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**Porcine-specific reagents available!**



Clean pigs  
for clear results

Dear Reader

In Denmark we have had one of best summers ever in terms of the weather and I hope that you have enjoyed the summer as much as we have.

So far, 2013 has been another good year for our company and the Göttingen Minipig. We continue to experience very positive requests and feedback from existing and prospective minipig users and the minipig as an animal model is continuously included in an increasing number of sessions, workshops, posters etc. at different meetings. The increasing request for information about the use of Minipigs in testing of biopharmaceuticals is a proof of the growing accept of the minipig as a very relevant non-rodent model. The minipig is more topical than ever. We are always interested in sharing our knowledge and experience and you are welcome to contact us for a discussion about minipigs.

In recent months I have sent many thoughts and several colleagues to Japan as we shipped a breeding herd to Oriental Yeast Co. in the end of May. Our collaboration with Oriental Yeast Co. started some years ago and after thorough preparation Oriental Yeast Co. now breeds Göttingen Minipigs for delivery to Japanese companies and universities. Oriental Yeast Co. has built a new barrier facility which is designed for the minipigs. Several employees have visited our facility to learn more about our experience with breeding, housing etc. With this development a new chapter in the history of our company and the Göttingen Minipig has been added.

Ten years ago we sent a breeding herd to Marshall BioResources in the US and since then the demand for minipigs in the US has increased. Thus, Marshall BioResources is now building a new facility which should be ready to house minipigs by early 2014. I appreciate the very good collaboration with Marshall BioResources and Oriental Yeast Co. and I look forward to seeing when the next chapter of the history of our company and the Göttingen Minipig will be added and what the content will be.

In May-June 2013 we conducted a customer satisfaction survey because we want to continuously improve our service. I appreciate the good response rate as well as the useful answers and comments. The results from the survey will be used as a guide so that we can meet your needs and requirements even better in the future.

*Yours sincerely,  
Jens Ellegaard*

## Follow us on LinkedIn!

Now you can follow Ellegaard Göttingen Minipigs on LinkedIn!

Our Company Page on LinkedIn will keep you updated with useful and interesting information regarding our company and the Göttingen Minipig!

# Customer satisfaction survey

In May-June 2013 we conducted a customer satisfaction survey to find out how satisfied our customers are with our company as a supplier and business partner.

We value the good collaboration with our customers and the results from the customer satisfaction survey can help us to continuously improve our service.

The customer satisfaction survey consisted of 11 sections: Overall satisfaction & loyalty, image, ordering, prices, delivery, handling & dosing, support, courses, complaint handling, newsletter and website. Every section consisted of 2-7 questions for evaluation and a box for comments.

We appreciate the very good response rate (33 %) and we are pleased to see that the results from the survey are very positive. The results confirm that we should maintain our offer for scientific, veterinary and practical support and that our courses are very useful for our customers. Especially our Laboratory Technician Adrian Zeltner is very popular as he handles minipigs just as well as he handles people.

Some customers request even more types of courses and we are actually able and willing to support our customers with any kind of information, knowledge and experience. There are no limits and you are welcome to contact us if you would like us to tailor a course specifically to your needs and interests.

Our website is important for many of our customers and we want to make it an even better resource for everyone working with minipigs. Please do not hesitate to contact us if you have any ideas for how our website can be improved as we would like for it to be a useful tool for our customers.

Even though the customer satisfaction survey had very good results we will continuously improve our service as we believe that our customers deserve the best support and service possible.

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# Refinement – What do Minipigs want??

Animal welfare is an ongoing process. Rather than a destination, animal welfare at Ellegaard is considered a process where we continually adapt our actions to meet minipig needs in the best possible way.

**Read more about minipigs “on the run” in the corridors and cotton towels on the floor!**

In early 2013, we appointed a group made up of four animal technicians and the attending veterinarian to brainstorm about all the ideas and proposals we had regarding minipig enrichment.

(It is relevant to mention that in recent years, basic enrichment in the pens has consisted of straw on the floor, biting sticks, metal chains and, to some degree, plastic balls).

Every idea was written down on a “post-it” and put on the wall. The ideas were then discussed and categorised, and a pattern emerged: enrichment must be adapted to the age of the minipig. Toys can be entertaining for young minipigs whereas breeding sows couldn’t care less! Conversely, a good scratch on the back with a broom is appreciated by a sow, but not so much by young, lively minipigs.

