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Mouse VAB Catheter Maintenance

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Protocol status: Working

We use this protocol and it's working

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Abstract

This protocol describes how to perform catheter maintenance to preserve mouse catheter patency after Vascular Access Button (VAB) implant.

Guidelines

- Maintenance should be performed upon arrival of animal or 4-7 days post VAB implantation and then every 2-7 days thereafter.
- Maintenance can be performed on awake or anesthetized mice.

Materials

	Material	Manufacturer/Supplier	Catalog Number
	Animal with VAB implant	Instech	C20PU-MJV2013
	VAB cap	Instech	VABM1C-5
	Weight scale	Fisher Scientific	01-922-341
	Container for weighing mouse		
	Isoflurane		
	Large paper towel		
	Forceps	Fine Science Tools	11253-25
	Ethanol swabs	Uline	13-680-63
	Sterile saline (0.9%)	Fisher Scientific	NC9054335
	500 units/mL heparinized 50% glycerol	Instech	USP-HGS-500-10-VB-5
	1 20 µL Hamilton syringe	Sigma-Aldrich	24531
	23 Gauge needle attachments	BD	BD305143
	2 1 mL syringes per mouse	Fisher Scientific	309659
	3 pinport injectors per mouse	Instech	PNP3M

✕ Jugular Vein Catheters for Mice **Instech Laboratories, Inc. Catalog #C20PU-MJV2013**

✕ One Channel Vascular Access Button™ for Mice **Instech Laboratories, Inc. Catalog #VABM1C-5**

✕ Dumont Forceps - Micro-Blunted Tips **Fine Science Tools Catalog #11253-25**

✕ 0.9% SODIUM CHLOR. INJ.10ML **Thermo Fisher Scientific Catalog #NC9054335**

✕ 500 units/mL heparinized 50% glycerol **Instech Laboratories, Inc. Catalog #USP-HGS-500-10-VB-5**

✕ Hamilton® syringe, luer tip **Merck MilliporeSigma (Sigma-Aldrich) Catalog #24531**

✕ BD® Needle 3/4 in. single use, sterile, 23 G **Becton Dickinson (BD) Catalog #305143**

BD Slip Tip Sterile Syringes **Thermo Fisher Scientific Catalog #BD 309659/14-823-434**

PinPort™ Injectors **Instech Laboratories, Inc. Catalog #PNP3M**

Equipment

Compass CR Series	NAME
Scale	TYPE
OHAUS™	BRAND
01-922-341	SKU

Safety warnings

- ⚠ Wear required PPE for animal facility. Proper PPE includes lab coat, eye protection, and disposable gloves.
- If maintenance is being performed under isoflurane anesthesia, ensure proper ventilation and airflow in a fume hood or air extraction system to reduce exposure.
- When handling syringes with needles, always ensure needles are pointed away from you to avoid any accidental sticks.
- Report any accidental sticks to EHS.
- Used needles and syringes should be disposed of in biohazard sharps container.

Ethics statement

This protocol has been approved by the Allen Institute Animal Care and Use Committee (IACUC).

PHS Assurance: D16-00781

AAALAC: Unit 1854

Before start

- Implant or acquire mice with VAB Instech implanted catheters from animal vendor.



Prepare syringes

1m

- 1 Prefill a flush syringe(s) (slip tip syringes Fisher Scientific catalog # 309656) with  50 μL of sterile saline (1 per mouse).

- 1.1 Wipe septum of vial with 70% ethanol swab and let air dry for  00:00:30 prior to puncturing septum.

30s

- 1.2 Use a 1 mL syringe with 23 Gauge needle attachment to withdraw ~  100 μL saline solution to account for any dead volume when pinport injector is added.

Note

After withdrawal, point the syringe upward and away from you and gently flick the syringe to knock any bubbles up towards the needle.

- 1.3 Remove the 23-gauge needle and attach pinport injector.

Note

- Ensure the needle is pointed away from you and grip the base of the needle while pulling the syringe out.
- Dispose of needle in sharps waste container.

- 1.4 Push saline through pinport until a small drop is seen and no bubbles are noticeable in syringe or pinport connection.

- 2 Prefill Hamilton syringe with  14 μL of 500 units/mL of heparinized saline in 50% glycerol.

- 2.1 Wipe septum of vial with 70% ethanol swab and let air dry for  00:00:30 prior to puncturing septum.

