

## ISTT FINAL REPORT

### ICGEB International Course

# LATEST ADVANCES IN GENOME EDITING AND ART TECHNOLOGIES IN LABORATORY MICE



ICGEB  
Meetings and Courses 2023

**LATEST  
ADVANCES IN  
GENOME EDITING  
AND ART  
TECHNOLOGIES  
IN LABORATORY  
MICE**



 May 2023

**Funded & Sponsored by:**



  


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## Date and venue

May 15-19<sup>th</sup>, 2023

Institut Pasteur de Montevideo (IPMon)

Mataojo 2020, Montevideo (11400) URUGUAY

## Organizers

Local organizers: Martina Crispo\*, Noel Meikle\*, Geraldine Schlapp\*

Unidad de Biotecnología de Animales de Laboratorio (Laboratory Animal Biotechnology Unit)

Institut Pasteur de Montevideo, Uruguay

Organizers from International Centre for Genetic Engineering and Biotechnology (ICGEB):

Marcello Raspa, National Research Council, IBBC, Rome, Italy

Andrés Muro, ICGEB, Trieste, Italy

\*ISTT members

## Financial support

The workshop received the following international funding:

ICGEB, Institut Pasteur International Network (RIIP), International Society for Transgenic Technologies (ISTT), United Nations University – Programme for Biotechnology in Latin America and the Caribbean (UNU-Biolac)

Sponsors: Biko (Uruguay), Eleco (Uruguay), Cosmobio (USA)

## Invited speakers/instructors

Lluis Montoliu, Centro Nacional de Biotecnología, Madrid, Spain.

Lydia Teboul, Mary Lyon Centre, MRC Harwell, Oxford, UK.

Marcello Raspa, NRC, IBBC, Rome, Italy.

Andres Muro, ICGEB, Trieste, Italy.

Marcelo Rubinstein, INGEBI-CONICET, Buenos Aires, Argentina.

Jean Jaubert, Institut Pasteur, Paris, France.

Francina Langa, Institut Pasteur, Paris, France.

Martina Crispo, Institut Pasteur de Montevideo, Uruguay.

María Noel Meikle, Institut Pasteur de Montevideo, Uruguay.

Jorge Pórfido, Institut Pasteur de Montevideo, Uruguay.  
Geraldine Schlapp, Institut Pasteur de Montevideo, Uruguay.

## Workshop program and activities

This course was focused on the latest advances in genome editing using the novel tool CRISPR/Cas to generate mouse models. Moreover, *in vitro* fertilization and cryopreservation (a.k.a. Assisted Reproductive Techniques – ARTs) were central topics which are routine procedures in mouse facilities such as ours that produce genome editing models. Participants had the opportunity to spend five days on theoretical lessons and hands-on training with national and international expert speakers working in this cutting-edge field. Additionally, theoretical lectures were streamed by zoom webinar, so the information was spread in our region and around the world, with an average of 25 people connected.

### PROGRAM

Monday 15th

08:45 – 09:00 Registration

09:00 – 09:20 Teacher's and student's presentation

09:20 – 09:30 Unidad de Biotecnología en Animales de Laboratorio - presentation (M. Crispo)

09:30 – 11:00 Lecture: Genome modification in animals: past, present and future (L. Montoliu)

11:00 – 11:15 Coffee break

11:15 – 12:30 Lecture: Main applications of CRISPR system in rodents (A. Muro)

12:30 – 14:00 Lunch

14:00 – 15:00 Lecture: Basic CRISPR design (A. Muro)

15:00 – 17:00 Practical/Informatics session: step by step tutorial for the design of CRISPR reagents (part I) (L. Teboul, J. Pórfido, A. Muro)

17:00 Toast; Informal get-together

Tuesday 16th

09:00 – 11:00 Practical/Informatics session: step by step tutorial for the design of CRISPR reagents (part II) (L. Teboul, J. Pórfido, A. Muro)

11:00 – 11:15 Coffee break

11:15 – 12:15 Lecture: Validation of CRISPR reagents (L. Montoliu)

12:15 – 13:00 Lunch

13:00 – 14:00 Lecture: CIGM presentation. Embryo microinjection and electroporation approaches (F. Langa)

14:00 – 17:00 Practical session: Microinjection and electroporation of mouse embryos (M.N. Meikle, G. Schlapp, M. Crispo, F. Langa)

Wednesday 17th

09:00 – 10:30 Lecture: Genotyping strategies and validation of GE alleles (L. Teboul)

10:30 – 10:45 Coffee break

10:45 - 12:30 Practical/Informatics session: step by step tutorial for the design of CRISPR reagents (part III) (L. Teboul, J. Pórfido, A. Muro)

12:30 – 13:30 Lunch

13:30 – 14:30 Lecture: Functional validation of GE mouse models (J. Pórfido)

14:30 – 15:30 Lecture: Controlling food intake and body weight using CRISPR/Cas9 in mice (M. Rubinstein)

15:30 – 15:45 Coffee break

15:45 - 17:00 Round table: CRISPR troubleshooting (all together)

