



**Long Term Infusion
Using ALZET® Osmotic Pumps**

ALZET pumps range in duration from 24 hours to 6 weeks. Animals can be dosed for periods which exceed the duration of a single pump by serial reimplantation of fresh pumps. This collection of references includes only the most recent citations. However, we do have older references which include infusions of as long as 3 years and in which up to 52 serial implantations have been performed on a single animal. The following table indicates the longest published duration of administration by animal along with a reference. *(In some cases, more than one study infused for this duration.)

ANIMAL	DURATION	PUMPS REPLACED	REFERENCE
Mouse	9 months	Every month	Q8922 P. Oliveros-Matus, <i>et al.</i> Cotinine Enhances Fear Extinction and Astrocyte Survival by Mechanisms Involving the Nicotinic Acetylcholine Receptors Signaling. <i>Frontiers in Pharmacology</i> 2020;11(303)
Rabbit	36 weeks	Every 4 weeks	P8478 Ma T Modulation of allograft incorporation by growth factors over a prolonged continuous infusion of duration in vivo. <i>Bone</i> 2007; 41(3):386-392
Rat	1 year	Not stated	P0818 Murphy WM, Blatnik AF, Shelton TB, Soloway MS. Carcinogenesis in mammalian urothelium: changes induced by non-carcinogenic substances and chronic indwelling catheters. <i>J Urol</i> 1986; 135(4):840-844
Dog	18 months	Every 2-4 weeks	P0752 McRae GI, Roberts BB, Worden AC, Bajka A, Vickery BH. Long-term reversible suppression of oestrus in bitches with nafarelin acetate, a potent LHRH agonist. <i>J Reprod Fertil</i> 1985; 74(2):389-397
Cattle	9 weeks	Every 28 days	Q2176: A. Contri, <i>et al.</i> Successful use of a gonadotropin-releasing hormone (GnRH) analog for the treatment of tertiary hypogonadism (GnRH deficiency) in a 5-year-old Belgian Blue bull. <i>VETERINARY QUARTERLY</i> 2012;32(1):51-54
*Guinea-pig	12 weeks	Every 6 weeks	Q2910: F. Y. Wei, <i>et al.</i> Attenuation of osteoarthritis via blockade of the SDF-1/CXCR4 signaling pathway. <i>Arthritis Research & Therapy</i> 2012;14(4):U233-U243
Monkey	3 years	Every 3 weeks	P2083 Ravindranath N, Ramesh V, Krishnamurthy H, Roa AJ, Moudgal RN. Chronic suppression of testicular function by constant infusion of gonadotropin-releasing hormone agonist and testosterone supplementation in the bonnet monkey (<i>Macaca radiata</i>). <i>Fertil Steril</i> 1992; 57(3):671-676.

The short abstract following each reference in the attached list details the substance(s) infused, route of administration, animal model studied, solvent(s), model of pump, duration of infusion, and whether stress to the animal was noted.

Note: This list does not contain references in this category from before the years specified. To obtain a complete listing of earlier references, contact ALZET Technical Services at 800-692-2990 (U.S. & Canada) or by email at alzet@direct.com.



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

Q10908: D. Zhu, *et al.* Irisin Rescues Diabetic Cardiac Microvascular Injury Via ERK1/2/Nrf2/HO-1 Mediated Inhibition of Oxidative Stress. *Diabetes Research and Clinical Practice* 2022;183(109170)

Agents: Irisin **Vehicle:** Saline; **Route:** IP; **Species:** Mice; **Pump:** Not Stated; **Duration:** 12 weeks;

ALZET Comments: Dose (0.5 ug/g body weight/day); controls received mp w/ vehicle; animal info (T2DM Male; Fed a high fat diet at 4 weeks old to induce diabetes); long-term study; cardiovascular; diabetes; Therapeutic indication (Diabetes);

Q10651: T. Prasse, *et al.* Bisphenol A-Related Effects on Bone Morphology and Biomechanical Properties in an Animal Model. *Toxics* 2022;10(2):

Agents: Bisphenol A **Vehicle:** DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 12 weeks;

ALZET Comments: Controls received mp w/ vehicle; animal info (Wistar rats total; 10 weeks old); post op. care (Metamizole); pumps replaced every 4 weeks; long-term study; toxicology;

Q10385: Y. Hasuike, *et al.* CAG repeat-binding small molecule improves motor coordination impairment in a mouse model of Dentatorubral-pallidoluysian atrophy. *Neurobiology of Disease* 2022;163(105604)

Agents: Naphthyridine-azaquinolone **Vehicle:** PBS; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Pump:** 2004; **Duration:** 16 weeks;

ALZET Comments: Dose (2 mM); Controls received mp w/ vehicle; animal info (6 weeks old); behavioral testing (Tested motor function with rotarod device; Beam-walking test); pumps replaced every 4 weeks; long-term study; ALZET brain infusion kit used; Brain coordinates (0.4 mm posterior; 1.0 mm right lateral; 2.5 mm ventral); neurodegenerative (Dentatorubral-pallidoluysian atrophy); Therapeutic indication (DRPLA);

Q10358: S. Arttamangkul, *et al.* Cellular tolerance at the micro-opioid receptor is phosphorylation dependent. *eLife* 2018;7(Agents: Morphine sulfate **Vehicle:** Water; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** 7 days;

ALZET Comments: "Dose (80mg/kg/ml); animal info (Adult 180-300g, 5-6 week male and female Sprague-Dawley rats, MOR-knock out Sprague-Dawley rats with ZFN target site (GCTGTCTGCCACCCAgctaaaGCCCTGGATTTC within exon 2) F3 generation); enzyme agonist (mu-opioid receptor aka MOR); dependence; The present work addresses one mechanism that underlies the development of long-term tolerance to morphine. Elimination of phosphorylation sites on the C-terminal rendered MORs resistant to one cellular measure of long-term tolerance induced by morphine. One conclusion is that desensitization and/or internalization of MORs is necessary for the development of this form of cellular tolerance to opioids. Although there were no obvious change in cellular excitability, it could be that continued signaling through the phosphorylation deficient receptors result in downstream homeostatic mechanisms that counteract the lack of cellular tolerance and may well increase signs of withdrawal; "

Q10271: N. Daneshgar, *et al.* Elamipretide treatment during pregnancy ameliorates the progression of polycystic kidney disease in maternal and neonatal mice with PKD1 mutations. *Kidney International* 2022;101(5):906-911

Agents: Elamipretide **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 10 weeks;

ALZET Comments: Dose (3 mg/kg/d); animal info (PKD1RC/null mice were generated by crossing PKD1RC/RC mice with PKD1p/ mice. The PKD1 p/ were generated by breeding PKD1flox/flox mice, JAX, with germline Sox2-Cre transgenic mice); pumps replaced after 5 weeks; peptides; teratology; Therapeutic indication (ADPKD);

Q10286: E. A. L. Wozniak, *et al.* Cholecystokinin 1 receptor activation restores normal mTORC1 signaling and is protective to Purkinje cells of SCA mice. *Cell Reports* 2021;37(2):109831

Agents: A71623 **Vehicle:** PBS; **Route:** IP; **Species:** Mice; **Pump:** 1004; **Duration:** 30 weeks;

ALZET Comments: Dose (0.02mg/kg/day); animal info (6 weeks old, ~20g or larger); behavioral testing (tested on a rotarod apparatus, beam walk); pumps replaced every 7 weeks; Cck1 receptor agonist aka A71623; neurodegenerative (Spinocerebellar ataxia);



