

Advancing Ethical Standards in Minipig Studies

The Role of Vascular Access Buttons

Mélanie Reijnaers, Joelle van Dijk, Judith Latour, Gabry Warmels



INTRODUCTION

In current studies with Göttingen minipigs, stress remains a critical concern, particularly during the process of restraining, blood collection, and administering drug substances. The repetitive nature of venipunctures exacerbates this issue and can compromise both animal welfare and data integrity. In severe cases, the stress-induced complications may even necessitate euthanasia, emphasizing the need for a more ethical and reliable alternative.

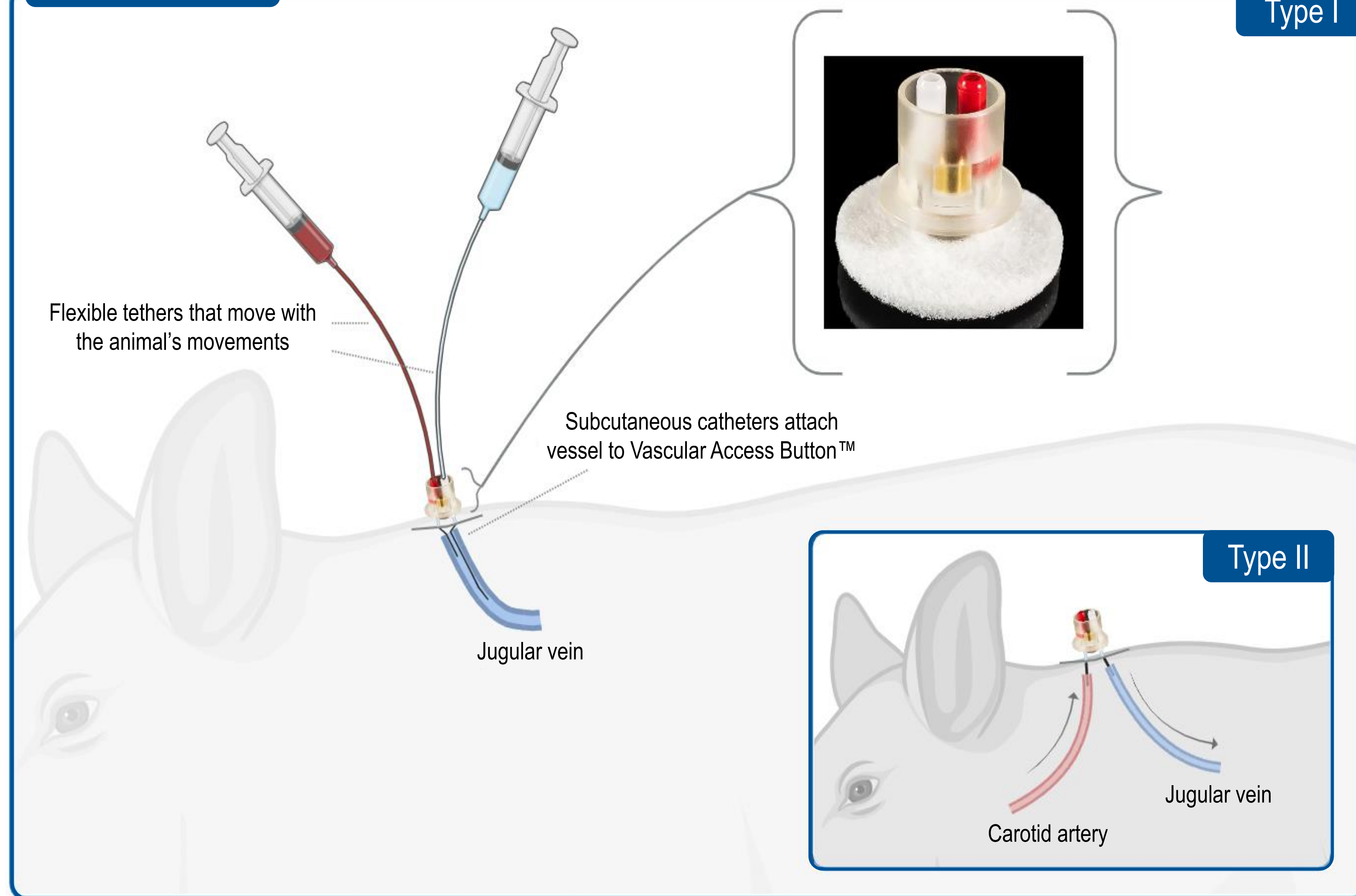
Recognizing this need, CRL Den Bosch in collaboration with Ellegaard Göttingen Minipigs A/S have turned to **vascular access buttons (VAB)** as a potential solution. Unlike with conventional vein punctures and vascular access ports (puncture of a septum-covered port), the VAB features a self-sealing silicone membrane that eliminates the need for needle access.

