



**Recent References on the Study of Obesity, Appetite & Satiety
Using ALZET® Osmotic Pumps**

Agouti-related Peptide

P9223: G. M. Sutton, *et al.* The Melanocortin-3 Receptor Is Required for Entrainment to Meal Intake. *Journal of Neuroscience* 2008;28(48):12946-12955

Agents: Agouti-related peptide (82-131) **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; ALZET brain infusion kit used; dental cement and stay screws used; peptides; post op. care (Buprenorphine); animal info (male, B6, 8 wks old)

P8331: M. A. Joppa, *et al.* Central infusion of the melanocortin receptor antagonist agouti-related peptide (AgRP(83-132)) prevents cachexia-related symptoms induced by radiation and colon-26 tumors in mice. *Peptides* 2007;28(3):636-642

Agents: Agouti-related peptide (83-132) **Vehicle:** Saline, sterile; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1003D; **Duration:** 72 hours;

ALZET Comments: Controls received mp w/ vehicle; cancer (colon adenocarcinoma); peptides; animal info (male, BALB/C, 6 weeks old, 22 grams); Research Diets D12689B

P9007: J. J. G. Hillebrand, *et al.* AgRP₍₈₃₋₁₃₂₎ and SHU9119 differently affect activity-based anorexia. *European Neuropsychopharmacology* 2006;16(6):403-412

Agents: SHU9119; Agouti-related protein (83-132), human **Vehicle:** Saline, sterile, isotonic; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 4, 6 days;

ALZET Comments: Controls received mp w/ vehicle; ALZET brain infusion kit 2 used; peptides; post op. care (Buprenorphine, temagesic); animal info (female, Wistar wu); melanocortin antagonist

P5827: M. J. H. Kas, *et al.* Agouti-related protein prevents self-starvation. *Molecular Psychiatry* 2003;8(2):235-240

Agents: Agouti-related protein **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 4,5 days;

ALZET Comments: Controls received mp w/ vehicle; ALZET brain infusion kit used; peptides; catheter tubing filled w/ saline to allow 2-3 day delayed infusion; Agouti-related protein is a suppressor of melanocortin receptor activity

P5583: C. Fekete, *et al.* Agouti-related protein (AGRP) has a central inhibitory action on the hypothalamic-pituitary-thyroid (HPT) axis; Comparisons between the effect of AGRP and neuropeptide Y on energy homeostasis and the HPT axis. *Endocrinology* 2002;143(10):3846-3853

Agents: Neuropeptide Y; Agouti-related protein **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1003D; **Duration:** 3 days;

ALZET Comments: peptides; cannula was implanted then occluded with a dummy cannula for one week prior to infusion to allow for recovery; AGRP is an appetite stimulant

CART (55-102)

P7017: Y. H. Choi, *et al.* CART peptide: central mediator of leptin-induced adipose tissue apoptosis? *Regulatory Peptides* 2004;121(1-3):155-162

Agents: CART (55-102); Leptin, recomb. rat **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 5 days;

ALZET Comments: Controls received mp w/ vehicle; dose-response; peptides; mp primed overnight; catheter connecting mp to cannula filled with 12 ul aCSF to give 24 hours lag time before agent delivery

P5040: F. Rohner-Jeanraud, *et al.* Chronic central infusion of cocaine- and amphetamine-regulated transcript (CART 55-102): effects on body weight homeostasis in lean and high -fat-fed obese rats. *International Journal of Obesity* 2002;26(143-149

Agents: CART (55-102) **Vehicle:** Saline; Ascorbic acid; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; **Duration:** 6 days;

ALZET Comments: controls received mp w/ vehicle; in vitro stability verified by HPLC: 72% of agent was stable after 7 days (p. 145); peptides; ALZET Brain Infusion Kit used; CART is Cocaine-and Amphetamine-Regulated Transcript; pumps primed for at least 20 hours (p. 144)



Corticotrophin-releasing Factor (2001-Present)

Q9070: A. K. Short, *et al.* Short-term block of CRH receptor in adults mitigates age-related memory impairments provoked by early-life adversity. *BioRxiv* 2019;

Agents: Corticotropin-releasing factor receptor type 1 antagonist; **Vehicle:** Not stated; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Dose (4 mg/kg/day); Controls received mp w/ vehicle; animal info (Sprague Dawley, 2 months old); behavioral testing (Object Recognition Test, Object Location Test); CRFR1 antagonist aka Corticotropin-releasing factor receptor type 1 antagonist; enzyme inhibitor (CRFR1 inhibitor); Brain coordinates (AP-1.3, L 2.0, V 3.5 mm); dependence;

Q7285: X. F. Li, *et al.* Role of the posterodorsal medial amygdala in predator odour stress-induced puberty delay in female rats. *J Neuroendocrinol* 2019;e12719

Agents: Corticotropin-releasing factor **Vehicle:** CSF, artificial; **Route:** CSF/CNS (posterodorsal medial amygdala); **Species:** Rat; **Pump:** 1002; **Duration:** 14 Days;

ALZET Comments: Dose (0.2 nmol/day); Controls received mp w/ vehicle; animal info (Sprague-Dawley prepubertal rats); Brain coordinates (2.5 mm posterior to bregma (AP), 3.2 mm lateral (ML) and 7.8 mm below the surface of the dura (DV)); Cannula placement verified via histological verification;

Q3356: A. J. Park, *et al.* Altered colonic function and microbiota profile in a mouse model of chronic depression. *NEUROGASTROENTEROLOGY AND MOTILITY* 2013;25(9):733-E575

Agents: Corticotropin releasing hormone **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Pump:** Not Stated; **Duration:** 28 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (female, C57BL/6, 8-10 weeks old); behavioral testing (Step down test, tail suspension test, open field); peptides; cyanoacrylate adhesive; Corticotropin-rel. factor aka Corticotropin releasing hormone; Plastics 1 cannula, DURECT PE 60 tubing.

