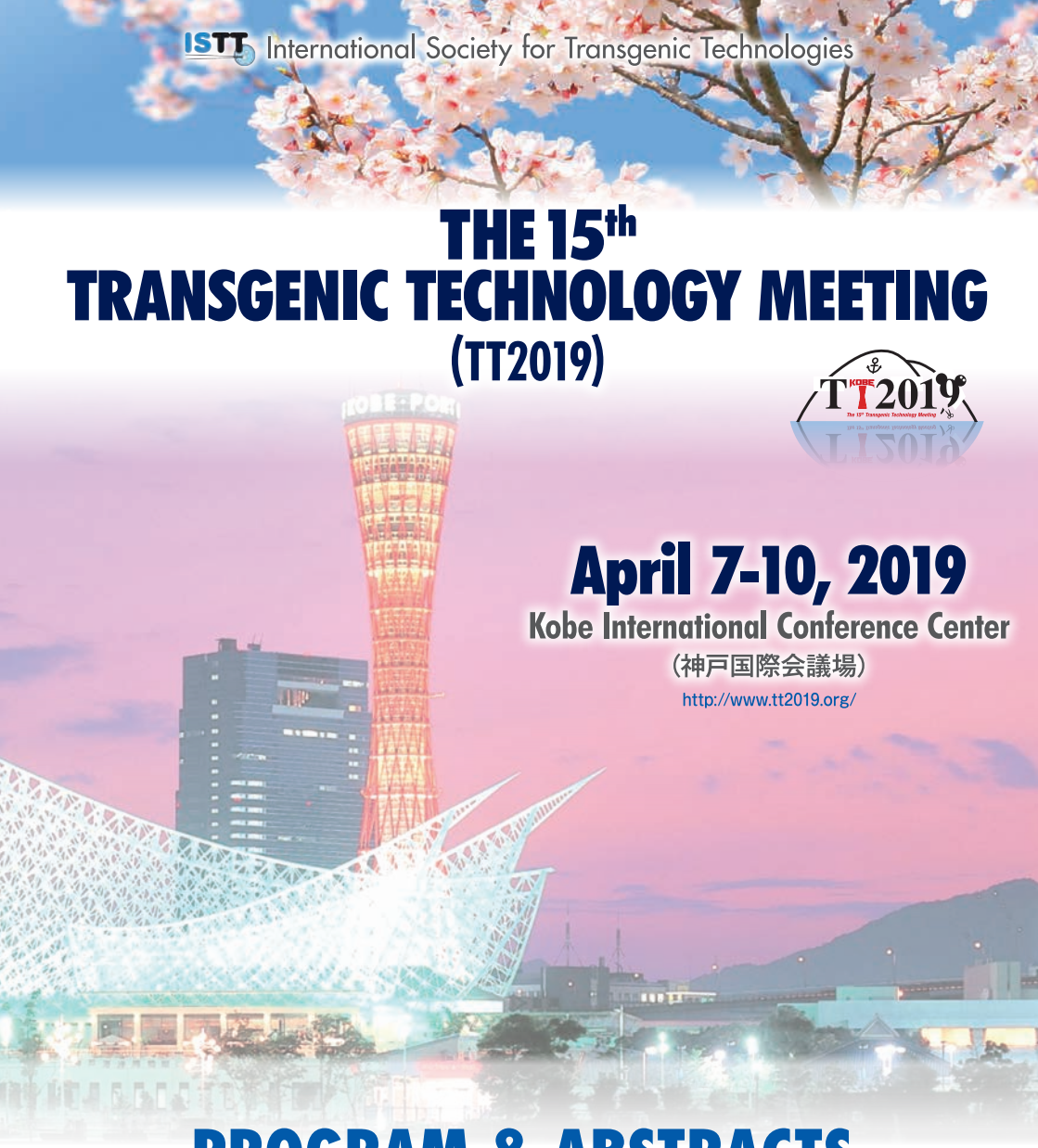
ISTT International Society for Transgenic Technologies

THE 15th TRANSGENIC TECHNOLOGY MEETING (TT2019)



April 7-10, 2019

Kobe International Conference Center

(神戸国際会議場)

http://www.tt2019.org/

PROGRAM & ABSTRACTS

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ISTT www.transtechsociety.org International Society for Transgenic Technologies

RIKEN BDR Center for Biosystems Dynamics Research

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International Society for Transgenic Technologies

The International Society for Transgenic Technologies (ISTT) seeks to foster communication and technology sharing, to enhance scientific research, to advance the field of animal transgenesis, particularly as it applies to useful experimental models in biology, medicine and biotechnology, and to represent the interests of an international body of professionals (scientists, technicians, and graduate students) working in the field of transgenic technologies.

Become a member! Be part of our community!

The benefits of membership include priority access/reduced registration fees to Transgenic Technology (TT) meetings, and free on-line access to *Transgenic Research,* as well as unique online content (pictures, videos, methods, talks, posters) through the members-only area of the ISTT website. Further information on membership can be found at:

www.transtechsociety.org

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Welcome Message

Welcome to Kobe, Japan!

It is a great honor and pleasure of the TT2019 Conference Committee and the ISTT to welcome you all to the 15th Transgenic Technology Meeting (TT2019). At the milestone of our 15th event to celebrate, the local staff of RIKEN Center for Biosystems Dynamics Research (BDR), the host institution of this Conference, also would like to offer the delegates from all over the world a warm welcome to Kobe, Japan.

The past four decades of animal transgenesis research have seen a number of technological breakthroughs, having paved the way to linking genes and their functions. We are now witnessing yet another wave of revolution in our field driven by genome editing technologies. This trend not only has tasked us to further enrich our technical expertise, but also has challenged us with many ethical questions. TT2019 starts off with the inaugural discussion session on ethics in the CRISPR era, followed by a number of innovative approaches using genome editing technologies in an expanding plethora of experimental model animal species, as well as those for translational and industrial applications. Yet it does, by no means, detract fundamentals from traditional approaches in animal genetic manipulations, underscored by many other excellent talks, including the ISTT Prize Lecture by Lluis Montoliu on transgenesis with large constructs, the Keynote Lecture by Hiroshi Hamada on elucidation of fundamental mechanisms underlying animal body plan by transgenic approaches and the Orbis Pictus Lecture by Gail Martin on historical perspectives of the embryonic stem cell technology. We will also hear from the recipients of Young Investigator Award and 3Rs Prize about innovative research accomplishments for which they were awarded.

Delegates will also feel the heat of new developments in our community in poster sessions where numerous emerging techniques and tools in transgenic technologies, including zygote electroporation, diverse animal models and bioresource development. The Post-TT2019 Hands-on Workshop will provide some of the delegates with a unique opportunity to exploit cutting-edge techniques in animal transgenesis.

We thank all the speakers and poster presenters in providing the seeds of exciting discussions. We are also deeply indebted to our sponsors and exhibitors from corporate and academic sectors for their generous support. Additionally, but not the least, the exhaustive efforts and support of the ISTT leadership, TT2019 Scientific Advisory and Organizing Committees and the local meeting staff warrant an enormous amount of gratitude for the realization of this Conference.

It is our great expectation that TT2019 will be a venue for the transgenic technology community to enjoy fruitful scientific exchange, to develop future collaborations and to explore possible future directions of our field!

Sincerely,

Yas Furuta
Chair of TT2019 Organizers

Wojtek Auerbach
ISTT President

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Chair

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Branko Zevnik	CECAD, University of Cologne, Germany

Scientific Program

SUNDAY, APRIL 7, 2019

14:00 – 19:30 ***REGISTRATION*** ***Main Hall Foyer, 1F ;***
Poster Set-up ***International Conference Room, 3F***

17:00 – 17:10 ***INTRODUCTION – TT2019 Committee*** ***Main Hall***

WELCOME ADDRESS
Eisuke Nishida Director, RIKEN Center for Biosytems Dynamics Research, Japan

17:10 – 19:30 ***PRE-MEETING PANEL DISCUSSION:***
Ethical Aspects of Genome Editing ***Main Hall***
Moderators: Ernst-Martin Füchtbauer & Jan Parker Thornburg

Mickey Gjerris University of Copenhagen, Denmark
"With great power comes great responsibility - Ethical aspects of gene-editing"

Ewa Maria Bartnik University of Warsaw, Poland
"The ethics of human genome editing"

Marion Abecassis INSERM Ethics Committee, France
"Genome Editing: A Global Legal Perspective"

19:30 – 21:00 ***WELCOME RECEPTION; Poster Pre-View, Vendor Exhibits***
International Conference Room / Reception Hall / Lounge, 3F

MONDAY, APRIL 8, 2019

8:30 – 8:35 ***OPENING ADDRESS – Wojtek Auerbach (ISTT President)*** ***Main Hall***

8:35 – 9:25 ***OPENING KEYNOTE LECTURE*** ***Main Hall***
Introduction: Hiroshi Kiyonari

