rev. 3.01e

Technical Note
Micro SMP-200

Recommendations for Intraperitoneal Administration

INTRODUCTION

iPRECIO® is a completely implantable, programmable micro-infusion pump system for experimentation in small laboratory animals. The pump has a built-in microprocessor which can be programmed to administer small volumes, in vivo, for extended durations. Additionally, the pump houses a septum designed for percutaneous access, through which filling and exchange of solutions is made possible. The iPRECIO® system's highly precise, in-vivo capabilities uses a patented, high accuracy, mechanical pump technology, the "Rotary Finger Method", which was developed by Primetech.

Intraperitoneal (IP) administration is one of the 4 preferred principal routes for most animal studies. Solutions (drugs) are absorbed mainly by mesenteric vessels and end up mainly into the portal circulation and subject to first-pass metabolism. Absorption is faster than oral administration routes and the actual rate of absorption from the abdominal cavity would depend on the physicochemical characteristics of the drug and solvent/vehicle. IP administration techniques are relatively simple with iPRECIO® pumps and catheters.

Compatibility of a drug in terms of pH/irritancy, osmolarity, viscosity and biocompatibility to IP administration should be considered when choosing this route.

WARNING：iPRECIO® Micro – Infusion Pump is not intended for human use.

REQUIREMENTS

Perioperative Care

- Antibiotics and the treatments
- Anesthetic agents and the techniques
- Heating Pad
- Surgical gloves, mask, cap and gown
- 70% Isopropyl Alcohol
- Disinfectant Soap
- Sterile saline
- Electric shaver or Hair remover

Pocket and Tunnel Making

- Surgical scissors and forceps
- Sterile scalpel blade with handle
- Trocar sleeve kit

Pump Fixation

- 5-0 non-absorbable suture with curved needle

Intraperitoneal Tube Fixation

- 23-gauge needle
- Side-hole catheter: Side-hole/Dacron® Mesh Silicone Catheter 3 French (supplied by Access Technologies)

- Stainless coupler: Stainless steel tubing coupler 22-gauge × 15mm (supplied by Instech Solomon)

Wound Closing

- Wound clips and wound clip applier
- 3M™ Vetbond™ Tissue Adhesive (supplied by 3M)

METHODS

1. Perioperative Care

Careful attention to sterile techniques and the use of sterile equipment are crucial to successful surgery. Additionally, antibiotics are most effective to administer pre- and post-surgery in order to maximize blood levels during surgery and recovery. Primetech recommends the use of a heating pad to prevent decreased body temperature in the peri- and post-operative animal.

2. Anesthetize the Animal

Anesthesia must be used to ensure a reliable experimental result. General anesthesia should be maintained for around 20 – 30 minutes. Primetech recommends using an anesthetic method that supports prompt post-operative recovery.

3. Side-hole Catheter Attachment···See Fig. 1

1. Cut the outlet tube to around 5cm under sterile conditions.
2. Connect the coupler into the tip of the tube.
3. Cut the side-hole catheter around 10cm and connect to the outlet tube with a coupler.
4. Fill the solution to the tip of the tube. (if possible or up to the lowest positioned side hole)
5. Activate the pump.

This special accessory increases the perfusion area, and decreases the risk of tube clogging. At the catheter tip, there are 8 side holes evenly spread over a 3cm length. A Dacron® Mesh attachment is used to support catheter fixation with surrounding tissue.

4. Pocket Making ···See Fig. 2

1. Position the animal in sternal recumbency on the heating pad.
2. Remove the hair from the incision site and scrub with disinfectant soap and isopropyl alcohol. A series of three scrubs with both the disinfectant soap and alcohol is recommended.
3. Using a scalpel blade, make a 4cm midline incision through the skin on the thoracic vertebrae.
4. Using blunt dissection, create a pouch under the skin from the point of the incision to the caudal area by separating the skin from the underlying tissue with scissors.

The pocket should be the appropriate size (not too large and not too small) for pump fixation, low-stress implantation for a successful long-term infusion.

5. Tunnel Making ···See Fig.2

1. Position the animal in dorsal recumbency on the heating pad.
2. Remove the hair from the incision site and scrub with disinfectant soap and isopropyl alcohol. A series of three scrubs with both the disinfectant soap and alcohol is recommended.
3. Using a scalpel blade, make a 2cm midline incision through the skin on the abdomen.
4. Gently separate the skin from the muscle by blunt dissection with a scissors. Position the animal in lateral recumbency on the heating pad.
5. Using the metal trocar sleeve kit, tunnel subcutaneously from the dorsal pocket to the abdominal skin incision.

