



Recent References (2019-Present) on the Administration of Enzyme Inhibitors  
Using ALZET® Osmotic Pumps

- Q11319:** J. Huang, *et al.* Effects of Mineralocorticoid Receptor Blockade and Statins on Kidney Injury Marker 1 (KIM-1) in Female Rats Receiving L-NAME and Angiotensin II. *International Journal of Molecular Sciences* 2023;24(7);  
**Agents:** Angiotensin II **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Strain:** Wistar; **Pump:** 2001; **Duration:** 2 days;  
**ALZET Comments:** Dose (Ang II 225 ug/kg/day; L-NAME 0.2 mg/mL); controls received mp w/ vehicle; animal info (Female; 8-10 weeks old; Weighed 180-260 g); blood pressure measured via tail cuff method; enzyme inhibitor (Nitric Oxide Synthetase); peptides; cardiovascular; nephrology; good methods (used lot specific info to calculate concentration);
- Q11313:** P. L. Hsu, *et al.* Targeting BRD3 eradicates nuclear TYRO3-induced colorectal cancer metastasis. *Science Advances* 2023;  
**Agents:** ARP100 **Vehicle:** DMSO; **Route:** IP; **Species:** Mice; **Strain:** NOD/SCID; **Pump:** 2004; **Duration:** 1 month;  
**ALZET Comments:** Dose (5 mg/kg/day); Controls received mp w/ vehicle; animal info (Male; 8 weeks old); enzyme inhibitor (MMP2); cancer (Colorectal);
- Q11268:** M. H. Hsu, *et al.* Increased Circulating ADMA in Young Male Rats Caused Cognitive Deficits and Increased Intestinal and Hippocampal NLRP3 Inflammasome Expression and Microbiota Composition Alterations: Effects of Resveratrol. *Pharmaceuticals (Basel)* 2023;16(6);  
**Agents:** Dimethylarginine, asymmetric **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** Not Stated; **Duration:** Not Stated;  
**ALZET Comments:** Dose (0.25 mmol/kg/day); Controls received mp w/ vehicle; animal info (Male; Weighed about 50 g); enzyme inhibitor (Nitric oxide synthase); behavioral testing (Water maze);
- Q10918:** R. Ge, *et al.* A Novel Tumor-Promoting Role for Nuclear Factor IX in Glioblastoma Is Mediated through Transcriptional Activation of GINS1. *Molecular Cancer Research* 2023;21(3):189-198  
**Agents:** Doxorubicin **Vehicle:** Not Stated; **Route:** CSF/CNS (intratumoral); **Species:** Mice; **Strain:** BALB/cj; **Pump:** 1003D; **Duration:** Not Stated;  
**ALZET Comments:** animal info (Male; Mice; genetic background); enzyme inhibitor (Topo isomerase 2); cyanoacrylate adhesive; cancer (Glioblastoma); Therapeutic indication (Glioblastoma);
- Q11073:** L. Dias, *et al.* Increased Synaptic ATP Release and CD73-Mediated Formation of Extracellular Adenosine in the Control of Behavioral and Electrophysiological Modifications Caused by Chronic Stress. *ACS Chem Neuroscience* 2023;14(7):1299-1309  
**Agents:** Alpha, beta-methylene ADP **Vehicle:** Saline; **Route:** CSF/CNS (right lateral ventricle); **Species:** Rat; **Strain:** Wistar; **Pump:** 1004; **Duration:** 14 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (Male; Weighed 220-250 g); enzyme inhibitor (CD73); ALZET brain infusion kit 2 used; Brain coordinates (anteroposterior = 0 relative to bregma; lateral = 1.5 mm to midline; depth = 4.5 mm down from surface of skull); behavioral testing (restraint test, open-field test, object displacement, elevated-plus maze, forced swimming test); stress, memory
- Q11089:** M. S. Arrazola, *et al.* Necroptosis inhibition counteracts neurodegeneration, memory decline, and key hallmarks of aging, promoting brain rejuvenation. *Aging Cell* 2023;22(5):e13814  
**Agents:** GSK'872 **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Strain:** Wild-type; **Pump:** 1004; **Duration:** 28 days;  
**ALZET Comments:** Dose (2 mg/kg); animal info (; 23 months old); enzyme inhibitor (RIPK3); behavioral testing (Morris water maze); aging;
- Q10692:** S. Talele, *et al.* Central Nervous System Distribution of the Ataxia-Telangiectasia Mutated Kinase Inhibitor AZD1390: Implications for the Treatment of Brain Tumors. *Journal of Pharmacology and Experimental Therapeutics* 2022;383(1):91-102  
**Agents:** AZD1390 **Vehicle:** DMSO; **Route:** IP; **Species:** Mice; **Strain:** Wild-type, TKO; **Pump:** 1003D; **Duration:** 24 hours;  
**ALZET Comments:** Dose (10 mg/ml); Controls received mp w/ vehicle; animal info (Male; Female; 8-14 weeks old; ); enzyme inhibitor (AZD1390 is a ataxia telangiectasia mutant kinase inhibitor); cancer (Glioblastoma);



