

利用 PA-C10 测定小鼠血压

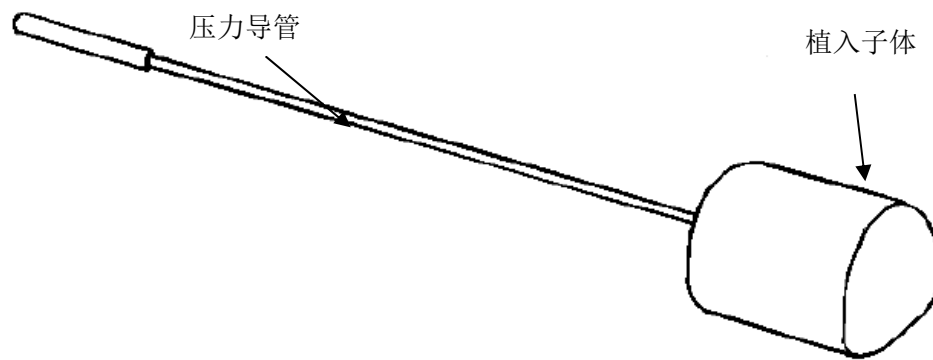
植入子简介

PA-C10 植入子可以测定小鼠或者其它相近体型动物的血压、活动度信号。其形状为圆柱状，有一根压力导管。

在使用 PA-C10 植入子之前请对其功能及其信号采集系统做清晰得了解。

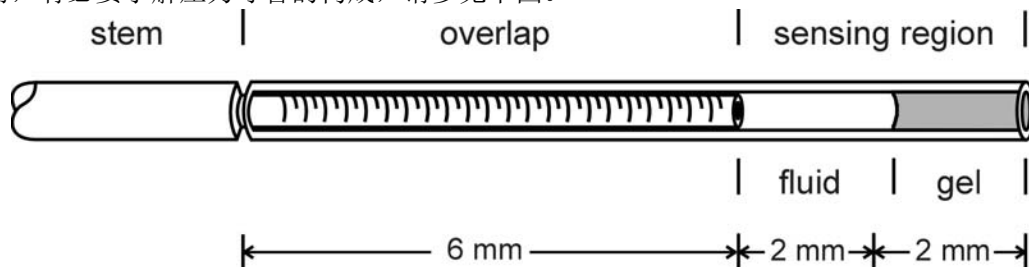
植入子由以下组成：

- 植入子主体部分
 - 缝合脊（可选，图中未显示）
- 压力导管



PA-C10

在手术前，有必要了解压力导管的构成，请参见下图。



压力导管

PA-C10 手术所需的物品

手术设备

- 双目手术显微镜
- 小剪刀
- 动物保温装置
- PA-C10 的 DSI 植入子

手术器械

- 请详见附录

其它物品

- 消毒用棉球或纱布（含洗必泰溶液）
- 润眼膏
- 消毒的手术洞巾
- 消毒的外科手套
- 消毒的纱布海绵- 5x5cm 大小
- 无菌的生理盐水
- 无菌的用于阻断血流的；非吸收性 5-0 或者 6-0 多股缝线
- 无菌的用于伤口缝合的缝线；吸收性的 5-0 或者 6-0 带针的缝线
- 25-gauge 针头*
- 18-gauge 针头
- 纤维贴（Fiber patch）
- 生物胶
- 导管引导器*
- AM 收音机*
- 磁铁*
- 皮下穿引器*

*在 Strater Kit 里包含

+ 详见附录

麻醉指南

实验动物的麻醉往往是一个具有挑战性的工作。通常情况下麻醉剂量需要针对不同的动物种类和种群进行测试。一般情况下，手术过程需要维持 40-60 分钟左右的外科麻醉期。请咨询贵单位的兽医获取合适的麻醉方法和培训。本手术指南中所使用的麻醉方法是基于异氟烷和氧气混合吸入麻醉而开发的。

