The Use of Modified Rat Vascular Access Buttons™ to Refine Repeat Blood Sample Collection in Miniature Pigs

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Background

Pigs share many physiological, anatomical, and metabolic similarities to humans. They are therefore often used in toxicology studies as part of pre-clinical drug safety testing. Typically, these tests require multiple bleeding sessions as all studies use multiple dose levels or for multiple studies. Repeat blood sampling per animal. Additional blood vessel access may also be required for toxicology studies. To handle this process, trained personnel are often used.

Collecting Blood from Pigs Can Be Challenging. Pigs have several external anatomical features. • Pigs are intelligent and quick to develop procedures to handle when stressed. Most pigs are not easily available for blood collection and should be handled with care.

Although there are several options available for blood collection and IV dosing of blood, it might be difficult to handle even for personnel trained in pigs. In particular, blood vessels suitable for needle stick do not all work well. Several options have been described in this context.

Questions of Interest:

1. Can buttons be used successfully to collect blood for pharmacokinetic studies?
2. Can blood be collected more easily than using traditional venipuncture
3. Can blood be collected at lower distress levels than using traditional methods?

Frontage Laboratories, Inc. is a full-service contract research laboratory that specializes in pre-clinical drug testing. The nature of our work requires that we get multiple blood samples from miniature pigs efficiently and ideally with little stress to the animals and technicians as possible.

Modified Rat Vascular Access Buttons™ seemed to offer the perfect solution. Since the beginning of 2019, we have surgically implanted buttons in 12 male Göttingen miniature pigs with double channel buttons. Double channel buttons had one PinPort™ used for dosing (white) and one for bleeding (red). Below we present the results of our preliminary work.

How prevalent is infection in miniature pigs with buttons?

Five out of twelve pigs have developed button site infections (purple), but two of those animals only developed infections after over 130 days. There were no infections developing in other pigs within the first two months of surgery. Animals were able to be kept in our colony long enough for this to be a useful method of blood collection.

Questions of Interest:

1. How prevalent is infection when buttons are used in miniature pigs?
2. How prevalent is infection when buttons are used in miniature pigs?
3. How prevalent is infection when buttons are used in miniature pigs?

Can buttons be used successfully to collect pharmacokinetic studies in pigs?

Four of the animals with buttons have been used on multiple pharmacokinetic (PK) studies. Button port provided adequate blood sample collections needed (1-2 mL) quickly and samples yielded good pharmacokinetic data (left). Only one out of the four animals had their port stopped, being functional for blood collection (but still showing) the start of use. The buttons on the most (N=10) the animals remained functional for over 10 blood collection time points (right). Animal 106809 is still functional for blood collection at the time of writing.

Conclusions and Future Work

It is clear that Modified Rat Vascular Access Buttons™ provide a good alternative to other devices used to collect repeat blood samples in miniature pigs. Our results support the findings of Ellegaard’s work and provide evidence that this device is a practical solution for future blood collection in pigs. Future work will include a histological evaluation of the button insertion site of infected and non-infected pigs as well as a histological examination of the inner and outer surfaces of the button.

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References