

DARVALL Warms from Within

Darvall Smooth Wall Tubing (SWT)^t: Low Resistance & Volume

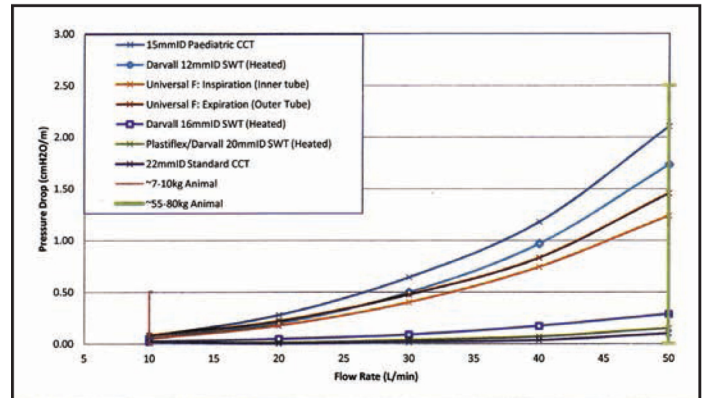
Tubing accounts for up to 1/2 the resistance of circle absorber systems¹. Darvall's small diameter, smooth wall tubing has been shown to produce less resistance than typical 22mm(7/8") corrugated tubing. Darvall SWT 16mm(5/8")ID x 1.5M(5') long can supporting animals up to 70kg(155lb) with less than 0.5cm H₂O pressure drop; Darvall SWT 12mm(1/2")ID x 1.5M(5') long can support animals up to 40kg(90lb) (Graph 1)².

Efficient & Responsive Breathing Systems

SWT offers a huge efficiency advantage (volume of gas relative to the size of animal) requiring as little as 63% (SWT 16) and 32% (SWT 12) the volume of 22mm(7/8") ID corrugated tubing or Universal F tubing.

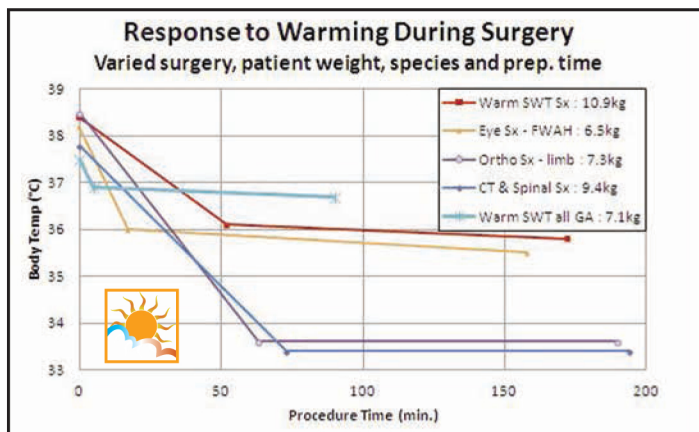
Inspiring Cold, Dry Gas Causes Heat Loss

Heat loss during anesthesia has been focussed on body surface heat conservation and surface warming³. However, warming and humidification of inspired gas accounts is a large contributor to heat loss in anesthetised, intubated animals. Normally the nose and pharyngeal mucosa transfer heat and moisture to the air during inspiration and then largely recover it during expiration. Saturated air holds 44mg H₂O/L at 37°C(98.6°F) which requires 24 calories. A 10kg(22lb) dog taking 20 x 100ml breaths/min and ventilating 120L/hr could loose (24cal/L x 120L/hr) = 2880 calories/hr.



Graph 1: Pressure drop flowing medical air through straightened hoses with 1.5M(5') patient length. Flows between 10 and 50 L/min were used to simulate peak flow rates in animals with weights in the range 7kg-80kg (15lb-175lb).

Warm Inspired Gas - a Totally new solution to hypothermia



Graph 2: Average Temperature (T) of dogs & cats during anesthesia for surgical procedures. Time 1 = T pre GA; Time 2 = T end CT/prep/start surgery (Sx [no warming]) & start of warming (all Darvall forced warm air heating except Heated Smooth Wall Tubing groups); Time 3 = T end Sx. Ortho Sx = distal limb Sx; Eye Sx = intra-ocular surgery; Warm SWT = mix of all these Sx types. Average weights of animals are listed in the key.

* Animals below 5kg (11lb) - studies conducted using Darvall Low Resistance, High Response circle breathing system
^t Patents applied for

References

1. CI Dunlop, JS Dunlop, T Wallis et al. Efficiency, volume and flow resistance of anesthesia circle system breathing hose. Abst. ACVA Ann. Meeting, San Antonio TX, Sept 2012
2. T Wallis, CI Dunlop, JS Dunlop et al. A model for analysis of flow resistance in a circle system designed for small animals to 2kg. Abst. WCVA, Capetown S. Africa Sept 2012
3. Pottie RG, Dart CM, Perkins NR et al. Effect of hypothermia on recovery from general anaesthesia in the dog. Aust Vet J 85:158-162 2007
4. CI Dunlop, BA Koster, JS Dunlop et al. Response to heated smooth wall breathing circuits & circle systems in small animals - Comparison to conventional warming. Abst. Aust. Coll. Vet. Scientists Ann. Meeting, Surfers Paradise, June 2012

Darvall Heated Smooth Wall Tubing^t (HSWT) has a heating element imbedded into the ribbing of the tubing wall. A sensor imbedded into the tubing at the Y piece connector monitors temperature and the microprocessor controls heating to 39.5°C(103°F). An additional esophageal temperature probe enables the microprocessor to respond directly to the animal's body temperature.

Warm Inspired Gas Prevents Hypothermia

Recent research demonstrates that warming inspired gas for animals as small as 3kg(6.5lb) is as effective as the best forced warm air heating system at preventing heat loss during anesthesia (Graph 2)⁴. The study also shows that MOST temperature loss occurs after induction, during clipping and surgery prep. It further shows that recovering lost body temperature is very difficult.

Darvall heated smooth wall tubing begins to warm animals from the inside from the very first breath after induction, minimising loss of body temperature prior to the start of surgery.