Technical and animal welfare perspectives of portable automated blood sampling with Fluispotter® in Göttingen Minipigs

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Introduction
Multiple blood sampling is a time consuming and costly procedure. Often, several sampling occasions in relation to dosing are requested, including sampling outside normal working hours and sampling frequency is often critical. Furthermore, minipigs like other animals are stressed by restraint which may impact certain blood parameters and animal welfare.

Objectives
The aim of this study was to test and evaluate the usability of the newly developed Fluispotter® in Göttingen Minipigs. With the wearable Fluispotter® system it is possible to collect up to 20 blood samples (10µl DBS) in 24 hours without restraining the pig and whilst it is moving freely in its pen.

Methods
Two male Göttingen Minipigs (app 13 kg) were included in the study. The anaesthetized pig was placed in dorsal recumbency and prepared for catheterization using sterile principles. The sampling catheter was introduced into the right jugular vein through a MILACATH 16Ga (7.5 cm) guide catheter using Seldinger technique. MILACATH was retracted from the vein, the sampling catheter was secured to the skin and the Fluispotter® was placed in the jacket pocket. Each pig was dosed rectally with 250 mg paracetamol as a test drug and brought to its pen for recovery. On Day 2 the device was detached and the pigs were examined for vascular trauma related to catheterization.

Results and conclusion
During the entire 24-hour study there were only two occasions of restraint (at induction of anaesthesia and at removal of Fluispotter®). Pathological findings (fibrin and thrombi) were found to be related entirely to catherization and catheter displacement inside the vein.

With practice, surgical preparation and catheterization can be carried out by two people in app. 20 minutes. Work-load and animal stress during studies with multiple blood sampling is significantly reduced with this new procedure, offering a new tool for Refinement (3R).

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Introduction

Multiple blood sampling is time consuming and costly. Several samples in relation to dosing are often requested, including sampling outside normal working hours. Minipigs are stressed by restraint which may impact certain blood parameters and animal welfare.

Objectives

The aim of this study was to test the feasibility of the newly developed wearable Fluispotter® in 2 male Göttingen Minipigs (app. 13 kg). With this automated blood sampler it is possible to collect up to 20 blood samples (10μl DBS) in 24 hours without restraining the pig and whilst it is moving freely in its pen.

Procedure DAY 0

Fluispotter® is easily charged and programmed with desired sampling schedule.
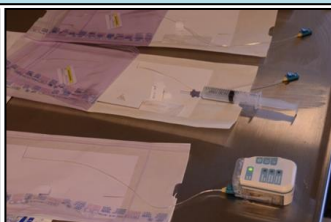
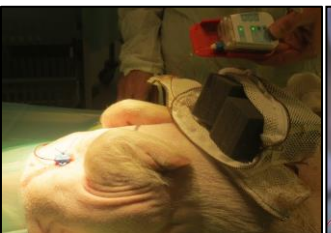The sampling catheter is prepared for insertion while the pig is prepared.

The pig is prepared for catheterization using sterile procedures.

MILA Cath 16Ga is implanted in the vena jugularis using Seldinger method (Arrow kit).

MILA Cath in situ as guide for the sampling catheter.

Guide catheter is retracted and sampling catheter secured to the skin.

First "zero" sample is collected before rectal dosing of test substance.

The pig is bandaged and brought to his individual pen to wake up.
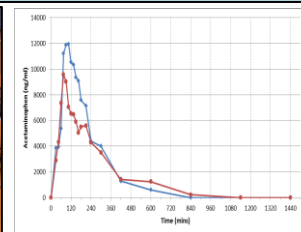
Procedure DAY 1+

The pig is calmly restrained for removal of Fluispotter®, catheter and jacket.

The paper spool is removed and sent off for analysis.

The motor unit is connected to a computer and sampling data analysed.

Based on bioanalysis of the Dried Blood Spots a PK-curve is generated.

Results and perspectives

Implantation requires only short-term anesthesia as a trained technician can perform it in 20 min. After that, the 20 samples are collected over 24 hours in the free moving animal. With this automated sampling system, workload as well as restraint and stress for the animals is significantly reduced, offering a new tool for Refinement (3R).

All procedures were carried out in compliance with current laboratory guidelines for good conduct and the project was conducted with approval of the Danish Animal Experiments Inspectorate according to Danish law. Animals were housed at approved facilities, and taken care of by qualified personnel.