下面的麻醉方案仅供参考，请贵部门使用时根据你们的方案和动物进行相应的调整。

异氟烷和氧气混合吸入性麻醉用于小鼠

- 诱导麻醉：2.5%异氟烷浓度配合约 1 L/min 的氧气流速*
- 维持麻醉：1.5%异氟烷浓度配合约 0.5 L/min 的氧气流速*

*具体请咨询贵部门的兽医或者参照你们的麻醉手册来确定一个对于你们所使用的动物和麻醉剂最合适的一个异氟烷浓度和氧气流速供给。

麻醉状态下的动物体温容易流失，而体温过低将会延长术后的恢复期甚至严重时引起动物死亡。为了提高手术的成功率，请在手术中对动物使用保温装置（例如，可以用水循环的加热板，温水袋/瓶）。

良好的麻醉和无菌手术对于良好的伤口愈合和对于实验动物的福利有着重要的意义。如果想进一步确定哪种麻醉方案更适合您的手术，请咨询您部分的兽医师或者参考我们 DSI 兽医部门编纂的针对多种常见实验动物麻醉的麻醉指导手册。

围手术期抗生素和镇痛药的使用

围手术期抗生素的使用与否取决于研究者的意见。无菌的植入子包装和无菌的手术操作实际上足以保证手术的成功。研究者需根据自己部门的规定进行方案确定。关于使用抗生素的相关问题，请咨询您部门的兽医师。

我们强烈推荐在术前术后对实验动物使用镇痛剂。“对研究用的动物适当得使用麻醉剂和镇痛剂是伦理的需要.....选择最适合的镇痛药或者麻醉剂需要专业性的判断，既能满足临床和人类要求又不会对研究方案造成负面影响。”⁶ 关于使用镇痛剂的相关问题，请咨询您部门的兽医师。

6 Guide for the Care and Use of Laboratory Animals, NRC, *National Academy Press*, 1996

PA-C10 植入子植入手术

这一部分将介绍该植入子用于采集系统血压的手术过程。系统血压是通过左侧颈动脉插管到主动脉弓或者直接插管到腹主动脉来完成的。

在手术之前，请记录压力导管的 **offset** 初始读数，并按照下面步骤对植入子导管进行浸泡。

在将植入子从无菌包装中取出来之前：

1. 用磁铁将植入子开关打开，将收音机调到 **AM** 波段并通过听到尖锐的声音来确认植入子已经打开。我们推荐在植入手术前，将植入子提前打开放置 **1-4** 小时使其内部电子元件工作稳定。
2. 记录下植入子的 **SN** 序列号，并确认植入子和将要被植入的动物的对应关系。
3. 用软件测量并记录下每一个植入子的压力 **offset** 值。

导管浸泡：

1. 将植入子包装上面的纸质盖子揭开，不要丢掉盖子，因为有重要的植入子定标参数。而且在进行植入更新的时候需要用这个包装放置植入子返回DSI总部。
2. 将透明的盖子打开，将植入子导管所在的通道里用注射器灌满无菌生理盐水。之后请不要晃动包装或者去触碰植入子，尽量避免无菌，并防止生理盐水在晃动后留到其它通道里面。
3. 将上面透明的小盖子盖上，将整个植入子包装放到旁边，直到你在要用的时候再将其移到你旁边的无菌区域。我们推荐在手术前最少要对植入子导管浸泡30分钟。

注意 1： 压力测试导管由亲水性的材料制成的，如果事先不经浸泡，那么导管将从血液中 吸收水份，体积上会有轻微地扩张，这会导致尖端的凝胶体稍微退入导管，并在顶端形成无效空间而易导致血栓的形成。

注意 2： 切莫将生物电导联线放到生理盐水中浸泡，这样会有液体顺着电极线流入植入子主体内的风险。

压力导管将被放置到小鼠的左颈动脉，测定的是主动脉弓处的血压。植入子主体最理想的放置位置是放到小鼠前后腿之间的腹侧。从颈部开口向腹侧钝性分离一个皮下口袋，如果动物体重小于 25.0 克，植入子主体放到动物的右腹侧，如果动物体重大于 25.0 克，植入子主体放到动物的左腹侧。

颈动脉插管（在整个手术过程中需要对术部组织进行补水保湿）

1. 手术动物采取仰卧式，头部朝向术者。手术过程中需对小鼠进行保暖。
2. 将小鼠的四肢用胶带粘到手术桌上。
3. 营造一个无菌的手术区域，对手术动物使用手术盖布。
4. 用一个小手术剪在颈中部皮肤上切开一个 1.5cm 的创口。

