

# 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.

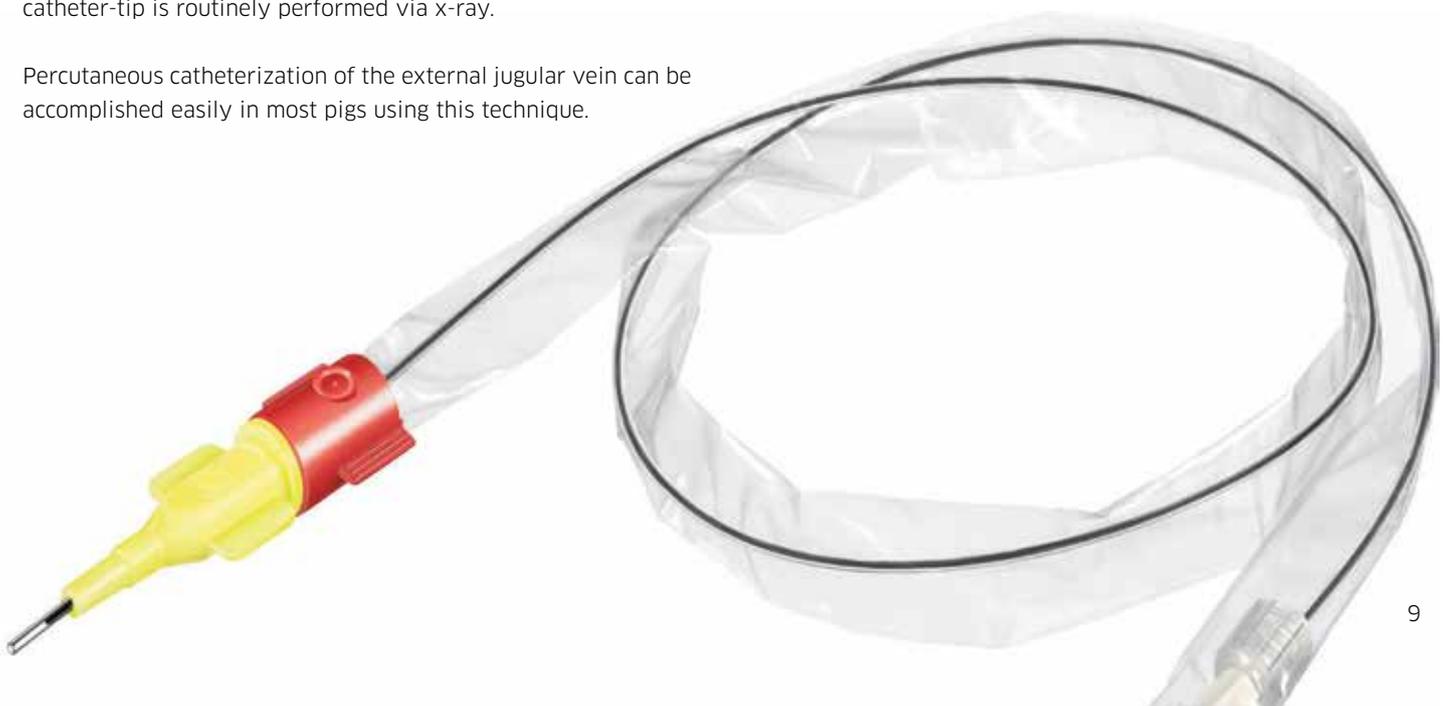
The technique has the advantage of minimizing damage to soft tissue and blood vessels. We adapted this procedure by using five anatomical landmarks to target and catheterize the external jugular vein in pigs. Intra-operative check of the position of the catheter-tip is routinely performed via x-ray.

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,



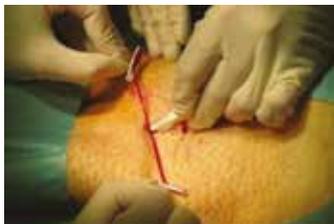
- after positioning the catheter, remove the red sheath from the yellow coupling piece and tear the protective sheath,



- 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

1. Percutaneous external jugular vein catheterization in piglets using a triangulation technique. W S Flournoy, S Mani in Laboratory Animals (2009).
2. A minimally invasive percutaneous technique for jugular vein catheterization in pigs. Mack Fudge, Randall E Coleman, Sheri B Parker in Contemporary topics in laboratory animal science American Association for Laboratory Animal Science (2002).