References (2016-Present) on Pain Research Using ALZET® Osmotic Pumps

Q10752: S. He, *et al.* A Human TRPV1 Genetic Variant Within the Channel Gating Domain Regulates Pain Sensitivity in Rodents. Journal of Clinical Investigation 2023;133(3):
Agents: TAT (45-57); V1-cal **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (Male mice; C57BL/6 and Wild-type; 10-16 weeks old); peptides; behavioral testing (Measured paw-licking, flinching behavior and paw thickness); good methods (Filled and then primed in 0.9% sterile saline at 37°C for ~24 hours prior to implantation);

Q10525: S. Fujiwara, *et al.* Age-related Changes in Trigeminal Ganglion Macrophages Enhance Orofacial Ectopic Pain After Inferior Alveolar Nerve Injury. In Vivo 2023;37(1):132-142
Agents: Liposomal clodronate; Liposome (control) **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1004; **Duration:** 5 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (23 week old male SAMP8/SAMR1 mice; Weighed 20-30 g); Brain Coordinates (2,8 mm anterior from posterior fontanelle, 1.2 mm lateral to sagitall suture); polyethylene catheter; dental cement used; aging;

Q10599: L. Di Cesare Mannelli, *et al.* Neuronal Alarmin IL-1alpha Evokes Astrocyte-Mediated Protective Signals: Effectiveness in Chemotherapy-Induced Neuropathic Pain. Neurobiology of Disease 2022;168(105716
Agents: Interleukin-1a **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 1002; **Duration:** 10 days;
ALZET Comments: Dose (0.25 mL/h); Controls received mp w/ vehicle; animal info (Male; Weighed about 200-250 g); behavioral testing (Paw pressure test; Cold plate test); immunology;

Q10563: B. Cao, *et al.* Spinal Cord Retinoic Acid Receptor Signaling Gates Mechanical Hypersensitivity in Neuropathic Pain. Neuron 2022;110(24):4108-4124 e6
Agents: Ro41-5253 **Vehicle:** DMSO; **Route:** CSF/CNS (subarachnoid space); **Species:** Mice; **Pump:** 1007D; 1004; **Duration:** 7 days; 4 weeks;
ALZET Comments: Dose (1.25 ug/hr); animal info (P34-P42); Controls received mp w/ vehicle; catheter; spinal cord injury; behavioral testing (Open field test; Elevated plus maze; Y-maze test; Hargreaves test; Cold plantar assay; Formalin test; Von Frey withdrawal threshold test); pain (neuropathic)

Q9919: H. Yamanaka, *et al.* Aberrant Axo-Axonic Synaptic Reorganization in the Phosphorylated L1-CAM/Calcium Channel Subunit alpha2delta-1-Containing Central Terminals of Injured c-Fibers in the Spinal Cord of a Neuropathic Pain Model. eNeuro 2021;8(2):
Agents: Pregabalin **Vehicle:** Saline; **Route:** Saline; **Species:** Rat; **Pump:** 2001; **Duration:** 14 days;
ALZET Comments: Dose (30 or 300 ug/day); Controls received mp w/ vehicle; animal info (male Sprague Dawley rats, 200–250 g); spinal cord injury;

Q9454: K. Sessler, *et al.* Spinal cord fractalkine (CX3CL1) signaling is critical for neuronal sensitization in experimental nonspecific, myofascial low back pain. Journal of Neurophysiology 2021;125(5):1598-1611
Agents: Fractalkine; Anti-fractalkine antibody **Vehicle:** CSF, artificial; **Route:** CSF/CNS (spinal cord); **Species:** Rat; **Pump:** 2002; **Duration:** 5 days;
ALZET Comments: Dose (20 or 200 ng/mL); Controls received mp w/ vehicle; animal info (Adult male Sprague-Dawley rats, 300-460 g); spinal cord injury;

Q10649: A. Phero, *et al.* A Novel Rat Model of Temporomandibular Disorder With Improved Face and Construct Validities. Life Sciences 2021;286(120023
Agents: OR-486 **Vehicle:** DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (15 mg/kg/day); 5:3:2 DMSO:ethanol:distilled water; animal info (Male; Weighed 250-350 g); behavioral testing (Rat gnaw meter test); pain (TMJ/TMD)

Q10641: F. Pantouli, *et al.* Comparison of Morphine, Oxycodone and the Biased MOR Agonist SR-17018 For Tolerance and Efficacy in Mouse Models of Pain. Neuropharmacology 2021;185(108439
Agents: Morphine **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** 2001; **Duration:** 6 days;
ALZET Comments: Controls received mp w/ vehicle; animal info: C57BL/6J mice 10–20 weeks of age (23–32 g)dependence; pain

Q10632: S. H. Oh, *et al.* Sec-O-Glucosylhamaudol Mitigates Inflammatory Processes and Autophagy Via p38/JNK MAPK Signaling in a Rat Neuropathic Pain Model. Korean Journal of Pain 2021;34(4):405-416
Agents: Sec-O-glucosylhamaudol **Vehicle:** DMSO; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: Dose (96 ug/day); Controls received mp w/ vehicle; 70% DMSO used; animal info (Male Sprague Dawley; Pathogen-free; 100-120 g); behavioral testing (Paw withdrawal threshold using von Frey filament; Naloxone challenge test); spinal cord injury;

Q10256: C. M. Mecca, *et al.* Dynamic Change of Endocannabinoid Signaling in the Medial Prefrontal Cortex Controls the Development of Depression After Neuropathic Pain. Journal of Neuroscience 2021;41(35):7492-7508
Agents: Gabapentin **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** Not Stated;
ALZET Comments: "Controls received mp w/ vehicle; animal info: Male and female Sprague Dawley rats weighing 170-200; behavioral testing: Sensory behavioral tests; von Frey test; Open field test; Sucrose-preference test; Novelty-suppressed feeding; Forced swim test; Gabapentin aka (GBP); Brain coordinates ((from 151 bregma, anteroposterior, +3.2 mm; mediolateral, ±1.0 mm; dorsoventral, -3.5 mm)
dental cement used;"