5. 用消毒棉签小心分离颌下腺。
6. 用拉线钩小心牵拉左侧的颌下腺，并将钩子柄部用胶带粘到手术台上（图 1 所示）。
7. 用消毒棉签找到位于沿气管左侧的主动脉，用钝头的弯镊子小心将血管从周围组织中分离出来，确保不要破坏迷走神经。
8. 在主动脉血管下面小心穿引三根 5-0 或 6-0 非吸收性缝线。最远心端的缝线用于永久性的阻断颈动脉而最近心端位置的缝线用于插管时临时阻断血流，中间的缝线用于将压力导管固定住。（见图 1）

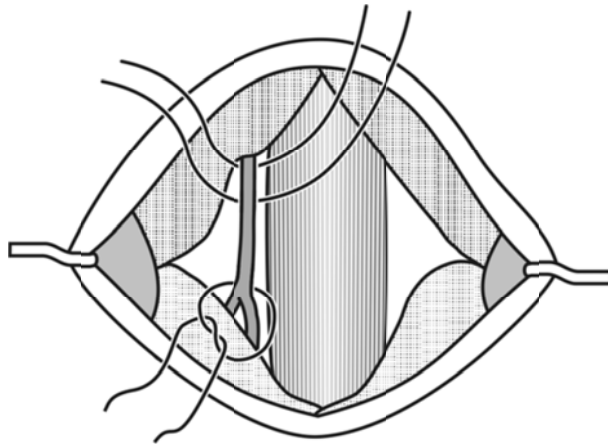


图 1: 左侧颈动脉已经分离出来，而且缝线已经放置。（图中的下方指向动物的头部）

9. 将永久阻断血流的缝线放到内外颈动脉的分叉处，在此处打结用于阻断血流并将缝线末端粘到手术台上。
10. 在另外的两根缝线上先打一个活结，把它们尽可能得放到近锁骨侧，血管分离的长度至少 6mm。
11. 在两根缝线打一个活结后，将中间的一根缝线的一端用胶带粘到手术台上。
12. 将植入子从无菌包装中取出，注意不要只通过导管来拎起植入子，这样可能会压力导管的压力传导造成损伤。小心去掉压力导管末端的保护套，打开 AM 收音机。在去掉保护套的时候，要注意采取一拉一松的方式，不要用力捏导管或者迅速拔掉保护套，这样都容易损失导管里的胶。如果压力导管里出现气泡或者胶没有注满需要注胶时，排气泡和注胶一定要在显微镜下进行。对于 PA-C10 型号植入子注胶的操作规范和视频演示，请从该链接下载，
http://www.kuaipan.cn/file/id_21305232516452239.htm，密码：MB4ADP。
13. 准备一个 25-gauge 的注射器针头作为压力导管插入的引导器。将针头的斜面完成大约 90°（见图 2），针头套上 1cc 注射器针管用于把持针头，以留出空间能看到手术视野。

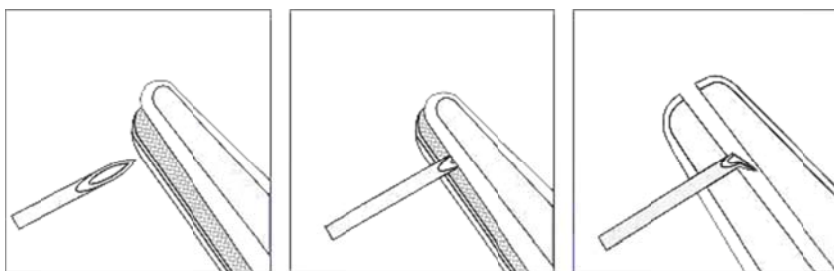


图 2 弯针技术

14. 轻轻拉靠近锁骨侧夹持血液阻断线的止血钳，并拉紧头部已结紧的缝线，将其用胶带粘到手术台上，这样就可以抬高血管阻断血流。注：不要用力过大，造成血管损伤甚至拉断血管。
15. 用带有凹槽的导管镊夹住导管薄壁段后端。
16. 用 25-gauge 针头作为引导器具，在结扎缝线的前端刺破血管并将导管逆流方向插入血管（见图 3），当导管进入血管后，立即去掉针头。

