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As Christmas and New Year approaches, it is natural to look back at the year that has passed – and what a memorable year it has been, with the celebration of 50 years with Göttingen Minipigs. We have been celebrating the anniversary internally at Ellegaard Göttingen Minipigs, and externally almost all over the globe. Our internal celebration culminated at a teambuilding event at Lykkesholm Castle focusing on our company values (animal welfare, quality, respect and collaboration) combined with Hans Christian Andersen’s fairy tales. This proved the dedicated team spirit, which truly defines the foundation of our company. The external celebration was manifested through 9 scientific roadshows in 5 European locations and in Israel, Beijing, Shanghai and the USA. Almost 1,000 attendees shared their experiences and discussed advantages of using Göttingen Minipigs for biomedical research. Additionally, 10 Göttingen Minipigs Ambassadors were appointed, all devoted to promoting the use of Göttingen Minipigs in various ways, ranging from housing, care and welfare to scientific characterization, animal model development and validation. During 2019, we also presented a selection of webinars starring well-known experts within their field of research – an initiative that will continue in 2020, along with more white papers and scientific peer-reviewed papers based on our numerous scientific collaborations. Our supporting services in our Research Barrier, such as the development of both diet-induced and “ready-to-go” animals plus the breeding of genetically modified disease models, will also continue in 2020 with exciting new projects and partnerships to be announced – not least as a follow-up to the recently published paper on NASH inducing diets in Göttingen Minipigs. Finally, I would like to thank all of you for your support in 2019 and good discussions at the many great networking and social events. I will be looking forward to meeting many of you again in 2020 – maybe at the Minipig Research Forum (MRF) in Lisbon?

Happy Holidays and a Happy New Year,

Lars Friis Mikkelsen, CEO
Ellegaard Göttingen Minipigs A/S

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Follow us on LinkedIn to stay updated on scientific news, events, webinars, publications and much more – all related to the use of Göttingen Minipigs in biomedical research.
Göttingen Minipigs in Embryofetal Development Toxicology

Anette Blak Grossi¹, Celine Pique², Edward Marsden², Sisse Ellemann-Laursen¹

¹ Charles River, Copenhagen
² Charles River, Lyon

Background data from our first embryofoetal development studies in Göttingen Minipigs were published in 1998 (Damm Jørgensen, K) and since then several minipig embryofoetal development studies have been completed. In the following, the minipig characteristics will be discussed together with our experience and some background data from studies performed at Charles River, Copenhagen (former Citoxlab, Scantox) and Charles River, Lyon.

Species Considerations

In studies for effects on embryofoetal development, two mammalian species have traditionally been required, one rodent and one non-rodent species. Because of practicality and a large amount of historical background data, the predominant rodent and non-rodent species are the rat and rabbit, respectively. In some cases, the use of these species is found unsuitable, because of significant differences in the metabolism and kinetics of a test item compared to humans, or test item or dose route related harmful effects on the health of the mother e.g. destroying effects on the intestinal flora for the rabbit. In such cases, the microbiologically defined, genetically stable Göttingen Minipig could be a possible non-rodent alternative. When working with non-standard species for studies of this nature, a reliable study design producing robust data is imperative, whilst taking into consideration the requirements of the guidelines. The ICH S5 and OECD 414 guidelines make clear the study designs.

Breeding Characteristics

The minipig has several benefits over other non-rodent species e.g. sexual maturity is reached at approximately 5-6 months of age, the average gestation length is 115 days, and the litter size is typically 4-6 piglets in primiparous, and 5-9 piglets in multi-parous, minipigs. By comparison, the cynomolgus monkey attains puberty/sexual maturity much later (age 2.5-6 years); gestation length is about 165 days and, in general, has a single offspring only. There are also significant ethical issues involved in using large numbers of non-human primates for reproductive and juvenile toxicity studies. Whilst the dog (beagle) may also appear a good alternative for several reasons such as body weight (approximately 10 kg), gestation length (average of 63 days) and a litter size comparable with that of the minipig, animal supply in the numbers required for regulatory embryofoetal development studies is unrealistic due to the long and varying dioestrus periods.

