Recent References (2018-Present) Where ALZET® Osmotic Pump Functionality Was Documented

Q11315: L. D. Coles, *et al.* Levetiracetam Pharmacokinetics and Brain Uptake in a Lateral Fluid Percussion Injury Rat Model. Journal of Pharmacology and Experimental Therapeutics 2023;386(2):259-265
Agents: Levetiracetam **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2ML1; **Duration:** 7 days;
ALZET Comments: Dose (200 mg/kg/day); 0.9% sterile saline used; controls received mp w/ vehicle; animal info (Male; 11 weeks old); functionality of mp verified by plasma levels see fig. 3; PK study

Q10994: D. Selvakumar, *et al.* Delivery of Cardioactive Therapeutics in a Porcine Myocardial Infarction Model. Journal of Visual Experiment 2023;192):
Agents: Platelet-derived growth factor-AB, human **Vehicle:** Saline; **Route:** IV (jugular); **Species:** Pig; **Strain:** Large white x landrace; **Pump:** 2ML1; 2ML2; 2ML4; **Duration:** 7 days;
ALZET Comments: Dose: Controls received mp w/ vehicle; animal info: Pre-pubescent large white x landrace gilts, 18-20 kg, post op. care: 0.2 mg/kg of meloxicam SC; comparison of injections (thoracotomy, transepicardial, percutaneous transendocardial) vs mp; functionality of mp verified by recomb protein serum concentration (ELISA); cardiovascular (myocardial infarction); good methods p. 8, 13 fig. 2; no stress; "Jugular vein minipump insertion provides a safe and reliable method of PDGF delivery over a 7 day time period." p. 13

Q10991: P. G. Saletti, *et al.* Tau Phosphorylation Patterns in the Rat Cerebral Cortex After Traumatic Brain Injury and Sodium Selenate Effects: An Epibios4rx Project 2 Study. Journal of Neurotrauma 2023;
Agents: Sodium selenate **Vehicle:** Saline, sterile; **Route:** SC; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2ML1; **Duration:** 7 d
ALZET Comments: Dose (1mg/kg/d); dose-response; 0.9% sterile saline used; Controls received mp w/ vehicle; animal info: Adult male; functionality of mp verified by plasma levels (Table 3); traumatic brain injury

Q10984: G. Rached, *et al.* TRPC3 Regulates Islet Beta-Cell Insulin Secretion. Advanced Science 2023;10(6):e2204846
Agents: GSK1702934A **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** Trpc3-/-; **Pump:** Not Stated; **Duration:** 4 weeks;
ALZET Comments: Dose (0.1 mg/kg/day); animal info: WT mice; GSK 1702934A is a small molecule, potent and selective TRPC3/6 activator; functionality of mp verified by plasma insulin levels; diabetes;

Q10978: R. Patel, *et al.* Signaling through the IL-6-STAT3 Pathway Promotes Proteolytically-Active Macrophage Accumulation Necessary for Development of Small AAA. Vascular and Endovascular Surgery 2023;57(5):433-444
Agents: Interleukin-6 **Vehicle:** Saline, sterile; **Route:** IP; **Species:** Mice; **Strain:** C57BL/6; IL-6KO; **Pump:** 1004; **Duration:** 21 d
ALZET Comments: Dose: (4.36 µg/kg/day); Controls received mp w/ vehicle; animal info: wild-type mice; post op. care (subcutaneous injection of 0.05 mg/kg buprenorphine); functionality of mp verified by IL-6 plasma levels; cardiovascular; abdominal aortic aneurysm; immunology

Q10970: A. Nenmar, *et al.* Assessment of the Hepatotoxicity of Intratracheally Instilled Silver Nanoparticles in Hypertensive Mice. Hamdan Medical Journal 2023;
Agents: Angiotensin II **Vehicle:** Saline; PEG; **Route:** SC; **Species:** Mice; **Strain:** BALB/c; **Pump:** 2006; **Duration:** Not Stated;
ALZET Comments: Dose (0.75 Mg/kg/day); Controls received mp w/ vehicle; animal info: Eight to 10-week-old mice both genders weighing 20–25 g; functionality of mp verified by Ang II plasma concentration; Blood pressure measured via: computer-based tail-cuff manometry system; 136 ± 2 mmHg - 81 ± 1 mmHg pg.4 (result); cardiovascular; (hypertension)

Q11061: A. Nemmar, *et al.* Impact of Intratracheal Administration of Polyethylene Glycol-Coated Silver Nanoparticles on the Heart of Normotensive and Hypertensive Mice. International Journal of Molecular Sciences 2023;24(10):
Agents: Angiotensin II **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice **Strain:** BALB/c; **Pump:** 2006; **Duration:** 28 days;
ALZET Comments: Dose (0.75 mg/kg/day); 0.15 mol/L NaCl and 0.01-N acetic acid used; controls received mp w/ vehicle; animal info: both sexes, aged 8 to 10 weeks, 20 to 25 g); blood pressure measured via tail cuff; blood pressure measurement results (p.4) Fig. 2; functionality of mp verified by plasma levels; cardiovascular (hypertension)