Q9554: E. A. L. Wozniak, *et al.* Cholecystokinin 1 Receptor (Cck1R) Activates mTORC1 signaling and is Protective to. *BioRxiv* 2021;

Agents: A71623 **Vehicle:** PBS; **Route:** IP; **Species:** Mice; **Pump:** 1004; **Duration:** 31 weeks;

ALZET Comments: Dose (0.02 mg/kg/day); Controls received mp w/ vehicle; animal info (5 week old mice); behavioral testing (Rotarod; Beam Walk); pumps replaced every 7 weeks; neurodegenerative (Purkinje neuron degeneration);

Q9957: T. Wakamatsu, *et al.* Type I Angiotensin II Receptor Blockade Reduces Uremia-Induced Deterioration of Bone Material Properties. *Journal of Bone & Mineral Research* 2021;36(1):67-79

Agents: Olmesartan, Hydralazine Hydrochloride **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 26 weeks;

ALZET Comments: Dose (Olmesartan- 3 mg/kg/day or Hydralazine Hydrochloride- 10 mg/kg/day); Controls received mp w/ vehicle; pumps replaced every 2 weeks; long-term study; Blood pressure measured via Tail Cuff Method ; dependence;

Q9517: P. S. van Nieuwenhuijzen, *et al.* Targeting GABAC Receptors Improves Post-Stroke Motor Recovery. *Brain Sciences* 2021;11(3):

Agents: L655,708; (R)-4-ACBPBA; (S)-4-ACBPBA **Vehicle:** DMSO; Saline; **Species:** Mice; **Pump:** 1002; **Duration:** 4 weeks;

ALZET Comments: Dose (200 ug/kg/day); 0.9% Saline used; Controls received mp w/ vehicle; animal info (male C57BL/6J mice, 2-3 months old, 27-30 g); behavioral testing (Grid-Walking test; Cylinder task); pumps replaced every 2 weeks; ischemia

Q9505: T. Troiano, *et al.* Inhibition of NOX1 mitigates blood pressure increases in elastin insufficiency. *American Physiological Society* 2021;

Agents: Apocynin **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 56 days;

ALZET Comments: Dose (3 mg/kg/day); 50% DMSO used; Controls received mp w/ vehicle; animal info (4-6 wk of age, male Eln+/+ and Eln+/- mice); functionality of mp verified by volume of solution; pumps replaced every 28 days; Blood pressure measured via angiocatheter; cardiovascular;

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; **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 BALB/cByJ 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;

Q10254: T. Masaki, *et al.* GIP_HUMAN[22-51] is a new proatherogenic peptide identified by native plasma peptidomics. *Scientific Reports* 2021;11(1):14470

Agents: Glucose-dependent insulintropic polypeptide; Glucose-dependent insulintropic polypeptide neutralizing antibody

Vehicle: Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 4 weeks;

ALZET Comments: Dose: (0.6 nmol/kg/h) or (1.4 ug/kg/h); Controls received mp w/ vehicle; animal info: ApoE, 17 weeks of age, pumps replaced after 2 weeks; Glucose-dependent insulintropic polypeptide aka (GIP)

Q9358: S. Maeda, *et al.* Notch signaling-modified mesenchymal stem cells improve tissue perfusion by induction of arteriogenesis in a rat hindlimb ischemia model. *Scientific Reports* 2021;11(1):2543

Agents: Cyclosporin **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 28 days;

ALZET Comments: Dose (10 mg/kg/day); animal info (Female Sprague-Dawley rats, 10 weeks old); pumps replaced every 2 weeks; ischemia (rat hindlimb ischemia model);

Q10222: S. Kumar, *et al.* Neuroprotection of the Inner Retina Also Prevents Secondary Outer Retinal Pathology in a Mouse Model of Glaucoma. *Investigative Ophthalmology & Visual Science*, 2021;62(9):35

Agents: Meclofenamic Acid **Vehicle:** Not Stated; **Route:** SC **Species:** Mice; **Pump:** 2004; **Duration:** Not Stated;

ALZET Comments: Dose: (20 mg/kg/day); Controls received mp w/ no vehicle; animal info: C57BL/6 wild-type (WT) mice and on connexin 36 knock-out mice pumps replaced at 4 weeks; Meclofenamic acid aka (MFA); neurodegenerative (Glaucoma);



- Q9228:** N. D. Fried, *et al.* Angiotensin II type 1 receptor mediates pulmonary hypertension and right ventricular remodeling induced by inhaled nicotine. *American Journal of Physiology Heart Circulatory Physiology* 2021;320(4):H1526-H1534
Agents: Losartan **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 8 weeks;
ALZET Comments: Dose (6.5, 5.0 mg/kg/day); Controls received mp w/ vehicle; animal info (Adult, male C57BL6/J mice, 8 to 12 weeks old, 23 to 30 g); post op. care (buprenorphine); pumps replaced every 4 weeks; cardiovascular;
- Q10143:** K. E. Chen, *et al.* Prolactin enhances T regulatory cell promotion of breast cancer through the long form prolactin receptor. *Translational Oncology* 2021;14(11):101195
Agents: SMO; LFPRLR SMO, mice; LFPRLR SMO, human **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice (NOD/SCID); **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Dose: (100 pmoles/h); Controls received mp w/ vehicle; animal info:8-week old Foxp3+EGFP Balb/c or NOD-SCID mice; pumps replaced (as needed); SMO aka splice modulating oligomer; LFPRLR aka long form prolactin receptor; cancer (Breast cancer);
- Q9169:** S. L. Burke, *et al.* Role of Mineralocorticoid and Angiotensin Type 1 Receptors in the Paraventricular Nucleus in Angiotensin-Induced Hypertension. *Frontiers in Physiology* 2021;12(640373
Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Rabbit; **Pump:** 2ML4; **Duration:** 12 weeks;
ALZET Comments: Dose (24 ng/kg/min); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (male New Zealand White rabbits, 2.3-3.1 kg); pumps replaced every 4 weeks; Angiotensin II aka AngII; cardiovascular;
- Q9889:** S. Yoshida, *et al.* Syngeneic Mesenchymal Stem Cells Reduce Immune Rejection After Induced Pluripotent Stem Cell-Derived Allogeneic Cardiomyocyte Transplantation. *Scientific Reports* 2020;10(1):4593
Agents: Tacrolimus **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 15 days;
ALZET Comments: Dose (1.5 mg/kg body weight); animal info (Adult male BALB/c mice (6–7 weeks old, 17–22 g)); pumps replaced every 13 days; immunology;
- Q9902:** Q. Yang, *et al.* Sirt6 deficiency aggravates angiotensin II-induced cholesterol accumulation and injury in podocytes. *Theranostics* 2020;10(16):7465-7479
Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 8 weeks;
ALZET Comments: Dose (700 ng/kg/min); Controls received mp w/ vehicle; animal info (8 weeks old, Male); pumps replaced every 4 weeks; cardiovascular;
- Q9938:** J. A. Whitson, *et al.* SS-31 and NMN: Two paths to improve metabolism and function in aged hearts. *Aging Cell* 2020;19(10):e13213
Agents: Elamipretide **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 8 weeks;
ALZET Comments: Dose (3 mg/kg/day); Controls received mp w/ vehicle; animal info (Male, C57BL/6, 24 months old); pumps replaced every 4 weeks; as Elamipretide aka SS-31 aka synthetic tetrapeptide ; peptides; cardiovascular;
- Q9538:** X. Wang, *et al.* Nogo receptor decoy promotes recovery and corticospinal growth in non-human primate spinal cord injury. *Brain* 2020;143(6):1697-1713
Agents: NgR1(310)-Fc **Vehicle:** Not Stated; **Route:** CSF/CNS (spinal cord); **Species:** Monkey; **Pump:** 2ML4; **Duration:** 4 months;
ALZET Comments: Dose (0.10-0.17 mg/kg/day); Controls received mp w/ vehicle; animal info (Adult African green monkeys (vervets, female, baseline body weight 4.2–7.2 kg)); pumps replaced every month; long-term study; NgR1(310)-Fc aka Nogo receptor decoy protein; spinal cord injury;
- Q9536:** L. Wang, *et al.* Treatment With Treprostinil and Metformin Normalizes Hyperglycemia and Improves Cardiac Function in Pulmonary Hypertension Associated With Heart Failure With Preserved Ejection Fraction. *Arteriosclerosis, Thrombosis, and Vascular Biology* 2020;40(6):1543-1558
Agents: Treprostinil **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat, Mice; **Pump:** 2ML4, 2006; **Duration:** 16 weeks;
ALZET Comments: Dose (40, 300, and 900 ng/kg/min); animal info (8-week old male obese ZSF1 rats; 8-week old male C57BL/6J mice); pumps replaced every 28 or 42 days; long-term study; cardiovascular;



