Recent References (2009-Present) on the Administration of Agents to Nerves Using ALZET® Osmotic Pumps


**Agents:** Ropivacaine  
**Vehicle:** Saline;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Rat;  
**Pump:** 2ML1;  
**Duration:** 7 days;  
**ALZET Comments:** Dose (10 μl/hour); 0.9% NaCl used; animal info (male Sprague-Dawley rats, 200–250 g, aged 6–8 weeks); spinal cord injury;


**Agents:** Cytidine, 5-aza-2'-deoxy-; Methionine, S-adeno-syl-  
**Vehicle:** DMSO; PBS;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Rat;  
**Pump:** Not Stated;  
**Duration:** 7 days;  
**ALZET Comments:** Dose (1 mM 5-aza-2'-deoxycytidine; 1mM S-adeno-sylmethionine); Controls received mp w/ vehicle; animal info (Adult female Sprague Dawley rats, 250–300 g); 5-aza-2'-deoxycytidine aka 5-aza; S-adeno-sylmethionine aka SAM;


**Agents:** ibuprofen  
**Vehicle:** Saline;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Rat;  
**Pump:** 1004;  
**Duration:** 21 days;  
**ALZET Comments:** Dose (7 μg/day); Controls received mp w/ vehicle; animal info (male, Wistar, 220-250g); pump was implanted locally parallel to re-connected nerve (p.1631);


**Agents:** Curcumin  
**Vehicle:** Saline;  
**Route:** CSF/CNS (Sciatic nerve);  
**Species:** Rat;  
**Pump:** Not Stated;  
**Duration:** 4 weeks;  
**ALZET Comments:** Dose (0.2mg/day); 0.9% saline used; post op. care (buprenorphine 0.05 mg/kg); behavioral testing (Von Frey’s filament test, SSI test, beam walking test); neurodegenerative (nerve regeneration);


**Agents:** Tetrodotoxin  
**Vehicle:** Saline;  
**Route:** CSF/CNS (peroneal nerve);  
**Species:** Rat;  
**Pump:** 2002;  
**Duration:** 14 days;  
**ALZET Comments:** Dose (350mg/ml); 0.9% saline used; Controls received mp w/ vehicle; animal info (Male Wistar rats weighing between 350–450 g); delivery tubes were channeled to a silicone rubber cuff that was carefully placed around the common peroneal nerve of the left hind limb (Fig.1);
**Q4655:** J. G. Yan, et al. CALCITONIN PUMP IMPROVES NERVE REGENERATION AFTER TRANSECTION INJURY AND REPAIR. MUSCLE & NERVE 2015;51(2):229-234

**Agents:** Calcitonin  
**Vehicle:** Water, distilled sterile;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Rat;  
**Pump:** 2006;  
**Duration:** 12 weeks;

**ALZET Comments:** Animal info (Sprague Dawley, 250-300g, 3 months old); half-life (p.233); long-term study; “To achieve a continuous and gradual mode of delivery, a mini-osmotic pump was implanted to deliver medication at a constant 0.15 ul/h” pg 233; “Calcitonin has short absorption and elimination half-lives of 10–15 minutes and 50–80 minutes, respectively; however, using an osmotic pump allows for gradual and prolonged release.” pg233; pg230 diagram of pump implantation;


**Agents:** Bupivacaine; clonidine; dexamethasone  
**Vehicle:** Saline;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Rat;  
**Pump:** 2ML1;  
**Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, albino, CD[SD]); no stress (see pg. 192); post op. care (IM butorphanol tartrate 0.05 mg/kg, ceftiofur sodium 5 mg/kg); stability verified by (pg. 195); used polyurethane catheter 0.5mm ID 0.9 mmOD; pumps removed after 1 week; dose (66.6 ug/mL)


**Agents:** Nerve growth factor, human B-  
**Vehicle:** PBS;  
**Route:** CSF/CNS (inferior alveolar nerve);  
**Species:** Dog (beagle);  
**Pump:** 2ML2;  
**Duration:** 6 weeks;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, beagle, 18 weeks old, 10-12 kg); good methods (picture of implant pg 413); Multiple pumps per animal (2; one pump delivered NGF other delivered PBS); used rat jugular catheter, 15 cm long; pump body placed into retromandibular area; long-term study;

**Q3330:** S. Unezaki, et al. Involvement of Na(x) sodium channel in peripheral nerve regeneration via lactate signaling. European Journal of Neuroscience 2014;39(5):720-729

**Agents:** Lactate; hydroxycinnamic acid, alpha-cyano-4;  
**Vehicle:** Saline;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Mice (transgenic);  
**Pump:** 1004;  
**Duration:** 4 weeks;

**ALZET Comments:** Controls received mp w/ vehicle; animal info ([B6.Cg-Tg (thy1-YFP)16Jrs/J, Nax -/-, 8-15 weeks old); behavioral testing (von frey filaments, neurometer analysis); alpha-cyano-4 hydroxycinnamic acid aka CIN; used catheter tubing #7701 to attach pump to silicone tubing sutured to nerve stump; schematic of surgery on pg.725, figure 3A;