Q10255: S. L. McAllister, *et al.* Aberrant reactive aldehyde detoxification by aldehyde dehydrogenase-2 influences endometriosis development and pain-associated behaviors. Pain 2021;162(1):71-83
Agents: Alda-1 **Vehicle:** PEG; DMSO; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** Not Stated;
ALZET Comments: "Dose: (5 mg/kg/day); 50% PEG; 50% DMSO; animal info: virgin female ALDH2*2 knock-in (n 5 107) and C57BL/6 wild-type (n 5 107) littermate mice, aged 6 to 8 weeks; behavioral testing: abdominal licking, mechanical nociception, thermal nociception, locomotor activity, and
exploratory behavior,"

Q10223: Y. Kuthati, *et al.* Teneligliptin Exerts Antinociceptive Effects in Rat Model of Partial Sciatic Nerve Transection Induced Neuropathic Pain. Antioxidants (Basel) 2021;10(9):
Agents: Teneligliptin **Vehicle:** DMSO; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose: (5 ug/1 uL/h); Controls received mp w/ vehicle; animal info: Male Wistar rats; behavioral testing; Behavior Test for Tactile Allodynia; Behavior Test for Thermal Hyperalgesia; Teneligliptin aka (TEN) is a dipeptidyl peptidase-4 inhibitor

Q10193: N. A. Huck, *et al.* Temporal Contribution of Myeloid-Lineage TLR4 to the Transition to Chronic Pain: A Focus on Sex Differences. Journal of Neuroscience 2021;41(19):4349-4365
Agents: RS504393 **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: Dose: (5mg/kg/day)animal info: Male 25g and female 20g adult mice 10-12 weeks old, WT C57BL/6J mice, Cx3CR1-Crebehavioral testing (see pg. 2) RS504393 is a selective CCR2 antagonist

Q10378: O. Echeverria-Rodriguez, *et al.* Participation of angiotensin-(1-7) in exercise-induced analgesia in rats with neuropathic pain. Peptides 2021;146(170670
Agents: Angiotensin 1-7; A779 **Vehicle:** Water, deionized; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (Ang 1-7 0.1 and 1 mg/kg; A779 24 ug/kg/h); animal info (Male; Weigh 120-150 g); behavioral testing (Swimming); peptides; spinal cord injury;

Q9130: W. Zhong, *et al.* Blockade of peripheral nociceptive signal input relieves the formation of spinal central sensitization and retains morphine efficacy in a neuropathic pain rat model. Neuroscience Letters 2020;716(134643
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;

Q9861: X. Zhang, *et al.* Low catechol-O-methyltransferase and stress potentiate functional pain and depressive behavior, especially in female mice. Pain 2020;161(2):446-458
Agents: Catechol-O-methyltransferase inhibitor **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: 0.9% Saline used; Controls received mp w/ vehicle; animal info (8-12 weeks old, 18-30 g, C57BL/6); behavioral testing (Forced Swim Test); Catechol-O-methyltransferase aka COMT inhibitor ; dependence;

Q9868: W. Zhang, *et al.* Inhibition of NADPH oxidase within midbrain periaqueductal gray decreases pain sensitivity in Parkinson's disease via GABAergic signaling pathway. Physiological Research 2020;
Agents: 6-hydroxydopamine **Vehicle:** CSF, Artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1003D; **Duration:** 3 days;
ALZET Comments: Dose (6 ul/min); Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 200-250 g); behavioral testing (Rotation Behavior Test); 6-hydroxydopamine aka 6-OHDA ; Brain coordinates (3.3 mm rostral to the interaural line, 1.4 mm left of the midline, and 6.5 and 6.8 mm ventral to the dural surface); neurodegenerative (Parkinson's Disease);

Q9455: M. Shaqura, *et al.* Neuronal aldosterone elicits a distinct genomic response in pain signaling molecules contributing to inflammatory pain. Journal of Neuroinflammation 2020;17(1):183
Agents: FAD286 **Vehicle:** Saline; **Route:** IV (lumbar); **Species:** Rat; **Pump:** Not Stated; **Duration:** Not Stated;
ALZET Comments: Dose (0.3ug/1 µ1); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (male Wistar rats (180–250g)); dependence;

Q9413: E. Persoons, *et al.* Mimicking Sampson's Retrograde Menstrual Theory in Rats: A New Rat Model for Ongoing Endometriosis-Associated Pain. International Journal of Molecular Sciences 2020;21(7):
Agents: Calcitonin gene-related peptide; Substance P **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2006; **Duration:** 6 weeks;
ALZET Comments: Dose (50 ug/kg/day); animal info (Sprague Dawley Rats, 8 to 10 weeks old); behavioral testing (Advanced Dynamic Weight Bearing Assessment, Open Field Assessment); functionality of mp verified by increased plasma levels; Calcitonin gene-related peptide aka CGRP, Substance P aka SP; peptides; dependence;

Q8633: X. Li, *et al.* Exercise training modulates glutamic acid decarboxylase-65/67 expression through TrkB signaling to ameliorate neuropathic pain in rats with spinal cord injury. Molecular Pain 2020;16(1744806920924511
Agents: Immunoglobulin G, TrkB **Vehicle:** PBS; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 2 weeks;
ALZET Comments: Animal info (adult female Sprague–Dawley rats); behavioral testing (Mechanical withdrawal thresholds assessment); TrkB Immunoglobulin G aka TrkB-IgG; spinal cord injury;

Q8644: J. Li, *et al.* Prolonged Use of NMDAR Antagonist Develops Analgesic Tolerance in Neuropathic Pain via Nitric Oxide Reduction-Induced GABAergic Disinhibition. Neurotherapeutics 2020;17(3):1016-1030
Agents: MK801; TrkB-Fc **Vehicle:** Saline; **Route:** CSF/CNS (Intrathecal); **Species:** Mice; Rat; **Pump:** 1004; 2ML4; **Duration:** 11 days;
ALZET Comments: Dose (5 ug/day MK801; 0.2 ug/day TrkB-Fc); Controls received mp w/ vehicle; animal info (Adult male Sprague-Dawley rats, 250-300 g; Adult male mice, 6 to 7 weeks old); behavioral testing (Mechanical Nociception Assays; Themal Nociceptioin Assays); MK801 aka N-methyl-D-aspartate receptor antagonist; spinal cord injury;

