



MASTERS IN LABORATORY ANIMAL SCIENCE AND ANIMAL WELFARE

Module 6: Reduction and Refinement in Experimental Design and Methodology. Research and Development of Drugs

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COURSE OBJECTIVES

This course provides the practical and theoretical knowledge and skills regarding experimental design and methodology required by designated veterinarians and other onsite personnel responsible for the welfare and care of laboratory animals in the conduct of experimental procedures.

This course covers the most important aspects in relation to the reduction in the number of animals used in research, experimental design, literature searches and presentation of results. It also deals with refinement through the study of the main non-invasive and minimally invasive techniques and refinement in surgical techniques. The module also provides an overview of the strategy and processes required in research and drug development.

The content of this course also complies with the training requirements set out in **European Directive EU63/2010** developed by the European Commission in respect of the following modules: *10. Design of procedures and projects (level 1), 11. Design of procedures and projects (level 2), 22. Principles of surgery and 51. Information provision and retrieval.*

For details, see: <https://op.europa.eu/en/publication-detail/-/publication/fca9ae7f-2554-11e9-8d04-01aa75ed71a1/language-en/format-PDF/source-282223752>

This course is part of the **Master's Degree in Laboratory Animal Science and Welfare accredited by FELASA as "Category D – Specialist in laboratory animal science"** and the training program for **Diplomates of the European College of Laboratory Animal Medicine (ECLAM)**. For veterinarians, this module forms part of the program **Certified Veterinarian in Laboratory Animal Science and Medicine (VetCEE approved)**.

The organizers would like to thank **Serveis Integrats de l'Animal de Laboratori (Integrated Laboratory Animal Services; SIAL)**, the **International Council for Laboratory Animal Science (ICLAS)** and **Novartis** for their support with individual scholarships.

We would also like to thank **Storz, Data Sciences International (DSI), Institut de Recerca Vall d'Hebron (VHIR), Institute of Oncology (VHIO)** and **Centro de Cirugía de Mínima Invasión Jesús Usón** who kindly provided equipment and materials for the practical sessions.



TEACHING STAFF

- Joana Almeida, Labcorp Drug Development, Huntingdon, UK
- Albert Altafaj, Vall d'Hebron Institute of Oncology (VHIO), Barcelona, Spain
- Julio Alvarez, Data Sciences International, Belgium
- Elena Abellán Rubio, Microsurgery unit, Centro de Cirugía de Mínima Invasión Jesús Usón, Cáceres, Spain
- Carlos Baldellou Estrada, Universitat Autònoma de Barcelona, Barcelona, Spain
- David Bartolome, Institut for Bioengineering of Catalonia (IBEC), Spain
- Manuel Berdoy, Oxford University, UK
- Ana Paula Candiota, Department of Biochemistry and Molecular Biology, Universitat Autònoma de Barcelona, Barcelona, Spain
- Estefania Contreras, CReSA/IRTA, UAB, Barcelona, Spain
- Lukas (Stulik) Dillinger, X4 Pharmaceuticals, Viena, Austria
- Marielle Esteves Coelho, Vall d'Hebron Research Institute (VHIR), Barcelona, Spain
- Eliza Franco, Vall d'Hebron Institute of Oncology (VHIO), Barcelona, Spain
- Laura Fresno, Endolab, Hospital Clinic Veterinari, Barcelona, Spain
- César Galo García Fontecha, Hospital Sant Joan de Deu, Barcelona, Spain
- Marta Giral, Almirall, Barcelona, Spain
- Ferran Jordi, Janssen Research & Development, Belgium
- Juan Jose Jiménez, Vall d'Hebron Institute of Oncology (VHIO), Barcelona, Spain
- Silvia Lope, Servei de Resonància Magnètica Nuclear (Service of MRI), Universitat Autònoma de Barcelona, Barcelona, Spain
- Francesco Mannara, PANLAB, Barcelona, Spain
- Julia Menon, Preclinicaltrials.eu, France
- Fernando de Mora, Department of Pharmacology, Universitat Autònoma de Barcelona, Barcelona, Spain
- Camen Navarro, Head of Quality Research Unit at University of Barcelona until novembrer 2023, at present retired, Spain
- Merel Ritskes-Hoitinga, Utrecht University, The Netherlands
- Kate Read, Labcorp Drug Development, Huntingdon, UK



- Daniel Ruiz, Royal College of Surgeons, Dublin, Ireland
- David Sabaté, ONDAX Scientific, Barcelona, Spain
- Angelica Salas, Vall d'Hebron Institute of Oncology (VHIO), Barcelona, Spain
- Laura Santos, Endolab, Hospital Clinic Veterinari, Barcelona, Spain
- Fabrizio Scorrano, Novartis. Basel, Switzerland
- Anna Server Salvà, Vall d'Hebron Research Institute (VHIR), Barcelona, Spain
- Marcel Sorribas, Institut for Bioengineering of Catalonia (IBEC), Spain
- Francisco Javier Vela, Microsurgery unit, Centro de Cirugía de Mínima Invasión Jesús Usón, Cáceres, Spain
- Kim Wever, Radboud University Medical Center, Radboud Institute for Health Sciences, Dept. of Anesthesiology, Nijmegen, The Netherlands

Technical support: Antonio Acosta

Duration of course: 12 ECTS (80 class hours).

