

AETE NEWSLETTER

Editor: Karolien Desmet



AETE

Association Européenne des Technologies de l'Embryon
Association of Embryo Technology in Europe

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Presidents Letter

By Marja Mikkola

Dear friends and colleagues

It is my great pleasure to welcome you to the Annual Scientific Meeting of AETE in the beautiful city of Brescia, Italy as we celebrate the 40th anniversary of our association. The first meeting of AETE was held back in 1984, with Pierre Mauléon as the very first President of our society; Jeff Mahon, Vice President and Treasurer; and Jean-Claude Plat, the first Secretary. Since these early times

AETE has grown, flourished and evolved to what it is today – a vibrant and friendly society that fosters connections between its members to interact and exchange knowledge across Europe and worldwide with our partner societies IETS and SBTE, as well as numerous national societies.

This milestone anniversary is a perfect occasion for reflection and celebration. We will revisit the decades via the path

that has led our society and the ART industry to our current achievements and where we are heading. Our outstanding speakers from Europe, Brazil and the US will share their diverse perspectives, guiding us through this voyage. In addition to these invited talks, the program will include two practical workshops, the student competition and oral presentations of selected abstracts. With four poster sessions, there will be ample opportunity to discuss with the presenters about their latest research. We are also thrilled to honor Patrick Lonergan with the Pioneer Award of 2024 for his distinguished career.

Kicking off the event, the Local Organizing Committee, chaired by Pierluigi Guarneri, has prepared a Preconference Workshop. The workshop, focused on bovine species including the buffalo, will delve into the origins of fertility, starting from the *in utero* period to the management of young animals, collection of oocytes, and finally grading of oocytes and IVP embryos. This event will take place at the Agricultural Technical Institute barn facilities a short distance from our conference venue.

The scientific sessions will be hosted at The Centro Pastorale Paolo VI. The LOC has prepared a delightful social program starting with a Welcome Reception taking place in the beautiful garden of Paolo VI. Our Gala Dinner will be an evening under the arches of the Vita restaurant accompanied by jazz music and followed by dancing. Since we are in the “home” of pizza, what better way to bid farewell than with a party at a local pizzeria, enjoying a buffet of delicious pizzas and Italian specialties. After the main event, the conference will conclude with an exciting post-conference tour to Avantea in Cremona.

I extend my heartfelt thanks to everyone involved in organizing this special anniversary meeting. The dedication of the LOC and the board of AETE have been instrumental in making this event a success. I am deeply grateful to our loyal sponsors and new supporters for their generous contributions. A special thank you to our invited speakers as well as all researchers sharing their latest work and all members and friends of our society for making this event possible.

Let's make this 40th anniversary meeting a memorable and inspiring celebration!

Marja Mikkola, President of the AETE

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Annual Meeting in Brescia 2024

We look forward to welcoming you to the 40th Annual Meeting in Brescia, Italy. Situated between Milan and Verona, Brescia, the Italian Capital of Culture 2023, is a city that has a great deal to offer ranging from its artistic and archaeological heritage to its tasty cuisine.

The venue, “Centro Pastorale Paolo VI” offers a monumental Baroque-style experience and a green oasis in the center of Brescia. We will have the opportunity to enjoy our coffee breaks and lunches in the gallery adjacent to the garden and meet at the sponsor boots.

The **welcome reception** on the evening of the **4th of September** will take place at the Paolo VI garden.



The **Gala dinner** on the **5th of September** will take place at the “Vita” restaurant located in the centre of Brescia in walking distance from the Paolo VI center. The dinner will be served sitting at the table under the arches with jazz music. After the dinner, the dancing floor will be opened with a DJ until 3 am.



The **Farewell party** will take place on the **6th of September** at the "Trattoria Caprese" pizzeria located in Brescia's heart. Typical Italian specialties like

arancini, fried vegetables and zeppoline, will be served in a buffet kind of style in a warm and friendly atmosphere.



Last but not least, a **pre-conference workshop** will be organized on the 4th of September at the State Agricultural Technical Institute Giuseppe Pastori in Brescia. This workshop consists of three lectures in the morning and a practical session on OPU in the afternoon. Also, a **post-conference tour** to Avantea will take place on the 7th of September.