Q11060: A. Nakamoto, *et al.* O-linked N-acetylglucosamine modification is essential for physiological adipose expansion induced by high-fat feeding. American Journal of Physiology Endocrinology and Metabolism 2023;325(1):E46-E61
Agents: Leptin **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Strain:** Ogt-FKO; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (10 µg/day); controls received mp w/ vehicle; animal info: 8 wk, HFD; functionality of mp verified by plasma levels; obesity, insulin resistance

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

Q11044: B. A. Karamian, *et al.* Varenicline mitigates the increased risk of pseudarthrosis associated with nicotine. The Spine Journal 2023;23(8):1212-1222
Agents: Nicotine; varenicline **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2ML4; **Duration:** 8 weeks;
ALZET Comments: Dose: Nicotine 15mg/kg/day, 22.5mg/kg/day, 30mg/kg/day; Varenicline 1mg/kg/day, 2mg/kg/day: animal info: eight-week-old male Sprague-Dawley rats ~300 grams; post op. care: skin closed with running sub-cuticular 4-0 Vicrylsuture, incision was dressed with triple antibiotic ointment; pumps replaced after 4 weeks; functionality of mp verified by serum levels; good methods (pump replacement) p. 2-3; therapeutic indication: (Pseudarthrosis, spinal fusion)

Q11041: K. M. Jansen, *et al.* Impact of GLP-1 receptor agonist versus omega-3 fatty acids supplement on obesity-induced alterations of mitochondrial respiration. Frontiers in Endocrinology 2023;14(1098391
Agents: Exenatide **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6JOlaHSD; **Pump:** 1004; **Duration:** 8 weeks;
ALZET Comments: Dose (10 µg/kg/day); animal info: six-week-old female; post op. care: Temgesic analgesia (0.1 mg/kg) was given 8 and 20 hours postoperatively; functionality of mp verified by weight gain; peptides; obesity

Q11079: A. Huang, *et al.* Modulation of foraging-like behaviors by cholesterol-FGF19 axis. Cell & Bioscience 2023;13(1):20
Agents: Fibroblast growth factor 19 **Vehicle:** CSF, artificial; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Strain:** C57BL/6; **Pump:** 2006; **Duration:** 2 weeks;
ALZET Comments: Dose: FGF19 (15 ng/0.5 ul/h); Controls received mp w/ vehicle; animal info (Male; 5 months old); peptides; pumps replaced twice; functionality of mp verified by measuring residual volume; Brain coordinates: (Anteroposterior -0.3 mm to bregma, lateral 1 mm to bregma, -2.5 mm below skull); vinyl tubing used; behavioral testing (Open field);

Q11078: A. Gurdita, *et al.* Development of a new surgical technique to infuse kynurenic acid to optic nerves in chickens for studying loss of myelination. Heliyon 2023;9(3):e14361
Agents: Kynurenic acid **Vehicle:** PBS; NaOH; **Route:** CSF/CNS (optic nerve); **Species:** Bird **Strain:** White Leghorn chicken; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: animal info (Chicks; 7 days old); post op. care: meloxicam, polysporine; functionality of mp verified by India ink (non-toxic dye); receptor antagonist (Glutamate); intrathecal catheter used;

Q11275: A. Gallez, *et al.* Comparison of Estetrol Exposure between Women and Mice to Model Preclinical Experiments and Anticipate Human Treatment. International Journal of Molecular Sciences 2023;24(11):
Agents: Estetrol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** FVB/N; **Pump:** Not Stated; **Duration:** 5 weeks;
ALZET Comments: Dose (0.1, 0.3 or 1 mg/kg/day); 0.9% NaCl used; animal info (Female; Average weight of 25 g; Ovariectomized); comparison of mp vs IV, SC, IP, oral gavage (acute methods); functionality of mp verified by blood plasma levels; "The use of osmotic minipumps continuously releasing E4 for several weeks provided an exposure profile mimicking chronic oral administration in women."

Q11074: K. Fukuyama*, et al.* Opposing effects of clozapine and brexpiprazole on beta-aminoisobutyric acid: Pathophysiology of antipsychotics-induced weight gain. Schizophrenia 2023;9(1):8
Agents: Clozapin; brexpiprazole; vigabatrin **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2ML1; **Duration:** 14 days;
ALZET Comments: Dose: (clozapine 5 mg/kg/day, brexpiprazole 10 mg/kg/day, vigabatrin 75 mg/kg/day); Controls received mp w/ vehicle; animal info (Male; 6-7 weeks old); functionality of mp verified by plasma concentration p. 4 fig. 1; schizophrenia