Q10025: S. Ilari, *et al.* Natural Antioxidant Control of Neuropathic Pain-Exploring the Role of Mitochondrial SIRT3 Pathway. Antioxidants (Basel) 2020;9(11):
Agents: Bergamot Polyphenolic fraction; Pregabalin **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Duration:** 21 days;
ALZET Comments: Dose (25, 50, 75 mg/kg Bergamot Polyphenolic fraction; 10 mg/kg Pregabalin); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (8 week old male Sprague Dawley rats, 225-250 g); behavioral testing (Mechanical allodynia, Mechanical hyperalgesia, Thermal hyperalgesia); Bergamot Polyphenolic fraction aka BPF; spinal cord injury;

Q8542: R. Hornung, *et al.* Reduced activity of GAD67 expressing cells in the reticular thalamus enhance thalamic excitatory activity and varicella zoster virus associated pain. Neuroscience Letters 2020;736(135287
Agents: Estradiol benzoate, 17-beta- **Vehicle:** PEG; **Route:** SC; **Species:** Rat; **Pump:** Not stated; **Duration:** 28 days;
ALZET Comments: Dose (750 ng/6 ul/day); animal info (Transgenic male (300 g) and female Long Evans rats (260 g)); replacement therapy (estradiol);

Q8472: T. Fujimura, *et al.* The pain-relieving effects of lactoferrin on oxaliplatin-induced neuropathic pain. Journal of Veterinary Medical Science 2020;
Agents: Lactoferrin, human recombinant **Vehicle:** PBS; **Route:** IV (external jugular); **Species:** Mice; **Pump:** Not Stated;
Duration: 2 weeks;
ALZET Comments: Dose (10 mg/kg/day); Controls received mp w/ vehicle; animal info (five-week-old male ICR mice); human recombinant lactoferrin aka rhLf; dependence;

Q6948: Y. Zhang, *et al.* Hyperbaric oxygen produces a nitric oxide synthase-regulated anti-allodynic effect in rats with paclitaxel-induced neuropathic pain. Brain Research 2019;
Agents: S-Methyl-L-thiocitrulline **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Dose (0.5 ± 0.1 µL/hr/day); 0.9% saline used; animal info (male Sprague Dawley); post op. care (Ampicillin, meloxicam); enzyme inhibitor (S-Methyl-L-thiocitrulline is a neuronal nitric oxide synthase (nNOS) inhibitor); Brain coordinates (AP–1.0 mm, ML –2.0 mm, DV –3.5mm from bregma); bilateral cannula used; dependence;

Q6990: L. Zhang, *et al.* Chronic pain induces nociceptive neurogenesis in dorsal root ganglia from Sox2-positive satellite cells. Glia 2019;
Agents: Tetrodotoxin **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (0.5 µL/hr); animal info (Male C57BL/6 mice 8–12 weeks old, 25–30 g); To block the injured sciatic nerve, the outlet of minipump was placed to 5 mm proximal to the ligature.

Q7037: J. Zhang, *et al.* Neuroinflammation and central PI3K/Akt/mTOR signal pathway contribute to bone cancer pain. Mol Pain 2019;15(1744806919830240
Agents: Rapamycin, LY294002, Interleukin-1Receptor antagonist, SC144, etanercept, **Vehicle:** CSF, artificial; **Route:** CSF/CNS (midbrain periaqueductal gray); **Species:** Rat; **Pump:** 1001D; **Duration:** Not Stated;
ALZET Comments: animal info (200-250 gr Wistar rats); rapamycin is an mTOR inhibitor; LY294002 is a PI3K inhibitor; IL-1Ra is an IL-1b receptor antagonist, SC144 is a gp130 antagonist, etanercept is a TNF-a receptor antagonist; ALZET brain infusion kit used; Brain coordinates (7.6 mm posterior to the bregma, 0.65mm lateral to the midline, and 4.2 mm ventral to the brain surface); Therapeutic indication (bone cancer pain);

Q9044: M. Yamada, *et al.* Increased Expression of Fibronectin Leucine-Rich Transmembrane Protein 3 in the Dorsal Root Ganglion Induces Neuropathic Pain in Rats. Journal of Neuroscience 2019;39(38):7615-7627
Agents: Goat anti-FLRT3; Goat IgG **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 1002; **Duration:** Not Stated;
ALZET Comments: Dose (0.2 ul/hr); animal info (Male, Wistar, 6-10 weeks old); Goat anti-Fibronetctin leucine-rich transmembrane protein 3 aka Goat anti-FLRT3; dependence;

Q7671: L. Sun, *et al.* MicroRNA-211-5p Enhances Analgesic Effect of Dexmedetomidine on Inflammatory Visceral Pain in Rats by Suppressing ERK Signaling. J Mol Neurosci 2019;68(1):19-28
Agents: Dexmedetomidine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 1 week;
ALZET Comments: Dose (25 ug/mL); Controls received mp w/ vehicle; animal info (Sprague Dawley, Male, 400 g); Dexmedetomidine aka DEX; enzyme inhibitor (a2 adrenergic receptor agonist); bilateral cannula used; dependence;

Q6999: S. J. Shiue, *et al.* Mesenchymal stem cell exosomes as a cell-free therapy for nerve injury-induced pain in rats. Pain 2019;160(1):210-223
Agents: Exosomes, human umbilical cord mesenchymal stem cell **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (1.2 mg/mL/ hr); Controls received mp w/ vehicle; animal info (Male Sprague–Dawley rats, 200 to 250 g); Therapeutic indication (neuropathic pain);

Q7427: M. Shinoda, *et al.* Spinal glial cell line-derived neurotrophic factor infusion reverses reduction of Kv4.1-mediated A-type potassium currents of injured myelinated primary afferent neurons in a neuropathic pain model. Mol Pain 2019;15(1744806919841196
Agents: Glial cell line-derived neurotrophic factor, recombinant human **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (0.5 mg/ml); Controls received mp w/ vehicle; animal info (adult male Sprague-Dawley rats weighing 210 to 240 g); Therapeutic indication (neuropathic pain);

Q8294: K. M. Nation, *et al.* Sustained exposure to acute migraine medications combined with repeated noxious stimulation dysregulates descending pain modulatory circuits: Relevance to medication overuse headache. Cephalalgia 2019;39(5):617-625
Agents: Sumatriptan succinate or Morphine Sulfate **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (Sumatriptan succinate- 0.6 mg/kg/day or 3 mg/kg/day or Morphine Sulfate- 7.68 mg/kg/day); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 175-200g); dependence;