How to get there

Brescia is strategically located between Milan and Venice along the A4 motorway, served by regional and high-speed trains and four airports: Bergamo Orio al Serio international airport, Valerio Catullo international airport in Verona, Milan Linate international airport and Milan Malpensa airport.



Where to stay

Rooms can be booked at the following hotels:

- Centro Paolo VI, the conference hotel
- B&B Hotel 3*
- Hotel Vittoria 5*
- Hotel Master 4*

Hotel reservations can be made through the following link:

https://docs.google.com/forms/d/1ISObp39_PT39hhL1nL1jGgrFCwLcMBPRem5WyvnrXUG/viewform?edit_requested=true&pli=1

We are excited about this year's Annual Meeting and we look forward to seeing you in Brescia!

Do you want to share news?

Do you have a job opportunity at your university or company? Do you have a conference that you want to inform about? Do you have other news you want to share with members of the AETE?

Send the information to Karolien Desmet (karolien.desmet@geno.no) and the information can be published on the website and social media.



Check the website <https://www.aete.eu/news/> for news updates and our Facebook page!

AETE is now also on LinkedIn. Follow us there for the latest news!

Travel Grant Awardees

The board of the AETE recognizes that presenting research at conferences is vital aspect of a student's professional, educational and research development. Each year, we invite students to apply for a travel grant to support their attendance at the annual conference of the AETE. The Board are delighted to announce five awardees this year:

Nuria Martinez de los Reyes, from INIA, CSIC, Spain

Carmen María Picazo Córdoba, from Castilla-La Mancha University, Spain

Celia Piñeiro-Silva, from University of Murcia, Spain

Laura Thompson, from University College Dublin, Ireland

Jiayi Yang, from Utrecht University, Netherlands

Congratulations to the AETE travel grant awardees for 2024!

Each awardee has submitted a short article of their overall research projects which can be found below.

We offer travel grants every year to support attendance at AETE annual meeting. Remember to check the website for details on how to apply for a travel grant.

<https://www.aete.eu/students/travel-grant/>

Molecular mechanisms regulating early embryo development in sheep.

Nuria Martínez de los Reyes

Early gestational losses reach strikingly high rates in farm ungulates, including bovine, ovine, caprine and porcine, having a great impact on economy and the environment. It is during these first weeks of development when key cellular differentiation and proliferation processes take place. The first lineage differentiation gives rise to the trophoctoderm (TE) and the inner cell mass, which will later differentiate into epiblast and hypoblast. In ungulates, there is an extended period of preimplantation development termed conceptus elongation, during which the hypoblast migrates to cover the inner embryo surface, and together with the TE experience a massive proliferation. At the same time, the epiblast develops a flat embryonic disc that undergoes gastrulation before implantation. Until recently, these processes could only be studied *in vivo*, but our laboratory recently developed a post-blastocyst *in vitro* culture system that allows to recapitulate ovine embryo development up to gastrulating stages.

The aim of my PhD thesis is to analyze the molecular basis of ovine embryo development during conceptus elongation. To this aim, we are generating a scRNAseq transcriptional map of ovine *in vivo* and *in vitro* embryos from the blastocyst stage up to gastrulating stages, and we are functionally characterizing key transcription factors through the generation of knock-out embryo models

by CRISPR-Cas9, and key signaling pathways through the use of specific inhibitors.

Understanding the molecular basis of these processes of embryonic development will allow us to understand reproductive failures and to design strategies to reduce early pregnancies losses.

Isolation and characterization of extracellular vesicles from the reproductive tract of sheep and their effect on sperm functionality and capacitation.

Carmen María Picazo Córdoba

Extracellular vesicles (EVs) are membrane-bound nanoparticles that are in all biological fluids, also in reproductive fluids, and mainly contain lipids, proteins and nucleic acids. Depending on their origin, there are exosomes (30-150 nm) whose endosomal origin allows them to be released into the extracellular space by fusion of the multivesicular bodies (MVB) and the plasma membrane; and microvesicles (100-1000 nm) which fuse directly with the plasma membrane. It has been shown that they take part in cellular communication acting as small messengers. Besides, EVs seem to be involved in signaling pathways of sperm capacitation, since through the release of their content they can modulate both physiological and pathophysiological responses in their target cells.

