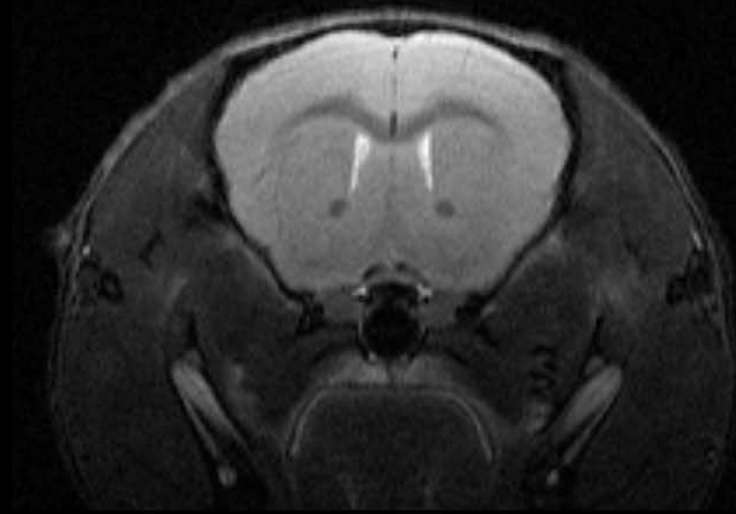




# Summer Course

## Module II



### Mouse Imaging



STRASBOURG, Sept. 21st– 29th 2020

**PATHBIO** ([www.pathbio.org](http://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 **September 21<sup>st</sup>-29<sup>th</sup>, 2020**, the second course on **Mouse Imaging**, will be organized by PHENOMIN-ICS ([PHENOMIN- Institut Clinique de la Souris](http://phenomin-ics.org)) as **virtual classes**. The aim is to provide Master’s students, 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, Asia, and Canada will give lectures and discuss with the participants different aspects of mouse imaging technologies providing powerful tools to understand and follow the progress of diseases in humans as well as in mouse models.

It gives the opportunity to learn more about image-based phenotyping using a wide variety of methods to characterize morphologically and functionally disease models. This PATHBIO module covered the “state of art” for the most relevant imaging techniques used in mice, such as X-ray, microCT, MRI, OPT, HREM, optoacoustic imaging, echography, intravital microscopy, as well as the basis for image analysis and 3D rendering. Most of these are translational from the human clinic as the technologies were initially developed for assessing human patients and later adapted to mouse models.

The course teaching will combine lectures and workshop in which participants will learn how to use Image J for analysis, discern and discuss the processing and the analyzing methods between OPT, HREM, micro-CT & MRI, and finally understand how to take advantage of these imaging methods to answer your scientific questions, specifically focusing on the 3’R criteria (Refinement, Replacement and Reduction), ethics and animal welfare.

There is not fee for this course. Interested participants should apply online with CV and letter of motivation. Deadline for applications is August 20<sup>th</sup>, 2020. Accepted participants will be informed early in September.



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



**Monday September 21<sup>st</sup>**

**Introduction & image analysis**

- 10:00-10:15** Welcome
- 10:15-10:25** Introduction to PATHBIO and PATHBIO summer course  
**Yann HERAULT**
- 10:25-11:00** Quick Overview of the imaging principles technics used in mouse pathology analysis  
**Hugues JACOBS**

**Break 15'**

- 11:15-12:05** Integrated morphological mouse phenotyping: synergies between pathology and imaging  
**Jesus RUBERTE**

**Lunch**

- 14:00-16:30** Workshop: Image analysis with IMAGE J  
(Break included)  
**Bertrand VERNAY**  
**Hugues JACOBS**

An advanced workshop on your own samples is scheduled on Tuesday 29<sup>th</sup>  
(Not mandatory – under registration)



Tuesday September 22<sup>nd</sup>

**Optical imaging, X-rays and  $\mu$ CT imaging**

**9:00-09:50** Bone imaging: from X-Rays, passing through CT, to specialized microscopical imaging

**Jesus RUBERTE**

**Break 5'**

**09:55-10:30** Application of microCT analysis with a specific focus on Teeth

**Jan PROCHAZKA**

**Break 15'**

**10:50-11:40** In vivo mechanisms of (pro)platelet formation

**Catherine LEON**

**11:40-12:15** *pending slot for "intravital microscopy" slot*

**Lunch**

**14:00-14:50** Embryo phenotyping and HREM

**Olivia WENDLING**

**Break 5'**

**14:55-15:45** Embryo phenotyping and X-rays OPT

**Rosie BUNTON-STASYSHYN**

**Workshop tomography- scheduled on Monday 28<sup>th</sup> (Mandatory)**



Wednesday September 23<sup>rd</sup>

## Optical imaging, Echography, Opto-acoustic imaging

**09:00-09:50** Introduction to Micro-ultrasound for preclinical imaging  
**Ghina BOUABOUT**

**Break 5'**

**09:55-10:45** Short overview of applications and the next evolution of ultrasound  
**Dieter FUCHS/ Philippe DAVault**

**Break 15'**

**11:00-11:50** Opto-acoustic imaging for oncology  
**Stéphanie LERONDEL**

**Lunch**

**13:30-14:20** High-resolution ultrasound and Photoacoustic imaging in embryology, neurovascular and cardiovascular diseases  
**Pierre SICARD**

**Break 15'**

**14:35-15:35** Workshop : echography (heart, Abdominal)  
**Ghina BOUABOUT**  
**Philippe DAVault**

An advanced workshop to analyze echography imaging is scheduled on Tuesday 29<sup>th</sup> (Not mandatory – under registration)