Q8286: T. Miladinovic, *et al.* Spinal microglia contribute to cancer-induced pain through system xC (-)-mediated glutamate release. Pain Rep 2019;4(3):e738
Agents: Sulfasalazine **Vehicle:** Ammonium Hydroxide; **Route:** IP; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (6.6 mg/kg/day); Controls received mp w/ vehicle; animal info (BALBl/c, 4-6 weeks old); behavioral testing (Nociception Test); Sulfasalazine aka SSZ; cancer (Cancer-induced pain);

Q7578: S. Lux, *et al.* The antinociceptive effect of resveratrol in bone cancer pain is inhibited by the Silent Information Regulator 1 inhibitor selisistat. J Pharm Pharmacol 2019;71(5):816-825
Agents: Selistate **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 10074D; **Duration:** 1 week;
ALZET Comments: Dose (0.5 lg/h); Controls received mp w/ vehicle; animal info (Male BALB/c mice (20–30 g)); cancer (pain); Therapeutic indication (cancer pain (nociception));

Q8248: G. W. Lee, *et al.* Central VEGF-A pathway plays a key role in the development of trigeminal neuropathic pain in rats. Mol Pain 2019;15(1744806919872602
Agents: VEGF-A164 antibody **Vehicle:** Not stated; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (250 ng or 500 ng/day); Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 200-230 g); bilateral cannula used; neurodegenerative (Neuropathic pain);

Q8235: Y. Kuthati, *et al.* Melatonin MT2 receptor agonist IIK-7 produces antinociception by modulation of ROS and suppression of spinal microglial activation in neuropathic pain rats. J Pain Res 2019;12(2473-2485
Agents: MT2 agonists (IIK-7 or 4-p) **Vehicle:** Not stated; **Route:** SC; **Species:** Rat; **Pump:** Not stated; **Duration:** 7 days;
ALZET Comments: Dose (IIK-7- 0.5 ug/hr or 4-p- 1 ug/hr); Controls received mp w/ vehicle; animal info (Male, Wistar); MT2 agonist aka IIK-7 or 4-p ;

Q7522: J. Guindon, *et al.* (282) Sex Differences in the Development of Tolerance to Arachidonyl-2-Chloroethalamide (ACEA) in the Mouse Formalin Pain Model. The Journal of Pain 2019;20(4):
Agents: ACEA **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 8 days;
ALZET Comments: Dose (0.1, 0.5, 1 mg/kg); animal info (C57BL6); dependence;

Q8735: S. M. Green-Fulgham, *et al.* Oxycodone, fentanyl, and morphine amplify established neuropathic pain in male rats. Pain 2019;160(11):2634-2640
Agents: Fentanyl **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 5 days;
ALZET Comments: Dose (0.01 mg/kg/hr); Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 10 weeks old); dependence;

Q7994: A. K. Feehan, *et al.* Morphine immunomodulation prolongs inflammatory and postoperative pain while the novel analgesic ZH853 accelerates recovery and protects against latent sensitization. J Neuroinflammation 2019;16(1):100
Agents: Endomorphin analog **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 5 days;
ALZET Comments: Dose (1 ul/hr); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 59-67 days old, 250-300 g); Endomorphin analog aka ZH853; dependence;

Q8189: R. de la Puerta, *et al.* BMP-7 protects male and female rodents against neuropathic pain induced by nerve injury through a mechanism mediated by endogenous opioids. Pharmacol Res 2019;150(104470
Agents: recombinant BMP-7 **Vehicle:** CSF; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (6µg/kg/day); Controls received mp w/ vehicle; animal info (8–10 weeks old wild type 3 (C57BL/6) and BMP-7+/− male and female mice); recombinant BMP-7 aka rBMP-7; neurodegenerative (BMP-7 and its type I receptors were detected in regions of the nervous system involved in pain transmission, processing, and modulation);

Q8573: David H. Kim1, James D. Beckett1*, Varun Nagpal1, Manuel A. Seman-Senderos1,2, Russell A. Gould1,3, Tyler J. Creamer4, Elena Gallo MacFarlane1,4, Yichun Chen1, Djahida Bedja5, Jonathan T. Butcher3, Wayne Mitzner6, Rosanne Rouf5, Shoji Hata7, Daniel S. Warren4, Harry C. Dietz1,8†. Calpain 9 as a therapeutic target in TGF□-induced mesenchymal transition and fibrosis. Science Translational Medicine 2019;
Agents: Bleomycin; Angiotensin II **Vehicle:** Saline; **Route:** Not stated; **Species:** Mice; **Pump:** 1007D; 2004; **Duration:** 10 days; 28 days;
ALZET Comments: Dose (1.5 U/kg Bleomycin; 1.2 ug/kg/min Angiotensin II); Controls received mp w/ vehicle; animal info (Wild-type mice, 6 weeks old); Blood pressure measured via tail cuff method; Angiotensin II aka Ang II; cardiovascular;

Q7369: J. Ball, *et al.* (351) The Opioids Oxycodone, Fentanyl, and Morphine Amplify Neuropathic when Given after Chronic Pain is Established. The Journal of Pain 2019;20(4):
Agents: Fentanyl **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** Pump model not stated; **Duration:** 5 days;
ALZET Comments: Dose (0.01mg/kg/hr); Controls received mp w/ vehicle; animal info (Male, Sprague-dawley); dependence;

Q8158: P. Alvarez, *et al.* Unpredictable stress delays recovery from exercise-induced muscle pain: contribution of the sympathoadrenal axis. Pain Rep 2019;4(5):e782
Agents: Epinephrine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 2 weeks;
ALZET Comments: Dose (5.4 mg/0.25 mL/h); Controls received mp w/ vehicle; animal info (adult male Sprague-Dawley rats, weighing 250 to 400 g (approximately 8-12 weeks old)); antisense (intrathecal b2-adrenergic receptor antisense);

Q7270: L. S. Almeida, *et al.* Amylin, a peptide expressed by nociceptors, modulates chronic neuropathic pain. Eur J Pain 2019;23(4):784-799
Agents: Amylin **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (2 ug/kg/hr); Controls received mp w/ vehicle; animal info (male Wistar rats, 175 and 225 g); behavioral testing (von Frey, pinprick and acetone tests); spinal cord injury;