Q0128: J. S. Kinsey-Jones, *et al.* Corticotropin-Releasing Factor Alters the Timing of Puberty in the Female Rat. *Journal of Neuroendocrinology* 2010;22(2):102-109

Agents: Corticotropin-releasing factor; astressin-B **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 14, 14 days;

ALZET Comments: Controls received no treatment/surgery; peptides; no stress (see pg. 105); animal info (female, Sprague-Dawley, 28 days old); dose-response (fig. 1); neuroendocrinology

P9948: O. J. Bosch, *et al.* The CRF System Mediates Increased Passive Stress-Coping Behavior Following the Loss of a Bonded Partner in a Monogamous Rodent. *Neuropsychopharmacology* 2009;34(6):1406-1415

Agents: Corticotropin-releasing factor, d-phe; CP-154526; astressin-2b **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Prairie vole; **Pump:** 1007D; **Duration:** Not Stated;

ALZET Comments: ALZET brain infusion kit 3 used; cyanoacrylate adhesive; animal info (naive, adult, male, female, 70-100 g); catheter contained ringers solution for delayed delivery of 44 hours

P9144: A. A. Teitelbaum, *et al.* Chronic peripheral administration of corticotropin-releasing factor causes colonic barrier dysfunction similar to psychological stress. *American Journal of Physiology Gastrointestinal and Liver Physiology* 2008;295(3):G452-G459

Agents: Corticotropin-releasing factor; Stressin1; Sauvagine, anti-; Urocortin III **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 12 days;

ALZET Comments: Controls received mp w/ vehicle; peptides; multiple pumps per animal (2); animal info (mast cell-deficient, +/+, 10 wks old, 200-250 g.); "The use of the minipump avoids daily interactions with the animals, possibly causing less variability in the results." pg G458; stressin1 is a selective CFR-R1 agonist; urocortin III is a CFR-R2 agonist; antisauvagine is a CRF-R2 antagonist



P7890: N. Boyadjieva, *et al.* Role of beta-endorphin, corticotropin-releasing hormone, and autonomic nervous system in mediation of the effect of chronic ethanol on natural killer cell cytolytic activity. *Alcoholism Clinical and Experimental Research* 2006;30(10):1761-1767

Agents: Endorphin, B; corticotropin releasing hormone **Vehicle:** CSF, artificial; **Route:** CSF/CNS (paraventricular nucleus of hypothalamus); **Species:** Rat; **Pump:** 2002; **Duration:** 16 hours;

ALZET Comments: Controls received mp w/ vehicle; peptides; animal info (male, Fischer, 160-175g.)

P7604: N. J. Bernier, *et al.* CRF-related peptides contribute to stress response and regulation of appetite in hypoxic rainbow trout. *American Journal of Physiology Regulatory, Integrative, and Comparable Physiology* 2005;289(4):R982-R990

Agents: Corticotropin-releasing factor, a helical (9-41) **Vehicle:** Saline, physiological; NaOH; **Route:** CSF/CNS; **Species:** Fish (rainbow trout); **Pump:** 1003D; **Duration:** 8 days;

ALZET Comments: Controls received mp w/ vehicle; no stress (see pg. R984); peptides; animal info (male, female, hypoxia); CRF receptor antagonist; x-ray radiography; mp encased in a layer of dialysis tubing; cannula placement confirm; mp at 14C

P6607: Y. Kagamiishi, *et al.* Detrimental role of corticotropin-releasing factor on the decrease of CA1 field potential induced by in vitro ischemia in rat hippocampal slices. *JOURNAL OF PHARMACOLOGICAL SCIENCES* 2004;94(1):39-44

Agents: Corticotropin-releasing factor; astressin **Vehicle:** Saline; BSA; Ascorbic acid; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ vehicle; ALZET brain infusion kit 1 used; 2 week recovery period by filling tubing and cannula with sterile saline; pump connected to catheter after recovery period; astressin is a novel CRF antagonist;

Q6823: M. J. CULLEN, *et al.* Urocortin, Corticotropin Releasing Factor-2 Receptors and Energy Balance. *Endocrinology* 2001;142(3):992-999

Agents: Urocortin; Corticotropin-releasing factor **Route:** CSF/CNS (lateral ventricle); **Species:** Rat; **Pump:** 2001; **Duration:** 13 days;

ALZET Comments: Dose (0.01-1.0 nmol/day); Controls received mp w/ vehicle; animal info (Male Long-Evans rats: 300-347 g); pumps replaced every 7 days; Urocortin, Corticotropin are CRF-related peptide; peptides; Silicone catheter used to connect pump to cannula; Brain coordinates (AP=-0.8 mm, ML=+1.2mm, and DV=-4.5mm); Cannula placement verified via cresyl violet dye injection post mortem;

Dexfenfluramine (2002-Present)

Q0904: S. M. Banas, *et al.* Deconstructing Antiobesity Compound Action: Requirement of Serotonin 5-HT_{2B} Receptors for Dexfenfluramine Anorectic Effects. *Neuropsychopharmacology* 2011;36(2):423-433

Agents: Dexfenfluramine **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 5 weeks;

ALZET Comments: Controls received mp w/ vehicle; animal info (8 wks old, male, 8-12 wks old, 5-HT_{2B}-/-); obesity

P9671: N. Desbouds, *et al.* Dexfenfluramine discontinuous treatment does not worsen hypoxia-induced pulmonary vascular remodeling but activates RhoA/ROCK pathway: Consequences on pulmonary hypertension. *European Journal of Pharmacology* 2009;602(2-3):355-363

Agents: Dexfenfluramine **Vehicle:** Water, sterile; **Route:** IV (jugular); **Species:** Rat; **Pump:** 2ML4; **Duration:** 28 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (female, Wistar, 250-275 g.)

P7822: J. Callebert, *et al.* Evidence for a control of plasma serotonin levels by 5-hydroxytryptamine_{2B} receptors in mice. *Journal of Pharmacology and Experimental Therapeutics* 2006;317(2):724-731

Agents: Dexfenfluramine; RS-127445 **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated;

ALZET Comments: Controls received mp w/ vehicle; comparison of IP injections vs. mp; cardiovascular; animal info (129PAS wt or 5-HT_{2B}-R(-/-), 6wk old, 20-25g, male, female)

P5548: J. M. Launay, *et al.* Function of the serotonin 5-hydroxytryptamine 2B receptor in pulmonary hypertension. *Nature Medicine* 2002;8(10):1129-1135

Agents: RS-127445; dexfenfluramine **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice;

ALZET Comments: Controls received mp w/ vehicle; RS-127445 is a highly selective, high affinity 5-HT_{2B} receptor antagonist;



Ghrelin (2017-Present)

Q10177: D. Gupta, *et al.* Disrupting the ghrelin-growth hormone axis limits ghrelin's orexigenic but not glucoregulatory actions. *Molecular Metabolism* 2021;53(10)1258

Agents: Acyl-ghrelin **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Dose: (4 mg/kg) animal info: Male mice 8 weeks; post op. care: Carprofen; Acyl-ghrelin is a (growth hormone secretagogue receptor)

Q9204: L. S. Dalboge, *et al.* Evaluation of VGF peptides as potential anti-obesity candidates in pre-clinical animal models. *Peptides* 2021;136(170444