With this background, the goal of my PhD project is to isolate EVs from different reproductive fluids (uterine, oviductal and follicular fluids, and serum, a fluid generally used for *in vitro* capacitation of sheep spermatozoa) and study their effect

on sperm functionality. The specific objectives of this study are:

- Isolation and characterization of extracellular vesicles from uterine, oviductal and follicular fluids, and serum.
- Study of the interaction between extracellular vesicles and sheep spermatozoa.
- Study of changes in the functionality of sheep spermatozoa after incubation with extracellular vesicles from different fluids.

The development of these objectives is necessary to see whether extracellular vesicles are involved in the signaling pathways of sperm capacitation as well as in the fertilization process. In this way, the next step would be to elucidate the molecular mechanisms involved in these processes to increase the rates of embryos produced by *in vitro* fertilization in the future.

Optimization of the generation of gene edited pigs by oocyte electroporation and lipofection.

Celia Piñero-Silva

Since its discovery, the CRISPR/Cas9 system has been widely used to create genetically modified animals, including large mammals such as pigs. Knock-out and knock-in pigs have been produced since 2014, with applications in different fields such as biomedicine, production or basic research. The most common methods for generating mutant pigs are cloning and embryo or oocyte microinjection procedures, but they require expensive equipment and trained personnel. New techniques, such as

electroporation and lipofection of embryos and oocytes, are being developed to overcome these challenges.

The aim of my PhD project is to optimize the conditions of electroporation and lipofection to produce gene edited pig embryos.

Our first objective was to optimize the electroporation conditions. We tried different concentrations of Cas9 protein and sgRNA to create different models with one, two and five sgRNAs targeting different genes simultaneously. Additionally, we evaluated the parthenote formation due to the electrical pulse during the electroporation process, as this can be a problem if the aim of the experiment is to transfer the embryos to a recipient and obtain piglets. Our second objective was to optimize the lipofection technique applied to *zona pellucida*-intact oocytes, testing different lipofectamine reagents, concentrations of lipofectamine, Cas9 and sgRNA, and co-incubation times to optimize the protocol.

Our preliminary results have shown the efficiency of these methods to develop gene-edited models for biomedical, human diseases, xenotransplantation and resistance to swine viral diseases.

Assessing the impact of in vitro fertilization on fetal development and calf health.

Laura Thompson

Amongst the assisted reproductive technologies available to farmers nowadays, the use of embryos derived from *in vitro* fertilization (IVF) has increased dramatically in the past decade, now surpassing the use of embryos derived by traditional superovulation. Still, challenges remain

with such embryos including poorer cryotolerance and greater embryo loss compared with *in vivo* derived embryos, the impact of which is exacerbated in a seasonal system with a compact breeding season such as that operated in Ireland. In addition, while it is likely under-recorded, the occurrence of large offspring syndrome (LOS) following the transfer of IVF embryos represents a significant welfare and economic challenge for farmers. Currently, there are no reliable tests to identify LOS pregnancies, and limited data exist on fetal development and calf birth weight following IVF.

The main objectives of my thesis are:

- Elucidate the relationship between fetal morphometrics on Day 63 of gestation, at which point the fetus can be reliably sexed, and the birth weight of calves following the transfer of *in vitro*-produced (IVP) embryos derived from conventional or sex-sorted sperm.
- Assess the impact of IVP on the liver and muscle transcriptomes of 4-month-old male and female dairy calves conceived through IVF or artificial insemination.

The findings from my PhD could help establish a non-invasive method to predict LOS pregnancies in cattle and optimize IVP protocols to accommodate the distinct needs of male and female embryos.

This work was supported the Department of Agriculture, Food and the Marine Research Stimulus Fund.

The effect of nanoplastics on oocyte and embryo development.

Jiayi Yang

The ubiquity of micro- and nanoplastics (MNPs) has recently gained increasing attention due to their potential health effects. MNPs can enter the body through ingestion, inhalation, and dermal contact. Recent studies indicate the presence of MNPs in the blood circulation of humans, and in rodent models, the ability of MNPs to pass biological barriers, including the reproductive tract has been proved. However, the reproductive toxicity of MNPs in mammals is scarcely studied.