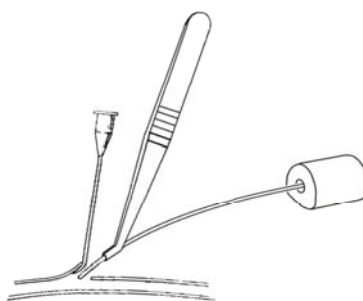


图 3 插管技术

17. 推进压力导管直到其抵到近锁骨侧的血流阻断缝线。
18. 将中间的缝线拉到插入了导管的血管上，拉紧一侧缝线使其打结。在打结前不要释放压力导管，否则导管会后退出血管。
19. 一旦导管被暂时保定，释放血流阻断线，继续推进压力导管近胸腔。
20. 压力导管末端伸入主动脉弓的长度应该略大于 2 mm(见图 4)，具体插入血管的长度要视情况而定，由于会受小鼠的种群、性别和体重影响，导管末端打到主动脉弓需要插入的长度会不同。因此，我们强烈建议，在做存活手术之前，我们建议解剖一只已经插管成功的小鼠，通过胸骨切开来确认导管插入的位置是不是合适，根据测量后得到数据，从而调整以后的手术插管深度。

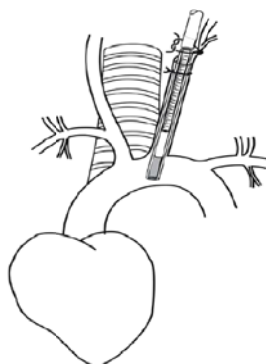


图 4 导管位置

21. 将用于阻断血流的缝线和中间的缝线都拉紧打外科结，使血管壁和导管紧紧得固定在一起。
22. 放开头侧的缝线，然后用两个线端绕过压力导管打结，将导管锚定到相应的位置。
23. 将所有的缝线末端尽量剪短。

皮下植入子主体的放置

1. 从颈部开口向小鼠体侧插入钝头的小剪刀到皮下进行钝性分离（一定注意在皮下打开剪子后不能闭合，待抽出剪刀后再闭合剪刀，以防剪到皮下的组织）见图 5。如果皮下口袋开得不够大，那么皮肤将被植入子撑得很近导致血液循环不畅而出现局部坏死。



图 5：钝性分离皮下口袋

2. 向经钝性分离得到的口袋里用 3 cc 的针管注入温生理盐水，此时保证针管可以在口袋里很容易得滑动。将 PA-C10 植入子主体塞入口袋（见图 6）。

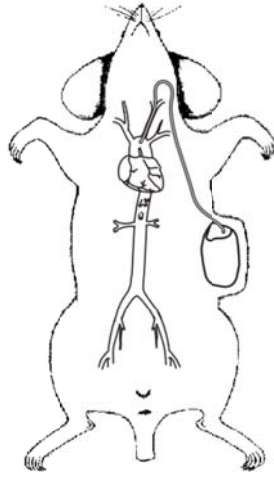


图 6: PA-C10 的皮下放置

3. 当塞入植入子之后，可以用一小滴组织胶将植入子固定在相应的位置，用 1cc 的针管吸取组织胶将针管插入皮下口袋，边回撤边注胶。
4. 将颈部的导管用一小滴组织胶进行固定，这样会方便缝合。在滴组织胶的时候，建议使用微量吸液管。

动物恢复：

1. 一直对动物进行保温，直至动物从麻醉状态苏醒。
2. 将术后动物**单独饲养**于温度适宜的环境中。
3. 在动物完全清醒前密切关注动物的恢复状态。
4. 在术后 3-7 天给动物补给止痛剂，并每天用碘酊对创部进行消毒。
5. 如有需要，在术后 7 天内给动物补给抗生素。