Agents: NERP-1; HHPD-41; TLQP-21; PGH-NH2; NERP-2; TLQP-62; Glucagon-like peptide-1 (7-37); Ghrelin **Vehicle:** Not Stated; **Route:** CSF/CNS (intracerebral); IV; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (2 nmol/mouse/day Glucagon-like peptide-1 (7-37); 3 nmol/mouse/day Ghrelin); Controls received mp w/ vehicle; animal info (male and female C57BL/6J mice, 13 weeks old); Glucagon-like peptide-1 aka GLP-1 (7-37); peptides; Brain coordinates (-0.7 mm posterior, -1.2 mm lateral [left], and -2.0 mm ventral); dependence;

Q10057: A. D. Petrescu, *et al.* Ghrelin reverses ductular reaction and hepatic fibrosis in a rodent model of cholestasis. *Scientific Reports* 2020;10(1):16024

Agents: Ghrelin; Ghrelin, des-octanoyl **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose (100 ug/kg/day); Controls received mp w/ vehicle; animal info (FVBN and Mdr2KO mice, 2 months old); Ghrelin aka Ghr; des-octanoyl-ghrelin aka DG; peptides; dependence;

Q8850: L. Hyland, *et al.* Ghrelin infused into the dorsomedial hypothalamus of male mice increases food intake and adiposity. *Physiology & Behavior* 2020;220(112882

Agents: Ghrelin; JMV2959 **Vehicle:** Saline; **Route:** CSF/CNS (dorsomedial hypothalamus); **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (adult male C57BL/6 mice); JMV2959 aka growth hormone secretagogue receptor antagonist; peptides; ALZET brain infusion kit used; Brain coordinates (AP 1.6 mm, ML 0.4 mm, and DV 5.25 mm); replacement therapy (Ghrelin infusion);

Q9277: A. K. E. Hornsby, *et al.* Unacylated-Ghrelin Impairs Hippocampal Neurogenesis and Memory in Mice and Is Altered in Parkinson's Dementia in Humans. *Cell Report Medicine* 2020;1(7):100120

Agents: Ghrelin, unacylated **Vehicle:** Saline, sterile; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (48 ug/day); Controls received mp w/ vehicle; animal info (six-month old homozygous GOAT null mice); unacylated Ghrelin aka UAG; neurodegenerative (Parkinson's Dementia);

Q8747: R. E. Hay, *et al.* Ghrelin Receptor Signaling Is Not Required for Glucocorticoid-Induced Obesity in Male Mice. *Endocrinology* 2020;161(3):

Agents: Ghrelin Receptor Antagonist **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;

ALZET Comments: Dose (100 ug/day); Controls received mp w/ vehicle; animal info (C57BL, Male, 2-4 months old, 25-30 g); Ghrelin Receptor Antagonist aka GHSR ; immunology;

Q8820: M. Ratcliff, *et al.* Calorie restriction activates new adult born olfactory-bulb neurones in a ghrelin-dependent manner but acyl-ghrelin does not enhance subventricular zone neurogenesis. *Journal of Neuroendocrinology* 2019;31(7):e12755

Agents: Acyl-ghrelin **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Dose (48 ug/day); Controls received mp w/ vehicle; animal info (14 weeks old, Male, GHSr-eGFP); bilateral cannula used; neurodegenerative (Neurogenesis);

Q7326: R. Yu, *et al.* Activation of mTORC1 signaling in gastric X/A-like cells induces spontaneous pancreatic fibrosis and derangement of glucose metabolism by reducing ghrelin production. *EBioMedicine* 2018;36(304-315

Agents: Ghrelin, acyl- **Vehicle:** saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Dose (11 nmol/kg/d); Controls received mp w/ vehicle; animal info (4-week-old, male, C57BL/6J);



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);

Q7090: Poretti MB, *et al.* Reproductive performance of male mice after hypothalamic ghrelin administration. *Reproduction* 2018;156(2):121-132

Agents: Ghrelin, acyl- **Vehicle:** CSF, artificial; **Route:** CSF/CNS (hypothalamus); **Species:** Mice; **Pump:** 1007D, 2006; **Duration:** 7 days, 42 days;

ALZET Comments: Dose (0.5 umol/h/day- 1007D, 0.15 umol/h/day-2006) Controls received mp w/ vehicle; animal info (Adult male mice, 60 days old, 30 g); Brain coordinates (relative to bregma: anterior 0.15 mm, lateral 0.05 mm, vertical 5.5 mm); cyanoacrylate adhesive; dependence;

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);

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);

Q7138: S. Galic, *et al.* AMPK signaling to acetyl-CoA carboxylase is required for fasting- and cold-induced appetite but not thermogenesis. *eLife Journal* 2018;7(**Agents:** Ghrelin, N-octanoylated **Vehicle:** Ghrelin, N-octanoylated; **Route:** SC; **Species:** Mouse; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Dose (30 ug/day); Controls received mp w/ vehicle; animal info (Male, ACC DKI); Peptide, recombinant protein aka N-octanoylated murine ghrelin; gene therapy;

Q6461: A. L. Hopkins, *et al.* Unacylated ghrelin promotes adipogenesis in rodent bone marrow via ghrelin O-acyl transferase and GHS-R1a activity: evidence for target cell-induced acylation. *Sci Rep* 2017;7(45541

Agents: Ghrelin, acylated; Ghrelin, unacylated **Vehicle:** Saline; BSA; Heparin; **Route:** Bone (tibia); **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (720 ng/day); animal info (9-month old male loxTB-GHS-R mice);

Q6243: N. E. Hill, *et al.* Impact of ghrelin on body composition and muscle function in a long-term rodent model of critical illness. *PLoS One* 2017;12(8):e0182659

Agents: Ghrelin **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; 2002; **Duration:** 10 days;

ALZET Comments: Dose (300 nmol/kg/day); Controls received mp w/ vehicle; animal info (Male Wistar rats weighing 274±333 g); delayed delivery (48 hours);

Q6420: T. Bake, *et al.* Acute ghrelin changes food preference from a high-fat diet to chow during binge-like eating in rodents. *J Neuroendocrinol* 2017;29(4):

Agents: Ghrelin **Vehicle:** CSF, artificial; **Route:** CSF/CNS (lateral ventricle); **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;

ALZET Comments: Dose (0.5 µg/h); Controls received mp w/ vehicle; animal info (male Sprague-Dawley rats weighing 200-220g); ALZET brain infusion kit 2 used; Brain coordinates (0.9 mm posterior to bregma, ±1.6 mm lateral to the midline and 2.5 mm ventral of the skull surface); Cannula placement verified via post mortem injection of 2.0 µL of India ink into the cannula after the tubing was disconnected;



Q6315: W. Ai, *et al.* Ghrelin ameliorates atherosclerosis by inhibiting endoplasmic reticulum stress. *Fundam Clin Pharmacol* 2017;31(2):147-154

