



ALZET® Osmotic Pump References from 2016 – 2020: The Rate-Controlled Modulation of Hormone Levels

This collection of references illustrates techniques by which the physiological effects of a controlled hormone infusion are determined in the absence of endogenous hormone production. In this manner, the effects that hormones have at different concentrations can be determined independent of temporal fluctuations in hormone levels. The technical notes following each reference detail the substance(s) infused, the route of administration, the animal model studied, the vehicle for infusion, the model of pump used, the duration of infusion, and notable technical achievements or results obtained.

This list does not contain references in this category from before 2013. To obtain a complete list of citations since 1975, please contact ALZET Technical Services at (800) 692-2990 (U.S. & Canada), or (408) 367-4036. You may also contact us via e-mail at alzet@direct.com.

The inverse of this technique, or the study of the differential effects of varying regimens of pulsatile hormone administration, can be accessed through the sub-bibliography entitled "References on Pulsed Administration of Agents by ALZET Osmotic Pumps". To obtain a copy of this sub-bibliography call ALZET Technical Services at the numbers listed above.

For a more complete discussion of the capabilities of these techniques consult the following reference:

Urquhart, J., Fara, J., and Willis, K.L. (1984). Rate-controlled delivery systems in drug and hormone research. Ann. Rev. Pharmacol. Toxicol. 24, 199-236.

**Recent References (2016-2020): The Rate-Controlled Modulation of Hormone Levels
Using ALZET® Osmotic Pumps**

Q8591: S. V. Koebele, *et al.* Characterizing the effects of tonic 17beta-estradiol administration on spatial learning and memory in the follicle-deplete middle-aged female rat. *Horm Behav* 2020;126(104854)

Agents: Estradiol, 17-beta- **Vehicle:** PEG; **Route:** SC; **Species:** Rat; **Pump:** 2006; **Duration:** 6 weeks;

ALZET Comments: Dose (3 ug/day); Controls received mp w/ vehicle; animal info (female, virgin, Fischer-344 rats, 11 months old); 17-beta-estradiol aka E2; replacement therapy (estradiol);

Q8584: Z. Z. Kirshner, *et al.* Impact of estrogen receptor agonists and model of menopause on enzymes involved in brain metabolism, acetyl-CoA production and cholinergic function. *Life Sci* 2020;256(117975)

Agents: 17 B-Estradiol; 4,4',4''-(4- Propyl-[1H]-pyrazole-1,3,5-triyl) trisphenol; Diarylpropionitrile; G-1 **Vehicle:** DMSO; Cyclodextrin, Hydroxypropyl-β-; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 30 days;

ALZET Comments: Dose (3 ug/day 17 B-Estradiol; 5 ug/day other agonists); 10% DMSO, 20% Hydroxypropyl-β-Cyclodextrin used; Controls received mp w/ vehicle; animal info (Female Sprague–Dawley rats, 11 weeks of age); 17 B-Estradiol aka E2; 4,4',4''-(4- Propyl-[1H]-pyrazole-1,3,5-triyl) trisphenol aka PPT; Diarylpropionitrile aka DPN; G-1 aka GPER1 agonist; replacement therapy (estradiol);

Q8212: T. Iwasa, *et al.* The effects of chronic oxytocin administration on body weight and food intake in DHT-induced PCOS model rats. *Gynecol Endocrinol* 2020;36(1):55-60

Agents: Oxytocin **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Dose (380 ug/day); Controls received mp w/ vehicle; animal info (Female Wistar rats); replacement therapy (effects of the chronic administration of oxytocin);

Q8542: R. Hornung, *et al.* Reduced activity of GAD67 expressing cells in the reticular thalamus enhance thalamic excitatory activity and varicella zoster virus associated pain. *Neurosci Lett* 2020;736(135287)

Agents: Estradiol benzoate, 17-beta- **Vehicle:** PEG; **Route:** SC; **Species:** Rat; **Pump:** Not stated; **Duration:** 28 days;

ALZET Comments: Dose (750 ng/6 ul/day); animal info (Transgenic male (300 g) and female Long Evans rats (260 g)); replacement therapy (estradiol);

Q8208: T. Hirayama, *et al.* Oxytocin induced labor causes region and sex-specific transient oligodendrocyte cell death in neonatal mouse brain. *J Obstet Gynaecol Res* 2020;46(1):66-78

Agents: Oxytocin **Vehicle:** Buffered Saline; **Route:** SC; **Species:** Mice; **Pump:** 1003D; **Duration:** Not stated;

ALZET Comments: Dose (0.6, 6, 18 or 240 μg/day); Controls received mp w/ vehicle; animal info (Wild-type C57BL6/J mice and DBA/2 mice); replacement therapy (associations between oxytocin induced labor and mental disorders in offspring);

Q8491: E. Y. Gohar, *et al.* Evidence for G-Protein-Coupled Estrogen Receptor as a Pronatriuretic Factor. *J Am Heart Assoc* 2020;9(10):e015110

Agents: G1 **Vehicle:** DMSO; **Route:** SC; **Species:** Rat; **Pump:** Q8491; **Duration:** Q8491;

ALZET Comments: Dose (400 ug/kg/day); 75% DMSO used; Controls received mp w/ vehicle; animal info (Male and female (16–20 weeks of age) Sprague Dawley rats); Blood pressure measured via HD- S10 transmitters; G1 aka GPER agonist; replacement therapy (estradiol);

Q8445: Q. N. Dinh, *et al.* Aldosterone-Induced Hypertension is Sex-Dependent, Mediated by T Cells and Sensitive to GPER Activation. *Cardiovasc Res* 2020;