Therefore we chose different actions in different sections. An example from the farrowing section is shown below.

Farrowing section	How	Time	Scheme no.
Sow and piglets in the corridor	3 groups/day	15 min./day	4
Scratching the sows’ back	Only if they like it!	10 min./day	5
Socialisation	Open the gate, squat and make the piglets come forward	10 min./day	6

We realise that this is not rocket science! The point is to systematise all the actions, write them down as Standard Operating Procedures and register them just like any other activity in the barriers. This way, we ensure that the efforts will not fizzle out.



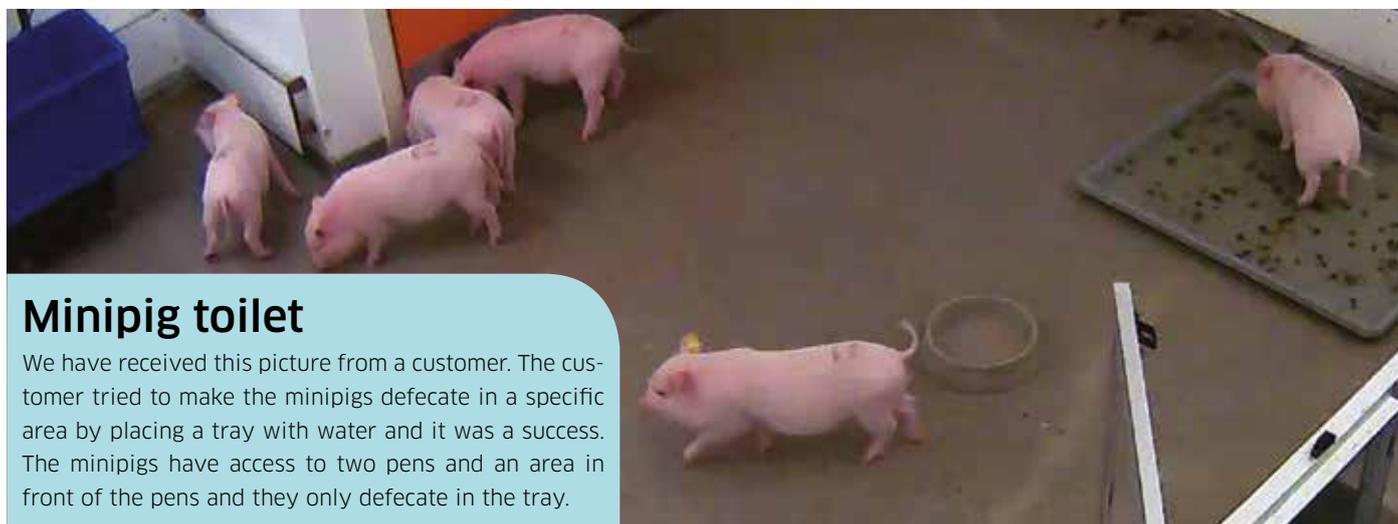
Even though different groups of minipigs like different types of enrichment, we found that they all had one thing in common: they love to go for a walk in the corridor! Therefore this activity has become routine in every barrier section.

Not only is it enriching for the minipigs on the run, but also for the other minipigs in the room. The time spent by the staff is limited – but admittedly it does require a little more floor cleaning!

Another thing which has become a daily routine is to put towels on the floor for weaned minipigs. They rub the towel actively with their snout; it is reasonable to imagine that they are mimicking the manipulation of the sow’s udder. Giving towels to old minipigs doesn’t really provide any activity.

We are continuously considering ways to enrich minipigs, keeping in mind that we can always do better. Remembering that time and resources are limited, we choose the activities with the most value for money. In this perspective a short walk in the corridor is the favourite – for animals and staff!

*Helle Lorentsen, DVM, Ellegaard Göttingen Minipigs*



## Minipig toilet

We have received this picture from a customer. The customer tried to make the minipigs defecate in a specific area by placing a tray with water and it was a success. The minipigs have access to two pens and an area in front of the pens and they only defecate in the tray.

# Enrichment of Göttingen Minipigs: Models of human hepatocellular carcinoma

Prashasika Gehlot, PhD – PGehlot@mdanderson.org

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The pig has long been a meaningful model in biomedical research. It provides hope for successful xenotransplantation and the development of induced pluripotent stem cell technology in the field of regenerative medicine. Insulin obtained from pigs is used to treat diabetes. Pig heart valves are being surgically placed into humans.