Thursday September 24<sup>th</sup>

## Nuclear imaging and Magnetic Resonance Imaging (MRI)

**09:00-09:30** Introduction to Magnetic Resonance Imaging  
**Markus KRAIGER**

**09:30-10:00** MRI and image analysis  
**Christelle PO**

**Break 15'**

**10:15-10:45** *In vivo* molecular imaging from pathology to clinic: illustrations  
**Ho-Young LEE**

**Break 5'**

**10:50-11:40** Nuclear Imaging Spect-CT/PET and Bioluminescence experience at the PHENOMIN-TAAM  
**Stéphanie LERONDEL**

**Lunch**

**14:00-14:50** Nuclear Imaging in animal research at ImAbio: micro PET-TEMP and microCT and recent application for diagnosis  
**David BRASSE**



**Friday September 25<sup>th</sup>**

**Imaging analysis, tissue sampling, dedicated case studies in mouse pathology**

**11:00-11:50**                      Ontologies for imaging analysis in Mouse Pathology  
**Paul SCHOFIELD**

**Lunch**

**14:00-14:50**                      Gross Pathology & Routine Histology; It all starts with a  
good necropsy and a good tissue section  
**Colin McKERLIE**

**Break 5'**

**14:55-15:45**                      Histopathology; Common “normal” histopathology in  
laboratory mice (spontaneous, strain-related, and  
incidental) AND the value of histopathology phenotyping  
to model human disease  
**Colin McKERLIE**

**15:45-16:00**                      Conclusions- End of the first week  
**Yann HERAULT**

## Monday September 28<sup>th</sup>

### **Animal research workshop**

**10:00: 12:30**

(Break included)

Workshop on good practices in animal research: ethical and regulatory aspects, and how imaging supports 3'Rs

**Isabelle GONCALVES**  
**Stéphanie LERONDEL**

### **Lunch**

### **Tomography workshop**

**14:00: 16:30**

(Break included)

Demonstration and workshop: HREM, CT and OPT

**Olivia WENDLING**  
**Hugues JACOBS**



Tuesday September 29<sup>th</sup>



### Optical clearing

**09:30-10:20** Immunolabeling followed by optical clearing with solvents (3DISCO) and light-sheet microscopy reveals morphological phenotyping

**Alain CHEDOTAL**

**10:20-10:45** Conclusions- Questions - feedback

**Yann HERAULT**

**End of the school & Workshops which are not mandatory**

### Break 15'

**11:00: 12:00** Image analysis in echography

**Ghina BOUABOUT**

**Philippe DAVAULT**

### Lunch

**14:00: 16:00** Advanced Image analysis with Image J  
Your own sample analysis










**Bertrand VERNAY**

**This course is also sponsored by**



## List of speakers

| NAME             | FIRST NAME | INSTITUT                         | LOGO   |
|------------------|------------|----------------------------------|--|
| BOU ABOUT        | Ghina      | PHENOMIN-ICS                     |  <b>phenomin</b> <br>EXCELLENCE IN MOUSE PHENOGENOMICS  |
| BRASSE           | David      | IPHC, Strasbourg                 |  <b>IPHC</b><br>Institut Pluridisciplinaire<br>Hubert CURIE<br>STRASBOURG   |
| BUNTON-STASYSHYN | Rosie      | MRC Harwell                      |  <b>MRC</b>   Harwell<br>Institute  |
| CHEDOTAL         | Alain      | Institut de la Vision            |  <b>INSTITUT DE<br/>LA VISION</b><br>PARIS  |
| DAVAULT          | Philippe   | Fujifilm                         |  <b>VISUAL SONICS</b><br>FUJIFILM  |
| FUCHS            | Dieter     | Fujifilm                         |  <b>VISUAL SONICS</b><br>FUJIFILM   |
| GONCALVES        | Isabelle   | PHENOMIN-ICS                     |  <b>phenomin</b> <br>EXCELLENCE IN MOUSE PHENOGENOMICS                                      |
| HERAULT          | Yann       | PHENOMIN-ICS                     |  <b>phenomin</b> <br>EXCELLENCE IN MOUSE PHENOGENOMICS                                      |
| JACOBS           | Hugues     | PHENOMIN-ICS                     |  <b>phenomin</b> <br>EXCELLENCE IN MOUSE PHENOGENOMICS                                      |
| KRAIGER          | Markus     | GMC                              |  <b>GMC</b> German<br>Mouse Clinic   |
| LEE              | Ho-Young   | Seoul National University - KMPC |  <b>SEOUL<br/>NATIONAL<br/>UNIVERSITY</b>  <b>KMPC</b><br>KOREA MOUSE<br>PHENOTYPING CENTER |
| LEON             | Catherine  | EFS, Strasbourg                  |  <b>EFS</b><br>ETABLISSEMENT FRANÇAIS DU SANG<br><i>Du donneur<br/>au patient</i>   |

|                  |                   |                              |  |
|------------------|-------------------|------------------------------|--|
| <b>LERONDEL</b>  | <b>Stéphanie</b>  | PHENOMIN-TAAM                |    |
| <b>McKERLIE</b>  | <b>Colin</b>      | TCP                          |   |
| <b>PO</b>        | <b>Christelle</b> | ICUBE, Strasbourg University |   |
| <b>PROCHAZKA</b> | <b>Jan</b>        | IMG                          |    |
| <b>RUBERTE</b>   | <b>Jesus</b>      | UAB                          |   |
| <b>SCHOFIELD</b> | <b>Paul</b>       | UCAM                         |   |
| <b>SICARD</b>    | <b>Pierre</b>     | PHYMEDEXP                    |  |
| <b>VERNAY</b>    | <b>Bertrand</b>   | IGBMC                        |  |
| <b>WENDLING</b>  | <b>Olivia</b>     | PHENOMIN-ICS                 |  |