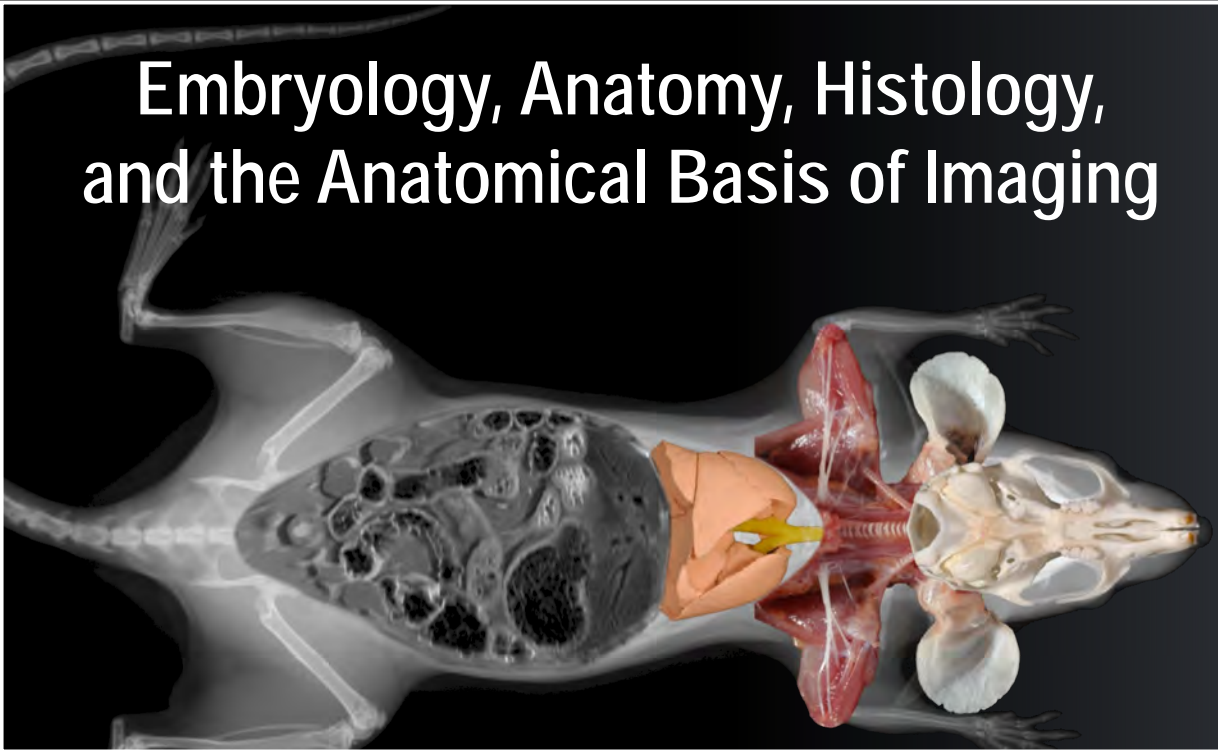




On-line Summer Course

Embryology, Anatomy, Histology,
and the Anatomical Basis of Imaging



July 6th - 17th 2020

PATHBIO (www.pathbio.org) is an EU-funded ERASMUS+ Knowledge Alliance for “**Precision Pathobiology for Disease Models**”, including major European Universities, 5 European “Mouse clinics” for high-throughput phenotyping of mice, major mouse providers (Charles River, JAX, TCP), as well as associated partners worldwide (KMPC, APN, UATE, UCT). This Knowledge Alliance will provide courses and on-line teaching material for mouse embryology and anatomy, mouse pathology, and for mouse imaging.

In July 6th-17th, 2020, the second course on **Mouse Embryology, Anatomy, Histology, and Anatomical Basis of Imaging** will take place **ON-LINE**. The aim is to provide graduate, master, PhD and postdoc students with basic and expert knowledge to phenotype morphologically mouse models of human diseases. At this course, expert mouse embryologists, anatomists, pathologists and researchers from Europe and the US will give lectures and discuss with the participants different aspects of mouse morphological phenotyping, including examples of mouse models for the major human diseases.

Hands on teaching is a very important phase for learning morphological sciences. However, due to COVID-19 pandemic a “classical” presential dissection room teaching is not possible. During this course lectures will be followed by on-line dissections of the different regions and organs of the mouse body. Recorded videos and preprint material will be available for participants to improve the on-line learning experience. Furthermore, radiographs, images from TEM, micro-CT, and MRI, as well as, digital slides will be used for teaching during the course.

To promote interaction between participants and speakers every day on-line lunch with speakers will be programmed. The technological platform to set the on-line course will be TEAMS (Microsoft). The local organizers will host the sessions and will lead the discussions.

There is no fee for this course. Interested participants should apply with CV and letter of motivation to jesus.ruberte@uab.es. Deadline for applications is June 15th, 2020. Accepted participants will be informed by the end of June.