Methodology: Theoretical /practical classes
Case Discussions Practical sessions

Location of course:

- Facultat de Veterinària, Universitat Autònoma de Barcelona:
 - Class rooms and seminars
 - Laboratories: 1, 2, 3, V0-137
- Servei de Ressonància Magnètica Nuclear (Service of MRI), Facultat de Ciències, Universitat Autònoma de Barcelona.
- Animal Experimental Unit, Vall d'Hebron Institut de Recerca (VHIR; Vall d'Hebron Research Institute)
- Imaging Platform, Vall d'Hebron Institute of Oncology (VHIO), Barcelona, Spain



SYLLABUS

Block I: Reduction

Topic 1. Evidence-Based Transition to Animal-free Innovations

Teaching staff: Merel Ristkes-Hoitinga

Topic 2. Experimental design

Teaching staff: Manuel Berdoy

Topic 3. Systematic Reviews and preclinical trials registration

Teaching staff: Julia Menon

Topic 4. Internal validity and bias analysis

Teaching staff: Kim Wever

Block II: Refinement

Topic 5. Asepsis and preparation for surgery. Aseptic surgery in rodents

Teaching staff: Daniel Ruiz

**Topic 6. Pre-operative assessment, perioperative and postoperative care.
Fluidotherapy and antibiotherapy**

Teaching staff: Daniel Ruiz

Topic 7. Microsurgery techniques: vascular surgery

Teaching staff: Elena Abellán
Javier Vela

**Topic 8. Refining Physiological Monitoring to Reduce the Use of
Laboratory Animals.**

Teaching staff: Julio Alvarez

Topic 9. Imaging techniques

Teaching staff: Angelica Salas

9.1. Bioluminescence and fluorescence

Teaching staff: Juan Jose Jimenez

9.2. Magnetic Resonance Imaging (MRI)

Teaching staff: Silvia Lope

9.3. Positron Emission Tomography (PET)

Teaching staff: Juan Jose Jimenez

9.4 Echography

Teaching staff: Marielle Esteves/Anna Server

9.5 Micro Computed Tomography

Teaching staff: Juan Jose Jimenez



Block III: Experiments under legal requirements

Topic 10. Drug development and Drug Efficacy

Teaching staff: Lukas (Stulik) Dillinger

Topic 11. Development of veterinary drugs

Teaching staff: David Sabaté

Topic 12. Drug development: Safety and toxicology

Teaching staff: Ferran Jordi

Topic 13. Biologicals: immunogenicity and immunotoxicity

Teaching staff: Fernando de Mora

Topic 14: Quality standards: Good Laboratory Practice and consistency in conducting scientific procedures and correct handling, storing, recording, and ensuring traceability of samples. Animal data recording

Teaching staff: Carmen Navarro
Estefania Contreras

Topic 15: Translatability of digital biomarkers in drug development

Teaching staff: Fabrizio Scorrano

Topic 16: Translational research

Teaching staff: César García Fontecha



PRACTICAL SESSIONS

Practical session 1.1: Imaging techniques in rodents: Positron Emission Tomography, Ecography. MicroCT, Bioluminescence and Biofluorescence (IVIS).

Teaching staff: Albert Altafaj
Angelica Salas
Juan Jose Jimenez
Eliza Franco

Practical session 1.2: Imaging techniques: Magnetic Resonance Imaging (MRI).

Teaching staff: Silvia Lope
Ana Paula Candiota

Practical session 2.1: Principles of surgery in refinement. Asepsis. Sutures and knots. Aseptic surgery in rats. Minimally invasive devices

Teaching staff: David Ruiz
Carlos Baldellou
Estefania Contreras

Practical session 2.2: Introduction to microsurgery.

Teaching staff: Elena Abellán
Javier Vela

Practical session 2.3: Cannulation, catheters.

Teaching staff: Kate Read
Joana Almeida
Daniel Ruiz

Practical session 2.4: Laparoscopy and Ultrasound guided vascular cannulation

Teaching staff: Marielle Esteves Coelho
Anna Server
Laura Fresno
Laura Santos

Practical session 3.1: Telemetry

Teaching staff: Julio Alvarez

Practical session 4: SOP and animal data recording

Teaching staff: Estefania Contreras

Practical session 5: Translatability of digital biomarkers in drug development

Teaching staff: Fabrizio Scorrano

Practical session 6: Organoids

Teaching staff: Marcel Sorribas
David Bartolome

Technical staff for practical sessions:

Antonio Acosta