Placental transfer of compounds is dependent on fat-solubility, molecular weight, ionizing of compound and presence of transport systems. Most compounds, such as small molecules, administered to the pregnant female will cross the placenta. However, the minipig has a diffuse epitheliochorial placenta, and maternal immunity is acquired postnatally by immunoglobulins secreted in the maternal milk and taken up by FcRn mediated active transport of IgGs over the polarized intestinal barrier. Despite that FcRn is present in the minipig placenta on the maternal side and in the fetal intestine, monoclonal antibody therapeutics are not transferred to the fetuses in pigs as confirmed in a recent study conducted at our site in Lyon. (Hey, A. et al).

For other therapeutics, such as small molecules, the minipig is a relevant alternative, which is supported by studies with known human teratogenic substances like thalidomide, hydroxyurea, aminopterin, pyrimethamine, ethanol and tretinoin. (Damm Jørgensen, K).

Practical Aspects of Study Conduct

Oestrus Synchronisation and Mating

A standard GLP embryofoetal study includes 4 groups of 18 primiparous minipigs. Oestrus in the minipig gilts is synchronized in order to harmonize dosing and allow for staggered start and manageable necropsy planning.

Regumate® (11mg Altrenogest/animal) added to the morning diet for at least 18 days is used for oestrus synchronization. Females are mated over 1-3 days, and maximum three successful matings are allowed for each female. The day of the first successful mating is defined as GD 0. The female is usually introduced to the male two days after cessation of Regumate® treatment. Oestrus length in minipigs is three days and hindering of successful mating before the 6th day after cessation of Regumate® treatment results in lighter synchronization with more than 90% of the documented GD0 synchronized to the same day after cessation

<table>
<thead>
<tr>
<th>Background Information (Göttingen Minipigs) for Embryofetal Studies</th>
<th>Table 1: Placental Transfer and Susceptibility to Teratogens</th>
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</thead>
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<tr>
<td>• Sexual maturity: 5 months</td>
<td>• Polyoestrus</td>
</tr>
<tr>
<td>• Implantation: GD 11</td>
<td>• Cycle length: 21-22 days</td>
</tr>
<tr>
<td>• Closure of the hard palate: GD 35</td>
<td>• Oestrus length: 3 days</td>
</tr>
<tr>
<td>• Diffuse epitheliochorial placentation</td>
<td>• Gestation length: 114-116 days</td>
</tr>
</tbody>
</table>
Treatment is performed during organogenesis – gestation day (GD) 11-35. Between gestation days 11-35, the pregnant minipigs weigh between 18 and 23 kg and all commonly used dose routes can be applied.

In preliminary and main embryofoetal studies, caesarean section is usually performed on GD 60 and GD 110, respectively.

One of the inconveniences of using the minipig for embryofoetal development studies is the gestation length. Charles River, Lyon therefore evaluated if study duration and cost could be optimized without impacting scientific validity by performing all terminal procedures around mid-gestation (GD 60). At this stage, minipig fetal size is not too dissimilar to the full-term rabbit fetus and therefore better suited to fetal processing/examination compared with at the end of gestation. This work demonstrated, that time, resources and financial savings can be made by performing a shortened study design for minipig embryofoetal development studies with mid-term caesarean sections and full fetal examinations without detrimental impact on scientific validity. Morphological defects previously reported with a known teratogen, pyrimethamine (Hayama, T. et al.), were detected in the fetuses examined at mid-term. In addition, double staining of the bone and cartilage of the mid-term fetal skeleton allowed a more refined examination than in specimens only stained with Alizarin red (Pique, C. et al.) (Figure 3).

Study design and standard endpoints are summarised in Table 2.