Agents: Ghrelin **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** 2004; **Duration:** 4 weeks;

ALZET Comments: Dose (10-9 mol/kg/day); animal info (Male ApoE $_ _$ mice and wild-type C57BL/6J mice weighing 28–32 g (age 17 weeks));

Glucagon-like Peptide 1 (2015-Present)

Q9204: L. S. Dalboge, *et al.* Evaluation of VGF peptides as potential anti-obesity candidates in pre-clinical animal models. *Peptides* 2021;136(170444)

Agents: NERP-1; HHPD-41; TLQP-21; PGH-NH2; NERP-2; TLQP-62; Glucagon-like peptide-1 (7-37); Ghrelin **Vehicle:** Not Stated; **Route:** CSF/CNS (intracerebral); IV; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (2 nmol/mouse/day Glucagon-like peptide-1 (7-37); 3 nmol/mouse/day Ghrelin); Controls received mp w/ vehicle; animal info (male and female C57BL/6J mice, 13 weeks old); Glucagon-like peptide-1 aka GLP-1 (7-37); peptides; Brain coordinates (-0.7 mm posterior, -1.2 mm lateral [left], and -2.0 mm ventral); dependence;

Q9999: J. Lee, *et al.* Antagonistic interaction between central glucagon-like Peptide-1 and oxytocin on diet-induced obesity mice. *Heliyon* 2020;6(10):e05190

Agents: Glucagon-like peptide-1 **Vehicle:** Saline; **Route:** CNS/CSF (third ventricle); **Species:** Mice; **Pump:** 1002D; **Duration:** 26 days;

ALZET Comments: Dose (16.01 nmol/d); 0.9% Saline used; Controls received mp w/ vehicle; animal info (5 to 6-week-old male C57BL/6J mice); Glucagon-like peptide-1 aka GLP-1; peptides; Brain coordinates (1.79 mm caudal to bregma); dental cement

Q8842: S. Rohl, *et al.* Noninvasive in vivo Assessment of the Re-endothelialization Process Using Ultrasound Biomicroscopy in the Rat Carotid Artery Balloon Injury Model. *Journal of Ultrasound in Medicine* 2019;38(7):1723-1731

Agents: Glucagon-like peptide-1 (Exendin-4) **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 weeks;

ALZET Comments: Dose (1 nmol/day); animal info (Sprague Dawley); post op. care (Buprenorphine);

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);

Q7188: B. Jones, *et al.* Targeting GLP-1 receptor trafficking to improve agonist efficacy. *Nat Commun* 2018;9(1):1602

Agents: Glucagon-like peptide-1 receptor agonist **Vehicle:** Glucagon-like peptide-1 receptor agonist; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 2 weeks;

ALZET Comments: Dose (0.24 nmol/kg/day); animal info (Male C57BL/6 J mice; 8–10 weeks); Glucagon-like peptide-1 receptor agonist aka GLP-1R agonist; stress/adverse reaction: (see pg. 10);

Q5950: C. Quarta, *et al.* Molecular Integration of Incretin and Glucocorticoid Action Reverses Immunometabolic Dysfunction and Obesity. *Cell Metabolism* 2017;26(4):620-632 e6

Agents: Glucagon-like peptide-1, Dexamethasone **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; Dose (GLP-1: 0.1 mg/24h; Dexa: 0.0219mg/ml); animal info (20 week-old male C57bl6j); post op. care (meloxicam for post-surgical pain (3 mg/kg); ALZET brain infusion kit 3 used; Brain coordinates (anteroposterior: 0.5 mm from bregma, lateral: \pm 1; 2 mm to bregma and dorsoventral: 2.1 mm below skull); Therapeutic indication (obesity);



Q5841: A. Karmaker, *et al.* Is OM-3 synergistic with GLP-2 in intestinal failure? *J Surg Res* 2017;207(7-12

Agents: Glucagon-like peptide-2 **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 7 days, 14 days, 28 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (200-250g); Rats underwent 80% bowel resection ; Therapeutic indication (Intestinal failure, bowel adaptation, intestinal adaptation); Dose (100 ug/kg);

Q5381: K. Kohashi, *et al.* A Dipeptidyl Peptidase-4 Inhibitor but not Incretins Suppresses Abdominal Aortic Aneurysms in Angiotensin II-Infused Apolipoprotein E-Null mice. *Journal of Atherosclerosis and Thrombosis* 2016;23(4):441-454

Agents: Angiotensin II; Glucagon-like peptide-1; Glucose-dependent insulintropic polypeptide **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 4 weeks;

ALZET Comments: Controls received mp w/ vehicle; animal info (ApoE -/- mice, 9 weeks old); functionality of mp verified by plasma levels, blood pressure; pumps replaced every 2 weeks; cardiovascular; atherosclerosis; peptides; Pathophysiology similarities btwn abdominal aortic aneurysms, atherosclerosis; blood pressure measure via tail-cuff method; Dose (2000 ng/kg/min AngII, 2.16 nmol/kg/day GLP-1, 25 nmol/kg/day GIP); Resultant blood pressure (Start: 104 mmHg, End: 118 mmHg);

Q4308: K. Aravindhan, *et al.* Cardioprotection Resulting from Glucagon-Like Peptide-1 Administration Involves Shifting Metabolic Substrate Utilization to Increase Energy Efficiency in the Rat Heart. *PLoS One* 2015;10(U1979-U1996

Agents: Glucagon-like peptide-1 **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** Not Stated;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 250-300g); ischemia (cardiac); post op. care (Saline IP, 37C incubator until fully ambulatory); cardiovascular;

Leptin (2019-Present)

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; **Pump:** Not Stated; **Duration:** 2 weeks;

ALZET Comments: Dose (10 µg/mouse/day); Controls received mp w/ vehicle; animal info (8-week-old Aa4KO mice); diabetes;

Q10648: A. D. Petrescu, *et al.* Leptin Enhances Hepatic Fibrosis and Inflammation in a Mouse Model of Cholestasis. *The American Journal of Pathology* 2022;192(3):484-502

Agents: Leptin **Vehicle:** Saline; **Route:** IP; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose: (100 mg/kg per day) Controls received mp w/ vehicle; animal info: 2-month-old, male and female FVBN and Mdr2KO mice (weights being 25 to 30 g), Obesity; Leptin

Q10635: A. C. M. Omoto, *et al.* Central Nervous System Actions of Leptin Improve Cardiac Function After Ischemia-Reperfusion: Roles of Sympathetic Innervation and Sex Differences. *Journal of American Heart Association* 2022;11(21):e027081

Agents: Leptin **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 28 days;

