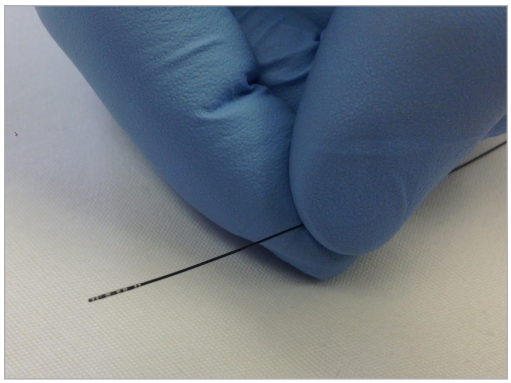
Catheter Technical Note

How to Optimize Scisense Pressure & PV Catheter Life Span

CATHETERS ARE DELICATE MEASUREMENT DEVICES: ALWAYS HANDLE WITH CARE.
FAILURE TO PROPERLY HANDLE CATHETERS MAY RESULT IN VOIDING THE WARRANTY.
FOLLOW ALL INSTRUCTIONS IN THE QUICK START GUIDES, INSERTS AND OPERATOR'S MANUALS.

In order to get the longest life possible from a Scisense Pressure or Pressure-Volume Catheter, it is important that the user have some appreciation of the delicate nature Catheters. The sensing surfaces, tube wall and conducting wires are measured on the order of microns. However, when appropriate precautionary measures are taken, Catheters can be successfully reused for many experimental protocols.

- Damage to the Catheter shaft from excessive force is the most common cause of Catheter failure. While the shaft material is very strong, it has a yield point, and will break if it is deformed past this point. The catheter shaft will also be weakened by any micro cuts or abrasion that may be inflicted during the course of its use.
  - Before handling a functional Catheter, practice catheter handling and insertion with a dummy Catheter.
  - If you chose to handle the Catheter with forceps, place small pieces of polyethylene (PE) tubing over the forceps' tips. This will protect the Catheter body against kinks or abrasions from the sharp forceps' edges. When using forceps to handle the Catheter, please be aware that the forceps or grasping ends are not designed to manipulate such a delicate shaft.
  - When starting to work with Catheters please use a surgical microscope to estimate and coordinate the actual hand grip and applied strength under a variety of magnifications. This will help you with Catheter/ hand coordination and help determine the amount of force required to hold the Catheter.
  - Ensure that you not grasping the Catheter with either fingers or forceps close to the area where metal rings or pressure sensor(s) are located. Applying pressure directly to the pressure sensor or metal rings can cause significant damage.
  - Even when using protected forceps the user must be aware of the force generated on the Catheter shaft. It should not be necessary to exert force to any extent that noticeably deforms the diameter of the Catheter. Crushing the tube flat will destroy the strength and possible damage the wires inside. Note: This type of damage is easy to identify and will not be covered by the warranty.



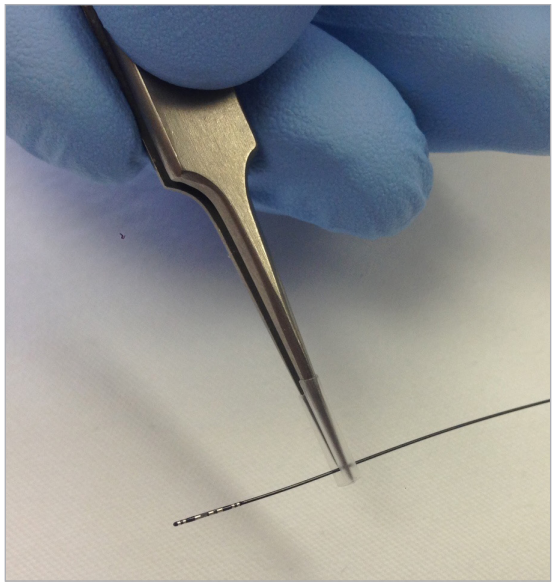
Correct Catheter handling with fingers. Grip is along the shaft, well behind the sensitive Catheter tip.

Place polyethylene tubing over the forceps' tips to protect the Catheter body from damage.

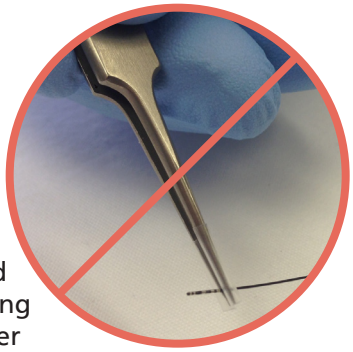
transonic
THE MEASURE OF BETTER RESULTS.

How to Optimize Scisense Pressure & PV Catheter Life Span Cont.