附录：手术所需的其它辅助用品（供参考）

如下手术的其它一些辅助用品是DSI经常用于各类手术的，仅供参考，您可以根据您的需要买到类似的产品。

所有的辅助用品在用于手术前必须是无菌的！

非一次性设备

名称	目的	产品编号	供应商	其它
Surgical Bench	Perform surgery on	Customizable	Production Automation Corporation www.gotopac.com	•A Production Basics bench •Design to fit your specific needs
Surgical Chair	To sit on for surgery	ERGO 2F 200 TILT FR	Production Automation Corporation www.gotopac.com	With Urethane Casters
Leica Surgical Microscope	Use it to perform microsurgery	M60	North Central Instruments www.mcimicro.com	Contact a sales representative for the most appropriate configuration for your needs
Surgical Microscope	Use it to perform microsurgery	PZMTIV-BS-CCTV PZMTIV	WPI www.wpiinc.com	Cheaper alternative to the Leica microscope. Comes with: - o PZMTIV-BS TRINOCULAR, PZMTIV BOOM STAND - o COLCAMNTSC SYSTEM COLCAMNTSC - o 500261 COUPLER 0.3X VIDEO COUPLER - o 501385 COLOR TELEVISION MONITOR - o 502016 LENS,OBJ.,0.32X PLANCHROMATIC - o 502010 EYEPIECE, WIDE FIELD 10X PZMIV - o NOVA FIBER OPTIC ILLUMINATOR 115V
Anesthesia Machine	For Inhalant (Isoflurane) Anesthesia	V703001	Surgivet www.surgivet.com	•6 station machine •Various sized machines for your needs
Hot Bead Sterilizer	Intra-operative sterilization of surgical instruments	14404	WPI www.wpiinc.com	

Water Circulating Heating Pad 15" x 22" (Gaymar Multi T Pad-Single Use)	Keep animals warm during surgery	TP-D22C	Braintree Scientific, Inc. www.braintreesci.com	Need a pump and cover for the pad so it does not get cut or punctured
Heating Pad Pump (T/Pump)	Circulate water through the pad	TP-700	Braintree Scientific, Inc. www.braintreesci.com	
Heating Pad Cover	Prevents pad from being cut or punctured	65000	Veterinary Specialty Products www.vetspecialtyproducts.com	Fits Gaymar heating pads 15" x 22"
Heating Source	Keep animals warm during recovery	NA	NA	Many options available- Heated cage, hair hugger, heating pad, etc.
Instrument Tray	Use for cold sterilization of surgical instruments	JOR392A	Med-Vet International www.shopmedvet.com	Requires cold sterilant solution
Ultrasonic Cleaner	For cleaning of surgical instruments	EW-08895-04	Cole Parmer www.coleparmer.com	•Basket not included •Requires cleaning solution.
Surgical Clippers (rats and larger species)	Hair removal	032487	Butler Schein Animal Health www.butlerschein.com	•Oster PowerPro, cordless, rechargeable brand •Best to use with a #40 blade.
#40 Clipper Blade	Place on clippers for hair removal	025107	Butler Schein Animal Health www.butlerschein.com	Use on rats and larger sized species
Surgical Clippers (mice and similar sized species)	Hair removal	032555	Butler Schein Animal Health www.butlerschein.com	Wahl Pocket Pro Battery Operated Trimmer, cordless
Magnet	Turn transmitter on and off	370-0034-001	DSI	
Metal Ruler	Measure during mouse carotid surgery	2285A55	McMaster-Carr www.mcmaster.com	Sterilize before use in surgery

手术器械

名称	产品编号	推荐持有数量	供应商	使用目的	使用范围及其它
Graefe Forceps with Teeth*	11054-10	1	Fine Science Tools www.finescience.com	Rats, mice and similar sized species	Any surgery
Lexar-Baby Scissors-straight, 10 cm*	14078-10	1	Fine Science Tools www.finescience.com	Rats, mice and similar sized species	Any surgery
Olsen-Hegar Needle Holder-extra delicate*	12002-12	1	Fine Science Tools www.finescience.com	Rats, mice and similar sized species	Any surgery
Vessel Dilator-45 degree angled tip, 13.5 cm long*	00276-13	2	Fine Science Tools www.finescience.com	Rats, mice and similar sized species	Any surgery
Vessel Cannulation Forceps, 11 cm long*	00608-11	1	Fine Science Tools www.finescience.com	Rats, mice and similar sized species	Blood Pressure Surgery
Wound Clip Applier (Stapler)	01-804	1	Fisher Scientific www.fishersci.com	Rats, mice and similar sized species	Any surgery
Wound Clip Remover	01-804-15	1	Fisher Scientific www.fishersci.com	Rats, mice and similar sized species	Any surgery except we do not recommend they be placed on the ventral neck or top of the head
Elastic Stay Hooks	Mouse sized: 722593	2	Harvard Apparatus www.harvardapparatus.com	Rats, mice and similar sized species	Any surgery
	Rat Sized: 722595				
Scalpel Blade Handle	#3 (fits #10, 11, 15 blades): 10003-12	1	Fine Science Tools www.finescience.com	Rats, mice and similar sized species	Incisions and lead exposure
	#4 (fits #22 blade): 10004-13				