Supported by RIKEN Symposium Series

"How Left-Right Asymmetry is Established in the Mouse Embryo: Lessons we learned from Transgenic Mice"
Hiroshi Hamada RIKEN Center for Biosystems Dynamics Research, Japan

SESSION 1: Genome Editing – from Mechanisms to Applications *Main Hall*

Chair: Masato Ohtsuka

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9:25 – 9:50 Jonathan Wilde Massachusetts Institute of Technology, USA
"Efficient embryonic genome editing via RAD51-eenhanced interhomolog repair"

9:50 – 10:05 Seiya Mizuno University of Tsukuba, Japan
"Modified-Cas9 improves genome editing efficiency in mouse zygote"

10:05 – 10:20 Gus McFarlane University of Edinburgh, Scotland, UK
"A CRISPR-Cas9 gene drive targeting female reproduction in mice"

10:20 – 10:40 ***Coffee Break***
Main Hall Foyer, 1F; International Conference Room / Reception Hall / Lounge, 3F

SESSION 2: Transgenesis in Non-Mammalian Models *Main Hall*

Chair: Richard Behringer

10:40 – 11:05 Erin Alberstat Marine Biological Lab, Woods Hole, USA
"Unraveling crustacean body plan evolution through CRISPR/Cas9 genome editing"

11:05 – 11:30 Kiyoshi Naruse National Institute for Basic Biology, Japan
"Transgenic and genome editing technologies and medaka bioresource project"

11:30 – 11:55 Rachel Miller University of Texas, USA
"Tissue-Specific CRISPR knockouts in Xenopus laevis"

11:55 – 12:10 Anne Straume Institute of Marine Research, Norway
"Highly efficient CRISPR/Cas9 knock-in in Atlantic Salmon"

Scientific Program

12:10 – 12:35 ***POSTER FLASH TALKS I : odd number posters*** ***Main Hall***

12:40- ***Lunch Break***

12:40 – 13:25 ***Luncheon Seminar*** ***Main Hall***

Presentation 1
Takayuki KOYANO Division of Molecular Genetics, Shigei Medical Research Institute, Japan
"GONAD -A simple method for genome-editing in Mice and Rats-"

Presentation 2
Masahito IKAWA Research Institute for Microbial Diseases, Osaka University, Japan
"CRISPR/Cas9 Mediated Genome Editing in Mice"

Sponsored by NEPAGENE

13:25 – 14:40 ***Poster Session I***
odd number posters; International Conference Room, 3F

12:40 – 14:40 ***Vendor Exhibits*** ***Reception Hall / Lounge, 3F***

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SESSION 3: Panel Discussion – Running a Transgenic Core *Main Hall*

14:40 - 16:15 Moderator: Elizabeth Williams
Panelist: Martina Crispo Institut Pasteur de Montevideo, Uruguay
Judy Hallett Purdue University, USA
Yas Furuta RIKEN Center for Biosystems Dynamics Research, Japan
Geert Michel Charité Universitätsmedizin Berlin, Germany

16:15 – 16:40 ***Coffee Break***
Main Hall Foyer, 1F; International Conference Room / Reception Hall / Lounge, 3F

SESSION 4: Development of Sex and Germ Line *Main Hall*

Chair: Aimee Stablewski & Toru Takeo

16:40 – 17:05 Tomoya Kitajima RIKEN Center for Biosystems Dynamics Research, Japan
"Causes of aneuploidy in eggs"

17:05 – 17:30 Jon Oatley Washington State University, USA
"Advancing reproductive capacity in livestock with gene editing"

17:30 – 17:55 Yumiko Saga National Institute of Genetics, Japan
"Germ cell-specific conditional knockout without making mouse lines"

17:55 – 18:10 Ella Thomson University of Queensland, Australia
"Understanding the structure/function relationship of the human sex determining gene, Sry, using a transgenic mouse model"

18:10 – 19:10 ***ISTT PRIZE LECTURE (Main Hall)***
Introduction and Award Presentation: Wojtek Auerbach ISTT President

Sponsored by genOway

"Eventually, Size Did not Matter"
Lluis Montoliu National Center for Biotechnologies, Spain

TUESDAY, APRIL 9, 2019

SESSION 5: Transgenic Technologies in the Rat Main Hall

Chair: Tomoji Mashimo & Lynn Doglio

8:30 – 8:55 Akiko Takizawa Medical College of Wisconsin, USA
"Establishment of a cryopreservation system for gene modified rat strains"

8:55 – 9:20 Ignacio Anegon Universite de Nantes, France
"Generation of genome edited rats for the analysis of immune responses"

9:20 – 9:45 Hiromitsu Nakauchi Stanford University, USA
"Exploiting the organ niche for interspecies organogenesis"

9:45 – 10:00 Jeffrey Lee Regeneron Pharmaceuticals, Inc., USA
"Embryonic Stem Cell-Based Production of Large Targeted Genome Modifications in the Rat for the Purposes of Human Disease Modeling and Drug Discovery"

10:00 – 10:30 ***Coffee Break***
Main Hall Foyer, 1F; International Conference Room / Reception Hall / Lounge, 3F

SESSION 6: Ethics and 3Rs – Ethical Challenges in Genetically Engineered Animals Main Hall

Chair: Boris Jerchow & Branko Zevnik

10:30 – 10:50 Adrian Smith Norwegian Veterinary Institute, Norway
"PREPARE before you ARRIVE: how to plan animal experiments"

10:50 – 11:10 Anne Zintzsch Justus-Liebig-Universität Gießen, Germany
"Coping with the phenotype: Challenges of assessing severity"

11:10 – 11:30 Takashi Agui Hokkaido University, Japan
"Humane endpoints in generating and breeding genetically modified animals"

Scientific Program

11:30 – 11:40 Benjamin Davies Welcome Centre for Human Genetics, UK
"Replacement of surgical vasectomy by the use of wild-type sterile hybrids"

11:40 – 12:00 ***3Rs Prize Presentation and Talk***

Sponsored by JANVIER LABS

Pawel Pelczar University of Basel, Switzerland
"Permanent companion females improve the welfare of vasectomized males without adversely affecting their plugging performance."

12:00 – 12:25 ***POSTER FLASH TALKS II: even number posters***

12:30- ***Lunch Break***

12:30 – 13:15 ***Luncheon Seminar*** ***Main Hall***

Satoru Takahashi, Seiya Mizuno, Fumihiro Sugiyama
Department of Anatomy and Embryology, Faculty of Medicine, Laboratory Animal Resource Center (LARC), Transborder Medical Research Center (TMRC), University of Tsukuba, Japan

Christopher Dowdy Charles River
"Generation services of genetically modified mice by using new modified Cas9 in Laboratory Animal Resource Center, University of Tsukuba"

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13:15 – 14:30 ***Poster Session II*** ***even number posters; International Conference Room, 3F***

12:30 – 14:30 ***Vendor Exhibits*** ***Reception Hall / Lounge, 3F***

SESSION 7: New Developments in Transgenic Technologies *Main Hall*

Chair: Peter Hohenstein & Karen Brennan

14:30 – 14:45 Takaya Abe RIKEN Center for Biosystems Dynamics Research, Japan
"Fluorescent reporter mouse lines and image analyses reveal distinct region-specific cell behaviors in the visceral endoderm"

14:45 – 15:00 Leslie Goodwin The Jackson Laboratory, USA
"Large-scale discovery of transgene insertion sites in mice"

15:00 – 15:15 Soren Warming Genentech, Inc., USA
"Targeted Locus Amplification (TLA) as a powerful tool for allele verification and transgene integration site analysis"

15:15 – 15:30 Marie-Christine Birling CELPHEDIA, PHENOMIN, Institut Clinique de la Souris, France
"Generation of genomic structural variants and chromosomal manipulation by CRISPR/Cas9 genome editing in rodents"

15:30 – 15:45 Xiaofeng Liu Sun Yat-sen University, China
"Targeted editing of the ZBED6 binding site in intron 3 of IGF2 by base editor leads to enhanced muscle development in Liang Guang Small Spotted pigs"

15:45 – 16:00 Hiroshi Kiyonari RIKEN Center for Biosystems Dynamics Research, Japan
"Development of reproductive technology in Wistar rat strain"

16:00 – 16:30 ***Coffee Break***
Main Hall Foyer, 1F; International Conference Room / Reception Hall / Lounge, 3F

SESSION 8: Transgenic Technologies in Large Animals/Livestock *Main Hall*

Chair: Simon Lillico & Martina Crispo

16:30 – 16:55 Charlotte Brandt Sorensen Aarhus University, Denmark
"Genetically Modified Yucatan minipigs as models for hypercholesterolemia and atherosclerosis"

16:55 – 17:20 Adrian Mutto National University of General San Martin, Argentina
"Somatic Cell Nuclear Transfer and Its impact on equine industry"

