



Recent References (2019 – Present) on Bilateral CNS Infusion Using ALZET® Osmotic Pumps

Q11323: N. Kajitani, *et al.* G protein-biased LPAR1 agonism of prototypic antidepressants: Implication in the identification of novel therapeutic target for depression. *Neuropsychopharmacology* 2024;49(3):561-572

Agents: Lysophosphatidic acid; **OMPT Vehicle:** PBS; **Route:** CSF/CNS (hippocampus); **Species:** Mice; **Strain:** C57BL/6J; LPAR1-heterozygous; **Pump:** 1004; **Duration:** 2 weeks;

ALZET Comments: dose-response (see graphs on pg 8); controls received mp w/ vehicle; animal info (Male; 7-8 weeks old); post op. care: penicillin G, carprofen; brain coordinates (-2.2 mm posterior to bregma, 1.5 mm lateral to midline, -2 mm ventral to skull surface); bilateral cannula used; behavioral testing (Swim test; Open field test); multiple pumps (2) per animal; "...long-term infusion of mouse hippocampus with the potent G protein-biased LPAR agonist OMPT, but not the non-biased agonist LPA, induced antidepressant-like behavior, indicating that G protein-biased agonism might be necessary for the antidepressant-like effects."

Q11112: J. Huang, *et al.* The salt-inducible kinases inhibitor HG-9-91-01 exhibits antidepressant-like actions in mice exposed to chronic unpredictable mild stress. *Neuropharmacology* 2023;227(109437)

Agents: HG-9-91-01 **Vehicle:** Not Stated; **Route:** CSF/CS (hippocampus); **Species:** Mice; **Strain:** C57BL/6J; **Pump:** Not Stated; **Duration:** Not Stated;

ALZET Comments: Dose (0.2 µl/min); Controls received mp w/ vehicle; animal info (Male; 8 weeks old; Weighed about 22-24 g); bilateral cannula used; dental cement used; behavioral testing (Forced swim; Tail suspension; Sucrose preference); Therapeutic indication (Major depressive disorder);

Q11257: M. Ceanga, *et al.* Human NMDAR autoantibodies disrupt excitatory-inhibitory balance, leading to hippocampal network hypersynchrony. *Cell Reports* 2023;42(10):113166

Agents: NMDAR-antibody, human monoclonal; control-antibody **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: animal info: male, 16-weeks old 25-30g; brain coordinates: 0.2 mm posterior and ±1.00 mm lateral from bregma, depth 2.2 mm); bilateral cannula used; multiple pumps per mice (2)

Q10868: T. Zhang, *et al.* Mitigation of Memory Impairment with Fermented Fucoïdan and lambda-Carrageenan Supplementation through Modulating the Gut Microbiota and Their Metagenome Function in Hippocampal Amyloid-beta Infused Rats. *Cells* 2022;11(15):

Agents: Amyloid-Beta (25-35) **Vehicle:** Water, distilled; **Route:** CSF/CNS (hippocampus); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** Not Stated; **Duration:** 3 weeks;

ALZET Comments: Dose (0.005 mg in 300 µl); Controls received mp w/ vehicle; animal info (Male; Weighed about 267 g); peptides; Brain coordinates (lateral -3.3 mm from bregma; posterior 2 mm from midline; ventral -2.5 mm from dura); bilateral cannula used; neurodegenerative ;

Q10284: H. Tran, *et al.* Suppression of mutant C9orf72 expression by a potent mixed backbone antisense oligonucleotide. *Nature Medicine* 2022;28(1):117-124

Agents: Oligonucleotide, antisense **Vehicle:** PBS; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Strain:** C9BAC; **Pump:** 1007D; **Duration:** 10 days;

ALZET Comments: Dose (2.5-20 nmol/day); dose-response (dose-dependent reduction in V1 and V3 repeat-containing transcripts in both the cortex and spinal cord regions after being treated with ASO3 and ASO5); animal info (transgenic mice); antisense oligonucleotides aka ASO; antisense (oligonucleotide); ALZET brain infusion kit 3 used; bilateral cannula used; 2.5-20 nmol/day of each ASO were continuously infused over 10 d into the right lateral ventricle of age-matched heterozygous C9BAC mice through a cannula using an implanted Alzet osmotic pump tissue perfusion (brain); neurodegenerative (ALS);(FTD) Therapeutic indication (ALS, FTD); "In our C9BAC mice, we were not able to safely perform ICV bolus injections with more than 10 nmol of LNA-modified ASO3 due to induction of severe motor phenotypes. To overcome this limitation, we use osmotic pumps to compare the potency of ASO3 and ASO5" pg3; gene therapy