**Q10279:** Y. Pan, *et al.* Myeloid cyclooxygenase-2/prostaglandin E2/E-type prostanoid receptor 4 promotes transcription factor MafB-dependent inflammatory resolution in acute kidney injury. *Kidney International* 2022;101(1):79-91

**Agents:** ONO-4819 **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Strain:** Myeloid knockout; **Pump:** 2004; **Duration:** Not Stated;

**ALZET Comments:** Dose (75 ug/kg/day); animal info (male, 8-10 weeks old mice); ONO-4819 is an EP4a antagonist; enzyme inhibitor (cyclooxygenase); ischemia (renal);

**Q10614:** F. Mota, *et al.* A Reactivity-Based (18)F-Labeled Probe for PET Imaging of Oxidative Stress in Chemotherapy-Induced Cardiotoxicity. *Molecular Pharmaceutics* 2022;19(1):18-25

**Agents:** Doxorubicin **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Strain:** Wistar; **Pump:** Not Stated; **Duration:** 7 days;

**ALZET Comments:** Dose (30 mg/kg); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (Male; ; Weighed 280-300 g); enzyme inhibitor (Doxorubicin); cardiovascular (cardiotoxicity)

**Q10593:** B. Lv, *et al.* Exenatide improves the luteinizing hormone pulse in obese polycystic ovary syndrome rats by upregulating sirtuin-1 in the hypothalamus. *The American Journal of Drug and Alcohol Abuse* 2022;

**Agents:** EX527 **Vehicle:** DMSO; **Route:** CSF/CNS (third ventricle); **Species:** Rat; **Strain:** PCOS; **Pump:** Not Stated; **Duration:** 3 w

**ALZET Comments:** Dose: EX527 (5 µg/24 h) Controls received mp w/ vehicle; animal info: Obese rats(EX-527) is an SIRT1 inhibitor; enzyme inhibitor (EX527);

**Q10588:** R. Landau, *et al.* The Rat Rotenone Model Reproduces the Abnormal Pattern of Central Catecholamine Metabolism Found in Parkinson's Disease. *Disease Models & Mechanisms* 2022;15(1):

**Agents:** Rotenone **Vehicle:** DMSO; PEG; **Route:** SC; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** Not Stated; **Duration:** 10 d

**ALZET Comments:** Dose (2 mg/kg/day); 1:1 DMSO:PEG used; animal info (Male; 10 weeks old; Acclimated for at least 3 days before mp implantation); enzyme inhibitor (Rotenone); neurodegenerative (Parkinson's disease);

**Q10277:** B. A. Kemp, *et al.* Renal AT2 Receptors Mediate Natriuresis via Protein Phosphatase PP2A. *Circulation research* 2022;130(1):96-111

**Agents:** Candesartan **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Strain:** Wistar-Kyoto; **Pump:** 2001D; **Duration:** 24 hours;

**ALZET Comments:** Dose (0.01 mg/kg/min); 5% dextrose in water used; animal info (4/10-week old female rats); Blood pressure measured via direct intracarotid method with use of digital BP analyzer; enzyme inhibitor; antihypertensive (candesartan); cardiovascular (hypertension); Therapeutic indication (treating renal Na<sup>+</sup> retention and hypertension);

**Q10745:** T. S. Eteläinen, *et al.* Removal of Proteinase K Resistant αSyn Species Does Not Correlate With Cell Survival in a Virus Vector-Based Parkinson's Disease Mouse Model. *Neuropharmacology* 2022;218(**Agents:** KYP-2047 **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1002; **Duration:** 2 weeks; 4 weeks;

**ALZET Comments:** Dose: (10 mg/kg/day.); Controls received mp w/ vehicle; animal info: Male 10–11 weeks old post op. care: Topical lidocaine (10 mg/ml), s.c. buprenorphine (0.1 mg/kg) and s.c. carprofen (5 mg/kg); pumps replaced after 2 weeks; KYP-2047 is a enzyme inhibitor (PREP); neurodegenerative (Parkinson's disease); good methods (pg. 3)

**Q9452:** D. R. Seeger, *et al.* Cyclooxygenase inhibition attenuates brain angiogenesis and independently decreases mouse survival under hypoxia. *Journal of Neurochemistry* 2021;158(2):246-261

**Agents:** Ketoralac **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2002; **Duration:** 10 days;

**ALZET Comments:** Dose (0.64, 1.28, 6.4 mg/kg/hr); dose-response (); Controls received mp w/ vehicle; functionality of mp verified by ketorolac and prostaglandin levels in plasma and brain; enzyme inhibitor (non-specific cyclooxygenase (COX)); hypoxia and normoxia

