



Recent References (2021-Present) on Diabetes Research
Using ALZET® Osmotic Pumps

Q11344: Y. Kuthati, *et al.* Teneclisaptin Co-Infusion Alleviates Morphine Tolerance by Inhibition of Spinal Microglial Cell Activation in Streptozotocin-Induced Diabetic Rats. *Antioxidants (Basel)* 2023;12(7):

Agents: Teneclisaptin; morphine **Vehicle:** DMSO; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Strain:** Wistar; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Dose: mor 15 ug/h; ten 2 ug/h, or both mor + ten; 4% DMSO used; controls received mp w/ saline; animal info (Male); polyethylene catheter; behavioral testing (mechanical paw withdrawal threshold and tail-flick tests); diabetes; (neuropathic pain)

Q10738: J. Zhan, *et al.* Positive Feedback Loop of miR-320 and CD36 Regulates the Hyperglycemic Memory-Induced Diabetic Diastolic Cardiac Dysfunction. *Molecular Therapy Nucleic Acid* 2023;31(122-138

Agents: Insulin **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1004; **Duration:** 4 weeks;

ALZET Comments: Dose (40 mg/kg); Controls received mp w/ vehicle; animal info (mice (8-week-old males); diabetes;

Q11024: T. Wei, *et al.* Glucagon Acting at the GLP-1 Receptor Contributes to beta-Cell Regeneration Induced by Glucagon Receptor Antagonism in Diabetic Mice. *Diabetes* 2023;72(5):599-610

Agents: Exendin 9-39 **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Strain:** db/db; **Pump:** Not Stated; **Duration:** 4 weeks;

ALZET Comments: Dose (50 nmol/kg/day); Controls received mp w/ vehicle; animal info: Male (8 weeks old; diabetes; Ex9 is a GLP-1R antagonist

Q11023: H. Watanabe, *et al.* Cyb5r3-based mechanism and reversal of secondary failure to sulfonylurea in diabetes. *Science Translational Medicine* 2023;15(**Agents:** Glibenclamide **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Strain:** C57BL/6;

Pump: Not Stated; **Duration:** 4 weeks;

ALZET Comments: Dose (20 mg/kg per day); diabetes; GLB is a third-gen sulfonylurea (induce insulin secretion)

Q10995: S. A. Shah, *et al.* Obesity-Induced Coronary Microvascular Disease Is Prevented by iNOS Deletion and Reversed by iNOS Inhibition. *JACC Basic to Translational Science* 2023;8(5):501-514

Agents: 1400W **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Strain:** Not Stated; **Pump:** 1004; **Duration:** Not Stated;

ALZET Comments: Dose (30 mg/kg/day); animal info: mice, 8 weeks of age; Blood pressure measured via Radiotelemetry see pg.9 table 2; 1400W is a highly selective iNOS inhibitor/antagonist; obesity; diabetes; cardiovascular (coronary microvascular disease, heart failure)

Q10987: D. Rogacka, *et al.* Inhibition of phosphodiesterase 5A by tadalafil improves SIRT1 expression and activity in insulin-resistant podocytes. *Cellular Signaling* 2023;105(110622

Agents: Tadalafil **Vehicle:** DMSO; **Route:** SC; **Species:** Rat; **Strain:** Wistar; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Dose Tadalafil (2.5 mg/kg/day); Controls received mp w/ vehicle; animal info: Male; post op. care (Butomidor (10 mg/ml) and gentamicin (50 mg/ml) were subcutaneously administered; tadalafil is a highly selective inhibitor of PDE5A on SIRT1 expression and activity; diabetes;

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;

Q10959: S. Maurotti, *et al.* Preventing muscle wasting: pro-insulin C-peptide prevents loss in muscle mass in streptozotocin-diabetic rats. *Journal of Cachexia, Sarcopenia and Muscle* 2023;14(2):1117-1129

Agents: C-peptide **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Strain:** Wistar; **Pump:** 2006; **Duration:** 6 weeks;

ALZET Comments: Dose (72 nmol/kg /24 h); animal info: adult T1DM male; Controls received mp w/ vehicle; animal info: 4-month-old male Wistar rats (400–500 g); diabetes;



Q10973: A. K. Palbrink, *et al.* Betahistine prevents development of endolymphatic hydrops in a mouse model of insulin resistance and diabetes. *Acta Oto-Laryngologica* 2023;143(2):127-133

Agents: Betahistidine; spironolactone; empagliflozin; cilostamide **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; CBA/J; **Pump:** 1004; **Duration:** 30 days;

ALZET Comments: Dose: Betahistine 26 mg/kg/day; Spironolactone 0.5 mg/kg/day; Empagliflozin 1.2 mg/kg/day; Cilostamide 0.5 mg/kg/day; animal info: Female 8 weeks, 26–27 gram; spironolactone (aldosterone antagonist); empagliflozin (sodium-glucose cotransporter2 inhibitor); cilostamide (phosphodiesterase3 inhibitor); diabetes

