Recent References (2016-2019) on the Intracerebroventricular Administration of Agents to Rats Using ALZET® Osmotic Pumps

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; **Species:** Rat; **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 Sprague-Dawley 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;

Q7420: A. M. Schiller*, et al.* Increased Brain-Derived Neurotrophic Factor in Lumbar Dorsal Root Ganglia Contributes to the Enhanced Exercise Pressor Reflex in Heart Failure. Int J Mol Sci 2019;20(6):
Agents: Brain-derived neurotrophic factor, Anti- **Vehicle:** Vehicle not stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 1 Week;
ALZET Comments: Dose (10 g/mL); Controls received mp w/ vehicle; animal info (male Sprague-Dawley rats weighing 420 to 510 g); post op. care (Betadine, buprenorphine); cardiovascular;

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; **Pump:** 2004; **Duration:** 11 days;
ALZET Comments: Dose (0.25 µL/hr); animal info (Male Wistar 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 ();

Q7607: M. Okada*, et al.* Effects of acute and sub-chronic administrations of guanfacine on catecholaminergic transmissions in the orbitofrontal cortex. Neuropharmacology 2019;156(**Agents:** Guanfacine **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Dose (0.12 mg/kg/day); animal info (Male, Sprague Dawaley, 7 weeks old); neurodegenerative (ADHD);

Q8260: Y. T. Liu*, et al.* Effects of porcine brain hydrolysate on impairment of cognitive learning ability in amyloid beta(1-40) -infused rats. Anim Sci J 2019;90(2):271-279
Agents: Amyloid B (1-40) **Vehicle:** Not stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2004; **Duration:** 4 weeks;
ALZET Comments: Dose (10, 50, or 100 mg/kg/day); Controls received mp w/ vehicle; animal info (Male, Wistar, 8 weeks old, 200-300g); behavioral testing (Morris Water Maze Test, Spatial Memory Test, Working Memory Test); Alpha B (1-40) aka AB; peptides; ALZET brain infusion kit 3 used; Brain coordinates (relative to bregma; 0.8 mm posterior, 1.4 mm lateral); dental cement used;neurodegenerative (Alzheimer's Disease);

Q8240: T. A. Lanz*, et al.* Postmortem transcriptional profiling reveals widespread increase in inflammation in schizophrenia: a comparison of prefrontal cortex, striatum, and hippocampus among matched tetrads of controls with subjects diagnosed with schizophrenia, bipolar or major depressive disorder. Transl Psychiatry 2019;9(1):151
Agents: Haloperidol or Risperidone **Vehicle:** Acetic Acid; **Route:** CSF/CNS; **Species:** Rat; **Pump:** Not stated; **Duration:** 21 days;
ALZET Comments: Dose (haloperidol-0.25 mg/kg/day or risperidone-5 mg/kg/day); 1% Acetic Acid used; Controls received mp w/ vehicle; animal info (2 months old, Sprague Dawley, Male); neurodegenerative (Psychiatric Disorder);

Q8239: D. Lana*, et al.* Microglial distribution, branching, and clearance activity in aged rat hippocampus are affected by astrocyte meshwork integrity: evidence of a novel cell-cell interglial interaction. FASEB J 2019;33(3):4007-4020
Agents: Lipopolysaccharide **Vehicle:** Artificial Cerebrosprinal Fluid; **Route:** CSF/CNS; **Species:** Rat; **Pump:** Not stated; **Duration:** 4 weeks;

ALZET Comments: "Dose (1.6 ug/mL); Controls received mp w/ vehicle; animal info (Male, Wistar, 3-22 week sold); Lipopolysaccharide aka LPS ; Brain coordinates (on midline: 22.5 mm posterior to the lambda, 7 mm ventral to the dura); bilateral cannula used; neurodegenerative (Microglia Dysregulation); "

Q8226: M. Kongstorp*, et al.* High Accumulation of Methadone Compared with Buprenorphine in Fetal Rat Brain after Maternal Exposure. J Pharmacol Exp Ther 2019;371(1):130-137
Agents: Methadone or Buprenorphine **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2ML4; **Duration:** 28 days;
ALZET Comments: Dose (Buprenorphine- 1 mg/kg/day or); Controls received mp w/ vehicle; animal info (Female); post op. care (Metacam); dependence;