**Q8822:** A. Recabal, *et al.* The FGF2-induced tanycyte proliferation involves a connexin 43 hemichannel/purinergic-dependent pathway. *Journal of Neurochemistry* 2021;156(2):182-199

**Agents:** Uridine, bromodeoxy-; Fibroblast Growth Factor 2; Gap27 **Vehicle:** CSF, filtered; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 1007D; **Duration:** 8 days;

**ALZET Comments:** Dose (0.75 ug/h BrdU, 0.0125 ug/hr FGF2, 0.13 ug/h Gap27); Controls received mp w/ vehicle; animal info (Male, 20-280 g); Gap27 is a selective Cx43HC inhibitor; dental cement used; dependence;



**Q10577:** C. Kondak, *et al.* Hydromethylthionine Enhancement of Central Cholinergic Signalling is Blocked by Rivastigmine and Memantine. *Journal of Neurochemistry* 2021;160(2):172-184

**Agents:** Rivastigmine; Memantine **Vehicle:** Aqua ad injectabilia; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1004; **Duration:** 28 days;

**ALZET Comments:** Dose (Rivastigmine 0.5 mg/kg/d; Memantine 1 mg/kg/d); dose-response (see p. 174); animal info (60 of each species so 120 mice total; Female; 6-8 months old; NMRI); enzyme inhibitor (Rivastigmine); wound clips used; neurodegenerative (Alzheimer's Disease);

**Q10366:** I. D. Calma, *et al.* Mitochondrial function influences expression of methamphetamine-induced behavioral sensitization. *Scientific Reports* 2021;11(1):24529

**Agents:** Rotenone **Vehicle:** DMSO; PEG; **Route:** SC; **Species:** Rat; **Strain:** Not Stated; **Pump:** 2001; **Duration:** 6 days;

**ALZET Comments:** Dose (1 mg/kg/day; 3 mg/kg/day); Controls received mp w/ vehicle; animal info (Male; Weighed 225-250 g); enzyme inhibitor (Rotenone); toxicology; dependence;

**Q10104:** R. M. B. Bell, *et al.* Carbonyl reductase 1 amplifies glucocorticoid action in adipose tissue and impairs glucose tolerance in lean mice. *Molecular Metabolism* 2021;48(10)1225

**Agents:** Dexamethasone; Aldosterone; 20b-DHB **Vehicle:** DMSO; Propylene glycol; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** Not Stated; **Duration:** 7 days;

**ALZET Comments:** Dose: 20b-DHB(20 ug/day); animal info ( Male, Female (8 weeks of age); Dihydrocorticosterone aka (20b-DHB) is a full agonist of the mineralocorticoid receptor.; Mifepristone is a GR antagonist RU486; Spironolactone is a MR antagonist; Carbonyl reductase 1 (Cbr1),is an enzyme inhibitor; diabetes; obesity

**Q9847:** W. Zhang, *et al.* A blockade of microRNA-155 signal pathway has a beneficial effect on neural injury after intracerebral haemorrhage via reduction in neuroinflammation and oxidative stress. *Archives of Physiology and Biochemistry* 2020;1-7

**Agents:** miR-155 inhibitor **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** Not Stated; **Duration:** 1 day;

**ALZET Comments:** Dose (0.25 ul/hr); Controls received mp w/ vehicle; animal info (200-250 g, Male); enzyme inhibitor (miR-155 inhibitor); ALZET brain infusion kit XX used; Brain coordinates (3.7 mm posterior to the bregma, 4.1 mm lateral to the midline, and 3.5 mm under the dura); bilateral cannula used; dental cement used; neurodegenerative (Brain Injury);

**Q9881:** K. Yuan, *et al.* Mural Cell SDF1 Signaling is Associated with the Pathogenesis of Pulmonary. *American Journal of Respiratory Cell and Molecular Biology* 2020;

**Agents:** AMD3100 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1004; **Duration:** 21 days;

**ALZET Comments:** Animal info (19-25 g, Male); AMD3100 aka CXCR4 Inhibitor; cardiovascular;

**Q9907:** H. Yang, *et al.* TLR4/MyD88/NF-kappaB Signaling in the Rostral Ventrolateral Medulla Is Involved in the Depressor Effect of Candesartan in Stress-Induced Hypertensive Rats. *ACS Chemical Neuroscience* 2020;11(19):2978-2988

**Agents:** VIPER or Candesartan **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2002; **Duration:** 14 days;

**ALZET Comments:** Dose (VIPER-40 ug/kg/day or Candesartan-4 ug/day); Controls received mp w/ vehicle; animal info (7 weeks old, Male, ); VIPER aka TLR4 Inhibitor Candesartan aka AT1R antagonist ; enzyme inhibitor (TLR4 Inhibitor); Brain coordinates (0.5 mm caudal to bregma, 1.5 mm lateral to the midline, and 2.7 mm below the skull surface); bilateral cannula used; cardiovascular;