Thursday 18th

09:00 – 10:00 Lecture: In vitro fertilization (J. Jaubert)

10:00 – 12:00 Practical session: In vitro fertilization (Part I) (M. Raspa, J. Jaubert)

12:00 - 13:30 Lunch

13:30 – 15:15 Practical session: In vitro fertilization (Washing) (M. Raspa, J. Jaubert)

15:15-15:30 Coffee break

15:30-17:00 Students paper's discussion

20:00 - Social event

Friday 19th

09:00 - 10:30 Practical session: In vitro fertilization (Part II). Count embryos from IVF (M. Raspa, J. Jaubert)

10:30-10:45 Coffee break

10:45-12:00 Lecture: Embryo and sperm cryopreservation (M. Raspa)

12:00 - 13:00 Lunch

13:00 – 16:00 Practical session: Embryo and sperm cryopreservation (M. Raspa, J. Jaubert)

16:00 - 17:00 Wrap up - End of the course

### Student application and selection

Nineteen out of 47 high-level students were selected. The selection criteria were based on their academic education and experience on the course topics, their motivation to attend the course, and the support letter, taking into consideration the possibility to apply the learned techniques. Additionally, we considered to select students from diverse Latin American nationalities, different institutions, and gender balance. Finally, three of the selected students could not participate in the course, two applicants from Nigeria and one from Uganda, because of travel expenses or VISA affairs.

Total Participants: 16 (Female 10, Male 6). Total fellowships granted: 11 full; 5 partial (Female: 7 full, 3 partial / Male: 4 full, 2 partial).

## Organization

The Institut Pasteur de Montevideo (IPMon) is located at short distance from hotel infrastructure in Montevideo. Teachers and students were accommodated in the same hotel, which was important to foster interaction. A transfer bus ensured daily hotel/institute/hotel transport.

The institute has designated laboratories for teaching purposes, for both practical and informatics sessions. Secretarial and technical assistance is available, both for organizational logistics, as well as for informatics system management. Furthermore, the institute and our unit count with good previous experience in organizing theoretical and practical courses, which resulted in a very smooth flow, with no major problems. The Secretary of the IP Montevideo took care of every non-academic detail, from scheduling flight arrivals and departures to dealing with food, accommodation and travel providers.

## Global appreciation of the training

As a result, sixteen students from diverse nationalities have been trained in the use of CRISPR system to generate gene edited animal models; they have acquired the main principles to design the CRISPR reagents *in silico*, to microinject/electroporate mouse embryos, and to analyze their genotype. Furthermore, students have learnt to use assisted reproductive techniques that are strongly associated to CRISPR models: to cryopreserve embryos and sperm, to thaw both samples and check for viability and to perform *in vitro* fertilization. We hope the acquired knowledge will be spread among student's colleagues. Last but not least, the possibility to access the open lectures allowed colleagues and students around the world to attend the lectures (as seen in the picture).

The Workshop was entirely dictated in English. A hands-on manual was prepared by the organizers. CRISPR troubleshooting was discussed in a round table where all the speakers took part and had the chance to talk about their experience in problems and solutions that could arise in the CRISPR pipeline. Students had to present and discuss a research article in groups. Social activities included a get-together toast the first course day and course dinner on the fourth day.

A video was produced by the Communications Office of IPMon, in which students and teachers were asked to talk their experience/feelings about this course and the importance of this type of education training for the Latin American region: [https://www.youtube.com/watch?v=UdR9bxZvSDE&ab\\_channel=InstitutPasteurdeMontevideo](https://www.youtube.com/watch?v=UdR9bxZvSDE&ab_channel=InstitutPasteurdeMontevideo)

At the end of the workshop, students were asked to fill out an anonymous survey form of the workshop, to evaluate different aspects of this event, which resulted very valuable for the organizing team. Survey results are showed in the next tables:

<b>Administrative Form Evaluation</b>	<b>Poor</b>	<b>Adequate</b>	<b>Good</b>	<b>Very good</b>	<b>Excellent</b>
Application process	0	0	1	4	10
Organization of the Course	0	0	0	1	14
Responsiveness of Course Coordinator	0	0	0	1	14
Meeting/Classrooms	0	0	0	2	13
Meals	0	0	0	2	13
Coffee breaks	0	0	0	2	11
Lodging: Quality	0	0	0	1	13
Cleanliness	0	0	0	1	11
Location	0	0	1	0	11
Attention & Service	0	0	2	0	10

<b>Questionnaire Course Form Evaluation</b>	<b>Poor</b>	<b>Adequate</b>	<b>Good</b>	<b>Very good</b>	<b>Excellent</b>
Usefulness of the Course	0	0	1	2	12
Relevance of Topics	0	0	0	1	14
Effectiveness of Faculty/Presenters	0	0	0	3	12
Quality of the Presentation	0	0	0	3	12
Schedule was coherent and managed	0	0	0	3	12
Quality of Reading Material	0	0	0	2	13
Balance between Lab Practice and Theory	0	0	1	4	10
Laboratory Facilities	0	0	0	3	12
Length of Course	0	0	0	0	14

### Photos



