twenty-fourth week after surgery. Also intestinal adaptive response was measured observing villus height, crypt depth and SGLT1 and GLUT 5 expression in the alimentary limb of RYGB rats or equivalent intestinal segments from the control groups. The results shown a long-term insulin response loss after RYGB, including pancreatic Beta-cell mass depletion and Alfa-cell mass increase, a remarkable growth of villi and crypts and an increase in the expression of SGLT1 in the alimentary limb. In conclusion, RYGB performance leave to adaptive changes in the alimentary limb that implies an increased glucose intake and high insulin secretion requirement to maintain glucose homeostasis. This long-term situation causes beta-cell population overwork, triggering the transdifferentiation on alpha-cell. This process could explain RYGB long-term failure to control diabetes.

P-AQA-3. **THERE IS NO CORRELATION BETWEEN BODY MASS INDEX AND CORNEAL THICKNESS IN EMMETROPIC INDIVIDUALS**

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Currently there is little evidence about the correlation of body mass index (BMI) with quantitative corneal anatomy in emmetropic subjects. We carried out an observational prevalence study that analyzed the central corneal thickness (CCT) in a sample of 64 young healthy emmetropic subjects (20 to 25 years; mean ± SD, 21.8±1.8; 95% CI, 21.4-22.2), with a BMI that ranged from 18.5 to 24.9 (mean ± SD, 22.3±1.1; 95% CI, 22.0-22.6). The means of five consecutive measurements of the CCT were determined with scanning-slit corneal topography. The CCT of the subjects analyzed was 560±17 microns (95% CI, 555.9-564). We found no correlation between the BMI and the CCT ($r = 0.01$; $p = 0.965$) although literature suggests that non emmetropic taller and heavier individuals tended to have eyes with thicker CCTs and there is a weakly correlation between BMI and CCT in non emmetropic eyes. Nevertheless, our study has revealed that there is no correlation between the BMI and the CCT in young healthy emmetropic individuals.

P-AQA-4. **FACIAL RECOGNITION FROM THE PAST**

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Neandertals were cold-adapted extinct humans with craniofacial features that differed from anatomically modern humans as midfacial prognathism, marked supraorbital torus, and large

nasal and orbital areas. Neandertals are the stars in several social media and scientific audiovisual films, and everybody can know about its anatomy and, in theory, everybody can identify a Neandertal. Nevertheless, we aimed to test if grade students who have studied gross human anatomy could positively identify a Neanderthal face. First, we instructed 91 (100%) students about the Neandertal face characteristics and their differences with the anatomically modern human faces. Second, we presented a sample of Neanderthal and anatomically modern human faces obtained from Google and specialized textbooks to the students. Finally, we presented two Neandertal face images (one face of a Neanderthal woman and one face of a Neanderthal man) and asked them to identify if they were Neandertals or not. The question-answer test was carried out online utilizing an own specific computer programme software. Ten (11.0%) students (five women and five men) failed to identify the face of the Neanderthal man positively, while 39 (42.9%) students failed to identify the face of the Neandertal woman positively. The students that failed to identify the Neandertal woman face were 20 (22.0%) men and 19 (20.9%) women. Although Neandertal anatomy is well known, our results have revealed a significant number of students who cannot identify a Neanderthal woman face. Our results have detected that there is a deficit of knowledge about the Neandertal women facial anatomy. As a result, we believe that gender perspective is needed when disseminating knowledge about Neandertals anatomy in social media to reduce the difficulty of identifying a Neanderthal woman face.