Q10693: W. Q. Tang, *et al.* Virus-Mediated Decrease of LKB1 Activity in the mPFC Diminishes Stress-Induced Depressive-Like Behaviors in Mice. *Biochemical Pharmacology* 2022;197(114885)

Agents: Virus, adeno-associated **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Strain:** CD1; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose (0.2 ul/min); animal info (8 weeks old; Male; Weighed 23-25 g; 50 weeks old mice male and female); behavioral testing (Forced swim test; Tail suspension test; Sucrose preference test; Social interaction test); bilateral cannula used; dental cement used; gene therapy; Therapeutic indication (Depression);

Q11208: L. G. Niu, *et al.* Genistein Alleviates Oxidative Stress and Inflammation in the Hypothalamic Paraventricular Nucleus by Activating the Sirt1/Nrf2 Pathway in High Salt-Induced Hypertension. *Cardiovascular Toxicology* 2022;22(10-11):898-909

Agents: Genistein; nicotinamide **Vehicle:** Saline; **Route:** CSF/CNS (hypothalamic paraventricular nucleus); **Species:** Rat; **Strain:** Wistar; **Pump:** 1004; **Duration:** 4 weeks;

ALZET Comments: Dose (20 µg/h); (0.3% NaCl); (8% NaCl) used; Controls received mp w/ vehicle; animal info: Four-week-old male 100–120 g; blood pressure measured via: Tail cuff; Blood pressure measurement results (see pg.900) fig.1 b; Brain coordinates (1.8 mm caudal to the bregma, 0.4 mm lateral to the central line, and 7.9 mm ventral to the dorsal surface); bilateral cannula used; cardiovascular;

Q10608: E. Montalban, *et al.* Translational Profiling of Mouse Dopaminoceptive Neurons Reveals Region-Specific Gene Expression, Exon Usage, and Striatal Prostaglandin E2 Modulatory Effects. *Molecular Psychiatry* 2022;27(4):2068-2079

Agents: Misoprostol; Haloperidol **Vehicle:** PBS; Saline; **Route:** IP; CSF/CNS (intracerebral); **Species:** Mice; **Strain:** Wild-type; **Pump:** 1004; 2004; **Duration:** Not Stated;

ALZET Comments: animal info (D2-TRAP; C57BL/6 mice Male; Female; Transgenic); behavioral testing (rotarod/food-cued Y maze); neurodegenerative (Parkinson's; Addiction; Schizophrenia); Therapeutic indication (Neuromodulators);

Q10227: E. D. Levin, *et al.* Chronic infusions of mecamylamine into the medial habenula: Effects on nicotine self-administration in rats. *Behavioural Brain Research* 2022;416(113574)

Agents: Mecamylamine **Vehicle:** CSF, artificial; **Route:** Not Stated; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2004; **Duration:** 4 weeks;

ALZET Comments: Dose: (0.27 ul/h); Controls received mp w/ vehicle; animal info: young adult female rats; Brain coordinates (From bregma for anterior-posterior and medial-lateral and from the cortical surface for dorsal-ventral, the stereotaxic coordinates for the medial habenula were ±0.4 mm medial-lateral, ? 2.4 mm anterior-posterior, and ? 4.7 mm dorsal-ventral); bilateral cannula used; dental cement used;

Q10560: B. Joubert, *et al.* Human CASPR2 Antibodies Reversibly Alter Memory and the CASPR2 Protein Complex. *Annals of Neurology* 2022;91(6):801-813

Agents: CSF **Vehicle:** Not Stated; **Route:** CSF/CNS (lateral ventricle); **Species:** Mice; **Strain:** C57BL6/J; **Pump:** 1002; **Duration:** Not Stated;

ALZET Comments: animal info (; Male; 55 total; 8-10 weeks old; Weighed 25-30 g); behavioral testing (Novel object location; Locomotor activity; Sucrose preference; Open field; Rotarod test); multiple pumps per animal (2); brain coordinates: (0.02 mm anterior and 1.00 mm lateral from bregma, depth 0.22 mm); cannula placement verified via methylene blue; dental cement

Q10760: C. H. Ji, *et al.* Hippocampal MSK1 Regulates the Behavioral and Biological Responses of Mice to Chronic Social Defeat Stress: Involving of the BDNF-CREB Signaling and Neurogenesis. *Biochemical Pharmacology* 2022;195(114836)

Agents: Virus, adeno-associated **Vehicle:** Not Stated; **Route:** CSF/CNS (hippocampus); **Species:** Mice; **Strain:** C57BL/6J CD1; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose: 0.2 ul/min; animal info (Adult; ; 8 weeks old; Weighed 22-24 g; CD1 male and female mice; 50 weeks old; Weighed 35-38 g); behavioral testing (Forced swim test; Tail suspension test; Sucrose preference test; Social interaction test); AAV aka Adeno-associated virus; bilateral cannula used; Brain coordinates: AP = -2.3 mm, ML = +/- 1.6 mm, DV = 1.8 mm); dental cement used; Therapeutic indication (Depression);