We are using Göttingen minipigs to achieve our goal of developing an animal model of human hepatocellular carcinoma (HCC), including background cirrhosis that would facilitate the development of diagnostic and prognostic therapies or markers. HCC is prevalent all over the world. Sorafenib is the only approved systemic therapy for patients with advanced disease, but its effect on overall patient survival is modest and the time to develop drug resistance is short. Studies with laboratory mice have failed to produce similar effects in clinical trials with humans. Despite thousands of publications on HCC studies with mice and other small-animal models, we are still in dire need of a model that mimics all the phases of HCC. Ultimately, large-animal models are needed to determine the diagnostic and prognostic relevance of the heterogeneous attributes of HCC. For our study, the cancer-causing agent diethylnitrosoamine (DENa) is being used to develop this model. The effects of the carcinogen DENa on the liver of pigs was initially described in 1977 and DENa is now known to cause liver cirrhosis. Because in most persons

liver cirrhosis preceded HCC, the swine model mimics patient conditions. Swine have continued to serve as a laboratory model to study a variety of human treatments since 1980. We expect our findings to reinforce the applicability of the swine model in the search for new therapies that can be translated into human clinical trials, reveal new areas of application of pig biology that would benefit humans, and demonstrate that the pig is good model for molecular mechanistic studies of human cancer. Our study is the first use of the Göttingen Minipig in cancer research. The findings will be highly relevant to patients with cirrhosis and a high risk of HCC.

It is our goal to characterize the DENa-induced HCC model in the pigs and identify its applicability in the search for new therapies that can be translated into human clinical trials and hopefully demonstrate that the pig is a good model for HCC in humans.

I would like to share our experiences with enrichment of Göttingen minipigs. We welcomed four animals from Marshall BioResources to our facility in January 2013. Each weighed about 10 kg upon arrival and currently weighs 14–15 kg. The animals eat a minipig grower diet, which consists of an average of 200 g (based on animal weight) daily.

Social or pair-housing is our main form of swine enrichment. The minipigs are group-housed in stalls that have sliding divider doors/panel which allow separation of animals for feeding and study procedures, as needed. The objective of the group housing is to meet the social needs of the minipigs and improves their pro-social behaviours.

Ideally, enrichment is designed to draw out behaviours that would be exhibited in nature (i.e., rooting for pigs). Not only do pigs display rooting while feeding, but larger “wobble” toys are great for drawing out this specific action: when nudged, these toys nudge back. The interaction is stimulating. Toys that can be pushed around, chewed on, or dug into appear to be used frequently and occupy the time of the minipigs, and appear to facilitate rooting and other natural behaviours. However, with continued exposure, a loss of interest in toys has been noticed. Manipulanda should be rotated regularly to maintain the animal’s interest and natural behaviour. We switch the toys every couple of days to prevent the minipigs from becoming bored.

In addition to enriching toys and manipulanda, we also frequently use novel treats for enrichment. Candy corn is used as a reward for weighing, receiving an injection, or being picked up or restrained. Medication in powder or pill form is drizzled with honey or hidden in yoghurt to encourage intake. The minipigs are also occasionally treated to raisins, fruits, popsicles, or Dum-Dum suckers. While eating these sweets is certainly not indigenous behaviour, their sugary attraction can be very useful





when a pig is required to perform an “unnatural” behaviour. Exposure to these tasty treats, typically more enticing than toys to the Göttingen minipigs, should be limited to small quantities to avoid distracting them from their normal diet or causing an undesirable increase in weight.

Enrichment is critical in laboratory animal medicine, especially for intelligent animals such as pigs, that are not in their natural environment. The goal of our animal team is to create a positive environment for the Göttingen minipigs while they are in our facility. Our small group is easily maintained with a variety of enrichment activities. Husbandry and veterinary interactions with the animals have been improved with the use of these toys and food items.