**Q9939:** M. D. Wetzel, *et al.* Selective inhibition of arginase-2 in endothelial cells but not proximal tubules reduces renal fibrosis. *JCI Insight* 2020;5(19):

**Agents:** Nonselective arginase inhibitor S-(2-boronoeth- yl)-L-cysteine **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57Bl/6J; **Pump:** Not Stated; **Duration:** 7 days;

**ALZET Comments:** Dose (2.3 mg/kg/day); Controls received mp w/ vehicle; animal info (Male, 8 weeks old); Nonselective arginase inhibitor S-(2-boronoeth- yl)-L-cysteine aka BEC ; enzyme inhibitor (Nonselective arginase inhibitor); dependence;



**Q9951:** Y. Wang, *et al.* Calpain-2 as a therapeutic target in repeated concussion-induced neuropathy and behavioral impairment. *Neuroscience* 2020;

**Agents:** Selective Calpain 2 Inhibitor **Vehicle:** Not stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57Bl/6; **Pump:** 2002; **Duration:** 10 days;

**ALZET Comments:** Dose (0.3 mg/kg/day); Controls received mp w/ vehicle; animal info (); Selective Calpain 2 Inhibitor aka C21; enzyme inhibitor (Selective Calpain 2 Inhibitor); neurodegenerative (Traumatic Brain Injury);

**Q9090:** V. Tsvankin, *et al.* ABC Transporter Inhibition Plus Dexamethasone Enhances the Efficacy of Convection Enhanced Delivery in H3.3K27M Mutant Diffuse Intrinsic Pontine Glioma. *Neurosurgery* 2020;86(5):742-751

**Agents:** Dasatinib **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2002; **Duration:** 14 days;

**ALZET Comments:** Dose (2 uM); Dasatinib aka Tyrosine Kinase Inhibitor; enzyme inhibitor (Tyrosine Kinase Inhibitor); cancer (Glioma);

**Q8813:** Y. Qin, *et al.* Estradiol Replacement at the Critical Period Protects Hippocampal Neural Stem Cells to Improve Cognition in APP/PS1 Mice. *Frontiers in Aging Neuroscience* 2020;12(240)

**Agents:** p75 NTR metalloprotease inhibitor **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Strain:** APP/PS1; **Pump:** Not Stated; **Duration:** 7 days;

**ALZET Comments:** Dose (0.25 ul/hr); Controls received mp w/ vehicle; animal info (, 4-10 months old); p75 NTR metalloprotease inhibitor aka TAPI-2 ; enzyme inhibitor (p75 NTR metalloprotease inhibitor); Brain coordinates (0.3 mm posterior, 1.0 mm lateral, and 2.3 mm ventral to Bregma); bilateral cannula used; neurodegenerative (Alzheimer's Disease);

**Q8369:** G. Pirovano, *et al.* Targeted Brain Tumor Radiotherapy Using an Auger Emitter. *Clin Cancer Res* 2020;26(12):2871-2881

**Agents:** Iodine-123 Meitner-Auger PARP1 inhibitor **Vehicle:** PEG; PBS; **Route:** CSF/CNS; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1003D; **Duration:** 3 days;

**ALZET Comments:** 30% PEG/PBS used; (Iodine-123 Meitner-Auger PARP1 inhibitor aka 123 I-MAPi; enzyme inhibitor ((Iodine-123 Meitner-Auger PARP1 inhibitor); ALZET brain infusion kit 3 used; cancer (Glioblastoma);

**Q8494:** L. Park, *et al.* tPA Deficiency Underlies Neurovascular Coupling Dysfunction by Amyloid-beta. *Journal of Neuroscience* 2020;40(42):8160-8173

**Agents:** PAI-039 **Vehicle:** Not stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1004; **Duration:** 4 weeks;

**ALZET Comments:** Dose (42 ng/kg/min); Controls received mp w/ vehicle; animal info (10-11 months old); behavioral testing (Maze Test, Novel Object Recognition Test); enzyme inhibitor (PAI-1 inhibitor); Brain coordinates (-0.22 mm lateral, 0.8 mm, dorsal 2 mm); neurodegenerative (Alzheimer's Disease);

**Q8586:** J. Kjell, *et al.* Defining the Adult Neural Stem Cell Niche Proteome Identifies Key Regulators of Adult Neurogenesis. *Cell Stem Cell* 2020;26(2):277-293 e8

**Agents:** Z-DON **Vehicle:** CSF, artificial; DMSO; **Route:** CSF/CNS (intracerebroventricular); **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 2001; **Duration:** 7 days;

**ALZET Comments:** Dose (100 uM); 0.4% DMSO used; Controls received mp w/ vehicle; animal info (male mice, 8-10 weeks old); Z-DON aka Transglutaminase 2 inhibitor; enzyme inhibitor; ALZET brain infusion kit 2 used; Brain coordinates (1.2 mm laterally to and 0.5 mm posterior to the bregma (right side));

