Recent References (2017-Present) on the Administration of Leptin Using ALZET® Osmotic Pumps

**Agents:** Leptin, rat recomb.  **Vehicle:** Not Stated;  **Route:** SC;  **Species:** Rat;  **Pump:** 2ML1;  **Duration:** 5 days;
**ALZET Comments:** Dose (1 ug/kg/min); Controls received mp w/ vehicle; animal info (Timed-pregnant SAS Sprague-Dawley rats); ischemia (ischemia-induced hypertension);

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;

**Agents:** Leptin  **Vehicle:** Not Stated;  **Route:** CSF/CNS (intracerebral); IV;  **Species:** Rat;  **Pump:** 2001;  **Duration:** 7 days;
**ALZET Comments:** Dose (0.62 ug/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)

**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);

**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;

**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;

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)); dependence;

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); cardiovascular;


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;


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; dependence;


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

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


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

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


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;


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;


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;

**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;


**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;


**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;


**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);


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

**ALZET Comments:** Dose (454 ng/μl); Controls received mp w/ vehicle; animal info (4-8 weeks, Agrp-IRES-cre and Agrp-IRES-cre::LSL-Cas9-GFP); comparison of IP injection vs mp; Brain coordinates (AP: −0.50mm, ML:±1.3mm, DV: −2.3mm); replacement therapy (leptin);


**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 ± 1.4 ng/mL); replacement therapy (leptin); good methods (detailed pump placement on page e3);


**Agents:** Leptin  
**Vehicle:** Not Stated;  
**Route:** SC  
**Species:** Mice  
**Pump:** 1002  
**Duration:** 2 weeks

**ALZET Comments:** Dose (6 ug/day); animal info (6 weeks old, ob/ob); post op. care (Ketofen); dependence;
Agents: Leptin Vehicle: PBS; Route: SC; Species: Rat; Pump: 2001; Duration: 1 week;
ALZET Comments: Dose (0.6 mg/Kg-weight); 200 μL of 10 mM used; Controls received mp w/ vehicle; Controls received mp w/ vehicle;

Agents: Leptin Vehicle: Saline; Route: CSF/CNS (lateral ventricle); Species: Mice; Pump: Not stated; Duration: Not stated;
ALZET Comments: Dose (1 ug/day); animal info (Male, LepRbCCK KO); Brain coordinates (0.7mm posterior to bregma, 1.3 mm lateral, and 2.3 mm below the skull); bilateral cannula used; dependence;

Agents: PrRP palmitoylated analogs, Leptin, Amylin, Cyclic AC253, Exendin 4 Vehicle: Not Stated; Route: SC, CSF/CNS (lateral ventricle); Species: Mice; Pump: Not Stated; Duration: 2 months; 28 days; 5 weeks; 5 months; 16 weeks;
ALZET Comments: Dose: Palm11-PrRP (5 mg/kg/day), Leptin (2.4 nmol/day), Amylin (0.24 mg/kg/day), Exendin-4 (3.5 pmol/kg/min); animal info (7 month old THY-Tau22 mice; 5 month old APP/PS1 mice; 6 month old AMP8 mice ); behavioral testing (Y-maze); neurodegenerative (Alzheimer's); This review summarizes current information on the potential neuroprotective properties of food intake-lowering (anorexigenic) peptides that have been tested in experimental models of AD-like pathology.

Q8099: V. Lopez, et al. Food Restriction is Required to Preserve the Antisteatotic Effects of Central Leptin in the Liver of Middle-Aged Rats. Obesity (Silver Spring) 2018;26(5):877-884
Agents: Leptin Vehicle: Saline; Route: CSF/CNS (lateral ventricle); Species: Rat; Pump: Not stated; Duration: 7 days;
ALZET Comments: Dose (0.2 ug/day); Controls received mp w/ vehicle; animal info (3 or 7 month old, Male, Wistar); bilateral cannula used; dependence;