Listed are some of the toys we used for the enrichment of our minipigs:

- Big Red Apple: polyethylene, apple scented, can be hung (Bio-Serv)
- Kong Genius: rubber, designed to be filled with treats (Bio-Serv)
- Busy Buddy Football: rubber, has slots for hiding food treats (Bio-Serv)
- Jingle Ball: polyethylene, noisemakers inside, has holes that a chain can be attached to for hanging (Bio-Serv)
- Blue Kong: rubber, can be filled with treats (Bio-Serv)
- Precious Gem: polyethylene, can be filled with treats (Bio-Serv)
- Bobbin: rolls easily, can be pushed around the run (Otto-environmental)
- Sauras Egg: polyethylene, large oval toy with a weighted bottom that pops back up when it is pushed over (Otto-environmental)

#### **Acknowledgement:**

I would like to thank my Mentor Dr Steven Curley and ESIS (Experimental Surgery and Imaging Support) and NCAR and Dr Agatha Borne, Dr Laura R. Paeon of MD Anderson’s Department of Veterinary Medicine and Surgery for this study.

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# Blood sampling

Adrian Zeltner, Laboratory Technician, Veterinary Services

*Ellegaard Göttingen Minipigs*

## Introduction

The traditional method for sampling blood from a minipig is to place it in a V-trough in dorsal recumbency to have access to the blood vessels in the neck. This system is quite established and it allows for fast sampling with high turnover. Its limitation, however, becomes obvious when minipigs become larger or begin to struggle. Smaller animals can easily be put in and restrained in this position, but as minipig size and strength increase, more manpower is required to do the job. It is unnatural for any animal to be placed on its back, and as it makes them feel vulnerable with their underbelly exposed; it is likely that stress levels are quite high, too. This is not the only option for obtaining blood from a minipig, so in the spirit of refinement, we explored other options to reduce the stress and strain on the animal.

## Sampling in a sling

Göttingen Minipigs usually adapt quite well to the sling and are quite happy to hang in it, so it was self-evident to investigate the possibilities of using this device. First we cut a hole in the hammock, around where the appropriate vessels could be placed when the minipig is in it. It was possible to take blood this way, but it was quite clear that a standard sling frame puts the technician in an awkward working position. This challenge was resolved using a height-adjustable frame. The minipig can be placed in the sling at a lower level, then raised so the technician can comfortably take the sample sitting down. Finding the right point for the needle through this hole proved to be the next challenge. The tip of the sternum was used as a landmark and could be palpated, but the entry site for the needle was not always placed over the hole and the minipig had to be repositioned. This was suboptimal, and an enlargement of

the hole led to difficulties when positioning the minipig: they tended to stick their snout through it. Once properly positioned, the minipig's neck was not sufficiently extended as hanging loose skin made sampling challenging. We altered the design of the device to put the neck in a raised, extended position but it proved difficult to fit different sizes of minipigs. Ultimately, the simplest way turned out to be the lifting of the head by an assistant. The equipment was modified so the frame is relatively wide to prevent the insert, which is cut in a way that no longer supports the head, from hanging too much. After placing the minipig in the modified sling (lower position), the technician lifts the head and extends the neck. At the same time, the sling is raised to a position which allows the seated technician to take the sample comfortably. The sling is then lowered again, the minipig is removed and replaced with the next one.

## Proof of principle

We tested this procedure in three setups:

1. A study where the collection of one sample of blood was required from 22 pigs (males and females) weighing 10-12 kg. The vacutainer system was applied. The pigs were naïve: they had never been used for blood sampling before and had never been in a sling before. They all accepted the sling very well and there was no problem lifting the head and basically no struggling was observed. The only challenge here was the technician, who was used to the traditional sampling method and had to adapt to the new approach of collecting samples with speed and confidence.
2. Two minipigs of about the same weight as above were sampled four times at 90-minute intervals. The minipigs were calm and sampling was effortless. No significant change in behaviour was observed from start to finish.

Photo 1: Modified sling



Photo 2: Holding the head of the minipig in raised sling



3. The next test was to sample pigs weighing more than 25 kg. It was easy enough to get them into the sling; it was decided that two persons should do this to reduce the burden of lifting a heavy minipig. After the animal was placed in the sling, only one technician was needed to hold the head up so the other could take the sample. The limitation (for staff) of these larger animals was felt when many animals had to go through the process or several vials of blood were taken which meant that the head had to be held for a prolonged period of time.

### Conclusion

All the minipigs were easily placed in the sling and were quite relaxed. No signs of stress were observed, even during multiple sampling. Blood could be obtained from all pigs, but there were some technical challenges for technicians until they became accustomed to looking at the sampling site from a different angle. The time used to obtain one sample per minipig was longer than using the traditional method due to placing the animals in the sling and raising and lowering it. This disadvantage however is offset by the fact that only two technicians need to be present and no force is necessary to restrain the minipigs. The reduction of stress compared to the traditional technique was noticeable by mere observation; it is therefore a true refinement in the sense of the 3Rs. We did not test the system using very small minipigs, so we cannot report about a minimum size limit. The limitations we reached with the large minipigs might be overcome by further modification of the material.