30s

- 2.2 Use 1mL syringe with 23-gauge needle attachment to pull ~  100 μL of 500 units/mL of heparinized saline in 50% glycerol.



- 2.3 Remove plunger from Hamilton and insert needle of filled syringe into the back of the Hamilton syringe and fill until the liquid can be seen in a drop at the tip of the Hamilton syringe.
- 2.4 Remove needle from the back of the Hamilton syringe and reinsert plunger, ensuring no air is in the Hamilton syringe.
- 2.5 With the remainder of the 500 units/mL of heparinized saline in 50% glycerol in the 1mL syringe, fill the pinport injector such that no air is present.
- 2.6 Connect the Hamilton syringe to the pinport injector, then lower the plunger to  14 μL .
- 2.7 Use paper towel to dab away excess liquid from the pinport tip.
- 2.8 Between mice, fill a new pinport attachment with 500 units/mL of heparinized saline in 50% glycerol, then pull Hamilton syringe plunger up to  14 μL , then swap to the newly filled pinport attachment while ensuring no air in the syringe.

Prepare mouse for catheter maintenance

- 3 Place mouse cage in a fume hood with prepared syringes and remove the lid.
- 4 Place mouse in container on scale and record body weight.
- 5 Do a health assessment per IACUC protocol and continue if mouse meets criteria to proceed.

(Optional) Anesthetize mouse

3m

- 6 Place mouse in isoflurane chamber and induce mouse at 4% isoflurane in oxygen at a rate of 0.8L per minute for about  00:03:00 .

3m

**Note**

Ensure the mouse is immobile with a slowed breathing rate (~55-100 breaths per minute) before proceeding.

- 7 Remove anesthetized mouse and ensure mouse is in the appropriate anesthetic plane with toe pinch and by noting slowed respiration rate.

Note

If mouse shows signs of wakefulness such as movement, increased respiration, or response to toe pinch during the maintenance procedure, then return the mouse to the isoflurane chamber and wait for about 3 minutes or until it is unresponsive before trying again.

Perform catheter maintenance

- 8 Position mouse for optimal VAB (Vascular Access Button) access.

- 8.1 If anesthetized, place mouse on paper towel.

- 8.2 If awake, place mouse on grid of food hopper.

- 9 Remove the VAB cap with forceps and fingers.

Note

Forceps should grip the base of the VAB while fingers grip the cap before pulling the cap from the VAB.

- 10 Sanitize the top of the VAB with a 70% ethanol swab and allow to air dry for 5-10 seconds.

- 11 Insert empty withdrawal syringe with pinport attached and remove lock solution from VAB.

**Note**

Note: A small amount of blood should be seen to indicate locking solution has been removed. If no blood is withdrawn, this could indicate catheter patency issues. Patency can sometimes be recovered by filling a syringe with ~50 µL saline and then perform a rapid flush quickly followed by a gentle pull.

- 12 Remove and discard withdrawal syringe.
- 13 Attach prefilled flush syringe and flush catheter with 50 µL of saline.
- 14 Remove flushing syringe while maintaining positive pressure on the plunger.
- 14.1 Maintain positive pressure by applying a small amount of force onto the plunger while removing it. If there is some liquid left in the syringe, some will be pushed out the tip as the syringe is removed.
- 15 Attach prefilled Hamilton syringe with heparinized saline in 50% glycerol and push all  14 µL into catheter and remove Hamilton syringe while maintaining positive pressure.
- 15.1 Maintain positive pressure with the Hamilton syringe by holding the plunger down while removing the syringe.
- 16 Return cap to VAB by gripping the base of the VAB with forceps and applying the cap with fingers. The cap should be pushed past the black rubber ring in the middle of the VAB to ensure it stays in place.

Recovery and takedown

- 17 Return mouse to its cage.
- 18 If maintenance is performed under anesthesia:
 - 18.1 Lay mouse on its side to allow for respiration while still under anesthesia.



- 18.2 Monitor mouse until it wakes up from anesthesia and confirm no issues are seen with mouse post catheter maintenance.
- 18.3 Ensure isoflurane gas flow is turned off.
- 19 Record catheter patency status.
 - 19.1 *Patent*: The catheter is capable of infusing and withdrawing.
Partial patency: The catheter is capable of infusing solution but not capable of withdrawing blood.
Patency loss: The catheter is neither capable of infusion solution nor withdrawing blood.
- 20 Clean area and return cage to rack.