**Q9783:** R. Dhaher, *et al.* Oral glutamine supplementation increases seizure severity in a rodent model of mesial temporal lobe epilepsy. *Nutritional Neuroscience* 2020;1-6

**Agents:** Methionine Sulfoximine **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2004; **Duration:** 28 days;

**ALZET Comments:** Dose (0.625 ug/hr); Controls received mp w/ vehicle; animal info (Male, , 280-400 g); Methionine Sulfoximine aka MSO; enzyme inhibitor (Glutamine Synthetase Inhibitor); Brain coordinates (AP 7.8 mm, ML 5.2 mm, DV -6.5 mm); bilateral cannula used; neurodegenerative (Epileptogenesis);



**Q9154:** N. Bengoa-Vergniory, *et al.* CLR01 protects dopaminergic neurons in vitro and in mouse models of Parkinson's disease. *Nature Communications* 2020;11(1):4885

**Agents:** CLR01 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1004; **Duration:** 28 days;  
**ALZET Comments:** Dose (40 ug/kg/day); Controls received mp w/ vehicle; animal info (17 month old); CLR01 aka amyloid inhibitor; enzyme inhibitor (CLR01); neurodegenerative (Parkinson's Disease);

**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; **Strain:** Sprague Dawley **Pump:** 1007D **Duration:** 7d  
**ALZET Comments:** Dose (0.5 ± 0.1 µL/hr/day); 0.9% saline used; animal info (male ); 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;

**Q8982:** H. Zhang, *et al.* PDE1 inhibition facilitates proteasomal degradation of misfolded proteins and protects against cardiac proteinopathy. *Science Advances* 2019;

**Agents:** IC86430 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2004; **Duration:** 4 weeks;  
**ALZET Comments:** Dose (3 mg/kg/day); Controls received mp w/ vehicle; animal info (4 months old, ); PDE1-selective inhibitor aka IC86430 ; enzyme inhibitor (PDE1-selective inhibitor); cardiovascular;

**Q7647:** D. D. Zhang, *et al.* Carbon Monoxide Attenuates High Salt-Induced Hypertension While Reducing Pro-inflammatory Cytokines and Oxidative Stress in the Paraventricular Nucleus. *Cardiovascular Toxicology* 2019;

**Agents:** Carbon monoxide-releasing molecule-2; Zinc protoporphyrin IX **Vehicle:** CSF, Artificial; DMSO, Buffered; **Route:** CSF/CNS (paraventricular nucleus); **Species:** Rat; **Strain:** Dahl Salt-Sensitive; **Pump:** 2006; **Duration:** 6 weeks;  
**ALZET Comments:** Dose ((CORM-2 2 nmol/h),(ZnPP IX 2 nmol/h)); 0.5% DMSO in aCSF used; Controls received normal-salt diet and mp w/ vehicle; animal info (male, , 250-275g); post op. care (buprenorphine 0.01 mg/kg SC immediately after and 12 h postoperatively); Carbon monoxide-releasing molecule-2 (aka CORM-2) is an agent that releases CO from tricarbonyldichlororuthenium (II) dimer; ZnPP IX is an enzyme inhibitor (heme oxygenase-1); Brain coordinates (1.8 mm posterior to the bregma, 0.4 mm lateral to the central line, and 7.9 mm ventral to the zero level); Pump implantation occurred at week 4 of study. Cannulae were secured using dental acrylic. Author states "The success rate of bilateral PVN microinjection was 75%." p.2; Therapeutic indication (exogenous or endogenous CO within the PVN might have potential antihypertensive treatment by downregulating COX2 and PICs in the PVN and by reducing PVN oxidative stress-mediated sympathetic activity in high salt-induced hypertension);

**Q6949:** T. Zera, *et al.* Microglia and brain angiotensin type 1 receptors are involved in desensitising baroreflex by intracerebroventricular hypertonic saline in male Sprague-Dawley rats. *Autonomic Neuroscience: Basic and Clinical* 2019;217(49-57)

**Agents:** Minocycline, Losartan **Vehicle:** Saline, iso-osmotic, Saline, hyperosmotic; **Route:** CSF/CNS (lateral ventricle); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2ML2; **Duration:** 2 weeks;

**ALZET Comments:** Dose (Minocycline-5 µg/h; Losartan- 12.5 µg/h); 0.9% isosmotic saline with minocycline, 5% Hyperosmotic saline with Losartan used; animal info (Normotensive adult male rats); enzyme inhibitor (microglia); ALZET brain infusion kit 2 used; Brain coordinates (1.2mm posterior to bregma, -1.8mm laterolateral from sagittal suture, diameter 0.5 mm) bilateral cannula used; cyanoacrylate adhesive; cardiovascular;

**Q9043:** J. P. Zepecki, *et al.* Regulation of human glioma cell migration, tumor growth, and stemness gene expression using a Lck targeted inhibitor. *Oncogene* 2019;38(10):1734-1750