ALZET Comments: Dose Leptin (0.62 µg/h); Controls received mp w/ vehicle; animal info (Wistar rats (12-to 14-weeks old)pumps replaced on day 14; catheter; See (p.3-4)ischemia (ischemia/reperfusion injury.);

Q10457: K. E. Claflin, *et al.* Pharmacological FGF21 signals to glutamatergic neurons to enhance leptin action and lower body weight during obesity. *Molecular Metabolism* 2022;64(101564

Agents: Fibroblast growth factor 21; Leptin; Leptin antagonist **Vehicle:** Not Stated; **Route:** SC; CSF/CNS; **Species:** Mice; **Pump:** 1002; 1004; **Duration:** 2 weeks;

ALZET Comments: Dose: FGF21 (1 mg/kg/day); Leptin (250 ng/h); Leptin antagonist (8 ug/day); Controls received mp w/ vehicle; animal info: mice: DIO WT mice: 16-18-week-old WTt; 12 week-old WT mice; Fibroblast growth factor 21 aka (FGF21); ALZET brain infusion kit 3 used; Brain coordinates (1 mm lateral, 0.34 mm caudal to bregma, and 2.5 mm ventral from the surface of the skull.); dental cement used; Vetbond (3 M); dependence;



Q10441: R. T. Atawia, *et al.* Endothelial leptin receptor is dispensable for leptin-induced sympatho-activation and hypertension in male mice. *Vascular Pharmacology* 2022;146(107093)

Agents: Leptin **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (1 mg/kg/day); animal info (Male; 12 weeks old); Blood pressure measured via radio-telemetry transmitters; cardiovascular;

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; **Pump:** Not Stated; **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;

Q10301: E. A. Polyakova, *et al.* Hyperleptinemia results in systemic inflammation and the exacerbation of ischemia-reperfusion myocardial injury. *Heliyon* 2021;7(11):e08491

Agents: Leptin **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** Not Stated;

ALZET Comments: Dose: (0.33 µg/ul); Controls received mp w/ vehicle; animal info: male Wistar rats aged 11–12 weeks and weighing 250–300 g; ischemia (ischemia-reperfusion injury); "

Q9402: A. C. Palei, *et al.* Impact of hyperleptinemia during placental ischemia-induced hypertension in 2 pregnant rats. *American Journal of Physiology and Heart Circulatory Physiology* 2021;

Agents: Leptin, rat recomb. **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** 5 days;

ALZET Comments: Dose (1 µg/kg/min); Controls received mp w/ vehicle; animal info (Timed-pregnant SAS SD rats);

Q9242: F. N. Gava, *et al.* Restoration of Cardiac Function After Myocardial Infarction by Long-Term Activation of the CNS Leptin-Melanocortin System. *JACC Basic to Translational Science* 2021;6(1):55-70

Agents: Leptin; Melanotan II **Vehicle:** Saline; **Route:** CSF/CNS (intracerebral); IV; **Species:** Rat; **Pump:** 2002; **Duration:** 28 days;

ALZET Comments: Dose (0.62 µg/h Leptin; 10 ng/h Melanotan II); Controls received mp w/ vehicle; animal info (12 to 14 week-old male Sprague-Dawley rats); Melanotan II aka MTII; cardiovascular;

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 Comparative Physiology* 2021;320(2):R173-R181

Agents: Leptin **Vehicle:** Not Stated; **Route:** CSF/CNS (intracerebral); IV; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Dose (0.62 µg/h); animal info (male and female Sprague-Dawley rats, 12 weeks old); Blood pressure measured via BP telemeter device; 95 mmHg - 110 mmHg; peptides; diabetes;

Q10103: V. Barrios, *et al.* Cerebral Insulin Bolus Revokes the Changes in Hepatic Lipid Metabolism Induced by Chronic Central Leptin Infusion. *Cells* 2021;10(3):

Agents: Leptin; Saline **Vehicle:** Not Stated; **Route:** CSF/CNS (cerebral ventricle); **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose: (0.2 mg/kg/day); Controls received mp w/ vehicle; Animal info: Adult male Wistar rats (250 ± 10 g)

Q10362: V. Barrios, *et al.* Opposite Effects of Chronic Central Leptin Infusion on Activation of Insulin Signaling Pathways in Adipose Tissue and Liver Are Related to Changes in the Inflammatory Environment. *Biomolecules* 2021;11(11):

Agents: Leptin **Vehicle:** Saline; BSA; **Route:** CSF/CNS (right cerebral ventricle); **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose (12 µg/day); animal info (Male; 15 total; Around 250 g); Brain coordinates (-0.3 mm anteroposterior; 1.1 mm lateral from Bregma);

Q9817: C. Zhu, *et al.* Profound and redundant functions of arcuate neurons in obesity development. *Nature Metabolism* 2020;2(8):763-774

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

ALZET Comments: Dose (50 ng/hr); Controls received mp w/ vehicle; animal info (40 g); dependence;



Q9496: Q. Tang, *et al.* Sirt6 in pro-opiomelanocortin neurons controls energy metabolism by modulating leptin signaling. *Molecular Metabolism* 2020;37(100994)

Agents: Leptin **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 2 days;

ALZET Comments: Dose (500 ng/h); Controls received mp w/ vehicle; animal info (Male mice, 6 weeks old); replacement therapy (Leptin);

Q8955: J. Sorrell, *et al.* The central melanocortin system mediates the benefits of time-restricted feeding on energy balance. *Physiology & Behavior* 2020;227(113132)

Agents: Leptin **Vehicle:** Saline; **Route:** CSF/CSN; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (1 ug/day); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male, C57BL/6J); Brain coordinates (0.7 mm posterior, 1.2 mm lateral, and 2.5 mm ventrally from the surface of the brain); bilateral cannula used; dependence;

Q9299: M. C. Kang, *et al.* LRP1 regulates food intake and energy balance in GABAergic neurons independently of leptin action. *American Journal of Physiology Endocrinology Metabolism* 2020;

Agents: Leptin **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 9 days;

ALZET Comments: Dose (0.5 mg/kg/day); Controls received mp w/ vehicle; animal info (male LRP1 mice, 30 weeks old); dependence;

Q8468: A. Fraga, *et al.* Temperature but not leptin prevents semi-starvation induced hyperactivity in rats: implications for anorexia nervosa treatment. *Scientific Reports* 2020;10(1):5300

Agents: Leptin, recomb. rat **Vehicle:** PBS; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 14 days;

ALZET Comments: Dose (1.29 mg/ml); Controls received mp w/ vehicle; animal info (Male Sprague-Dawley rats (130–190 g));