**Background Data**

Another draw back from using the minipig in embryofoetal development studies, which is also mentioned in the ICH guideline SS5R2, is malformation clusters and insufficient historical background data. However, Charles River’s historical background database, in conjunction with other studies in Göttingen Minipigs, add substantial background data on the incidence of spontaneous external and visceral congenital abnormalities and provide context to findings in embryofoetal development studies allowing for a correct evaluation of study-to-study variability and low incidence findings (Ellemann-Laursen, S. et al.). Table 3 lists some of the most common variations and malformation observed in Göttingen Minipigs. Additional data on variations and malformation are also available from the Charles River webpage:

Conclusion
The first embryofoetal development studies in Göttingen Minipigs were performed more than 20 years ago and since then a significant amount of experience and background data have been gathered at Charles River. Minipigs are susceptible to known teratogens and characteristics such as availability, polyoestrus and large litter size make the microbiologically defined, genetically stable Göttingen Minipigs an attractive species for embryofoetal development studies. The authors believe that time, resources and financial savings could be made by performing mid-term caesarean sections with full fetal examinations according to regulatory requirements without detrimental impact on scientific validity.

References
Thinking out of the box to deliver improved animal welfare and a better working environment

Stable design considerations in Novo Nordisk and AstraZeneca pig research

Lotte Martoft, DVM, PhD, Senior Director, Animal Sciences & Technologies, Clinical Pharmacology and Safety Sciences, R&D, AstraZeneca, Gothenburg, Sweden and Stine Øvlisen, DVM, PhD, Senior Director, Head of Animal Unit Canløse & Bioethics, Novo Nordisk

Building a new pig facility for pharmaceutical research is not without challenges. Details to consider are many and catalogues from experts with examples are hard to come by. Most material on stable designs concerns conventional farms. This is in many aspects relevant, but pen systems specifically designed to accommodate the needs of pharmaceutical research differ from industrial farming pen systems.

In a recent talk at the Minipigs Research Forum we were asked to share our learnings from building and revamping our pig research facilities. Here, we try to capture the most important aspects.

Introduction

Besides the building and specific frameworks such as the manure disposal system and the temperature and air control, it is crucial that areas relevant for pharmaceutical research are considered carefully when building a new research facility for pigs. In our experience a focus on the environment in the stable including welfare of the animals and the safety and well-being of the staff will facilitate the research. The key areas to consider are: 1) regulatory demands, 2) natural pig behaviour, 3) functionality necessary for specific types of research and 4) safety of the employees (Figure 1). If these areas are covered in the design, it will lead to less stressed animals and a better working environment for the employees; ultimately leading to better data.

In our experience incorporating advanced flexibility into the pen system design, including smart aids for the research staff, is what makes it possible to meet all the needs of research when building a modern well-functioning facility.

Considerations in the early part of the design phase

The diverse nature of the key areas calls for diverse expertise, specialist knowledge and importantly, experience of the staff. It is highly recommended to invite technical staff, research scientists, veterinarians and caretakers to participate in early brainstorming sessions and to employ their review and advise during all project phases. The employees working in the facilities have the best insights and knowledge of what should be a part of the considerations. Another good way to ensure that all imaginable constraints are considered and incorporated into the building project is to tap into the pool of experience found among peers.

AstraZeneca and Novo Nordisk has collaborated across company borders for the benefit of the research, the employees working in the facilities and most certainly for the benefit of the pigs. The key learnings from the early project phase for both parties has been:

- Draw on experience and visit your network
- Consider and draw workflows in the facility for safety and functionality
- Involve caretakers
- Make a model for corrections prior to building a complex flexible pen system (Figure 2)

Regulatory demands

In the early design face, it is important to consider national and international regulations on laboratory animals and national/local environmental regulations. Factors such as accessibility to the facility, air filtering, light and noise levels, temperature, ventilation, housing demands, animal care and waste handling are described, and needs to be considered. In Europe space considerations for housing of pigs/minipigs are described in the “DIRECTIVE 2010/63/EU” but also national requirements and local environment requirements must be considered. In the EU directive the minimum space requirements are described as is the need for social housing, training and socialization. The Directive allows for pigs to be confined in smaller enclosures than outlined for short periods of time when justified on veterinary or experimental grounds. When
designing a facility, it is crucial that foreseen as well as un-foreseen needs for single housing versus group housing are considered. Likewise, the requirements for enrichment, training and socialization must be considered to ensure that there is room for these activities and the related equipment/materials.