17:20 – 17:45 Hideyuki Okano Keio University School of Medicine, Japan
"Disease modeling and brain mapping using genetically modified marmosets"

17:45 – 18:00 Hendrik Sake Friedrich-Loeffler-Institut, Germany
"Generation and characterization of SLA class I knockout pigs for xenotransplantation"

18:00 – 19:00 ***ISTT GENERAL ASSEMBLY*** ***Main Hall***

19:30 – 21:30 ***GALA DINNER*** ***Kobe Portopia Hotel***

Scientific Program

WEDNESDAY, APRIL 10, 2019

SESSION 9: Genome Editing – Advanced Applications and Challenges (I) *Main Hall*

Chair: Benoît Kanzler & Cheryl Bock

8:40 – 8:55 Guochun Gong Regeneron Pharmaceuticals Inc., USA
"CRISPR expressing mice for tissue specific gene modulation"

8:55 – 9:10 Takuro Horii Gunma University, Japan
"Generation of epigenetic disease model mice by targeted demethylation of the epigenome"

9:10 – 9:25 Daniel Davis University of Missouri, USA
"Genome editing in an era of precision medicine: Multi-species approach to determine underlying mechanism of KCNT1-associated epilepsy"

9:25 – 9:40 Yang Zhou Chinese Academy of Sciences, China; Massachusetts Institute of Technology, USA
"Generation of a germline-transmissible macaque model of autism via CRISPR/Cas9"

9:40 – 10:05 Jaime Rivera University of Massachusetts Medical School, USA
"Dunkin' Transgenics: A Simple Method to Edit Mammalian Embryos"

10:05 – 10:35 ***Coffee Break***
Main Hall Foyer, 1F; International Conference Room / Reception Hall / Lounge, 3F

SESSION 10: Genome Editing – Advanced Applications and Challenges (II)

Chair: Lluis Montoliu

10:35 – 10:50 Thomas Saunders University of Michigan, USA
"CRISPR/Cas9 Complement C3 Rat Knockout Model Implicates C3 in Neuropathy"

10:50 – 11:05 Lydia Teboul MRC Harwell Institute, UK
"Generation and validation of increasingly complex alleles introduced by genome editing"

11:05 – 11:30 Hui Yang Shanghai Institute for Biological Sciences, China
"Generation of genetically modified animals by CRISPR"

11:30 – 12:00 ***YOUNG INVESTIGATOR AWARD***
Introduction and Award Presentation: Benoit Kanzler ISTT Vice President

"Light up the Embryos: Efficient Generation of Knock-in Reporter Mice by 2C-HR-CRISPR"
Bin Gu Hospital for Sick Children, Canada

ISTT Young Investigator Award is supported by an independent medical education grant from Regeneron Pharmaceuticals, Inc.

12:00- ***Lunch Break***

12:50 – 13:50 ***CLOSING KEYNOTE – Orbis Pictus Lecture***
Award Presentation: Czech Center for Phenogenomics
Introduction: Wojtek Auerbach (ISTT President)

Sponsored by 

"Twists and Turns on the Road to Gene Targeting"
Gail Martin University of California San Francisco, USA

13:50 – 14:15 ***CLOSING***
Poster Awards: ISTT Committee
Closing Remarks: Wojtek Auerbach (ISTT President) & TT2019 Committee
Presentation of TT2020: Rebecca Haffner-Krausz Weizmann Institute of Science, Israel

Abstracts

PRE-MEETING PANEL DISCUSSION

With great power comes great responsibility – Ethical aspects of gene-editing

Mickey Gjerris
University of Copenhagen, Denmark

The advent of novel technologies brings social challenges as they force us to revisit our values and examine if and how the new possibilities should be implemented in our lives. The emergence of gene-editing technologies such as CRISPR-Cas9 is the latest example of this. With the promise of revolutionizing plant and animal breeding and providing new tools to treat diseases and alleviate human suffering the benefits of gene-editing seems obvious, but they come with ethical concerns that needs to be addressed, if the implementation of the technology is to be socially robust.

With regard to plants and animals, discussions mainly revolve around risks to humans and the environment, but concepts such as naturalness, social justice and the integrity of plants and animals are just as important to discuss as the technology challenges the ethical values of many citizens. With regard to humans there has been widespread agreement in the international community that gene-technology should only be used on humans for therapeutic purposes to avoid that induced changes would be inheritable, but with the advent of gene-editing the discussion has resurfaced, not the least when a Chinese researcher claimed that he had already created ”CRISPR-babies”. The possibility of unintended side-effects cautions such a development, but there are other and broader ethical considerations to include in the discussion such as: How will it affect our understanding of human nature, if we begin editing our genome? The talk will give an overview of the ethical issues related to gene-editing and present ethical arguments for a cautionary approach to the new possibilities.

PRE-MEETING PANEL DISCUSSION

The ethics of human genome editing

Ewa Maria Bartnik

Indtitute of Genetics and Biotechnology
Faculty of Biology, University of Warsaw, Poland

Since the letter by Baltimore et al. "Biotechnology. A prudent path forward for genomic engineering and germline gene modification" appeared in Science almost exactly four years ago a lot of discussions have been taking place which mainly focus on the fundamental statement made in that publication, "Strongly discourage…any attempts at germline modification for clinical application in humans while societal, environmental, and ethical implications of such activity are discussed among scientific and governmental organizations….This will enable pathways to responsible uses of this technology, if any, to be identified". The "if any" is fundamental, and especially so as genome editing had already been used on human embryos. The ethics issues as well as fundamental position statements made by leading institutions will be presented.

Abstracts

PRE-MEETING PANEL DISCUSSION

Genome editing: A Global Legal Perspective

Marion Abecassis

Attorney in Life Sciences –Member of the Board of the Association for Responsible Research and Innovation in Genome Editing (ARRIGE), France

The rapidity of scientific advances challenges experts' predictions… And the capacity of the law to adapt to the advent of new technology. "Be careful what you wish for" – What should we wish (and work) for with regards to genome-editing technology, from a global legal perspective?

The International Bioethics Committee of UNESCO raised, almost four years ago, that, "*it is important for States and governments to accept the principle of a shared global responsibility when the engineering of the human genome is involved.*" This takes on renewed importance now that gene-edited babies are born in China. Genome-editing technology can no longer be considered solely as a lab technology or a revolution of plants and animals transgenics, and its potential use on humans can no longer be thought as only occurring on the occasion of rare and highly controlled clinical trials.

This presentation will focus on existing international legal tools applicable to the use of genome-editing technology on living organisms and on-going initiatives advocating for a global framework for the use of genome editing.

OPENING KEYNOTE LECTURE

How left-right asymmetry is established in the mouse embryo: lessons we learned from transgenic mice

Hiroshi Hamada, Yayoi Ikawa, Eriko Kajikawa,
Katsura Minegishi, Katsutoshi Mizuno, Hiromi Nishimura

Riken Center for Biosystems Dynamics Research, Japan

In the past >20 years, my lab has studied how left-right (L-R) asymmetry is established in the mouse embryo. We now understand, in principle, how L-R symmetry is broken by rotating cilia and unidirectional fluid flow (how L-R asymmetry is originated), how this symmetry breaking leads to asymmetric gene expression in the lateral plate, and how asymmetric gene expression results in situs-specific organogenesis. However, there still remain several important questions unanswered. For example, how the fluid flow is sensed by embryo, and how L-R symmetry is broken in the absence of motile cilia in some vertebrates. In our past and ongoing work, we always addressed questions by taking advantage of transgenic mice. Thus, generating various transgenic and mutant mice has been the basic strategy of our work. Here we will introduce our recent work that would address some of the unanswered questions.

Supported by RIKEN Symposium Series

Abstracts

Plenary Session 3

Cutting-edge technologies in South America

Martina Crispo[1], G. Schlapp[2], M.N. Meikle[2], A.P. Mulet[2]

[1]Institut Pasteur de Montevideo, Uruguay,
[2]Transgenic and Experimental Animal Unit, IPMon, Uruguay

Since 2006 the Transgenic and Experimental Animal Unit of Institut Pasteur de Montevideo has provided genetically modified (GM) tailor-made animal models for researchers of the region and the world, through standard techniques such as DNA microinjection, homologous recombination in ES cells, lentivirus and transposons. In 2014 the incorporation of CRISPR/Cas system into our portfolio allowed us to speed up the production of GM experimental animals and livestock, improving the efficiency of the techniques and reducing the costs. Since then, we have produced KO, KI and cKI animal models with applications in the fields of biomedicine and agriculture. In addition, our Unit provides mice and rats for different research groups working in cancer, neurodegenerative and metabolic diseases among others. Furthermore, we introduced IVF of ultrasuperovulated mouse oocytes using anti-inhibin serum and CARD method, which allowed us to obtain hundreds of zygotes that can be either vitrified or microinjected and transferred to foster females, reducing the number of animals used. We incorporated a molecular biology Lab that specializes in molecular design and genotyping analysis, offering a complete GM production service, from model design to detection of founders. All these cutting-edge technologies had positioned us as a reference core facility in South America, always keeping us at the forefront of GM animal generation techniques.