Agents: Aldosterone; G-1; G-15; Angiotensin II **Vehicle:** Propylene Glycol; DMSO; Saline; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Dose (0.72 mg/kg/d; 0.03 mg/kg/d; 0.3 mg/kg/d; 0.7 mg/kg/d); 87% propylene glycol used; Controls received mp w/ vehicle; animal info (C57Bl/6 (WT) mice; RAG1-deficient mice; GPER- deficient mice); Blood pressure measured via tail cuff plethysmography; G-1 aka G protein-coupled estrogen receptor 1 agonist; G-15 aka G protein-coupled estrogen receptor 1 antagonist; replacement therapy (estrogen receptor);



Q8440: S. Dey, *et al.* Sex-specific brain erythropoietin regulation of mouse metabolism and hypothalamic inflammation. *JCI Insight* 2020;5(5):

Agents: Erythropoietin, recombinant human **Vehicle:** Saline; **Route:** CSF/CNS (intracerebral); IV; **Species:** Mice; **Pump:** 2006; **Duration:** 14 days;

ALZET Comments: Dose (3000 U/kg); Controls received mp w/ vehicle; animal info (Tg21 mice); recombinant human Erythropoietin aka recombinant human EPO; ALZET brain infusion kit 3 used; Brain coordinates (midline, 1.00 mm; antero-posterior, 0.34 mm; dorsoventral, 2.30 mm); dental cement used; replacement therapy (Erythropoietin);

Q8417: L. Chen, *et al.* Ouabain Protects Nephrogenesis in Rats Experiencing Intrauterine Growth Restriction and Partially Restores Renal Function in Adulthood. *Reprod Sci* 2020;

Agents: Ouabain **Vehicle:** PBS, Sterile; **Route:** Not stated; **Species:** Rat; **Pump:** 2004; **Duration:** 4 weeks;

ALZET Comments: Dose (10 ug/kg/day); animal info (female Sprague-Dawley rats); Blood pressure measured via tail-cuff method; replacement therapy (Ouabain);

Q8410: J. R. Chen, *et al.* Nox4 Expression Is Not Required for OVX-Induced Osteoblast Senescence and Bone Loss in Mice. *JBMR Plus* 2020;4(8):e10376

Agents: Estradiol, 17 β - **Vehicle:** Not stated; **Route:** Intraovarian; **Species:** Mice; **Pump:** Not stated; **Duration:** 8 weeks;

ALZET Comments: Dose (20 ug/kg/day); animal info (Six-month-old WT C57Bl6 mice); 17 β -Estradiol aka E2; replacement therapy (estradiol);

Q7642: W. Yan, *et al.* Treatment with a brain-selective prodrug of 17 β -estradiol improves cognitive function in Alzheimer's disease mice by regulating klf5-NF- κ B pathway. *Naunyn Schmiedebergs Arch Pharmacol* 2019;392(7):879-886

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

ALZET Comments: Dose (2 μ g/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; 17 β -dihydroxyestra-1,4-diene-3-one (DHED) is a brain-selective prodrug of 17 β -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- κ B pathway and restraining oxidative and inflammatory stress in the hippocampus);

Q7663: G. Shetty, *et al.* Effect of hormone modulations on donor-derived spermatogenesis or colonization after syngeneic and xenotransplantation in mice. *Anesthesia & Analgesia* 2019;7(2):257-265

Agents: Follicle stimulating hormone, recomb. human **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 2 weeks;

ALZET Comments: Dose (5 IU/day); Controls received sham surgery; animal info (7-9 weeks, male, C57BL/6Law and nude); replacement therapy (FSH);

Q7419: T. Sato, *et al.* Disrupted tubular parathyroid hormone/parathyroid hormone receptor signaling and damaged tubular cell viability possibly trigger postsurgical kidney injury in patients with advanced hyperparathyroidism. *Clinical Kidney Journal: Clinical and Translational Nephrology* 2019;

Agents: Parathyroid Hormone, 1-34 **Vehicle:** Vehicle not stated; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** Duration not stated;

ALZET Comments: "Dose (0.1 mg/kg/h); animal info (13-week-old male Sprague Dawley rats weighing 350 g); replacement therapy (parathyroidectomy); "

Q7424: E. Noirrit, *et al.* Effects of conjugated estrogen and bazedoxifene on hemostasis and thrombosis in mice. *Endocrine Connections* 2019;

Agents: Estrogen, conjugated; Bazedoxifene **Vehicle:** Cyclodextrin, hydroxypropyl-beta; HEPES buffer; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 3 weeks;



ALZET Comments: Dose (BZA (10 mg/kg/day), CE (3 mg/kg/day)); animal info (Female C57BL/6J mice 4 weeks old); replacement therapy (ovariectomized);

Q7613: N. Nishizawa, *et al.* A new class of pentapeptide KISS1 receptor agonists with hypothalamic-pituitary-gonadal axis activation. *Bioorganic & Medicinal Chemistry Letters* 2019;29(4):654-658

Agents: 4-pyridyl analog **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 6 days;

ALZET Comments: Dose (5, 10, or 20 nmol/hr); Controls received mp w/ vehicle; animal info (9 week old, Male); replacement therapy (Testosterone);

Q7566: Y. Nagata, *et al.* Attenuated Dentin Matrix Protein 1 Enhances Fibroblast Growth Factor 23 in Calvaria in a Primary Hyperparathyroidism Model. *Endocrinology* 2019;160(5):1348-1358

Agents: Pituitary Growth Hormone 1-34, Human **Vehicle:** aminocaproic acid, 6-; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 21 days;

ALZET Comments: Dose (25 ug/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6J, FVB/N, 75-96 weeks old); replacement therapy (parathyroidectomy); dependence;

Q7377: N. Morozumi, *et al.* ASB20123: A novel C-type natriuretic peptide derivative for treatment of growth failure and dwarfism. *PLoS One* 2019;14(2):e0212680

Agents: ASB20123 **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 1 week, 12 weeks;