Q8703: T. Bruder-Nascimento, *et al.* HIV Protease Inhibitor Ritonavir Impairs Endothelial Function Via Reduction in Adipose Mass and Endothelial Leptin Receptor-Dependent Increases in NADPH Oxidase 1 (Nox1), C-C Chemokine Receptor Type 5 (CCR5), and Inflammation. *J Am Heart Assoc* 2020;9(19):e018074

Agents: Leptin **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (0.3 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6, 8–14 weeks old);

Q7682: Z. Wang, *et al.* Role of SOCS3 in POMC neurons in metabolic and cardiovascular regulation. *American Journal of Physiology Regulatory, Integrative, and Comparable Physiology* 2019;316(4):R338-R351

Agents: Leptin **Vehicle:** Saline; **Route:** IP; **Species:** Mice; **Pump:** 1007D; 1002; **Duration:** 7 days; 14 days;

ALZET Comments: Dose (4 ug/kg/min); animal info (6–17 wk of age, male and female mice); cardiovascular;

Q9074: A. K. Singha, *et al.* Glucose-Lowering by Leptin in the Absence of Insulin Does Not Fully Rely on the Central Melanocortin System in Male Mice. *Endocrinology* 2019;160(3):651-663

Agents: Leptin **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;

ALZET Comments: Dose (2.5 ng/hr/0.11 uL); Controls received mp w/ vehicle; animal info (3–6 months old, Male, greater than 25 g); Brain coordinates (20.34 mm from the bregma, 1 mm lateral (right side), 22.5 mm from the skull); bilateral cannula used;

Q9991: M. K. Shin, *et al.* Experimental Approach to Examine Leptin Signaling in the Carotid Bodies and its Effects on Control of Breathing. *Journal of Visualized Experiments* 2019;152);

Agents: Leptin **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** Duration: 3 days;

ALZET Comments: Dose (5 mg/mL); animal info (C57BL/6J); cardiovascular;

Q8948: M. Seamon, *et al.* Leptin receptor-expressing neurons in ventromedial nucleus of the hypothalamus contribute to weight loss caused by fourth ventricle leptin infusions. *American Journal of Physiology Endocrinology and Metabolism* 2019;317(4):E586-E596

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

ALZET Comments: Dose (0.9 ug/day); Controls received mp w/ vehicle; animal info (Male, Sprague-Dawley, 275–300 g);



Q8817: G. Ramadori, *et al.* S100A9 extends lifespan in insulin deficiency. *Nature Communications* 2019;10(1):3545

Agents: Leptin **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1004; **Duration:** 10 days;

ALZET Comments: Dose (227 ng/uL); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male); Brain coordinates (–0.34 mm from the bregma, ±1mm lateral, –2.5mm from the skull); bilateral cannula used; diabetes;

Q8364: S. Pereira, *et al.* Metabolic effects of leptin receptor knockdown or reconstitution in adipose tissues. *Sci Rep* 2019;9(1):3307

Agents: Recombinant Murine Leptin **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 8 days;

ALZET Comments: Dose (20 ug/day); Controls received mp w/ vehicle; animal info (8-12 weeks old); diabetes;

Q7524: R. B. S. Harris. Low-dose infusions of leptin into the nucleus of the solitary tract increase sensitivity to third ventricle leptin. *American Journal of Physiology Endocrinology and Metabolism* 2019;316(5):E719-E728

Agents: Leptin **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1004; **Duration:** 14 days;

ALZET Comments: Dose (5, 10 ng/day); 0.9% saline used; animal info (Male, Sprague-Dawley, 275-300 g); bilateral cannula used; dependence;

Q8021: M. T. Hackl, *et al.* Brain leptin reduces liver lipids by increasing hepatic triglyceride secretion and lowering lipogenesis. *Nat Commun* 2019;10(1):2717

Agents: Leptin; LpR **Vehicle:** Saline; CSF, artificial; **Route:** IP; CSF/CNS (third ventricle); **Species:** Rat; **Pump:** 2004; **Duration:** 2 weeks;

ALZET Comments: Dose (0.3 ug/day); 0.9% used; Controls received mp w/ vehicle; animal info (10 weeks old, Male, Sprague Dawley); dependence; LpR AKA Leptin Receptor Antagonist;

Q9768: V. Frodermann, *et al.* Exercise reduces inflammatory cell production and cardiovascular inflammation via instruction of hematopoietic progenitor cells. *Nature Medicine* 2019;25(11):1761-1771

Agents: Leptin **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2006; **Duration:** 6 weeks;

ALZET Comments: Dose (0.3 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6, 7-8 weeks old, Male); post op. care (Buprenorphine); cardiovascular;

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);

Q6983: C. Caballero-Eraso, *et al.* Leptin acts in the carotid bodies to increase minute ventilation during wakefulness and sleep and augment the hypoxic ventilatory response. *J Physiol* 2019;597(1):151-172

Agents: Leptin **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 2 days;

ALZET Comments: Dose (120 µg/day); Controls received mp w/ vehicle;

Q6878: D. M. Arble, *et al.* Vertical sleeve gastrectomy improves ventilatory drive through a leptin-dependent mechanism. *JCI Insight* 2019;4(1):

Agents: Leptin **Vehicle:** Water; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 6 weeks;

ALZET Comments: Dose (10µg/day); Controls received mp w/ vehicle; animal info (C57BL6/J WT and ob/ob male mice, 6-8 weeks of age);



Melanin-Concentrating Hormone (2005-Present)

Q5840: Y. Kawata, *et al.* A novel and selective melanin-concentrating hormone receptor 1 antagonist ameliorates obesity and hepatic steatosis in diet-induced obese rodent models. *European Journal of Pharmacology* 2017;796(45-53)

Agents: Melanin-concentrating hormone **Vehicle:** Water, distilled; **Route:** CSF/CNS (lateral ventricle); **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks, 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (11 weeks-14 weeks); functionality of mp verified by measuring blood plasma parameters; Therapeutic indication (Obesity, non-alcoholic fatty liver disease); Dose (2.5 µg/mouse/day);

Q2601: M. Imbernon, *et al.* Central Melanin-Concentrating Hormone Influences Liver and Adipose Metabolism Via Specific Hypothalamic Nuclei and Efferent Autonomic/JNK1 Pathways. *Gastroenterology* 2013;144(3):636-U254

Agents: Melanin-concentrating hormone **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; 1007D; **Duration:** 7 days;

ALZET Comments: Control animals received mp w/ saline; animal info (Sprague Dawley, male, 8-10 wks old, 250-300 g)

Q0432: M. Glick, *et al.* Chronic MCH infusion causes a decrease in energy expenditure and body temperature, and an increase in serum IGF-1 levels in mice. *Endocrine* 2009;36(3):479-485