Q11273: Y. Fu*, et al.* Effects of Leptin and Body Weight on Inflammation and Knee Osteoarthritis Phenotypes in Female Rats. JBMR Plus 2023;7(7):e10754
Agents: Leptin, recombinant **Vehicle:** Tris hydrochloride; **Route:** SC; **Species:** Rat; **Strain:** Zucker (F344 BN F1); **Pump:** 2006; **Duration:** 23 weeks;
ALZET Comments: Dose (3.6 ug/day); Controls received mp w/ vehicle; animal info (Female; Obese; 12 months old, hybrid); pumps replaced every 5 weeks; long-term study; functionality of mp verified by plasma levels p. 7

Q11242: I. Ali*, et al.* E2730, an uncompetitive gamma-aminobutyric acid transporter-1 inhibitor, suppresses epileptic seizures in a rat model of chronic mesial temporal lobe epilepsy. Epilepsia 2023;64(10):2806-2817
Agents: E2730 **Vehicle:** DMSO; propylene glycol; saline; **Route:** SC; **Species:** Rat; **Strain:** Wistar **Pump:** 2ML1; **Duration:** 1; 2 w;
ALZET Comments: Dose-dependent study (10, 20, 100mg/kg/day); controls received mp w/ vehicle; 30:30:40 DMSO:propylene glycol:saline; animal info: Wistar,19-week-old; post op. care: carprofen 5mg/kg and buprenorphine .05mg/kg sc; bupivacaine 1mg/kg at site of incision; behavioral testing (sedation, ataxia, neuromotor scores); functionality of mp verified by plasma levels; neurodegenerative (Epilepsy); "...continuous infusion of E2730 by osmotic pump over 7 days had a marked, dose-dependent suppression of spontaneous recurrent seizures in chronically epileptic rats..." p. 9

Q10721: Y. Wada*, et al.* Compromised Blood Flow in the Optic Nerve Head after Systemic Administration of Aldosterone in Rats: A Possible Rat Model of Retinal Ganglion Cell Loss. Current Eye Research 2022;47(5):777-785
Agents: Aldosterone **Vehicle:** Not Stated **Route:** SC **Species:** Rat **Strain:** Pigmented Brown Norway **Pump:** 2004 **Duration:** 4w
ALZET Comments: Dose (80 ug/kg/d); Controls received mp w/ vehicle; animal info (Male rat; ; 20 weeks old); Blood pressure measured via automic sphygomomanometer; functionality of mp verified by plasma levels;

Q10672: J. Santiago-Moreno*, et al.* Expression of Aquaglyceroporins in Spermatozoa from Wild Ruminants Is Influenced by Photoperiod and Thyroxine Concentrations. International Journal of Molecular Sciences 2022;23(6):
Agents: Thyroxine **Vehicle:** Saline; **Route:** SC (lateral shoulder); **Species:** Ibex (Iberian); **Strain:** Not Stated; **Pump:** 2ML2; **Duration:** 56 days;
ALZET Comments: Dose (164 µg/day); 0.9% normal saline used; T4 aka thyroxine; pumps replaced after 14 days; functionality of mp verified by plasma concentrations

Q10827: F. Li*, et al.* TEAD1 regulates Cell Proliferation Through a Pocket-Independent Transcription Repression Mechanism. Nucleic Acids Research 2022;50(22):12723-12738
Agents: Insulin, human **Vehicle:** Saline; **Route:** SC; **Species:** Mice (transgenic); **Strain:** TKO; TEAD1 ko; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (0.2 U/day); 0.9% NaCl used; Controls received mp w/ vehicle; animal info pancreatic B cell specific mice; 4-weeks old; functionality of mp verified by blood glucose levels; diabetes

Q10821: J. T. Le*, et al.* Neurobehavioral Deficits and a Progressive Ictogenesis in the Tetrodotoxin Model of Epileptic Spasms. Epilepsia 2022;63(12):3078-3089
Agents: Tetrodotoxin **Vehicle:** Saline; **Route:** CSF/CNS (somatosensory cortex); **Species:** Rat; **Strain:** Not Stated; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Dose (12 umol); Controls received mp w/ vehicle; animal info (Male and female rats pups; 11-12 days old); functionality of mp verified by behavioral spasms; behavioral testing (Object recognition memory test; Object location memory test; Matching to place water maze test);

Q10815: Y. K. Kaneko*, et al.* Nobiletin Ameliorates Glucose Tolerance by Protecting Against β-Cell Loss in Type-2 Diabetic db/db Mice. Phytomedicine Plus 2022;2(4):
Agents: Nobiletin **Vehicle:** DMSO; Polyethylene glycol; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (80 µg/kg/h); 50% DMSO polyethylene glycol used; Controls received mp w/ vehicle; animal info (Male diabetic mice; 5 weeks old); functionality of mp verified by blood glucose levels, OGTT and ITT results; diabetes; Therapeutic indication (Type 2 Diabetes);