The aim of my PhD project is to investigate the impact of nanoplastics (NPs, <math><1 \mu\text{m}</math>) on oocyte and embryo development using the bovine model, with the following objectives:

- To determine the uptake of NPs by the oocyte and embryo.
- To assess the dose-response-related effects of NPs on the developmental competence of the oocyte and embryo.
- To assess the mechanism of the potential toxicity of NPs on oocyte and embryo development.

This study could provide a deeper understanding of how NPs may affect the early stage of life. Moreover, insights gained could also contribute to the understanding of Adverse Outcome Pathways (AOPs) related to NP exposure, and also provide critical data for risk assessment.

AETE Logo Competition

This year, we will celebrate the 40th anniversary of AETE. To celebrate this special occasion, a competition was announced in the newsletter of December 2023 to create a brand-new logo for AETE. We have received logos from several members, and we want to thank **Sonia Gago Martin**, **Andrea Fernandez Montoro** and **Linda Dujickova** for sharing their beautiful creations with us. The board has chosen a new logo and a logo to celebrate the 40th Anniversary of AETE. Congratulations to **Axelle Buydens** for creating the new AETE logo and **Marie Belen Rabaglino** for creating the 40th Anniversary logo! The logos will be published on the materials for the Annual Meeting, the website, newsletter and social media.



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Upcoming Events

SOCIETY FOR THE STUDY OF REPRODUCTION

15-19 July 2024

Dublin, Ireland

<https://ssr.org/news-events/upcoming-events/annual-meeting-2024.html>

AETE

5-6 september 2024

Brescia, Italy

<https://www.aete.eu/annual-meeting/>

EUROPEAN SOCIETY FOR DOMESTIC ANIMAL REPRODUCTION

12-14 September 2024

<https://esdar2024.vet.bg.ac.rs/>

AETA & CETA/ACTE JOINT ANNUAL CONVENTION

16-18 October 2024

Reno, USA

https://www.aeta.org/mtg_future.asp



Association Européenne des Technologies de l'Embryon
Association of Embryo Technology in Europe

40th SCIENTIFIC MEETING

**Centro Paolo VI
Brescia, Italy**

P R O G R A M

September 4th to 6th 2024

Preconference Workshop (Wednesday 4th, 07.30-18.30)

Place: State Agricultural Technical Institute Giuseppe Pastori, Viale della Bornata, 110, 25100 Brescia

07.30: Transport from Paolo VI, Brescia

Morning session (lectures)

- **Alex Bach:** Management of young animals: from calves to heifers to have the best performance
- **Francesca Mossa:** Developmental programming in ruminants: is fertility established in utero?
- **Daniela Demetrio:** Evaluation of oocytes and IVF embryos

Lunch break

Afternoon session (lecture and practical sessions)

- **Bianca Gasparrini:** OPU in buffaloes (lecture)
- **Pierluigi Guarneri, Daniel Martinez & Rob Simmons:** Oocyte collection by OPU on 3 donors (practical session)
- **Daniela Demetrio:** Real time evaluation of the oocytes recovered (practical session)

18.00: Transport back to Paolo VI, Brescia

Workshop I (Thursday 5th, 17.00-18.45)

Embryo therapy to increase the conception rate

Sponsored by **CALIER**

- **Daniela Demetrio**, *RuAnn Genetics Embryo Production Director (USA), American Embryo Transfer Association President*
The use of embryos to improve pregnancy rates in lactating cows (45 min)
- **Pierluigi Guarneri**, *Embryonet Director (Italy), Head of the LOC*
Beef on dairy: is it a good opportunity for dairy breeders to use pure beef IVF embryos to increase the farm income? (20 min)
- **Daniel Martinez**, *Embriomarket, Embrionet Technical Director (Spain)*
Economic perspective of *Embryo therapy*. Understanding utility" (20 min)

Round table: Moderator: **Ana I. de Prado** (*Global Ruminant Veterinary Manager -Calier-*)

Workshop II (Friday 6th, 17.00-18.30)