**Agents:** Lck inhibitor **Vehicle:** DMSO, Kolliphor; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Strain:** Nu/J; **Pump:** 1004; **Duration:** 4 weeks;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (8 weeks old, , Male); Lck-I aka Lck Inhibitor; enzyme inhibitor (Lck Inhibitor); ALZET brain infusion kit 3 used; Brain coordinates (+0.5 mm and +1.1 mm ML relative to Bregma); cyanoacrylate adhesive; cancer (Glioblastoma);





**Q7038:** G. Zadra, *et al.* Inhibition of de novo lipogenesis targets androgen receptor signaling in castration-resistant prostate cancer. *Proc Natl Acad Sci U S A* 2019;116(2):631-640

**Agents:** IPI-9119 **Vehicle:** 1-methyl-2-pyrrolidinone; sodium phosphate buffer; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2002; **Duration:** 4 weeks;

**ALZET Comments:** Dose (100 mg/mL); 20% 1-methyl-2-pyrrolidinone used; enzyme inhibitor (fatty acid synthase); cancer (prostate); no stress: Mice did not show any signs of toxicity, stress, weight loss, or changes in feeding behavior. (see pg. 635); pumps replaced after 2 weeks

**Q7645:** A. Yoshida, *et al.* (Pro)renin Receptor Blockade Ameliorates Heart Failure Caused by Chronic Kidney Disease. *J Cardiac Fail* 2019;25(4):286-300

**Agents:** handle region peptide **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** Not Stated; **Duration:** 4 w **ALZET Comments:** Dose (0.01, 0.3 mg/kg/d); Controls received sham surgery and mp w/ vehicle; animal info (8 weeks, ); HRP competes with the handle region of prorenin for binding to (P)RR and inhibits nonproteolytic activation of prorenin.; enzyme inhibitor ((pro)renin receptor); peptides; cardiovascular; Therapeutic indication (candidate to treat heart failure in CKD due to inhibition of unfavorable signaling pathways via both AT1R and (P)RR);

**Q9118:** S. W. Yoo, *et al.* Inhibition of neutral sphingomyelinase-2 facilitates remyelination. *Neuroscience* 2019;6(eaba5210

**Agents:** Cambinol **Vehicle:** Not stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57BL/6; **Pump:** Not Stated; **Duration:** 28 d **ALZET Comments:** Dose (0.31 ug/kg/day); animal info (Male, , 8-10 weeks old); Cambinol aka nSMase2 inhibitor; enzyme inhibitor (nSMase2 inhibitor); Brain coordinates (AP, -0.5 mm; ML, 1.0 mm; DV, 2.5 mm); neurodegenerative (Myelin);

**Q9041:** W. Xiong, *et al.* Astrocytic Epoxyeicosatrienoic Acid Signaling in the Medial Prefrontal Cortex Modulates Depressive-like Behaviors. *Journal of Neuroscience* 2019;39(23):4606-4623

**Agents:** TPPU **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1007D; **Duration:** 7 days; **ALZET Comments:** Dose (1 uM); Controls received mp w/ vehicle; animal info (Male, 10-12 weeks old); TPPU aka Soluble epoxide hydrolase (sEH) inhibitor; enzyme inhibitor (Soluble epoxide hydrolase inhibitor); Brain coordinates (anteroposterior=-0.6 mm, mediolateral=1.5 mm dorsoventral= 2.0 mm); neurodegenerative (Depressive Disorder);

**Q7685:** Y. Wu, *et al.* Sulforaphane triggers a functional elongation of microglial process via the Akt signal. *J Nutr Biochem* 2019;67(51-62

**Agents:** LY294002 **Vehicle:** CSF, artificial; **Route:** CSF/CNS (left lateral ventricle); **Species:** Mice; **Strain:** C57BL6/J; **Pump:** 1003D; 2002; **Duration:** Not Stated;

**ALZET Comments:** Dose (5 ug/ml); Controls received mp w/ vehicle; animal info (Eight-week-old male mice); enzyme inhibitor (LY294002 inhibits Akt);

**Q7509:** C. M. Wilkinson, *et al.* Glibenclamide, a Sur1-Trpm4 antagonist, does not improve outcome after collagenase-induced intracerebral hemorrhage. *PLoS One* 2019;14(5):e0215952

**Agents:** Glibenclamide **Vehicle:** DMSO, NaOH, Saline; **Route:** SC; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2001; **Duration:** Not Stated;

**ALZET Comments:** Dose (200ng/hour); animal info (80 male rats (275-450 g, ~2-4 months old)); enzyme inhibitor (Sur1 receptor antagonist);

**Q9061:** L. T. Weckbach, *et al.* Midkine drives cardiac inflammation by promoting neutrophil trafficking and NETosis in myocarditis. *Journal of Experimental Medicine* 2019;216(2):350-368

**Agents:** Inhibitor receptor-associated protein **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 2004; **Duration:** 21 days;