P-AQA-5. **PREVALENCE OF ARCUATE FORAMEN IN DRY CADAVERIC VERTEBRAE: OWN RESULTS AND META-ANALYSIS**

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The arcuate foramen (AF) is an anatomical variant of C1 which consists of a complete osseous bridge over the groove for the vertebral artery, from the posterior region of the superior articular facet to the superior lateral border of the posterior arch. An AF has been associated with clinical symptoms such as headache, migraine, neck pain, arm pain, shoulder pain, and vertebral artery dissection. We analyzed the presence of the AF in dry cadaveric atlases. Dry atlases (n=118) were obtained from the Raymond A. Dart Collection of Human Skeletons (Dart Collection) housed in the School of Anatomical Sciences at the University of the Witwatersrand, Johannesburg, South Africa (IRB number: W-CJ-140604-1). Only anatomically well preserved C1 dry vertebrae, devoid of any other observable pathology, were analyzed. In addition, we carried out a systematic review and meta-analysis to answer what is the prevalence of complete AF in cadaveric dry bone. We conducted an extensive search to identify studies that reported relevant data on the complete AF prevalence in cadaveric dry bone. A total of 57 studies involving 13.081 dry atlases were included. We found that 15 (12.7%) dry atlases from the Dart Collection presented a complete AF: those dry atlases were from 7 (5.9%) women and 8 (6.8%) men (p=0.346). Meta-analysis revealed that the overall pooled prevalence of complete AF in dry atlases was 10.6% (IC 95% 9.3-12). The prevalence of AF in our sample and in the meta-analysis was similar to the average frequency presented in the literature. Surgeons and chiropractors may be aware of the possible AF presence previous to cervical spine adjustment or surgery to the cervical spine since the AF is not an uncommon anomaly related to clinical symptoms.

P-AQA-6. **EX VIVO ANATOMIC-MORPHOMETRIC STUDY OF MANDIBULAR INTRAORAL BILATERAL SAGITTAL OSTEOTOMY (OBWEGESER-DAL PONT TECHNIQUE) FOR IMPROVING CERVICAL SPINE APPROACH**

Díaz-Tapiador, Sebastián; Blasco-Serra, Arantxa; Puche-Roses, Miguel; Torres-Gayá, Jorge; González-Soler, Eva M.; Valverde-Navarro, Alfonso A.; Puche-Torres, Miguel

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Approach to the cervical spine seems complicated due to the anatomical complexity of

this area. Currently, anterior approach techniques, especially the transoral transpharyngeal ones, are the gold standard because of the smaller number of structures to manipulate. However, the use of ampliation techniques is required to reach an optimal operability, such as a mandibulotomy, which can be completed or not by a glossotomy or a palatectomy, associating a higher morbidity and risk of side effects. The aim of this work is to carry out an anatomical-morphometric study of the transoral-transpharyngeal access to the cervical spine by means of a mandibular intraoral bilateral sagittal osteotomy (OSBIM), in cadaver. Results shown an enlargement on the operability of the approach to the cervical spine, based on the measures of mouth opening: interincisal, intercommissural and opening area. With the use of this technique, a considerable increase in the external mouth opening is experienced, necessary to obtain a correct approach operability; especially when the patient to intervene presents a limitation of this, either by pathology of the temporomandibular joint, or by some type of craniofacial or intraoral malformation.

P-AQA-7. **IMPORTANCE OF THE FUSION FASCIA OF FREDET AS AN ANATOMICAL LANDMARK FOR COMPLETE MESOCOLIC EXCISION WITH D3 LYMPHADENECTOMY IN RIGHT COLON CANCER**

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The fusion fascia of Fredet, the plane between the ascending mesocolon and the visceral duodenal-pancreatic peritoneum, remains a neglected anatomical structure. However, awareness and knowledge of its development and location can be useful to perform D3-lymphadenectomy (D3-L) and complete mesocolic excision (CME), reducing the risk of intraoperative bleeding. First aim of this study was to provide an anatomic description of the fascia of Fredet. Second aim was to assess whether application of this knowledge to minimally invasive D3-L and CME in right colon cancer reduces intraoperative complications. In this study, in the first phase of this study, we perform cadaveric dissections and an anatomic description of the fascia of Fredet. In a second phase, we carry out a prospective evaluation of its surgical application in a consecutive series of laparoscopic right hemicolectomies with CME and D3-L at a tertiary hospital. The fascia of Fredet was identified and dissected in one fresh and two formalin-fixed cadavers. The trunk of Henle and the medial border of the superior mesenteric vein defined the medial limit of this anatomic plane. Seventeen patients with right colon cancer were operated on. Laparoscopic dissection of the fascia of Fredet was possible in every patient. There were no major postoperative complications. Lymphatic invasion was found in six patients. All resections were classified as satisfactory mesocolic excision and R0. Local and distal recurrence rate was 0. In conclusion, the fusion fascia of Fredet is a useful landmark to achieve CME and D3-L in right colon cancers with reduced risk of intraoperative complications.

