Recent References (2018-Present) on the Intrathecal Administration of Agents Using ALZET® Osmotic Pumps

Q11344: Y. Kuthati, *et al.* Teneligliptin Co-Infusion Alleviates Morphine Tolerance by Inhibition of Spinal Microglial Cell Activation in Streptozotocin-Induced Diabetic Rats. Antioxidants (Basel) 2023;12(7):
Agents: Teneligliptin; morphine **Vehicle:** DMSO; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Wistar; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose: mor 15 ug/h; ten 2 ug/h, or both mor + ten; 4% DMSO used; controls received mp w/ saline; animal info (Male); polyethylene catheter; behavioral testing (mechanical paw withdrawal threshold and tail-flick tests); diabetes; (neuropathic pain)

Q11020: S. H. Wang, *et al.* Hyperbaric Oxygen Therapy Alleviates Paclitaxel-Induced Peripheral Neuropathy Involving Suppressing TLR4-MyD88-NF-kappaB Signaling Pathway. International Journal of Molecular Sciences 2023;24(6):
Agents: TAK-242 **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose; TAK-242 (20 ug); 0.9% normal saline used; Controls received mp w/ vehicle; animal info: Male 180–200 g; TAK-242 is a TLR4 antagonist; chemotherapy induced neuropathy

Q10963: S. Minamiyama, *et al.* Efficacy of oligodendrocyte precursor cells as delivery vehicles for single-chain variable fragment to misfolded SOD1 in ALS rat model. Molecular Therapy: Methods and Clinical Development 2023;28(312-329
Agents: D3-1 antibody, mouse **Vehicle:** PBS; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** SOD1H46R; **Pump:** 2ML4; **Duration:** 4 weeks;
ALZET Comments: Dose (1 mg/mL); Controls received mp w/ vehicle; animal info: 1- to 2-day-old Sprague-Dawley rats; behavioral testing (Hindfoot reflex test; Inclined plate test; Grip test); functionality of mp verified by D3-1 concentrations with ELISA; neurodegenerative: Amyotrophic lateral sclerosis; good methods p. 14

Q11282: J. Y. Hong, *et al.* Epidural Injection Method for Long-Term Pain Management in Rats with Spinal Stenosis. Biomedicines 2023;11(5):
Agents: Not Stated **Vehicle:** Not Stated; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Not Stated; **Pump:** Not Stated; **Duration:** Not Stated;
ALZET Comments: ALZET mention "Previous studies have used implantable mini-osmotic pumps to continuously deliver drugs into the intrathecal space [16]. An osmotic pump (Alzet, Alza, Palo Alto, CA, USA) capable of supplying a certain drug concentration at a constant rate was developed and used in multiple animal species as small as mice. This can be achieved by implantation at multiple anatomical sites for long-term drug delivery, generally over a 2- to 4-week period in the case of rats."

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; **Strain:** Not Stated; **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;

Q10460: C. De Luca, *et al.* Matrix metalloproteinases, purinergic signaling, and epigenetics: hubs in the spinal neuroglial network following peripheral nerve injury. Histochemistry and Cell Biology 2022;157(5):557-567
Agents: GM6001 **Vehicle:** CSF, artificial; **Route:** CSF/CNS (intrathecal, subarachnoid space); **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2001; **Duration:** 8 days;
ALZET Comments: Dose: (180 ug/ul, 100 mg/kg/day); Controls received mp w/ vehicle; animal info: Adult (250–300 g;) ratsGM6001 aka (GM); peripheral nerve injury

Q11333: H. Tanaka*, et al.* HMGB1 signaling phosphorylates Ku70 and impairs DNA damage repair in Alzheimer's disease pathology. Communications Biology 2021;4(1):1175
Agents: Go6976 **Vehicle:** Not Stated; **Route:** CSF/CNS (intrathecal); **Species:** Mice; **Strain:** 5xFAD; C57BL/6SJL background; **Pump:** 2006; **Duration:** 4.5 months;
ALZET Comments: Dose: 6.6 uM; behavioral testing (Y-maze Test); PKC inhibitor; neurodegenerative (Alzheimer's Disease);

Q10882: Y. Zhang*, et al.* Extracellular Vesicle-Encapsulated microRNA-23a From Dorsal Root Ganglia Neurons Binds to A20 and Promotes Inflammatory Macrophage Polarization Following Peripheral Nerve Injury. Aging 2021;
Agents: Vesicles, extracellular; miR-23a inhibitor, locked nucleic acid based; Oligomer, interfered control **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Dose: (1.4 mg/hr, oligomers 12 pmol/day); Controls received mp w/ vehicle; animal info: male mice (aged 8 weeks); behavioral testing: Paw withdrawal using Dixon's "up-down" method; polyethylene catheter used;