6. Access to Abdominal Cavity···See Fig.3A

1. Tunnel the outlet tube subcutaneously from the dorsal pocket to the abdominal skin incision.
2. Make a 1cm midline incision on the abdominal wall for intraperitoneal tube fixation.
3. Make a purse-string suture on the lateral abdominal wall.
4. Insert a 23-gauge needle into the center of the purse-string suture. Remove the needle and insert the tube into the hole. ···See Fig.3B
5. Place forceps into the abdominal cavity from the incision site and withdraw the inserted tube around 5cm.
6. Gently secure the tube with the purse-string suture.
7. Gently suture the inserted tube to the abdominal wall midway between the purse-string suture and the abdominal wall incision.
8. Ensure the tip of the tube is buried in the mesenterium and close the abdominal wall incision using 5-0 non-absorbable suture.
9. Close the abdominal skin incision using wound clips or 5-0 non-absorbable suture.

7. Pump Fixation ···See Fig.4

1. Place the pump into the pocket.
2. Suture the pump to the muscle layer.

Over tightening of the sutures may induce tissue necrosis and laceration due to compression.

8. Wound Closing

1. Close all skin incisions using wound clips or 5-0 non-absorbable suture.
2. Use one drop of Vetbond™ in between wound clips, and press edges of skin together to seal wound.

Proper pocket closing will help in wound healing and help to prevent infection.