P-AQA-8. **THE CONCEPT OF THE SPLENIC FLEXURE BOX: FIVE ACCESS METHODS TO THE SPLENIC FLEXURE**

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The splenic flexure mobilization (SFM) is one of the fundamental surgical steps in colorectal surgery. Different types of laparoscopic SFM have been described, defined by the anatomic trajectory used to access the lesser omental sac. However, there is still a controversy in the literature on the technical details of each approach, and which should be the first choice. The aim of this study

was to describe all the possible approaches for laparoscopic SFM, each suitable for specific situations, and create an illustrated system to show SFM approaches in an easy and practical way to make it easy to learn and teach. A cadaver-based study of the colonic splenic flexure anatomy was carried out. In order to demonstrate the different approaches, a balloon was placed through the colonic hepatic flexure in the lesser sac without sectioning any of the fixing ligaments of the splenic flexure. Eleven cadavers were dissected. Five potential approaches to SFM were found: anterior, trans-omentum, lateral, medial infra-mesocolic, and medial trans-mesocolic. The illustrative system developed was named: Splenic Flexure "Box" (SFBox). In conclusion, with this study we have shown five types of laparoscopic SFM. The SFBox concept is a useful way to learn and teach this surgical maneuver.

P-AQA-9. **LAPAROSCOPIC ANATOMO-SURGICAL APPROACH OF THE COLON BASED ON 3D-MORPHOMETRIC ANALYSIS IN A CADAVERIC MODEL**

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Colon anatomy has been extensively described in classical human anatomy treatises and related to both visceral and bony neighboring structures. The considerable anatomical variability of this organ is mostly explained through embryological development. This study aims to define and analyze the anatomical modifications that occur in certain segments of the colon -susceptible to topographical changes- during laparoscopic surgery, which requires specific positioning of the patient on the surgical table in order to facilitate optimal exposure of the intra-abdominal viscera. Three cadavers were subjected to abdominal computerized tomography in laparoscopic surgical positions followed by three-dimensional reconstruction. Our analysis includes images obtained from supinus, right and left lateral decubitus, repeating the same procedure at 15 degrees Trendelenburg. Subsequently, the same protocol was applied after injecting 15 mm of Hg of pneumoperitoneum. For 3D-reconstruction the reference points were marked: the anterior superior iliac spines, the midpoint of the pubic symphysis, the root of the superior mesenteric artery, the root of the inferior mesenteric artery, the highest point of the colon in the right hemiabdomen, in the transition zone between the ascending colon and the transverse colon, and the highest point of the colon in the left hemiabdomen, in the transition zone between the transverse colon and the descending colon. The measurements were performed using the computer program ImageJ. A total of 390 measurements were performed, 159 showed changes. The inferior mesenteric artery point modifications were the most strongly related to the other points. The transverse colon - pubic symphysis – descending colon angle depended on the pubic symphysis - descending colon distance, and the transverse colon - inferior mesenteric artery - descending colon angle depended on the inferior mesenteric artery - transverse colon distance. Colon undergoes modifications in the location of certain segments in the application of factors such as position changes and pneumoperitoneum pressure. These changes could be related to their fixations to the peritoneum, to the proximity of the neighboring viscera and to their location in the abdomen.