A study was conducted in two Göttingen minipigs with both a different type of VAB to **assess the feasibility, validity, and benefits** of the VAB in Göttingen minipigs compared to the traditional, often used, vena cava cranialis (VCC) puncture.

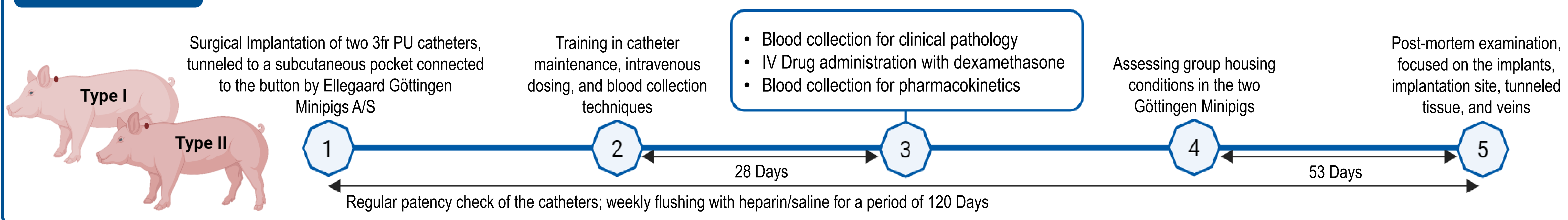
ADVANTAGES

- No needles required
- Hands-off sampling
- Reduced stress response
- Reduced procedural time
- Minimal technical support required

METHODS



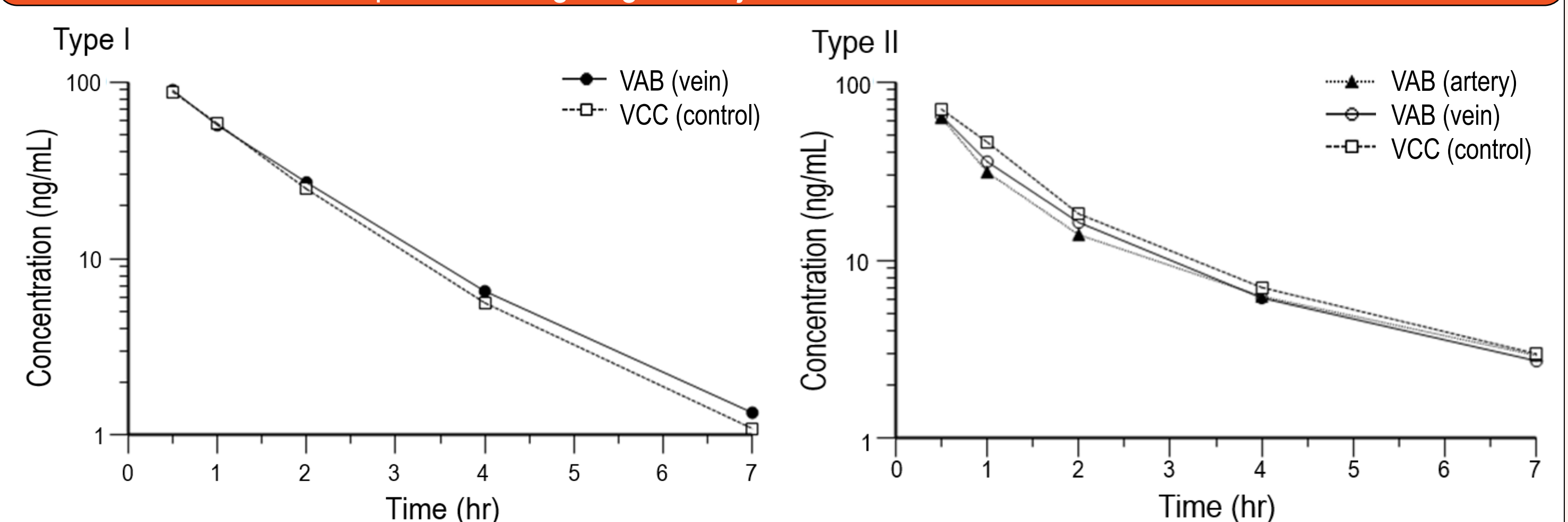
TIMELINE



RESULTS

- The VAB system remained patent throughout the entire 120-day study period.
- The animals were successfully housed together for a period of 53 days.
- There were no signs of disruption or infections nor any appearance of seromas.
- PK parameters remained consistent across different blood collection techniques.
- There was an overall congruity between collected samples for clinical pathology.