Q7524: R. B. S. Harris. Low-dose infusions of leptin into the nucleus of the solitary tract increase sensitivity to third ventricle leptin. American Journal of Physiology Endocrinology and Metabolism 2019;316(5):E719-E728
Agents: Leptin **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1004; **Duration:** 14 days;
ALZET Comments: Dose (5, 10 ng/day); 0.9% saline used; animal info (Male, Sprague-Dawley, 275-300 g); bilateral cannula used; dependence;

Q6981: H. Chao*, et al.* Cardiolipin-dependent mitophagy guides outcome after traumatic brain injury. J Neurosci 2019;
Agents: RNA, small interfering (cardiolipin synthase); RNA, small interfering (Phospholipid scramblase-3) **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1003D; **Duration:** 72 hours;
ALZET Comments: Dose (30 nmol); animal info (17-day-old male Sprague–Dawley rats); Brain coordinates (−0.8 mm posterior to bregma, −1.5 mm lateral to midline, and −4.6 mm ventral to the skull surface); Traumatic brain injury;

Q5932: T. Yang*, et al.* 4,4'-Diisothiocyanatostilbene-2,2'-disulfonic acid attenuates spontaneous recurrent seizures and vasogenic edema following lithium-pilocarpine induced status epilepticus. Neurosci Lett 2017;653(51-57
Agents: DIDS **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 1 week;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 250-300g); ALZET brain infusion kit used; DIDS aka 4,4' - diisothiocyanatostilbene-2,2' -disulfonic acid; Therapeutic indication (epilepsy); Dose (0.6 ug/day);

Q5928: S. Yamashita*, et al.* Oral Administration of Ethanolamine Glycerophospholipid Containing a High Level of Plasmalogen Improves Memory Impairment in Amyloid beta-Infused Rats. Lipids 2017;52(7):575-585
Agents: Amyloid protein, beta (1-40) **Vehicle:** Aluminum trichloride; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 2 weeks;
ALZET Comments: animal info (male, Wistar, 12 weeks old); neurodegenerative (Alzheimers); behavioral testing (radial maze-learning ability); "Instead of Aβ1–42 that is easy to aggregate in osmotic pump and line to cerebral ventricle, Aβ1–40 and AlCl3 were used and enabled to aggregate in cerebral ventricle." pg 3;

Q5900: T. Tsuji*, et al.* Vasopressin casts light on the suprachiasmatic nucleus. J Physiol 2017;595(11):3497-3514
Agents: Antagonist, vasopressin V1A receptor **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; **Duration:** 3 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (Sprague Dawley, 250-350g); ALZET brain infusion kit 2 used;Dose (416 ng/hr);

Q5692: H. Z. Toklu*, et al.* Intracerebroventricular tempol administration in older rats reduces oxidative stress in the hypothalamus but does not change STAT3 signalling or SIRT1/AMPK pathway. Applied Microbiology and Biotechnology 2017;42(1):59-67
Agents: Tempol **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** Not Stated; **Duration:** 3 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Fischer 344 x Brown Norway, 3 months or 23 months old); functionality of mp verified by ; Vehicle pumps replaced after one week; Dose (300 ug/h);

Q5691: K. W. Tian*, et al.* Role of C16, angiopoietin-1 and regeneration gene protein 2 in attenuating inflammation in an experimental rat model of autoimmune encephalomyelitis. J Anat 2017;230(1):30-46
Agents: Reg-2 **Vehicle:** Saline; PBS; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Lewis, adult, 250-300g); ALZET brain infusion kit used; post op. care (rats placed in temperature and humidity controlled chambers overnight for recovery; Penicillin IM 2500IU); immunology; immunology; Pumps primed overnight in room temperature saline;

Q5892: J. Tang*, et al.* A selective CB2R agonist (JWH133) restores neuronal circuit after Germinal Matrix Hemorrhage in the preterm via CX3CR1(+) microglia. Neuropharmacology 2017;119(157-169
Agents: shRNA, NM_133534.1; antibody, CX3CR1 **Vehicle:** NaCL; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1003D; **Duration:** 3 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, P7); ALZET brain infusion kit 3 used; ALZET brain infusion kit 3 used; Brain coordinates;