Q10972: P. Pakataridis, *et al.* EVIDENCE FOR BIOLOGICAL EFFECTS OF THE HEXAPEPTIDE NOVOKININ. *Journal of Chemical Technology and Metallurgy* 2023;58(3):608-614

Agents: Novokinin **Vehicle:** Saline, sterile; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Strain:** SHR; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Dose: 0.3 ug/rat/day; Controls received mp w/ vehicle; animal info: 2-month-old female 220 - 280g; receptor agonist (angiotensin AT2 receptor agonist novokinin aggravates some diabetes mellitus-induced alterations in Wistar); ALZET brain infusion kit 2 used; Brain coordinates (1.5 mm lateral (right) to the sagittal suture, 1 mm caudal to bregma, and a depth of 3 mm); behavioral testing Open field test; Elevated plus maze test; Paw pressure test; T-maze rewarded alternating test; Novel object recognition; anxiety; memory

Q11201: K. Makki, *et al.* 6alpha-hydroxylated bile acids mediate TGR5 signaling to improve glucose metabolism upon dietary fiber supplementation in mice. *Gut* 2023;72(2):314-324

Agents: Exendin-4 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** TGR5 KO; **Pump:** Not Stated; **Duration:** 6 weeks;

ALZET Comments: Dose (2 nmol/kg/day); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (Male; Wild-type; 8-9 weeks old; Fed either chow or western-style diet); diabetes; Therapeutic indication (Glucose metabolism);

Q11130: C. H. Leo, *et al.* Relaxin elicits renoprotective actions accompanied by increasing bile acid levels in streptozotocin-induced diabetic mice. *Biomedicine & Pharmacotherapy* 2023;162(114578)

Agents: Relaxin-2, recomb human **Vehicle:** Sodium acetate; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1002; **Duration:** 2 w

ALZET Comments: Dose (0.5 mg/kg/day); Controls received mp w/ vehicle; animal info (Male; 19 w); peptides; diabetes;

Q11117: H. Y. Jeon, *et al.* Simultaneous attenuation of hyperglycemic memory-induced retinal, pulmonary, and glomerular dysfunctions by proinsulin C-peptide in diabetes. *BMC Medicine* 2023;21(1):49

Agents: Insulin, human recombinant **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 2004; **Duration:** 4 weeks;

ALZET Comments: Dose (58.4 pmol/min/kg); animal info (Male; 6 weeks old); diabetes;

Q11109: P. Gonzalez, *et al.* Antimicrobial protein REG3A regulates glucose homeostasis and insulin resistance in obese diabetic mice. *Communication Biology* 2023;6(1):269

Agents: REG3A, human recombinant **Route:** SC; **Species:** Mice; **Strain:** ob/ob; **Pump:** 2004; **Duration:** 4 weeks;

ALZET Comments: Dose (9 or 43 µg/day); Controls received mp w/ vehicle; animal info (11-13 weeks old); diabetes;

Q11100: Y. Duan, *et al.* Adiponectin-mediated promotion of CD44 suppresses diabetic vascular inflammatory effects. *iScience* 2023;26(4):106428

Agents: Adiponectin; CD44 C-terminal polypeptide **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Strain:** Wild-type, APPL1KO; **Pump:** Not Stated; **Duration:** Not Stated;

ALZET Comments: Dose (0.25 ug/g/day); animal info (Fed high-fat diet; ; Male and female); peptides; diabetes;

Q11239: G. Basile, *et al.* Excess pancreatic elastase alters acinar-beta cell communication by impairing the mechano-signaling and the PAR2 pathways. *Cell Metabolism* 2023;35(7):1242-1260 e9

Agents: Telaprevir **Vehicle:** DMSO; **Route:** SC; **Species:** Mice; **Strain:** NSG; C57BL6/J; **Pump:** 1004; **Duration:** 4 weeks;

ALZET Comments: Dose (30 or 300 ug/kg/day); Controls received mp w/ vehicle; animal info (Male; 8-10 weeks, 4 weeks old); diabetes;



Q10440: K. Aoyagi, *et al.* A new beta cell-specific mitophagy reporter mouse shows that metabolic stress leads to accumulation of dysfunctional mitochondria despite increased mitophagy. *Diabetologia* 2023;66(1):147-162

Agents: Humulin R **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Strain:** RIP-Cre;

ALZET Comments: Dose: (0.36 U/day); Controls received mp w/ vehicle; animal info: male, Cmmrflox/+ mice and RIP-Cre mice used to generate CMMR mice; Pink1 knockout mice; diabetes

Q10928: F. Andreozzi, *et al.* Glucagon induces the hepatic expression of inflammatory markers in vitro and in vivo. *Diabetes Obesity & Metabolism* 2023;25(2):556-569

Agents: Glucagon **Vehicle:** Saline, sterile; **Species:** Mice; **Strain:** Hsd:ICR (CD-1); **Pump:** 1004; **Duration:** 28 days;

ALZET Comments: Dose (1 ug/h); 0.9% saline used; Controls received mp w/ vehicle; animal info (Four-week-old male mice); functionality of pump verified by measuring residual volume; diabetes; immunology