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:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2001; **Duration:** 14 days;
ALZET Comments: Dose (30 or 300 ug/day); Controls received mp w/ vehicle; animal info (male, 200–250 g); spinal cord injury;

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; **Strain:** Sprague Dawley; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: Dose (96 ug/day); Controls received mp w/ vehicle; 70% DMSO used; animal info (Male ; Pathogen-free; 100-120 g); behavioral testing (Paw withdrawal threshold using von Frey filament; Naloxone challenge test); spinal cord injury;

Q10620: A. Nakano*, et al.* Intrathecal Infusion of Diosgenin during the Chronic Phase of Spinal Cord Injury Ameliorates Motor Function and Axonal Density. Neurochemical Journal 2021;15(4):454-461
Agents: Diosgenin **Vehicle:** CSF, artificial; **Route:** CSF/CNS (intrathecal); **Species:** Mice; **Strain:** ddY **Pump:** 1004 **Duration:** 56d
ALZET Comments: Dose: (0.1 µM); 0.1% ethanol vehicle used; Controls received mp w/ vehicle; animal info: Eight-week-old female; post op. care: During and after surgery, the mice were placed on a heating pad to maintain their body temperature; behavioral testing: Climbing performance; spinal cord injury; mouse intrathecal catheter used; pumps replaced after 28 days

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; **Strain:** Wistar; **Pump:** 2001; **Duration:** 7 d
ALZET Comments: Dose: (5 ug/1 uL/h); Controls received mp w/ vehicle; animal info: Male rats; behavioral testing; Behavior Test for Tactile Allodynia; Behavior Test for Thermal Hyperalgesia;Teneligliptin aka (TEN) is a dipeptidyl peptidase-4 inhibitor

Q10113: P. Bonilla*, et al.* Human-Induced Neural and Mesenchymal Stem Cell Therapy Combined with a Curcumin Nanoconjugate as a Spinal Cord Injury Treatment. International Journal of Molecular Sciences 2021;22(11):
Agents: Polyacetal-curcumin nanoconjugate **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague–Dawley; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Saline 0.9% vehicle used; Controls received mp w/ vehicle; animal info: Female weighing 300g; post op. care: buprenorphine; behavioral testing: open-field BBB locomotor scale and video-based system for automated gait analysis; PA-C aka polyacetal-curcumin nonconjugate; 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; **Strain:** Sprague-Dawley; **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 rats, 250-300 g; Adult male mice, 6 to 7 weeks old); behavioral testing (Mechanical Nociception Assays; Themal Nociception Assays); MK801 aka N-methyl-D-aspartate receptor antagonist; spinal cord injury;

Q8593: Y. Kamata, *et al.* Paclitaxel Induces Upregulation of Transient Receptor Potential Vanilloid 1 Expression in the Rat Spinal Cord. International Journal of Molecular Sciences 2020;21(12):
Agents: RNA, small interfering; TRPV1 **Vehicle:** CSF, artificial; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Wistar; **Pump:** Not stated; **Duration:** 3 days;
ALZET Comments: Dose (0.5 nmol/µL/h); Controls received mp w/ vehicle; animal info (Male rats weighing 250 to 320 g); behavioral testing (Mechanical or Thermal Stimulation); dependence;

Q10141: T. Chen, *et al.* Astrocyte-microglia interaction drives evolving neuromyelitis optica lesion. Journal of Clinical Investigation 2020;130(8):4025-4038
Agents: Immunoglobulin G, human; Immunoglobulin G, mouse **Vehicle:** Not Stated; **Route:** CSF/CNS (intrathecal); **Species:** Mice; **Strain:** C57BL/6J; Cx3cr1; **Pump:** Not Stated; **Duration:** 5, 7 days;
ALZET Comments: Dose IgG (1.0–10 µg/day;) Controls received mp w/ vehicle; animal info Female, 6–8 weeks old; behavioral testing (Rotarod performance test); Immunoglobulin G aka (IgG); immunology;