P-AQA-10. **EVALUATION OF RADIOLOGICAL ANATOMY OF THE RETROMOLAR CANAL AND CLINICAL IMPORTANCE OF ITS PRESENCE**

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The retromolar canal (RMC) is an anatomical variation of the mandibular canal (MC) whose

identification and study should be bear in mind due to its implication in the surgical procedures of the retromolar area. The prevalence of the RMC has a wide variation according to the previous studies. The aim of this work was to evaluate the prevalence of the RMC in a sample of our population. For that purpose, 225 CT scan images (with higher resolution than cone beam CT used in the rest of the previous studies) from the Hospital Clínico Universitario of Valencia were analyzed. The dimensions, location in the retromolar area and the morphologic characteristics of the RMC classifying them according to their typology were evaluated. Furthermore, the relations between the RMC and the sex, age and laterality were studied. We reported that the prevalence of the RMC was 23.1% and no significant relation between the presence of the canal and the sex, age or laterality was found. The type Ia (a) was the most common type with a prevalence of 40.8%. In addition, an anatomical "ex vivus" study was done through mandibular dissections in 10 cadavers finding RMC in two of them (20%). Based on the results of this study, the RMC should be considered as a frequent anatomical variation whose complete study is very important in daily clinical practice.

P-AQA-11. **COMPARATIVE VASCULAR ANATOMY OF THE CANINE PROSTATE: ANGIOGRAPHIC ANALYSIS**

López-Sánchez, Carmen; García-López, Virginio; Lucas-Cava, Vanesa; Sánchez-Margallo, Francisco-Miguel; Sun, Fei; García-Martínez, Virginio

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Dogs are the only experimental animals with spontaneous benign prostatic hyperplasia and prostate cancer. These characteristics make them an ideal model for preclinical evaluation of minimally invasive surgical techniques and devices. This study aims to evaluate anatomic features of prostatic arteries in comparison with the human anatomy. Twenty adult beagles, including 10 with hormone induced benign prostatic hyperplasia (BPH) and 9 with spontaneous BPH, underwent selective angiography. From all the above dogs, angiograms were obtained to evaluate anatomic features of the internal iliac artery (IIA), anterior division of IIA and prostatic artery (PA) and its branches. Internal diameters of IIA and PA were available in 6 dogs. Unlike in humans, the caudal end of the abdominal aorta gives off a trifurcation with 2 external iliac arteries and a common trunk of IIA, which further divides into three arteries: left and right IIA and sacral median artery. The main trunk of PA arises from the anterior branch of IIA, giving off a final branch of the inferior vesical artery and a terminal branch of the middle rectal artery. The inner diameter (mm, mean ± SD) of the left and right anterior division of IIA and PA was 1.90 ± 0.15, 1.98 ± 0.11, 0.95 ±0.07, and 0.90 ±0.03, respectively. The prostatic artery in dogs is relatively regular with less anatomic variations seen in humans. Adult beagles may serve as an ideal animal model in preclinical investigation.

P-AQA-12. **3D RECONSTRUCTION USING FREE OPEN SOURCE SOFTWARE (3D SLICER) FOR LIVER SURGERY PLANNING**

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3D reconstruction has become a valuable tool for planning liver surgery. Faced with payment options and third-party services, in recent years free and open source alternatives have emerged within the reach of any surgeon. To present our experience with one of them (3D Slicer) through three cases. After a brief period of self-training using open access online tutorials, the reconstruction, segmentation and liver volumetry of three patients with colon adenocarcinoma and liver metastases subsidiary to surgical treatment were performed. We have worked on the images in DICOM format of CT or MRI in portal phase using the open source software 3D Slicer, adding the extensions DCMQI, MarupsToModel, PETDICOMExtension, QuantitativeReporting, SegmentEditorExtraEffects and SlicerDevelopmentToolbox. Case 1.

A 52-year-old woman with a single 12-mm liver metastasis in the periphery of segment 8. Case 2. A 64-year-old man with liver metastases in multiple segments, the largest being 66 mm with direct involvement of the periportal axis, infiltrating and completely occluding the right portal vein. Case 3. 52-year-old woman with liver metastases in multiple segments. In the right lobe, the largest are located in segment 7 (35 mm) and 5 (30 mm), the latter infiltrating the bifurcation of the right portal vein. In the left lobe, the predominant one is located in segment 3 (9 mm). The use of free and open source software 3D Slicer allows to obtain quality liver reconstructions and valid for surgical planning and volumetric calculation of the future liver remnant. Using this strategy is within the reach of any surgeon and allows familiarization with the anatomy that will later be addressed in the operating room.

