

Materials List for:

Urinary Bladder Distention Evoked Visceromotor Responses as a Model for Bladder Pain in Mice

Katelyn E. Sadler¹, Jarred M. Stratton¹, Benedict J. Kolber¹

¹Department of Biological Sciences and Chronic Pain Research Consortium, Duquesne University

Correspondence to: Benedict J. Kolber at kolberb@duq.edu

URL: <https://www.jove.com/video/51413>

DOI: [doi:10.3791/51413](https://doi.org/10.3791/51413)

Materials

Name	Company	Catalog Number	Comments
Infrared heating blanket and monitoring system	Kent Scientific	Right-Temp System	This system is set up to monitor two separate temperatures. This should include the animal and the heating blanket. In addition, the system can automatically adjust the temperature to maintain a set temp. However, this automatic function produces electrical interference during EMG recording and must be turned off. Kent can provide a battery pack for the heating pad for use during the riEMG recording part of the experiment.
Isoflurane vaporizer	Draeger	Vapor 19.1	Any isoflurane vaporizer will work, but it is helpful to have one that has multiple notches between 0-2% isoflurane.
Isoflurane	multiple sources	n/a	
100% Oxygen air tank	multiple sources	n/a	For ventilation of animal
Air breathing grade	multiple sources	n/a	For bladder distention
24 G 0.56 in IV catheter	BD Biosciences	381411	For bladder catheterization
Surgilube (sterile)	Savage Laboratories	0281-0205-02	Any surgical grade lubricate would work fine.
Mineral oil (sterile)	multiple sources	n/a	
Saline (sterile)	multiple sources	n/a	
AG8W Silver Wire, 2 m, 0.20 mm (.008 in) D, L, No Insulation	Warner Instruments	W4 64-1318	Any silver wire with these specifications will work. Wire does not need to be "chlorinated."
Ophthalmic ointment	multiple sources	n/a	
Small surgical scissors	multiple sources	n/a	
Sharp forceps	multiple sources	n/a	
21 G Needle	multiple sources	n/a	
Grass amplifier P511 with 3-lead input cable	Grass Instruments	P511 (F-P51C3/REV1)	This is the "amplifier" used in the protocol. Amplifier with the following settings: Calibrator = 1 mV; Lo freq = 300 Hz; Amplification = 20; Hi freq = 10 kHz; Line filter = in.
Cambridge Electronic Design (CED) 1401 Plus (or equivalent)	Cambridge Electronic Design	1401 Plus	This is the "digitizer" used in the protocol. Other digitizer systems from WINDAQ or other companies would work fine; Need inputs

			for pressure signal, EMG, and stimulus signal.
CED Spike2 software	Cambridge Electronic Design	Spike 2	This is the the "digitizer software" used in the protocol. Should be from same manufacturer as digitizer. Program should be setup with 3 channels for pressure (0-100 mmHg scale), EMG signal (typically -5 to +5 V range), and stimulus marker (0-2 V) range.
Flow chart from air tank to bladder catheter	n/a	n/a	Sequence of connections from pressurized air tank to animal bladder: Air tank to 1/4 in tubing to Gilmont flowmeter to y connector. Branch 1 of y connector to to sphgmomanometer. Branch 2 to a single input on the 4-way gang valve to 4-way valve output to the timed pressure regulator to 3/32 tubing from timed pressure regulator to 2nd y connector (branch 1 to sphgmomanometer) with branch 2 to 3/32 tubing to a 3rd y connector. Branch 1 of y connector to a 3rd sphgmomanometer and branch 2 to animal bladder catheter.
Gilmont Flowmeter	Gilmont	GF8321-1401	Multiple brands of flowmeters will work. For bladder distention air, flow meter should be able to handle high pressures (such as this Gilmont meter). For breathing air, flow rate should be adjustable down to 100 ml/min (typical mouse rate is 500-1,000 ml/min).
4-way Gang valve	Elite		This is a specific piece of equipment. The Elite gang valve is designed for fish tanks at low air pressures. In the bladder distention setup, this valve acts as a safety valves in case the pressure spikes. Too high pressure during initial turning on of the tank will ruin the pressure transducer in the Timed pressure regulator and/or the sphgmometers. In addition, by providing a small amount of leak in the system, this valve makes it easier to adjust the pressure between 10-80 mmHg.
1/4 in Tubing	multiple sources	n/a	
3/32 inch Tubing	multiple sources	n/a	
"Y" connectors (1/4 and 3/32 in)	multiple sources	n/a	
Sphgmomanometer	CVS		Any analog sphgmomanometer from a drug store will work for this application.
Timed Pressure Regulator	custom		This is a custom built machine (Washington University in St. Louis Machine shop) that allows for automated pressure delivery including digitization of air pressure, control of trial length, inter-trial interval automation, control of trial number, and

			<p>stimulus onset digital signal. However, the basic components of the system (pressure on and off for a given trial period) could be controlled with a simple on/off in-line switch. Such analog control of a trial would necessitate additional analysis parameters (see Protocol 4). In addition, one would have to manually assign the pressure based on the analog sphygmomanometer during data analysis.</p>
IGOR Pro	Wavemetrics	n/a	<p>For analysis of EMG signal. Many different types of software can be used for data analysis in these experiments.</p>