Q10427: Y. M. Chen, *et al.* Hippocampal F3/Contactin plays a role in chronic stress-induced depressive-like effects and the antidepressant actions of vortioxetine in mice. *Biochemical Pharmacology* 2022;202(115097)

Agents: Virus, adeno-associated **Vehicle:** Not Stated; **Route:** CSF/CNS (hippocampus); **Species:** Mice; **Strain:** Not Stated; **Pump:** Not Stated; **Duration:** 2 weeks;

ALZET Comments: animal info (Male; 8 weeks old; Weighed 23-25 g; Male and Female; 50 weeks old; Weighed 35--38 g); behavioral testing (Chronic social defeat stress; Chronic restraint stress; Forced swim test; Tail suspension test; Sucrose preference test; Social interaction test); Brain coordinates (Hippocampus -2.3 mm anteroposterior; 1.6 mm medialateral; 1.8 mm dorsoventral); bilateral cannula used; dental cement used; toxicology; Therapeutic indication (Depression);

Q10396: S. Alvente, *et al.* Pilot Study of the Effects of Chronic Intracerebroventricular Infusion of Human Anti-IgLON5 Disease Antibodies in Mice. *Cells* 2022;11(6):1024-1048

Agents: Pt-IgG; Ctrl-IgG **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1002; **Duration:** 14 days; **ALZET Comments:** Dose (0.25 µL/h); animal info (19-22 weeks old; Female); behavioral testing (Water-licking behavior); Pt-IgG aka human anti-IgLON5 IgG, Ctrl-IgG aka IgG from patient without IgLON5 disease; Brain coordinates (0.6 mm posterior and 1 mm lateral to bregma at a depth of 2 mm); bilateral cannula used; dental cement used; neurodegenerative; immunology

Q10784: L. Wang, *et al.* Coupling of GPR30 Mediated Neurogenesis and Protection With Astroglial Aromatase-STAT3 Signaling in Rat Hippocampus After Global Cerebral Ischemia. *Molecular and Cellular Endocrinology* 2021;535(111394)

Agents: G1 **Vehicle:** DMSO; Cotton Oil; **Route:** CSF/CNS (ventricle); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2004; **Duration:** 28 days;

ALZET Comments: Dose: (3 ug/day); 0.1% DMSO; 0.9% Saline vehicle used Controls received mp w/ vehicle; animal info: Adult (3-month-old) female rats bilateral OVX; G1- aka G protein-coupled receptor 30 agonist; ALZET brain infusion kit 1 used; Brain coordinates (2.5-4.5 mm posterior from bregma);

Q9846: Y. Zhang, *et al.* WWP2 regulates SIRT1-STAT3 acetylation and phosphorylation involved in hypertensive angiopathy. *Journal of Cellular and Molecular Medicine* 2020;24(16):9041-9054

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

ALZET Comments: Controls received mp w/ vehicle; animal info (200-250 g); antisense (5'AAU UAC GAU UAG CAC UAU CCC CA-3'); ALZET brain infusion kit used; Brain coordinates (3.7mm posterior to the bregma, 4.1mm lateral to the midline, and 3.5mm under the dura); bilateral cannula used; dental cement used; neurodegenerative (Intracerebral Hemorrhage);

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 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);

Q10027: Q. Yang, *et al.* Blockade of c-Src Within the Paraventricular Nucleus Attenuates Inflammatory Cytokines and Oxidative Stress in the Mechanism of the TLR4 Signal Pathway in Salt-Induced Hypertension. *Neuroscience Bulletin* 2020;36(4):385-395

Agents: TAK-242 **Vehicle:** CSF, Artificial; **Route:** CSF/CNS (Hypothalamic paraventricular nucleus); **Species:** Rat; **Strain:** Dahl salt-sensitive; **Pump:** 2004; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (Male rats, 150-200 g); post op. care (buprenorphine); Blood pressure measured via tail cuff method; 103 mmHg - 168 mmHg; TAK-242 aka selective TLR4 blocker; Brain coordinates (1.8 mm posterior to bregma, 0.4 mm from midline, and 7.9 mm below the skull surface); dental cement used; 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 is an TLR4 Inhibitor Candesartan is an AT1R antagonist; Brain coordinates (0.5 mm caudal to bregma, 1.5 mm lateral to the midline, and 2.7 mm below the skull surface); cardiovascular;