Q10749: J. Guo*, et al.* Blockage of MLKL Prevents Myelin Damage in Experimental Diabetic Neuropathy. Proceedings of National Academy of Sciences 2022;119(14):e2121552119
Agents: TC013249 **Vehicle:** Citrate buffer; **Route:** IP; **Species:** Mice; **Strain:** Wild-type; **Pump:** 1004; **Duration:** 7 days; 14 days;
ALZET Comments: Dose: (160 mg/kg.)Controls received mp w/ vehicle; animal info: diabetic mouse model in (WT); functionality of mp verified by plasma levels; TC013249 is an hMLKL-specific inhibitor; diabetes; (Diabetic neuropathy);

Q10473: K. A. R. Estrela*, et al.* Blocking Metabotropic Glutamate Receptor Subtype 7 via the Venus Flytrap Domain Promotes a Chronic Stress-Resilient Phenotype in Mice. Cells 2022;11(11):
Agents: XAP044 **Vehicle:** DMSO; Ringer's solution; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1004; **Duration:** 26 days;
ALZET Comments: Dose response (100 uM, 10 uM, 1 uM); 5% DMSO used; Controls received mp w/ vehicle; animal info (Male 19-22 g); behavioral testing (Chronic Subordinate Colony Housing Paradigm; Light/Dark Box Test; Stress-Induced Hyperthermia Test); functionality of mp verified by aspirating residual volume; ALZET brain infusion kit 3 used; gene therapy; Therapeutic indication (Chronic stress-related pathology);

Q9505: T. Troiano*, et al.* Inhibition of NOX1 mitigates blood pressure increases in elastin insufficiency. American Phsiological Society 2021;
Agents: Apocynin **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Strain:** Eln+/+; Eln+/-; **Pump:** 1004; **Duration:** 56 days;
ALZET Comments: Dose (3 mg/kg/day); 50% DMSO used; Controls received mp w/ vehicle; animal info Male (4–6 wk of age, mice); functionality of mp verified by volume of solution; pumps replaced every 28 days; Blood pressure measured via angiocatheter; cardiovascular;

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

Q10053: J. Pajarinen*, et al.* Interleukin-4 repairs wear particle induced osteolysis by modulating macrophage polarization and bone turnover. Journal of Biomedical Material Research Part A 2021;109(8):1512-1520
Agents: Polyethylene, ultra high molecular mass weight; Interleukin-4, mouse recombinant **Vehicle:** BSA; PBS; **Route:** SC; **Species:** Mice; **Strain:** BALB/cByJ; **Pump:** 2006; **Duration:** 8 weeks;
ALZET Comments: Dose (15 mg/ml ultra high molecular mass weight polyethylene; 10 ug/ml Interleukin-4); 1% BSA-PBS used; Controls received mp w/ vehicle; animal info (male mice, 10-12 weeks); post op. care (buprenorphine); functionality of mp verified by residual volume; pumps replaced every 4 weeks; ultra high molecular mass weight polyethylene aka UHMWPE; mouse recombinant interleukin-4 aka IL-4; dependence;

Q11137: X. Liang*, et al.* Comparative Proteomic Analysis of tPVAT during Ang II Infusion. Biomedicines 2021;9(12):
Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (1000 ng/kg/min); Controls received mp w/ vehicle; animal info (Male; 45 days old; about 20 g); functionality of mp verified by weight change, hypertrophy and tPVAT phenotype; peptides; cardiovascular;

Q10824: Y. Kim, *et al.* Investigation of the Feasibility of Ventricular Delivery of Resveratrol to the Microelectrode Tissue Interface. Micromachines (Basel) 2021;12(12):
Agents: Resveratrol **Vehicle:** PEG 200; **Route:** CSF/CNS (lateral ventricle); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2006; **Duration:** 6 weeks;
ALZET Comments: Dose (356 ug/day); animal info (11 weeks old; About 250g); functionality of mp verified by aspirating residual volume; ALZET brain infusion kit 1 used; dental cement used; Brain coordinates: 1 mm posterior to bregma, 1.5 mm lateral to midline; good methods (pgs. 3, 4, 5, 8)

Q9781: L. B. Crawford, *et al.* Development of a huBLT Mouse Model to Study HCMV Latency, Reactivation, and Immune Response. Methods in Molecular Biology 2021;
Agents: Granulocyte-colony stimulating factor **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice;
Strain: NOD.Cg-Prkdcscid IL2rgtm1Wjil/SxJ (NSG); **Pump:** 1000; **Duration:** Not Stated;
ALZET Comments: Animal info (Adult mice); functionality of mp verified by weight; Granulocyte-colony stimulating factor aka G-CSF; dependence; good methods (p. 356)