**Agents:** CAY10441  
**Vehicle:** PBS; DMSO;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Mice;  
**Pump:** 1007D;  
**Duration:** 4 days;  
**Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (C57BL6N or IP receptor KO mice); 1% DMSO used; behavioral testing (paw withdrawal latency); immunology; sciatic nerve injury; used RenaSil tube attached to PE-60, and fixed by Stabiloblast 2-component glue; pumps primed in 37C saline; pumps implanted subcutaneously and fixed with 6-0 Prolene suture to muscle; CAY10441 is an IP receptor antagonist;


**Agents:** Tetrodotoxin  
**Vehicle:** Not Stated;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Rat;  
**Pump:** Not Stated;  
**Duration:** 7,10 days;

**ALZET Comments:** Animal info (AO Rat); nerve injury; functionality of mp verified by establishment of a chronic conduction block; tissue perfusion (sciatic nerve);
Agents: Pregabalin Vehicle: Saline; Route: CSF/CNS (sciatic nerve); Species: Rat; Pump: 2ML1; Duration: 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 8-9 weeks old); behavioral testing (Hargreaves' radiant heat testing, guarding behavior, incapacitance testing); pump and catheter secured using 4-0 silk suture; sciatic nerve injury;

Agents: Nifedipine; calcitonin Vehicle: Not Stated; Route: CSF/CNS (sciatic nerve); Species: Rat; Pump: 2006; Duration: 4 weeks;
ALZET Comments: Controls received mp w/ saline or sham only; animal info (3 month old, male, Sprague-Dawley 250-300g); functionality of mp verified by decrease in calcium levels; peptides; Picture of MP p56, Fig1A. MP Pump setup p56, Fig1B;

Agents: Albumin Vehicle: Saline, sterile; Route: CSF/CNS (pudendal nerve); Species: Rat; Pump: 1007D; 2002; Duration: 1, 2 weeks;
ALZET Comments: Animal info (Sprague Dawley, female, virgin, 200-225 g); bilateral cannula used; "localized continuous neurotrophin supplementation has been most effective at promoting nerve regeneration and provided the rationale behind utilizing miniature osmotic pumps in this study." pg 86; bilateral infusion;

Agents: Antibody, Fibroblast growth factor-2, mouse, monoclonal Vehicle: Not Stated; Route: CSF/CNS (sciatic nerve); Species: Rat; Pump: 2002; Duration: Not Stated;
ALZET Comments: Animal info (male, Lister Hooded, 3 mo old)

Agents: Pregabalin, I125; pregabalin, unlabeled Vehicle: Not Stated; Route: CSF/CNS (intrathecal); CSF/CNS (sciatic nerve); Species: Rat; Pump: 2002; Duration: 72 hours;
ALZET Comments: Controls received mp w/ saline; animal info (Sprague Dawley, male, 200-225 g); catheter patency and functionality of mp verified via pump infusion of india ink; neuropathic pain

Agents: Endothelin-1 Vehicle: Not Stated; Route: CSF/CNS (optic nerve, perineural region); Species: Rabbit; Pump: Not Stated; Duration: 2, 4, 8 weeks;
ALZET Comments: Animal info (New Zealand, 2.5-3.5 kg); long-term study; PE tubing used

Agents: Tetrodotoxin Vehicle: Not Stated; Route: CSF/CNS (sciatic nerve); Species: Rat; Pump: 2ML4; Duration: Not Stated;
ALZET Comments: Animal info (AO strain, 200-400 g, Harlan); fig 1, schematic of pump and placement of conduction block

Q2413: D. I. Carrasco, et al. Motor terminal degeneration unaffected by activity changes in SOD1(G93A) mice; a possible role for glycolysis. NEUROBIOLOGY OF DISEASE 2012;48(1):132-140
Agents: Tetrodotoxin; dexamethasone Vehicle: Not Stated; Route: CSF/CNS (sciatic nerve); Species: Mice; Pump: 2002; Duration: Not Stated;
ALZET Comments: Animal info (SOD1 G93A); good methods, pg 133

**Agents:** Nerve growth factor; glial-derived neurotrophic factor  
**Vehicle:** Saline;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Mice (transgenic);  
**Pump:** 1004;  
**Duration:** 4 weeks;  

**ALZET Comments:** Controls received mp w/ vehicle; half-life (p. 308) "short"; animal info (10 wks old, 20 g., Thy1-YEP); image of pump pg. 309; schematic of drug delivery system with pump+silicone, fig. 1); “Because of the short biological half-life of neurotrophic factors, a delivery system that protects the protein and slowly releases it locally over a prolonged period of time is required.” pg. 308; tissue perfusion (sciatic nerve)


**Agents:** Cycloheximide; puromycin  
**Vehicle:** Saline;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Rat;  
**Pump:** 2002;  
**Duration:** 14 days;  

**ALZET Comments:** Animal info (adult, male, Sprague-Dawley, 250-300 g)


**Agents:** Alkaline phosphatase tag; eTEM-AP, recomb.  
**Vehicle:** Not Stated;  
**Route:** CSF/CNS (sciatic nerve);  
**Species:** Rat;  
**Pump:** 1002;  
**Duration:** 2 weeks;  

**ALZET Comments:** Controls received mp w/ alkaline phosphatase tag; animal info (adult, male, Sprague-Dawley, 150-300 g); peptides