Q8413: I. J. Chen, *et al.* The Circadian Hormone Melatonin Inhibits Morphine-Induced Tolerance and Inflammation via the Activation of Antioxidative Enzymes. Antioxidants (Basel) 2020;9(9):
Agents: Morphine **Vehicle:** DMSO; Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Wistar; **Pump:** Not stated; **Duration:** 10 days;
ALZET Comments: 0.9% Saline used; Controls received mp w/ vehicle; animal info (adult male rats, 300-350 g); behavioral testing (Nociceptive Test); 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; **Strain:** Sprague–Dawley; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (1.2 mg/mL/ hr); Controls received mp w/ vehicle; animal info (Male rats, 200 to 250 g); Therapeutic indication (neuropathic pain);

Q7660: M. P. Schneider, *et al.* Anti-Nogo-A Antibodies As a Potential Causal Therapy for Lower Urinary Tract Dysfunction after Spinal Cord Injury. J Neurosci 2019;39(21):4066-4076
Agents: Antibody, anti-Nogo-A **Vehicle:** Not Stated; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Lewis; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (5 µl/h, 3 mg of antibody/ml); Controls received mp w/ inactive control antibody; animal info (4+/-1 months, female, 210+/-20g); spinal cord injury; Pump and catheter were removed 15–16 d after implantation under 5% isoflurane; Therapeutic indication (reduction of the impairment of several key urodynamic functions such as recovery of the physiological EUS function during voiding after induced SCI);

Q7679: P. Liu, *et al.* Inhibitory effect of hyaluronidase-4 in a rat spinal cord hemisection model. Cancer Translational Medicine 2019;5(1):10-16
Agents: Antibody, anti-Hyal-4; IgG **Vehicle:** Not Stated; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague–Dawley; **Pump:** 1004; **Duration:** 4 weeks;
ALZET Comments: animal info (Female); spinal cord injury;

Q10237: W. Lin, *et al.* NMDAR and JNK Activation in the Spinal Trigeminal Nucleus Caudalis Contributes to Masseter Hyperalgesia Induced by Stress. Frontiers in Cellular Neuroscience 2019;13(495
Agents: SP600125 **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague–Dawley; **Pump:** Not Stated; **Duration:** 11 days;
ALZET Comments: Dose: SP600125 (1 mg/ml); 0.9% Saline vehicle used; Controls received mp w/ vehicle; animal info: Adult male (180–220 g); behavioral testing: open-field test and elevated plus maze test; SP600125 is a JNK inhibitor

Q7622: S. Kokubu, *et al.* Characterization of Analgesic Actions of the Chronic Intrathecal Infusion of H-Dmt-D-Arg-Phe-Lys-NH2 in Rat. Neuromodulation 2019;
Agents: DMT-DALDA; morphine sulfate **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2001, 2002; **Duration:** 7 days, 14 days;
ALZET Comments: Dose ((DMT-DALDA 0.3, 1, 3, or 10 pmol/µL/hour), (MS 37.5 nmol/hour)); dose-response (Figure 1a graph on page 4); Controls received mp w/ vehicle; animal info (adult, male, , 225-300g); behavioral testing (Hargreaves-type hind paw thermal stimulator, formalin-induced flinching); DMT-DALDA (H-Dmt-D-Arg-Phe-Lys-NH2; Dmt = 2',6'-dimethyltyrosine) is a dermorphin analogue and selective mu opioid agonist; dependence; good methods (surgical techniques and pump/catheter implantation on p.2);

Q8039: H. J. Huang, *et al.* MGCD0103, a selective histone deacetylase inhibitor, coameliorates oligomeric Abeta25-35 -induced anxiety and cognitive deficits in a mouse model. CNS Neurosci Ther 2019;25(2):175-186
Agents: MGCD0103 **Vehicle:** Not Stated; **Route:** CSF/CNS (Intrathecal); **Species:** Mice; **Strain:** C57BL/6J; **Pump:** Not stated; **Duration:** 4 weeks;
ALZET Comments: Dose (30 or 60 nmol/day); animal info (); Selective histone deacetylase inhibitor aka MGCD0103 ; enzyme inhibitor (selective histone deacetylase inhibitor); neurodegenerative (Alzheimer's Disease);

Q7286: X. J. Feng, *et al.* Nerve injury elevates functional Cav3.2 channels in superficial spinal dorsal horn. Mol Pain 2019;15(1744806919836569
Agents: Nickel Chloride; TTA-A2 **Vehicle:** Not Stated; **Route:** CSF/CNS (Intrathecal); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (TTA-A2, 0.35 ug/h, Nickel Chloride, 0.5 ug/h); Controls received mp w/ Saline; animal info (rats, 150–250 g); TTA-A2 aka ([2-(4-cyclopropylphenyl)-N-((1R)-1-{5-[(2,2,2-trifluoroethyl)oxo]-pyridin-2-yl}ethyl)acetamide]; Brain coordinates (rostrally about 2 cm); Catheter placement verified via tail-flick response; spinal nerve litigation;