Concentration vs. Time curves for Dexamethasone in plasma sampled via the different sampling techniques following single IV injection of dexamethasone via the VAB



Clinical Chemistry Parameters

Parameter	ALT (U/L)	AST (U/L)	ALP (U/L)	TBIL (µmol/L)	GGT (U/L)	CK (U/L)	UREA (mmol/L)	CREAT (µmol/L)	CA (mmol/L)	PHOS (mmol/L)	TPROT (g/L)
Animal TYPE I											
VAB	68	37	165	1.8	67	330	2.7	84	2.77	2.11	66.9
VCC	69	59	171	2.2	69	339	2.6	73	2.79	2.18	68.1
Animal TYPE II											
VABa	46	20	129	1.4	34	383	1.3	60	2.64	1.96	57.4
VABv	46	22	132	2.1	35	397	1.3	61	2.65	1.96	58.0
VCC	46	26	127	1.5	36	505	1.3	65	2.63	1.82	54.1
Parameter	ALB (g/L)	GLOB (g/L)	A/G (ratio)	GLUC (mmol/L)	CHOL (mmol/L)	TRIG (mmol/L)	NA (mmol/L)	K (mmol/L)	CL (mmol/L)	PLIP (mmol/L)	LDH (U/L)
Animal TYPE I											
VAB	49.8	17.1	2.9	4.52	1.44	0.36	147	4.7	104	1.26	437
VCC	52.7	15.4	3.4	5.87	1.51	0.29	146	5.1	104	1.31	661
Animal TYPE II											
VABa	45.6	11.8	3.9	5.02	1.51	1.50	142	4.4	104	1.33	383
VABv	45.7	12.3	3.7	4.83	1.39	2.37	143	4.4	102	1.34	395
VCC	43.4	10.7	4.1	7.11	1.33	0.23	145	5.1	105	1.36	447

Hematology Parameters

Parameter	EOS (10 ⁹ /L)	HCT (L/L)	HGB (g/L)	LUC (10 ⁹ /L)	LYMPH (10 ⁹ /L)	MCHC (g/L)	MCH (pg)	MCV (fL)	MONO (10 ⁹ /L)	
Animal TYPE I										
VAB	0.18	0.446	149	0.10	6.92	335	16.8	50.2	0.29	
VCC	0.20	0.488	165	0.12	7.87	337	17.0	50.4	0.34	
Animal TYPE II										
VABa	0.12	0.431	146	0.17	5.92	340	17.9	52.5	0.19	
VABv	0.10	0.434	145	0.18	5.62	335	17.6	52.5	0.19	
VCC	0.13	0.456	153	0.22	6.73	335	17.7	52.7	0.28	
Parameter	NEUT (10 ⁹ /L)	PLT (10 ⁹ /L)	RBC (10 ¹² /L)	RDW (%)	RETIC (10 ⁹ /L)	WBC (10 ⁹ /L)	Coagulation Parameters			
Animal TYPE I							PT (sec)	APTT (sec)		
VAB	1.98	336	8.89	14.9	18.8	9.49	15.0	20.2		
VCC	2.20	353	9.69	15.1	37.9	10.76	14.1	16.8		
Animal TYPE II										
VABa	3.98	386	8.20	15.6	33.4	10.41	15.2	17.8		
VABv	3.80	393	8.27	16.0	39.5	9.91	15.3	17.9		
VCC	4.16	291	8.66	15.9	64.4	11.56	15.5	18.8		

CONCLUSION

The VAB is a **reliable alternative** for IV drug administration and blood collection in minipigs, particularly in studies requiring frequent blood sampling. Its ability to mitigate stress from the animals by avoiding needles and the need of restraining, reduce procedural time, and minimize the technical support required positions it as a **valuable technique** for future studies.

Overall, the exploration of the VAB technology signifies a promising path toward **advancing ethical standards** in animal research. By prioritizing the welfare of research subjects and refining experimental methodologies, VAB buttons have the potential to revolutionize the field of *in vivo* studies across various non-rodent species.

CONTACT

melanie.reijnaers@crl.com

linkedin.com/in/MelanieReijnaers



INFO



More information on Vascular Access Buttons