Agents: Recombinant Leptin Vehicle: Saline; Route: SC; Species: Mice; Pump: Not stated; Duration: 4 weeks;
ALZET Comments: Dose (10 uL/hr); Controls received mp w/ vehicle; animal info (C57BL/6, 8 weeks old); cardiovascular;

Agents: Leptin Vehicle: Saline; Route: SC; Species: Mice; Pump: 1004; Duration: 4 weeks;
ALZET Comments: animal info (Male, 7 weeks old, C57BL/6J); ALZET brain infusion kit 1 used; Brain coordinates (0.6mm caudal to bregma, 1mm right to the sagittal sinus, and 2.0mm ventral to the sagittal sinus); bilateral cannula used; dependence;

Agents: Leptin Vehicle: Saline; Route: SC; Species: Rat; Pump: 2ML1; Duration: 7 days;
ALZET Comments: Dose (10 uL/hr); Controls received mp w/ vehicle; animal info (Male, Wistar, 11-12 weeks old); Leptin aka recombinant rat leptin protein ; dependence;

Agents: Oxytocin; leptin Vehicle: Saline; Route: SC; Species: Mice; Pump: Not Stated; Duration: 2 weeks;
ALZET Comments: Dose (oxytocin (50 µg/day); leptin (20 or 40 µg/day)); Controls received mp w/ vehicle; animal info (Eight-week-old C57BL/6J male mice); "Osmotic pump content was verified postmortem in order to ensure complete drug delivery."
Q7778: E. Burgos-Ramos, et al. The increase in fiber size in male rat gastrocnemius after chronic central leptin infusion is related to activation of insulin signaling. Mol Cell Endocrinol 2018;470(48-59
**Agents:** Leptin  **Vehicle:** Saline;  **Route:** CSF/CNS (right cerebral ventricle);  **Species:** Rat;  **Pump:** Not Stated;  **Duration:** 14 days;
**ALZET Comments:** Dose (12 ug/day); Controls received mp w/ vehicle; animal info (Male, Wistar, 240-260 g); Brain coordinates (0.3 mm anteroposterior, 1.1 mm lateral from Bregma); dependence;

**Agents:** Leptin;  **Vehicle:** PBS;  **Route:** SC; CSF/CNS;  **Species:** Mice;  **Pump:** 2004;  **Duration:** 12 weeks, 7 days;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (leptin-deficient ob/ob mice); long-term study; pumps replaced every 28 days; SHU-9119 is a MC4R antagonist; Leptin dissolved in PBS and delivered SC for 12 weeks; SHU-9119 dissolved in saline and delivered ICV for 7 days; Pumps model incorrectly listed as Model 2001D. It should be Model 2004 based on description.

**Agents:** Leptin, recomb. mouse  **Vehicle:** Saline;  **Route:** SC;  **Species:** Mice;  **Pump:** Not Stated;  **Duration:** 1 week; 4 weeks;
**ALZET Comments:** Dose (4.8 µg/day); Controls received mp w/ vehicle; animal info (AnimalsMale C57BL/6J mice and ob/ob mice (5-week and 8-week old));

**Agents:** Leptin  **Vehicle:** Saline;  **Route:** SC;  **Species:** Mice;  **Pump:** 1002;  **Duration:** 12 days;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (8 weeks old); Therapeutic indication (Metabolic syndrome, Syndrome X);
Dose (10 ug/day);

**Agents:** Leptin  **Vehicle:** Not Stated;  **Route:** SC;  **Species:** Mice;  **Pump:** 1002;  **Duration:** 12 days;
**ALZET Comments:** Dose (0, 4, 12, 40, 140, or 400 ng/h); dose-response (Fig 2; Page 16); animal info (6-week-old female ob/ob mice); Therapeutic indication (obesity);

**Agents:** Leptin  **Vehicle:** Saline;  **Route:** SC;  **Species:** Mice;  **Pump:** 1004;  **Duration:** 2 weeks, 14 days;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (6-week-old female ob/ob mice); Therapeutic indication (diabetic ketoacidosis); Dose (0.624 ug/hr);