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; **Strain:** T2DM; **Pump:** Not Stated; **Duration:** 12 weeks;

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

Q10894: Y. Zheng, *et al.* Adiponectin Ameliorates Placental Injury in Gestational Diabetes Mice by Correcting Fatty Acid Oxidation/Peroxide Imbalance-Induced Ferroptosis Via Restoration of CPT-1 Activity. *Endocrine* 2022;75(3):781-793

Agents: Adiponectin, recombinant full-length **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1003D; **Duration:** 17 days;

ALZET Comments: Dose (10 ug/d); animal info (Female; 6 weeks old; Weigh 16-18 g, high fat diet); diabetes;

Q10895: J. Zheng, *et al.* cPKCgamma Deficiency Exacerbates Autophagy Impairment and Hyperphosphorylated Tau Buildup through the AMPK/mTOR Pathway in Mice with Type 1 Diabetes Mellitus. *Neuroscience Bulletin* 2022;38(10):1153-1169

Agents: Rapamycin **Vehicle:** DMSO; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Strain:** Wild-type (cPKCγ^{-/-}); cPKCγ knockout (cPKCγ^{-/-}) C57BL/6; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose: (0.2 mg/kg); Controls received mp w/ vehicle; animal info: Adult male mice (18 g–22 g, 6–8 weeks) diabetes mellitus; behavioral testing: Morris Water Maze (MWM) Test; Brain coordinates (AP - 0.5 mm, ML + 1.0 mm, and DV - 2.8 mm relative to bregma); diabetes;

Q11225: S. Yonekubo-Awaka, *et al.* Therapeutic effects of silodosin and urapidil on underactive bladder associated with diabetic cystopathy. *Low Urin Tract Symptoms* 2022;14(6):434-441

Agents: Silodosin; Urapidil **Vehicle:** Hartmann's solution; **Route:** SC; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2ML4; **Duration:** 4 weeks;

ALZET Comments: Dose Silodosin (0.3 or 1 mg/kg.15); Urapidil (100 mg/kg); 0.60 w/v% NaCl, 0.03 w/v% KCl, 0.02 w/v% CaCl₂, 0.31 w/v% lactic acid, hydrobromide 2-fold equiv. of silodosin used; Controls received mp w/ vehicle; animal info: Female; Blood pressure measured via blood pressure (MBP) Blood pressure measurement: see diagram (pg.437) fig.2 A&B;

Q10777: W. Wang, *et al.* Diabetic hyperglycemia promotes primary tumor progression through glycation-induced tumor extracellular matrix stiffening. *Science Advances* 2022;

Agents: Insulin **Vehicle:** Citrate buffer; **Route:** SC; **Species:** Mice; **Strain:** MMTV-PyMT; **Pump:** 2006; **Duration:** 7 weeks;

ALZET Comments: Dose: Insulin (0.5 U of insulin per mouse per day); Controls received mp w/ vehicle; animal info: Female mice of the FVB strain background (4 weeks of age.); diabetes;

Q10764: B. Wang, *et al.* WNT1-Inducible Signaling Pathway Protein 1 Regulates Kidney Inflammation Through the NF-kappaB Pathway. *Clinical Science (Lond)* 2022;136(1):29-44

Agents: Immunoglobulin G; WISP1, antibody **Route:** IP; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (Male; Weighed 20-25 g; 7-8 weeks old; Induced overt diabetes and developed chronic kidney fibrosis); Therapeutic indication (Inflammation in kidney disease);



Q11223: Y. Tanaka, *et al.* Combined treatment with glucagon-like peptide-1 receptor agonist exendin-4 and metformin attenuates breast cancer growth. *Diabetology International* 2022;13(3):480-492

Agents: Exendin-4 **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Strain:** athymic CAnN.Cg-Foxn1nu/CrlCrlj; **Pump:** 1004; **ALZET Comments:** Dose: 300 pmol/kg/day; Controls received mp w/ vehicle; animal info: Female mice 6 weeks; cancer (Breast cancer); diabetes;

Q11219: J. Shirakawa, *et al.* E2F1 transcription factor mediates a link between fat and islets to promote beta cell proliferation in response to acute insulin resistance. *Cell Report Medicine* 2022;41(1):111436

Agents: S961; OSI-906 **Vehicle:** PBS; PEG400; Tween 80; propylene glycol; **Route:** SC; **Species:** Mice; **Strain:** Control (IR-floxed); BIRKO; **Pump:** 2001; **Duration:** 7, 8, 9 days;

ALZET Comments: Dose: 10 nM/week S961; 1.5 mg/day insulin receptor +OSI-906; 30% PEG400, 0.5% Tween 80, 5% propylene glycol used; animal info (8-10-week-old; S961 is an insulin receptor antagonist; OSI-906 is an IGF1 receptor dual inhibitor;

Q10669: M. Sakaguchi, *et al.* Phosphatase Protector Alpha4 (alpha4) is Involved in Adipocyte Maintenance and Mitochondrial Homeostasis Through Regulation of Insulin Signaling. *Nature Communications* 2022;13(1):6092