ALZET Comments: Dose (0.05, 0.15 mg/kg/day); dose-response (fig 5); Controls received mp w/ vehicle; animal info (Seven-week-old male SD rats); comparison of injections vs mp “We also analyzed whether continuous sc infusion of ASB20123 to rats could accelerate skeletal growth, compared to the effects of multiple sc bolus injections”; long-term study; ASB20123 is a CNP/ghrelin chimeric peptide, composed of CNP(1-22) and human ghrelin (12-28, E17D); peptides; replacement therapy (dwarf);

Q7576: Y. Lu, *et al.* Neuron-Derived Estrogen Regulates Synaptic Plasticity and Memory. *J Neurosci* 2019;39(15):2792-2809

Agents: Estradiol, 17 beta- **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (0.0167mg); Controls received mp w/ placebo; animal info (Chimera male); replacement therapy (ovariectomy);

Q7537: J. Y. Li, *et al.* IL-17 Receptor Signaling in Osteoblasts/Osteocytes Mediates PTH-Induced Bone Loss and Enhances Osteocytic RANKL Production. *J Bone Miner Res* 2019;34(2):349-360

Agents: Parathyroid Hormone 1-34, human **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks;

ALZET Comments: Dose (80 ug/kg/day); Controls received mp w/ vehicle; animal info (16-week-old female IL-17RADO CY mice); replacement therapy (hyperparathyroidism);

Q7354: D. Lau-Corona, *et al.* Sex-biased genetic programs in liver metabolism and liver fibrosis are controlled by EZH1 and EZH2. *bioRxiv* 2019;

Agents: Growth Hormone **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 Days;

ALZET Comments: animal info (male E1/E2-KO mice); replacement therapy (hypophysectomy); “pituitary secretion of growth hormone”;

Q7976: O. S. Dallner, *et al.* Dysregulation of a long noncoding RNA reduces leptin leading to a leptin-responsive form of obesity. *Nat Med* 2019;25(3):507-516

Agents: Leptin **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 14 days;

ALZET Comments: Dose (0.5 µg/h); Controls received mp w/ vehicle; animal info (12 weeks, female, C57BL/J6 Lep(ob)/Lep(ob)); replacement therapy (leptin);

Q8341: N. Aydogdu, *et al.* The Effects of Irisin on Nomega-Nitro-L-arginine Methyl Ester Hydrochloride-Induced Hypertension in Rats. *Balkan Med J* 2019;36(6):337-346

Agents: Irisin **Vehicle:** Saline; **Route:** IV; **Species:** Rat; **Pump:** 2ML2; **Duration:** 2 weeks;



ALZET Comments: Dose (50 nmol/day); Controls received mp w/ vehicle; animal info (adult male, 330-390 g, Sprague Dawley rats); Blood pressure measured via tail cuff method; replacement therapy (Irisin);

Q7651: H. Zhao, *et al.* Chemokine-like receptor 1 deficiency leads to lower bone mass in male mice. *Cellular and Molecular Life Sciences* 2018;76(2):355-367

Agents: dihydrotestosterone, 5 α -; ethyltrimethylammonium iodide, 2-(α -naphthoyl)- **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;

ALZET Comments: Dose ((DHT 83.3 μ g/day), (α -NETA 33 μ g/day)); Controls received empty mp; animal info (8 or 10 weeks, male, C57BL/6 or CMKLR1 $^{-/-}$); DHT is a nonaromatizable androgen. α -NETA is a small molecule reported to function as a CMKLR1 antagonist; replacement therapy (testosterone);

Q7327: K. Yukata, *et al.* Continuous infusion of PTH1-34 delayed fracture healing in mice. *Sci Rep* 2018;8(1):13175

Agents: Parathyroid hormone 1-34 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 2 weeks;

ALZET Comments: Dose (40 μ g/kg/day); Controls received mp w/ vehicle; animal info (8 week old, male, C57BL/6J); replacement therapy (parathyroid hormone);

Q7833: Q. Wang, *et al.* Ghrelin Restores the Disruption of the Circadian Clock in Steatotic Liver. *Int J Mol Sci* 2018;19(10):

Agents: ghrelin, acyl **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks;

ALZET Comments: Dose (11 nmol/kg/d); Controls received mp w/ vehicle; animal info (16 weeks, male, C57BL/6J); replacement therapy (ghrelin); Therapeutic indication (ghrelin is able to restore the derangement of the circadian clock in steatotic liver by increasing the expression amplitude and shifting the expression peak of clock genes);

Q7935: T. Wada, *et al.* Impact of central and peripheral estrogen treatment on anxiety and depression phenotypes in a mouse model of postmenopausal obesity. *PLoS One* 2018;13(12):e0209859

Agents: Estradiol **Vehicle:** CSF, artificial; **Route:** SC; CSF/CNS (lateral ventricle); **Species:** Mice; **Pump:** 1004; **Duration:** 3 weeks;

ALZET Comments: Dose ((SC 50 μ g/kg/day), (ICV 1 μ g/kg/day)); Controls received mp w/ vehicle; animal info (16 weeks, female, C57BL/6); behavioral testing (Open field, Light-dark box, Tail suspension, Forced swim); Multiple pumps per animal (2 for SC group); comparison of SC mp vs ICV mp; ALZET brain infusion kit 3 used; Brain coordinates (0.3 mm posterior to the bregma, 0.9 mm lateral to the central sulcus, 2.5 mm below the skull); replacement therapy (estradiol); Therapeutic indication (mouse model of postmenopausal obesity that exhibited anxiety disorder and depression phenotypes were improved by E2 replacement.);

Q7873: T. D. Tremaine, *et al.* Immunolocalization of angiogenic growth factors in the ovine uterus during the oestrus cycle and in response to Steroids. *Reprod Domest Anim* 2018;53(3):667-679

Agents: Buserelin acetate **Vehicle:** Saline; **Route:** SC; **Species:** Sheep; **Pump:** Not stated; **Duration:** 18 days;