**Agents:** Leptin  **Vehicle:** Not Stated;  **Route:** SC;  **Species:** Mice;  **Pump:** Not Stated;  **Duration:** 24 weeks;
**ALZET Comments:** Dose (5 mg/day; 10 mg/day); Controls received mp w/ vehicle; animal info (10-week-old male ObOb and strain-matched control mice); pumps replaced every 12 weeks; Multiple pumps per animal (2); long-term study;

**Agents:** Antibody, leptin neutralizing; leptin, recombinant mouse  **Vehicle:** PBS;  **Route:** CSF/CNS (intrathecal);  **Species:** Mice;  **Pump:** 1007D, 1002;  **Duration:** Not Stated;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (7-8 weeks old); ALZET brain infusion kit used; neurodegenerative (Demyelination); Therapeutic indication (Demyelination); Dose ((12 µ g/kg body weight per day, 10 ug/kg of body weight per day);
Agents: Leptin Vehicle: Not Stated; Route: CSF/CNS (fourth ventricle); Species: Rat; Pump: 2004; Duration: 11 days, 13 days; ALZET Comments: Dose (0.01, 0.1, 0.3, or 0.6 ug/24 h); Controls received mp w/ vehicle; animal info (rats weighing ~280 g);

Agents: Leptin Vehicle: HCl; Route: SC; Species: Mice; Pump: 2004; Duration: 4 weeks; ALZET Comments: Dose (2.5 mg/ml); animal info (6-8 week old C57BL/6 and NOS2/- mice);

Agents: Leptin Vehicle: Tris; Saline; Route: SC; Species: Mice; Pump: Not Stated; Duration: 3 weeks; ALZET Comments: Dose (0.36 mg/kg/day); 20 mmol L−1 Tris, 150 nmol L−1 NaCl used; Controls received mp w/ vehicle; animal info (Ten-week-old C57Bl/6 male mice); cardiovascular;

Agents: Leptin Vehicle: Saline; Route: CSF/CNS (lateral ventricle); Species: Rat; Pump: 1003D; Duration: 3 days; ALZET Comments: Controls received mp w/ vehicle; animal info (Male Wistar rats weighing 180–250 g); post op. care (5 mg/kg ketoprofen); Brain coordinates (0.5 mm caudal to the bregma and 1.5 mm to the right of the midline);

Agents: Leptin Vehicle: PBS; Route: CSF/CNS; Species: Rat; Mice; Pump: Not Stated; Duration: 14 days; ALZET Comments: animal info (male and female, C57B/6 J (B6) and Ob); Therapeutic indication (Obesity, Neuropathic pain); Dose (1 ug/day);

Agents: Leptin Vehicle: Saline; Route: SC; Species: Mice; Pump: 1007D; Duration: 7 days; ALZET Comments: Dose (4 mg/kg/min); Controls received mp w/ vehicle; animal info (22 week old Male wild-type (WT) C57BL/6J mice); cardiovascular;

Agents: Leptin, Hexamethonium Vehicle: Saline; Route: CSF/CNS (lateral ventricle); Species: Rat; Pump: 2002; Duration: 12 days; ALZET Comments: Controls received mp w/ vehicle; animal info (360-420g); diabetes; Therapeutic indication (Diabetes); Dose (Hexamethonium: 15 mg/kg);

Q6006: K. T. Chang, et al. Leptin is essential for microglial activation and neuropathic pain after preganglionic cervical root avulsion. Life Sci 2017;187(31-41
Agents: Leptin Vehicle: PBS; Route: CSF/CNS (Cervical); Species: Mice; Pump: 2004; Duration: 28 days; ALZET Comments: Controls received mp w/ vehicle; animal info (male and female, C57B/6 J (B6) and Ob); Therapeutic indication (Obesity, Neuropathic pain); Dose (1 ug/day);

Agents: Leptin Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 2002; Duration: 10 days; ALZET Comments: Dose (450 ng/hr); Controls received mp w/ vehicle; animal info (ob/ob mice); Therapeutic indication (Obesity);