Q6498: T. Y. Tai*, et al.* Antiepileptic action of c-Jun N-terminal kinase (JNK) inhibition in an animal model of temporal lobe epilepsy. Neuroscience 2017;349(35-47
Agents: SB203580; SP600125; Lamotrigine isethionate **Vehicle:** Saline; DMSO; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2ML2; 2ML4; **Duration:** Not Stated;
ALZET Comments: Lamotrigine isethionate Dose (20 mg/kg/d); 1% DMSO used; animal info (6 week-old male Sprague Dawley); "Also, i.c.v. delivery of drugs via osmotic pump achieves steady-state drug levels without diurnal variation; avoids issues with drug blood-brain barrier permeability; avoids the animal stress that would occur with repeated drug injection or gavage; and minimizes drug amounts used. " pg. 4

Q6340: M. Piazza*, et al.* Simulating vasogenic brain edema using chronic VEGF infusion. J Neurosurg 2017;127(4):905-916
Agents: Vascular endothelial growth factor **Vehicle:** PBS; Rat serum albumin; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; 1007D; **Duration:** Not Stated;
ALZET Comments: Dose (2, 10, and 20 ng/hr); 0.1% rat serum albumin used; Controls received mp w/ vehicle; animal info (275-350g Male Fischer-344 rats); Brain coordinates (2.5 mm to the right of and 1 mm anterior to bregma); cyanoacrylate adhesive;

Q5877: D. E. Peragine*, et al.* RFamide-related peptide-3 (RFRP-3) suppresses sexual maturation in a eusocial mammal. Proc Natl Acad Sci U S A 2017;114(5):1207-1212
Agents: RFamide-related peptide-3 **Vehicle:** saline; **Route:** CSF/CNS; **Species:** Rat (naked mole); **Pump:** 2004; **Duration:** 4 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (13–65 mo of age; 34–58 g);
ALZET brain infusion kit 3 used;

Q6712: B. M. Park*, et al.* Fermented garlic extract ameliorates monocrotaline-induced pulmonary hypertension in rats. Journal of Functional Foods 2017;30(247-253
Agents: Oxadiazolo quinoxalin-1-one, 1H-[1,2,4], [4,3-a] **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 21 days;
ALZET Comments: Dose (2 mg/kg/day); animal info (Eight-week-old male Sprague-Dawley); 1H-[1,2,4] oxadiazolo [4,3,- a] quinoxalin-1-one aka ODQ; Brain coordinates (lateral, −3.3 mm from the bregma; posterior, 2.0 mm from the midline; ventral, −2.5 mm from dura); bilateral cannula used; cardiovascular;

Q6033: R. L. O'Hare Doig*, et al.* Specific ion channels contribute to key elements of pathology during secondary degeneration following neurotrauma. BMC Neuroscience 2017;18(1):62
Agents: Oxidized ATP **Vehicle:** PBS; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 4 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (160-200g); oxATP is a P2X7 receptor inhibitor. Therapeutic indication (Neurotrauma); Dose (1 mM);

Q6477: Y. F. Liang*, et al.* Hydrogen sulfide in paraventricular nucleus attenuates blood pressure by regulating oxidative stress and inflammatory cytokines in high salt-induced hypertension. Toxicol Lett 2017;270(62-71
Agents: GYY4137, hydroxylamine hydrochloride **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2006; **Duration:** 6 weeks;

ALZET Comments: Controls received mp w/ vehicle; animal info (male Dahl rats,); post op. care (buprenorphine); hydroxylamine hydrochloride aka HA; 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); bilateral cannula used; Cannula placement verified via histological confirmation;