Agents: Melanin-concentrating hormone **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; peptides; cyanoacrylate adhesive; animal info (12 wks old, C57BL/6); cannula placement verified post mortem with Evans Blue dye; endocrinology

P9273: M. Ito, *et al.* Antagonism of central melanin-concentrating hormone 1 receptor alleviates steatohepatitis in mice. *Journal of Endocrinology* 2008;198(2):309-315

Agents: Melanin-concentrating hormone 1, receptor antagonist **Vehicle:** Water, distilled; Propylene glycol; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 2004; **Duration:** 4, 8 weeks;

ALZET Comments: Controls received mp w/ vehicle; pumps replaced after 2 or 4 weeks; no stress (see pg. 311, 314); ALZET brain infusion kit used; peptides; post op. care (Cefamezin); animal info (male, C57BL/6, 10 wks old, 16 wks old, 1 year old); animals received mp w/vehicle for 2 or 4 weeks, then mp with agent or vehicle for 2 or 4 more weeks; dental cement used; cannula placement confirmed at end of experiment with Evans blue dye

P8300: M. M. Messina, *et al.* Cardiovascular effects of melanin-concentrating hormone. *Regulatory Peptides* 2007;139(1-3):23-30

Agents: Melanin-concentrating hormone **Vehicle:** PBS; BSA; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1002; **Duration:** 10 days;

ALZET Comments: Controls received mp w/ vehicle; dose-response (fig. 1); comparison of acute icv infusion vs. mp; peptides; post op. care (Bupivacaine); animal info (male, Long-Evans, 330g.)

P8513: A. Gomori, *et al.* Blockade of MCH1 receptor signalling ameliorates obesity and related hepatic steatosis in ovariectomized mice. *British Journal of Pharmacology* 2007;151(6):900-908

Agents: Melanin-concentrating hormone 1, receptor antagonist **Vehicle:** Propylene glycol; Water, distilled; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 2004; **Duration:** 8 weeks;

ALZET Comments: Controls received mp w/ vehicle; pumps replaced after 4 weeks of vehicle delivery; ALZET brain infusion kit used; post op. care (cefamezin-a); animal info (female, C57BL/6J, 12 weeks old, female Mch1r KD, 14-16 weeks old, 22 g); cannula placement confirmed with Evans Blue dye; obesity

P7245: S. Mashiko, *et al.* Antiobesity effect of a melanin-concentrating hormone 1 receptor antagonist in diet-induced obese mice. *Endocrinology* 2005;146(7):3080-3086

Agents: Melanin-concentrating hormone 1 receptor antagonist **Vehicle:** Propylene glycol; CSF, artificial; **Route:** CSF/CNS; CSF/CNS (third ventricle); **Species:** Mice; **Pump:** 1007D; 2002; 2004; **Duration:** 3, 8 weeks;

ALZET Comments: Controls received mp w/ vehicle; pumps replaced after 1 or 4 weeks of vehicle; ALZET brain infusion kit used; peptides; cyanoacrylate adhesive; post op. care (cefamedin); DEXA; cannula placement confirmed by Evans blue dye injection; animal info (C57BL/6); pumps used in lateral ventricle for one group of animals, and third ventricle for others. Third ventricle group used Plastics One cannulae



Melanotan (2017-Present)

Q9335: J. K. Y. Lau, *et al.* Melanocortin receptor activation alleviates amyloid pathology and glial reactivity in an Alzheimer's disease transgenic mouse model. *Scientific Reports* 2021;11(1):4359

Agents: Melanotan II **Vehicle:** PBS; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Pump:** 1004; **Duration:** 28 days; **ALZET Comments:** Dose (2.4 nmol/day); Controls received mp w/ vehicle; animal info (6–7-month-old APP/PS1 mice); neurodegenerative (Alzheimer's Disease);

Q9242: F. N. Gava, *et al.* Restoration of Cardiac Function After Myocardial Infarction by Long-Term Activation of the CNS Leptin-Melanocortin System. *JACC Basic to Translational Science* 2021;6(1):55-70

Agents: Leptin; Melanotan II **Vehicle:** Saline; **Route:** CSF/CNS (intracerebral); IV; **Species:** Rat; **Pump:** 2002; **Duration:** 28 days; **ALZET Comments:** Dose (0.62 ug/h Leptin; 10 ng/h Melanotan II); Controls received mp w/ vehicle; animal info (12 to 14 week-old male Sprague-Dawley rats); Melanotan II aka MTII; cardiovascular;

Q7634: B. P. Tooke, *et al.* Hypothalamic POMC or MC4R deficiency impairs counterregulatory responses to hypoglycemia in mice. *Mol Metab* 2019;20(194-204

Agents: Insulin; Melanotan **Vehicle:** PBS; **Route:** SC; CSF/CNS (Paraventricular Nucleus of Hypothalamus); **Species:** Mice; **Pump:** 2002; 1002; **Duration:** 14 days;

ALZET Comments: Dose (10 U/kg/day); Controls received mp w/ vehicle; Brain coordinates (bregma: anteroposterior, 0.70; mediolateral, 0.22; dorsoventral, 4.80 mm); bilateral cannula used; diabetes; BIK: Plastics1, 3280PD/V/SPC;

Q6887: E. Minakova, *et al.* Melanotan-II reverses autistic features in a maternal immune activation mouse model of autism. *PLoS One* 2019;14(1):e0210389

Agents: Melanotan-II **Vehicle:** Water, sterile; Saline; **Route:** CSF/CNS (left lateral ventricle); **Species:** Mice; **Pump:** 1007D; 1002; **Duration:** 7 days; 14 days;

ALZET Comments: Dose (2.5 µg/day); Controls received mp w/ vehicle; animal info (Four- to six-month-old male MIA and male control C57BL/6J mice weighing 25-30g); behavioral testing (self-grooming test; three chamber test; Exploratory behavior; marble burying); ALZET brain infusion kit 3 used; Brain coordinates (posterior 0.20 mm, left 0.8 mm, ventral 2.5 mm); cyanoacrylate adhesive; neurodegenerative (Autism spectrum disorder);

Q7126: A. A. da Silva, *et al.* Control of appetite, blood glucose, and blood pressure during melanocortin-4 receptor activation in normoglycemic and diabetic NPY-deficient mice. *American Journal of Physiology Regulatory, Integrative, and Comparable Physiology* 2018;314(4):R533-R539

Agents: Melanotan II **Vehicle:** Saline; **Route:** CSF/CNS (left lateral ventricle); **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (200 ug/kg/day); Controls received mp w/ vehicle; animal info (male, 20-24 week old); antagonist aka melanocortin 3/4; diabetes;