Abstracts

ISTT Prize Lecture

Eventually, size did not matter

Lluis Montoliu

CNB-CSIC and CIBERER-ISCIII, Madrid, Spain
National Center for Biotechnologies, Spain

During the first decade of animal transgenesis, researchers had to deal with the so-called chromosomal position effects, associated with altered expression of the injected transgenes upon integrating randomly in the host genome. This undesired variability was usually compensated by increasing the number of transgenic mouse lines generated. Therefore, only those phenotypes robustly found in several independent mouse lines were believed to be associated with the intended genetic modification.

In the 90's, an alternative approach was devised, to overcome those annoying position effects. The use of large genomic pieces of DNA, hundreds of kilobases in length, as transgenes was established. At first, yeast artificial chromosomes (YACs) were used for the production of transgenic mice. Subsequently, bacterial artificial chromosomes (BACs) and P1-derived artificial chromosomes (PACs) were tested similarly in vivo. These transgenes usually recapitulated the expression pattern of the endogenous genes they were carrying, thereby apparently eliminating the position effects. The size of these transgenes ensured the presence of relevant regulatory regions within the genomic region. Thus, the notion that "size matters" was adopted for artificial chromosome-type transgenic animals.

Twenty years later, CRISPR/Cas9-derived genome edited mice have been generated and used to functionally assess the role of relevant regulatory regions directly at the endogenous locus. These new experiments have revealed unexpected differences with analogous results generated through YAC transgenesis, suggesting that position effects had not been entirely eliminated. Therefore, 25 years later after establishing that sizes matter we probably have to conclude that, after all, size does not matter in animal transgenesis.

Plenary Session 6

3Rs Prize Presentation and Talk

OP-7 Permanent companion females improve the welfare of vasectomized males without adversely affection their plugging performance.

Pawel Pelczar, Heide Oller, Michael Bernstein

Center for Transgenic Models, University of Basel, Switzerland

Transgenic facilities require large numbers of vasectomized stud males to provide surrogate females necessary for their day to day operation. These males are mated as needed, but otherwise remain single-housed. The practice of single housing social animals such as laboratory mice is known to be stressful, however due to aggression it is frequently accepted when housing idle breeding or vasectomized males. Our lab has generated and distributed genetically sterile males that can serve as vasectomy replacements. We have now investigated whether providing a permanent companion female as a stress to sterile males will affect their ability to generate pseudopregnant females needed for embryo transfer procedures. Over the course of eight months, half of our colony of sterile males received a companion female, while the other half remained in single housing. We did not see a significant difference in plug rate between the two groups and therefore postulate that providing a sterile stud male with an additional permanent female companion improves animal welfare without reducing the plugging efficiency.

Young Investigator Award

Light up the embryos: Efficient generation of knock-in reporter mice by 2C-HR-CRISPR

Bin Gu[1], Eszter Posfai[2], Janet Rossant[2]

[1]Hospital for Sick Children, Canada,
[2]Program in Developmental and Stem Cell Biology, Hospital for Sick Children, Toronto, Canada

Large fragment knock-in, especially fluorescent reporter mouse models are important tools that could strongly promote the precise spatial-temporal analysis of developmental processes. Rapid and efficient generation of such models is still a major hurdle in mouse genetics. We developed 2C-HR-CRISPR, a highly efficient gene editing method based on introducing CRISPR reagents into mouse embryos at the 2-cell stage, taking advantage of the likely increase in HR efficiency during the long G2 phase and open chromatin structure of the 2-cell embryo. With 2C-HR-CRISPR and a modified biotin-streptavidin approach to localize repair templates to target sites, we rapidly targeted 20 endogenous genes that are expressed in mouse blastocysts with fluorescent reporters and generated reporter mouse lines with gene dependent efficiencies up to 95%. We showcase the first live triple-color blastocyst with all three lineages differentially reported. Additionally, we demonstrated efficient double targeting, enabling rapid assessment of the auxin-inducible degradation system for probing protein function in mouse embryos. These methods open up exciting avenues for exploring cell fate decisions in the blastocyst and later stages of development. We also suggest that 2C-HR-CRISPR can be a better alternative to random transgenesis by ensuring transgene insertions at defined 'safe harbor sites.

ISTT Young Investigator Award is supported by an independent medical education grant from Regeneron Pharmaceuticals, Inc.

CLOSING KEYNOTE: Orbis Pictus Lecture

Twists and turns on the road to gene targeting

Gail R. Martin

Department of Anatomy, University of California San Francisco, USA

The process of making specific changes in the genome of an embryo and creating animals that carry and can transmit those changes to their offspring has become commonplace. But how did we come to know that such a remarkable feat is possible? This talk will describe the milestones on the road that led to that knowledge, the first of which was the observation that certain male mice spontaneously developed a special type of testicular tumor. In addition, a major offshoot of the road to gene targeting – the development of in vitro model systems for studying various aspects of embryogenesis – will be discussed along with some of the lessons learned from experiments aimed at producing mice carrying specific mutations.

Posters

Posters will be mounted in International Conference Room, Kobe International Conference Center 3F and will be available for viewing from 8:30 AM, Monday, April 8, 2019. The posters will remain on display for the duration of the meeting and can be viewed until the specified times:

Monday, April 8, 2019	5:00 PM
Tuesday, April 9, 2019	5:00 PM
Wednesday, April 10, 2019	1:00 PM

During the poster sessions, Tuesday, April 9, 13:15 – 14:30 (even numbers) & Monday, April 8, 13:25 – 14:40 (odd numbers), the authors of the posters will be present and available for more in-depth discussion.

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P-01 Detection of Mouse Pregnancy by 7.5 Days Post Coitum Using a Refined Weight Gain Method

Juan M Reyes, Xin Y Rairdan, Mariela D Pantle, Ben Grellman, Kristin D Evans
Genentech, Inc., USA

P-02 Re-Evaluating One-step Generation of Mice Carrying Conditional Alleles by CRISPR-Cas9-Mediated Genome Editing Technology

Channabasavaiah Gurumurthy[1] and 110 co-authors[2]
[1]Mouse Genome Engineering Core Facility, Vice Chancellor for Research Office, University of Nebraska Medical Center, Omaha, NE, USA; [2]42 other affiliations

P-03 Management of mouse sperm freezing and quality control

Nicole Kuepper, Julia Mock, Sonja Kropp, Klaus Pfeffer
Institute of Medical Microbiology and Hospital Hygiene, Heinrich-Heine-University Duesseldorf, Duesseldorf, Germany

P-04 Noninvasive multi-modality imaging in genetically engineered mouse (GEM) model of pancreatic cancer: 3R principle in cancer research

Ying Zhao[1,2], Rainer Heuchel[3], Sandra Oerther[4], Kristian Konigsson[4], Moustapha Hassan[1,2]
[1]Preclinical Imaging Facility, Preclinical Laboratory; Clinical Research Center (KFC), Karolinska University Hospital; [2]Experimental Cancer Medicine (ECM), Clinical Research Center (KFC), Department of Laboratory Medicine, Karolinska Institutet; [3]Pancreatic cancer research laboratory, Department of Clinical Science, Intervention and Technology (CLINTEC), Karolinska Institutet; [4]Preclinical Laboratory, Karolinska University Hospital, Sweden

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P-05 Development of the Cryosword for Vitrification of Mouse Embryos and Sperm

Barbara J Stone[1], K John McLaughlin[2]
[1]ParaTechs Corporation, Lexington, Kentucky, USA; [2]Center for Molecular and Human Genetics, The Research Institute at Nationwide Children's Hospital, Columbus, Ohio, USA

P-06 Zero Angle Microinjection (ZAM): A More Efficient Method of Mouse Zygote Pronuclear Injection

Xiaojun Xing, Timothy Nottoli, Suxia Bai
Yale Genome Editing Center, Department of Comparative Medicine, Yale School of Medicine, Yale University, USA

P-07 Motorization and automation of micromanipulation for genetic modification

Tomoo Eto[1], Hiroki Ueda[2], Ryoji Ito[1], Riichi Takahashi[1], Nobuaki Tanaka[2]
[1]Central Institute for Experimental Animals; [2]NSK Ltd., Japan

P-08 Modification strategies of recombinant BAC vectors for Sleeping Beauty mediated transgenesis

Mate Z.[1], Kovacs K.[1], Hevesi Z.[2], Harkany T.[2,3], Szabo G.[1], Erdelyi F.[1]
[1]Institute of Experimental Medicine, Hungarian Academy of Sciences, Hungary; [2]Department of Molecular Neurosciences, Center for Brain Research, Medical University of Vienna, Austria; [3]Department of Neuroscience, Karolinska Institutet, Sweden