Critical to pig housing

In a research setting there is a risk for a constraint of the natural behaviour of the pigs. But if the design of the pen structures is well thought through and made flexible it can accommodate both pig behavioural needs and research needs. The flexible solution should enable the social and curious nature of the pigs. This includes adequate space for enrichment in the pens and functionality of the surrounding areas for daily exercise and training. Group housing should be the standard but the need for single housing during studies is frequent and during these solitary periods, no matter how short, the social needs of the animals should be accommodated. For individually housed pigs the flexible stable design should allow the pigs to have visual, olfactory, and auditory contact with other pigs to prevent social deprivation (Figure 3).

Pigs are not “pigs” – they are clean animals. They will naturally rest and sleep in dry nesting areas and defecate furthest away from where they are fed. If this natural behaviour is thought into the design, it can facilitate clean and dry space for the pigs and for ongoing research activities in the pen including clean environments for possible post-surgical convalescence. Placing the water access in one end of the pen and hay/bedding in the other creates a wet-dry environment that stimulates the pigs to retain this natural separation of the living area.

In their natural environment pigs use their strong snouts for rooting in the soil. Taking this behaviour into the research stable pigs will use their snouts to manipulate all loose objects. This requires a very solid construction of the pen walls, of all flexible walls and doors and of additional fittings such as water systems.

Pigs are intelligent, adaptive and highly inquisitive and providing diverse enrichment is the optimal way to help the pigs express their natural behaviour including their need to exercise and root during their awake hours. Access to exercise areas can vary from custom made outdoor areas to the work areas just outside the pens or even inside the pens if the space permits. Exercise can easily become a part of the daily training routines.
and corridors are easily used for this (Figure 4). Particularly if this is thought into the design and gates have been placed strategically throughout the facility to create extra enclosures in the corridors. The areas outside the pens can also be used for the training and socialization. Think out of the box! A variety of items can be used as environmental enrichment, including food items, durable balls, chains, a broom head attached to the pen wall or a big cardboard box (Figure 5). The key is the diversity of the enrichment since curiosity of pigs are satisfied best by novelty. A frequent rotation of the enrichment items and limited time with specific items each day will help maintain the novelty.

**Flexible housing of pigs**

- **Spacing enabling natural pig behaviour**
  
  Flexibility, including connectivity between pens and research infrastructure, is vital for the overall success of the design. The flexible design of pen walls and doors should permit space for
group housing with means for natural socialization with fellow pigs and at the same time give the possibility for periodic conversion into a single housing system (Figure 6). The flexible pen system should also give an option to create a short-term small research enclosure where employees can reach the pig from outside of the pen and the pig can remain calm during dosing and blood sampling, or where the pig can undergo anaesthesia induction/awakening in a calm local and known space. Also, in direct conjunction to the small short-term research enclosure ample space and infrastructure for research equipment and aids for good and safe work processes should be considered.

Safe work processes and space and aids for ensuring this is critical to consider when working with large animals. To support the lifting of anaesthetized pigs a hoist system should be included in the construction of the facility. The system needs to be easy to use and compliant to lifting of animals between home pens and research areas. It does not need to be specifically designed for pigs. A system developed for human use can easily be converted with a hammock refitting to suit pigs of different sizes (Figure 7).

A well-designed facility creates a better work environment with reduced noise levels, no or reduced need for physical restraint and fewer heavy lifts. Making room for exercise and complex training makes it more fun for both animals and employees. A flexible design becomes more agile facilitating changes in research strategies and refined procedures.

**Summary**

Share design considerations and build flexible pen systems. It will pave the way for better science, increased safety and welfare.

The elements to incorporate and factors to consider when designing a research facility are numerous and ingenuity is a plus. The optimal way forward is to have welfare, research and safety aspects incorporated early in the design phase and optimized by users including mock-ups. Learnings made by peers, and visits to other facilities helps reduce mistakes and increases the creativity needed when planning functionality and design of your facility.

A well-designed research facility has a flexible interior and lever better science, animal welfare and working environment.
By Lars Friis Mikkelsen, CEO, Ellegaard Göttingen Minipigs

It is with great pleasure, pride and indeed humbleness that I would like to share with you a flashback on some of the events which have characterized 2019 as the year of celebration of The First 50 Years with Göttingen Minipigs.