- Be gentle when inserting and withdrawing Catheters, especially when navigating past tie off sutures and heart valves as this is the second most common way for Catheters to sustain damage.
  - Consider using inhalation anesthesia to anesthetize the animal to ensure complete control over body position for the entire duration of the catheterization (from insertion to withdrawal). Any sudden change of position from an uncontrolled animal or anesthesia replenishment might damage (kink) the Catheter.
  - When catheterizing a vessel, ensure the area where the Catheter is inserted is well surgically prepared and maintained without an excessive amount of vascular sheets (adventitia). When placing a Catheter in the ventricle or atria ensure that the pericardium is removed close to insertion site and that the appropriate sized needle is used to puncture the tissue. Never try to force the Catheter through a thick layer of vascular adventitia or cardiac tissue.
  - If using a carotid artery access the animal is usually in supine position, ventilated with 1-2% of Isoflurane, and all nociceptive withdrawal-reflexes are deficient. Insertion is through well-cleaned segment of common carotid artery. Complete preparation and surgery can be seen on our website www.transonic.com. Access through the right carotid artery works better than the left carotid artery in LV catheterization (Migneco et al 2008).
  - The suture placed around the common carotid area and tied over the segment during surgery has to be positioned such that the sensing surface of the Catheter does not bear direct contact. Moreover, it is important that holding and supporting sutures are not tied to the point where the Catheter requires a strong force to pass through (during either insertion and withdrawal). Be careful when tying off sutures to stabilize the Catheter during measurements. If the sutures are tied too tight they can damage the Catheter shaft.
  - When passing the Catheter into the ascending aorta and through the aortic valve to enter the left ventricle (LV), the sensor tip of the Catheter often encounters resistance at the valve entrance. If you are using ventilation set-up, long supine-axis position can be adjusted to accommodate the Catheter in such way that Catheter passes more in line with the supine-axis of the animal. This manoeuvre can be achieved by pulling on the front paws to reposition the animal, while slowly withdrawing and inserting Catheter without an excessive force. Trying to force the Catheter past this point might result in the Catheter bending too much and inducing a permanent crimp in the Catheter shaft.



Correct Catheter handling with forceps. PE tubing covers the forceps' tips and the grip is along the shaft, well behind the sensitive Catheter tip.



Incorrect Catheter handling with forceps. Note how the grip is on the sensitive Catheter tip.

REFERENCE

Migneco F, Huang YC, Coyan GN, Birla RK. "New and simplified method for multiple left ventricle catheterizations in small animals." Interact CardioVasc Thorac Surg 2008; 7: 925-927.

transonic
THE MEASURE OF BETTER RESULTS.

How to Optimize Scisense Pressure & PV Catheter Life Span Cont.

- Failure to properly clean the Catheter post-intervention is detrimental to its performance and lifespan. See the Catheter Cleaning and Disinfecting Guide for detailed instructions.
  - Tissue left on the Catheter can actually constrict the sensor to the point where it damages the pressure sensing surface inside.
  - Tissue left on the Catheter will eventually alter the properties of the sensor interface. While it will not stop the sensor from working, it will change the baseline offset and potentially alter sensitivity.
  - The bulk of cleaning should be done with an enzymatic cleaner that will dissolve any tissue. If tissue is observed to be stuck on the sensing surface of the Catheter, the tissue should be removed with extreme care under a microscope.
  - Catheters should never be pulled through a cleaning cloth or "wiped" in such a manner where the cloth puts force on the sensor surface.
  - Cleaning your Catheter and observing for any residual material under a microscope is a good opportunity to look for damage from being used. If shaft roughness or marks from forceps/tweezers are observed, it is a good indication that the surgical procedure needs to be adjusted. There should be no visible wear or tear on a properly handled Catheter shaft.

Please contact Customer Service or your nearest Sales Representative for more information on Catheter use best practices.

transonic
THE MEASURE OF BETTER RESULTS.
www.transonic.com

Transonic Systems Inc. is a global manufacturer of innovative biomedical measurement equipment. Founded in 1983, Transonic sells "gold standard" transit-time ultrasound flowmeters and monitors for surgical, hemodialysis, pediatric critical care, perfusion, interventional radiology and research applications. In addition, Transonic provides pressure and pressure volume systems, laser Doppler flowmeters and telemetry systems.

AMERICAS
Transonic Systems Inc.
34 Dutch Mill Rd
Ithaca, NY 14850
U.S.A.
Tel: +1 607-257-5300
Fax: +1 607-257-7256
support@transonic.com

EUROPE
Transonic Europe B.V.
Business Park Stein 205
6181 MB Elsloo
The Netherlands
Tel: +31 43-407-7200
Fax: +31 43-407-7201
europe@transonic.com

ASIA/PACIFIC
Transonic Asia Inc.
6F-3 No 5 Hangsiang Rd
Dayuan, Taoyuan County
33747 Taiwan, R.O.C.
Tel: +886 3399-5806
Fax: +886 3399-5805
support@transonicasia.com

JAPAN
Transonic Japan Inc.
KS Bldg 201, 735-4 Kita-Akitsu
Tokorozawa Saitama
359-0038 Japan
Tel: +81 04-2946-8541
Fax: +81 04-2946-8542
info@transonic.jp