Q7987: S. Dyck, *et al.* LAR and PTPsigma receptors are negative regulators of oligodendrogenesis and oligodendrocyte integrity in spinal cord injury. Glia 2019;67(1):125-145
Agents: peptide, intracellular LAR; peptide, intracellular sigma **Vehicle:** saline, BSA buffered; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2001D, 1003D, 2001, 2002, and 2004; **Duration:** 1, 3, 5, 7, 14, 28 days;
ALZET Comments: Dose ((ILP 10 µg/day), (ISP 10 µg/day)); 0.1% BSA in saline used; Controls received mp w/ vehicle; animal info (female, 250g); ILP (NH2-GRKKRRQRRRCDLADNIERLKANDGLKFSQEYESI-NH2) and ISP (NH2-GRKKRRQRRRCDMAEHMERLKANDSLKLSQEYESI-NH2) are peptides against LAR and PTPsigma; enzyme inhibitor (LAR and PTPsigma receptor); peptides; spinal cord injury; Therapeutic indication (inhibition of PTPsigma and LAR receptors promotes oligodendrogenesis by endogenous precursor cells, attenuates caspase 3-mediated cell death in mature oligodendrocytes, and preserves myelin);

Q7272: F. Bai, *et al.* Spinal Cord Glycine Transporter 2 Mediates Bilateral ST35 Acupoints Sensitization in Rats with Knee Osteoarthritis. Evidence-Based Complementary and Alternative Medicine 2019;2019(7493286
Agents: Glycine **Vehicle:** Saline; **Route:** CSF/CNS (Intrathecal); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2002; **Duration:** 14 Days;
ALZET Comments: Dose (0.1 umol/h); Controls received mp w/ vehicle; animal info (Male 200-250 g); behavioral testing (PWMT test);

Q7942: G. L. Austin*, et al.* Central Nervous System Delivery and Biodistribution Analysis of an Antibody-Enzyme Fusion for the Treatment of Lafora Disease. Mol Pharm 2019;16(9):3791-3801
Agents: Fusion protein, VAL-0417; amylase, recombinant pancreatic **Vehicle:** PBS; **Route:** CSF/CNS (lateral ventricle); CSF/CNS (intrathecal); **Species:** Mice; **Strain:** Wild type (WT), Epm2a(-/-); **Pump:** Not stated; **Duration:** 14, 28 days;
ALZET Comments: Dose ((VAL-0417 0.08 mg/day), (amylase 0.04 mg/day)); Controls received mp w/ vehicle; animal info (); VAL-0417 is an antibody−enzyme fusion protein; brain tissue distribution; neurodegenerative (Lafora disease); generation of antibody-enzyme fusion protein on p.3792;

Q7163: Y. Zhang*, et al.* Combination Treatment of C16 Peptide and Angiopoietin-1 Alleviates Neuromyelitis Optica in an Experimental Model. Mediators Inflamm 2018;2018(4187347
Agents: Antibody, NMO-IgG; Complement, human **Vehicle:** Not Stated; **Route:** CSF/CNS (intrathecal); CSF/CNS (lateral ventricle);; **Species:** Rat; **Strain:** Not Stated; **Pump:** 1003D; **Duration:** 3 days;
ALZET Comments: Dose (10 µg NMO-IgG and 50 µL (5µg/µL) human complement); NMO aka Neuromyelitis optica;

Q7542: Q. Wu*, et al.* Human menstrual blood-derived stem cells promote functional recovery in a rat spinal cord hemisection model. Cell Death & Disease 2018;9(9):882
Agents: TrKB-IgG; immunoglobulin G, human **Vehicle:** PBS; **Route:** CSF/CNS (intrathecal); **Species:** Rat;
Strain: Sprague-Dawley; **Pump:** 2002; **Duration:** 4 weeks;
ALZET Comments: Dose (3 µg/day); Controls received mp w/ vehicle; animal info (adult, female, , 220-250g); behavioral testing (BBB locomotion scale); pumps replaced at 3 weeks; enzyme inhibitor (BDNF-TrkB signaling); spinal cord injury;