Q9526: G. Wang, *et al.* The study of targeted blocking SDF-1/CXCR4 signaling pathway with three antagonists on MMPs, type II collagen, and aggrecan levels in articular cartilage of guinea pigs. *Journal of Orthopaedic Surgery and Research* 2020;15(1):195

Agents: T140; AMD3100; TN14003 **Vehicle:** PBS; **Route:** SC; **Species:** Guinea Pig; **Pump:** Not Stated; **Duration:** 12 weeks; **ALZET Comments:** Dose (180 ug/ml); Controls received mp w/ vehicle; animal info (male Duncan-Hartley guinea pigs (6-month-old, weight = 600 ± 50g)); pumps replaced every 6 weeks; long-term study; dependence;

Q9514: M. A. Ulleryd, *et al.* RNA sequencing data describing transcriptional changes in aorta of ApoE^{-/-} mice after alpha 7 nicotinic acetylcholine receptor (alpha7nAChR) stimulation. *Data in Brief* 2020;30(105415)

Agents: Alpha 7 nicotinic acetylcholine receptor agonist **Vehicle:** Cyclodextrin; Saline; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 8 weeks;

ALZET Comments: Dose (50 µmol/kg/day); 28% cyclodextrin used; Controls received mp w/ vehicle; animal info (Male apoE^{-/-} mice, 10 weeks old); pumps replaced every 4 weeks; Alpha 7 nicotinic acetylcholine receptor agonist aka α7nAChR agonist; gene therapy;

Q9500: W. M. Tierney, *et al.* Transplanted Human Neural Progenitor Cells Attenuate Motor Dysfunction and Lengthen Longevity in a Rat Model of Ataxia. *Cell Transplantation* 2020;29(963689720920275)

Agents: Cyclosporine **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 28 days;

ALZET Comments: Dose (15 mg/ kg/d); animal info (spastic Han Wistar rat); behavioral testing (Motor Activity Testing); pumps replaced every 23 days; gene therapy;

Q9978: A. Szeto, *et al.* Oxytocin reduces adipose tissue inflammation in obese mice. *Lipids in Health and Disease* 2020;19(1):188

Agents: Oxytocin **Vehicle:** Sodium Citrate; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 8 weeks;

ALZET Comments: Dose (4.22 ug/day); Controls received mp w/ vehicle; animal info (Male, C57BLKS/J); pumps replaced every 6 weeks; immunology;

Q9473: K. Shibata, *et al.* Lipocalin-2 exerts pro-atherosclerotic effects as evidenced by in vitro and in vivo experiments. *Heart and Vessels* 2020;35(7):1012-1024

Agents: Lipocalin-2 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 4 weeks;

ALZET Comments: Dose (5 µg/kg/h); Controls received mp w/ vehicle; animal info (male spontaneously hyperlipidemic ApoE^{-/-} mice, 13 weeks old); pumps replaced every 2 weeks; Blood pressure measured via tail-cuff method; 92.1 mmHg - 92.6 mmHg; Resultant plasma level (282.7 mg/dL Glucose; 27.4 pM Insulin); Lipocalin-2 aka LCN2; cardiovascular;

Q10050: N. Osaka, *et al.* Anti-inflammatory and atheroprotective properties of glucagon. *Diabetes & Vascular Disease Research* 2020;17(5):1479164120965183

Agents: Glucagon **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 4 weeks;

ALZET Comments: Dose (138 or 413 nmol/kg/day); Controls received mp w/ vehicle; animal info (Male ApoE^{-/-} mice, 6 weeks old); pumps replaced every 2 weeks; Blood pressure measured via tail-cuff method; 103 mmHg - 115 mmHg; Resultant plasma level (81 mg/dl Plasma glucose); diabetes;

Q8920: T. Okano, *et al.* Beta-Endorphin Mediates the Development and Instability of Atherosclerotic Plaques. *International Journal of Endocrinology* 2020;2020(4139093)

Agents: Endorphin, B-; **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 4 weeks;

ALZET Comments: Controls received mp w/ vehicle; animal info (male spontaneously hyperlipidemic ApoE^{-/-} mice, 13 weeks of age); pumps replaced every 2 weeks; Blood pressure measured via tail-cuff method; 91.4 mmHg - 92.1 mmHg; Resultant plasma level (294.3 mg/dL Glucose); peptides; dependence;



Q10048: M. A. Nunes, *et al.* Kinin B2 Receptor Activation Prevents the Evolution of Alzheimer's Disease Pathological Characteristics in a Transgenic Mouse Model. *Pharmaceuticals (Basel)* 2020;13(10):

Agents: Amyloid Beta 1-42 **Vehicle:** CSF, Artificial; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1004; **Duration:** 8 weeks;

ALZET Comments: Dose (10 nmol/kg/h); Controls received mp w/ vehicle; animal info (Twelve-month-old transgenic mice); pumps replaced every 4 weeks; Amyloid Beta 1-42 aka AB peptide; peptides; neurodegenerative (Alzheimer's Disease);

Q8651: A. Maqbool, *et al.* Divergent effects of genetic and pharmacological inhibition of Nox2 NADPH oxidase on insulin resistance-related vascular damage. *American Journal of Physiology-Cell Physiology* 2020;319(1):C64-C74

Agents: Peptide, Gp91ds-tat **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** 1004; **Duration:** 8 weeks;

ALZET Comments: Dose (10 mg/kg/day); animal info (Mice, 8 weeks old); pumps replaced every 4 weeks; Peptide, Gp91ds-tat aka gp91dstat; peptides; diabetes;

Q8628: A. Levit, *et al.* Hypertension and Pathogenic hAPP Independently Induce White Matter Astrocytosis and Cognitive Impairment in the Rat. *Frontiers in Aging Neuroscience* 2020;12(82)

Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 8 weeks;

ALZET Comments: Dose (10,000 ng/kg/h); Controls received mp w/ vehicle; animal info (male Rats, 7.25 months old, 367 g); behavioral testing (Morris Water Maze, Open Field Test); pumps replaced every 4 weeks; Blood pressure measured via tail cuff method; 120 mmHg - 170 mmHg; Angiotensin II aka Ang II; cardiovascular;