P-AQA-13. **REVIEW OF ANATOMIC CONCEPTS IN RELATION TO WALDEYER'S FASCIA AND THE RECTOSACRAL FASCIA**

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Pelvic dissection and surgical experience report the rectosacral fascia in a variable percentage of pelvis with different limits. A study of the retrorectal space is reported to clarify anatomical concepts previously described to define Waldeyer's and the rectosacral fascia. A total of 36 pelvis were dissected (20 males and 16 females). All specimens were divided in the median sagittal plane including the middle axis of the anal canal, to allow a correct visualization of and access to the retrorectal space. The retrorectal space was limited anteriorly by the rectum and posterior mesorectum covered by a fine visceral fascia, and posteriorly by the sacrum covered by the parietal presacral fascia. The rectosacral fascia divided the retrorectal space into inferior and superior portions in 75% of the male and 96% of the female specimens. It originated from the presacral parietal fascia at the level of S2 in 10%, S3 in 42% and S4 in 38% of specimens. In all cases it passed caudally to join the rectal visceral fascia 3-4 cm above the anorectal junction. As described by Waldeyer, the floor of the retrorectal space is formed by the fusion of the presacral parietal fascia and the rectal visceral fascia and lies above the levator ani muscle at the level of the anorectal junction. The rectosacral fascia divides, therefore, the retrorectal space into inferior and superior portions. This must be differentiated from Waldeyer's description of the fascia lying in the inferior limit of the retrorectal space, formed by the fusion of the rectal visceral and parietal fascias.

ROUNDTABLES

XXIX CONGRESS OF THE SPANISH ANATOMICAL SOCIETY

The research in Anatomy in Europe's horizon. Challenges, burdens and funding.

Chair: Virginio García Martínez. Catedrático de Anatomía, Universidad de Extremadura

Speakers: Beatriz Alonso Martín. Oficina de Proyectos Europeos UJI
Isabel Fariñas Gómez. Universitat de València
Jesús Lancis Sáez. Vicerrector de investigación UJI
José Luis Ferrán. Universidad de Murcia

Anatomy is on the ground foundation of modern biomedical sciences. Although research in Human Anatomy extends its roots in the renaissance, research in this area is still reporting great advances in understanding the bases of the body organization and its alteration in pathological conditions. Anatomy is still a hot topic in several biomedical areas and all of them need Anatomy as a basic element to understand a particular biological process. Thus, Anatomy is a relevant keystone for its own entity and in supporting other areas.

Anatomy needs (on the other hand) to be adapted to challenges that society demands. Sometimes, it is need to consider the possibility to redirect the research lines towards more translational aspects. There is a rather important gap between bench and bed, i.e. the models that scientists analyze and the applicability of the results obtained in the lab to the medical practice. It is, then, relevant to identify the scientific health problem to address and go in the reverse way to consider how Anatomy can provide new insights to face the challenge. Anatomy research lines can gain from interaction with more applied health science such as medical and surgical specialties and also sports medicine, physiotherapy or nursing for example, but it is need an effort to get closer views in these disciplines. It is also need a good preparation for the join proposal, in the experience from the members of the table it is need at least one year of co-work in the project to afford enough data to obtain a good foundation for the project, in that conditions, writing the project may flow from a closer collaboration and can be done in a couple of months. In any case, it is basic the identification of the relevance of the problem and address the research in a direction involving innovative technical approaches.