ALZET Comments: Dose (1mg/ml at 2.5 μ l/hr); Controls received mp w/ agent; animal info (female, Welsh mountain); Buserelin acetate is a gonadotrophin agonist; replacement therapy (oestradiol); Buserelin used to remove the effect of endogenous gonadotrophins, luteinizing hormone and follicle stimulating hormone;

Q7302: R. Scott, *et al.* Oxyntomodulin analogue increases energy expenditure via the glucagon receptor. *Peptides* 2018;104(70-77)

Agents: Exendin (9-39), Oxyntomodulin analogue **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 1003D; **Duration:** 3 days;

ALZET Comments: Dose (100 nmol/kg/hr Ex9-39); (40 nmol/kg OX-SR); Controls received mp w/ vehicle; animal info (Male, Wistar, 222g mean); replacement therapy (Oxyntomodulin);

Q7849: Y. Ravussin, *et al.* Evidence for a Non-leptin System that Defends against Weight Gain in Overfeeding. *Cell Metabolism* 2018;28(2):289-299 e5

Agents: leptin, recomb. mouse **Vehicle:** Saline, buffered; **Route:** SC; **Species:** Mice; **Pump:** 2006; **Duration:** 33 days;

ALZET Comments: Dose (150 ng/hr); saline (pH 8) used; Controls were WT and received mp w/ agent; animal info (4 weeks, male, C57BL/6J(Lepob/ob)); Resultant plasma level (1.8 \pm 1.4 ng/mL); replacement therapy (leptin); good methods (detailed pump placement on page e3);



R0393: C. Physiology. Mechanisms of Sex Disparities in Cardiovascular Function and Remodeling. *Compr Physiol* 2018;9(1):375-411

Agents: Estradiol; Estrogen-dendrimer conjugate **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Not Stated; **Pump:** Not Stated; **Duration:** 2 weeks;

ALZET Comments: ischemia (placental); replacement therapy (ovarectomy);

Q7771: W. H. Liao, *et al.* Aldosterone deficiency in mice burdens respiration and accentuates diet-induced hyperinsulinemia and obesity. *JCI Insight* 2018;3(14):

Agents: aldosterone **Vehicle:** CSF, artificial; **Route:** CSF/CNS (lateral ventricle); **Species:** Mice; **Pump:** 2004; **Duration:** 4 weeks;

ALZET Comments: Dose (25 ng/h); Controls received mp w/ vehicle; animal info (10-12 weeks, 129SvEv or ASKO); ALZET brain infusion kit 2 used; Brain coordinates (anterior-posterior -0.220, medial-lateral +1.000, dorsal-ventral -3.000); Cannula placement verified via stereotaxic frame and at sacrifice; cyanoacrylate adhesive; replacement therapy (aldosterone); Therapeutic indication (aldosterone attenuated high fat diet-induced hyperinsulinemia through increased body energetic efficiency.);

Q7915: A. K. E. Hornsby, *et al.* Circulating unacylated-ghrelin impairs hippocampal neurogenesis and memory in mice and is altered in human Parkinson's disease dementia. *BioRxiv* 2018;

Agents: ghrelin, unacylated- **Vehicle:** saline, sterile, heparinized, BSA buffered; **Route:** IV (jugular); **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (48µg/day); sterile isotonic saline containing BSA (1mg/ml) and heparin (5U/ml) used; Controls received mp w/ vehicle; animal info (6 months, C57BL/6 and GOAT-null); UAG is considered an inactive precursor to acyl-ghrelin; neurodegenerative (Parkinson's); replacement therapy (ghrelin);

Q7912: N. Hoa, *et al.* Estrogen receptor beta maintains expression of KLF15 to prevent cardiac myocyte hypertrophy in female rodents. *Mol Cell Endocrinol* 2018;470(240-250)

Agents: Angiotensin II; LGND2, beta- **Vehicle:** Saline; **Route:** SC; **Species:** Mice (ovariectomized); **Pump:** Not Stated; **Duration:** Not Stated;

ALZET Comments: Dose ((AngII 0.7 mg/kg/day), (beta-LGND2 0.5mg in 100 µl)); Controls received mp w/ vehicle; animal info (10 weeks, female, C57/BJ6); beta-LGND2 is a highly specific ERbeta agonist;; replacement therapy (estradiol); cardiovascular; "In some mice, an E2 pellet (0.1 mg, 21-day release pellets, Innovative Research of America, Sarasota, Florida) was inserted under the skin and these mice did not receive beta-LGND2." p.241;

Q7754: D. Hirohama, *et al.* Aldosterone Is Essential for Angiotensin II-Induced Upregulation of Pendrin. *J Am Soc Nephrol* 2018;29(1):57-68

Agents: Angiotensin II; Aldosterone; Dexamethasone **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 7 days;

ALZET Comments: Dose ((AngII 400 µg/kg/day), (aldosterone 0.1µg/day), (dexamethasone 12 µg/kg/day)); Controls received mp w/ vehicle; animal info (8-14 weeks, male, C57BL/6J or PDS-/-); replacement therapy (aldosterone, dexamethasone; adrenalectomy); Vehicle used but identity not stated. All minipumps contained dexamethasone for glucocorticoid replacement;

Q7819: I. Gonzalez-Garcia, *et al.* Estradiol Regulates Energy Balance by Ameliorating Hypothalamic Ceramide-Induced ER Stress. *Cell Reports* 2018;25(2):413-423 e5

Agents: myriocin; tauroursodeoxycholic acid **Vehicle:** Saline; DMSO, buffered; PBS; **Route:** CSF/CNS (lateral ventricle); **Species:** Rat; **Pump:** 2001; **Duration:** 6 days;

ALZET Comments: "Dose ((myriocin 4 µg/day), (TUDCA 10 µg/day)); saline containing 1/3 of DMSO, or PBS alone was used; Controls received sham surgery and mp w/ vehicle; animal info (female, Sprague-Dawley, 250-300g); myriocin is a serine palmitoyltransferase inhibitor. TUDCA is a chemical chaperone; Brain coordinates (1.6 mm lateral to bregma, 0.6 mm posterior, 4.5 mm deep); Cannula placement verified via stereotaxic frame; replacement therapy (estradiol); Therapeutic



indication (both TUDCA and myriocin induced (in OVX rats) feeding-independent weight loss, decreased hypothalamic ER stress, a trend to increase body temperature, elevated BAT temperature and UCP1 protein levels in BAT.); "