Q8618: J. Kwun, *et al.* Cultured thymus tissue implantation promotes donor-specific tolerance to allogeneic heart transplants. *JCI Insight* 2020;5(11):

Agents: Cyclosporine A **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 months;

ALZET Comments: Dose (2.5 mg/kg/d); animal info (LW (RT-1l) and BN (RT-1n) rats); pumps replaced every month; Cyclosporine A aka CsA; immunology;

Q10319: M. Krishnan, *et al.* beta-hydroxybutyrate Impedes the Progression of Alzheimer's Disease and Atherosclerosis in ApoE-Deficient Mice. *Nutrients* 2020;12(2):

Agents: PBS; Beta-hydroxybutyrate **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 8 weeks;

ALZET Comments: Dose: (1.5 mmol/kg/day in PBS); Controls received mp w/ vehicle; animal info: Six-week-old male ApoE^{+/+} (C57BL/6J background) and C57BL/6J mice; pumps replaced every 4 weeks; half-life (p.10); Beta-hydroxybutyrate aka (B-OHB); neurodegenerative (Alzheimer's disease);

Q8611: M. Krishnan, *et al.* beta-hydroxybutyrate Impedes the Progression of Alzheimer's Disease and Atherosclerosis in ApoE-Deficient Mice. *Nutrients* 2020;12(2):

Agents: Beta-hydroxybutyrate **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 8 weeks;

ALZET Comments: Dose (1.5 mmol/kg/day); Controls received mp w/ vehicle; animal info (Six-week-old male ApoE^{-/-} and C57BL/6J mice); pumps replaced every 4 weeks; Beta-hydroxybutyrate aka B-OHB; neurodegenerative (Alzheimer's Disease);

Q8572: E. Kim, *et al.* Preventative, but not post-stroke, inhibition of CD36 attenuates brain swelling in hyperlipidemic stroke. *Journal of Cerebral Blood Flow & Metabolism* 2020;40(4):885-894

Agents: Salvianolic acid B **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 8 weeks;

ALZET Comments: Dose (100 mg/kg/day); Controls received mp w/ vehicle; animal info (Six-week-old ApoE KO mice); pumps replaced every 4 weeks; salvianolic acid B aka SAB; neurodegenerative (Stroke);

Q8603: D. Kerkhofs, *et al.* Pharmacological depletion of microglia and perivascular macrophages prevents Vascular Cognitive Impairment in Ang II-induced hypertension. *Theranostics* 2020;10(21):9512-9527

Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2006; **Duration:** 12 weeks;

ALZET Comments: Dose (1 ug/kg/min); Controls received mp w/ vehicle; animal info (3 month old male Tg mice); pumps replaced every 12 weeks; Blood pressure measured via tail-cuff; Angiotensin II aka Ang II; cardiovascular;



Q8854: R. H. Isaacson, *et al.* Olanzapine-induced liver injury in mice: aggravation by high-fat diet and protection with sulforaphane. *Journal of Nutritional Biochemistry* 2020;81(108399)

Agents: Olanzapine **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 4 weeks;

ALZET Comments: Dose (8 mg/kg/d); Controls received mp w/ vehicle; animal info (Female C57BL/6 J mice (8 weeks old)); pumps replaced every 2 weeks; dependence;

Q10162: J. J. Fuster, *et al.* TET2-Loss-of-Function-Driven Clonal Hematopoiesis Exacerbates Experimental Insulin Resistance in Aging and Obesity. *Cell Reports* 2020;33(4):108326

Agents: MCC950 **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 2006; **Duration:** 6 weeks;

ALZET Comments: Dose:(10 mg/kg/day); Controls received mp w/ vehicle; animal info:10 week-old unconditioned (i.e., non-irradiated) C57BL/6 Pep Boy CD45; pumps replaced at week 10; MCC950 is a specific NLRP3 blocker; diabetes; Type 2 diabetes

Q8467: E. Fielder, *et al.* Anti-inflammatory treatment rescues memory deficits during aging in nfkb1(-/-) mice. *Aging Cell* 2020;19(10):e13188

Agents: Ibuprofen **Vehicle:** DMSO; PEG; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 2 months;

ALZET Comments: Dose (50 mg/kg/day); Controls received mp w/ vehicle; animal info (male C57BL/6 mice, 6 months old); pumps replaced every 28 days; dependence;

Q8463: A. K. Evans, *et al.* Beta-adrenergic receptor antagonism is proinflammatory and exacerbates neuroinflammation in a mouse model of Alzheimer's Disease. *Neurobiology of Disease* 2020;146(105089)

Agents: Metoprolol **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 3 months; 2 months;

ALZET Comments: Dose (5 mg/kg/day); Controls received mp w/ vehicle; animal info (male mice, 3.5 months old; female mice, 6 months old); behavioral testing (Morris Water Maze; Fear Conditioning); pumps replaced every 4 weeks; long-term study; neurodegenerative (Alzheimer's);

Q8439: T. Develi, *et al.* Preventive and therapeutic effects of relaxin on bisphosphonaterelated osteonecrosis of the jaw: an experimental study in rats. *Brazilian Dental Science* 2020;23(1):

Agents: Relaxin **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** Not stated; **Duration:** 12 weeks;

ALZET Comments: Dose (0.17 µg/hr); Controls received mp w/ vehicle; animal info (Sprague Dawley rats); pumps replaced every 4 weeks; long-term study; dependence;

Q9841: Y. Zhao, *et al.* ATAD3A oligomerization causes neurodegeneration by coupling mitochondrial fragmentation and bioenergetics defects. *Nature Communications* 2019;10(1):1371

Agents: TAT control peptide or DA1 peptide **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 6,8 weeks;

ALZET Comments: Dose (1 mg/kg/day); animal info (Male, YAC128, 3 month old); behavioral testing (Tail Suspension Test); pumps replaced every 4 weeks; peptides; neurodegenerative (Huntington's Disease);

Q8971: Y. Zhao, *et al.* ATAD3A oligomerization causes neurodegeneration by coupling mitochondrial fragmentation and bioenergetics defects. *Nature Communications* 2019;10(1):1371

Agents: TAT control peptide; DA1 peptide **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 6, 8 weeks;

ALZET Comments: Dose (1 mg/kg/day); animal info (Male, YAC128, 3 month old); behavioral testing (Tail Suspension Test); pumps replaced every 4 weeks; peptides; neurodegenerative (Huntington's Disease);

Q9120: T. Yotsumoto, *et al.* Foramen magnum stenosis and midface hypoplasia in C-type natriuretic peptide-deficient rats and restoration by the administration of human C-type natriuretic peptide with 53 amino acids. *PLoS One* 2019;14(5):e0216340

Agents: C-type natriuretic peptide 53 **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 4 weeks;

ALZET Comments: Dose (0.5 mg/kg/day); Controls received mp w/ vehicle; animal info (CNP-KO, 5-9 weeks old); pumps replaced every 2 weeks; peptides; dependence;



Q7516: W. Yin, *et al.* Protein kinase C and protein kinase A are involved in the protection of recombinant human glucagon-like peptide-1 on glomeruli and tubules in diabetic rats. *Journal of Diabetes Investigation* 2019;10(3):613-625

Agents: Peptide-1, recombinant human glucagon-like **Vehicle:** Saline; **Route:** IV; **Species:** Rat; **Pump:** 2004; **Duration:** 12 weeks;