Q6438: A. H. Leko*, et al.* Insulin-like growth factor I and its binding protein-3 are regulators of lactation and maternal responsiveness. Sci Rep 2017;7(1):3396
Agents: NBI-31772; Insulin-like growth factor I **Vehicle:** CSF, artificial; DMSO; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (48 µg IGF-I/day; 19,92 µg NBI-31772/day); 1% DMSO used; Controls received mp w/ vehicle; animal info (85 female Wistar rats weighing 250–300 g); post op. care (Tardomyocel®comp. III antibiotics (0.1 ml/kg body weight) was given s.c. to the animals for 5 days); enzyme inhibitor (brain IGFBP-3); ALZET brain infusion kit 2 used; Brain coordinates (antero-posterior, −0.5; lateral, 1.4; ventral, 3.6 mm);

Q6082: N. Kourdougli*, et al.* Depolarizing gamma-aminobutyric acid contributes to glutamatergic network rewiring in epilepsy. Annals of Neurology 2017;81(2):251-265
Agents: Bumetanide; Antibody, anti-pan-neurotrophin receptor p75 **Vehicle:** Ethanol; PBS; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 3 days;
ALZET Comments: Dose (bumetanide: 86ng/24 hours, p75NTR antibody: 6.67 ug/mL); 0.3% of ethanol in 1M PBS; Controls received mp w/ vehicle or rabbit IgG; animal info (adult male Wistar rats); post op. care (0.03 mg/kg buprenorphine administered SC); ALZET brain infusion kit used; Brain coordinates (anterior/posterior, -3.8; lateral/medial, +2.5; dorsal/ventral,+3.0);

Q5674: J. Y. Kim*, et al.* PDI regulates seizure activity via NMDA receptor redox in rats. Sci Rep 2017;7(42491
Agents: RNA, small interfering (PDI; DTNB); bactracin; Immunoglobulin, anti-PDI; tunicamycin ; **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days, 14 days;
ALZET Comments: Controls received mp w/ vehicle or control siRNA or control IgG; animal info (male, Sprague Dawley, 7 weeks old); pumps replaced every week; ALZET brain infusion kit 1 used; behavioral testing (behavioral seizure severity); Brain coordinates;

Q5854: H. L. Gao*, et al.* PVN Blockade of p44/42 MAPK Pathway Attenuates Salt-induced Hypertension through Modulating Neurotransmitters and Attenuating Oxidative Stress. Sci Rep 2017;7(43038
Agents: PD-98059 **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2006; **Duration:** 6 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (8 weeks old) ; Controls received mp w/ vehicle; animal info (8 weeks old) ; Therapeutic indication (Oral drug delivery, Pharmacokinetics); Dose (.025 ug/hr);

Q5327: G. Futamura*, et al.* Evaluation of a novel sodium borocaptate-containing unnatural amino acid as a boron delivery agent for neutron capture therapy of the F98 rat glioma. Radiat Oncol 2017;12(1):26
Agents: Boron-10 containing sodium borocaptate, ACBC-BSH (Boron-10 derivative) **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001D; **Duration:** 24 hours;
ALZET Comments: ALZET brain infusion kit used; comparison of IV injections vs mp; cancer (F98 glioma); brain tissue distribution; “we succeeded in achieving a high accumulation of boron in the tumors of rats in which ACBC-BSH was administered by CED, compared with ACBC-BSH administered intravenously” pg. 9 ; ACBC-BSH is a boron-10 containing sodium borocaptate derivative, 1-amino-3-fluorocyclobutane-1-carboxylic acid; Dose (1.2 mg/kg);

Q6385: X. Du*, et al.* Local GABAergic signaling within sensory ganglia controls peripheral nociceptive transmission. J Clin Invest 2017;127(5):1741-1756
Agents: GABA; muscimol; NO711 **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (adult male Sprague-Dawley rats weighing 180–200 g); NO711 is a GAT1 inhibitor; ALZET brain infusion kit 2 used;

Q6386: Dorfman MD*, et al.* Deletion of Protein Kinase C l in POMC Neurons Predisposes to Diet-Induced Obesity. Diabetes 2017;66(4):920-934

Agents: Leptin **Vehicle:** PBS; **Route:** CSF/CNS; **Species:** Rat; Mice; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: animal info (male Wistar rats; Eight-week-old male and female POMC-lKO and WT mice); Brain coordinates (0.8 mm posterior to bregma; 1.5 mm lateral to the sagittal suture, and 3.6 mm below the skull surface); diabetes;