Trocars	370-0007-001	1	DSI www.datasci.com	Rats, mice and similar sized species	Tunneling from one incision to another
Mayo Scissors-straight, 15 cm	14010-15	1	Fine Science Tools www.finescience.com	Rats and similar sized species	Any surgery
Olsen-Hegar Needle Holder	12002-14	2	Fine Science Tools www.finescience.com	Rats and similar sized species	Any surgery
Tissue Forceps-with teeth	11021-12	1	Fine Science Tools www.finescience.com	Rats and similar sized species	Any surgery

*DSI offers a Mouse Surgical Kit (Part Number 276-0034-001) that contains the first five instruments listed above. The instruments are contained in a Moria instrument case.

一次性用品

名称	产品编号	供应商	其它
Gauze Sponge (4 x 4 cm)	2297	Physician Sales and Service www.pssd.com	Sterile
Gauze Sponge (4 x 4 cm)	009716	Butler Schein Animal Health www.butlerschein.com	Non-Sterile
Gauze Sponge (2 x 2 cm)	2296	Physician Sales and Service www.pssd.com	Sterile
Gauze Sponge (2 x 2 cm)	001435	Butler Schein Animal Health www.butlerschein.com	Non-Sterile
Cotton Tipped Applicators (2/pack)	034598	Butler Schein Animal Health www.butlerschein.com	Sterile
Cotton Tipped Applicators (100/pack)	003263	Butler Schein Animal Health www.butlerschein.com	Non-Sterile
Surgical Drape	010408	Butler Schein Animal Health www.butlerschein.com	Non-Sterile
Specimen Cup	002078	Butler Schein Animal Health www.butlerschein.com	•Sterile •Use to hold sterile saline during procedure or clean/sterilize transmitters
Silk Suture	4-0: 160-1215-4/0	George Tiemann www.georgetiemann.com	•Non-Sterile •Use for vessel occlusion or ligation
	5-0: 160-1215-5/0		
	6-0: 160-1215-6/0		

4-0 TiCron Suture	109472	Physician Sales and Service www.pssd.com	•Sterile •Braided Polyester •Non-absorbable •CV-305 taper needle, ½ circle •Use for incisional closure in rats and similar sized species
5-0 Polyviolene Suture	LOO797B	Medical Resources www.medicalresources.com	•Sterile •Braided Polyester •Non-absorbable •Y5 taper cutting needle, ½ circle •Use for incisional closure in mice and similar sized species
4-0 Vicryl Suture	022667	Butler Schein Animal Health www.butlerschein.com	•Sterile •Braided Polyester •Absorbable •RB-1 taper needle, ½ circle •Use for incisional closure in rats and similar sized species
5-0 Monocryl Suture	022663	Butler Schein Animal Health www.butlerschein.com	•Sterile •Braided Polyester •Absorbable •RB-1 taper needle, ½ circle •Use for incisional closure in mice and similar sized species
Wound Clips	01-804-5	Fisher Scientific www.fishersci.com	•Use for skin closure •Need wound clip applicator •Not recommended for use on the ventral neck or top of the head
Artificial Tears Ophthalmic Ointment	007312	Butler Schein Animal Health www.butlerschein.com	Use during surgery to keep eyes lubricated as animals don't close their eyes

Isoflurane Inhalant Anesthesia	029404	Butler Schein Animal Health www.butlerschein.com	Use with inhalant anesthetic machine
Scalpel Blade	#10: 019711	Butler Schein Animal Health www.butlerschein.com	•Use appropriate size for species being used •Will need appropriate sized handle
	#11: 019712		
	#15: 019739		
	#22: 019741		
Syringe	Insulin: 019336 1cc: 040847 3cc: 040848 10cc: 017270	Butler Schein Animal Health www.butlerschein.com	
Needle	14-gauge: 002075 18-gauge: 000238 20-gauge: 000234 22-gauge: 034860 25-gauge: 000224	Butler Schein Animal Health www.butlerschein.com	
Fiber Patch	370-0036-001	DSI www.datasci.com	•Encourages connective tissue growth •Helps hold pressure catheter in place in aorta
Vetbond	370-0005-001	DSI www.datasci.com	•Secures pressure catheter in place in aorta •Aids in incisional closure
Gel Loading Micropipette Tip	02-707-83	Fisher Scientific www.fishersci.com	Use to dispense Vetbond
Re-gel Syringe	276-0038-001	DSI www.datasci.com	Re-gels catheter
Tape	½": 2451 1": 2450	Physician Sales and Service www.pssd.com	
Lidocaine	002468	Butler Schein Animal Health www.butlerschein.com	•Dilates vessels •Do not use on carotid artery