Q7818: L. Gonzalez, *et al.* Angiotensin-(1-9) reduces cardiovascular and renal inflammation in experimental renin-independent hypertension. *Biochemical Pharmacology* 2018;156(357-370)
Agents: angiotensin (1-9) **Vehicle:** Not stated; **Route:** IV (jugular); **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose ((Ang(1-9) 600 ng/kg/min), (PD123319 28 ng/kg/min), (A779 100 ng/kg/min)); Controls received sham surgery and mp w/ vehicle; animal info (male, Sprague-Dawley, 150+/-10g); PD123319 is an AT2R blocker. A779 is a Mas receptor blocker; replacement therapy (Uninephrectomized); cardiovascular; vehicle used but identity not stated.; Therapeutic indication (Ang-(1-9) protects against hypertensive cardiovascular and kidney damage induced by volume overload by decreasing inflammation in the heart, aortic wall, and kidney; these effects are not mediated by the Mas or AT2 receptor.);

Q7816: X. Ge, *et al.* LEAP2 Is an Endogenous Antagonist of the Ghrelin Receptor. *Cell Metabolism* 2018;27(2):461-469 e6
Agents: Ghrelin, recombinant rat **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 17 days;
ALZET Comments: Dose (0.5 µg/hr); Controls received standard diet and mp w/ vehicle; animal info (2-3 months, male, C57BL/6); replacement therapy (); pumps implanted 3 days prior to caloric restriction. "mice implanted with vehicle pumps failed to maintain viable glucose levels, and the entire group had to be euthanized on day 12." (p.467);

Q7812: M. B. Fluit, *et al.* Chronic Insulin Infusion Down-Regulates Circulating and Urinary Nitric Oxide (NO) Levels Despite Molecular Changes in the Kidney Predicting Greater Endothelial NO Synthase Activity in Mice. *Int J Mol Sci* 2018;19(10):
Agents: insulin **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (50 U/kg/d); Controls received mp w/ vehicle; animal info (4-7 months, male, TALLYHO/Jng); replacement therapy (insulin); "Systolic BP was significantly higher in the insulin-infused mice during the early time period of infusion; however this arose primarily due to the fact that systolic BP levels tended to fall in vehicle-infused mice. We do not fully understand this response, but it may reflect recovery from the surgeries to implant the radiotelemetry transmitter and osmotic pumps." p.8;

Q7798: E. A. de Los Rios, *et al.* Impaired prolactin actions mediate altered offspring metabolism induced by maternal high-fat feeding during lactation. *FASEB J* 2018;32(6):3457-3470
Agents: prolactin, ovine **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat (lactating); **Pump:** Not Stated; **Duration:** 17 days;
ALZET Comments: Dose (0.16 mg/kg/d); Controls received sham surgery; animal info (female, Sprague-Dawley, 300-350g); comparison of oral administration of PRL in pups vs mp; replacement therapy (prolactin); pump model not stated although listed as a 28-day rate. pumps implanted from d4 to d21 of lactation.;

Q7779: M. Buscato, *et al.* The antagonist properties of Bazedoxifene after acute treatment are shifted to stimulatory action after chronic exposure in the liver but not in the uterus. *Mol Cell Endocrinol* 2018;472(87-96)
Agents: Estrogen, Conjugated Equine; Bazedoxifene **Vehicle:** Hydroxypropyl-beta-cyclodextrin; HEPES buffer; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (CE- 3 mg/kg/day, BZA- 10 mg/kg/day); animal info (Female, C57BL/6J); Conjugated Equine Estrogen aka CE, Bazedoxifene aka BE; replacement therapy (Estrogen);

Q7086: J. C. Bague, *et al.* BDNF infusion into the MPN mag is sufficient to restore copulatory behavior in the castrated Syrian hamster. *Horm Behav* 2018;102(69-75)
Agents: Brain-derived neurotrophic factor, human recomb. **Vehicle:** Albumin, bovine serum; **Route:** CSF/CNS (magnocellular medial preoptic nucleus); **Species:** Hamster; **Pump:** 2004; **Duration:** 9 days;
ALZET Comments: Dose (6.25 µg/ml/day); Controls received mp w/ vehicle; animal info (Male, Mesocricetus auratus, 5–6 months old); behavioral testing (Sex behavior test); Brain coordinates (ML=+0.85mm, DV=-7.4); replacement therapy (testosterone);



Q5727: Y. Zhu, *et al.* Protective Effect of 17beta-Estradiol Upon Hippocampal Spine Density and Cognitive Function in an Animal Model of Vascular Dementia. *Sci Rep* 2017;7(42660)

Agents: Estradiol, 17b- **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2006; **Duration:** Not Stated;

ALZET Comments: Controls received mp w/ 20% cyclodextrin; animal info (male, Sprague Dawley, 250-300g, adult); functionality of mp verified by serum levels; behavioral testing (Morris water maze); replacement therapy (estradiol infusion); long-term study; cardiovascular; Dose (0.05 ug/h); “exogenous E2 replacement produced E2 levels of 25-33pg/ml” (pg 2);

Q5925: C. Xu, *et al.* (Pro)Renin receptor regulates potassium homeostasis through a local mechanism. *American Journal of Physiology Renal Physiology* 2017;313(3):F641-F656

Agents: PRO020 **Vehicle:** Saline; **Route:** Intrarenal (cortex); **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 250-300g); replacement therapy (uniphrectomy, bilateral adrenalectomy); cardiovascular; peptides; Used PE-10 catheter, inserted 2mm into cortex; vet bond; Dose (700 ug/kg/day); PRO20 is a decoy peptide antagonist of (Pro)renin receptor (PRR)