Global availability of Göttingen Minipigs means global celebration

Today, Göttingen Minipigs are being used for biomedical research almost all over the world, available also from our partners, Marshall BioResources in the US, Oriental Yeast Co. in Japan and WoojungBio in South Korea. With our recent expansion efforts into both China and India, those two major R&D markets will also soon benefit from having access to our high-quality and genetically well-defined Göttingen Minipigs. This global approach anchored the planning of our series of scientific symposia which we have conducted at nine different locations all over the world. It has been a great recognition, that so many people have participated in the very successful and well attended global roadshows, which have included various scientific topics presented by knowledgeable speakers sharing their experiences and data using Göttingen Minipigs. In the update from Marshall BioResources on page 13, you can get a more detailed idea of the topics of the symposium held in the USA. In addition to the focus on science, the roadshows were an excellent opportunity for users of Göttingen Minipigs to network with fellow researchers, which many benefited from.

In 1969, renowned researchers at the Georg-August University in Göttingen, Germany, succeeded in establishing the first barrier-bred population of Göttingen Minipigs aimed at developing a small non-rodent animal model for biomedical research. In 1992, Lars Ellegaard, the founder of Ellegaard Göttingen Minipigs, entered into an exclusive license agreement with the University to breed, develop and sell Göttingen Minipigs world-wide. Twenty years later, Lars Ellegaard received the Gold Medal of Honor, Aureus Göttingensis, from the University for his great efforts and achievements expanding the use of Göttingen Minipigs for biomedical research! Of course, one of our first celebration events therefore took place ‘at home’, at our facility in Dalmose, Denmark, together with our Guests of Honor: Lars and Bodil Ellegaard.
Webinars: A way of expanding knowledge on the use of Göttingen Minipigs

As another jubilee activity, we decided to launch a series of webinars on relevant and exciting topics within the use of Göttingen Minipigs. A total of three webinars were conducted, each of which were attended by an impressive number of people, and it goes without saying, that this particular method of knowledge sharing will continue, and we look forward to inviting you to more webinars in the new year: follow us on LinkedIn to stay updated!

A dream tour for all employees

Of course, we also wanted to celebrate The First 50 Years with Göttingen Minipigs with our employees, who were invited to a day of celebration at a beautiful castle only a one-hour drive from Dalmose. In advance, we had asked all participants to work together in groups to prepare a short theatrical performance for their colleagues onsite illustrating our four company values: Animal Welfare, Quality, Respect and Collaboration matched with different fairy tales by the famous Danish author, Hans Christian Andersen. Everybody was blown away by the creativeness of those performances and was awarded with an enjoyable and truly great party in the evening!

THANK YOU VERY MUCH!

Finally, on behalf of all of us at Ellegaard Göttingen Minipigs, I would like to shout out a big and warm thank you to everyone who have taken part in our year of celebrating The First 50 Years with Göttingen Minipigs! We are truly grateful for all contributions which have made our jubilee year such a great success, and we will strive to continue to expand knowledge about the use of Göttingen Minipigs as a highly relevant large animal species for biomedical research.

Filipe Nunes, Associate Principal Specialist Veterinary at AstraZeneca:
“I was honoured to participate in the 50th Anniversary celebration in Copenhagen. It was a great day focusing on leading science on Göttingen Minipigs and an incredible opportunity to get into contact with other in vivo scientists across both pharma industry and academia and share our experiences. Events like these foster the sense of community among us scientists and allow successful collaborations to be established.”

Joanna Harding, Project Toxicologist at AstraZeneca:
“In May this year, I was lucky enough to be invited to speak at the London celebration of 50 years of Göttingen Minipigs. The celebration was held at the beautiful ‘Royal Society’ Building and the presentations included a range of topics from researchers across the UK. Ample time was given for networking which lead to many interesting introductions and discussions. This was a perfect way to celebrate 50 years of these amazing animals and their role in research and drug development.”

Copenhagen, Denmark

London, United Kingdom

Antwerp, Belgium

Kibbutz Lahav, Israel
Congratulations to 10 Göttingen Minipigs Ambassadors!