Q9956: W. H. Walker, 2nd, *et al.* Social enrichment attenuates chemotherapy induced pro-inflammatory cytokine production and affective behavior via oxytocin signaling. *Brain, Behavior, and Immunity* 2020;89(451-464

Agents: Oxytocin, Selective Oxytocin Antagonist **Vehicle:** CSF artificial; **Route:** CSF/CNS; **Species:** Mice; **Strain:** Balb/C; **Pump:** 1004; **Duration:** 14 days;

ALZET Comments: Dose (OT- 40 or 100 ng, OTA- 500 ng); Controls received mp w/ vehicle; animal info (Female, , 8 weeks or older); Oxytocin aka OT or Selective Oxytocin Antagonist aka OTA ; ALZET brain infusion kit 3 used; Brain coordinates (+0.02 posterior, -0.95 lateral, -2.75 mm for bregma); bilateral cannula used; cancer (Chemotherapy);

Q9980: J. Szczepanski, *et al.* Acute kidney injury during pregnancy leads to increased sFlt-1 and sEng and decreased renal T regulatory cells in pregnant rats with HELLP syndrome. *Biology of Sex Differences* 2020;11(1):54

Agents: Fms-like tyrosine kinase, Soluble Endoglin **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2002; **Duration:** 10.1186/s13293-020-00331-6;

ALZET Comments: Dose (4.7 ug/kg sFlt-1, 7 ug/kg sEng); animal info (Female, Pregnant,); Fms-like tyrosine kinase aka sFlt-1, Soluble Endoglin aka sEng ; ischemia (Bilateral);

Q9983: Y. Sun, *et al.* Modulation of the Astrocyte-Neuron Lactate Shuttle System contributes to Neuroprotective action of Fibroblast Growth Factor 21. *Theranostics* 2020;10(18):8430-8445

Agents: Fibroblast Growth Factor 21 **Vehicle:** Not Stated; **Route:** CSF/CNS (intracerebroventricular); **Species:** Mice; **Strain:** Not Stated; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose (0.4 ug/day); Controls received mp w/ vehicle; animal info (6 month old); Fibroblast Growth Factor 21 aka FGF21 ; Brain coordinates (0.1 mm anteroposterior to bregma; 0.9 mm lateral from midline; 2.5 mm below the dura); bilateral cannula used; neurodegenerative (Alzheimer's Disease);

Q8955: J. Sorrell, *et al.* The central melanocortin system mediates the benefits of time-restricted feeding on energy balance. *Physiology & Behavior* 2020;227(113132

Agents: Leptin **Vehicle:** Saline; **Route:** CSF/CSN; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (1 ug/day); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male,); Brain coordinates (0.7 mm posterior, 1.2 mm lateral, and 2.5 mm ventrally from the surface of the brain); bilateral cannula used; dependence;

Q8957: D. K. Singh, *et al.* Testosterone Acts Within the Medial Amygdala of Rats to Reduce Innate Fear to Predator Odor Akin to the Effects of *Toxoplasma gondii* Infection. *Frontiers in Psychiatry* 2020;11(630

Agents: Testosterone **Vehicle:** CSF, artificial; **Route:** CSF/CSN; **Species:** Rat; **Strain:** Wistar; **Pump:** Not Stated; **Duration:** Not Stated;

ALZET Comments: Controls received mp w/ vehicle; animal info (Male); Brain coordinates (AP = -3.0, L = ±3.8, v = -7.0); bilateral cannula used; dependence;

Q8947: A. B. Schwartz, *et al.* Olfactory bulb-targeted quantum dot (QD) bioconjugate and Kv1.3 blocking peptide improve metabolic health in obese male mice. *Journal of Neurochemistry* 2020;157(6):1876-1896

Agents: Quantum dots, fluorescent **Vehicle:** PBS; **Route:** CSF/CNS (olfactory bulb); **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; Fluorescent quantum dots aka QDMgTx/MgTx ; Brain coordinates (AP -0.25 mm from bregma, M/L ±0.075 and D/V -2.25 mm from dura); bilateral cannula used; dental cement used; dependence;



Q9132: G. A. Rodriguez, *et al.* Attenuation of entorhinal cortex hyperactivity reduces A β and tau pathology. PLOS Biology 2020;18(8):

Agents: D-4- [(2E)-3-phosphono-2-propenyl]-2-piperazinecarboxylic acid **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Strain:** EC-Tau/hAPP; **Pump:** 1007D; **Duration:** 2 days;

ALZET Comments: Dose (10 μ M); Controls received mp w/ vehicle; animal info (NR1 flox); D-4- [(2E)-3-phosphono-2-propenyl]-2-piperazinecarboxylic acid aka NMDAR antagonist; Brain coordinates (-0.22 mm posterior, 1 mm lateral from bregma to target the lateral cerebral ventricle); bilateral cannula used; dental cement used; neurodegenerative (Synaptic scaling and sliding threshold); "these data support the utility of long-term CNO delivery in indwelling osmotic minipumps to activate DREADDs in vivo (see also [83]). Importantly, percentage theta power was further reduced in EC-Tau/hAPP mice following chronic hM4Di DREADDs activation."