Agents: Leptin **Vehicle:** Saline, sterile; **Route:** SC; **Species:** Mice; **Strain:** Aa4KO; **Pump:** Not Stated; **Duration:** 2 weeks; **ALZET Comments:** Dose (10 µg/mouse/day); Controls received mp w/ vehicle; animal info (8-week-old mice); diabetes;

Q10646: R. Perez-Villavicencio, *et al.* Effect of Empagliflozin on Sphingolipid Catabolism in Diabetic and Hypertensive Rats. *International Journal of Molecular Sciences* 2022;23(5):

Agents: Angiotensin II **Vehicle:** Isoflurane; **Route:** SC; **Species:** Rat; **Strain:** Wistar; **Pump:** 2002; **Duration:** 2 weeks;

ALZET Comments: Dose (435 ng/kg/min); Controls received mp w/ vehicle; animal info (Male rat; Weighed 350-360 g); post op. care (Empagliflozin treatment for 2 weeks); peptides; cardiovascular (hypertension); diabetes;

Q11204: A. V. Mikhailov, *et al.* Calmodulin-dependent protein kinase II activation promotes kidney mesangial expansion in streptozotocin-induced diabetic mice. *Heliyon* 2022;8(11):e11653

Agents: KN-93; K9-92 **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Strain:** FVB; **Pump:** 1004; **Duration:** 4 weeks;

ALZET Comments: Dose: (70 µg/kg/day); Controls received mp w/ vehicle; animal info: 4 months old female; KN-93 is a small molecule CaMKII inhibitor; diabetes;

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

Q11168: Y. J. Lee, *et al.* Dopamine ameliorates hyperglycemic memory-induced microvascular dysfunction in diabetic retinopathy. *FASEB Journal* 2022;36(12):e22643

Agents: Insulin, human recombinant **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 2004; **Duration:** 12 weeks;

ALZET Comments: Dose (58.4 pmol/min/kg.); animal info: Six-week-old male; diabetes, hyperglycemic stress

Q11167: A. Le Lay, *et al.* Regenerating islet-derived protein 3alpha: A promising therapy for diabetes. Preliminary data in rodents and in humans. *Heliyon* 2022;8(7):e09944

Agents: ALF-5755 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** Pump: 2004; **Duration:** 4 weeks;

ALZET Comments: Dose: 50 µg/day; 0.9% saline used; Controls received mp w/ vehicle; animal info: 13-week-old mice; Human recombinant protein Reg3α (rcReg3α, also named (ALF-5755); diabetes; "Thus, chronic treatment with Reg3α in the context of T2D may reduce or limit weight gain by reorienting the metabolism of glucose to the muscles with a beneficial impact on the overall energy homeostasis." p. 6



- Q10583:** M. Kuczeriszka, *et al.* Role of Ang1-7 in Renal Haemodynamics and Excretion in Streptozotocin Diabetic Rats. *Clinical and Experimental Pharmacology and Physiology* 2022;49(3):432-441
Agents: Angiotensin (1-7) **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2002; **Duration:** 2 weeks;
ALZET Comments: Dose: (400 ng/min); Controls received mp w/ vehicle; animal info: Male rats, (227–250g) normoglycaemic or diabetic; Blood pressure measured via: Tail cuff; Blood pressure measurements (p.435) see Fig.1; diabetes;
- Q11161:** S. Kim, *et al.* miR204 potentially promotes non-alcoholic fatty liver disease by inhibition of cpt1a in mouse hepatocytes. *Communications Biology* 2022;5(1):1002
Agents: miR204 inhibitors **Route:** SC; **Species:** Mice; **Strain:** WT; IDH2 KO; **Pump:** 1004; **Duration:** 4 weeks;
ALZET Comments: Dose: (0.5 mg/kg/day); animal info: male mice 8 weeks old; Non-alcoholic fatty liver disease; diabetes
- Q10569:** M. Kaplanian, *et al.* Deciphering Metformin Action in Obese Mice: A Critical Re-Evaluation of Established Protocols. *Metabolism* 2022;128(15):4956
Agents: Metformin **Vehicle:** Saline; **Route:** IP; **Species:** Mice; **Strain:** C57BL/6; **Pump:** Not Stated; **Duration:** 1 month;
ALZET Comments: Dose (13.3 mg/kg daily); Controls received mp with vehicle; animal info (8-weeks old;; male; obese; high fat diet); diabetes;
- 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 μ g/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);
- Q10514:** L. B. James-Allan, *et al.* A Novel Technique Using Chronic Infusion Of Small Extracellular Vesicles From Gestational Diabetes Mellitus Causes Glucose Intolerance In Pregnant Mice. *Clinical Science (Lond)* 2022;136(21):1535-1549
Agents: Vesicle, human small extracellular **Vehicle:** PBS; **Route:** IV (jugular); **Species:** Mice; **Strain:** C57BL6; **Pump:** 1003D;
Duration: 4 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (Pregnant female mice); jugular catheter used; gestational diabetes mellitus
- Q10758:** Y. Ito, *et al.* Protein Tyrosine Phosphatase 1B Deficiency Improves Glucose Homeostasis in Type 1 Diabetes Treated With Leptin. *Diabetes* 2022;71(9):1902-1914
Agents: Leptin, recombinant **Vehicle:** Saline; **Route:** CSF/CNS (cerebral lateral ventricle); **Species:** Mice; **Strain:** T1D WT; T1D KO; **Pump:** 1002; **Duration:** 10 days;
ALZET Comments: Dose: (0.25 mg/day) Controls received mp w/ vehicle; animal info: mice Brain coordinates (anterior-posterior 0.50 mm, medial-lateral \pm 1.3 mm, dorsal-ventral 2.3 mm) diabetes; (Type 1 diabetes)
- Q10944:** X. Hu, *et al.* Effects of continuous subcutaneous insulin infusion on the microstructures, mechanical properties and bone mineral compositions of lumbar spines in type 2 diabetic rats. *BMC Musculoskeletal Disorders* 2022;23(1):511
Agents: Insulin **Vehicle:** Citrate buffer; **Route:** SC; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2ML4; **Duration:** 4 weeks; 8 weeks;
ALZET Comments: Dose (2.5 IU/day); Controls received mp w/ vehicle; animal info (Male; 6 weeks old; 70 total; Weighed about 200 g more or less); peptides; 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);