During our year of jubilee celebrating The First 50 Years with Göttingen Minipigs, we have had the honor and pleasure of appointing a total of 10 Göttingen Minipigs Ambassadors!

A common characteristic for all Ambassadors is that they have received the recognition for their high-level international knowledge-dissemination and promotion of the use of Göttingen Minipigs in biomedical research.

Additionally, we want to thank the Göttingen Minipigs Ambassadors once again for their huge and persistent efforts also in connection with, but certainly not limited to:

- Characterization, validation and development of Göttingen Minipigs disease models
- Development of an extensive genetic quantification and breeding program
- Dedication to improve the health and welfare of Göttingen Minipigs as well as to ensure ‘good practice’ use of Göttingen Minipigs in biomedical research

Henner Simianer – Professor of Animal Breeding and Genetics
University of Göttingen, Germany

Andy Makin – CEO
Andrew Makin Preclinical Consulting, Denmark

Hanne Gamst Andersen – Laboratory Animal Veterinarian
Novo Nordisk, Denmark (retired)

Steven van Cruchten – Associate Professor
University of Antwerp, Belgium

Laurence Bishop – Senior Business Development Lead
Sequani Limited, UK

Berit Østergaard Christoffersen – Principal Scientist
Novo Nordisk, Denmark

Jo Harding – Project Toxicologist
AstraZeneca, UK

Edward Marsden – Associate Director
Charles River Laboratories, France

Susanne Mohr – Senior Toxicology Project Leader
F. Hoffmann-La Roche, Switzerland

Ofer Doron – Managing Director
Institute of Animal Research (Lahav CRO), Israel

Andy Makin was announced Ambassador of Göttingen Minipigs 28 February 2019 in Copenhagen, Denmark

Susanne Mohr was announced Ambassador of Göttingen Minipigs 15 October 2019 in Basel, Switzerland

Laurence Bishop was announced Ambassador of Göttingen Minipigs 9 May 2019 in London, UK

Henner Simianer was announced Ambassador of Göttingen Minipigs 19 February 2019 in Göttingen, Germany
50 Years with Göttingen Minipigs celebrated in the USA

Marshall BioResources was very pleased to collaborate with Ellegaard Göttingen Minipigs to host the 9th scientific symposium, this time in the United States. The session was the final event following a series of symposia held across the world over the course of 2019, celebrating 50 years with Göttingen Minipigs. Efficacy is the leading reason why new drugs fail to get to market, and the symposium began with a presentation highlighting that minipigs can help bridge the efficacy gap in specific therapeutic areas given the physiological similarities between minipigs and humans. This was followed by a section highlighting the ethical importance of selecting the right models for the right research, and why the minipig may be advantageous in many ways.

Peter Vestbjerg of Ellegaard Göttingen Minipigs reviewed the history and development of Göttingen Minipigs from the beginning and the collaborations that have helped drive the development of the model. Nicole Navratil from Marshall BioResources discussed the expansion of Göttingen Minipigs into the United States, the growth of the Marshall BioResources production facilities, and services available to researchers in North America. Michelle Salerno of Marshall BioResources ended the morning sessions with an overview of minipig behavior and behavioral management. She also discussed the training and enrichment program at Marshall BioResources, and opportunities to enhance minipig welfare.

To demonstrate the translational value of Göttingen Minipigs, Lars Friis Mikkelsen, CEO of Ellegaard Göttingen Minipigs, kicked off the afternoon sessions with a discussion about the scientific value of Göttingen Minipigs as models for human disease and several advancements in this area. This was followed by a presentation about an exciting translational minipig model of human urinary tract infection. Michael Pellizzon of Research Diets, Inc. offered a comprehensive review of diet induced minipig models of metabolic disease and the impact of diet on the research design.

The final sessions transitioned into a focus on the future, and Troy Arends of Exemplar provided an overview of their plans to provide transgenic models of disease developed in Göttingen Minipigs. He stated their ultimate goal is to “change the world by providing better treatments and therapies.”

In the last session, Patricia Turner of Charles River provided an overview of their global approach to minipig welfare. She reminded us not to focus just on our favorite species and focus on ways we can cultivate a high quality of life for all laboratory animals, including minipigs.