Q7319: Q. Wang*, et al.* Danhong Injection Alleviates Mechanical Allodynia via Inhibiting ERK1/2 Activation and Elevates BDNF Level in Sciatic Nerve in Diabetic Rat. Evidence-Based Complementary and Alternative Medicine 2018;2018(5798453
Agents: U0126 **Vehicle:** DMSO; CSF, artificial; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague-Dawley;
Pump: 1007D; **Duration:** 1 week;
ALZET Comments: Dose (0.5 ug/ul/hr); 10% DMSO used; Controls received mp w/ vehicle; animal info (Male, , 180-200 g); behavioral testing (Stimulus test); U0216 is a Mitogen-activated protein kinase (MAPK) kinase 1/2 inhibitor; enzyme inhibitor (Mitogen-activated protein kinase); Intrathecal catheters were inserted into subarachnoid spaces through atlantooccipital membrane; diabetes;

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;
Strain: Sprague Dawley; **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, 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;

Q7052: I. Rossetti*, et al.* Calcitonin gene-related peptide decreases IL-1beta, IL-6 as well as Ym1, Arg1, CD163 expression in a brain tissue context-dependent manner while ameliorating experimental autoimmune encephalomyelitis. J Neuroimmunol 2018;323(94-104
Agents: Calcitonin gene-related peptide **Vehicle:** CSF, artificial; **Route:** CSF/CNS (intrathecal); **Species:** Mice; **Strain:** C57BL/6;
Pump: 2002; **Duration:** 2 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (7-8 week old female mice); peptides;

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;
Strain: C57BL/6 naive, Flt3KO; **Pump:** 1002; **Duration:** 6 days;
ALZET Comments: Dose (12.53 ng/ml); animal info (mice, mice 25–30 g.); behavioral testing (reflexive tail flick); spinal cord injury; stress/adverse reaction: (see pg. 10);

Q7263: L. Riemann, *et al.* Transplantation of Neural Precursor Cells Attenuates Chronic Immune Environment in Cervical Spinal Cord Injury. Front Neurol 2018;9(428
Agents: Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor **Vehicle:** Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor; **Route:** CSF/CNS(Intrathecal); **Species:** Rat; **Strain:** Wistar; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Dose (PDGF-AA, 1 µg/100 µL; EGF, 3 µg/100 µL; bFGF, 3 µg/100mL;); 0.1% rat serum albumin used; animal info (female rats 250 g;); post op. care (moxifloxacin, buprenorphine); spinal cord injury;

Q8126: L. Micheli, *et al.* Involvement of the N/OFQ-NOP system in rat morphine antinociceptive tolerance: Are astrocytes the crossroad? Eur J Pharmacol 2018;823(79-86
Agents: Nociception/orphanin FQ; Morphine **Vehicle:** Not stated; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague-Dawley, Wistar; **Pump:** 1002; **Duration:** 10 days;
ALZET Comments: Dose (1 and 3 nmol/h); animal info (Male); behavioral testing (Paw Pressure Test, Rota-rod Test); Nociception/orphanin FQ aka (N/OFQ) ; dependence;

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; **Strain:** Sprague-Dawley; **Pump:** Not Stated; **Duration:** 7 days;
ALZET Comments: animal info (adult male); enzyme inhibitor (P2X7R antagonist A740003); Therapeutic indication (arthritis);

Q7202: W. Liu, *et al.* Dextran-based biodegradable nanoparticles: an alternative and convenient strategy for treatment of traumatic spinal cord injury. Int J Nanomedicine 2018;13(4121-4132
Agents: Taxol **Vehicle:** Cremophor EL; **Route:** CSF/CNS (Intrathecal); **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2004;
Duration: 7 days;
ALZET Comments: Dose (256 ng/day); animal info (rats); behavioral testing (Locomotor capacity, BBB open field 21 point scale); ALZET rat intrathecal catheter used; spinal cord injury; stress/adverse reaction: (see pg. 4130);

Q7216: G. Li, *et al.* MiR-103 alleviates autophagy and apoptosis by regulating SOX2 in LPS-injured PC12 cells and SCI rats. Iran J Basic Med Sci 2018;21(3):292-300
Agents: miR-103 agomir **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 1003D;
Duration: 3 days;
ALZET Comments: Dose (1 ul/hr/day); Controls received mp w/ vehicle; animal info (Male, , 180-220 g); post op. care (Penicillin G); spinal cord injury;

Q9467: J. M. Kwiecien. Methods for Assessing Serpins as Neuroprotective Therapeutics. Methods in Molecular Biology 2018;
Agents: Dexamethasone **Vehicle:** Saline; **Route:** CSF/CNS (Intrathecal); **Species:** Rat; **Strain:** Long Evans;
Pump: 2ML4, 2ML2, 2ML1; **Duration:** 2 weeks;
ALZET Comments: Dose (2.5-10 mL/h); animal info (, Male, 16 week old rat, 370-420 g); ALZET IT catheter used; spinal cord injury; good methods (p. 229)