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 μ l/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);

Q8563: N. Kajitani, *et al.* Prefrontal cortex infusion of beta-hydroxybutyrate, an endogenous NLRP3 inflammasome inhibitor, produces antidepressant-like effects in a rodent model of depression. Neuropsychopharmacology Reports 2020;40(2):157-165

Agents: Beta-hydroxybutyrate **Vehicle:** PBS; **Route:** CSF/CNS (frontal cortex); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2006; **Duration:** 21 days;

ALZET Comments: Dose (80 mg/mL); Controls received mp w/ vehicle; animal info (Male rats, 7-8 weeks of age); post op. care: Antibacterial penicillin G; Analgesic carprofen; behavioral testing (forced swim test; open field test); Multiple pumps per animal (2 pumps); Beta-hydroxybutyrate aka BHB; Brain coordinates (coordinates: anteroposterior + 3.2 mm, dorsolateral \pm 0.6 mm from bregma, ventral 4.0 mm from the skull surface); bilateral cannula used; neurodegenerative (Depression);

Q8760: Z. Hai-Na, *et al.* Atorvastatin ameliorates depressive behaviors and neuroinflammatory in streptozotocin-induced diabetic mice. Psychopharmacology (Berl) 2020;237(3):695-705

Agents: Atorvastatin **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57BL/6; **Pump:** Not Stated; **Duration:** 3 weeks;

ALZET Comments: Dose (1 μ g or 5 μ g); animal info (Male, , 25-30 g, 2 months old); behavioral testing (Open Field Test, Tail Suspension Test, Sucrose Preference Test, Novelty Suppressed Feeding Test); Brain coordinates ((- 0.7 mm posterior to the bregma; \pm 1.2 mm lateral to the sagittal; 2.0 mm below dura); bilateral cannula used; immunology;

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 μ g/hr); Controls received mp w/ vehicle; animal info (Male, , 280-400 g); Methionine Sulfoxine 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);

Q9568: Y. M. Chen, *et al.* Inhibition of Hypothalamic Inhibitor kappaB Kinase beta/Nuclear Transcription Factor kappaB Pathway Attenuates Metabolism and Cardiac Dysfunction in Type 2 Diabetic Rats. Neuroendocrinology 2020;110(11-12):899-913

Agents: IKK β inhibitor SC-514 **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2006; **Duration:** Not Stated;

ALZET Comments: "Dose (4.5 mg/mL); animal info (Male, , 8 weeks old); Brain coordinates (bregma: 3.4-3.6 mm posterior, 0.1-0.2 mm lateral, and 9.7-10 mm ventral to the dura);; dental cement used; immunology; "



Q8699: S. Beesley, *et al.* D-serine mitigates cell loss associated with temporal lobe epilepsy. *Nat Commun* 2020;11(1):4966
Agents: D-serine **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Not Stated; **Pump:** 1004; **Duration:** 28 days;
ALZET Comments: Dose (0.1 ul/hr); Controls received mp w/ vehicle; bilateral cannula used; dental cement used; neurodegenerative (Epilepsy);

Q8697: J. Baecker, *et al.* Treatment with the Neurotrophic Protein S100B Increases Synaptogenesis after Traumatic Brain Injury. *J Neurotrauma* 2020;37(8):1097-1107

Agents: S100 calcium-binding protein B **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 1007D; **Duration:** 1 week;

ALZET Comments: Dose (50 ng/hr); Controls received mp w/ vehicle; animal info (Male, 250-300 g); S100 calcium-binding protein B aka S100B; ALZET brain infusion kit 3 used; Brain coordinates (0.8mm behind bregma, 1.5mm lateral to midline, 3–4mm beneath the surface of the skull); bilateral cannula used; dental cement used; neurodegenerative (Traumatic Brain Injury);

Q9772: K. A. Alkadhi. A Novel Preclinical Rat Model of Alzheimer's Disease. *Neuromethods* 2020;

Agents: Amyloid-Beta 1-42 Peptides **Vehicle:** Not Stated; **Route:** CSF/CSN; **Species:** Rat; **Strain:** Wistar; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose (160 pmol/day); animal info (Male,); behavioral testing (Water Maze Test); peptides; Brain coordinates (AP: -0.3, L: 1.2, V: 4.5); bilateral cannula used; dental cement used; neurodegenerative (Alzheimer's Disease); good methods (p. 71-3)