ALZET Comments: "Dose (1.5 pmol/kg/min); 0.9% saline; Controls received mp w/ vehicle; animal info (Eight-week-old male/female

Wistar rats weighing 300 – 10 g); pumps replaced at 4 weeks; half-life (p.614 half-life in blood is approximately 2 h.); peptides; diabetes; "

Q7642: W. Yan, *et al.* Treatment with a brain-selective prodrug of 17beta-estradiol improves cognitive function in Alzheimer's disease mice by regulating klf5-NF-kappaB pathway. *Naunyn-Schmiedeberg's Archives of Pharmacology* 2019;392(7):879-886

Agents: dihydroxyestra-1,4-dien-3-one, 10β,17β- **Vehicle:** propylene glycol; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 8 weeks;

ALZET Comments: Dose (2 µg/day); Controls received sham surgery and mp w/ vehicle; animal info (6 months, female, Tg2576); behavioral testing (Morris Water Maze); pumps replaced every 4 weeks; 17beta-dihydroxyestra-1,4-diene-3-one (DHED) is a brain-selective prodrug of 17beta-estradiol; neurodegenerative (Alzheimer's); replacement therapy (estradiol); treatment groups received bilateral ovariectomies; Therapeutic indication (hinder the progression of AD and improving cognitive functions through inhibiting klf5-NF-κB pathway and restraining oxidative and inflammatory stress in the hippocampus);

Q9100: M. D. Wetzel, *et al.* L-Homoarginine supplementation prevents diabetic kidney damage. *Physiological Reports* 2019;7(18):e14235

Agents: Arginine, L-homoarginine **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 12 weeks;

ALZET Comments: Dose (0.72 mg/kg/day); animal info (6-week-old Ins2Akita mice); pumps replaced every 6 weeks; Resultant plasma level (1.4 umol/L); cardiovascular;

Q9094: P. Varma, *et al.* Targeting Seizure-Induced Neurogenesis in a Clinically Relevant Time Period Leads to Transient But Not Persistent Seizure Reduction. *Journal of Neuroscience* 2019;39(35):7019-7028

Agents: Ganciclovir **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 8 weeks;

ALZET Comments: Dose (150 mg/kg/day); Controls received mp w/ vehicle; animal info (6 weeks old); pumps replaced every 4 weeks; neurodegenerative (Seizure);

Q9093: N. Valkov, *et al.* MicroRNA-1-Mediated Inhibition of Cardiac Fibroblast Proliferation Through Targeting Cyclin D2 and CDK6. *Frontiers in Cardiovascular Medicine* 2019;6(65)

Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 4 weeks;

ALZET Comments: Dose (555 ng/kg/min); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Sprague Dawley, Male, 5-6 weeks old); pumps replaced every 2 weeks; cardiovascular;

Q8944: K. Sato, *et al.* Chemerin-9, a potent agonist of chemerin receptor (ChemR23), prevents atherogenesis. *Clinical Science (Lond)* 2019;133(16):1779-1796

Agents: Human chemerin; Chemerin-9 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 4 weeks;

ALZET Comments: Dose (human chemerin- 7.7 ug/kg/h and chemerin-9- 7.7 ug/kg/h); Controls received mp w/ vehicle; animal info (Apoe-/-, 17 weeks old,); pumps replaced every 2 weeks; cardiovascular;

Q8823: C. N. Receno, *et al.* Effects of Prolonged Dietary Curcumin Exposure on Skeletal Muscle Biochemical and Functional Responses of Aged Male Rats. *International Journal of Molecular Sciences* 2019;20(5):

Agents: Curcumin **Vehicle:** DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 months;

ALZET Comments: Animal info (32 months old, Male); pumps replaced every 4 weeks; long-term study; dependence;



Q8839: N. Ozawa, *et al.* Legumain Promotes Atherosclerotic Vascular Remodeling. International Journal of Molecular Sciences 2019;20(9):

Agents: Legumain **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 4 weeks;

ALZET Comments: Dose (5 ug/kg/day); Controls received mp w/ vehicle; animal info (Male, ApoE -/-, 17 weeks old); pumps replaced every 2 weeks; Blood pressure measured via Tail cuff method; cardiovascular;

Q7560: K. P. Melo, *et al.* Mild Exercise Differently Affects Proteostasis and Oxidative Stress on Motor Areas During Neurodegeneration: A Comparative Study of Three Treadmill Running Protocols. Neurotox Res 2019;35(2):410-420

Agents: Rotenone **Vehicle:** DMSO, Polyethylene glycol; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 weeks; 8 weeks;

ALZET Comments: Dose (1 mg/kg/day); 50% DMSO:50% PEG used; Controls received mp w/ vehicle; animal info (Male, Lewis, 8 or 9 months old); pumps replaced every 4 weeks; spinal cord injury; neurodegenerative (Motorcortex);

Q8282: C. S. McAlpine, *et al.* Sleep modulates haematopoiesis and protects against atherosclerosis. Nature 2019;566(7744):383-387

Agents: Hypocretin-1 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 8 weeks;

ALZET Comments: Dose (50 nmol/h/kg); Controls received mp w/ vehicle; pumps replaced every 4 weeks;

Q7531: R. M. Lataro, *et al.* Chronic Treatment With Acetylcholinesterase Inhibitors Attenuates Vascular Dysfunction in Spontaneously Hypertensive Rats. American Journal of Hypertension 2019;32(6):579-587

Agents: Pyridostigmine Bromide; Donepezil **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 16 weeks;

ALZET Comments: Dose (Pyridostigmine bromide at 1.5 mg/kg/day; Donepezil at 1.4 mg/kg/day); animal info (5 week old male SHR and Wistar Kyoto rats); pumps replaced every 4 weeks; long-term study; enzyme inhibitor (Pyridostigmine Bromide inhibits plasma acetylcholinesterase activity; Donepezil inhibits brain acetylcholinesterase activity); cardiovascular; Four pump replacements were performed; BP measured via Tail-cuff method;

Q7616: A. Kurdi, *et al.* Everolimus depletes plaque macrophages, abolishes intraplaque neovascularization and improves survival in mice with advanced atherosclerosis. Vascu Pharmacol 2019;113(70-76

Agents: Everolimus **Vehicle:** DMSO; Propylene glycol; Ethanol, buffered; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 12 weeks;

ALZET Comments: "Dose (1.5 mg/kg/day); 50% DMSO, 40% propylene glycol, 10% absolute ethanol supplemented with 0.4 µl/ml Tween 20 used; animal info (6 weeks, female, ApoE(-/-)Fb1(C1039G+/-)); pumps replaced every 4 weeks; long-term study; cardiovascular; ""Four out of 12 control animals died abruptly during the experiment, which is a phenomenon that started at 21 weeks of WD (corresponding with 9 weeks of treatment with vehicle solution)."" p.72; Therapeutic indication (stabilizes atherosclerotic plaques and reduce atherosclerosis-driven complications such as cardiac hypertrophy and fibrosis, brain hypoxia and sudden death); "

Q9769: A. Kumar, *et al.* Alpha-calcitonin gene-related peptide prevents pressure-overload induced heart failure: role of apoptosis and oxidative stress. Physiological Reports 2019;7(21):e14269

Agents: Alpha-calcitonin gene-related peptide **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 28 days;

ALZET Comments: Dose (4 mg/kg b.w/day per mouse); Controls received mp w/ vehicle; animal info (Eight-week-old male C57/BL6 mice); pumps replaced every 7 days; Alpha-calcitonin gene-related peptide aka a-CGRP; cardiovascular;