Q5923: Q. Xie, *et al.* Transcriptional regulation of the Nkx3.1 gene in prostate luminal stem cell specification and cancer initiation via its 3' genomic region. *J Biol Chem* 2017;292(33):13521-13530

Agents: Testosterone **Vehicle:** Ethanol, PEG-400; **Route:** SC; **Species:** mice (transgenic); **Pump:** Not Stated; **Duration:** 4 weeks;

ALZET Comments: animal info (CK18-CreERT2 transgenic, Nkx3.1, C57BL/6N); cancer (prostate); replacement therapy (testosterone infusion); Dose (1.875 ug/h);

Q5909: L. Wang, *et al.* Sodium butyrate suppresses angiotensin II-induced hypertension by inhibition of renal (pro)renin receptor and intrarenal renin-angiotensin system. *J Hypertens* 2017;35(9):1899-1908

Agents: Angiotensin II; sodium butyrate **Vehicle:** Not Stated; **Route:** SC; Intrarenal (medulla); **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 250-300g); Multiple pumps per animal (2); replacement therapy (uniphrectomy); tissue perfusion (renal medulla); cardiovascular; antihypertensive; peptides; Bp measured using radio telemetry (DSI); Dose (Ang II 200 ng/kg/min; NaBu 1 ug/kg/min); good bp comparison curve (pg4);

Q6521: S. Ucer, *et al.* The Effects of Aging and Sex Steroid Deficiency on the Murine Skeleton Are Independent and Mechanistically Distinct. *J Bone Miner Res* 2017;32(3):560-574

Agents: Estradiol **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** 2006; **Duration:** 6 weeks;

ALZET Comments: Dose (6 µg/d); animal info (5-month-old C57BL/6 male mice); replacement therapy (orchietomy);

Q5894: S. Thammacharoen, *et al.* Effects of Hindbrain Infusion of an Estrogen Receptor Antagonist on Estrogenic Modulation of Eating Behavior. *Neurophysiology* 2017;49(1):72-77

Agents: ICI 182,780 **Vehicle:** DMSO; Saline; **Route:** CSF/CNS (fourth ventricle); **Species:** Rat; **Pump:** 1002; **Duration:** Not Stated;

ALZET Comments: animal info (female, Wistar, 250-300g, OVX); 1% DMSO used; post op. care (enrofloxacin IV 2.5-5 mg/kg, ibuprofen PO 15 mg/kg); replacement therapy (estradiol infusion); tissue perfusion (fourth ventricle); Cannula placement verified via injection of Evans Blue dye; Used PlasticsOne cannula;

Q6763: A. L. Russell, *et al.* The interaction of dietary isoflavones and estradiol replacement on behavior and brain-derived neurotrophic factor in the ovariectomized rat. *Neurosci Lett* 2017;640(53-59)

Agents: Estradiol, 17b- **Vehicle:** Cyclodextrin, 2-hydroxypropyl-b- ; water; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Dose (0.25 mg/kg body weight); 27% hydroxypropyl-β-cyclodextrin used; animal info (ovariectomized (OVX) female Sprague Dawley rats, weighing between 200–225 g.); replacement therapy (estradiol);



- Q6232:** S. F. Rosen, *et al.* T-Cell Mediation of Pregnancy Analgesia Affecting Chronic Pain in Mice. *J Neurosci* 2017;37(41):9819-9827
Agents: Estradiol, 17b-; Progesterone sulfate **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (17b-estradiol : 0.1 mg/kg/d, progesterone sulfate: 0.25 mg/kg/d, 0.1 mg/kg/d estradiol + 0.25 mg/kg/d progesterone); Controls received mp w/ vehicle; animal info (7-12 week old female C57BL/6J mice); replacement therapy (estradiol, ovariectomy); Therapeutic indication
- Q6204:** S. McIlvride, *et al.* A progesterone-brown fat axis is involved in regulating fetal growth. *Sci Rep* 2017;7(1):10671
Agents: Progesterone; Prolactin **Vehicle:** Cyclodextrin, 2-hydroxypropyl-b; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (progesterone 250 µg/day; prolactin 7 µg/day); 20% (w/v) 2-hydroxypropyl-beta-cyclodextrin used; Controls received mp w/ vehicle; animal info (7–8 week old female mice with bilateral oophorectomy); replacement therapy (oophorectomy);
- Q6077:** D. E. Livingstone, *et al.* Metabolic dysfunction in female mice with disruption of 5alpha-reductase 1. *J Endocrinol* 2017;232(1):29-36
Agents: Corticosterone **Vehicle:** DMSO; Propylene glycol; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** Not Stated;
ALZET Comments: Dose (100 ug/day); 50% DMSO, 50% Propylene glycol used; animal info (Female 3-4 month old 5αR1-KO and wild-type mice); replacement therapy (glucocorticoid);
- Q6143:** S. Laouafa, *et al.* Estradiol Protects Against Cardiorespiratory Dysfunctions and Oxidative Stress in Intermittent Hypoxia. *Sleep* 2017;40(8):
Agents: Estradiol **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 28 days;
ALZET Comments: Dose (0.5 mg/kg/d); Controls received mp w/ vehicle; animal info (Sprague-Dawley female rats weighing 230–250 g); post op. care (3.5 mg/kg bupivacaine and 7 mg/kg lidocaine SC injections for 48 hours after); functionality of mp verified by measuring residual volume at the end of the study; replacement therapy (estradiol);
- Q6449:** Y. Kato, *et al.* Natriuretic peptide receptor guanylyl cyclase-A pathway counteracts glomerular injury evoked by aldosterone through p38 mitogen-activated protein kinase inhibition. *Sci Rep* 2017;7(46624)
Agents: Aldosterone **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice (knockout); **Pump:** 2004; **Duration:** Not Stated;
ALZET Comments: Dose (0.2 µg/kg body weight per minute); Controls received mp w/ vehicle; animal info (Male systemic GC-A KO mice and wild-type); replacement therapy (left uninephrectomy);
- Q6452:** C. Jin, *et al.* Inhibition of SLC7A11 by Sulfasalazine Enhances Osteogenic Differentiation of Mesenchymal Stem Cells by Modulating BMP2/4 Expression and Suppresses Bone Loss in Ovariectomized Mice. *J Bone Miner Res* 2017;32(3):508-521
Agents: Sulfasalazine **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 4 weeks;
ALZET Comments: Dose (80 mg); animal info (3 month old Female BALB/C mice weighing 25-30g); replacement therapy (ovariectomy);
- Q6244:** S. C. Hewitt, *et al.* Role of ERalpha in Mediating Female Uterine Transcriptional Responses to IGF1. *Endocrinology* 2017;158(8):2427-2435
Agents: Insulin-like growth factor 1 **Vehicle:** Acetic acid; **Route:** Not Stated; **Species:** Mice (knockout); **Pump:** 1003D; **Duration:** 24 hours;
ALZET Comments: Dose (0.5 mg IGF1/mL); 0.1N acetic acid used; animal info (Eight weeks or older female Ex3aERKO or ERαUtkKO mice); replacement therapy (ooverectomy);
- Q6462:** J. B. Henningsen, *et al.* Roles of RFRP-3 in the Daily and Seasonal Regulation of Reproductive Activity in Female Syrian Hamsters. *Endocrinology* 2017;158(3):652-663
Agents: RFRP-3, Syrian hamster **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Hamster; **Pump:** 2006; **Duration:** 5.5 weeks;