Innovation, relevance and multidisciplinary approaches are requisites to build up a good proposal for the EU. Anatomy is a basic discipline that fits with any other to face a health problem and is a specific component that may be required in the constitution of a multidisciplinary consortium to apply for any c all to the different organisms of the European Union. The constitution of the consortium is a central element to gain possibilities of success in a particular call. It needs to be well balanced in countries and in gender and give the opportunity to create a multidisciplinary approach to one of the leading lines of challenges identified by the EU. All universities are having offices that may help in the complexity of rules of the different calls. The webpages of the European organisms use to have applications to finding partners to organize the consortium. All groups interested can post a proposal or ask to be a partner in an already formed or partially outlined consortium. Guidance from the European office at the universities is vital to progress in the proposal. In most cases the

preparation of the proposal be funded from either the own institution or at the regional or national level. All calls have a national informational point which is dedicated to provide additional support and advice in the preparation of the proposal.

At the national level the calls have become very competitive in such a way that many well founded proposals cannot, at the end, obtain funds. Anatomy is a central aspect of basic biomedical research and many specific aspects are hot topics in present science. The preparation of the proposal is a hard issue that requires to catch up the attention of the reviewers by providing them elements of high quality in the selection of the hypothesis, the definition of the aims and in choosing the adequate and innovative experimental approach to solve the questions raised by the state of the art in the particular topic in which the project fits. All aspects of the project need to be well interconnected and written in a direct and comprehensive language. Previous data supporting the hypothesis are of great value. Unfortunately, at the end the number of possible projects to be funded is limited and a line is drawn indicating which project can be funded and which not. This is sometimes disappointing when a good proposal cannot pass this burden. At this stage it is need the support of the institution that may give support to a promising research. Universities need to give support to a ground research of the contracted professors which need to teach and research at an equal proportion. Universities have to provide tools for research at the same proportion as providing tools for teaching.

Universities and Research Centers may, in fact, play a relevant role in providing groups in Anatomy and other disciplines with the mechanisms to get success. Higher education institutions use to have particular ways to finance their own groups. To carry out this task it is need a well-designed policy to identify competitive groups with innovative ideas in their own fields. An internal evaluation system is also required to analyze the strengths and the weakness and advice for driving the lines to areas having better possibilities.

As a general conclusion, the Anatomy is a keystone of the biomedical research with many still opened questions of great relevance for advance of the knowledge. The authorities, at the different levels, need to provide resources to make possible a successful participation in calls at the local, regional, national or European level.

Teaching Anatomy in the context of an integrative education, a new concept with advantages and caveats

Chair: Francisco Ros Bernal

Speakers: Matilde Moreno Cascales and Ofelia González Sequeros, Universidad de Murcia
Alino Martínez Marcos, Universidad de Castilla-La Mancha
José Antonio Llueca Abellá, Cátedra Medtronic, UJI
Francisco Gómez Esquer, Universidad Rey Juan Carlos

The education in Anatomy is one of the flagships of the Spanish Society for Anatomy. As a basic and historical discipline, Anatomy has been taught independently from others, like physiology, on the bases of the differential methodology. However, Anatomy can be also clustered together with other disciplines to study each system in a different way and focusing on the multidisciplinary approaches to its structure, function and pathophysiology. This particular approach has, in fact, reduced, the overall view of the body structure, but provides an integrative analysis of the different aspects that can be analyzed in a particular system.

Teaching Anatomy has passed to a long way of educational process. Anatomy teaching arise from the origin of European universities and it has become the basic knowledge for both medicine and surgery. The advance of medical science has been always supported by the advance in anatomy which has also provided the basic support to other basic sciences like Cellular and Molecular Biology.

The bases of the study of anatomy needs to necessarily root in the study of the cadaver as the central element to construct the morphological elements that can be analyzed in deep in subsequent studies. It is mandatory that these new approaches retrieve the basic structural elements that compose the human body. The anatomical analysis in the dissection room is, then the central element to build up all other lines including surgery and medical specialties of any system.