Q9155: A. Benitez, *et al.* Nerve Growth Factor: A Dual Activator of Noradrenergic and Cholinergic Systems of the Rat Ovary. Frontiers in Endocrinology 2021;12(636600
Agents: Nerve growth factor **Vehicle:** Saline; **Route:** Intraovarian; **Species:** Rat **Strain:** Not Stated **Pump:** 2004; **Duration:** 28 d
ALZET Comments: Controls received mp w/ vehicle; animal info (adult female rats, 3.5 months old); functionality of mp verified by position; Nerve growth factor aka NGF; peptides; dependence;

Q10058: F. Portillo, *et al.* Nitric oxide controls excitatory/inhibitory balance in the hypoglossal nucleus during early postnatal development. Brain Structure and Function 2020;225(9):2871-2884
Agents: L-NAME; D-NAME **Vehicle:** Saline, sterile; **Route:** CSF/CNS (fourth ventricle); **Species:** Rat; **Strain:** Wistar; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: Dose (180 mg/kg/day); Controls received mp w/ vehicle; animal info (rat); post op. care (penicillin); functionality of mp verified by pump weight; ALZET brain infusion kit 3 used; dependence;

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

Q8663: M. Methawasin, *et al.* Phosphodiesterase 9a Inhibition in Mouse Models of Diastolic Dysfunction. Circulation Heart Failure 2020;13(5):e006609
Agents: PF-4449613 **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Strain:** Leprdb/db; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Dose (1, 5, or 8 mg/kg per day); Controls received mp w/ vehicle; animal info (Male mice at ≈3.5 months of age); functionality of mp verified by plasma measuring; PF-4449613 aka phosphodiesterases 9a inhibitor; cardiovascular;

Q8646: S. K. Mamta, *et al.* Controlled release of sex steroids through osmotic pump alters brain GnRH1 and catecholaminergic system dimorphically in the catfish, Clarias gariepinus. Brain Research Bulletin 2020;164(325-333
Agents: Estradiol, 17B-; Testosterone, 17a-methyl **Vehicle:** Ethanol; Saline; **Route:** IP; **Species:** Fish (catfish); **Strain:** Not Stated; **Pump:** 1007D; **Duration:** 21 days;
ALZET Comments: Dose (0.48 ug/day); Controls received mp w/ vehicle; animal info (male and female catfish); functionality of mp verified by residual volume; 17B-estradiol aka E2, 17a-methyltesosterone aka MT; replacement therapy (testosterone; estradiol);

Q8857: C. T. Huang*, et al.* Glycemic control with insulin attenuates sepsis-associated encephalopathy by inhibiting glial activation via the suppression of the nuclear factor kappa B and mitogen-activated protein kinase signaling pathways in septic rats. Brain Research 2020;1738(146822
Agents: Dextrose; Fluorocitrate; Minocycline; SB203580; PD98059 **Vehicle:** DMSO; **Route:** CSF/CNS (left ventricle); IV (jugular); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: 1% DMSO used; Controls received mp w/ vehicle; animal info (male,rats (weight, 200–250 g)); behavioral testing (Von Frey filament test, Plantar test); functionality of mp verified by residual volume; SB203580 aka p38 MAPK inhibitor, PD98059 aka extracellular signal-regulated kinase inhibitor; Brain coordinates (0.8 mm posterior and 1.3 mm lateral to the bregma, and 4.0 mm ventral to the skull surface); dependence;

Q8409: Y. M. Chao*, et al.* Anomalous AMPK-regulated angiotensin AT1R expression and SIRT1-mediated mitochondrial biogenesis at RVLM in hypertension programming of offspring to maternal high fructose exposure. Journal of Biomedical Science 2020;27(1):68
Agents: Losartan **Vehicle:** CSF, Artificial; **Route:** CSF/CNS (cistern magna); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 1007D; **Duration:** 4 weeks;
ALZET Comments: Dose (3 μg·μL− 1·h− 1); Controls received mp w/ vehicle; animal info (10 weeks); functionality of mp verified by drainage of cerebrospinal fluid; Blood pressure measured via tail-cuff method;130 mmHg - 160 mmHg; cardiovascular;

Q10727: A. Willmore*, et al.* Effect of Chronic Administration of a Gonadotropin-Releasing Agonist on Luteal Function and Pregnancy Rates in Dairy Cattle. Animal Science Journal 2019;90(11):1432-1443
Agents: Deslorelin **Vehicle:** Saline, sterile; **Route:** SC; **Species:** Cow; **Strain:** Not Stated; **Pump:** 2ML1; 2ML2; **Duration:** 7; 12 d
ALZET Comments: Dose: 1 ug/kg/day; functionality of mp verified by aspirating residual volume

Q7357: Wenjing Zhou*, et al.* Fetuin B aggravates liver X receptor-mediated hepatic steatosis through AMPK in HepG2 cells and mice. American Journal of Translational Research 2019;11(1498-1509
Agents: Fetuin B, recomb. mouse **Vehicle:** Tris-HCL; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1002; **Duration:** 10
ALZET Comments: 20 mM Tris-HCL used; functionality of mp verified by measurement of serum fetuin B levels using an enzyme-linked immunosorbent assay; Fetuin B is a new hepatokine and endogenous inhibitor of the insulin receptor tyrosine kinase; Therapeutic indication (hepatic steatosis);