**ALZET Comments:** Dose (0.25 ul/h); Controls received mp w/ vehicle; animal info (8-12 weeks old, ); Inhibitor receptor-associated protein aka RAP; enzyme inhibitor (Inhibitor receptor-associated protein); cardiovascular;



**Q7681:** Y. Wang, *et al.* C-X-C Motif Chemokine Receptor 4 Blockade Promotes Tissue Repair After Myocardial Infarction by Enhancing Regulatory T Cell Mobilization and Immune-Regulatory Function. *Circulation* 2019;139(15):1798-1812

**Agents:** POL5551; POL6326 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; Pigs; **Strain:** Not Stated; **Pump:** 1007D; **Duration:** 7 d  
**ALZET Comments:** Dose (8mg/kg/dose); Controls received mp w/ vehicle; animal info (female pigs; 8- to 10-week-old male mice); enzyme inhibitor (peptidic macrocycle CXCR4 antagonist); cardiovascular; Therapeutic indication (Acute myocardial infarction);

**Q6890:** X. Wang, *et al.* Liver-Selective MMP-9 Inhibition in the Rat Eliminates Ischemia-Reperfusion Injury and Accelerates Liver Regeneration. *Hepatology* 2019;69(1):314-328

**Agents:** 2-[(4-biphenylsulfonyl)amino]-3-phenyl-propionic acid **Vehicle:** Not Stated; **Route:** IV (inferior mesenteric vein); IP; **Species:** Rat (transgenic); **Strain:** Low-Tg(CAG-EGFP)ys; **Pump:** 2ML1; 2001; **Duration:** 7 days;  
**ALZET Comments:** Dose (100 µg/h); animal info (Male rats); enzyme inhibitor (Matrix metalloproteinases 2/9);

**Q7677:** R. Wang, *et al.* Photobiomodulation for Global Cerebral Ischemia: Targeting Mitochondrial Dynamics and Functions. *Mol Neurobiol* 2019;56(3):1852-1869

**Agents:** Mdivi-1 **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 1003D;  
**Duration:** Not Stated;

**ALZET Comments:** Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (Adult male Sprague-Dawley rats 250–300 g); behavioral testing (Barnes Maze Task, Morris Water Maze Test); enzyme inhibitor (selective inhibitor of mitochondrial fission protein Drp1);

**Q7675:** D. C. Walters, *et al.* Metabolomic analyses of vigabatrin (VGB)-treated mice: GABA-transaminase inhibition significantly alters amino acid profiles in murine neural and non-neural tissues. *Neurochem Int* 2019;125(151-162)

**Agents:** Vigabatrin **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2002; **Duration:** 14 days;  
**ALZET Comments:** Dose (35, 70 and 140 mg/kg/d); dose-response (dose escalation); animal info (8–10 weeks of age and 20.8–26.1 g); Vigabatrin aka VGB; enzyme inhibitor (Vigabatrin inhibits GABA transaminase);

**Q7494:** B. Ulmasov, *et al.* An Inhibitor of αArginine-Glycine-Aspartate-Binding Integrins Reverses Fibrosis in a Mouse Model of Nonalcoholic Steatohepatitis. *Hepatol Commun* 2019;3(2):246-261

**Agents:** Propanoic acid,  
(3S)-3-(3-bromo-5-(tert-butyl)phenyl)-3-(2-(3-hydroxy-5-((5-Hydroxy-1,4,5,6-tetrahydropyrimidin-2-yl)amino)benzamido)acetamido) **Vehicle:** DMSO, Water; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** Not Stated; **Duration:** 4 weeks;  
**ALZET Comments:** Dose (100 mg/kg/day); 50% DMSO used; animal info (5-week-old male mice); enzyme inhibitor (integrin inhibitor); Therapeutic indication (nonalcoholic steatohepatitis; liver fibrosis);

**Q7635:** L. M. Toomey, *et al.* Comparison of ion channel inhibitor combinations for limiting secondary degeneration following partial optic nerve transection. *Experimental Brain Research* 2019;237(1):161-171

**Agents:** oxATP; BBG; YM872 **Vehicle:** PBS; **Route:** Not stated; **Species:** Rat; **Strain:** PVG; **Pump:** Not stated;  
**Duration:** Not Stated;

**ALZET Comments:** "Dose (oxATP (1 mM), BBG (540 µM) and YM872 (240 µM)); Controls received mp w/ vehicle; animal info (Thirty-eight adult, female); post op. care (2.8mg/kg carprofen); behavioral testing (optokinetic nystagmus assessment); enzyme inhibitor (Lomerizine+oxATP+YM872 inhibit ion channels; BBG inhibits P2X7 receptor); "

**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; **Strain:** Sprague Dawley; **Pump:** Not Stated; **Duration:** 1 w  
**ALZET Comments:** Dose (25 µg/mL); Controls received mp w/ vehicle; animal info (Male, 400 g); Dexmedetomidine aka DEX; enzyme inhibitor (α2 adrenergic receptor agonist); bilateral cannula used; dependence;