P-09 qPCR as a versatile and sensitive tool for monitoring transgene stability and genetic quality control

DON P LIU
Charles River Laboratories, USA

P-10 Test for imprinted DNA methylation activity of the human H19-ICR in YAC transgenic mice by adopting a transgene co-placement strategy

Katsuhiko Hirakawa[1], Hitomi Matsuzaki[2], Keiji Tanimoto[2]
[1]Graduate School of Life and Environmental Sciences, University of Tsukuba; [2]Faculty of Life and Environmental Sciences, Life Science Center for Survival Dynamics (TARA), University of Tsukuba, Japan

P-11 Site-directed transgenic mice production using TARGATT™ knock-in technology in TMDU

Yoshikazu Hirate[1], Hitomi Takahashi[1], Yoshiaki Ito[1], Jinling Li[2], Chiho Ohtsuka[1], Hiroshi Asahara[1], Ruby Yanru Chen-Tsai[2], Masami Kanai-Azuma[1]
[1]Tokyo Medical and Dental University, Japan; [2]Applied StemCell, Inc., USA

P-12 Manipulating the rodent genome: a comparison of traditional targeting vectors versus Cas9-mediated techniques

Susannah Diane Brydges, Jose Rojas, Jean Siao, Jeremy Rabinowitz, Yajun Tang, Qing Fang, Charleen Hunt, Guochun Gong, Sean Trzaska, Marine Prissette, Brian Zambrowicz
Regeneron Pharmaceuticals, Inc, USA

P-13 In vivo generation of the vascular-hematopoietic systems and cardiomoycytes from pluripotent stem cells

Giulia Coppiello[1], Marta Moya-Jodar[1], Gloria Abizanda[1], Javier Linares[1], Adrian Ruiz-Villalba[1], Ana Perez-Ruiz[1], Xabier Agirre[1], Juan Roberto Rodriguez-Madoz[1], Francisco Alberto Garcia-Vazquez[2], Xonia Carvajal-Vergara[1], Felipe Prosper[1,3], Xabier L. Aranguren[1]
[1]Laboratory of Regenerative Medicine, Foundation for Applied Medical Research, 31008 Pamplona, Spain; [2]Group of Veterinary Physiology Teaching Innovation, Department of Physiology, Faculty of Veterinary Science, University of Murcia, Murcia, Spain; [3]Department of Hematology, Clinica Universidad de Navarra, University of Navarra, Avenida Pio XII 36, E-31008 Pamplona, Spain

P-14 High-throughput Genome Editing in the Endogenous β-catenin Locus

Anagha Krishna[1], Martijn Kelder[2], Andrew Wood[2], Jeffrey Schoenebeck[1], Peter Hohenstein[1,3], Derya D Ozdemir[1]
[1]Roslin Institute, University of Edinburgh, UK, EH25 9RG; [2]IGMM, University of Edinburgh, UK, EH4 2XU; [3]Leiden University Medical Centre, Netherlands

P-15 Automation Applied for screening of Embryonic Stem Cells

Merone Roose Girma, Roger Caothien, Charles Yu, Lucinda Tam, Anna Pham, Soren Warming
Genentech, Inc., USA

P-16 Simple generation of transgenic mice by in vivo gene editing in preimplantation mouse embryos using rAAV vectors

Yeonsoo Yoon[1], Dan Wang[2], Phillip W.L. Tai[2], Alireza Edraki[3], Raed Ibraheim[3], Joy Riley[1], Judith Gallant[1], Erik J Sontheimer[3], Guangping Gao[2], Jaime A Rivera-Perez[1]
[1]Department of Pediatrics, Division of Genes and Development, University of Massachusetts Medical School; [2]Department of Microbiology and Physiological Systems and Horae Gene Therapy Center, University of Massachusetts Medical School; [3]RNA Therapeutics Institute, University of Massachusetts Medical School, USA

P-17 Comparison of Efficiency of CRISPR targeting: PNI vs ZEN vs GONAD

Susan Jenifer Tamowski, Kyle O'Connor, He Lan, Wenhua Li, Nicholas Black
University of Utah, USA

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P-18 One step to achieve non-mosaic gene edited porcine embryo by CRISPR/Cas9

Peiqing Cong, Junjiu Huang, Xiaohu Su, Wei Chen
Sun Yat-sen University, P. R. China

P-19 Efficient 2C-HR-CRISPR Gene Editing Using Nuclear Injection of IVF-Generated 2-cell Embryos

Kevin A Kelley[1], Kasper Bonderup[1], Philippe Soriano[2]
[1]Mouse Genetics and Gene Targeting CoRE, Icahn School of Medicine at Mount Sinai, New York, NY 10029; [2]Department of Cell, Developmental and Regenerative Biology, Icahn School of Medicine at Mount Sinai, New York, NY, USA

P-20 Generation of Large Knock-In alleles with Double Stranded Plasmid templates using the 2C-HR CRISPR method

MItra Cowan[1,2,3], Jade Desjardins[1,2,3], Janice Penney[1,2,3], Erzsebet Nagy-Kovacs[1,2,3], Nobuko Honma-Yamanaka[1,2,3], Yojiro Yamanaka[1,2,3]
[1]McGill Integrated Core for Animal Modeling, McGill University; [2]Research Institute McGill University Health Centre; [3]Department of Human Genetics, Goodman Cancer Research Centre, Canada

P-21 HDAC inhibitor increase gene targeting efficiency on the bovine β-casein locus in MAC-T cells using TALEN system

Man-Jong Kang[1], Da Som Park[1], Se Eun Kim[1], Deog-Bon Koo[2]
[1]Department of Animal Science, Chonnam National University, Republic of Korea; [2]Department of Biotechnology, Daegu University, Republic of Korea

P-22 Efficient floxing via embryo electroporation of two RNPs & two single stranded oligo donors

Xiaoxia Cui[1], Monica Sentamanat[1], Mike White[2], Colin Florian[1]
[1]Genome Engineering & iPSC Center, Department of Genetics, Washington University in St. Louis, St. Louis, MO, USA; [2]Microinjection Core, Department of Immunology & Pathology, Washington University in St. Louis, St. Louis, MO, USA

P-23 Using embryo electroporation with long DNA templates and ribonucleoprotein complexes for advanced genome editing in mouse

Marie TEIXEIRA[1], Severine CHAUTARD[2], Emilie MICHEL[2], Benedicte F PY[2], Antoine MARCAIS[2], Farida HENRY[1], Denise AUBERT[1,3], Suzy MARKOSSIAN[1,3]
[1]SFR BioSciences, Plateau de Biologie Experimentale de la Souris (AniRA-PBES), Ecole Normale Superieure de Lyon, Universite Lyon1, CNRS UMS3444, INSERM US8, France; [2]CIRI, INSERM U1111, Universite Claude Bernard Lyon 1, CNRS UMR 5308, Ecole Normale Superieure de Lyon, Universite Lyon1, France; [3]Institut de Genomique Fonctionnelle de Lyon, Ecole Normale Superieure de Lyon, Universite, Lyon, France

P-24 CRISPR/Cas9 murine zygote electroporation: combining efficiency improvement with animal reduction

Nicole Elenter, Ana Paula Mulet, Geraldine Schlapp, Maria Noel Meikle, Martina Crispo
Transgenic and Experimental Animal Unit. Institut Pasteur de Montevideo. Uruguay

P-25 Electroporation as an efficient mean of delivering genome editing reagent into mouse zygotes for CRISPR-mediated mouse genome editing

Pinghu Liu, Hideko Takahashi, Jingqi Lei, Carl Haugen, Yan Li, Lijin Dong
Genetic Engineering Core, National Eye Institute, NIH, USA

P-26 CRISPR/Cas9 electroporation can replace microinjection for in vivo genome editing in mice

Alberto Cebrian-Serrano[1], Florian Giesert[2], Wolfgang Wurst[2]
[1]Institute of Diabetes and Obesity, Helmholtz Diabetes Center, Helmholtz Zentrum Munchen; [2]Institute of Genetic and Development, Helmholtz Zentrum Munchen, Germany

P-27 Simple electroporation for efficient CRISPR/Cas9 genome editing in murine zygotes

Simon E. Troder[1], Lena K. Ebert[2], Linus Butt[2], Sonja Assenmacher[1], Bernhard Schermer[2], Branko Zevnik[1]
[1]Cologne Excellence Cluster for Cellular Stress Responses in Aging-Associated Diseases (CECAD), University of Cologne, Cologne, Germany; [2]Department II of Internal Medicine and Center for Molecular Medicine Cologne (CMMC), University of Cologne, Cologne, Germany

P-28 Highly efficient gene targeting and homologous recombination using Cpf1 electroporation