Q7617: A. Kostin*, et al.* Chronic Suppression of Hypothalamic Cell Proliferation and Neurogenesis Induces Aging-Like Changes in Sleep-Wake Organization in Young Mice. Neuroscience 2019;404(541-556
Agents: Arabinofuranoside, cytosine-beta-D-; deoxyuridine, 5-bromo-2′- **Vehicle:** CSF, Artificial; **Route:** CSF/CNS (lateral ventricle); **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1004; **Duration:** 4 weeks;
ALZET Comments: Dose (AraC 15 mg/ml, 2.69 µl/day), (BrdU 4 mg/ml)); Controls received mp w/ vehicle and BrdU; animal info (3-4 or 23–24 months); functionality of mp verified by residual volume and BrdU staining; cytosine beta-D-arabinofuranoside (AraC) is an antimitotic agent previously shown to suppress hypothalamic proliferation and neurogenesis; Brain coordinates (2 mm dorsal to the lateral ventricle (LV: anterior-posterior, −0.3 mm; dorsal-ventral, 2.5 mm; and lateral, 1.0 mm from the bregma)); Cannula placement verified via photomicrograph of histological section; “We used micro-osmotic pump and ICV administration for chronic delivery of aCSF or AraC, which provided good control of drug concentration and continuous delivery without disturbing animals. This method also reduced the likelihood that treatment effects on sleep–wake function could be due to stress of daily or multiple IP injections or mechanical or inflammatory responses of the sites examined in this study due to local manipulation.” pg.552; "We also noted that, unlike the control group, the AraC+BrdU-treated mice did not maintain their nests well." p.545;

Q8316: D. Knappe*, et al.* Continuous Subcutaneous Delivery of Proline-Rich Antimicrobial Peptide Api137 Provides Superior Efficacy to Intravenous Administration in a Mouse Infection Model. Front Microbiol 2019;10(2283
Agents: Api137 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** CD-1; **Pump:** 2001D; **Duration:** 48 hours;
ALZET Comments: Dose (6.4, 12.8, and 19.2 mg/kg/h); dose-response (tolerance study); 0.9% saline used; animal info (Female mice, 18–26 g,); functionality of mp verified by residual volume; pumps replaced after 48 hours; apidaecin derivative aka Api137; peptides;

Q7599: Z. Huang, *et al.* Antibody neutralization of microbiota-derived circulating peptidoglycan dampens inflammation and ameliorates autoimmunity. Nat Microbiol 2019;4(5):766-773
Agents: glutamine, muramyl-l-alanyl-d-iso- **Vehicle:** PBS; **Route:** SC **Species:** Mice **Strain:** DBA/1J **Pump:** 2004 **Duration:** 24 d
ALZET Comments: Dose (200µl of 1, 2.5, 5mg/ml MDP); Controls received mp w/ vehicle; animal info (8-10 weeks, male,); functionality of mp verified by icELISA of collected serum; muramyl-l-alanyl-d-iso-glutamine (MDP) is a conserved and minimal immunostimulatory structure of bacterial peptidoglycan; immunology; 1 and 5 mg/ml solutions used to assess the effect of stably elevated MDP levels on arthritis while 2.5 and 5 mg/ml solutions used to reach and maintain elevated levels of circulating PGN over an extended period for disease development;

Q9221: C. Faber, *et al.* Chemokine Expression in Murine RPE/Choroid in Response to Systemic Viral Infection and Elevated Levels of Circulating Interferon-gamma. Investigative Ophthalmology & Visual Science 2019;60(1):192-201
Agents: Interferon, gamma **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6, WT; C57BL/6, (IFNAR) -/-; C57BL/6, IFN-c -/-; **Pump:** Not Stated; **Duration:** Not Stated;
ALZET Comments: Dose: 50 ug; controls received mp w/ PBS; functionality of mp verified by plasma concentrations (Fig. 1);

Q7792: P. J. Cocker, *et al.* The beta-adrenoceptor blocker propranolol ameliorates compulsive-like gambling behaviour in a rodent slot machine task: implications for iatrogenic gambling disorder. European Journal of Neuroscience 2019;50(3):2401-2414
Agents: Ropinirole hydrochloride **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Strain:** Long Evans; **Pump:** Not Stated;
Duration: 28 days;
ALZET Comments: Dose (5 mg/kg/day); functionality of mp verified by ; Controls received mp w/ vehicle; animal info (275-300 g, Male,); post op. care (buprenorphine); behavioral testing (Rodent slot machine task Test, Forelimb Adjusting Step Tet); dependence;