Q10527: D. Gueddouri, *et al.* Insulin resistance per se drives early and reversible dysbiosis-mediated gut barrier impairment and bactericidal dysfunction. *Molecular Metabolism* 2022;57(10)1438

Agents: S961 **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** Not Stated; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (Male; 8 weeks old); S961 aka Insulin receptor peptide antagonist; peptides; diabetes;

Q10920: M. Gheblawi, *et al.* An advanced endothelial murine HFpEF model: eNOS is critical for angiotensin 1-7 rescue of the diabetic phenotype. *Journal of Molecular and Cellular Cardiology* 2022;169(10-12

Agents: Angiotensin 1-7 **Vehicle:** Placebo; **Route:** SC; **Species:** Mice; **Strain:** Wild-type C57BL/6; **Duration:** 28 days;

ALZET Comments: Dose (0.5 mg/kg/day); Controls received mp w/ vehicle; animal info (Male; 20 weeks old, db/db eNOS-/-); peptides; cardiovascular; diabetes;

Q10430: M. Crespo-Masip, *et al.* Elimination of Vitamin D Signaling Causes Increased Mortality in a Model of Overactivation of the Insulin Receptor: Role of Lipid Metabolism. *Nutrients* 2022;14(7):

Agents: Glucose, D-(+); Mannitol, D- **Vehicle:** Not Stated; **Route:** CSF/CNS (intracerebroventricular); **Species:** Mice; **Strain:** Cre-negative; VDR-KO; PTEN-KO; **Pump:** 2006; **Duration:** 42 days;

ALZET Comments: Controls received mp w/ vehicle; animal info: Cre-negative littermates were used as controls (CNT). Twenty-one days after birth, dependence; Taken together, the results shown in the present paper point to the paramount role of an adequate (vitamin D) signaling pathway in hypoglycemia induced by overactivation of the insulin receptor. Thus, in T1 diabetic patients, especially in the lean phenotype, maintaining correct levels of vitamin D could support proper lipid metabolism and decrease deaths induced by insulin dosing errors. (pg.13)"; diabetes

Q10428: C. H. Cho, *et al.* Role of the JAK/STAT pathway in a streptozotocin-induced diabetic retinopathy mouse model. *Graefes Archive Clinical and Experimental Ophthalmology* 2022;260(11):3553-3563

Agents: CP-690550; Pyridone 6; WP1066 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Duration:** 8 weeks;

ALZET Comments: Dose: (Pyridone 6: 45 mg/kg, CP-690550: 15 mg/kg, WP1066: 40 mg/kg); Controls received mp w/ vehicle; animal info: healthy male mice (18–22 g; 6 weeks old); pumps replaced after 4 weeks; CP-690550 aka tofacitinib citrate, Pyridone 6 is a JAK inhibitor, WP1066 is a STAT3 inhibitor; diabetes; Diabetic retinopathy

Q10425: X. Chen, *et al.* Klotho-derived peptide 6 ameliorates diabetic kidney disease by targeting Wnt/beta-catenin signaling. *Kidney International* 2022;102(3):506-520

Agents: KP6 **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Strain:** CD-1; SAU; **Pump:** Not Stated; **Duration:** 8 weeks;

ALZET Comments: Dose: KP6 (1 mg/kg per day); Controls received mp w/ vehicle; animal info: Male mice; mice; Male db/db and db/m mice; pump replaced after 4 weeks Klotho derived peptide 6 aka (KP6); peptides; diabetes;

Q10416: J. M. Brown, *et al.* Combined micro-osmotic pump infusion and intracerebroventricular injection to study FGF1 signaling pathways in the mouse brain. *STAR Protocols* 2022;3(2):101329