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:** 7 d

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;

Q9036: W. Zhang, *et al.* Role of microRNA-155 in modifying neuroinflammation and gamma-aminobutyric acid transporters in specific central regions after post-ischaemic seizures. *Journal of Cellular and Molecular Medicine* 2019;23(8):5017-5024

Agents: MiR-Inhibitor **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** Not Stated;

Duration: 1 day;

ALZET Comments: Animal info (Male, 200-250 g); ALZET brain infusion kit 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; neurodegenerative (Seizure);

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); 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); 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);

Q9908: J. B. Yang, *et al.* Infusion of Melatonin Into the Paraventricular Nucleus Ameliorates Myocardial Ischemia–Reperfusion Injury by Regulating Oxidative Stress and Inflammatory Cytokines. *Journal of Cardiovascular Pharmacology* 2019;

Agents: Melatonin **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 1004; **Duration:** 1 w

ALZET Comments: "Dose (0.025 ug/hr); Controls received mp w/ vehicle; animal info (Male, 220-285 g); Brain coordinates (1.8 mm caudal from bregma, 0.4 mm lateral to the midline, and 7.9 mm ventral to the dorsal surface); ischemia (Myocardial); "



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;

Q9060: X. Wang, *et al.* Neuronal NMDAR Currents of the Hippocampus and Learning Performance in Autoimmune Anti-NMDAR Encephalitis and Involvement of TNF-alpha and IL-6. *Frontiers in Neurology* 2019;10(684

Agents: Tumor necrosis factor- α ; Interleukin-6 **Vehicle:** CSF; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** Not Stated; **Duration:** 7 days;

ALZET Comments: Dose (5 µg); Controls received mp w/ vehicle; animal info (Male, 200-250 g); ALZET brain infusion kit used; bilateral cannula used; dental cement used; neurodegenerative (Seizure);

Q7634: B. P. Tooke, *et al.* Hypothalamic POMC or MC4R deficiency impairs counterregulatory responses to hypoglycemia in mice. *Mol Metab* 2019;20(194-204

Agents: Insulin; Melanotan **Vehicle:** PBS; **Route:** SC; CSF/CNS (Paraventricular Nucleus of Hypothalamus); **Species:** Mice; **Strain:** Not Stated; **Pump:** 2002; 1002; **Duration:** 14 days;

ALZET Comments: Dose (10 U/kg/day); Controls received mp w/ vehicle; Brain coordinates (bregma: anteroposterior, 0.70; mediolateral, 0.22; dorsoventral, 4.80 mm); bilateral cannula used; diabetes; BIK: Plastics1, 3280PD/V/SPC;

Q6799: H. Tian, *et al.* Chronic infusion of berberine into the hypothalamic paraventricular nucleus attenuates hypertension and sympathoexcitation via the ROS/Erk1/2/iNOS pathway. *Phytomedicine* 2019;52(216-224

Agents: Berberine **Vehicle:** CSF, artificial; **Route:** CSF/CNS (Paraventricular nucleus); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2006; **Duration:** 28 days;

ALZET Comments: Dose (2 µg / h); Controls received mp w/ vehicle; animal info (adult male rats (240–280 g).);

Q9083: S. Teng, *et al.* Inhibition of EphA/Ephrin-A signaling using genetic and pharmacologic approaches improves recovery following traumatic brain injury in mice. *Brain Injury* 2019;33(10):1385-1401

Agents: EphA6-Fc **Vehicle:** Not stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (2 µg/day); animal info (Male, 10-12 weeks old,); EphA6-Fc aka EphA6 antagonist; ALZET brain infusion kit 3 used; bilateral cannula used; cyanoacrylate adhesive; neurodegenerative (Traumatic Brain Injury);

Q9082: M. Telles-Longui, *et al.* Alpha7 nicotinic ACh receptors are necessary for memory recovery and neuroprotection promoted by attention training in amyloid-beta-infused mice. *British Journal of Pharmacology* 2019;176(17):3193-3205

Agents: (1-42) AB Peptide; (1--42) AB Peptide; Methyllycaconitine **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1004; **Duration:** 4 weeks;

ALZET Comments: Dose (0.11 µl/hr); Controls received mp w/ vehicle; animal info (, 2 months old); post op. care (Indomethacin); peptides; ALZET brain infusion kit 1 used; Brain coordinates (-0.8 mm anteroposterior, -1.4 mm mediolateral to the bregma, and -3.5 mm dorsoventral to the cranium ()); bilateral cannula used; neurodegenerative (Alzheimer's Disease);

Q9047: H. Suzuki, *et al.* Helicobacter pylori Vacuolating Cytotoxin A Causes Anorexia and Anxiety via Hypothalamic Urocortin 1 in Mice. *Scientific Reports* 2019;9(1):6011

