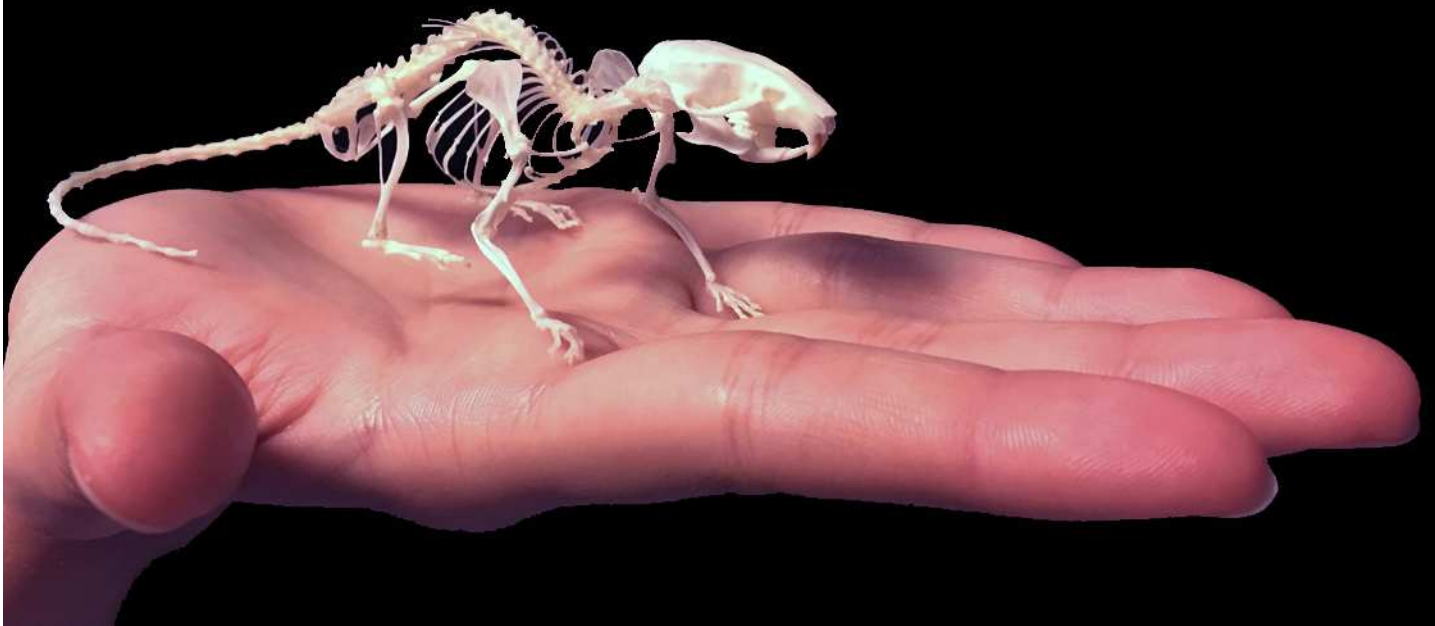


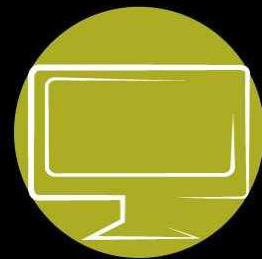


Summer Course

Module I



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



BARCELONA, July 15th – 26th 2019

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 online teaching material for mouse embryology and anatomy, mouse pathology, and for mouse imaging.

In July 15th-26th, 2019, the first course on **Mouse Embryology, Anatomy, Histology, and anatomical basis of Imaging** will take place in the Veterinary School at the Universitat Autònoma de Barcelona (www.uab.cat). 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.

The course teaching pretends to be a “hands on” process, and lectures will be followed by practical sessions in which participants will dissect specifically the different organs of the mouse body and will work with bone specimens, radiographs, and images from TEM, micro-CT and MRI. For histological teaching digital slides will be used.