Agents: UO126 **Vehicle:** DMSO; Saline; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1003D;

ALZET Comments: Dose (30 mg); 50% DMSO and saline used; Controls received mp w/ vehicle; animal info (Male; 8 weeks old); post op. care (Buprenorphine); dental cement used; diabetes;

Q10365: F. Brial, *et al.* Diet dependent impact of benzoate on diabetes and obesity in mice. *Biochimie* 2022;194(35-42

Agents: Benzoate **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2006; **Duration:** 6 weeks;

ALZET Comments: Dose (0.15 ul/h); 0.9% NaCl; Controls received mp w/ vehicle; animal info (Male; 6 weeks old; Fed high carbohydrate or high fat/sucrose diet); diabetes; Therapeutic indication (Cardiometabolic diseases);

Q10408: V. Barrios, *et al.* Chronic Central Leptin Infusion Promotes an Anti-Inflammatory Cytokine Profile Related to the Activation of Insulin Signaling in the Gastrocnemius of Male Rats. *Biomedicines* 2022;10(7):

Agents: Leptin **Vehicle:** Saline; BSA; **Route:** CSF/CNS (right ventricle); **Species:** Rat; **Duration:** 14 days;

ALZET Comments: Dose (12 µg/day); 0.9% saline and 1% serum albumin used; Controls received mp w/ vehicle; animal info (Male; Weighed about 250 g); diabetes;



Q10352: M. M. Aljumaiah, *et al.* Association of Maternal Diabetes and Autism Spectrum Disorders in Offspring: a Study in a Rodent Model of Autism. *Journal of Molecular Neuroscience* 2022;72(2):349-358

Agents: Glargine; **Species:** Rat; **Duration:** 45 days;

ALZET Comments: Dose (100 IU/mL); animal info (9 total; Female; Weighed about 280 g); glargine is an insulin analogue; neurodegenerative (Autism); diabetes; Therapeutic indication (Autism)

Q11338: Y. Liu, *et al.* NORAD lentivirus shRNA mitigates fibrosis and inflammatory responses in diabetic cardiomyopathy via the ceRNA network of NORAD/miR-125a-3p/Fyn. *Inflamm Res* 2021;70(10-12):1113-1127

Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** db/db; **Pump:** Not Stated; **Duration:** 4 weeks;

ALZET Comments: Dose (1000 ng/kg/min); animal info (Male; 12-14 weeks old; Leptin receptor-deficient); diabetes; Therapeutic indication (Diabetic cardiomyopathy);

Q11337: X. Liu, *et al.* Role of Renal Sympathetic Nerves in GLP-1 (Glucagon-Like Peptide-1) Receptor Agonist Exendin-4-Mediated Diuresis and Natriuresis in Diet-Induced Obese Rats. *Journal of the American Heart Association* 2021;10(21):e022542

Agents: Sacubitril **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (Male; Weighed 130-150 g; 6-7 weeks old; Exposed to high-fat or normal diet); sacubitril is a neprilysin inhibitor; cardiovascular; diabetes; "Chronic neprilysin inhibition by sacubitril significantly increased GLP- 1– mediated urine flow and sodium excretion in rats with HFD compared with the HFD rats with chronic saline infusion.." p. 7

Q10911: L. Zhu, *et al.* Dynamic Folding Modulation Generates FGF21 Variant Against Diabetes. *EMBO Reports* 2021;22(1):e51352

Agents: Uridine, 5-bromo-2-deoxy- **Route:** SC; **Species:** Mice; **Strain:** ob/ob; ICR; **Pump:** 1007D;

ALZET Comments: Dose: (16 mg/ml); animal info: Male mice (aged 6–7 weeks) and male mice (aged 8–10 weeks); diabetes;

Q10898: X. D. Zheng, *et al.* Regulatory role of Apelin-13-Mediated PI3K/AKT Signaling Pathway in the Glucose and Lipid Metabolism of Mouse with Gestational Diabetes Mellitus. *Immunobiology* 2021;226(5):152135

Agents: Apelin 13 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 2ML4; **Duration:** 18 days;

ALZET Comments: Dose: (2 mg/kg/day); Controls received mp w/ vehicle; animal info: 8-week old (20–25 g) mice; half-life (p.2); Half-life of Apelin-13 is approximately 30 min; diabetes; Gestational diabetes mellitus

Q10731: H. Yaginuma, *et al.* Peripheral Combination Treatment of Leptin and an SGLT2 Inhibitor Improved Glucose Metabolism in Insulin-Dependent Diabetes Mellitus Mice. *Journal of Pharmacological Sciences* 2021;147(4):340-347

Agents: Leptin, recombinant mouse **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** wild-type ,C57BL/6J; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Dose: (20 ug/day); Controls received mp w/ vehicle; animal info: 12-13 weeks of age Male); diabetes;

Q9543: Y. Wang, *et al.* Experimental study on renoprotective effect of intermedin on diabetic nephropathy. *Molecular and Cellular Endocrinology* 2021;528(111224)