Agents: Vacuolating cytotoxin A **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 2004; **Duration:** Not Stated;

ALZET Comments: Dose (0.06, 0.18, or 0.6 pmol/kg); Controls received mp w/ vehicle; animal info (, 7 weeks old, 20-25 g, Male); Vacuolating Cytotoxin A aka VacA; Brain coordinates (0.5 mm posterior to the bregma, 1.0 mm right lateral to the midline, and 2.5 mm below the outer surface of the skull); bilateral cannula used; dental cement used; 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; **Strain:** Sprague Dawley; **Pump:** Not Stated; **Duration:** 1 w
ALZET Comments: Dose (25 ug/mL); Controls received mp w/ vehicle; animal info (, Male, 400 g); Dexmedetomidine aka DEX; enzyme inhibitor (a2 adrenergic receptor agonist); bilateral cannula used; dependence;

Q9985: L. Sun, *et al.* Inhibition of microRNA-155 Alleviates Neurological Dysfunction Following Transient Global Ischemia and Contribution of Neuroinflammation and Oxidative Stress in the Hippocampus. *Current Pharmaceutical Design* 2019;25(40):4310-4317

Agents: miR-155 Inhibitor **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** Not Stated; **Duration:** 24, 96 hours;

ALZET Comments: Dose (0.25 ul/hr); animal info (Male, 200-250 g); peptides; ALZET brain infusion kit Not Stated 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; ischemia (Global);

Q7670: M. Su, *et al.* Mechanisms Associated with Type 2 Diabetes as a Risk Factor for Alzheimer-Related Pathology. *Mol Neurobiol* 2019;56(8):5815-5834

Agents: AB42 peptide **Vehicle:** CSF/CNS; **Route:** SC; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2004; **Duration:** 7 days;

ALZET Comments: Dose (0.5 ul/h); animal info (Male, 300 g); peptides; Brain coordinates (Bregma 1.3 mm; midline 1.8 mm; depth 3.0 mm from the brain surface); bilateral cannula used; cyanoacrylate adhesive; neurodegenerative (Alzheimer'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);

Q9074: A. K. Singha, *et al.* Glucose-Lowering by Leptin in the Absence of Insulin Does Not Fully Rely on the Central Melanocortin System in Male Mice. *Endocrinology* 2019;160(3):651-663

Agents: Leptin **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1004; **Duration:** 28 days;

ALZET Comments: Dose (2.5 ng/hr/0.11 uL); Controls received mp w/ vehicle; animal info (3-6 months old, Male, greater than 25 g); Brain coordinates (20.34 mm from the bregma, 1 mm lateral (right side), 22.5 mm from the skull); bilateral cannula used; dependence;

Q9771: G. Rodriguez, *et al.* Disruption of NMDAR Function Prevents Normal Experience-Dependent Homeostatic Synaptic Plasticity in Mouse Primary Visual Cortex. *The Journal of Neuroscience* 2019;39(39):7664-7673

Agents: D-4- [(2E)-3-phosphono-2-propenyl]-2-piperazinecarboxylic acid **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Strain:** NR1 flox; **Pump:** 1007D; **Duration:** 2 days;

ALZET Comments: Dose (10 uM); Controls received mp w/ vehicle; animal info (); D-4- [(2E)-3-phosphono-2-propenyl]-2-piperazinecarboxylic acid aka NMDAR antagonist; Brain coordinates (-0.22 mm posterior, 1 mm lateral from bregma to target the lateral cerebral ventricle); dental cement used; neurodegenerative (Synaptic scaling and sliding threshold);

Q8820: M. Ratcliff, *et al.* Calorie restriction activates new adult born olfactory-bulb neurones in a ghrelin-dependent manner but acyl-ghrelin does not enhance subventricular zone neurogenesis. *Journal of Neuroendocrinology* 2019;31(7):e12755

Agents: Acyl-ghrelin **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** GHSr-eGFP; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Dose (48 ug/day); Controls received mp w/ vehicle; animal info (14 weeks old, Male.); bilateral cannula used; neurodegenerative (Neurogenesis);