Co-funded by the
Erasmus+ Programme
of the European Union



Monday, July 6th

- 9-10** Welcome address and introductory remarks
J. Ruberte and G. Gràcia
- 10-11** Animal transgenesis: from the classics to the CRISPR genome editing
A. Pujol
- 11-12** Overview of mouse genetic nomenclature
J. Sundberg
- 12-13** 3R's principles for ethical use of mice: replacement, reduction and refinement
B. Pintado
- On-line lunch with speakers**
- 14-15** *In vivo* phenotyping of laboratory mouse
K. Svenson
- 15-16** Phenotyping and research reproducibility
C. Brayton
- 16-17** Histology of skin, hair and nail
J. Sundberg
- 17-18** Mouse models to study skin diseases
J. Sundberg

Tuesday, July 7th

- 9-10** General concepts in morphological mouse phenotyping. Directional terms and planes of the mouse body
J. Ruberte
- 10-11** Introduction to mouse development: segmentation, gastrulation, the embryonic period, and the foetal period
H. Jacobs



11-12 Development of extraembryonic lineages. The placenta
O. Wendling

12-13 Determining the window of lethality of mutant mice
in utero
O. Wendling

On-line lunch with speakers

14-15 Collection and fixation of mouse embryos and placentas
O. Wendling

15-16:30 Bone Ontogeny. Skeletal Nomenclature. Bone histology, immunohistochemistry and ultrastructure. Strain, gender and age differences
J. Ruberte

16:30-18:30 Skeleton of thoracic limb: scapula, clavicle, humerus, ulna, carpal, metacarpal, and digital bones. On-line identification of main anatomical features in isolated bones, X-ray and microCT images
L. Mendes-Jorge

Wednesday, July 8th

9-11 Skeleton of pelvic limb: coxal, femur, tibia, fibula, tarsal, and metatarsal bones. On-line Identification of main anatomical features in isolated bones, X-ray and microCT images
M. Navarro

11-13 Skeleton of the head: skull and mandible. On-line identification of main anatomical features in isolated bones, X-ray and microCT images
A. Carretero

On-line lunch with speakers

- 14-16** Skeleton of the trunk: vertebral column, ribs and sternum. On-line identification of main anatomical features in isolated bones, X-ray and microCT images
V. Nacher
- 16-17** Molecular Imaging Techniques in GEMM with bone diseases
F. Mulero
- 17-18** Arthrology: shoulder, elbow, hip, and stifle joints. Myology: types of muscles, histology, histochemistry, immunohistochemistry and ultrastructure
M. Navarro
- 18-19** Myology of limbs
H. Jacobs

Thursday, July 9th

- 9-10** Anatomy and histology of limb nerves
H. Jacobs
- 10-12** On-line dissection of main muscular groups and peripheral nerves
H. Jacobs and M. Navarro
- 12-13** Mouse models to study muscle diseases
A. Serrano
- On-line lunch with speakers**
- 14-15** Anatomical basis of cardiovascular development
J. Ruberte
- 15-16** Heart: topography, structure and vascularization
J. Ruberte



16-17 Animal models to study cardiac diseases: physiological and pathological interventions

A. Planavila

17-18 Blood: cellular morphology and clinical analysis

E. José-Cunilleras

Friday, July 10th

9-10 Localization, disposition and topography of main vessel trunks. Identification by X-ray angiography, CT and MRI

M. Navarro

10-11 Structure of blood and lymphatic vessels. Components of the vascular wall

J. Ruberte

11-12 Mouse models to study the lymphatic system

S. Ortega

12-13 Topography and histology of lymphatic nodes.

J. Ruberte and G. Gràcia

On-line lunch with speakers

14-15 On-line demonstration of lymphatic nodes and thoracic duct by Evan's blue injection and lipid ingesta

J. Ruberte and G. Gràcia

15-16 Histology of thymus and spleen: pathological findings of the lymphoid and hematopoietic system

J. Calzada-Wack

16-17 Students tutoring. Questions and answers. Students autoevaluation



Monday, July 13th

- 9-10** Anatomical basis of gastropulmonar development
J. Ruberte
- 10-11** Respiratory apparatus: nasal cavities, larynx, trachea and lungs. Anatomy and Imaging
M. Navarro
- 11-12** Mouse models of respiratory allergy
F. de Mora
- 12-13** Histopathology of mouse models to study pulmonary diseases
N. Prats
- On-line lunch with speakers**
- 14-15** On-line dissection of the thorax
M. Navarro and R. Bernardini
- 15-16** Oral cavity, pharynx, esophagus, and stomach. Anatomy and Imaging
V. Nacher
- 16-17** Imaging teeth. Mouse models to study tooth diseases
J. Prochazka

Tuesday, July 14th

- 9-10** Intestine and liver. Anatomy and Imaging
L. d'Angelo
- 10-11** Mouse models to study intestinal visceral sensitivity
V. Martinez
- 11-12** Animal models to study human chronic liver disease: an update
A. Fernandez