Agents: Intermedin **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Strain:** SPF-grade SD; **Pump:** 2004; **Duration:** 4 weeks;

ALZET Comments: Dose (100 ng/kg/h); Controls received mp w/ vehicle; animal info (male Six-week-old healthy rats, 130-170 g); Intermedin aka IMD; diabetes;

Q10282: W. Sun, *et al.* Local acetate inhibits brown adipose tissue function. *Proceedings of the National Academy of Sciences of the United States of America* 2021;118(49):

Agents: Sodium Acetate **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57B6; **Pump:** 1007D; **Duration:** Not Stated;

ALZET Comments: Dose (0.5 µL/h); animal info (Adult male); diabetes;



Q9484: A. Sotokawauchi, *et al.* DNA aptamer raised against receptor for advanced glycation end products suppresses renal tubular damage and improves insulin resistance in diabetic mice. *Diabetes & Vascular Disease Research* 2021;18(1):1479164121990533

Agents: RAGE-Apt **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Strain:** KKAY/Ta; **Pump:** Not Stated; **Duration:** 8 weeks;
ALZET Comments: Dose (2.0 pmol/day/g); animal info (Male 8-week-old mice); Blood pressure measured via tail-cuff method;

Q10339: E. Song, *et al.* Cardiac Autophagy Deficiency Attenuates ANP Production and Disrupts Myocardial-Adipose Cross Talk, Leading to Increased Fat Accumulation and Metabolic Dysfunction. *Diabetes* 2021;70(1):51-61

Agents: Atrial natriuretic peptide **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2004; **Duration:** 4 weeks;
ALZET Comments: Dose: (0.05 ug/kg/min) Controls received mp w/ vehicle; animal info: 7 weeks in male mice; diabetes;

Q10304: B. Proniewski, *et al.* Systemic Administration of Insulin Receptor Antagonist Results in Endothelial and Perivascular Adipose Tissue Dysfunction in Mice. *Cells* 2021;10(6):

Agents: S961 **Vehicle:** NaCl; DMSO; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6Jrj; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose: (0.57 mg/kg/day); 0.9% NaCl; 10% DMSO vehicle used; Controls received mp w/ vehicle; animal info: 12-week-old male mice; S961, peptide is an insulin receptor antagonist; peptides; diabetes;

Q9351: K. C. Ling, *et al.* Effects of sustained GABA releasing implants on pancreatic islets in mice. *Drug Delivery and Translational Research* 2021;11(5):2198-2208

Agents: Aminobutyric acid, gamma **Vehicle:** Saline; **Route:** IP; **Species:** Mice; **Strain:** CD-1 IGS; **Pump:** 1002; **Duration:** 14 d
ALZET Comments: Dose (10 mg/kg/day); animal info (mice, 67 to 81 days old); Gamma-aminobutyric acid aka GABA; diabetes;

Q10010: M. A. H. Khan, *et al.* Multitarget molecule, PTUPB, to treat diabetic nephropathy in rats. *British Journal of Pharmacology* 2021;178(22):4468-4484

Agents: PTUPB **Vehicle:** Not stated; **Route:** IP; **Species:** Rat; **Strain:** ZSF1; **Pump:** Not Stated; **Duration:** 8 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (16 week-old, male obese rats); Blood pressure measured via tail-cuff plethysmography; 139 mmHg - 182 mmHg; diabetes;

Q10190: S. Hu, *et al.* Upregulated LRRC55 promotes BK channel activation and aggravates cell injury in podocytes. *Journal of Experimental Medicine* 2021;218(3):

Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 2004; **Duration:** 4 weeks;
ALZET Comments: Dose: Angiotensin II (1,000 ng/kg/min) Controls received mp w/ vehicle; animal info: mice aged 10–12 wk; Angiotensin II aka (Ang II) diabetes;

Q10523: L. J. Fritsch, *et al.* Exercise prevents whole body type 2 diabetes risk factors better than estradiol replacement in rats. *Journal of Applied Physiology* (1985) 2021;131(5):1520-1531

Agents: Estradiol **Vehicle:** DMSO; **Route:** SC; **Species:** Rat; **Strain:** Wistar; **Pump:** 2006; **Duration:** 6 weeks;
ALZET Comments: Dose: (1.4µg/day); 50% sterile DMSO vehicle used; animal info: 181 ± 2 g female rats; replacement therapy (Estradiol); diabetes; type II diabetes

Q9214: M. Dixit, *et al.* Skeletal Response to Insulin in the Naturally Occurring Type 1 Diabetes Mellitus Mouse Model. *JBMR Plus* 2021;5(5):e10483

Agents: Humulin R **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** NOD; **Pump:** 1002; **Duration:** 4 weeks;
ALZET Comments: Dose (0.25 U/day); animal info (female autoimmune-prone 12 to 14 weeks old); diabetes;

Q10375: U. Dischinger, *et al.* Roux-en-Y Gastric Bypass and Caloric Restriction but Not Gut Hormone-Based Treatments Profoundly Impact the Hypothalamic Transcriptome in Obese Rats. *Nutrients* 2021;14(1):