Q7968: K. J. Clemens, *et al.* Pre-quit nicotine decreases nicotine self-administration and attenuates cue- and drug-induced reinstatement. J Psychopharmacol 2019;33(3):364-371
Agents: Nicotine, (-) hydrogen tartrate salt **Vehicle:** Saline, heparin buffered; **Route:** SC; **Species:** Rat; **Strain:** Sprague-Dawley; Long Evans; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (2.1 mg/kg/day); saline (pH 7.4 with sodium hydroxide) with 25IU heparin used; Controls received sham surgery; animal info (male, , 175–200g and 200–250g); post op. care (betadine ointment and recovery on a heating pad); behavioral testing (cue-reinstatement test); functionality of mp verified by weight after mp removal; dependence; pumps removed and reinstated on days 7 and 13. procedure listed on p.366;

Q7160: Y. W. Yu, *et al.* Glucose-Dependent Insulinotropic Polypeptide Mitigates 6-OHDA-Induced Behavioral Impairments in Parkinsonian Rats. Int J Mol Sci 2018;19(4):
Agents: Glucose-dependent insulinotropic polypeptide **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Strain:** Not Stated;
Pump: 2002; **Duration:** 2 weeks;
ALZET Comments: Dose (7.8 or 15 nmol/kg/day); Controls received mp w/ vehicle; behavioral testing (Open field test); functionality of mp verified by plasma levels; Resultant plasma level (GIP administration at 15 nmol/kg/day resulted in total GIP plasma levels of 203.9 pmol/L); neurodegenerative (Parkinson's);

Q7936: M. U. Wagenhauser, *et al.* Chronic Nicotine Exposure Induces Murine Aortic Remodeling and Stiffness Segmentation-Implications for Abdominal Aortic Aneurysm Susceptibility. Frontiers in Physiology 2018;9(1459
Agents: Nicotine **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** Not Stated; **Duration:** 10, 40 days;
ALZET Comments: Dose (20, 25 mg/kg/day); Controls received mp w/ vehicle; animal info (10 weeks, male, , 24-26g); functionality of mp verified by cotinine level measurement; cardiovascular; pump model not stated. Abstract lists 20 mg/kg/day while methods states 25 mg/kg/day used.;

Q7301: C. P. Schaefer, *et al.* Chronic morphine exposure potentiates p-glycoprotein trafficking from nuclear reservoirs in cortical rat brain microvessels. PLoS One 2018;13(2):e0192340
Agents: Morphine sulfate **Vehicle:** saline; **Route:** SC; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** Not Stated; **Duration:** 6 d
ALZET Comments: Dose (5 mg/kg/day); 0.9% saline used; Controls received mp w/ vehicle; animal info (female, ,175–200 g); behavioral testing (von Frey test, Hargreaves method); functionality of mp verified by weighing (empty, after filling, after priming, after removal); dependence;

Q7259: I. G. Rajapaksha, *et al.* The small molecule drug diminazene aceturate inhibits liver injury and biliary fibrosis in mice. Sci Rep 2018;8(1):10175
Agents: Diminazene aceturate **Vehicle:** Not Stated **Route:** SC **Species:** Mice **Strain:** C57BL/6 **Pump:** Not Stated; **Duration:** 2 w
ALZET Comments: Dose (10mg/kg/day); animal info (6–8 weeks old, male mice); functionality of mp verified by residual volume; Multiple pumps per animal (2 pumps); Diminazene aceturate aka 4-[2-(4-carbamimidoylphenyl) iminohy-drazinyl]benzenecarboximidamide;

Q6958: C. L. Montgomery, *et al.* Mechanisms Underlying Early-Stage Changes in Visual Performance and Retina Function After Experimental Induction of Sustained Dyslipidemia. Neurochem Res 2018;43(8):1500-1510
Agents: Poloxamer 407 **Vehicle:** Saline; **Route:** SC; IP; **Species:** Mice; **Strain:** C57BL/6Crl; **Pump:** 2004; **Duration:** 1 month;
ALZET Comments: Controls received mp w/ vehicle; animal info (mice); IP delivery via a cannula connected to SC pump; functionality of mp verified by total cholesterol and true triglyceride plasma concentrations; "To more easily maintain a sustained atherogenic plasma lipid profile without the increased stress and risk of animal loss associated with repeated intraperitoneal injections, we employed implantable osmotic pumps to continuously deliver P-407 at a defined rate to mice for 1 month. " pg. 1502; Therapeutic indication (Diabetic retinopathy);

Q7011: Koduru SV, *et al.* The contribution of cross-talk between the cell-surface proteins CD36 and CD47-TSP-1 in osteoclast formation and function. The Journal of Biological Chemistry 2018;293(39):15055-15069
Agents: Parathyroid hormone (1-34), human **Vehicle:** Acetic acid; mouse serum; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** Not Stated; **Duration:** 5 days;
ALZET Comments: Dose (0.67 pmol/g of body weight/h); 10 mM acetic acid containing 2% heat inactivated mouse serum used; Controls received mp w/ vehicle; functionality of mp verified by hypercalcemia;