ALZET Comments: Dose (12 ug/d); Controls received mp w/ vehicle; animal info (Adult sexually mature female Syrian hamsters); ALZET brain infusion kit 1 used; replacement therapy (ovariectomy);

Q5809: H. H. Farman, *et al.* Extra-nuclear effects of estrogen on cortical bone in males require ERalphaAF-1. *J Mol Endocrinol* 2017;58(2):105-111

Agents: Estradiol **Vehicle:** DMSO, PBS, Ethanol; **Route:** IP; **Species:** mice; **Pump:** 1004; **Duration:** 3.5 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (5 months old) (15% EtOH, 43% DMSO, 42% PBS) replacement therapy (Estradiol); Therapeutic indication (Estrogen); Dose (6 ug/day);

Q6413: B. B. Braden, *et al.* A comparison of progestins within three classes: Differential effects on learning and memory in the aging surgically menopausal rat. *Behavioural Brain Research* 2017;322(Pt B):258-268

Agents: NETA, progestin **Vehicle:** Propylene glycol; **Route:** Not Stated; **Species:** Rat; **Pump:** 2006; **Duration:** Not Stated;
ALZET Comments: Dose (20µg/day); Controls received mp w/ vehicle; animal info (twelve month old Fisher-344 female rats); post op. care (Rimadyl (5 mg/mL/kg) for pain and saline (2 mL) to prevent dehydration); replacement therapy (oophorectomy);

Q6419: J. P. Ball, *et al.* Role and Regulation of MicroRNAs in Aldosterone-Mediated Cardiac Injury and Dysfunction in Male Rats. *Endocrinology* 2017;158(6):1859-1874

Agents: Aldosterone **Vehicle:** PEG 300; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 8 weeks;
ALZET Comments: Dose (0.75 mg/h); Controls received mp w/ vehicle; animal info (Eight-week old male Sprague–Dawley rats); replacement therapy (uninephrectomy); cardiovascular;

Q6429: H. M. Abuhashish, *et al.* Angiotensin (1-7) ameliorates the structural and biochemical alterations of ovariectomy-induced osteoporosis in rats via activation of ACE-2/Mas receptor axis. *Sci Rep* 2017;7(1):2293

Agents: Angiotensin (1-7); A-779 **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2006; **Duration:** 6 weeks;
ALZET Comments: Dose (Ang 1-7: 200 ng/kg/min; A-779: 400 ng/kg/min); animal info (female Wistar rats weighting approximately 220–250 g); replacement therapy (ooverectomy);

Q5471: M. Valero-Munoz, *et al.* Dual Endothelin-A/Endothelin-B Receptor Blockade and Cardiac Remodeling in Heart Failure With Preserved Ejection Fraction. *Circulation: Heart Failure* 2016;9(11):

Agents: Aldosterone, D- **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 4 weeks;
ALZET Comments: Controls received mp w/ saline; animal info (Male, C57BL6J, 8 weeks old, 20-25g); no stress (see pg. 3); replacement therapy (uniphrectomy); cardiovascular; Dose (30 ug/h);

Q5081: A. E. Tschiffely, *et al.* A comparative evaluation of treatments with 17beta-estradiol and its brain-selective prodrug in a double-transgenic mouse model of Alzheimer's disease. *Horm Behav* 2016;83(39-44

Agents: DHED; estradiol, 17B- **Vehicle:** Propylene glycol; **Route:** SC; **Species:** Mice (transgenic); **Pump:** 2004; **Duration:** 8 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (female, APPswe/PS1dE9, 6 months old); functionality of mp verified by plasma levels (see figure S1 - E2 only; no assay for DHED); pumps replaced every 4 weeks; neurodegenerative (Alzheimer's); replacement therapy (estradiol infusion); DHED aka 10β,17β-dihydroxyestra-1,4-dien-3-one; Dose (2 ug/day); Industry authored (AgyPharma LLC);

Q5689: R. Thakkar, *et al.* NLRP3 Inflammasome Activation in the Brain after Global Cerebral Ischemia and Regulation by 17beta-Estradiol. *Oxid Med Cell Longev* 2016;2016(8309031