During last decades, new developments based on an integrative view of the medical and health sciences have been developed. According to this model, Anatomy is a part of the integrated set of approaches to the knowledge of the human body in healthy and disease. This model needs a high level of coordination between the disciplines converging on a given system. Thus, it enriches from the multiple side elements that are incorporated at once. However, the basic elements of a particular discipline loss its integrity as a unitary subject with particular methods to unravel the structural composition of the human body. The classical approach of has undergo a long history that has allowed to be enriched from the generations of professionals that have incorporated new educational technologies to the already existing resources which have notably improved the current teaching. This classical view extends its roots in the dissection as the basic source of anatomical knowledge. All new approaches and organizational models that could face new projects should assume this postulate as a basic element to be considered.

Besides the classical subject model, the integrative one is emerging as a new way to address the study of the human body in health and disease from multiple views no matter of discipline. Both models are using the same educational tools and only differs on the coordination of Anatomy with other disciplines to study one system at once. Integration have to be done in both, horizontal and vertical directions. Horizontal integration means that a particular system is analyzed from the Anatomy, Physiology, Pharmacology or Cell Biology, between others. Vertical integration

means that both basic and clinical disciplines focus at once on a particular issue. Both, vertical and horizontal integration have to be done at once to be effective. A high level of coordination has to be implemented in order to complement information from the different fields and to fill all possible gaps, avoid repetitiveness and overlapping.

On the other hand, high level of organization means low level of freedom and independence and this is one of the main problems that integrative teaching has to face. Professors have to assume that the teaching in one subject is conditionated by teaching in others and there is mutual dependence from each other at all levels.

Dissection is the main source for acquisition of the knowledge of the human body and is also the main element in the interaction between the between the educator and the learner. The anatomical concepts from different ways but the closest to the reality is the one that is perceived in the dissection room. New approaches and organizational models should respect this concept as a basic rule. Training skills in the dissection room are basic elements in the formative process of educators in Anatomy. Additional tools like 3D models, virtual reality or navigational systems are good complements to the traditional teaching but cannot substitute the historically developed dissection.

The Anatomy needs a continuum dialogue with the clinical world, especially with surgery. Anatomy and surgery enrich for a bidirectional flow in which Anatomy need to be aware of the requirements of Surgery and vice-versa, Surgery need to be clear the special configuration of the area and the anatomical configuration and relations of the elements that are being working with. In this sense, putting together these specialties may benefit from the partial reports in each field. Thus, an integrated view is a going option to walk together to a better model.

This collaboration needs to be extended to the postgraduate programs. Training courses must contain a basic anatomy statement to get to an advanced approach to solve a clinical problem either surgical or not. On its turn, Surgery has to be involved in a feedback model to guide Anatomy to the special procedure requirements. Communication between Surgery and Anatomy is also necessary to get better levels of efficacy in research. Innovation only can be done from a careful dialogue between the clinical world and Anatomy.

Finally, social networks are new tools that can be used as a new educative complement. Social networks can provide new motivational and enjoyable approaches. Gamification induces the student to participate more actively in the process of acquiring knowledge. Blogs are resources in which a question can be open during a time and students can participate in its resolution and afterwards the solution and a brief explanation can be provided. Tik-tok and twitter are also networks in which an interactive topic can be opened and provides a way of communication with the students also by sharing brief videos and images. Some of these media have become very popular not only in the restricted system of a university group but also for the whole anatomical community. However, there is a risk of overcrowded information for a simple issue and it must be determined the media that better fits with the pursued goal.

Teaching and Research Career in Anatomy

Chair: Esther Castillo Gómez, Universitat Jaume I, Spain

Speakers: Ramón Guirado Guillén, Director General de Universidades, Gobierno de Aragón, Zaragoza, Spain
María Sopesens, División de Evaluación del Profesorado, ANECA
José Ramos, Universidad de Córdoba, Ex-presidente del Comité del PEP salud, ANECA, Spain
María Luz Cuadrado Pérez, Vice-Decana, Facultad de Medicina, Universidad Complutense de Madrid, Spain