Lisa Jane Garrett, Jun Cheng, Gene Elliott, Dawn Watkins-Chow
National Institutes of Health, USA

P-29 CRISPR genome editing based on electroporation of rat and mouse zygotes

Petr Kasparek, Irena Jenickova, Jana Kopkanova, Radislav Sedlacek
Institute of Molecular Genetics, ASCR, Prague, Czech Republic

P-30 Optimization of i-GONAD electroporation conditions for genome editing in the C57BL/6 strain

Masato Ohtsuka[1,2], Ayaka Nakamura[3], Hiromi Miura[1,2], Channabasavaiah B Gurumurthy[4], Masahiro Sato[5]
[1]School of Medicine, Tokai University, Kanagawa, Japan; [2]Center for Matrix Biology and Medicine, Graduate School of Medicine, Tokai University, Japan; [3]Support Center for Medical Research and Education, Tokai University, Japan; [4]Mouse Genome Engineering Core Facility, University of Nebraska Medical Center, USA; [5]Frontier Science Research Center, Kagoshima University, Japan

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P-31 Creating knockdown mouse models using CRISPR-Cas system

Hiromi Miura[1], Masahiro Sato[2], Channabasavaiah B Gurumurthy[3], Masato Ohtsuka[1]
[1]Tokai University School of Medicine; [2]Kagoshima University, Japan; [3]University of Nebraska Medical Center, USA

P-32 Intentional somatic mosaicism induced by 2-cell stage injection can circumvent embryonic/perinatal lethality for CRISPR mediated genome modification in mice

Mitra Cowan[1,2,3], Jade Desjardins[1,2,3], Janice Penney[1,2,3], Erzsebet Nagy-Kovacs[1,2,3], Nobuko Honma-Yamanaka[1,2,3], Yojiro Yamanaka[1,2,3]
[1]McGill Integrated Core for Animal Modeling, McGill University; [2]Research Institute McGill University Hospital Centre; [3]Department of Human Genetics, Goodman Cancer Research Centre, Canada

P-33 Analysis of individual indels in KO and KIN mice after CRISPR/Cas9 gene editing

Lev Fedorov, Yingming Wang
Oregon Health & Science University, USA

P-34 Genome-wide Profiling of Adenine Base Editor Specificity by EndoV-seq

Puping Liang, Xiaowei Xie, Shengyao Zhi, Hongwei Sun, Xiya Zhang, Junjiu Huang, Zhou Songyang
The First Affiliated Hospital, Sun Yat-sen University; MOE Key Laboratory of Gene Function and Regulation and Guangzhou Key Laboratory of Healthy Aging Research, SYSU-BCM Joint Research Center, School of Life Sciences, Sun Yat-sen University, Guangzhou, P. R. China

P-35 The application of CRISPR/Cas9 technology in generating complex mouse models

Andrew Kueh
Walter and Eliza Hall Institute, Australia

P-36 Triple-target CRISPR enabled almost perfect whole-body bi-allelic knockouts at first generation

Kenta Sumiyama[1], Genshiro Sunagawa[1], Maki Tadenuma Ukai[1], Perrin Dimitri[1,2], Hiroki Ueda[1]
[1]RIKEN Center for Biosystems Dynamics Research, Osaka, Japan; [2]Queensland University of Technology, Brisbane, Australia

P-37 Application of CRISPR cas9 based genome editing system in the spontaneous mutant mouse STR/Ort

Tadashi Okubo[1], Kentaro Uchida[2], Masashi Takaso[2]
[1]Department of Laboratory Animal Science, Kitasato University School of Medicine; [2]Department of Orthopaedic Surgery, Kitasato University School of Medicine, Japan

P-38 Novel artificial intron technologies to generate conditional knock-out mice using CRISPR/Cas9

Jan Parker-Thornburg[1,2], Amber Thomas-Gordon[1,2]
[1]MD Anderson Cancer Centrer; [2]UT Health Graduate School of Biomedical Sciences, USA

P-39 A novel strategy for efficient gene knock-in in rodents

Kazuto Yoshimi[1,2], Yoshiki Miyasaka[2], yoshihiro Uno[2], Yuko Kotani[2], Kosuke Hattori[2], Yuko Yamauchi[2], Arisa Tanigawa[2], Tomoji Mashimo[1,2]
[1]Genome Editing Research and Development Center, Graduate School of Medicine, Osaka University; [2]Institute of Experimental Animal Sciences, Graduate School of Medicine, Osaka University, Japan

P-40 Splicing donor site sgRNAs enhance CRISPR/Cas9-mediated knock-out efficiency

Manuel Sanchez-Martin[1,2,3], Ignacio Garcia-Tunon[1,4], Elena Vuelta-Ramos[2], Sandra Perez-Ramos[2], Maria Herrero[2], Raquel Saldana[5], Fermin Sanchez-Guijo[1,6], Lucia Mendez[2], Veronica Alonso-Perez[1,4,6], Jesus Maria Hernandez-Rivas[1,4,6]
[1]Instituto de Investigacion Biomedica de Salamanca, Salamanca; [2]Servicio de Transgenesis, Nucleus, Universidad de Salamanca, Salamanca, Spain; [3]Departamento de Medicina, Universidad de Salamanca. Salamanca, Spain; [4]Centro de Investigacion del Cancer-IBMCC (USAL-CSIC), Salamanca, Spain; [5]Servicio de hematologia, Hospital de Especialidades de Jerez, Zacatecas, Spain; [6]Servicio de Hematologia, Hospital Universitario de Salamanca, Salamanca, Spain

P-41 SED [Single strand Ended Double strand] DNA donors as an inexpensive, easy to make, and efficiently inserted, long CRISPR donor

Elena McBeath[1], Yuka Fujii[2], Leonardo Cruz[1], Jun-ichi Abe[1], Marie-Claude Hofmann[1], Keigi Fujiwara[1]
[1]University of Texas, MD Anderson Cancer Center; [2]Houston Methodist Research Institute, USA

P-42 Optimization of in vitro manipulation techniques to improve rat genome editing efficiency

Hongsheng Men[1], Daniel J Davis[2], Barbara J Stone[3], Elizabeth C Bryda[1,2]
[1]Rat Resource and Research Center, University of Missouri, Columbia, MO 65201, USA; [2]Animal Modeling Core, University of Missouri, Columbia, MO 65201, USA; [3]ParaTechs Corporation, Lexington, KY 40505, USA

P-43 Comparison of CRISPR methods and reagents for the generation of a KI mice

Anna Pujol[1], Sandra Turon[1], Anna Arbos[1], Miquel Garcia[2], Fatima Bosch[2]
[1]Transgenic Animal Unit (UAT), CBATEG, Universitat Autonoma de Barcelona, Bellaterra, Spain; [2]CBATEG, Universitat Autonoma de Barcelona, Belaterra, Spain

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P-44 Harnessing the CRISPR/Cas9 System in Mouse Genome Engineering @ LARGE, RIKEN BDR

Takaya Abe[1], Kenichi Inoue[1], Hiroshi Kiyonari[1], Yas Furuta[1,2]
[1]LARGE, RIKEN Center for Biosystems Dynamics Research, Japan; [2]MGCF, Sloan Kettering Institute, Memorial Sloan Kettering Cancer Center, USA

P-45 Improving a pipeline for the generation of genetically altered mice by genome editing

Adam Caulder, Gemma Codner, Alasdair Allan, Elker Malzer, Skevoulla Christou-Smith, Matthew Mackenzie, Jorik Loeffler, Francesca Pike, Dan Archer, Susan Varley, Marie Hutchison, Janet Kenyon, Michelle Stewart, Sara Wells, Lydia Teboul
The Mary Lyon Centre, MRC Harwell Institute, Harwell Campus, Didcot, Oxon, OX11 0RD, UK

P-46 Improving Efficiency of CRISPR/Cas9-mediated Genome Editing in Mice

Lin Wu, Ying Chen, Zhenjuan Wang, Laurie R. Chen, Sarah J. Johnson
Genome Modification Facility, Harvard University, USA

P-47 Genome editing activity at CNRS, Toulouse, France: Efficiency for generating KO, KI and large deletions, a mixed picture.