Q7019: R. M. Jha, *et al.* Glibenclamide Produces Region-Dependent Effects on Cerebral Edema in a Combined Injury Model of Traumatic Brain Injury and Hemorrhagic Shock in Mice. J Neurotrauma 2018;35(17):2125-2135
Agents: Glibenclamide **Vehicle:** Saline, DMSO; **Route:** SC; **Species:** Mice; **Strain:** C57/BL6; **Pump:** Not Stated;
Duration: 1, 3, or 4 days;
ALZET Comments: Dose (0.4 ug/h); animal info (male mice, 12–15 weeks of age, weighing 25–30 g); functionality of mp verified by glibenclamide levels by ultra performance liquid chromatography-mass spectrometer; Therapeutic indication (traumatic brain injury);

Q7022: T. R. Harris, *et al.* Celecoxib Does Not Protect against Fibrosis and Inflammation in a Carbon Tetrachloride-Induced Model of Liver Injury. Mol Pharmacol 2018;94(2):834-841
Agents: Celecoxib, PTUPB **Vehicle:** PEG 400, DMSO; **Route:** SC **Species:** Mice **Strain:** C57BL/6NCrl **Pump:** 2006; **Duration:** 45d
ALZET Comments: Dose (10mg/kg/d); 50% PEG400 and 50% DMSO used; animal info (Male mice (~25 g)); functionality of mp verified by plasma levels; celecoxib is a cyclooxygenase-2 (COX-2) selective inhibitor; enzyme inhibitor (cyclooxygenase-2, soluble epoxide hydrolase);

Q7023: W. Q. Han, *et al.* Membrane rafts-redox signalling pathway contributes to renal fibrosis via modulation of the renal tubular epithelial-mesenchymal transition. J Physiol 2018;596(16):3603-3616
Agents: Angiotensin II **Vehicle:** Not Stated; **Route:** IP; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2002; **Duration:** 2 weeks;
ALZET Comments: Dose (200 ng/kg/min); animal info (280 gram, Male rats); functionality of mp verified by measurement of systolic blood pressure by tail-cuff method;

Q7128: L. Detti, *et al.* Xenotransplantation of pre-pubertal ovarian cortex and prevention of follicle depletion with anti-Mullerian hormone (AMH). Journal of Assisted Reproduction and Genetics 2018;35(10):1831-1841
Agents: anti-Müllerian hormone, recomb. **Vehicle:** Saline; **Route:** IP; **Species:** Mice (nude); **Strain:** NU/J; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: Dose (1.23 ug/d); Controls received mp w/ vehicle; animal info (10-week-old mice, or nude mice,); functionality of mp verified by residual volume;

Q7745: R. Corona, *et al.* Disruption of adult olfactory neurogenesis induces deficits in maternal behavior in sheep. Behavioural Brain Research 2018;347(124-131
Agents: Ara-C **Vehicle:** Serum, Physiological; **Route:** CSF/CNS (lateral ventricle); **Species:** Sheep; **Strain:** Primiparous parturient Ile de France ewes; **Pump:** 2ML4; **Duration:** 4 weeks;
ALZET Comments: 4% Physiological Serum used; Controls received mp w/ vehicle; animal info ((2–3 years old)); post op. care (amoxicillin, diurizone, finadyne, morphine); functionality of mp verified; Brain coordinates (rostrocaudal plane, 36 mm; mediolateral plane, 4.3 ± 0.7mm from the middle of the third ventricle; and depth,16.6 ± 1mm from the cortex surface); bilateral cannula used;

Q6939: A. J. Charboneau, *et al.* Fucoidans inhibit the formation of post-operative abdominal adhesions in a rat model. PLoS One 2018;13(11):e0207797
Agents: Sigma Fucoidan Crude **Vehicle:** Water; **Route:** IP; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2ML1; **Duration:** 1 w
ALZET Comments: Dose (4.3 mg/day, 8.3 mg/day, and 17.2 mg/day); animal info (female rats); functionality of mp verified by compressing the outer casing with pliers and then reweighing the pump; good methods (pg 3); Pump was implanted SC with catheter into abdominal cavity;

Q10119: D. M. Beauvais, *et al.* MST1R/RON and EGFR in a complex with syndecans sustain carcinoma Sphase progression by preventing p38 MAPK activation. bioRxiv 2018;
Agents: EGFTR, synstatin- **Vehicle:** Saline, sterile; **Route:** Not Stated; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2004; **Duration:** 4 weeks;
ALZET Comments: Dose (1.2 mM or 1.8 mg/kg/day SSTNEGFR); Controls received mp w/ vehicle; animal info (6-8-wk-old female, athymic Foxn1nu outbred nude mice); functionality of mp verified by blood plasma; stability verified by (stability assays); half-life (p. 30 Figure 3); Resultant plasma level (10uM); synstatin-EGFR aka SSTNEGFR; peptide mimetic;