Q7618: M. Koshibu, *et al.* Antiatherogenic effects of liraglutide in hyperglycemic apolipoprotein E-null mice via AMP-activated protein kinase-independent mechanisms. American Journal of Physiology Gastrointestinal and Liver Physiology 2019;316(5):E895-E907

Agents: liraglutide; dorsomorphin **Vehicle:** Saline; **Route:** SC; **Species:** Mice (hyperglycemic); **Pump:** 1002; **Duration:** 4 weeks;

ALZET Comments: Dose ((liraglutide 17, 107 nmol/kg/day), (dorsomorphin 52.9 µmol/kg/day); Controls were normoglycemic and received mp w/ vehicle; animal info (20 week, male, ApoE-/-); pumps replaced every 2 weeks; liraglutide is a Glucagon-like peptide-1 receptor agonist; dorsomorphin is an enzyme inhibitor (AMPK); cardiovascular; Therapeutic indication (AMPK-independent anti-atherogenic effects through reduced lipid deposition);



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; **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 CD-1 mice, 18–26 g.); functionality of mp verified by residual volume; pumps replaced after 48 hours; apidaecin derivative aka Api137; peptides;

Q8220: D. V. Keulen, *et al.* Oncostatin M reduces atherosclerosis development in APOE*3Leiden.CETP mice and is associated with increased survival probability in humans. *PLoS One* 2019;14(8):e0221477

Agents: Murine Oncostatin M **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 16 weeks;

ALZET Comments: Dose (10 or 30 µg/kg/day); Controls received mp w/ vehicle; animal info (female APOE3Leiden.CETP transgenic mice (10–15 weeks of age)); pumps replaced every 5.5 weeks; long-term study; Murine Oncostatin M aka Murine OSM; cardiovascular;

Q7626: S. Kalavalapalli, *et al.* Impact of exenatide on mitochondrial lipid metabolism in mice with nonalcoholic steatohepatitis. *J Endocrinol* 2019;241(3):293–305

Agents: exenatide **Vehicle:** Saline, DMSO Buffered; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 8 weeks;

ALZET Comments: Dose (30µg/kg/day); 10% DMSO in saline used; Controls received mp w/ vehicle; animal info (7 weeks, male, C57BL/6); pumps replaced every 4 weeks; Exenatide (Exe) is a GLP-1 receptor agonist; pump model not stated but maximum use duration listed at 4 weeks; Therapeutic indication (may improve nonalcoholic steatohepatitis as it ameliorates mitochondrial TCA cycle flux while decreasing insulin resistance, steatosis and hepatocyte lipotoxicity);

Q8033: E. Heikkila, *et al.* The plant product quinic acid activates Ca(2+) -dependent mitochondrial function and promotes insulin secretion from pancreatic beta cells. *Br J Pharmacol* 2019;176(17):3250–3263

Agents: Quinic acid **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 12 weeks;

ALZET Comments: Dose (75 mg/kg/day); Controls received mp w/ vehicle; animal info (12 weeks old, Male, C57BL/6N); pumps replaced every ? weeks; Multiple pumps per animal (); long-term study; Quinic acid aka QA ; dependence;

Q7526: A. B. Hawkey, *et al.* Paternal nicotine exposure in rats produces long-lasting neurobehavioral effects in the offspring. *Neurotoxicol Teratol* 2019;74(106808

Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 56 days;

ALZET Comments: Dose (2 mg/kg/day); Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 200–250 g); behavioral testing (Housing and behavioral test, Elevated plus maze test, Figure 8 apparatus test); pumps replaced every 4 weeks; dependence;

Q7525: C. Hartmann, *et al.* Angiotensin II-induced hypertension increases the mutant frequency in rat kidney. *Archives of Toxicology* 2019;93(7):2045–2055

Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2004, 2006; **Duration:** 20 weeks;

ALZET Comments: Dose (400 ug/kg/day); Controls received mp w/ PBS; animal info (5–8 weeks old, Male); pumps replaced every 7 weeks; long-term study; cardiovascular;

Q8002: X. Gao, *et al.* Interaction of N-acetyl-seryl-aspartyl-lysyl-proline with the angiotensin-converting enzyme 2-angiotensin-(1-7)-Mas axis attenuates pulmonary fibrosis in silicotic rats. *Exp Physiol* 2019;104(10):1562–1574

Agents: Antifibrotic peptide acetyl-seryl-aspartyl-lysyl-proline **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 8 weeks;

ALZET Comments: Dose (800 mg/kg/day); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male, Wistar, 3 week sold, 80 g); pumps replaced every 4 weeks; Antifibrotic peptide acetyl-seryl-aspartyl-lysyl-proline aka Ac-SDKP ; peptides; cardiovascular;



- Q7996:** J. C. B. Ferreira, *et al.* A selective inhibitor of mitofusin 1-betaIIIPKC association improves heart failure outcome in rats. *Nat Commun* 2019;10(1):329
Agents: Global β IIPKC inhibitor; TAT47–57-SAM β A peptide Mfn1- β IIPKC inhibitor **Vehicle:** Not stated; **Route:** SC; **Species:** Rat; **Pump:** Not stated; **Duration:** 6 weeks;
ALZET Comments: Dose (3 mg/kg/day); animal info (Male); pumps replaced every 2 weeks; cardiovascular;
- Q7990:** J. Ezpeleta, *et al.* Production of seedable Amyloid-beta peptides in model of prion diseases upon PrP(Sc)-induced PDK1 overactivation. *Nat Commun* 2019;10(1):3442
Agents: BX912 **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** Not stated;
ALZET Comments: Dose (5 mg/kg/day); 1% used; animal info (Male, C57BL/6J, 8 weeks old); pumps replaced every 4 weeks; PDK1 inhibitor aka BX912 ; enzyme inhibitor (PDK1 inhibitor); neurodegenerative (Cruetzfeldt-Jakob, Gertsmann-Strasussler-Scheinker disease);
- Q7282:** D. A. Duricki, *et al.* Stroke Recovery in Rats after 24-Hour-Delayed Intramuscular Neurotrophin-3 Infusion. *Annals of Oncology* 2019;85(1):32–46
Agents: Neurotrophin-3, recomb. human **Vehicle:** Saline; bovine serum, albumin; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 4 weeks;
ALZET Comments: Dose (100 μ g/ml); 0.1% bovine serum albumin used; Controls received mp w/ vehicle; animal info (Lister Hooded outbred female rats, ~4 months old, 200–300g); pumps replaced every 2 weeks; ischemia (ischemic stroke); no stress (see pg. 34); Pumps made MRI compatible
- Q8716:** S. P. Chelko, *et al.* Therapeutic Modulation of the Immune Response in Arrhythmogenic Cardiomyopathy. *Circulation* 2019;140(18):1491–1505
Agents: Small-molecule inhibitor of nuclear factor- κ B signaling **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 8 weeks;
ALZET Comments: Dose (5 mg/kg/day); Controls received mp w/ vehicle; animal info (8 weeks old); pumps replaced every 4 weeks; Small-molecule inhibitor of nuclear factor- κ B signaling aka Bay 11-7082 ;
- Q7275:** A. N. Cheema, *et al.* Nicotine impairs intra-substance tendon healing after full thickness injury in a rat model. *J Orthop Res* 2019;37(1):94–103
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 3 months;
ALZET Comments: Dose (61 mg/mL); Controls received mp w/ vehicle; animal info (adult male Sprague-Dawley rats 400–450g); pumps replaced every 4 weeks;
- Q7949:** E. Butti, *et al.* Neural Stem Cells of the Subventricular Zone Contribute to Neuroprotection of the Corpus Callosum after Cuprizone-Induced Demyelination. *J Neurosci* 2019;39(28):5481–5492
Agents: ganciclovir **Vehicle:** water, double distilled; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 4 weeks;
ALZET Comments: Dose (100 mg/kg/d); Controls were WT and received mp w/ agent; animal info (6–8 weeks, female, C57BL/6 and NestinTK); pumps replaced every 2 weeks; neurodegenerative (multiple sclerosis);
- Q9161:** E. Blacher, *et al.* Potential roles of gut microbiome and metabolites in modulating ALS in mice. *Nature* 2019;572(7770):474–480
Agents: Nicotinamide; Phenol Sulfate **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 4 months;
ALZET Comments: Dose (NAM- 30.8 mg/kg/week or 49.28 mg/kg/week); Controls received mp w/ vehicle; animal info (40–180 days old); pumps replaced every 4 weeks; Nicotinamide aka NAM ; neurodegenerative (Amyotrophic Lateral Sclerosis);
- Q8163:** Z. Bao, *et al.* Promotion of microglial phagocytosis by tuftsin stimulates remyelination in experimental autoimmune encephalomyelitis. *Mol Med Rep* 2019;20(6):5190–5196
Agents: Tuftsin **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 28 days;
ALZET Comments: Dose (0.25 ml/h); Controls received mp w/ vehicle; animal info (adult (8–9 weeks old and 18–20 g) female c57Bl/6 mice); pumps replaced on day 15; neurodegenerative (determine if the effect of microglia could promote the recovery of EAE and attenuate symptoms in EAE);