Q6321: S. C. Chen*, et al.* Administration of sonic hedgehog protein induces angiogenesis and has therapeutic effects after stroke in rats. Neuroscience 2017;352(285-295
Agents: Sonic hedgehog protein, Cyclopamine, antibody, anti-VEGF **Vehicle:** PBS; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Dose (1 mg/mL Shh, 20 µM Shh plus Cyc, 25 µg/ml Shh plus VEGF antibody); animal info (Male Sprague–Dawley rats); Cyclopamine is a sonic hedgehog protein inhibitor; Brain coordinates (bregma -0.8 mm anteroposterior, ±1.5 mm mediolateral, and -4.5 mm dorsoventral);

Q6402: K. Chen*, et al.* Sequential therapy of anti-Nogo-A antibody treatment and treadmill training leads to cumulative improvements after spinal cord injury in rats. Experimental Neurology 2017;292(135-144
Agents: Immunoglobulin G1, anti-Nogo-A antibody 11C7; Immunoglobulin G1, anti-cyclosporin A **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2ML2; **Duration:** 2 weeks;
ALZET Comments: animal info (female Sprague-Dawley rats weighing 200-250 g); Therapeutic indication (spinal cord injury);

Q6009: B. Changyaleket*, et al.* Heparanase promotes neuroinflammatory response during subarachnoid hemorrhage in rats. J Neuroinflammation 2017;14(1):137
Agents: OGT2115 **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1003D; **Duration:** 48 hours;
ALZET Comments: Controls received mp w/ vehicle; animal info (250–300g); enzyme inhibitor (heparanase inhibitor); Dose (0.4 uM);

Q5968: B. K. Becker*, et al.* Central TrkB blockade attenuates ICV angiotensin II-hypertension and sympathetic nerve activity in male Sprague-Dawley rats. Autonomic Neuroscience: Basic and Clinical 2017;205(77-86
Agents: Angiotensin II **Vehicle:** CSF, artificial; DMSO; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 11 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (350-400g); 50% DMSO, 50% aCSF used Therapeutic indication (Hypertension);

Q5730: B. Albright*, et al.* Progressive neuronal activation accompanies epileptogenesis caused by hippocampal glutamine synthetase inhibition. Experimental Neurology 2017;288(122-133
Agents: Methionine sulfoximine **Vehicle:** PBS; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (200-250 g) ; MSO: methionine sulfoximine ; enzyme inhibitor (methionine sulfoximine); Therapeutic indication (Temporal lobe epilepsy); Dose (2.5 mg/mL);

Q5869: D. A. Adekunbi*, et al.* Role of amygdala kisspeptin in pubertal timing in female rats. PLoS One 2017;12(8):e0183596
Agents: Peptide 234 **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days, 2 weeks;
ALZET Comments: animal info (21 and 100 day old rats); Peptide 234 is a kisspeptin receptor antagonist ; Bilateral cannulae used; Correct cannula placement in the MePD was confirmed by microscopic inspection of 30 µm brain sections; Therapeutic indication (Obesity);
Dose (2 nmol in 6 µl/d); Brain coordinates; 2.5 mm posterior to bregma (AP), 3.2 mm lateral (ML), and 7.8 mm below the surface of the dura (DV)

Q5502: T. Yayeh*, et al.* Morphine dependence is attenuated by red ginseng extract and ginsenosides Rh2, Rg3, and compound K. J Ginseng Res 2016;40(4):445-452
Agents: Ginsenoside, Rg3; ginsenoside, Rh; compound K; morphine **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2ML1; **Duration:** 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 220-240g); behavioral testing (conditioned place preference; escaping behavior); dependence; cyanoacrylate wound closure; Dose (morphine 26nmol/10ul/hr, ginsenoside 10 ug/ul/h); Brain coordinates (L: 1.3 mm; AeP: e0.5 mm; and DeV: e4.3 mm);

Q4911: J. Yang*, et al.* Inhibiting HIF-1alpha Decreases Expression of TNF-alpha and Caspase-3 in Specific Brain Regions Exposed Kainic Acid-Induced Status Epilepticus. Cellular Physiology and Biochemistry 2016;38(1):75-82
Agents: Estradiol, 2-methoxy; entanercept **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1003D; **Duration:** 3 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, 200-250g); ALZET brain infusion kit used; Cannula placement verified via histologic analysis;