- Q8817:** G. Ramadori, *et al.* S100A9 extends lifespan in insulin deficiency. *Nature Communications* 2019;10(1):3545
Agents: Leptin **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1004; **Duration:** 10 days;
ALZET Comments: Dose (227 ng/uL); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male); Brain coordinates (-0.34 mm from the bregma, ±1mm lateral, -2.5mm from the skull); bilateral cannula used; diabetes;
- Q6955:** A. Ortiz-Matamoros, *et al.* Differential Changes in the Number and Morphology of the New Neurons after Chronic Infusion of Wnt7a, Wnt5a, and Dkk-1 in the Adult Hippocampus In Vivo. *Anat Rec (Hoboken)* 2019;
Agents: Wnt7a, Wnt5a, Dkk-1 **Vehicle:** PBS; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Wistar; **Pump:** 2004; **Duration:** 11 days;
ALZET Comments: Dose (0.25 µL/hr); animal info (Male rats; 250–300 g, 3-months-old); Wnt7a and Wnt5a are Wnt agonists, and Dkk-1 is a Wnt antagonist; Brain coordinates (AP -3.6, L -3.1, and V + 2.0); bilateral cannula used(3.5 mm long bilateral cannula made with silicate capillaries); neurodegenerative ();
- Q7610:** T. Odaira, *et al.* Mechanisms underpinning AMP-activated protein kinase-related effects on behavior and hippocampal neurogenesis in an animal model of depression. *Neuropharmacology* 2019;150(121-133
Agents: Peptide, zeta-inhibitor **Vehicle:** Saline **Route:** CSF/CNS **Species:** Mice **Strain:** Not Stated; **Pump:** 2002; **Duration:** 14 d
ALZET Comments: Dose (5 ug/12 uL/day); animal info (6- weeks old, 26-28 g); behavioral testing (Forced Swim Test, Tail-Suspension Test); ZIP aka zeta-inhibitory peptide; enzyme inhibitor (zeta-inhibitor); ALZET brain infusion kit 3 used; Brain coordinates (1.00 L, 0.22 P, 3.00 to bregma); bilateral cannula used; cyanoacrylate adhesive; dependence;
- Q7563:** A. Mietelska-Porowska, *et al.* Pore-former enabled seeding of tau in rats: Alleviation by memantine and lithium chloride. *J Neurosci Methods* 2019;319(47-59
Agents: Okadaic acid **Vehicle:** CSF, artificial; **Route:** SC; **Species:** Rat; **Strain:** Wistar; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (2.4 nm); animal info (Male, rat, 2 months old); okadaic acid aka OA; enzyme inhibitor (non-specific phosphatase inhibitor); ALZET brain infusion kit 1 used; bilateral cannula used; neurodegenerative (Alzheimer's Disease);
- Q8284:** L. Meng, *et al.* Osteopontin plays important roles in pulmonary arterial hypertension induced by systemic-to-pulmonary shunt. *FASEB J* 2019;33(6):7236-7251
Agents: Arg-Gly-Asp peptidomimetic antagonist **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Strain:** Sprague Dawley;
Pump: 2ML4; **Duration:** 4 weeks;
ALZET Comments: Dose (90 mg/2 ml); Controls received mp w/ vehicle; animal info (Male, 8 weeks old, , 270-290 g); post op. care (Buprenorphine); Arg-Gly-Asp peptidomimetic antagonist aka XJ735; peptides; bilateral cannula used; cardiovascular;
- Q8268:** Q. Lu, *et al.* Circulating miR-103a-3p contributes to angiotensin II-induced renal inflammation and fibrosis via a SNRK/NF-kappaB/p65 regulatory axis. *Nat Commun* 2019;10(1):2145
Agents: Angiotensin II **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** Not stated; **Duration:** 4 weeks;
ALZET Comments: Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (); Blood pressure measured via Carotid artery cannulation; bilateral cannula used; cardiovascular;
- Q8257:** M. E. Lie, *et al.* GAT3 selective substrate L-isoserine upregulates GAT3 expression and increases functional recovery after a focal ischemic stroke in mice. *Journal of Cerebral Blood Flow and Metabolism* 2019;39(1):74-88
Agents: L-isoserine **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1004; **Duration:** 28 days;
ALZET Comments: Dose (38 uM or 380 uM); 0.3% DMSO used; Controls received mp w/ vehicle; animal info (2-4 months old, Male,); bilateral cannula used; ischemia (Stroke);
Q8252: O. Leiter, *et al.* Exercise-Induced Activated Platelets Increase Adult Hippocampal Precursor Proliferation and Promote Neuronal Differentiation. *Stem Cell Reports* 2019;12(4):667-679
Agents: Platelet factor 4 **Vehicle:** PBS; BSA; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57BL/6JRj; **Pump:** 1007D; **Duration:** 7
ALZET Comments: Dose (100 ng/mL); 0.9% Saline used; Controls received mp w/ vehicle; animal info (8 weeks old, , Female); Platelet factor 4 aka PF4; Brain coordinates (relative to bregma: anterior-posterior -1.3 mm; mediallylateral +1.0 mm; ventral-dorsal -2.2 mm); bilateral cannula used; neurodegenerative (Adult neurogenesis);