**Q7669:** I. C. Stancu, *et al.* Aggregated Tau activates NLRP3-ASC inflammasome exacerbating exogenously seeded and non-exogenously seeded Tau pathology in vivo. *Acta Neuropathologica* 2019;137(4):599-617

**Agents:** MCC950 **Vehicle:** Saline; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Strain:** Not Stated; **Pump:** 2006; **Duration:** 6 weeks;

**ALZET Comments:** Dose (0.15 ul/h); Controls received mp w/ vehicle; enzyme inhibitor (inflammasome inhibitor); ALZET brain infusion kit 3 used; Brain coordinates (A/P, - 0.5; L, - 1.1; relative to bregma); cyanoacrylate adhesive; neurodegenerative (Alzheimer's Disease);

**Q7668:** S. Song, *et al.* Loss of Brain Norepinephrine Elicits Neuroinflammation-Mediated Oxidative Injury and Selective Caudo-Rostral Neurodegeneration. *Mol Neurobiol* 2019;56(4):2653-2669

**Agents:** Diphenylethylidenehydrazide **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57/BL6; **Pump:** Not Stated; **Duration:** 3 mo **ALZET Comments:** Dose (10 ng/kg/day); Controls received mp w/ vehicle; animal info (3 months old, Male); DPI aka Diphenylethylidenehydrazide ; enzyme inhibitor (NOX2 inhibitor); neurodegenerative (Parkinson's Disease);

**Q9045:** A. D. Snow, *et al.* The Amazon rain forest plant *Uncaria tomentosa* (cat's claw) and its specific proanthocyanidin constituents are potent inhibitors and reducers of both brain plaques and tangles. *Scientific Reports* 2019;9(1):561

**Agents:** B-amyloid inhibitor **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2002; **Duration:** 2 w **ALZET Comments:** Dose (8 mg/ml); Controls received mp w/ vehicle; animal info (6-8 months old); B-amyloid inhibitor aka PTI-777; enzyme inhibitor (B-amyloid inhibitor); Brain coordinates (AP -1.7; ML 3.0; DV -3.0); bilateral cannula used; neurodegenerative (Alzheimer's Disease);

**Q9070:** A. K. Short, *et al.* Short-term block of CRH receptor in adults mitigates age-related memory impairments provoked by early-life adversity. *Neuropsychopharmacology* 2019;45(3):515-523

**Agents:** Corticotropin-releasing factor receptor type 1 antagonist; **Vehicle:** Not stated; **Route:** SC; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2001; **Duration:** 7 days;

**ALZET Comments:** Dose (4 mg/kg/day); Controls received mp w/ vehicle; animal info (, 2 months old); behavioral testing (Object Recognition Test, Object Location Test); CRFR1 antagonist aka Corticotropin-releasing factor receptor type 1 antagonist; enzyme inhibitor (CRFR1 inhibitor); Brain coordinates (AP -1.3, L 2.0, V 3.5 mm); dependence;

**R0374:** C. Shimbori, *et al.* The Role of Mast Cells in the Pathophysiology of Pulmonary Fibrosis. *Not Stated* 2019;135-173

**Agents:** TY-51469, H4R antagonist, MK-571 , PD123319 **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** ICR, C57BL/6; **Pump:** Not Stated; **Duration:** Not Stated;

**ALZET Comments:** Dose: TY-51469 ( 0.1 or 1.0 mg/kg/day), H4R antagonist (40 mg/kg); PD123319 (0.5 or 5 mg/kg/d); animal info ( mice); TY-51469 is a Chymase inhibitor; enzyme inhibitor (Chymase); cardiovascular;

**Q8367:** C. S. Piao, *et al.* Depression following traumatic brain injury in mice is associated with down-regulation of hippocampal astrocyte glutamate transporters by thrombin. *J Cereb Blood Flow Metab* 2019;39(1):58-73

**Agents:** Fasudil **Vehicle:** Not stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** CD1; **Pump:** 2001; **Duration:** 7 days;

**ALZET Comments:** Dose (25 gm/kg/day); Controls received mp w/ vehicle; animal info (, Male, 25-30 g); Fasudil aka selective ROCK inhibitor; enzyme inhibitor (Rho kinase inhibitor); neurodegenerative (Traumatic Brain Injury);

**Q7604:** S. Perveen, *et al.* MIF inhibition enhances pulmonary angiogenesis and lung development in congenital diaphragmatic hernia. *Pediatr Res* 2019;85(5):711-718

**Agents:** MIF inhibitor, Nitrofen **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Strain:** Not Stated; **Pump:** Not Stated; **Duration:** 21 days;

**ALZET Comments:** Dose (200 mg- Nitrofen, 1.8 mg/kg/day- MIF inhibitor); animal info (Adult, ); MIF inhibitor aka ISO-92; enzyme inhibitor (MIF inhibitor); dependence;