Agents: PYY3-36 **Vehicle:** Saline, isotonic; **Route:** SC; **Species:** Rat; **Strain:** Not Stated; **Pump:** 2004; **Duration:** Not Stated;
ALZET Comments: Dose (0.1 mg/kg/day); Controls received mp w/ vehicle; animal info (Adult; Male; 9-10 weeks old; Weighed about 329 g); peptides; diabetes;



Q9201: A. A. da Silva, *et al.* Chronic CNS-mediated cardiometabolic actions of leptin: potential role of sex differences. *American Journal of Physiology - Regulatory, Integrative and Comparative Physiology* 2021;320(2):R173-R181

Agents: Leptin **Vehicle:** Not Stated; **Route:** IP; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (0.62 ug/h); animal info (male and female rats, 12 weeks old); Blood pressure measured via BP telemeter device; 95 mmHg - 110 mmHg; peptides; diabetes;

Q10146: K. W. Cheung, *et al.* Analysis of the retinal capillary plexus layers in a murine model with diabetic retinopathy: effect of intravitreal injection of human CD34(+) bone marrow stem cells. *Annals of Translational Medicine* 2021;9(15):1273

Agents: Rapamycin; Tacrolimus **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1004;
ALZET Comments: Dose: (1 µg/g/day) Rapamycin; Tacrolimus; Controls received mp w/ vehicle; animal info :Male Six-week-old J; Tacrolimus aka (FK506); diabetes; Diabetic retinopathy

Q10123: K. J. Bubb, *et al.* beta 3 Adrenergic Receptor Stimulation Promotes Reperfusion in Ischemic Limbs in a Murine Diabetic Model. *Frontiers in Pharmacology* 2021;12(666334)

Agents: CL 316,243 **Vehicle:** Saline; **Route:** IP; **Species:** Mice; **Strain:** C57BL6/J; **Pump:** 1002; 1004; **Duration:** 14; 28 days;
ALZET Comments: Dose CL316,243 (1 mg/kg/day); animal info: mice 8–10 weeks of age; mice 6–8 weeks of age; post op. care: (Carprofen, 5 mg/kg sc); Compound aka: CL316,243 is a β3-adrenoceptor agonist; ischemia (Hind limb); cardiovascular; diabetes; "Following randomization 1 control mouse allocated to vehicle treatment died during a procedure due to equipment failure and 1 diabetic mouse randomized to the CL 316,243 group did not recover from surgery. (see pg.3); "

Q10417: J. M. Brown, *et al.* Role of hypothalamic MAPK/ERK signaling and central action of FGF1 in diabetes remission. *iScience* 2021;24(9):102944

Agents: UO126 **Vehicle:** DMSO; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57BL/6J (WT); **Pump:** 1003D; **Duration:** 24 hours;
ALZET Comments: Dose: (30 mM); Controls received mp w/ vehicle; animal info: Male mice, 8-week-old)post op. care: buprenorphine hydrochloride for pain relief and were allowed to recover for one week prior to the study; UO126 is a selective MAPK inhibitor Brain coordinates (LV: 0.7 mm posterior to bregma; 1.3 mm lateral, and 1.3 mm below the skull surface and 3V: -1.8 mm posterior to bregma; mid-line and -4.3 mm below the skull surface); diabetes

Q10105: A. Benardeau, *et al.* Runcaciguat, a novel soluble guanylate cyclase activator, shows renoprotection in hypertensive, diabetic, and metabolic preclinical models of chronic kidney disease. *Naunyn Schmiedeberg's Archives of Pharmacology* 2021;394(12):2363-2379

Agents: Angiotensin II **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose: Ang II (450 ng/min/kg,); Controls received mp w/ vehicle; animal info (male rats (Harlan Lab.) were weighing ca. 260 g; Blood pressure measured via tail-cuff method; Recorded blood pressure (see pg 2367); cardiovascular; diabetes; Kidney disease; In essence, and as summarized in Fig. 12, the sGC activator runcaciguat has shown significant benefits and efficacy in (hypertensive and diabetic) preclinical CKD models with progressive proteinuria. These data are suggesting a treatment benefit of runcaciguat in patients with diabetic and hypertensive CKD.

Q10104: R. M. B. Bell, *et al.* Carbonyl reductase 1 amplifies glucocorticoid action in adipose tissue and impairs glucose tolerance in lean mice. *Molecular Metabolism* 2021;48(101225)

Agents: Dexamethasone; Aldosterone; 20b-DHB **Vehicle:** DMSO; Propylene glycol; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** Not Stated; **Duration:** 7 days;
ALZET Comments: Dose: 20b-DHB(20 ug/day); animal info (Male, Female (8 weeks of age); Dihydrocorticosterone aka (20b-DHB) is a full agonist of the mineralocorticoid receptor.; Mifepristone is a GR antagonist RU486; Spironolactone is a MR antagonist; Carbonyl reductase 1 (Cbr1), is an enzyme inhibitor; diabetes; obesity