

### Use of venous catheterization

The primary use of venous catheterization is for intravenous administration. This route is advantageous due to the predictability and reproducibility of drug kinetics. One is able to deliver agents in a controlled manner via pumps. Intravenous deliveries bypass the stomach and, therefore, avoid gastric pH and first pass metabolism issues. There is rapid onset at the target site. This is the route of choice for protein and peptide-based drugs.

There are several considerations to note prior to intravenous delivery. One must be aware of possible vascular irritation and damage caused by the test substance, leakage out of the vessel, volume overload (hemodilution), hemolysis, and infection. One must also carefully consider the solubility and pH of the test substance. Solution should be 7.4 pH adjusted and completely soluble. Any particulates will cause an emboli.

*Methods in vascular infusion biotechnology in research with rodents* by Dr. Nolan (2002) is an excellent resource for this application.

Intravenous injections may be given as:

- **Bolus** – equal to or less than 20 seconds, may be given manually using a 22 gauge needle to connect to the jugular catheter
- **Slow push** – usually between 1 – 5 minutes, may be given manually or via pump
- **Continuous infusion** – usually hours to days to reach a steady state in the plasma, must be delivered via pump. The rat is fitted into a harness and the catheters threaded through a

protective sheath to an overhead swivel and infusion pump. Alternatively, an osmotic pump filled with test material can be implanted SC and attached to the catheter.

Vendors of continuous infusion equipment:

- Instech Solomon  
5209 Militia Hill Road  
Plymouth Meeting, PA 19462  
800-443-4227  
[www.instechlabs.com](http://www.instechlabs.com)
  
- Lomir Biomedical, Inc.  
99 East Main Street  
Malone, New York 12953  
518-483-7697  
[www.lomir.com](http://www.lomir.com)
  
- Bioanalytical Systems, Inc. (BAS)  
2701 Kent Avenue  
West Lafayette, Indiana 47906  
[www.bioanalytical.com](http://www.bioanalytical.com)

## Use of arterial catheterization

The most common use for arterial catheterization is serial blood sampling. Catheterization of the carotid artery provides a sampling procedure, which has technical ease and greatly reduces stress to the rat. Other uses include CNS delivery and cardiac monitoring.

- **Blood sampling** – Serial sampling may be performed manually or via robotic samplers. Automatic blood samplers (ABS) provide many benefits including fluid replacement, less supervision, precise timepoints, and collection of inconvenient timepoints. Consider preparatory time, maintenance and cost required when choosing between manual and ABS methods. A combination of the two can be quite efficient and serve many purposes. Remember sampling volume criteria to avoid stress to the rat. *Methods in vascular infusion biotechnology in research with rodents* by Dr. Nolan (2002) is an excellent resource for this application.
- **Intra-arterial administration** – Reversing direction of the catheter insertion to a rostral placement, allows for delivery of test substances to the brain. Research in CNS indications, such as stroke and Alzheimer's, benefit from this administration by directly reaching the brain without metabolism.

- **Cardiac parameter monitoring** – Carotid catheterization is useful for monitoring blood pressure, heart rate, ECG, temperature and blood gases. The catheter is attached to transducers outside or inside the body.

Vendors of ABS equipment:

- Instech Solomon  
5209 Militia Hill Road  
Plymouth Meeting, PA 19462  
800-443-4227  
[www.instechlabs.com](http://www.instechlabs.com)
- Bioanalytical Systems, Inc. (Culex)  
2701 Kent Avenue  
West Lafayette, Indiana 47906  
[www.bioanalytical.com](http://www.bioanalytical.com)
- DiLab Inc.  
11 Goldsmith Street  
Littleton, MA 01460  
888-844-3633  
[www.dilab.com](http://www.dilab.com)

Vendors of blood pressure equipment:

- ADInstruments  
2205 Executive Circle  
Colorado Springs, CO 80906  
719-576-3970  
[www.adinstruments.com](http://www.adinstruments.com)
- Data Sciences International (DSI)  
4211 Lexington Avenue,  
North, Suite 2244  
St. Paul, MN 55126  
800-262-9687  
[www.datasci.com](http://www.datasci.com)

- Mini Mitter  
20300 Empire Avenue, Bldg B-3  
Bend, OR 97701  
800-685-2999  
[www.minimitter.com](http://www.minimitter.com)