The day concluded with a networking reception where attendees could further ask questions and share ideas about the value of minipig models, and ways to enrich and enhance minipig welfare.
New scientific publications on Göttingen Minipigs

Ellegaard Göttingen Minipigs gives high priority to collaborative projects that aim to better characterize and validate Göttingen Minipigs as a translational animal model and which facilitate and refine the use of Göttingen Minipigs in research projects and safety testing. Please contact us if you have an idea for such a collaborative project. Below is a list of a few recent articles on Göttingen Minipigs.

Join the 14th Minipig Research Forum - a unique opportunity for minipig users to meet, discuss and share knowledge and experiences within all areas of minipig use related to biomedical research. Take part in this 3-day conference packed with scientific lectures, poster presentations and the opportunity of networking with minipig users from all over the world.

**SCIENTIFIC SESSIONS**
- Immune System
- Pain: Models and Management
- Nutrition and Metabolism
- Pharmacological Models
- Juvenile and Reproductive Toxicology

**BREAKOUT SESSIONS**
- Dosing and Sampling (continuing education)
- Training and Monitoring Welfare (continuing education)
- The Ethical Landscape (open forum discussion)

The full scientific program incl. speakers will be available during February/March 2020.

**POSTER SUBMISSION**
Every year the best MRF poster is elected and awarded. Posters with technical content (e.g. tips and tricks) or scientific content (including data) are accepted. Poster instructions incl. deadline for submission are available on [www.minipigresearchforum.org](http://www.minipigresearchforum.org).

**PRACTICALITIES**

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<th><strong>Starts at</strong></th>
<th>13 May 2020 (Wednesday)</th>
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<tr>
<td><strong>Ends at</strong></td>
<td>15 May 2020 (Friday)</td>
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<tr>
<td><strong>Registration fee</strong></td>
<td>Early Bird: €350 (register before 1 April 2020)</td>
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<td></td>
<td>Late registration: €400</td>
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</table>

The registration fee covers welcome lecture, five scientific sessions, one open session of choice, catering (lunch, coffee and snacks), get-together Wednesday evening incl. dinner, drinks and network, event Thursday evening followed by buffet dinner at venue hotel, and conference material.

**Venue**
Hotel Iberostar Selection Lisboa
Rua Castilho 64, Lisbon
The venue is located in the heart of the city and only 15 minutes from the airport.

**Accommodation**
Rooms can be booked at a special MRF conference rate of €175/night incl. breakfast. Download the booking form from our website and email it to the hotel ASAP. Alternative accommodation may also be found in the area.

**IMPORTANT NOTICE: Book your accommodation early!**
Lisbon is a very popular destination during May. Therefore the hotel will gradually release the MRF room allotment starting 1st February 2020, to accommodate the demand.

The MRF is one of my favorite conferences. Not too big, great people and networking
Good mixture of science, practical topics, animal welfare and networking/discussions
My first MRF: loved it totally and found everything to be very well organized

The MRF is a non-profit organization with more than 500 members worldwide working with minipigs in industry, academia and regulatory bodies. Participation in the annual MRF conference requires membership (free of charge). Read more and apply for membership at [www.minipigresearchforum.org](http://www.minipigresearchforum.org)
## Meeting Calendar 2020

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<td>SOT and ToxExpo</td>
<td>15-19 March</td>
<td>Anaheim, California, USA</td>
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<tr>
<td>AST Congress</td>
<td>23-26 March</td>
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<td>Minipig Research Forum</td>
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<td>Symposium AFSTAL</td>
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<tr>
<td>EUROTOX</td>
<td>6-9 September</td>
<td>Copenhagen, Denmark</td>
</tr>
<tr>
<td>SPS Annual Meeting</td>
<td>13-16 September</td>
<td>Montréal, Canada</td>
</tr>
<tr>
<td>GV-SOLAS</td>
<td>16-18 September</td>
<td>Würzburg, Germany</td>
</tr>
<tr>
<td>Janssen Juvenile Toxicity Symposium</td>
<td>TBA</td>
<td>Beerse, Belgium</td>
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<tr>
<td>CALAS</td>
<td>TBA</td>
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