Other disposable supplies can include but are not limited to: sterile surgical gloves, masks, caps, shoe covers, and gowns. Refer to your facility's policies for what is required for surgery. All survival surgeries should be performed aseptically.

清洁用品

名称	使用目的	产品编号	供应商	其它
Chlorhexidine Scrub (Nolvasan Scrub)	Skin disinfectant	007913	Butler Schein Animal Health www.butlerschein.com	•Proven to be more effective than Betadine •Not for use with transmitters

Chlorhexidine Solution (Nolvasan Solution)	Skin disinfectant	004130	Butler Schein Animal Health www.butlerschein.com	•Spray a small amount on skin after cleaning and before starting surgery •Not for use with transmitters
Sterile Saline (1L Bottle)	Irrigation, transmitter rinse, surgical site cleaner	040198	Butler Schein Animal Health www.butlerschein.com	Will not de-activate Chlorhexidine
Sterile Water (1L Bottle)	Surgical instrument rinse	040204	Butler Schein Animal Health www.butlerschein.com	Do not use as an irrigation solution
Isopropyl Alcohol	Skin disinfectant	011842	Butler Schein Animal Health www.butlerschein.com	•May de-activate Chlorhexidine •DO NOT use on transmitters
Zymit Cleaning Solution	Use in ultrasonic cleaner	EW-18101-30	Cole Parmer www.coleparmer.com	
Instrument Cleaning Brush	Cleans instruments	Nylon Bristles: 009909	Butler Schein Animal Health www.butlerschein.com	Should be used to maintain the integrity of the instrument
		Stainless Steel Bristles: 008771		
Instrument Lube Spray	Prevents instruments from rusting and keeps them lubricated after cleaning	004911	Butler Schein Animal Health www.butlerschein.com	Should be used to maintain the integrity of the instrument
Kool Lube Clipper Spray	Cleans and cools clipper blades	003458	Butler Schein Animal Health www.butlerschein.com	Use frequently to maintain the integrity of the blade
Benz-all Concentrate	Cold sterilization solution for surgical instruments	009911	Butler Schein Animal Health www.butlerschein.com	Use cold sterilants only if approved for use by your facility
Accel TB Cleaner	Surface Disinfectant	Wipes: 044173	Butler Schein Animal Health www.butlerschein.com	•Use on chairs, microscope, table, etc. •Safe to use on plexiglass
		Liquid: 035069		

Enzymatic Detergent	Cleans transmitters (DOES NOT sterilize them)	Tergazyme: 50-821-785	Fisher Scientific www.fishersci.com	To remove blood, serum proteins, and tissue debris from the surface of the transmitter
		Haemol-Sol NS: 23721050		
Cold Sterilant	Sterilizes transmitters (Use after enzymatic detergent)	Actril: 78337-000	Medivators www.medivators.com (Type Actril in the Search box)	Chemical sterilants will destroy all viable forms of microbial life.
		Cidex Activated Dialdehyde Solution:	Johnson and Johnson http://www.aspij.com/us/products/cidex-activated/features-and-benefits#page_content	

其它可能需要的物品

名称	产品编号	单次手术推荐持有量	供应商	使用目的	使用范围及其它
Absorption Triangle, un-mounted	18105-03	5-15	Fine Science Tools www.finescience.com	Absorb fluid/blood from thoracic cavity	•For LVP, RVP, PAP Surgery •Non-sterile
25-gauge IV Catheter	029525	1	Butler Schein Animal Health www.butlerschein.com	Removal of air through intercostals space	For LVP, RVP, PAP Surgery
3-way Stopcock	023305	1	Butler Schein Animal Health www.butlerschein.com	Connection between 25-gauge IV catheter and syringe for air evacuation from thoracic cavity	•For LVP, RVP, PAP Surgery •Sterile
6-0 Silk Suture with Taper Point Needle	036663	2	Butler Schein Animal Health www.butlerschein.com	Used on the heart or diaphragm	For LVP, RVP, PAP, and Bladder Pressure Surgery
Castroviejo Needle Holder	500223	1	World Precision Instruments www.wpiinc.com	To hold 6-0 silk suture needle	For LVP, RVP, PAP, and Bladder Pressure Surgery