Some further studies will be necessary to determine the shortest time interval possible and to determine the most practical solution for situations like multiple blood sampling to obtain a TK profile.

### Crucial factors

It is worthwhile to give special attention to the following two topics:

**First, it is imperative to take your time when placing the minipig in the sling.** You need to give this procedure utmost attention when you do it the first time with the minipig because the outcome of this first attempt will affect all subsequent sling placements. Do it calmly, concentrate on what you are doing and observe the minipig's behaviour. Only one person should be in control and guide the minipig. Preferably train this in a quiet moment when no sampling is required, so you and the minipig are ready when it comes to the "crunch". You can learn this procedure by joining one of our Handling and Dosing courses or as a minimum by reading our Handling and Dosing guidelines (downloadable from our website).

**Second, the actual sampling technique needs to be adapted to the new position.** Do not despair or give up if you are unsuccessful the first time. Practice has shown that technicians who are less experienced in the traditional technique initially do better using this method, as they may not be as "hardwired" as experienced technicians.

Photo 3: Ready to sample



Photo 4: Taking a blood sample



# Neuroimaging of white matter lesions and ischemia in Göttingen minipigs – a pilot study

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2) Centre of Functionally Integrative Neuroscience (CFIN) and MINDLab, Institute of Clinical Medicine, Aarhus University, Aarhus, Denmark

## Introduction

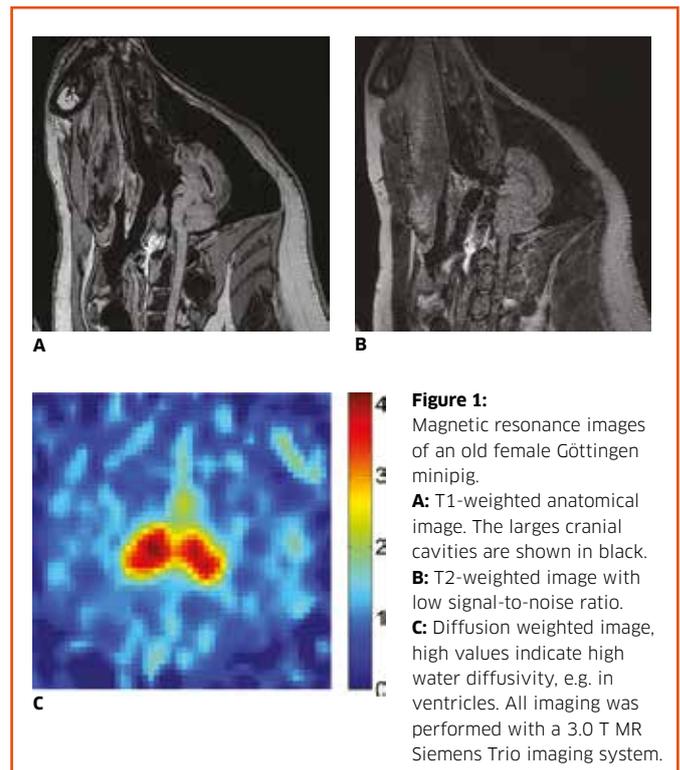
In the human brain, cerebral white-matter lesions (WMLs) are seen as areas of high intensity on certain types of magnetic resonance imaging (MRI) scans and are thought to represent small vascular abnormalities. Mild and moderate WMLs are common in healthy elderly people and are of uncertain significance. However, recent brain studies of depressed elderly patients report an excess of white-matter lesions. Furthermore, severe changes may predispose some elderly individuals to depression, and are reportedly associated with poor response to treatment in general. Brain ischemia is a condition of insufficient blood flow to the brain to meet metabolic demands. As a result, the affected areas of the brain cannot function, which might result in permanent neurological damage and death. Risk factors for stroke include old age. Diffusion MRI methods allow the mapping of the diffusion process of water in biological tissues, in vivo and non-invasively. These parameters are altered by brain ischemia. Thus, diffusion MRI's main application has been in the study of neurological disorders, especially for the management of patients who have suffered an acute stroke.