Pascale Mercier[1], Christophe Audouard[2], Jacques Auriol[2], Severine Ethuin[2], Laurence Lepourry[2], Alice Davy[2]
[1]Institute of Pharmacology and Structural Biology, CNRS, Toulouse, France; [2]Integrative Biology Center Toulouse, CNRS, France

P-48 Optimizing efficiencies of large knockin integration by CRISPR/Cas in mouse zygotes

Sagrario Ortega[1], Jaime Munoz[1], Pierfrancesco Vargiu[1], Estefania Ayala[1], Martina Reiss[2], Harald Kranz[2]
[1]Centro Nacional de Investigaciones Oncologicas (CNIO), Madrid, Spain; [2]Gene Bridges GmbH. 69120 Heidelberg, Germany

P-49 The efficiency of generating large DNA knock-in mice by CRISPR/Cas9 : a report from a single core facility

I-Shing Yu[1,2], Chia-Lu Hung[1], Hong-Yu Jhou[1], Shih-Fan Wu[1], Cheng-Ju Wang[1], Kuei-Liang Chen[1], Wei-Nien Chen[1], Yung-Shun Wang[1], Po-Yuen Wu[1], Feng-Lin Pu[1], Huang-Yi Ling[1], Chien-Hui Wu[1], Shu-Wha Lin[1,2,3]
[1]Transgenic Mouse Models Core Facility, Ministry of Science and Technology, Taiwan; [2]Laboratory Animal Center, College of Medicine, National Taiwan University, Taipei, Taiwan; [3]Department of Clinical Laboratory Sciences and Medical Biotechnology, National Taiwan University College of Medicine, Taiwan

P-50 Analyses of on-target mutations in 632 founder mice generated by using CRISPR/Cas9 to target 17 genomic loci

HY Shin[1,2], C Wang[1], HK Lee[1,3], KH Yoo[1,4], X Zeng[1], T Kuhns[1], CM Yang[1], T Mohr[1], Y Du[5], C Liu[5], L Hennighausen[1]

[1]Laboratory of Genetics and Physiology, National Institute of Diabetes and Digestive and Kidney Diseases, US National Institutes of Health, Bethesda, Maryland 20892, USA; [2]Department of Biomedical Science and Engineering, Konkuk University, Seoul 05029, Republic of Korea; [3]Department of Cell and Developmental Biology & Dental Research Institute, Seoul National University, Republic of Korea; [4]Department of Life Systems, Sookmyung Women's University, Seoul 140-742, Republic of Korea; [5]Transgenic Core, National Heart, Lung, and Blood Institute, US National Institutes of Health, Bethesda, Maryland 20892, USA

P-51 Optimizing Precise Genome Modification of the Rat Embryo

Mayumi Isaka, Daniel Kennedy, Michael Brown, Anthony Gagliardi, Katharina Lutter, Jingjing Wang, Roxanne Ally, Kevin Mitchell, Brian Morse, Jeffrey Lee, Joseph Hickey, Eric Chiao, Wojtek Auerbach, Brian Zambrowicz

Regeneron Pharmaceuticals, Inc., USA

P-52 CRISPR editing for mouse models: new developments and unexpected findings

Paul Quinton Thomas[1,2,3], Melissa Ashleigh White[1,2,3], Sandra Gaye Piltz[1,2,3]

[1]School of Medicine, The University of Adelaide; [2]South Australian Health and Medical Research Institute; [3]SA Genome Editing, Australia

P-53 Gene Editing Rat Resource Center (GERRC): Rat models for heart, lung, blood, and sleep disorder studies

Jason Klotz[1,2], Aron Geurts[1,2], Melinda Dwinell[1,2]

[1]Medical College of Wisconsin, Genomic Sciences and Precision Medicine Center; [2]Medical College of Wisconsin, Physiology, USA

P-54 Transgenic rat mediated by sleeping beauty transposon and development of embryo cryopreservation system

Yun-kyong Jin[1], Hee-kyoung Kim[1], Kyeong-Min Kim[1], Muhammad Ailla Joan[1], Sung-hyu Koo[1,2], Goo Jang[1,2]

[1]Laboratory of Theriogenology, Department of Veterinary Clinical Science, College of Veterinary Medicine, Seoul National University; [2]LARTbio Inc. Seoul, Republic of Korea

P-55 rGONAD: A new simple method for genome-editing in rats

Takayuki Koyano[1], Masumi Numba[1], Tomoe Kobayashi[1], Masato Ohtsuka[2], Makoto Matsuyama[1]

[1]Division of Molecular Genetics, Shigei Medical Research Institute, Okayama, Japan; [2]Department of Molecular Life Science, Division of Basic Medical Science and Molecular Medicine, School of Medicine, Tokai University, Isehara, Kanagawa, Japan

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P-56 Sexing in pigs by using Gene Editing

Stefanie Kurtz[1], Antje Frenzel[1], Stoyan Petkov[2], Andrea Lucas-Hahn[1], Petra Hassel[1], Roswitha Becker[1], Heinke Eylers[1], Heiner Niemann[3], Bjorn Petersen[1]
[1]Department of Biotechnology, Institute for Farm Animal Genetics, Friedrich-Loeffler-Institute, Mariensee, Germany; [2]German Primate Center, Leibniz Institute for Primate Research, Gottingen, Germany; [3]Hannover Medical School, Hannover, Germany

P-57 Expression of human IL2 recombinant protein in milk and germ-line transmission from transposon mediated transgenic dairy cattle

Goo Jang[1], Song-Jeon Lee[2], Soo-Young Yum[1], Kyeong-Min Kim[1], Shin-Ki Park[3], Ji-Young Kim[4], Seong-Hun Bae[2], Hyeong-Jong Kim[2], Hee-Kyeong Kim[1], Yun-Kyeong Jin[1], Seong-Jin Kim[3], Kyung-Woon Kim[4], Goo Jang[1,5]
[1]College of Veterinary Medicine, Seoul National University; [2]Seoul Milk Coop; [3]Theragen Etex; [4]National Institute of Animal Sciennce; [5]LARTBIO Inc., Republic of Korea

P-58 Generation of a polled phenotype in Holstein-Friesians and Brown Swiss using DNA-nucleases

Felix Schuster[1], Bjorn Petersen[1], Jens Boch[2], Heiner Niemann[3]
[1]Institute of Farm Animal Genetics, Friedrich-Loeffler-Institute; [2]Institute of Plant Genetics, Leibniz University Hannover; [3]Hannover Medical School, Germany

P-59 Assessment of PDX-1-deficient pigs generated using the CRISPR/Cas9 system introduced into porcine zygotes via electroporation

Fuminori Tanihara, Maki Hirata, Nhien Thi Nguyen, Quynh Anh Le, Takayuki Hirano, Takeshige Otoi
Faculty of Bioscience and Bioindustry, Tokushima University, Japan

P-60 Efficiency of gene editing by electroporation of Cas9 protein (GEEP) to generate GGTA1-modified pigs

Nhien Thi Nguyen, Fuminori Tanihara, Maki Hirata, Takayuki Hirano, Quynh Anh Le, Takeshige Otoi
Faculty of Bioscience and Bioindustry, Tokushima University, Japan

P-61 Effect of Cas9 protein levels on genomic mutations using the gene editing by electroporation of Cas9 protein (GEEP) system in putative zygotes

Quynh Anh Le, Maki Hirata, Fuminori Tanihara, Nhien Thi Nguyen, Takayuki Hirano, Takeshige Otoi
Faculty of Bioscience and Bioindustry, Tokushima University, Japan

P-62 Effects of CRISPR/Cas9-mediated gene targeting of porcine endogenous retrovirus on the developmental competence of porcine embryos

Maki Hirata, Fuminori Tanihara, Nhien Thi Nguyen, Quynh Anh Le, Takayuki Hirano, Takeshige Otoi
Faculty of Bioscience and Bioindustry, Tokushima University, Japan

P-63 Correction of the structural mutations of 450 kb KIT locus by CRISRPCRISPR/Cas9 increases red blood cells in Yorkshire pigs

Zuyongh He, Ke Qin, Xinyu Liang, Kai Zhang, Xiaohong Liu, Yaosheng Chen
Sun Yat-sen University, P. R. China

P-64 Generation of a CLN7 KI sheep model of Batten disease

Fabien Delerue[1,2], Nicolle Morey[1,2], Charley Lea Pollard[3], Christopher G Grupen[3], Imke Tammen[3], Lars Matthias Ittner[1,2]
[1]Genome Editing at Macquarie University (GEM), Sydney - Australia; [2]Dementia Research Centre, Macquarie University, Sydney - Australia; [3]School of Veterinary Science, the University of Sydney, Sydney - Australia

P-65 CNS transduction and expression of AAV9 genes after systemic delivery

James Pickel[1], Nick Flytzanis[2], Nick Goeden[2], Viviana Gradinaru[2]
[1]National Institutes of Mental Health / NIH; [2]California Institute of Technology, USA

P-66 Development of a transposon transfection technology for making transgenic chicken embryo at day 0 of incubation

Shahin Eghbalsaied, Sabine Klein, Ute Beermann, Ronald Wittig, Meike Stunkel, Maren Ziegler, Wilfried Kues
Institute of Farm Animal Genetics, Friedrich-Loeffler-Institut (FLI), Mariensee, Neustadt am Rubenberge, Germany.