Q7036: X. Zhang, *et al.* Sustained stimulation of beta2- and beta3-adrenergic receptors leads to persistent functional pain and neuroinflammation. Brain, Behavior, and Immunity 2018;73(520-532
Agents: OR486, ICI118551, SR59230A, Etanercept, SB203580, and U0126 **Vehicle:** DMSO, ethanol, saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (OR486 (15 mg/kg/day), ICI118551 (1.5 mg/kg/day), SR59230A (1.67 mg/kg/day)), SB203580 (12 µg/day), U0126 (12 µg/day) and Etanercept (10 µg/day); OR486 was dissolved in DMSO/ethanol/0.9% saline at 5:2:3 ratio. ICI118551 and SR59230A were dissolved in DMSO and 0.9% saline at 1:4 ratio; Etanercept, SB203580, and U0126 were dissolved in DMSO and 0.9% saline at 1:1 ratio.Controls received mp w/ vehicle; OR486 is a COMT inhibitor, ICI118551 is a β2AR antagonist; SR59230A is a β3AR antagonist; enzyme inhibitor (catechol-O-methyltransferase); delayed delivery (the Lynch method was used to delay delivery of ICI118551+SR59230A until day 7 using coiled PE50 polyethylene tubing;

Q6907: D. Xu, *et al.* Participation of pro-inflammatory cytokines in neuropathic pain evoked by chemotherapeutic oxaliplatin via central GABAergic pathway. Mol Pain 2018;14(1744806918783535
Agents: Interleukin 1 receptor antagonist; SC144; etanercept **Vehicle:** CSF, artificial; **Route:** CSF/CNS (periaqueductal gray); **Species:** Rat; **Pump:** 1003D; **Duration:** 3 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (Adult male Sprague-Dawley rats weighing 200–250 g); enzyme inhibitor (IL-1Ra is a IL-1b receptor antagonist; SC144 is a gp130 antagonist to block IL-6R, and etanercept is a TNF-a receptor antagonist); ALZET brain infusion kit used; Brain coordinates (7.6 mm posterior to the bregma, 0.65 mm lateral to the midline, and 4.2 mm ventral to the brain surface);

Q8777: Y. Wang, *et al.* Targeting Calpain for Heart Failure Therapy: Implications From Multiple Murine Models. JACC: Basic to Translational Science 2018;3(4):503-517
Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 2 weeks;
ALZET Comments: Dose (30 mg/kg/day); Controls received mp w/ agent; animal info (9-10 weeks, male, C57BL/6N or CAPN1-OExJP2-OE); comparison of myocardial infarction surgery or transverse aortic banding vs mp; ischemia (Myocardial infarction); cardiovascular; mp used to induce chronic heart failure in mice;

Q7884: A. Van Elstraete, *et al.* The Opiorphin Analog STR-324 Decreases Sensory Hypersensitivity in a Rat Model of Neuropathic Pain. Anesthesiology 2018;126(6):2102-2111
Agents: STR-324 **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** 7 days;
ALZET Comments: Dose (10, 50, 250 µg/10 µL); Controls received sham surgery and mp w/ vehicle; animal info (male, Sprague-Dawley, 250-275g); behavioral testing (Von Frey test, Thermal Paw Withdrawal, Paw Posture Rating); STR-324 is a pyroglutamate-opiorphin which provides a similar level of analgesia as opiorphin; neurodegenerative (peripheral mononeuropathy);

Q6900: Tramullas M, *et al.* MicroRNA-30c-5p modulates neuropathic pain in rodents. Science Translational Medicine 2018;10(453):
Agents: Transforming growth factor-b1 **Vehicle:** Hydrochloric acid; albumin; PBS; **Route:** Not Stated; **Species:** Mice (knockout); **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (6.2 ng/hour); animal info (BAMBI−/− mice); Therapeutic indication (chronic pain);

Q7304: K. Stockstill, *et al.* Dysregulation of sphingolipid metabolism contributes to bortezomib-induced neuropathic pain. J Exp Med 2018;215(5):1301-1313
Agents: FYT720, ponesimod, NIBR14 **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal; L5/L6 lumbar); **Species:** Rat, Mice; **Pump:** 2001; **Duration:** 6 days;
ALZET Comments: 5% Tween 80, 5% ethanol, saline used; Controls received mp w/ vehicle; animal info (Male, Sprague Dawley rats, 200–220 g); animal info (Male, Sprague Dawley rats, 200–220 g); FTY720 AKA fingolimod; Ponesimod AKA ACT-128800; NIBR14 is a methyl ester pro-drug; FTY720 AKA fingolimod; Ponesimod AKA ACT-128800; NIBR14 is a methyl ester pro-drug;

Q7264: C. Rivat, *et al.* Inhibition of neuronal FLT3 receptor tyrosine kinase alleviates peripheral neuropathic pain in mice. Nat Commun 2018;9(1):1042
Agents: RNA, small interfering (Flt3, scrambled) **Vehicle:** Not Stated; **Route:** CSF/CNS(Intrathecal); **Species:** Mice; **Pump:** 1002; **Duration:** 6 days;
ALZET Comments: Dose (12.53 ng/ml); animal info (C57BL/6 naive mice, Flt3KO mice 25–30 g.); behavioral testing (reflexive tail flick); spinal cord injury; stress/adverse reaction: (see pg. 10);

Q6892: B. Remeniuk, *et al.* Disease modifying actions of interleukin-6 blockade in a rat model of bone cancer pain. Pain 2018;159(4):684-698
Agents: TB-2-081 **Vehicle:** PEG 400; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (1 mg/kg/day); Controls received mp w/ vehicle; cancer (bone);

Q8143: K. M. Nation, *et al.* Lateralized kappa opioid receptor signaling from the amygdala central nucleus promotes stress-induced functional pain. Pain 2018;159(5):919-928
Agents: Morphine Sulfate **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (7.68 mg/kg/day); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 175-200 g); post op. care (Gentamycin); neurodegenerative (Functional Pain Syndrome);

Q7232: T. Miladinovic, *et al.* Functional effects of TrkA inhibition on system xC(-)-mediated glutamate release and cancer-induced bone pain. Mol Pain 2018;14(1744806918776467
Agents: AG879 **Vehicle:** DMSO; **Route:** IP; **Species:** Mice; **Pump:** 1002; **Duration:** Not Stated;
ALZET Comments: Dose (5 mg/kg/day); animal info (immunocompetent female BALB/c mice, 4 to 6 weeks old, 20g); AG879 is a TrkA inhibitor; enzyme inhibitor (Tyrosine kinase A); cancer (Breast cancer);