## Use of Göttingen minipigs

Both depressive and ischemic disorders affect elderly people. Rodents are commonly regarded as the gold standard in basic research when studying relationships between molecular mechanisms and behaviour. However, while MRI and Positron Emission Tomography (PET) neuroimaging can be carried out in small animals, their small brain size precludes the detection of WMLs and ischemia in the imaging systems designed for humans. To achieve such measurements in an environment that closely resembles the clinical setting, we have specialized in the use of pigs for basic research in neuroimaging. Thus, over the years, we have used different imaging modalities and techniques to explore the neurobiological aspects of ischemic and depressive disorders.

## Pilot study

To support our efforts, Ellegaard Göttingen Minipigs donated two old female minipigs for our research efforts. Specifically, our goals were to look for WML and to compare different diffusion MRI techniques in the aging brain during distinct levels of inhaled oxygen. Whole brain and associated structures were scanned with standard three-dimensional, T1-weighted sequences for anatomical details (Figure, part A). This was succeeded by standard clinical T2-weighted sequences aimed at depicting



WMLs (Figure, part B). The minipigs were scanned at different oxygen levels (a standard clinical diffusion was weighted and a new experimental MRI sequences was acquired for each level, see Figure, part C). After completing the experiment, the pigs were euthanized. The large cavities of the pig cranium proved to be a challenge for the MRI imaging. Where the T1-weighted images were superior for determining anatomical details, tissue contrast differences were not clear in T2-weighted scans due to a low signal-to-noise ratio. Thus, we could not detect WMLs. Further efforts are needed in the adjustment of MRI parameters and possible injection of an MRI-compatible gel into cranial cavities with the aim of improving the signal-to-noise ratio of the MRI signal. The experimental MRI sequences for imaging of the water diffusion correlated well with the standard clinical sequence. This may indicate that comprehensive and sensitive detection of subtle changes in tissue microstructure due to ischemia will be possible in future minipig models. Such imaging advances could provide better MR diffusion characterization of neural tissues in normal, developmental and pathological states.

# Placement of a CVC by Peel-away Introducer

by Abdullah Kandira, Diana Ströbel, Birgit Alka, Carolin Joerg, and Dr Gabi Itter,

DSAR-ARW SANOFI, Germany

## A chronically implanted large-animal model as refinement and reduction in research:

### Percutaneous venous catheterization in the Gottingen Minipig

There is a need for repeated long-term serial blood sampling and continuous infusion for pharmacological studies. Swine are commonly used as large animals for various experimental studies. The similarity of swine to human beings in many aspects of anatomy, physiology and biochemistry is well documented.

In drug development and pathophysiology, there is an increasing demand for chronic large-animal models with permanent vascular access for serial pharmacological and pharmacokinetic studies. Minipigs are often used in research due to their size and easy training features. We recently started PRIT (positive reinforcement training) to make handling easier and less stressful for pigs and researchers. The Ellegaard Göttingen Minipig was chosen as an animal model for the cannulation of the v. jugularis for the use in studies involving repeated blood-sampling.

Göttingen Minipigs were anaesthetized and percutaneously catheterized with a guide-wire technique (CAVAFIX®) using palpable anatomical landmarks, triangulation and an intraoperative x-ray check. This minimally invasive catheterization allowed our researchers to obtain blood quickly and easily via central venous access.