Q7746: I. Cote, *et al.* Activation of the central melanocortin system in rats persistently reduces body and fat mass independently of caloric reduction. *Canadian Journal of Physiology and Pharmacology* 2018;96(3):308-312

Agents: Melanotan II **Vehicle:** CSF, Artificial; **Route:** CSF/CNS (lateral ventricle); **Species:** Rat; **Pump:** Not Stated; **Duration:** 28 days;

ALZET Comments: Dose (2 µg/day); Controls received mp w/ vehicle; animal info (10 months, male, F344BN, 360-480g); MTII is a synthetic analog of alpha-MSH; Brain coordinates (1.3 mm posterior to bregma, 1.9 mm lateral to midsagittal suture, depth of 3.5 mm); Cannula placement verified via a stereotaxic device; Original mini-pumps were replaced after recovery from the surgery through a small incision (1 cm); Therapeutic indication (long-term reduction of body mass independent of caloric reduction);

Q5824: I. Mosialou, *et al.* MC4R-dependent suppression of appetite by bone-derived lipocalin 2. *Nature* 2017;543(7645):385-390

Agents: Melanotan II, Lipocalin 2 **Vehicle:** Saline; **Route:** CSF/CNS (third ventricle); **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (10-12 weeks old); ALZET brain infusion kit 2 used; Therapeutic indication (Bone); Dose (0.125 mg ml⁻¹,);



Neuropeptide Y (2011-Present)

Q4685: R. Zhang, *et al.* Long-Term Administration of Neuropeptide Y in the Subcutaneous Infusion Results in Cardiac Dysfunction and Hypertrophy in Rats. *Experimental Neurology* 2015;37(94-104

Agents: Neuropeptide Y **Vehicle:** PBS; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 30 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, 250-300g); functionality of mp verified by plasma levels; cardiovascular; peptides; pumps primed in 37C saline for 40 hours;

Q1862: F. Xie, *et al.* Long-term Neuropeptide Y Administration in the Periphery Induces Abnormal Baroreflex Sensitivity and Obesity in Rats. *Cellular Physiology and Biochemistry* 2012;29(1-2):111-120

Agents: Neuropeptide Y **Vehicle:** PBS; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 4 months;

ALZET Comments: Controls received mp w/ vehicle; animal info (Wistar, male, 230-270 g, 3-4 mo old); long-term study; pumps replaced monthly

Q1861: F. Xie, *et al.* Neuropeptide Y Reverses Chronic Stress-induced Baroreflex Hypersensitivity in Rats. *Cellular Physiology and Biochemistry* 2012;29(3-4):463-474

Agents: Neuropeptide Y **Vehicle:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 3 months;

ALZET Comments: Controls received mp w/ PBS; animal info (Wistar, male, adult, 230-250 g); long-term study; pumps replaced monthly

Q2311: J. C. Morales-Medina, *et al.* The selective neuropeptide Y Y(5) agonist [cPP(1-7),NPY(19-23),Ala(31),Aib(32),Gln(34)]hPP differently modulates emotional processes and body weight in the rat. *Behavioural Brain Research* 2012;233(2):298-304

Agents: Neuropeptide Y Y5 agonist **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 12, 14 days;

ALZET Comments: Control animals received mp w/ saline; animal info (Sprague Dawley, Wistar, male, 150-170 g, olfactory bulbectomized); neuropeptide Y Y5 agonist also known as [cPP1-7,NPY19-23,Ala31,Aib32,Gln34]hPP

Q3005: R. Matyal, *et al.* Neuropeptide Y improves myocardial perfusion and function in a swine model of hypercholesterolemia and chronic myocardial ischemia. *Journal of Molecular and Cellular Cardiology* 2012;53(6):891-898

Agents: Neuropeptide Y **Vehicle:** Heparin; BSA; **Route:** IA; **Species:** Swine; **Pump:** 2ML4; **Duration:** 5 weeks;

ALZET Comments: Animal info (swine model of metabolic syndrome with chronic myocardial ischemia, six-week-old, male; Yorkshire miniswine); ischemia (arterial)

Q1285: E. Preston, *et al.* Central neuropeptide Y infusion and melanocortin 4 receptor antagonism inhibit thyrotropic function by divergent pathways. *Neuropeptides* 2011;45(6):407-415

Agents: Neuropeptide Y; HS014 **Vehicle:** NaCl; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; **Duration:** 6 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, 25-280 g); peptides; HS014 is a melanocortin 4 receptor antagonist

Peptide YY (2015-Present)

Q6119: Y. C. Shi, *et al.* Y5 receptor signalling counteracts the anorectic effects of PYY3-36 in diet-induced obese mice. *J Neuroendocrinol* 2017;29(10):

Agents: Peptide YY (3-36) **Vehicle:** Disodium hydrogen phosphate, NaCl, Tween 80; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 21 days;

ALZET Comments: animal info (diet-induced obese wild-type, Y5R knockout); stability verified by (Peptide YY "was stable and functional over the period of the experiment"); Obesity and diabetes;

Q6707: N. Nishizawa, *et al.* Antiobesity Effect of a Short-Length Peptide YY Analogue after Continuous Administration in Mice. *ACS Medicinal Chemistry Letters* 2017;8(6):628-631

Agents: Peptide YY, (3-36) **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 3 days;

ALZET Comments: Dose (0.3 or 1 mg/kg/day); animal info (29-week-old DIO C57BL/6J mice); peptides;



Q6347: N. Nishizawa, *et al.* Highly potent antiobesity effect of a short-length peptide YY analog in mice. *Bioorganic & Medicinal Chemistry* 2017;25(20):5718-5725

Agents: Peptide YY analog **Vehicle:** DMSO; Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 2 weeks;

ALZET Comments: Dose (0.1 mg/kg/day); 10% DMSO used; animal info (34-week-old male DIO C57BL/6J mice); Therapeutic indication (obesity);

Q4478: T. M. Kilian, *et al.* Rational Design of Dual Peptides Targeting Ghrelin and Y(2) Receptors to Regulate Food Intake and Body Weight. *JOURNAL OF MEDICINAL CHEMISTRY* 2015;58(4180-4193

Agents: Peptide 1a; peptide YY (3-36), peptide 2a, peptide 5a **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ saline; animal info (female, C57BL6JRj); peptides;

Q4504: L. S. Dalboge, *et al.* A Hamster Model of Diet-Induced Obesity for Preclinical Evaluation of Anti-Obesity, Anti-Diabetic and Lipid Modulating Agents. *PLoS One* 2015;10(U2299-U2312

Agents: Peptide YY(3-36); neuromedin U **Vehicle:** Saline; **Route:** SC; **Species:** Hamster; **Pump:** 2ML4; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Golden Syrian hamster, 6 weeks old); peptides; obesity;