Q4913: Y. Yamaguchi*, et al.* Real-Time Recording of Circadian Per1 and Per2 Expression in the Suprachiasmatic Nucleus of Freely Moving Rats. J Biol Rhythms 2016;31(1):108-11
Agents: Luciferin, D- **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2ML4; **Duration:** Not Stated;
ALZET Comments: animal info (Per1-luc or Per2-luc); cyanoacrylate adhesive; Dose (measurement of real-time gene activity);

Q5102: W. S. Xu*, et al.* Bumetanide promotes neural precursor cell regeneration and dendritic development in the hippocampal dentate gyrus in the chronic stage of cerebral ischemia. Neural Regen Res 2016;11(5):745-51
Agents: Bumetanide **Vehicle:** Water, sterile; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2004; **Duration:** 21 days;
ALZET Comments: animal info (male, Wistar, 200-250g); ischemia (cerebral); behavioral testing (Morris water maze); pumps primed overnight in 37C saline; used dental cement; Dose (200 ug/kg/day); Brain coordinates (anteroposterior −0.9, mediolateral +1.5);

Q5713: H. Xu*, et al.* The Role of HMGB1 in Pial Arteriole Dilating Reactivity following Subarachnoid Hemorrhage in Rats. J Vasc Res 2016;53(5-6):349-357
Agents: HMGB1; Box A; OxPAPC **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1003D; **Duration:** 2 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 250-300g); Multiple pumps per animal (2); Bilateral infusion; Dose (HMGB1 120 ng/h; Box A 12-120 ng/hr; OxPAPC 20 ug/h);

Q5099: J. Xing*, et al.* HIF-1alpha Activation Attenuates IL-6 and TNF-alpha Pathways in Hippocampus of Rats Following Transient Global Ischemia. Cellular Physiology and Biochemistry 2016;39(2):511-20
Agents: SC144; etanercept **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** Not Stated; **Duration:** 24 hours;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 200-300g); ALZET brain infusion kit used; ischemia (cerebral); used polycarbonate tubing; SC144 is a gp130 inhibitor; Brain coordinates (3.7 mm posterior to the bregma, 4.1 mm lateral to the midline, and 3.5 mm under the dura);

Q5711: H. Xiao*, et al.* Effect of ephrin-B2 on the expressions of angiopoietin-1 and -2 after focal cerebral ischemia/reperfusion. Neural Regen Res 2016;11(11):1784-1789
Agents: Ephrin-B2-Fc, recombinant murine chimera **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1003D; **Duration:** 3 days;
ALZET Comments: animal info (male, Sprague Dawley, 8-10 weeks old, ~280g); ischemia (cerebral); Brain coordinates;

Q4857: M. Wen-Chung Liu*, et al.* Hyperbaric Oxygen Therapy Alleviates Carbon Monoxide Poisoning–Induced Delayed Memory Impairment by Preserving Brain-Derived Neurotrophic Factor–Dependent Hippocampal Neurogenesis. Critical Care Medicine 2016;44(1):
Agents: TrkB-Fc, recombinant human; brain-derived neurotrophic factor **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, adult); animal info (male, Sprague Dawley, adult); behavioral testing (radial arm maze, memory talk); used dental cement; pumps primed in 37C saline prior to implantation; Dose (); brain coordinates;

Q5707: S. G. Wei*, et al.* Endoplasmic reticulum stress increases brain MAPK signaling, inflammation and renin-angiotensin system activity and sympathetic nerve activity in heart failure. American Journal of Physiology Heart and Circulatory Physiology 2016;311(4):H871-H880

Agents: Tauroursodeoxycholic acid **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2004; **Duration:** 4 weeks, 28 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, adult, 275-325g);cardiovascular; Used screws and dental orthodontic resin; Dose (10 ug/day); Brain coordinates;