There is not fee for this course. Participants have to organize travel and accommodation themselves and cover the corresponding expenses. Interested participants should apply with CV and letter of motivation to jesus.ruberte@uab.es. Deadline for applications is May 31st, 2019. Accepted participants will be informed middle of June



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



Monday, July 15th

- 12:30-13** Welcome address and introductory remarks
J. Ruberte and G. Gracia
- 13-14** General concepts in morphological mouse phenotyping.
Directional terms and planes of the mouse body
J. Ruberte
- 14-15:30** Introduction to mouse development: segmentation, gastrulation, the embryonic period, and the fetal period
H. Jacobs
- Coffee break**
- 16-17** Development of extraembryonic lineages
O. Wendling
- 17-17:30** Morphology of the placenta. Interpretation of virtual slides
A. Carretero
- 17:30-18:30** Determining the window of lethality of mutant mice *in utero*
O. Wendling

Tuesday, July 16th

- 9-10** Collection and fixation of mouse embryos and placentas
O. Wendling
- 10-11** Models in Placental Biology Research
M. Climent
- 11-12** Bone Ontogeny. Skeletal Nomenclature, bone architecture and types of bone. Strain, gender and age differences
J. Ruberte



12-13 Bone histology, immunohistochemistry and ultrastructure. Interpretation of virtual slides
J. Ruberte

Lunch

14-16 Skeleton of thoracic limb: scapula, clavicle, humerus, ulna, carpal, metacarpal, and digital bones. Identification of main anatomical features in isolated bones, X-ray and microCT images
L. Mendes-Jorge

Coffee break

16:30-18:30 Skeleton of pelvic limb: coxal, femur, tibia, fibula, tarsal, and metatarsal bones. Hip and knee joints. Identification of main anatomical features in isolated bones, X-ray and microCT images
M. Navarro

Wednesday, July 17th

9-11 Skeleton of the head: skull and mandible. Identification of main anatomical features in isolated bones, X-ray and microCT images
A. Carretero

11-13 Skeleton of the trunk: vertebral column, ribs and sternum. Identification of main anatomical features in isolated bones, X-ray and microCT images
V. Nacher

Lunch



14-15 Molecular Imaging Techniques in GEMM with bone diseases

F. Mulero

15-16 Arthrology: shoulder, elbow, hip, and stifle joints. Interpretation of virtual slides

M. Navarro

Coffee break

16:30-17 Myology: types of muscles, histology, histochemistry, immunohistochemistry and ultrastructure

M. Navarro

17-18 Myology of limbs

H. Jacobs

Thursday, July 18th

9-10 Anatomy of peripheral nervous system

H. Jacobs

10-11 Nerve histology and ultrastructure: the facial nerve axotomy model

B. Almolda

11-12:30 Dissection of main muscular groups and peripheral nerves

M. Navarro and H. Jacobs

12:30-13:30 Mouse models to study muscle diseases

A. Serrano

Lunch

14:30-16 Anatomical basis of cardiovascular development

J. Ruberte



16-17 Heart: topography, structure and vascularization
J. Ruberte

Coffee break

17:30-18:30 Animal models to study cardiac diseases: physiological and pathological interventions
A. Planavila

Friday, July 19th

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 Histology of thymus and spleen: pathological findings of The lymphoid and hematopoietic system
J. Calzada-Wack

12-13:30 Topography and histology of lymphatic nodes. Demonstration of lymphatic nodes and thoracic duct by Evan's blue injection and lipid ingesta
J. Ruberte