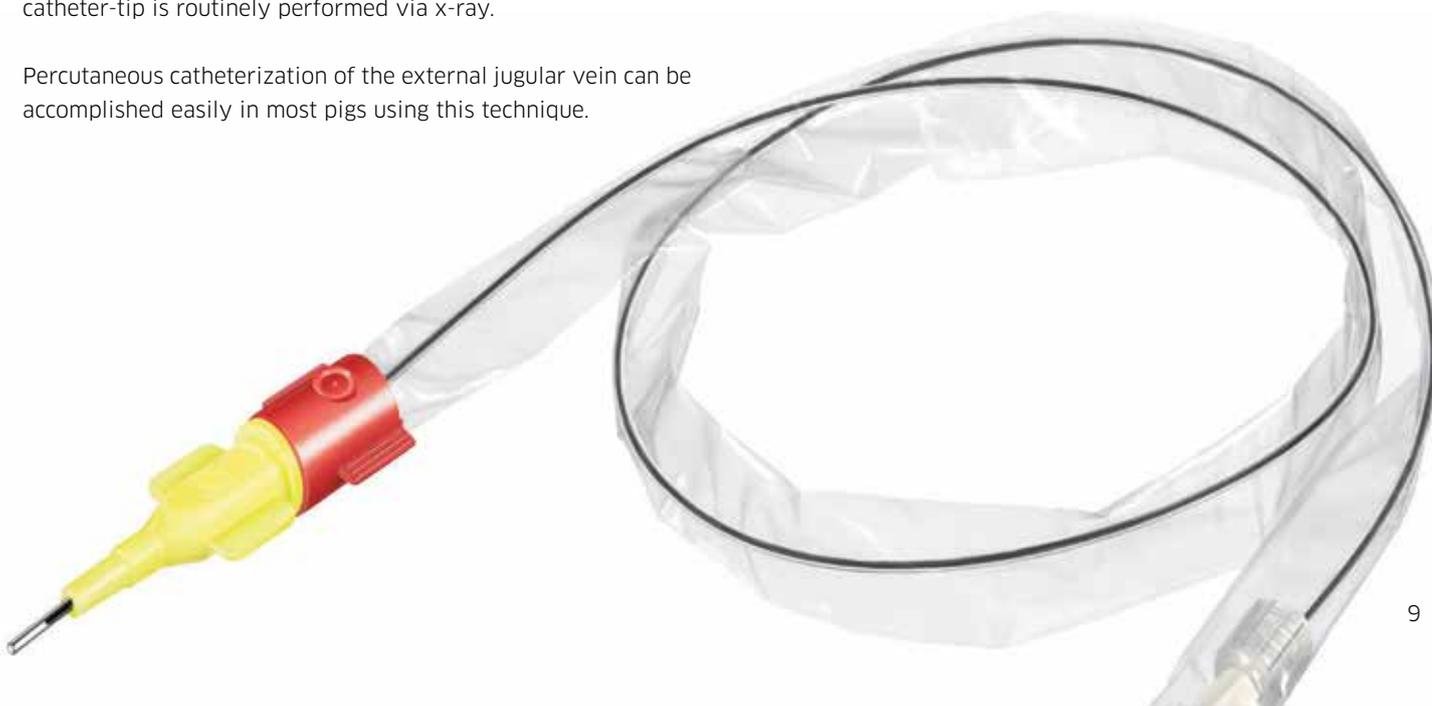
The technique has the advantage of minimizing damage to soft tissue and blood vessels. We adapted this procedure by using five anatomical landmarks to target and catheterize the external jugular vein in pigs. Intra-operative check of the position of the catheter-tip is routinely performed via x-ray.

Percutaneous catheterization of the external jugular vein can be accomplished easily in most pigs using this technique.

Catheters are usually left in place for a period of three weeks, or as long as they are patent. 70% of the implanted catheters were still patent after 21 days. They were rinsed with saline and locked with TauroLock HEP 500 on a daily base during idle time.

**Conclusions: the model of** percutaneously catheterized Minipigs using the (CAVAFIX®) technique contributes to the **3Rs of research:**

- **Refinement:** catheter implantation technique allows serial studies in the same animal (placebo and drug can be evaluated in one animal after a washout period);  
→ Inter-animal variation is reduced
- **Reduction:** due to re-use in repetitive experiments, fewer animals are needed;
- **Refinement:** due to chronic instrumentation;  
→ No need for anaesthesia during PK/PD study  
→ No influence of experiments through anaesthesia  
→ Conscious animals show physiological behaviour during studies
- **Refinement:** due to PRIT training of the animals according to the study outline, improvement of the surgical implantation technique and the use of appropriate materials with respect to animal welfare, repeated studies and catheter compatibilities (i.e. size, material, tips and locking, implanted length, port and catheter maintenance, time interval of catheter flushing, reproducibility, user friendliness).



# Minipig – Central Venous Catheter Implantation “Cavafix Certo with Splittocan”

## Equipment:

### Preparation:

- endotracheal tube
- laryngoscope with a long spatula
- eye ointment
- intravenous catheter.