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; **Strain:** Fischer 344; **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 rats); enzyme inhibitor (caspase-1);

Q7141: N. Geribaldi-Doldan*, et al.* Specific inhibition of ADAM17/TACE promotes neurogenesis in the injured motor cortex. Cell Death & Disease 2018;9(9):862
Agents: GM6001(N-[(2R)-2-(hydroxami-docarbonylmethyl)-4-methylpentanoy]-L-tryptophan methylamide) **Vehicle:** DMSO, PBS; **Route:** CSF/CNS (intrathecal); **Species:** Mice; **Strain:** Not Stated; **Pump:** 1002, 1004; **Duration:** 14 days, 28 days;
ALZET Comments: Dose (50-µM); 0.4% DMSO used; Controls received mp w/ vehicle; Controls received mp w/ vehicle; GM6001 is N-[(2R)-2-(hydroxami-docarbonylmethyl)-4-methylpentanoy]-L-tryptophan methylamide; ALZET BIK II used;

Q7137: K. Fujita*, et al.* Targeting Tyro3 ameliorates a model of PGRN-mutant FTLD-TDP via tau-mediated synaptic pathology. Nature Communications 2018;9(1):433
Agents: Gö6976 **Vehicle:** PBS; **Route:** CSF/CNS (intrathecal); **Species:** Mice; **Strain:** C57BL/6J; PGRN R504X mutation-KI; **Pump:** 2006; **Duration:** 2 weeks;
ALZET Comments: Dose (0.15 ul/h); animal info (PGRN-KI and C57BL/6J, 10-12 weeks old); behavioral testing (Morris water maze test, Fear-conditioning test, Probe test, Rotarod test, Open-field test, Light-dark box test); enzyme inhibitor (PKC inhibitor); gene therapy;

Q7031: M. Fregosi*, et al.* Changes of motor corticobulbar projections following different lesion types affecting the central nervous system in adult macaque monkeys. European Journal of Neuroscience 2018;48(4):2050-2070
Agents: Antibody, anti-Nogo-A **Vehicle:** Not Stated; **Route:** CSF/CNS (Intrathecal), SC; **Species:** Monkey (Macaca fascicularis); **Strain:** Macaca fascicularis; **Pump:** 2ML2; **Duration:** 4 weeks;
ALZET Comments: Dose (3 mg/ml); One pump administered the treatment intrathecally to the cervical spinal cord, whereas the other pump delivered the antibody close to the lesioned site in M1 below the dura; Multiple pumps per animal (2);

Q7131: S. Dyck*, et al.* Perturbing chondroitin sulfate proteoglycan signaling through LAR and PTPsigma receptors promotes a beneficial inflammatory response following spinal cord injury. Journal of Neuroinflammation 2018;15(1):90
Agents: Intracellular leukocyte common antigen-related peptide (ILP), Intracellular sigma peptide (ISP), TAT- conjugated peptides **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2001D, 1003D, 2001, 2002, 2004; **Duration:** 1, 3, 5, 7, or 14 days;
ALZET Comments: Dose (10 ug/day); Controls received mp w/ vehicle; animal info (, adult, female, 250 g); animal info (Sprague-Dawley, adult, female, 250 g); spinal cord injury;

Q3539: Y. C. Cheng*, et al.* Melatonin regulation of transcription in the reversal of morphine tolerance: Microarray analysis of differential gene expression. Int J Mol Med 2018;
Agents: Morphine **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Wistar; **Pump:** Not Stated; **Duration:** 7 days;
ALZET Comments: Dose (15 µg/h); Controls received mp w/ vehicle; animal info (27 Male rats (350 400 g), each rat (with 12 weeks of age)); neurodegenerative

Q7097: A. Alastrue-Agudo*, et al.* FM19G11 and Ependymal Progenitor/Stem Cell Combinatory Treatment Enhances Neuronal Preservation and Oligodendrogenesis after Severe Spinal Cord Injury. International Journal of Molecular Science 2018;19(1):
Agents: FM19G11 **Vehicle:** DMSO; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 1007D; **Duration:** 3 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (2-month-old rats weighing ~200 g); FM19G11 is an inhibitor of Hypoxia inducible factor-alpha protein expression; spinal cord injury;