Q5705: X. Wang*, et al.* Cerebral mTOR signal and pro-inflammatory cytokines in Alzheimer's disease rats. Transl Neurosci 2016;7(1):151-157
Agents: Rapamycin; amyloid protein, beta (1-42) **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: animal info (male, Sprague Dawley, 3-4 months old, 300-350g); Multiple pumps per animal (2); neurodegenerative (Alzheimer's); behavioral testing (Y-maze); immunology; Bilateral infusion; used jewelers' screw and dental zinc cement; Dose (10 mg/kg amyloid beta, rapamycin 500 ug/2 weeks); Brain coordinates;

Q5075: Q. Tong*, et al.* PPARbeta/delta Agonist Provides Neuroprotection by Suppression of IRE1alpha-Caspase-12-Mediated Endoplasmic Reticulum Stress Pathway in the Rotenone Rat Model of Parkinson's Disease. Mol Neurobiol 2016;53(6):3822-31
Agents: GW501516 **Vehicle:** DMSO; saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2006; **Duration:** 6 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 200-220g); animal info (male, Sprague Dawley, 200-220g); 30% DMSO used; neurodegenerative (Parkinson's); behavioral testing (open field test; catalepsy test); "GW501516 does not readily cross the blood–brain barrier, so GW501516 or vehicle was administrated intracerebroventricularly." pg 3823; pumps primed in 37C saline overnight; Brain coordinates (0.8 mm posterior to the bregma, 1.5 mm lateral to the midsagittal suture, and 4.0 mm ventral to the skull);

Q4903: Y. Y. Shun-Guang Wei, Robert M. Weiss, Robert B. Felder. Inhibition of Brain Mitogen-Activated Protein Kinase Signaling Reduces Central Endoplasmic Reticulum Stress and Inflammation and Sympathetic Nerve Activity in Heart Failure Rats. Hypertension 2016;67(229-236
Agents: PD98059; SB203580; SP600125 **Vehicle:** CSF, artificial; DMSO; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2004; **Duration:** 4 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, adult, 275-325g); 5% DMSO used; cardiovascular;

Q4816: Shu-Yan Dai*, et al.* Central Infusion of Angiotensin II Type 2 Receptor Agonist Compound 21 Attenuates DOCA/NaCl-Induced Hypertension in Female Rats. Oxidative Medicine and Cellular Longevity 2016;2016(**Agents:** Compound 21 **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2004; **Duration:** 4 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (female, Wistar, 10-12 weeks, OVX); ALZET brain infusion kit used; cardiovascular; bp meaured using radiotelemetry;

Q5179: N. Petitdant*, et al.* Cerebral radiofrequency exposures during adolescence: Impact on astrocytes and brain functions in healthy and pathologic rat models. Biofactors 2016;37(5):338-50
Agents: Endotoxin, LPS **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dalwey, P32); behavioral testing (Open Field test; elevated plus maze; fear conditioning); Cannula placement verified via methylene blue dye; used Plastics One cannula; used PEEK cannula; rats exposed to radio frequency electromagnetic fields while pump implanted; Dose (1.25 ug/h); Brain coordinates;

Q5177: P. A. Pereira*, et al.* Effects of chronic alcohol consumption, withdrawal and nerve growth factor on neuropeptide Y expression and cholinergic innervation of the rat dentate hilus. Neurotoxicology 2016;54(153-60
Agents: Nerve growth factor **Vehicle:** Methylene blue; BSA; CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 12 days;
ALZET Comments: animal info (male, Wistar); functionality of mp verified by residual volume; Pumps were pre-tested to confirm delivery rate; ALZET brain infusion kit used; post op. care (SC injections of 0.9% saline (2ml)); pulsed delivery; lynch

coil; the cannulae were connected to methylene blue (0.01%) filled minipumps via sterile coiled PE-60 tubing. The tubing was filled with air–oil spacer at the pump end and with NGF (150 mg diluted in 150 ml of vehicle).