Q6913: Michael Mousseau, *et al.* Microglial pannexin-1 channel activation is a spinal determinant of joint pain. Science Advances 2018;4(8):
Agents: A740003; mimetic peptide inhibitor of Panx1; 10panx; scrpanx; Mac1-saporin; Saporin **Vehicle:** Not Stated; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** Not Stated; **Duration:** 7 days;
ALZET Comments: animal info (adult male Sprague-Dawley rats); enzyme inhibitor (P2X7R antagonist A740003); Therapeutic indication (arthritis);

Q7768: S. Kim, *et al.* Acupuncture Resolves Persistent Pain and Neuroinflammation in a Mouse Model of Chronic Overlapping Pain Conditions. J Pain 2018;19(12):1384 e1-1384 e14
Agents: Dinitrocatechol, 3,5- **Vehicle:** saline, DMSO and ethanol buffered; **Route:** SC; **Species:** Mice (adult); **Pump:** 1002; **Duration:** 13 days;
ALZET Comments: Dose (15 mg/kg/d); 5:2:3 ratio of DMSO, ethanol and saline used; Controls received mp w/ vehicle; animal info (12-16 weeks, male and female, C57BL/6 or MRL/MpJ); behavioral testing (von Frey test); comparison of acupuncture vs mp; 3,5-Dinitrocatechol AKA OR486 is a COMT inhibitor; enzyme inhibitor (catechol-O-methyltransferase);

Q7026: P. M. Grace, *et al.* Protraction of neuropathic pain by morphine is mediated by spinal damage associated molecular patterns (DAMPs) in male rats. Brain, Behavior, and Immunity 2018;72(45-50
Agents: naloxone; A438079; YVAD-cmk, Ac- **Vehicle:** Not Stated; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 2001; **Duration:** Not Stated;
ALZET Comments: Dose (naloxone: 60 ug/h; A438079: 30 ng/h; ac-YVAD-cmk: 1 ug/h); animal info (10-12 week old male Fischer 344 rats); enzyme inhibitor (caspase-1);

Q6946: C. Alba-Delgado, *et al.* The onset of treatment with the antidepressant desipramine is critical for the emotional consequences of neuropathic pain. Pain 2018;159(12):2606-2619
Agents: Desipramine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 2 weeks;
ALZET Comments: Dose (10 mg/kg/day); Controls received mp w/ vehicle; animal info (45-55 day old male Sprague–Dawley rats weighing 200-250 g); Therapeutic indication (neuropathy);

Q7095: F. Aizawa, *et al.* The involvement of free fatty acid-GPR40/FFAR1 signaling in chronic social defeat stress-induced pain prolongation in C57BL/6J male mice. Psychopharmacology (Berl) 2018;235(8):2335-2347
Agents: GW1100 **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (1.0 µg/12 µL/day); 0.4% DMSO used; Controls received mp w/ vehicle; animal info (Male C57BL/6J- 8 weeks old, male ICR- 5 weeks old); behavioral testing (Open-field test, Social interaction test, Elevated plus-maze test); GW1100 is a GPR40/FFAR1 antagonist; Brain coordinates (Bregma − 1.0 mm, mid-sagittal line− 1.0 mm); dependence;

Q6332: J. Zhang, *et al.* Prevention and reversal of latent sensitization of dorsal horn neurons by glial blockers in a model of low back pain in male rats. J Neurophysiol 2017;118(4):2059-2069
Agents: Minocycline, fluorocitrate **Vehicle:** PBS, artificial cerebrospinal fluid; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 2002; **Duration:** 6 days, 3 days;
ALZET Comments: Dose (200 µg/day); Controls received mp w/ vehicle; animal info (adult male Sprague- Dawley rats);

Q6232: S. F. Rosen, *et al.* T-Cell Mediation of Pregnancy Analgesia Affecting Chronic Pain in Mice. J Neurosci 2017;37(41):9819-9827
Agents: Estradiol, 17b-; Progesterone sulfate **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (17b-estradiol : 0.1 mg/kg/d, progesterone sulfate: 0.25 mg/kg/d, 0.1 mg/kg/d estradiol + 0.25 mg/kg/d progesterone); Controls received mp w/ vehicle; animal info (7-12 week old female C57BL/6J mice); replacement therapy (estradiol, ovariectomy); Therapeutic indication

Q6751: J. Qian, *et al.* D-beta-hydroxybutyrate promotes functional recovery and relieves pain hypersensitivity in mice with spinal cord injury. British Journal of Pharmacology 2017;174(13):1961-1971
Agents: Hydroxybutyrate, D-β- **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 2001; **Duration:** 24 hours;
ALZET Comments: Dose (0.4, 0.8 and 1.6 mmol/kg/day),); Controls received mp w/ vehicle; animal info (C57BL/6J (male, 12-weekold) mice); spinal cord injury;

Q6702: A. Nagahisa, *et al.* Pharmacology of grapiprant, a novel EP4 antagonist: receptor binding, efficacy in a rodent postoperative pain model, and a dose estimation for controlling pain in dogs. J Vet Pharmacol Ther 2017;40(3):285-292
Agents: Grapiprant **Vehicle:** Cyclodextrin, sulfobutylether-b-; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** 7 days;
ALZET Comments: Dose (15, 30, and 60 mg/mL); 20% sulfobutylether-b-cyclodextrin used; Controls received mp w/ vehicle; animal info (Seven-week-old male Sprague Dawley rats);

Q6200: D. S. Montgomery, *et al.* ENaC activity is regulated by calpain-2 proteolysis of MARCKS proteins. American Journal of Physiology Cell Physiology 2017;313(1):C42-C53
Agents: Calpain-2 inhibitor A6060 **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 7 days;
ALZET Comments: Dose (20 uM); 50% DMSO used; Controls received mp w/ vehicle; animal info (22g SV129 wild-type mice);

Q6412: B. L, *et al.* CXCR1/2 pathways in paclitaxel-induced neuropathic pain. ONCOTARGET 2017;8(14):23188-23201
Agents: Reparixin L-lysine salt **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (8mg/hr/ kg); Controls received mp w/ vehicle; animal info (male Wistar rats weighing 200-250 g);