Head lamp	RS-6695	1	Roboz Surgical Instrument Company www.roboz.com	Necessary to illuminate surgical field for intra-thoracic procedures	For LVP, RVP, PAP Surgery
Magnifier Spectacles	28040-30	1	Fine Science Tools www.finescience.com	Necessary to visualize surgical field for intra-thoracic procedures	For LVP, RVP, PAP Surgery
Magnetic Arch Assembly	276-0079-001	1	DSI	Aid in the retraction of the abdominal wall during any procedure where access to the diaphragm is required	For LVP, RVP, Diaphragmatic EMG Surgery
Small Animal Retraction System	18200-20	1	Fine Science Tools www.finescience.com	Combine with the Magnetic Arch Assembly to aid in the retraction of the abdominal wall during any procedure where access to the diaphragm is required	• For LVP, RVP, Diaphragmatic EMG Surgery • Includes: • 1 Small Base Plate (No. 18200-03) • 2 Short Fixators (No. 18200-01) - Will need 2 more • 1 Tall Fixator (No. 18200-02) - Will need 1 more • 1 Elastomer, 2m roll (No. 18200-07) • 1 package of Blunt Retractors, 1mm wide (No. 18200-09) • 1 package of Blunt Retractors, 2.5mm wide (No. 18200-10)
Fixators	Short: 18200-01	2	Fine Science Tools	Necessary to hold retractors	These are in addition to what

	Tall: 18200-02	1	www.finescience.com		is supplied in the kit
Ventilator (Rodent Sized)	TOPO	1	Kent Scientific www.kentscientific.com	Necessary to maintain respiration for intra-thoracic surgery	For LVP, RVP, PAP Surgery
Endotracheal Tubes	RSP-ETT1605	1	Kent Scientific www.kentscientific.com	Supplies anesthesia/oxygen to animal via the trachea	For LVP, RVP, PAP Surgery
Alm Retractor	14240-G	1	World Precision Instruments www.wpiinc.com	Holds open thoracic cavity	For PAP Surgery
20-gauge IV Catheter	023010	1	Butler Schein Animal Health www.butlerschein.com	Puncture and tunnel under serosal layer of esophagus	For Pleural Pressure Surgery
Dental Acrylic	037413	1	Butler Schein Animal Health www.butlerschein.com	Secure EEG leads	•For EEG Surgery •This is a kit and includes the applicator gun, acrylic, and mixing tips. Supplies can be re-ordered separately when needed.
Stereotaxic Apparatus	51500: With Manipulator Arms 51501: No Manipulator Arms	1	Stoelting www.stoeltingco.com	Supports and steadies the head	•For EEG Surgery •Other forms of stereotaxic equipment are available. Inquire with the vendor to decide which one best meets your needs.
Micro Drill	RS6300	1	Roboz Surgical Instrument Company www.roboz.com	Holds steel burrs	•For EEG Surgery •Powered
Steel Burrs	RS-6280C	1	Roboz Surgical Instrument Company www.roboz.com	Makes a hole in the bone	•For EEG Surgery
Screws	Mice: 00-96 x 1/16	2 (at least)	Plastics One Inc. www.plastics1.com	Anchors EEG leads in place	•For EEG Surgery
	Rats: 00-80 x 1/16	2 (at least)			
Screwdriver	Mice: SD-96	1	Plastics One Inc.	Tightens	•For EEG

	Rats: SD-80		www.plastics1.com	screws	Surgery
Drill Bit	Mice: D#60	1	Plastics One Inc. www.plastics1.com	Makes a hole in the bone	•For EEG Surgery
	Rats: D#56				
Drill Bit Holder	DH-1	1	Plastics One Inc. www.plastics1.com	Holds the drill bit	•For EEG Surgery