Q7370: B. Balla, *et al.* Long-term selective estrogen receptor-beta agonist treatment modulates gene expression in bone and bone marrow of ovariectomized rats. *J Steroid Biochem Mol Biol* 2019;188(185-194

Agents: Diarylpropionitrile **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 84 days;

ALZET Comments: Dose (20 µg/day); Controls received mp w/ vehicle; animal info (Female, Harlan-Wistar, 8 months old); pumps replaced every 4 weeks; dependence;

Q6879: B. Badzyska, *et al.* Evidence against a crucial role of renal medullary perfusion in blood pressure control of hypertensive rats. *J Physiol* 2019;597(1):211-223

Agents: Angiotensin II; bradykinin **Vehicle:** Saline; **Route:** SC; kidney (left renal medulla); **Species:** Rat; **Pump:** 2002; **Duration:** 14 days; 28 days;

ALZET Comments: Dose (Angiotensin II (35µg/kg/d), bradykinin (0.27 mg/kg/hr; animal info (S-D rats (n = 16), aged 12 weeks, weighing 280–340 g); pumps replaced every 2 weeks; ALZET microcannula set used; cardiovascular; "Extending bradykinin-induced medullary vasodilatation over 2weeks was evenmore challenging:we found that this can indeed be accomplished by chronic intramedullary infusion of Bk using implanted osmotic minipumps." P.219

Q7366: G. Aubertin, *et al.* Effects of imidazoline-like drugs on liver and adipose tissues, and their role in preventing obesity and associated cardio-metabolic disorders. *Int J Obes (Lond)* 2019;

Agents: LNP599 **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 12 weeks;

ALZET Comments: Dose (10 mg/kg/day); animal info (Male, 12 week old, Zucker); pumps replaced every 4 weeks; LNP599 aka 3-chloro-2-methyl-phenyl)-(4-methyl-4,5-dihydro-3H-pyrrol-2-yl)-amine hydrochloride); enzyme inhibitor (selective agonists of the sympatho-inhibitory I1 imidazoline receptors (LNP ligands)); cardiovascular

Q9006: Y. Zhao, *et al.* Inhibition of Drp1 hyperactivation reduces neuropathology and behavioral deficits in zQ175 knock-in mouse model of Huntington's disease. *Biochemical and Biophysical Research Communications* 2018;507(1-4):319-323

Agents: Peptide, TAT; Peptide, P110 **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 8 months;

ALZET Comments: "Dose ((TAT 3 mg/kg/day), (P110 3 mg/kg/day)); Controls received mp w/ TAT control peptide; animal info (4 months, male, C57BL/6J and zQ175 knock-in); behavioral testing (open field test); pumps replaced once every month; long-term study; TAT is a control peptide. P110 peptide is a Drp1 inhibitor; P110 peptide is an enzyme inhibitor (Drp1); peptides; neurodegenerative (Huntington's); Therapeutic indication (Drp1 hyperactivation by P110 treatment has a neuroprotective effect in zQ175 KI HD mice by attenuating behavioral deficits, striatal neuronal loss and white matter disorganization and also reduces anxiety-like behavior); "

Q8999: L. Zhang, *et al.* N-acetyl-seryl-aspartyl-lysyl-proline (Ac-SDKP) attenuates silicotic fibrosis by suppressing apoptosis of alveolar type II epithelial cells via mediation of endoplasmic reticulum stress. *Toxicology and Applied Pharmacology* 2018;350(1-10

Agents: Ac-SDKP **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 2ML4; **Duration:** 8 weeks;

ALZET Comments: Dose (800 µg/kg/d); Controls received mp w/ vehicle; animal info (3 weeks, male, Wistar); pumps replaced every 30 days; N-acetyl-seryl-aspartyl-lysyl-proline (aka Ac-SDKP) is an endogenous tetra peptide that is present in mammalian organs and biological fluids; Therapeutic indication (Ac-SDKP exerts antifibrotic effects in rats with silicosis by attenuating apoptosis of type II AEC mediated by ER stress.);

Q7161: X. Yu, *et al.* Zinc Metallochaperones Reactivate Mutant p53 Using an ON/OFF Switch Mechanism: A New Paradigm in Cancer Therapeutics. *Clin Cancer Res* 2018;24(18):4505-4517

Agents: Zinc metallochaperone 1 **Vehicle:** DMSO; **Route:** IV (jugular); **Species:** Mice (nude); **Pump:** 2001; **Duration:** 7, 17 days;

ALZET Comments: Dose (1 mg/kg/d); Controls received mp w/ vehicle; animal info (8-12 week old mice); pumps replaced after 1 week; comparison of IV bolus injection vs continuous pump infusion; half-life: <30 min (p. 4505); cancer (therapeutics);



Q8983: W. Yin, *et al.* Recombinant human GLP-1(rhGLP-1) alleviating renal tubulointestinal injury in diabetic STZ-induced rats. *Biochemical and Biophysical Research Communications* 2018;495(1):793-800

Agents: Glucagon-like peptide-1, recomb. human **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 2004; **Duration:** 8 weeks;
ALZET Comments: Dose (1.5 pmol/kg/min); Controls received mp w/ vehicle; animal info (8 weeks, male, Wistar, 200-250g); pumps replaced every 4 weeks; diabetes; Therapeutic indication (rhGLP-1 can effectively decrease urinary albumin by ameliorating tubulointerstitial and tubular cell injured in diabetic nephropathy STZ-induced rats);

Q7324: J. Yang, *et al.* Inhibition of the CD36 receptor reduces visceral fat accumulation and improves insulin resistance in obese mice carrying the BDNF-Val66Met variant. *J Biol Chem* 2018;293(34):13338-13348