Q6254: S. A. Grenald, *et al.* Targeting the S1P/S1PR1 axis mitigates cancer-induced bone pain and neuroinflammation. Pain 2017;158(9):1733-1742
Agents: FTY720 **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Dose (1 mg/kg/d); Controls received mp w/ vehicle; animal info (Female BALB/c mice weighing 18-20 g); comparison of single daily injection vs mp; FTY720 aka fingolimod; cancer ();

Q5812: M. Flinspach, *et al.* Insensitivity to pain induced by a potent selective closed-state Nav1.7 inhibitor. Sci Rep 2017;7(39662
Agents: JNJ63955918, Morphine **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 2002, 2001; **Duration:** 14 days, 2 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (250-300g) behavioral testing (Hargreaves test, hotplate test, tail-flick test, formalin flinching); JNJ63955918 is a tarantula venom-derived peptide (a potent, highly selective, closed-state Nav1.7 blocking peptide) ; Therapeutic indication (Pain, analgesia, electrophysiology);

Q6379: J. Fazzari, *et al.* Identification of capsazepine as a novel inhibitor of system xc(-) and cancer-induced bone pain. J Pain Res 2017;10(915-925
Agents: Capsazepine **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice (nude); **Pump:** 1004; **Duration:** 28 days;
ALZET Comments: Dose (5 and 10 mg/kg); animal info (4-6 week old female athymic BALB/c nu/nu homozygous nude mice); behavioral testing (Dynamic Plantar Aesthesiometer and the Dynamic Weight Bearing); Capsazepine is an inhibitor of xCT in MDA-MB-231 cancer cells;

Q6028: I. M. Devonshire, *et al.* Manganese-enhanced magnetic resonance imaging depicts brain activity in models of acute and chronic pain: A new window to study experimental spontaneous pain? Neuroimage 2017;157(500-510
Agents: Manganese chloride **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 14 days;
ALZET Comments: Controls received mp w/ vehicle; behavioral testing (voluntary wheel running); MRI-compatible polyetheretherketone tubing; Therapeutic indication (osteoarthritis, fmri); Dose (80 mg/kg);

Q5784: K. Deseure, *et al.* Differential drug effects on spontaneous and evoked pain behavior in a model of trigeminal neuropathic pain. J Pain Res 2017;10(279-286
Agents: Carbamazepine, baclofen, clomipramine **Vehicle:** DMSO, PEG, Ethyl Alcohol, Acetone; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** Not Stated;
ALZET Comments: Controls received mp w/ vehicle; animal info (7 weeks old); dimethyl sulfoxide, propylene glycol, ethyl alcohol, and acetone at a ratio of 42:42:15:1; post op. care (morphine 5 mg/day); behavioral testing (Facial grooming); Therapeutic indication (Trigeminal neuralgia, neuropathic pain);
Dose (30 mg/day carbamazepine (the first-line drug treatment for trigeminal neuralgia), 1.06 mg/day baclofen, 4.18 mg/day clomipramine, and 5 mg/day morphine);

Q6006: K. T. Chang, *et al.* Leptin is essential for microglial activation and neuropathic pain after preganglionic cervical root avulsion. Life Sci 2017;187(31-41
Agents: Leptin **Vehicle:** PBS; **Route:** CSF/CNS (Cervical); **Species:** Mice; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male and female, C57B/6 J (B6) and Ob); Therapeutic indication (Obesity, Neuropathic pain); Dose (1 ug/day);

Q6005: M. Cha, *et al.* Repetitive motor cortex stimulation reinforces the pain modulation circuits of peripheral neuropathic pain. Sci Rep 2017;7(1):7986
Agents: Pseudosubstrate inhibitory peptide **Vehicle:** Saline; **Route:** CSF/CNS (anterior cingulate cortex); **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (200-220g); ALZET brain infusion kit 1 used; Therapeutic indication (Neuropathic pain); Dose (10 nmol/uL);

Q5761: S. Capsoni, *et al.* The chemokine CXCL12 mediates the anti-amyloidogenic action of painless human nerve growth factor. Brain 2017;140(1):201-217
Agents: Nerve growth factor, human painless **Vehicle:** PBS; **Route:** CSF/CNS; **Species:** Mice (transgenic); **Pump:** Not Stated; **Duration:** 28 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (wt and transgenic 5xFAD); neurodegenerative (Alzheimer's disease); behavioral testing (Y-maze test); Therapeutic indication (Alzheimer's disease); Dose (.54 ug/kg);

Q5118: X. Zhuang*, et al.* Contribution of Pro-inflammatory Cytokine Signaling within Midbrain Periaqueductal Gray to Pain Sensitivity in Parkinson's Disease via GABAergic Pathway. Front Neurol 2016;7(104
Agents: Interleukin-1 receptor antagonist; SC144; etanercept; muscimol **Vehicle:** CSF, artificial; **Route:** CSF/CNS (midbrain periaqueductal gray); **Species:** Rat; **Pump:** 1003D; **Duration:** 3 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 150-200g); ALZET brain infusion kit used; neurodegenerative (Parkinson's disease); behavioral testing (paw withdrawal latency; von Frey filaments); SC144 is an gp130 antagonist; etanercept is a TNF-a receptor antagonist; muscimol is a GABAa receptor agonist; Brain coordinates (7.6 mm posterior to the bregma 0.65 mm lateral to the midline, and 4.2 mm ventral to the brain surface.);

Q4914: H. Yamanaka*, et al.* Annexin A2 in primary afferents contributes to neuropathic pain associated with tissue type plasminogen activator. Neuroscience 2016;314(189-99
Agents: Homocysteine; tPA **Vehicle:** PBS; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 2001; 2001D; **Duration:** 9 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 200-250g); dose-response (pg195); behavioral testing (mechanical withdrawal threshold); Dose (homocysteine 1.2 umol/day or 120 nmol/day; tPA 2 ug/day);

Q5496: J. Y. Xie*, et al.* Sustained relief of ongoing experimental neuropathic pain by a CRMP2 peptide aptamer with low abuse potential. Pain 2016;157(9):2124-40
Agents: R9-CBD3-A6K **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2001D; 1003; **Duration:** 24 hours; 72 hours;
ALZET Comments: Controls received mp w/ saline; animal info (female, Sprague-Dawley, 150-200g); behavioral testing (light-dark box test; open field test; elevated plus maze; tail suspension test; novel object recognition); pumps primed prior to implantation; Dose (0.17 mg/hg or 0.22 mg/h);