Q6620: S. J. Min*, et al.* Positive feedback role of TRPC3 in TNF-alpha-mediated vasogenic edema formation induced by status epilepticus independent of ETB receptor activation. Neuroscience 2016;337(37-47
Agents: TNFp55 receptor, soluble; SN50 **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** Not Stated;
ALZET Comments: Controls received mp w/ vehicle; enzyme inhibitor (NFKB); ALZET brain infusion kit 1 used; Brain coordinates (1 mm posterior; 1.5 mm lateral; 3.5 mm depth
to the bregma);

Q4899: y. B. S. H. H.-W. WANG, y A. CHEN, M. AHMAD*,, et al.* ROLE OF BRAIN ALDOSTERONE AND MINERALOCORTICOID RECEPTORS IN ALDOSTERONE-SALT HYPERTENSION IN RATS. Neuroscience 2016;314(90-105
Agents: Aldosterone; eplerenone; FAD286 **Vehicle:** CSF, artificial; acetonitrile; **Route:** SC; CSF/CNS; **Species:** Rat; **Pump:** 2004; **Duration:** 2 weeks, 3 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, 200-250g); 4% acetonitrile used; Multiple pumps per animal; cardiovascular; bp measured using radiotelemetry; bp measured using radiotelemetry; dose (1.5 and 7.5 ug/kg/hr Aldosterone, 5ug/day Eplerenone, 25 ug/day FAD286)

Q4894: J. P. V. a. R. A. Gonzales. Chronic Intracerebroventricular Infusion of Monocyte Chemoattractant Protein-1 Leads to a Persistent Increase in Sweetened Ethanol Consumption During Operant Self-Administration But Does Not Influence Sucrose Consumption in Long-Evans Rats. Alcoholism Clinical and Experimental Research 2016;40(1):
Agents: Monocyte chemoattractant protein-1, recombinant rat **Vehicle:** CSF, artificial; water, distilled; albumin, rat serum; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1004; **Duration:** 5 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Long Evans, 350g); functionality of mp verified by ELISA and manufacturers instructions see pg189; ALZET brain infusion kit 2 used; dose-response (pg.190); post op. care (bupivicane intradermally; bupivacaine and gentamicin dripped into wound); behavioral testing (alcohol self administration); stability verified by (ELISA pg 192); cyanoacrylate adhesive; “We chose the ICV method to simulate the presence of brain-induced MCP-1 and the method’s ability to target the whole brain with molecules that do not readily cross the BBB” pg 188-189; pumps primed at 37C sterile saline; Dose (0.2, 20, 2000 ng/day);

Q6041: L. German-Castelan*, et al.* Intracellular Progesterone Receptor Mediates the Increase in Glioblastoma Growth Induced by Progesterone in the Rat Brain. Archives of Medical Science 2016;47(6):419-426
Agents: Oligodeoxynucleotide, antisense **Vehicle:** Propylene glycol; **Route:** CSF/CNS; **Species:** Rat; **Pump:** Not Stated; **Duration:** 15 days;
ALZET Comments: animal info (250-300g) ; tissue perfusion (brain tissue); Guide cannula used; Therapeutic indication (Astrocytomas, CNS tumor); Dose (0.5 ug/day);

Q5757: A. Cabrera-Pastor*, et al.* In vivo administration of extracellular cGMP normalizes TNF-alpha and membrane expression of AMPA receptors in hippocampus and spatial reference memory but not IL-1beta, NMDA receptors in membrane and working memory in hyperammonemic rats. Brain, Behavior, and Immunity 2016;57(360-370
Agents: cGMP **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days, 4 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (weight: 120-140g); ALZET brain infusion kit 2 used; behavioral testing (8 arm radial maze); Therapeutic indication (Neuroinflammation, learning and memory); Dose (240 uM);

Q4910: R. L. T. Baojian Xue, Yang Yu, Fang Guo, Terry G. Beltz, Robert B. Felder*,, et al.* Central Renin–Angiotensin System Activation and Inflammation Induced by High-Fat Diet Sensitize Angiotensin II–Elicited Hypertension. Hypertension 2016;67(163-170
Agents: Pentoxifylline; irbesartan; minocycline; angiotensin II **Vehicle:** CSF, artificial; Na sodium bicarbonate; saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2004; 2002; 2001; **Duration:** 4 weeks; 2 weeks; 1 week;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 10-12 weeks old); cardiovascular; peptides; Dose (ICV - Pentoxifylline 10 ug/hr; irbesartan 125 ug/day; minocycline 5 ug/hr; SC AngII 120 ng/kg/min); brain coordinates;