Agents: Salvionolic acid B **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 8 weeks;
ALZET Comments: Dose (50 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6, 6-weeks old, control 23.9 +/- 0.5 g, SAB treatment 23.3 +/- 0.6 g); pumps replaced after 4 weeks; stability verified by (measured effect of neutralized SAB on macrophage oxLDL uptake);

Q8978: G. Yang, *et al.* Angiotensin-(1-7)-induced Mas receptor activation attenuates atherosclerosis through a nitric oxide-dependent mechanism in apolipoproteinE-KO mice. *Molecular and Cellular Mechanisms of Disease* 2018;

Agents: Angiotensin (1-7) **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 6, 8 weeks;
ALZET Comments: Dose (82 µg/kg/h); Controls received mp w/ vehicle; animal info (6 or 8 weeks, C57BL/6, apoE-KO and apoE/Mas-KO); pumps replaced every 3 weeks; cardiovascular; Therapeutic indication (Ang-(1-7) attenuates the development of atherosclerosis through an NO-dependent mechanism);

Q7542: Q. Wu, *et al.* Human menstrual blood-derived stem cells promote functional recovery in a rat spinal cord hemisection model. *Cell Death & Disease* 2018;9(9):882

Agents: TrkB-IgG; immunoglobulin G, human **Vehicle:** PBS; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 2002; **Duration:** 4 weeks;
ALZET Comments: Dose (3 µg/day); Controls received mp w/ vehicle; animal info (adult, female, Sprague-Dawley, 220-250g); behavioral testing (BBB locomotion scale); pumps replaced at 3 weeks; enzyme inhibitor (BDNF-TrkB signaling); spinal cord injury;

Q7269: A. Vujic, *et al.* Exercise induces new cardiomyocyte generation in the adult mammalian heart. *Nat Commun* 2018;9(1):1659

Agents: Thymidine, 15-; Radio-isotope **Vehicle:** 15N tracer; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 8 weeks;
ALZET Comments: Dose (20 ug/h); animal info (2 months old, C57BL/6, male); pumps replaced weekly for 8 weeks; cardiovascular;

Q7312: N. Tsuburaya, *et al.* A small-molecule inhibitor of SOD1-Derlin-1 interaction ameliorates pathology in an ALS mouse model. *Nat Commun* 2018;9(1):2668

Agents: SOD1-Derlin-1 inhibitor #56-40, SOD1-Derlin-1 inhibitor #56-59 **Vehicle:** DMSO; **Route:** CSF/CNS (lateral ventricle); **Species:** Mice; **Pump:** 2006; **Duration:** 36 weeks;
ALZET Comments: Dose (1 mM #56-40 or 3 mM #56-59); Controls received mp w/ vehicle; animal info (22 weeks, male, C57BL/6); behavioral testing (rotarod performance); behavioral testing (rotarod performance); pumps replaced every 6 weeks until mouse showed paralysis onset; long-term study; stability verified by (in-vitro immunoprecipitation assay); 3-Amino-N-(4-pyridyl)-6-(3-pyridyl)thieno[2,3-b]pyridine-2-carboxamide aka #56-40; N-Allyl-3-amino-N-phenyl-6-(pyridin-3-yl)thieno[2,3-b]pyridine-2-carboxamide aka #56-59; enzyme inhibitor (SOD1-Derlin-1 interaction); ALZET brain infusion kit 3 used; neurodegenerative (Amyotrophic lateral sclerosis);



Q7245: M. Tsoli, *et al.* Dual targeting of mitochondrial function and mTOR pathway as a therapeutic strategy for diffuse intrinsic pontine glioma. *Oncotarget* 2018;9(7541-7556

Agents: Temsirolimus; Phenylarsonous acid, 4-(N-(S-penicillaminyllacetyl)-amino) **Vehicle:** Saline; **Route:** SC, IP; **Species:** Mice; **Pump:** 2002; **Duration:** 4 weeks;

ALZET Comments: Dose (PEMAO-3 mg/kg/day, Temsirolimus-10 mg/kg/day and 5 mg/kg/day); Controls received mp w/ vehicle; animal info (5 week-old, female, NOD/SCID); pumps replaced every 2 weeks; 4-(N-(S-penicillaminyllacetyl)-amino)phenylarsonous acid aka Anti-cancer compound (PENAO); enzyme inhibitor (PENAO Inhibits adenine nucleotide translocase, Temsirolimus inhibits mTOR; cancer (Glioma););

Q7875: A. E. Tschiffely, *et al.* An exploratory investigation of brain-selective estrogen treatment in males using a mouse model of Alzheimer's disease. *Horm Behav* 2018;98(16-21

Agents: estradiol, 17-beta-; DHED **Vehicle:** PEG; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 8 weeks;

ALZET Comments: Dose ((E2 2 µg/day), (DHED 2 µg/day)); Controls received mp w/ vehicle; animal info (5.5-6 months, male, C57BL/6 and APPswe/PS1dE9); behavioral testing (radial-arm water maze); pumps replaced every 4 weeks; 10beta,17beta-dihydroxyestra-1,4-dien-3-one (DHED) is a brain-selective prodrug of E2; neurodegenerative (Alzheimer's); pump model not stated but flow rate listed as 0.025 µL/min; Therapeutic indication (DHED-based estrogen treatment shown to decrease APP and Abeta peptide levels concomitantly improving learning in male animals at an early stage of the neuropathology.);

Q7311: L. J. Trigiani, *et al.* Pleiotropic Benefits of the Angiotensin Receptor Blocker Candesartan in a Mouse Model of Alzheimer Disease. *Hypertension* 2018;72(5):1217-1226

Agents: Candesartan **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 2 months;

ALZET Comments: Dose (1 mg/kg per day,); 25% DMSO used; 25% DMSO used; animal info (male and female, C57BL6 mice with APP mutations, 3-4 months old); behavioral testing (Morris water maze); pumps replaced at 34 days; comparison of oral delivery via drinking water vs mp; neurodegenerative (Alzheimer disease); "It is thus possible that delivery of candesartan through osmotic minipumps (cohort 1) compared with drinking water (cohort 2) allowed for better control of drug concentration and steady-state levels that conferred a better drug efficacy despite a shorter treatment,

Q7306: M. L. Sulciner, *et al.* Resolvins suppress tumor growth and enhance cancer therapy. *J Exp Med* 2018;215(1):115-140

Agents: Resolvin D1, Resolvin D2, Resolvin E1, Annexin V recombinant protein, **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice (SCID); **Pump:** pump model not stated; **Duration:** 28 days, 2 and 3 months;

ALZET Comments: Dose: Resolvins (15 ng/d), Annexin V recombinant protein (4 µg/kg/d); Controls received mp w/ vehicle; animal info (C57BL/6J, SCID); pumps replaced after 14 days for the 28 day studies, every 28 days for the 2 and 3 month studies;

Q7154: S. R. Subramaniam, *et al.* Chronic nicotine improves cognitive and social impairment in mice overexpressing wild type alpha-synuclein. *Neurobiol Dis* 2018;117(170-180

Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 1 or 6 months;

ALZET Comments: Dose (0.4 mg/kg/h and 2.0 mg/kg/h); dose-response (); dose-response (); pumps replaced every 4 weeks; long-term study; stress/adverse reaction: Mice treated with the higher nicotine dose (2.0 mg/kg/h) lost weight after surgery and 50% died after one week. This was as a result of combined toxic effects of isoflurane and a higher dose of nicotine. Therefore, pentobarbital was used instead of isoflurane for induction of anesthesia, which reduced the mortality rate and improved weight gain in the higher dose group. (see pg. 172);