The professional career in Anatomy is a matter of discussion in many higher education forums. The anatomical specialization has to be done in parallel with the research that sometimes does not fit with the pre or postdoctoral line and mechanisms have to be implemented to warranty both teaching and research competences in Anatomy. In Spain, each tenure track step of the career has to be evaluated by the Spanish Agency for the Evaluation of Quality and Accreditation (ANECA). The ANECA was formerly founded in 2002 as a Foundation assigned to the Ministry of Education. Along time, this organism was enriched by new functions covering the main aspects of the modification of the Spanish University System. Lately, in 2016, the ANECA was granted as an autonomous organization ascribed to the Ministry of Education and, in last years, to the Ministry of Universities. The ANECA is also under the control of the European Association for Quality Assurance in Higher Education (ENQA). ANECA develops its activity in three main evaluation programs i.e., Institutional, Program and Academic Staff. Under the Institutional Evaluation Procedure, it is advised procedures to warranty the quality of higher education organisms. The Program Evaluation Procedure is designed to warranty degree proposals and to warranty the quality of the degree implementation. Finally, the Program Evaluation Procedure is aimed at the evaluation of the CVs of applicants to access to tenure track academic positions in Spanish higher education centers. This last function is the matter of this round table.

The access to a University position is taken in two steps. In the first step, the ANECA assess that a particular applicant affords the basic requirements (publications, teaching, participation in research grants, mobilities, ...) to take a certain position in a broad sense (this is the "accreditation process"). Then, a particular university that needs to cover a vacancy position in particular research and teaching fields may select a candidate among the accredited applicants.

The accreditation process requires that the applicant can demonstrate good performance in research and teaching. For this purpose, it is important to present documents certifying a minimum level in both fields. There are several aspects that are easy to demonstrate, for example a publication in a relevant journal. Nowadays, qualification repositories may report the quality of a journal and the number of citations of a given article. In contrast, others seem difficult, such as the justification of participation in competitive research projects. The main way of certifying this participation is by presenting certificates issued by the organism that has awarded the project, the vice-rectorate for research, the university office for the transfer of research results, or the hospitals that manage the implementation of the project.

Another important aspect is teaching, which is counted as the number of hours actually taught. The evaluation of the teaching is also relevant. In addition to an extensive curriculum of lectures and practicals, it is important that these activities have been well perceived by the students and have led to a good improvement in their knowledge. Finally, it is worth paying attention to activities related to the improvement of teaching either through the development of materials for use by students, participation in workshops

and symposia focused on didactic tools or the implementation of research projects focused on the improvement of learning in a specific biomedical field. activity in this area.

The other step to be considered is an issue managed by universities as autonomous organisms. Here again, there are two considerations to be made. First, the amount of teaching that is allocated to a particular area of knowledge, and second, the selection process in each area. Each University is capacitated to determine, in accordance with the teaching plans in each degree, the number of credits assigned to each area of knowledge including Human Anatomy and Embryology. Anatomy is a basic biomedical science and, as such, is, or must be, present in all biomedical degrees. However, according to the discussion (in some cases disputes) between groups, there is a discretionary criterion that depends on University policies and may favor different areas over others. Thus, it is necessary to emphasize that the main goal should be that teaching should be adjusted to the areas of knowledge that best address a given subject.

Other aspect that falls in the particular management of the university is the selection of candidates. This selection has to be done according to objective criteria of a previously agreed scale. The aspects of this scale and adaptations must take into account the peculiarities of the area of knowledge of the offered position. This is the only time when special value can be given to the specialization in any anatomical topic.

A debate is being raised regarding the next future. A new University law is being processed that could set the guidelines in the near future. It is said that the new law is aimed to warranty the quality in the University outcomes. An important aspect in the new law is the status of Professors, Lecturers and Part-Time Professors. During the last decades the hiring of Part-Time Professors has become an economic solution to alleviate the scarce resources managed by universities. However, this solution is against the goal of having a University of good quality. Thus a solution must be given. However, it is important in several areas to maintain the figure of the Part-Time Professor. In the case of Anatomy, it is particularly useful to take advantage of having good professionals from the field of surgery and other clinical specialties to provide a practical vision in the training actions of Human Anatomy and Embryology.

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