Emerging diseases as risk to international trade of genetic materials

- **Bhavisha Patel**, *Veterinary Advisor, Veterinary Trade Facilitation (VTF), Global Animal Health, Animal and Plant Health & Welfare Directorate, Department for Environment, Food and Rural Affairs, London, UK*
The regulator's view on emerging diseases
- **Stéphan Zientara**, *Director of the ANSES Laboratory for Animal Health, Maisons-Alfort, France*
The virologist's view on emerging diseases

chaired by **Hanna Grothmann, H el ene Quinton, Karolien Desmet and James Quinn**

Tuesday, September 3rd 2024

15.00-18.30: Registration (Hotel reception)

Wednesday, September 4th 2024

07.30-18.30: Preconference

15.00-20.00: Registration (Hotel reception)

20.00-22.00: Welcome Reception at the Paolo VI indoor garden

Thursday, September 5th 2024

08.00-18.00: Registration (desk outside "Aula Magna" room)

08.15-08.30: Opening meeting: AETE President Marja Mikkola and Chair of the LOC Pierluigi Guarneri

SESSION 1: Chairpersons: Hilde AARDEMA and Pablo BERMEJO-ALVAREZ

08.30-09.15: *First invited lecture: Cesare Galli, Fondazione Avantea, Cremona, Italy*

Forty years of AETE: The contribution of scientists and practitioners to the progress of reproductive biotechnologies in Europe

09.15-10.30: Short oral communications: *Student Competition*

Axelle Buydens, *The impact of a maternal obesogenic diet on offspring's oocyte mitochondrial biogenesis in the primordial follicles at birth and at weaning. Insights from an outbred mouse model (Poster 1)*

Alan D. Crowe, *Concentration of progesterone, relative mRNA abundance of Interferon-Stimulated Gene-15 and concentration of Pregnancy-Specific Protein B in maternal circulation following timed artificial insemination or embryo transfer in lactating dairy cows (Poster 2)*

Rosane Mazzarella, *Embryo-induced alterations in the protein profile of bovine uterine extracellular vesicles in vitro (Poster 3)*

Federica Piscopo, *Oleic Acid prevents the detrimental effect of the combination of saturated NEFAs with Lipopolysaccharide on bovine oocyte competence (Poster 4)*

Inne Xhonneux, *The effect of a maternal obesogenic diet on offspring oocyte mitochondrial ultrastructure at birth in an outbred mouse model (Poster 5)*

10.30-11.30: *POSTER SESSION 1, EXHIBITION and coffee break*

SESSION 2: Chairpersons: Pascal SALVETTI, Axelle BUYDENS and Alan D. CROWE

11.30-12.15: *Second invited lectures: Jose Nélio de Sousa Sales, Department of Veterinary Medicine, Federal University of Juiz de Fora, Brazil.*

Evolution over the last 40 years of the Assisted Reproduction Technologies in cattle - the Brazilian Perspective - Timed artificial insemination

Guilherme Pugliesi, Animal Reproduction Department of the School of Veterinary Medicine and Animal Science of the University of São Paulo, Brazil.

Evolution over the last 40 years of the Assisted Reproduction Technologies in cattle - the Brazilian Perspective for Embryo Transfer and Resynchronization Programs

12.15-13.00: Short oral communications (SO) & Flash talks (FT)

Adele Frau, *Evidence that undernutrition in early gestation reduces maternal leptin and impairs AMH in juvenile offspring in dairy cattle (SO, Poster 51)*

Muhammad Furqan Asghar Chacher, *Utilizing ultrasonographic echotexture as a diagnostic tool to assess postpartum uterine endometrial involution (FT, Poster 72)*

Erik Mullaart, *Intergenerational inheritance of large offspring syndrome in IVP dairy cows (SO, Poster 41)*

Laura Thompson, *Relationship between fetal morphometrics and birth weight of calves following the transfer of in vitro-produced embryos derived from conventional or sex-sorted sperm (FT, Poster 23)*

13.00-14.30: Lunch/Student Lunch

SESSION 3: Chairpersons: Jane MORRELL and Rosane MAZZARELLA

14.30-15.15: *Third invited lecture: Gabriela Mastromonaco*, Reproductive Sciences Unit, Toronto Zoo, Toronto, Ontario, Canada.

Forty "wild" years: The current reality and future potential of Assisted Reproductive Technologies in wildlife species.