Agents: Estradiol, 17B- **Vehicle:** Cyclodextrin, B-; **Route:** SC; **Species:** Rat; Mice; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: animal info (Rats female, Sprague Dawley, 3 months old, OVX; Mice C27BL/6 PELP1, young adult, OVX); 20% Cyclodextrin used; ischemia (cerebral); replacement therapy (estradiol infusion); immunology; Resultant plasma level (10-15 pg/mL);

Q5686: A. Tanino, *et al.* Interleukin-18 deficiency protects against renal interstitial fibrosis in aldosterone/salt-treated mice. *Clinical Science* 2016;130(19):1727-39



Agents: Aldosterone **Vehicle:** Water; ethanol; propylene glycol; **Route:** SC; **Species:** mice; **Pump:** 2004; **Duration:** 4 weeks; 28 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, C57BL6 or IL-18 KO, 8 weeks old); 9% ethanol used; 86.5% propylene glycol used; replacement therapy (uniphrectomy); immunology; Bp measured using indirect tail cuff; Dose (0.15 ug/h);

Q4896: P. S. L. María Valero-Muñoz, BS; Richard M. Wilson, BS; Maarten Hulsmans, PhD; *et al.* Heart Failure With Preserved Ejection Fraction Induces Beiging in Adipose Tissue. *Circulation: Heart Failure* 2016;9(1-10)

Agents: Aldosterone, D- **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 4 weeks;

ALZET Comments: Controls received mp w/ saline; animal info (C57BL6, 8 weeks old, 20-25g, uninephrectomy); replacement therapy (uninephrectomy); cardiovascular; bp measured using tail cuff; Dose (0.3 ug/h);

Q4860: E. Maggioli, *et al.* Estrogen protects the blood–brain barrier from inflammation-induced disruption and increased lymphocyte trafficking. *Brain, Behavior, and Immunity* 2016;51(212-222)

Agents: Estradiol **Vehicle:** Cyclodextrin, B-; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (C57BL6 or AnxA1 -/-, 2 months old, OVX); replacement therapy (estradiol infusion); immunology; dose: 100nM

Q5414: D. Madularu, *et al.* High estrogen and chronic haloperidol lead to greater amphetamine-induced BOLD activation in awake, amphetamine-sensitized female rats. *Horm Behav* 2016;82(56-63)

Agents: Haloperidol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; Animal info (OVX Sprague Dawley rats, 200-250 g, 2 months old); post op. care (Anafen analgesic 0.1 mL/rat, and local antibiotic ointment); replacement therapy (estrogen replacement); MRI compatible PEEK tubing used; Dose (0.25 mg/kg/day); Therapeutic indication (Schizophrenia);

Q4842: A. Kimura, *et al.* Exaggerated arsenic nephrotoxicity in female mice through estrogen-dependent impairments in the autophagic flux. *Toxicology* 2016;339(9-18)

Agents: Estrogen-17B **Vehicle:** Ethanol; PBS; **Route:** Not Stated; **Species:** Mice; **Pump:** 1002; **Duration:** 1 week;

ALZET Comments: Controls received no mp; Controls received no mp; Controls received no mp; replacement therapy (estrogen infusion); Dose (0.2 mg/kg/day);

Q6568: T. Kanas, *et al.* Testosterone-dependent sex differences in red blood cell hemolysis in storage, stress, and disease. *Transfusion* 2016;56(10):2571-2583

Agents: Testosterone **Vehicle:** Propylene glycol; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 32 days;

ALZET Comments: Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (15-16 week old Orchiectomy FVB/NJ mice); replacement therapy (orchiectomized);

Q5653: H. Kaneko, *et al.* Growth and fertilization of porcine fetal oocytes grafted under the renal capsules of nude mice. *Theriogenology* 2016;86(7):1740-8

Agents: Follicle stimulating hormone, porcine **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** mice; **Pump:** 2004; **Duration:** 13 days;

ALZET Comments: Controls were non-grafted; replacement therapy (Estradiol); Therapeutic indication (Follicular development, oocyte maturation, fertilization);

Dose (62.5 U/mL);

Q6567: Y. Kakizoe, *et al.* A serine protease inhibitor attenuates aldosterone-induced kidney injuries via the suppression of plasmin activity. *J Pharmacol Sci* 2016;132(2):145-153

Agents: Aldosterone **Vehicle:** DMSO; Saline; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** Not Stated;

ALZET Comments: animal info (9 week old male SpragueDawley rats); replacement therapy (left uninephrectomy);

Q5316: Jeremie Boucher, *et al.* Differential Roles of Insulin and IGF-1 Receptors in Adipose Tissue Development and Function. *Diabetes* 2016;66(2201-2213)



Agents: Leptin **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (Fat-specific IR, IGF1R, and IR/IGF1R knockout mice; 3 month old); functionality of mp verified by blood glucose levels; dose-response (pg 2204-2206); behavioral testing (cold-resistance testing); replacement therapy (leptin); Lipoatrophic diabetes; Dose (10 ug/mouse/d);

Q4788: Jeffrey A. Blair, *et al.* Luteinizing hormone downregulation but not estrogen replacement improves ovariectomy-associated cognition and spine density loss independently of treatment onset timing. *Horm. Behav* 2016;78(60-66

Agents: Estradiol, 17b; leuprolide acetate **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 2 months; **ALZET Comments:** Controls received mp w/ vehicle; animal info (C57BL6J, 9 months old, OVX); pumps replaced every month; behavioral testing (morris water maze); replacement therapy (estradiol infusion); Dose (E2 1.1 ng/day; leuprolide 3.6 ug/day);

Q6530: Bin Wang, *et al.* Role of FOXO1 in aldosterone-induced autophagy: A compensatory protective mechanism related to podocyte injury. *ONCOTARGET* 2016;7(29):45331-45351

Agents: Aldosterone **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days; **ALZET Comments:** Dose (0.75 µg/kg/min); animal info (5-6 week old male Sprague-Dawley rats weighing 190 g); replacement therapy (uniphrectomy);