### Catheter insertion:

- Cavafix Certo® with Splittocan® 338, 1.1 x 1.7 mm/16 G, length: 32 cm, Braunüle 1.8 x 2.35 mm/14 G, Production: Braun Melsungen)



- Bionector

- 1 x tissue forceps
- 1 x ligature scissor
- 1 x needle-holder
- 2 x 10 ml syringe with NaCl
- 1 x 10 ml syringe
- sutures
- sterile gauze
- sterile surgical drapes



### Bandage:

- iodine ointment
- Fixomull stretch
- Mollelast haft
- Optiplast tape
- Tesa tissue tape

### Anaesthesia:

#### Introduction:

- **Zoletil** (Tiletamine/Zolazepam) dissolved in 10 ml Xylazine 0.5–1 ml/10 kg i.m.
- **Propofol 1%**, 1–2 mg/kg i.v. (if required)

#### Inhalation anaesthesia:

- Isoflurane 0.3–1 vol. % (close monitoring of vital parameters)

### Devices:

- pulse oximeter
- anaesthesia equipment
- ECG
- heat mat

### Implantation:

- anaesthetize the animal with Zoletil in the animal room,
- transfer the Minipig to the surgical preparation room,
- insert intravenous catheter into ear vein,
- connect the pulse oximeter to tail, ear, tongue or udder teat,
- if required, Propofol for intubation,
- intubation after anaesthesia in the prone position,
- connect the anaesthesia equipment,
- protect the eyes from drying out,
- shave and disinfect the neck area,
- transfer the pig to the surgery room,
- place in the supine position,
- connect the pig to the monitoring devices,
- disinfect the surgical area,
- localize the surgical area generously with sterile drapes,
- select the site for puncture (triangulation technique, W. S. Flournoy, S. Mani) and insert the needle under aspiration (negative pressure in the syringe),



- puncture the vessel (blood should be easy to obtain),



- after puncturing the vein, withdraw and remove the needle.



- connect the yellow connector to the plastic cannula and insert the catheter,



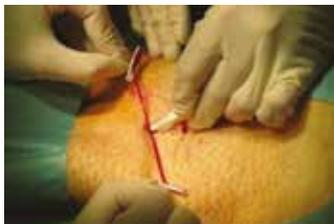
- after positioning the catheter, remove the red sheath from the yellow coupling piece and tear the protective sheath,



- remove the two-piece yellow connector,



- introduce the catheter completely and split the plastic cannula,



- aspirate blood for testing,



- check the position of the catheter tip using x-ray (Cavafix Certo with Splittocan has a Radi- Opaque stylet),



- affix the catheter with tape and ligatures.



### Dressing:

- connect the Bionector to the catheter,
- affix the catheter close to the puncture site with an adhesive plaster (Fixomull stretch),



- wrap first with Mollelast Haft,
- secondary dressing with Optiplast tape (self-adhesive for good fixation),
- affix the end of bandage with black Tesa tissue tape.



### References

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## Porcine-specific reagents

Are you looking for porcine-specific immunological and biological reagents; antibodies; kits?

Visit our website [www.minipigs.dk](http://www.minipigs.dk) to see where to find these.

## The 2013 Meeting of the Minipig Research Forum

The 2013 meeting of the Minipig Research Forum (MRF) will take place 18-19 November in Rome, Italy.

This year's main topics are:

- Safety assessment of large molecules/biopharmaceuticals
- CNS
- GI-Tract

Besides several presentations about the minipig in large molecule testing the programme includes presentations about diabetes, PK modeling and clicker training. There will also be a presentation with perspectives from a regulator, case studies and lunchtime workshops.

See the programme and find further information about the annual meeting of the MRF: [www.minipigresearchforum.org](http://www.minipigresearchforum.org)

## Announcement from Ellegaard Göttingen Minipigs

After serving 8 years as Scientific Officer for Ellegaard Göttingen Minipigs, Niels-Christian Ganderup has now been reassigned as Director of Business Development. In his new position, Niels-Christian will combine his knowledge of non-clinical drug development, and the minipig's role in this context, with a clear focus on developing the Ellegaard Göttingen Minipigs business. He will continue to assist customers who have specific scientific questions about the Göttingen Minipig.

## Meeting calendar

Name	Date	Location
SPS - Safety Pharmacology Society	16-19 September	Rotterdam, The Netherlands
AFSTAL	9-11 October	La Rochelle, France
ACT - American College of Toxicology	3-6 November	San Antonio, Texas, US
BSTP - British Society of Toxicologic Pathology	14-15 November	Cheshire, UK
Minipig Research Forum Meeting	18-19 November	Rome, Italy

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