Q5484: L. Wang*, et al.* Bisphosphonates Inhibit Pain, Bone Loss, and Inflammation in a Rat Tibia Fracture Model of Complex Regional Pain Syndrome. Anesthesia & Analgesia 2016;123(4):1033-45
Agents: Alendronate **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 4 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 10 months old); no stress (see pg. 1038); behavioral testing (von Frey filaments); immunology; Dose (3 ug/kg/day or 60 ug/kg/day);

Q5212: T. Tamagawa*, et al.* Involvement of Microglial P2Y12 Signaling in Tongue Cancer Pain. J Dent Res 2016;95(10):1176-82
Agents: MRS2395 **Vehicle:** DMSO; PBS; **Route:** CSF/CNS (cisterna magna); **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Fischer, 100-200g); 25% DMSO used; cancer (tongue squamous cell carcinoma SCC-158, JCRB0231; JCRB); behavioral testing (head-withdrawal); tissue perfusion (cisterna magna); used PE tubing 0.8mm diameter; MRS2395 is an P2Y12R antagonist;

Q6616: R. Matos*, et al.* Bladder pain induced by prolonged peripheral alpha 1A adrenoceptor stimulation involves the enhancement of transient receptor potential vanilloid 1 activity and an increase of urothelial adenosine triphosphate release. Acta Physiologica 2016;218(4):265-275
Agents: Phenylephrine **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 1002; **Duration:** Not Stated;
ALZET Comments: Dose (0.0498 mg/day); Controls received mp w/ vehicle; animal info (female Wistar rats); enzyme inhibitor (selective a1-adrenoceptor agonist); Therapeutic indication (chronic visceral pain);

Q5388: A. Leung*, et al.* Regular physical activity prevents chronic pain by altering resident muscle macrophage phenotype and increasing interleukin-10 in mice. Pain 2016;157(1):70-9
Agents: Interleukin-10 **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 2001; **Duration:** 9 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, female C57BL/6 mice, 8 – 12 weeks old); functionality of mp verified by hind limb muscle withdrawal; behavioral testing (running wheel); "Mice treated with systemic IL-10 had significantly less hyperalgesia compared with mice that received vehicle" pg. 75; analgesia produced by regular physical activity; Dose (2 ug/day);

Q5838: H. K. Kim, *et al.* Tempol Ameliorates and Prevents Mechanical Hyperalgesia in a Rat Model of Chemotherapy-Induced Neuropathic Pain. Front Pharmacol 2016;7(532
Agents: Tempol **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (200-350 g); cancer (Chemotherapy); behavioral testing; Therapeutic indication (Pain study, chemotherapy-induced neuropathic pain); Dose (200 mg/kg);

Q5621: H. Kim. Pentoxifylline Ameliorates Mechanical Hyperalgesia in a Rat Model of Chemotherapy-Induced Neuropathic Pain. Pain Physician 2016;19(4):589-600
Agents: Pentoxifylline **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (200-350g); cancer; Chronic Pain study; Therapeutic indication (Chemotherapy); Dose (.96 mg/day);

Q4840: Z. Jiang, *et al.* Blocking mammalian target of rapamycin alleviates bone cancer pain and morphine tolerance via u-opioid receptor. International Journal of Cancer 2016;138(2013-2020
Agents: Rapamycin; CTOP; LY297002 **Vehicle:** DMSO; saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Controls received mp w/ saline; animal info (Wistar, 200-250g); 50% DMSO used; cancer (breast; bone); dose-response (pg 2015); behavioral testing (hindpaw withdrawal latency); Rapamycin is an mTOR antagonist; CTOP is an MOR antagonist; LY297002 is a PI3K inhibitor;

Q6048: Y. Hayano, *et al.* Dorsal horn interneuron-derived Netrin-4 contributes to spinal sensitization in chronic pain via Unc5B. J Exp Med 2016;213(13):2949-2966
Agents: Netrin-4 **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 1002; **Duration:** 28 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (8-10 weeks old, Wistar; 200-280g); behavioral testing (von Frey filament test); Therapeutic indication (Chronic pain);

Q5815: S. Fuseya, *et al.* Systemic QX-314 Reduces Bone Cancer Pain through Selective Inhibition of Transient Receptor Potential Vanilloid Subfamily 1-expressing Primary Afferents in Mice. Anesthesiology 2016;125(1):204-18
Agents: QX-314 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1003D; **Duration:** 14 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (20-25g); cancer; behavioral testing (pain related behavior); Therapeutic indication (Bone cancer, pain);
Dose (3, 5 mg/kg);

Q6094: L. Deng, *et al.* Prophylactic treatment with the tricyclic antidepressant desipramine prevents development of paclitaxel-induced neuropathic pain through activation of endogenous analgesic systems. Pharmacol Res 2016;114(75-89
Agents: Desipramine, naloxone, AM251, AM630 **Vehicle:** Water, saline, PEG 400, DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 28 days;
ALZET Comments: Dose: Desipramine (10 mg/kg/d), Naloxone (12 mg/kg/d), AM251 (3 mg/kg/d), AM630 (3 mg/kg/day); Desipramine dissolved distilled water, naloxone dissolved in saline, AM251 and AM630 dissolved in 50% PEG400 and 50% DMSO; Controls received mp w/ vehicle; animal info (Sprague-Dawley rats weighing 275–350 g); Multiple pumps per animal (2 when given the treatment of 2 different agents), Desipramine, vehicle, and all antagonists were delivered in separate osmotic pumps;

Q5315: L. Bravo, *et al.* Effect of DSP4 and desipramine in the sensorial and affective component of neuropathic pain in rats. Prog Neuropsychopharmacol Biol Psychiatry 2016;70(57-67
Agents: Desipramine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 2 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (Adult male Harlan Sprague-Dawley rats, 200-250 g); functionality of mp verified by pain level measurements; functionality of mp verified by pain level measurements; Noradrenaline reuptake inhibitor; Chronic Constriction Injury (CCI); Therapeutic indication (Pain); Dose (10 mg/kg/d);