P-67 Transgenic resources for the study of human disease and development at the National Xenopus Resource

Marcin Wlizla, Sean McNamara, Nikko-Ideen Shaidani, Marko Horb
National Xenopus Resource, Marine Biological Laboratory, USA

P-68 Exploring beneficial genetic variants in Atlantic salmon using gene editing

Erik Kjarner-Semb, Rolf Edvardsen, Anna Wargelius
Institute of Marine Research, Norway

P-69 Generation of a Cancer Gene Allelic Series in Mice by CRISPR/Cas9 System

Hsiang-Hsian Lori Fan[1], I-Shing Yu[2], Yin-Hung Lin[1], Shin-Yu Wang[1], Ying-Hsuan Liaw[1], Pei-Lung Chen[1,3], Tsung-Lin Yang[4], Shu-Wha Lin[5], You-Tzung Chen[1]
[1]Graduate Institute of Medical Genomics and Proteomics, College of Medicine, National Taiwan University, Taipei 100, Taiwan; [2]Laboratory Animal Center, College of Medicine, National Taiwan University, Taipei 100, Taiwan; [3]Division of Endocrinology and Metabolism, Department of Internal Medicine, National Taiwan University Hospital, Taipei 100, Taiwa; [4]Department of Otolaryngology, National Taiwan University Hospital, Taipei 100, Taiwan; [5]Department of Clinical Laboratory Sciences and Medical Biotechnology, College of Medicine, National Taiwan University, Taipei 100, Taiwan

Posters

P-70 Challenges in modelling human diseases ? mice are not men

Benedikt Wefers[1,2], Xianyuan Xiang[3], Regina Kneuttinger[1], Sarah Passon[1], Christian Haass[1,3], Wolfgang Wurst[1,2]
[1]German Center for Neurodegenerative Diseases (DZNE), Munich; [2]Helmholtz Zentrum Muenchen, IDG, Munich; [3]BioMedical Center (BMC), LMU Munich, Germany

P-71 Altering organelle localization of mitochondrial protein show lethal impairment of sulfur respiration

Masanobu Morita[1], Tomoaki Ida[1], Tomohiro Tanaka[2], Tetsuro Matsunaga[1], Akira Nishimura[1], Motohiro Nishida[2], Hozumi Motohashi[3], Takaaki Akaike[1]
[1]Tohoku University Graduate School of Medicine; [2]National Institute for Physiological Sciences; [3]IDAC, Tohoku University, Japan

P-72 PA28$\alpha\beta$ OVEREXPRESSION ENHANCES LEARNING AND MEMORY OF FEMALE MICE WITHOUT INDUCING PROTEASOME ACTIVITY

Julia Adelof[1], John Wiseman[1], My Andersson[2], Michelle Porritt[1], Anne Petersen[3], Madeleine Zetterberg[3], Malin Hernebring[1,3]
[1]AstraZeneca, UK; [2]University of Lund, Sweden; [3]University of Gothenburg, Sweden

P-73 Transgenic mice with genetically evoked progressive degeneration of noradrenergic neurons as a novel tool to study presymptomatic phase of Parkinson's Disease.

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P-74 Generation of Fam83h Knockout Mice by CRISPR/Cas9-mediated Gene Engineering

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P-75 Inactivation of glyoxalase1 in cell lines and mice reveals compensatory mechanisms for methylglyoxal detoxification

Rebekka Medert[1], Dagmar Schumacher[1], Jakob Morgenstern[2], Yoko Oguchi[1], Nadine Volk[2], Stefan Kopf[2], Jan Benedikt Groner[2], Peter Paul Nawroth[2], Thomas Fleming[2], Marc Freichel[1]
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P-76 Disease relevant mutations introduced by genome editing in a humanised Barth Syndrome mouse model

Douglas Strathdee, Eve Anderson, Farah Naz Ghaffar, David Stevenson, Sheila Bryson, Cecilia Langhorne
Cancer Research UK Beatson Institute, UK

P-77 Gut Microbiota may influence your Mouse Model Phenotype

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P-78 Altered spermatogenesis in rats lacking the specific thyroid hormone transporter, monocarboxylate transporter 8

Jae Young Lee[1], Hee Sook Bae[1], Yun-Kyeong Jin[2], Hee Kyoung Kim[2], Kyeong-Min Kim[2], Hyejung Shin[1], Gyubon Cho[1], Ok-Jae Koo[1], Jang Goo[2], Jung Min Lee[1]
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P-79 A coagulation factor IX-deficient rat as a translational pre-clinical model of severe hemophilia B

Jae Young Lee[1], Hee Sook Bae[1], Yun-Kyeong Jin[2], Hee Kyoung Kim[2], Gyubon Cho[1], Hye jung Shin[1], Kyu jun Lee[1], Un Gi Kim[1], Dong Woo Song[1], Goo Jang[2], Jung Min Lee[1]
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P-80 CRISPR genome-edited animal models with patient-specific mutations

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P-81 Next-Gen large collaborative Alzheimer's Disease model consortium: MODEL-AD

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Posters

P-82 Application of reporter mice for live imaging in embryology

Go Shioi[1], Hideharu Hoshino[2], Takaya Abe[1], Hiroshi Kiyonari[1], Kazuki Nakao[3], Yasuhide Furuta[1], Toshihiko Fujimori[4], Shinichi Aizawa[2]
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P-83 A single reporter mouse line for Vika, Flp, Dre, and Cre recombination

Oliver Baker[1,2], Madina Karimova[3,4], Aylin Camgoz[3], Ronald Naumann[5], Frank Buchholz[3], Konstantinos Anastassiadis[1]
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P-84 A novel creation of reporter mouse model for assessing germ layer formation at gastrulation

Hayate Suzuki[1], Tra Thi Huong Dinh[2], Yoko Daitoku[2], Kanako Kato[2], Saori Iijima[3], Takuya Azami[4], Masatsugu Ema[4], Seiya Mizuno[1,2], Fumihiro Sugiyama[1,2]
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P-85 Cryopreservation of embryos using two protocols: A comparison study

Sandra Oerther[1], Muntaha Fartoo[1], Svetlana Pavlova[1], Jessica Akerlund[2], Moustapha Hassan[1]
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P-86 A Novel Undifferentiated Spermatogonia-specific Surface Protein 1 (USSP1) in Neonatal Mice

Junjiu Huang
Sun Yat-sen University, P. R. China

P-87 N-acetyl cysteine improves the fertilizability of vitrified-warmed mouse oocytes by recovering the thiol levels of zona pellucida post oxidation

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P-88 Possums and primordial germ cells- a novel method of pest control

Melanie Kate Laird, Tim Hore, Neil Gemmell
Department of Anatomy, University of Otago, Dunedin, New Zealand

P-89 Research & Development of Mouse Reproductive Technology in CARD

Satohiro Nakao, Ayumi Mukunoki, Hidetaka Yoshimoto, Kana Tamura, Chihiro Sugahara, Koharu Kirikihira, Kotono Ito, Mei Yamada, Serina Kuroshima, Ryusei Maeda, Jorge Sztein, Toru Takeo, Naomi Nakagata
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P-90 Nuclear DNA fragmentation as a measure of sperm fertility in mutant mice

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P-91 Staging estrous by vaginal impedance in hormonally primed rats

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P-92 Building up Nation-wide Infrastructure of Mouse Biology in Korea

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P-93 Applying genome editing technology to mutant mouse model creation in RIKEN BRC

Shinya Ayabe[1], Kenichi Nakashima[2], Toshiaki Nakashiba[1], Tomohiro Tamari[1,3], Eikichi Yanagisawa[1,3], Mizuho Iwama[1], Maiko Ijuin[1], Tomomi Hashimoto[1], Masayo Kadota[1], Saori Mizuno-Iijima[1], Koji Nakade[2], Hatsumi Nakata[1], Takehide Murata[2], Yuichi Obata[2], Atsushi Yoshiki[1]
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P-94 Rat Resource and Research Center

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Posters

P-95 The NCI Mouse Repository: Cancer models and miRNA-ES cell resource

Parirokh P. Awasthi, Debra Fitzgerald, Stephen N. Jones
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P-96 Data management systems for CARD mouse bank in Kumamoto University

Shuuji Tsuchiyama, Toru Takeo, Naomi Nakagata
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P-97 Setting up rat embryo cryopreservation in a transgenic animal unit

Anna Pujol, Anna Arbos, Sandra Turon
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P-98 Sanitation and move of a large animal facility

Lisbeth Ahm Hansen[1], Jakob Le Fevre Harslund[1], Ernst-Martin Fuchtbauer[2]
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P-99 Progress update of the mouse resource program at RIKEN BioResource Research Center

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RIKEN BioResource Research Center, Japan

P-100 Extending the Benefits of goGermline™ Chimeras: Expediting time to First Heterozygotes and First Experimental Cohorts

Jonathan Gauntlett, Maree Hagan, Jacqui Watts, Frank Koentgen, Roger Askew
Ozgene Pty Ltd, Bentley, Australia

THE 15th TRANSGENIC TECHNOLOGY MEETING (TT2019)

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