15.15-16.00: Short oral communications (SO) & Flash talks (FT)

Mohamed Hedia, *The positive association between maternal body condition score and antral follicle count does not affect the number of produced blastocysts in OPU mares (SO, Poster 18)*

Chiara Cosseddu, *M6a RNA methylation during in vitro maturation of sheep cumulus-oocyte complexes with different development competence (FT, Poster 30)*

Marie Saint-Dizier, *Phosphatidylserine on sperm head interacts with Annexin A5 on oviduct luminal cilia to form a sperm reservoir in pigs (SO, Poster 31)*

Bence Somoskői, *Effects of cold storage and different cryopreservation methods on canine epididymal sperm (FT, Poster 69)*

16.00-17.00: *POSTER SESSION 2, EXHIBITION* and coffee break

17.00-18.45: *Workshop I: Embryo therapy to increase the conception rate*

chaired by **Ana Isabel De Prado Taranilla**, and sponsored by **CALIER**

20.00-03.00: Gala Dinner at the Vita Restaurant

Friday, September 6th 2024

08.00-18.00: Registration (desk outside "Aula Magna" room)

SESSION 4: Chairpersons: Christine WRENZYCKI and Federica PISCOPO

08.30-09.15: *Fourth invited lecture: Rebecca Krisher, Colorado Center for Reproductive Medicine, Lone Tree, USA.*

Embryo production in vitro: Basic principles and commercial perspectives.

09.15-10.15: Short oral communications (SO) & Flash talks (FT)

Lien Loier, *Exploring mitophagy dynamics in bovine oocytes during in vitro maturation in response to mitochondrial membrane uncoupling (SO, Poster 56)*

Sonia Gago, *Comparison of dimethyl sulfoxide and propylene glycol for vitrifying in vitro matured bovine oocytes: effects on meiotic spindle and ROS levels (FT, Poster 71)*

Federica Franciosi, *Resilience of preimplantation bovine embryos to the availability of energy substrates (SO, Poster 49)*

Leopoldo González-Brusi, *A single-cell transcriptomic atlas of sheep gastrulation and conceptus elongation (FT, Poster 44)*

Jakomien Noordman, *Semen quality of young bulls does impact success rate of In Vitro Fertilization (SO, Poster 15)*

10.15-11.15: POSTER SESSION 3, EXHIBITION and coffee break

11.15-12.00: General Assembly

12.00-12.15: Sponsor presentation

12.15-13.45: Lunch, meeting of the "Elongated Embryos"

SESSION 5: Chairpersons: Marja MIKKOLA and Inne XHONNEUX

13.45-14.45: Short oral communications & Flash talks

Inés Flores Borobia, *SOX17 ablation impairs hypoblast formation and reduces trophectoderm proliferation in bovine embryos (SO, Poster 58)*

Raquel Romar, *Growth parameters and their hormonal regulation in pigs are differently affected by sex and embryo origin (FT, Poster 9)*

Maria Belen Rabaglino, *In vitro procedures deregulate the embryonic disc and extraembryonic membranes transcriptome of day 15 elongated bovine embryo (SO, Poster 57)*

Daniel Angel-Velez, *Vitrification by two different protocols does not affect pregnancy outcomes in in vitro-produced equine embryos (FT, Poster 21)*

Serge Lacaze, *Bovine donors infected with Epizootic Hemorrhagic Disease: Impact on in vitro embryo production and risk of transmission through in vitro embryos production (SO, Poster 24)*

14.45-15.45: *Fifth invited lecture: Patrick Lonergan*, School of Agriculture and Food Science, University College, Dublin, Ireland.

Embryo transfer: Past, present and future.

15.45-16.00: *Pioneer Award 2024* – Patrick Lonergan AETE Medalist Presentation, introduced by Dimitrios Rizos (Spain)

16.00-17.00: *POSTER SESSION 4, EXHIBITION* and coffee break

17.00-18.30: *Workshop II: Emerging diseases as risk to international trade of genetic materials* chaired by **Hanna Grothmann, H el ene Quinton, Karolien Desmet and James Quinn**

18.30-19.00: Closing session:

Results of competitions and elections and invitation to the AETE Conference 2025

21.00-24.00: Farewell party at the Trattoria Caprese