Lunch

14:30-15:30 Histology of skin, hair and nail
J. Sundberg

15:30-16:30 Mouse models to study skin diseases
J. Sundberg



Monday, July 22nd

- 9-10** Anatomical basis of gastropulmonar development
A. Carretero
- 10-12** Respiratory apparatus: nasal cavities, larynx, trachea and lungs. Anatomy and Imaging. Interpretation of virtual slides
M. Navarro and R. Bernardini
- 12-13** Mouse models of respiratory allergy
F. de Mora
- Lunch**
- 14-15** Histopathology of mouse models to study pulmonary diseases
N. Prats
- 15-16** Dissection of the thorax
M. Navarro and R. Bernardini
- Coffee break**
- 16:30-17:30** Oral cavity, pharynx, esophagus, and stomach. Interpretation of virtual slides
V. Nacher
- 17:30-18:30** Imaging teeth. Mouse models to study tooth diseases
J. Prochazka



Tuesday, July 23rd

- 9-10** Intestine and liver. Interpretation of virtual slides
L. d'Angelo
- 10-11** Mouse models to study gastrointestinal diseases
M. Jimenez
- 11-12** Animal models to study human chronic liver disease:
an update
J. Gracia-Sancho
- 11-13** Anatomical basis of urogenital development
M. Mark
- Lunch**
- 14-15** Urinary organs. Anatomy, histology, and imaging.
Interpretation of virtual slides
P. de Girolamo
- 15-16** Male and female genital organs. Anatomy, histology, and
imaging. Interpretation of virtual slides
A. Carretero
- Coffee break**
- 16:30-17:30** Modelling mammalian sperm function: is this possible?
J. E. Rodriguez

Wednesday, July 24th

- 9-11** 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
F. Villarroya

Lunch

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

15-16 Mouse models to study diabetes
V. Jiménez

Coffee break

16:30-17:30 Thyroid, parathyroid and adrenal glands
V. Nacher

Thursday, July 25th

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



Lunch

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

J. Ruberte

15-16 Telencephalon

L. Puellas

Coffee break

16:30-17:30 Correction of the cerebellar pathology in mouse models of Megaloencephalic Leukoencephalopathy with subcortical Cysts (MLC)

A. Sanchez

17:30-18:30 Cranial nerves. Encephalic ventricles and brain vascularization

J. Ruberte

Friday, July 26th

9-10:30 Dissection of the central nervous system. Interpretation of brain sections

J. Sautet and J. Ruberte

10:30-11:30 Vestibulocochlear organ. Anatomy and imaging

M. Navarro

11:30-12:30 Mouse models to study deafness

I. Valera-Nieto

12:30-13:30 Eye and related structures: Anatomy and imaging

J. Ruberte

Lunch

14:30-15:30 Retinal Vascularization. *In vivo* fluorescent angiography and scanning confocal microscopy analysis

J. Ruberte

15:30-16:30 Mouse models to study eye diseases

J. Ruberte











16:30-17 Course Evaluation

CONCLUDING REMARKS

List of speakers

SPEAKER	INSTITUTION
Almolda, Beatriz	
Bernardini, Roberta	
Bosch, Assumpció	
Calzada-Wack, Julia	
Carretero, Ana	
Climent, María	
d'Angelo, Livia	
de Girolamo, Paolo	

de Mora, Fernando	 Universitat Autònoma de Barcelona
Gracia-Sancho, Jordi	
Jacobs, Hugues	
Jiménez, Marcel	 Universitat Autònoma de Barcelona
Jiménez, Verónica	 Center of animal biothecology and gene therapy
Mark, Manuel	
Mendes-Jorge, Luisa	
Serrano, Antonio	 Universitat Pompeu Fabra Barcelona
Mulero, Francisca	 Centro Nacional de Investigaciones Oncológicas
Nacher, Víctor	 Universitat Autònoma de Barcelona
Navarro, Marc	 Universitat Autònoma de Barcelona
Planavila, Anna	 UNIVERSITAT DE BARCELONA
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	
Rodriguez, Juan Enrique	
Rozman, Jan	
Ruberte, Jesús	
Sánchez, Angela	
Sautet, Jean	
Serrano, Antonio	
Sundberg, John	
Varela-Nieto, Isabel	
Villarroya, Francesc	
Wendling, Olivia	

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