12-13 Anatomical basis of urogenital development
M. Mark

On-line lunch with speakers

14-15 Urinary organs. Anatomy, histology, and imaging
P. de Girolamo

15-16 Male and female genital organs. Anatomy, histology, and imaging
A. Carretero

16-17 Modelling mammalian sperm function: is this possible?
J. E. Rodríguez

Wednesday, July 15th

9-11 On-line dissection of male and female abdominal and pelvic cavities
A. Carretero and L. Mendes-Jorge

11-12 The fat organ. Morphology, physiology and imaging
J. Rozman

12-13 Mouse models to study obesity
M. Peyrou

On-line lunch with speakers

14-15 Pancreas. Anatomy, histology and imaging
V. Nacher

15-16 Mouse models to study diabetes
A. Casellas

16-17 Thyroid, parathyroid and adrenal glands
V. Nacher



Thursday, July 16th

9-10 Basic developmental concepts and general morphology of the central nervous system

L. Puellas

10-11 Spinal cord and rhombencephalon. Anatomy and imaging

J. Ruberte

11-12 Survival of motoneurons and preservation of neuromuscular junctions, two hallmarks of amyotrophic lateral sclerosis treatment

A. Bosch

12-13 Cerebellum and mesencephalon. Anatomy and imaging

J. Ruberte

On-line lunch with speakers

14-15 Diencephalon, hypothalamus, and hypophysis. Anatomy and imaging

J. Ruberte

15-16 Telencephalon

L. Puellas

16-17 Correction of the cerebellar pathology in mouse models of Megaloencephalic Leukoencephalopathy with subcortical Cysts (MLC)

A. Bosch

17-18 Cranial nerves. Encephalic ventricles and brain vascularization

J. Ruberte



Friday, July 17th

9-11 Dissection of the central nervous system. Interpretation of brain sections

J. Sautet and S. Marcó

11-12 Vestibulocochlear organ. Anatomy and imaging

M. Navarro

12-13 Mouse models to study deafness

S. Murillo

On-line lunch with speakers

14-15 Eye and related structures: Anatomy and imaging

J. Ruberte

15-16 Retinal Vascularization. *In vivo* fluorescent angiography and scanning confocal microscopy analysis

J. Ruberte









16-17 Eye morphological and physiological phenotyping. On-line dissection of the eye.

A. Bonet












17-18 Students tutoring. Questions and answers. Students Autoevaluation. Course Evaluation

CONCLUDING REMARKS

List of speakers

SPEAKER	INSTITUTION
Bernardini, Roberta	
Bosch, Assumpció	
Bonet, Aina	
Brayton, Cory	
Calzada-Wack, Julia	
Carretero, Ana	
Casellas, Alba	
d'Angelo, Livia	
de Girolamo, Paolo	
de Mora, Fernando	
Fernandez, Anabel	
Gràcia, Guillem	
Jacobs, Hugues	

José Cunilleras, Eduard	 Universitat Autònoma de Barcelona
Marcó, Sara	 Universitat Autònoma de Barcelona
Mark, Manuel	
Martinez, Vicente	 Universitat Autònoma de Barcelona
Mendes-Jorge, Luísa	
Mulero, Francisca	 Centro Nacional de Investigaciones Oncológicas
Murillo, Silvia	 Instituto de Investigaciones Biomédicas "Alberto Sols"
Nacher, Víctor	 Universitat Autònoma de Barcelona
Navarro, Marc	 Universitat Autònoma de Barcelona
Ortega, Sagrario	 Centro Nacional de Investigaciones Oncológicas
Peyrou, Marion	 UNIVERSITAT DE BARCELONA
Planavila, Anna	 UNIVERSITAT DE BARCELONA
Pintado, Belén	 CENTRO NACIONAL DE BIOTECNOLOGIA 
Prats, Neus	 INSTITUTE FOR RESEARCH IN BIOMEDICINE

Prochazka, Jan	 Czech Centre for Phenogenomics <small>hosted by the Institute of Molecular Genetics of the ASCR, v.v.i.</small>
Puelles, Luis	
Pujol, Anna	 UAB Universitat Autònoma de Barcelona
Rodríguez, Juan Enrique	 UAB Universitat Autònoma de Barcelona
Rozman, Jan	 Czech Centre for Phenogenomics <small>hosted by the Institute of Molecular Genetics of the ASCR, v.v.i.</small>
Ruberte, Jesús	 UAB Universitat Autònoma de Barcelona
Sautet, Jean	 ECOLE NATIONALE VÉTÉRINAIRE TOULOUSE
Serrano, Antonio	 upf. Universitat Pompeu Fabra Barcelona
Sundberg, John	 The Jackson Laboratory
Svenson, Karen	 The Jackson Laboratory
Wendling, Olivia	

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