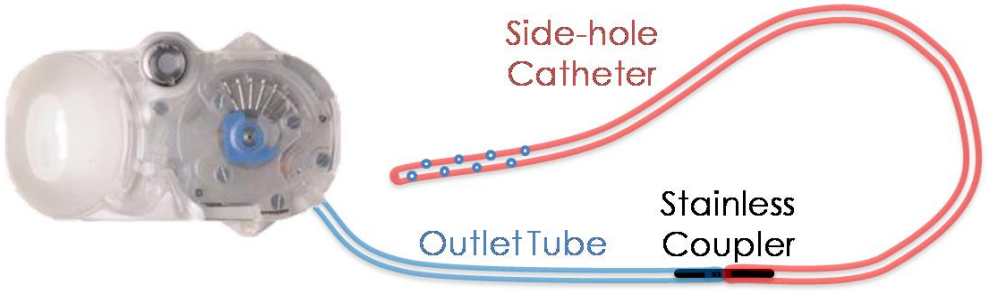

Fig. 1 Connect the side-hole catheter

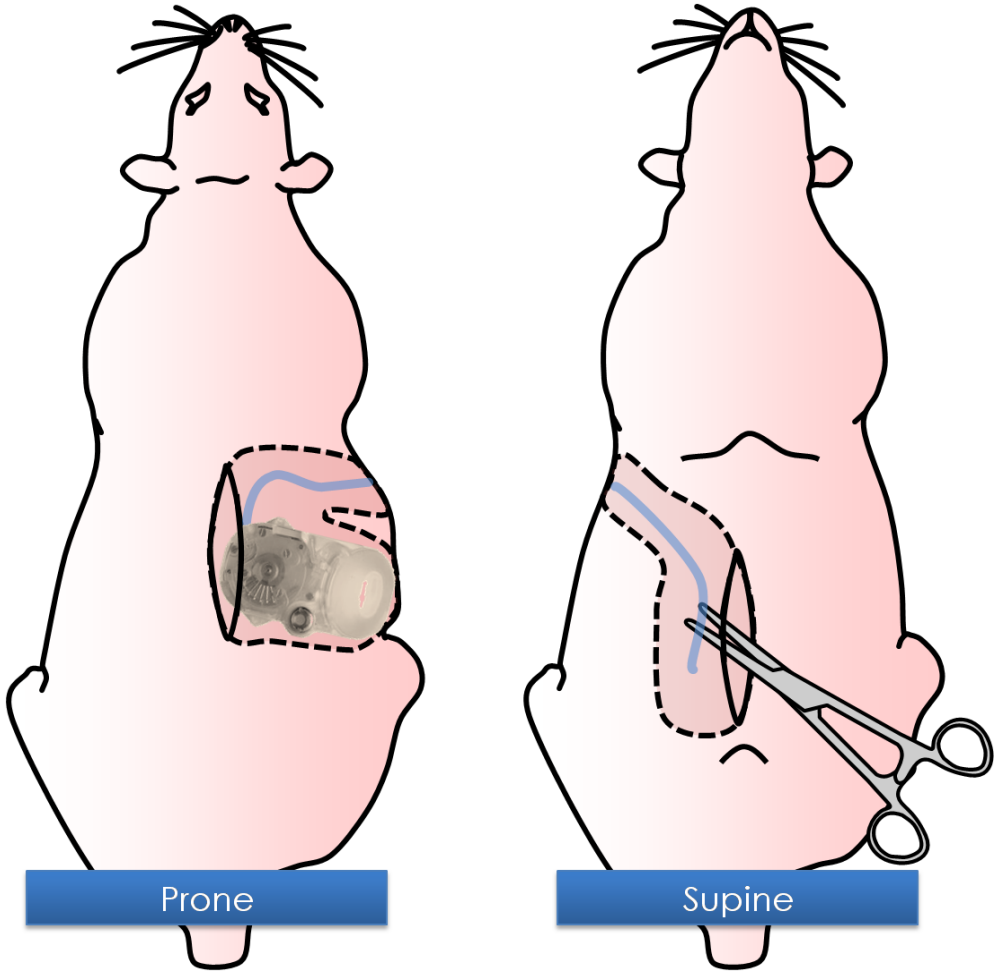

Fig. 2 Subcutaneous Pocket and Tunnel to Abdominal Incision

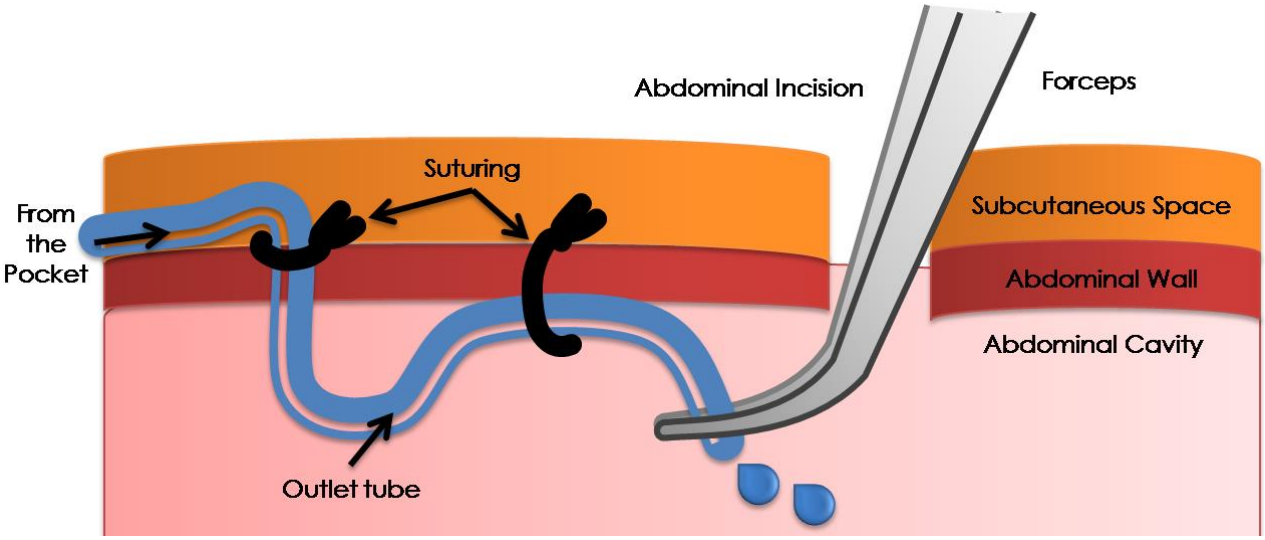

Fig.3A: Abdominal Tube Fixation

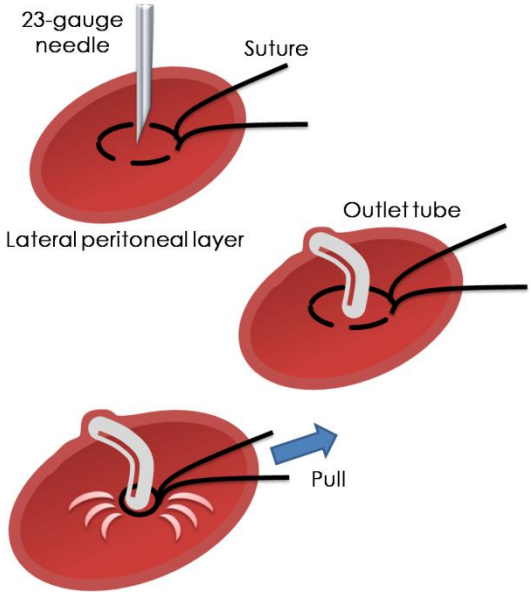

Fig.3B: Opening for catheter insertion and Purse-string suturing.

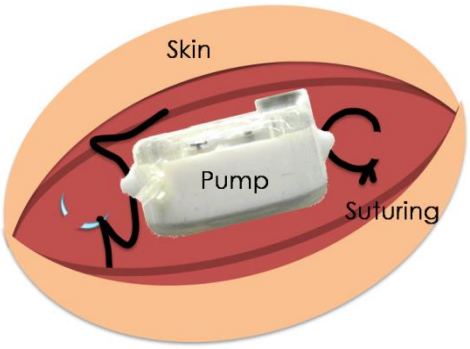

Fig.4: Subcutaneous Pump Fixation:
View from the back of the pump with septum port on right hand side.

REFERENCES

Rat Jugular Vein and Carotid Artery Catheterization for Acute Survival Studies, A Practical Guide. Angela Heiser, Foreword by John H. K. Liu. Springer

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