Recent References on the Administration of Cytokines Using ALZET® Osmotic Pumps

**Colony Stimulating Factor**

**Agents:** Colony-stimulating factor, Macrophage  
**Vehicle:** Not Stated;  
**Route:** SC;  
**Species:** Mice;  
**Duration:** 28 days;  
**ALZET Comments:** Animal info (male, C57BL/6 J, 7 wks old); comparison of SC injections vs mp; lack of cortical response in both daily injection and pump studies, pg 550

**Agents:** Colony-stimulating factor, Macrophage-; Interleukin-2; Colony stimulating factor, Granulocyte-  
**Vehicle:** Not Stated;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** Not Stated;  
**Duration:** Not Stated;  
**ALZET Comments:** Controls received mp with PBS; cancer; immunology; peptides; M-CSF + IL-2 given concomitantly provided best antitumor protection; recomb. IL-2 used; human G-CSF used

**Erythropoietin (2014-Present)**

**Agents:** Human recombinant erythropoietin  
**Vehicle:** Saline;  
**Route:** SC;  
**Species:** Rat;  
**Pump:** Not Stated;  
**Duration:** 14 days;  
**ALZET Comments:** Dose (1333 IU/kg, 667 IU/kg, and 333 IU/kg.); 0.9% Saline used; Controls received mp w/ vehicle; Human recombinant erythropoietin aka rHuEPO; dependence;


**Agents:** Erythropoietin, recombinant human  
**Vehicle:** Saline;  
**Route:** CSF/CNS (lateral cerebral ventricle);  
**Species:** Mice;  
**Pump:** Not Stated;  
**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);

**Agents:** Erythropoietin  
**Vehicle:** Saline;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** 1007D;  
**Duration:** 1 week;  
**ALZET Comments:** Dose (1,000 IU of EPO); animal info (36 weeks old, CD-1, Male, 20-25 g); EPO aka hemangiogenic and antiapoptotic factor ; dependence;

**Agents:** Erythropoietin, recombinant human  
**Vehicle:** Not Stated;  
**Route:** CSF/CNS;  
**Species:** Mice;  
**Duration:** 30 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (C57BL6); good methods (Jove Video; picture of pump and implantation pg. 4); ischemia (cerebral); post op. care (Carprofen 4 mg/kg); behavioral testing (rotarod test; hand grip strength); cyanoacrylate adhesive; “In this work we have shown the method of implantation of minipumps with a cannula connected to the skull in order to deliver the plasticity promoting protein rhEpo directly into the ventricle, thus circumventing the BBB.” pg 8; Cannula placement verified via histologic analysis “The are no evident severe tissue alterations based on Nissl staining as compared to the corresponding contralateral area”;
**Agents:** Erythropoietin, recomb. human **Route:** SC; **Species:** Mice (knockout), (transgenic); **Duration:** 30 days;
**ALZET Comments:** Dose (3 U EPO/day or 10 U EPO/day); Controls received mp w/ vehicle; animal info (8-12 week old WT and Osxcre-PHD2f/f and Vavcre-PHD2f/f mice);

**Agents:** Erythropoietin, human recombinant **Vehicle:** PBS; BSA; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 1 week;
**ALZET Comments:** Controls received mp w/ vehicle or sham surgery; animal info (Sprague Dawley, 120 days old, 240-280g); behavioral testing (open field exploration, inhibitory avoidance, Morris water maze);

**Agents:** Epidermal Growth Factor; erythropoietin **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; **Duration:** 14 days;
**ALZET Comments:** Animal info (male, Sprague Dawley); pumps replaced every 7 days; ischemia (cerebral); behavioral testing (staircase test); pumps removed 7 days after serial implantation;

Granulocyte-Macrophage Colony Stimulating Factor (2011-Present)
Q3634: F. Zhu, et al. MINOCYCLINE ALLEVIATES BEHAVIORAL DEFICITS AND INHIBITS MICROGLIAL ACTIVATION INDUCED BY INTRAHIPPOCAMPAL ADMINISTRATION OF GRANULOCYTE-MACROPHAGE COLONY-STIMULATING FACTOR IN ADULT RATS. Neuroscience 2014;266(275-281
**Agents:** Colony-stimulating factor, GM, recombinant rat **Vehicle:** Saline; **Route:** CSF/CNS (hippocampus); **Species:** Rat; **Pump:** 1007D; **Duration:** 14 days;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 280-320g); ALZET brain infusion kit 3 used; Multiple pumps per animal (2); behavioral testing (locomotor activity; social interaction test; PPI);

**Agents:** Colony-stimulating factor, GM **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;
**ALZET Comments:** Animal info (male, inbred, Fischer 344, 10-12 wks old); comparison of “all in-vivo therapy” vs mp; cancer

Interferon (2014-Present)
**Agents:** Interferon, alpha **Vehicle:** PBS; **Route:** CSF/CNS (left ventricle); **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;
**ALZET Comments:** Dose (250 IU/day); Controls received mp w/ vehicle; animal info (male 8–12-week-old mice); post op. care (buprenorphine); Interferon, alpha aka IFN-α; ALZET brain infusion kit 3 used; Brain coordinates (0.2 mm anterior and 0.9 mm lateral to bregma); dependence;

**Agents:** Interferon, alpha **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;
**ALZET Comments:** Dose (0.25 ul/h); Controls received mp w/ vehicle; animal info (NZB/W F1 female mice, 20 weeks old); behavioral testing (Forced Swim Test, Rotarod Test, Locomotor Activity Monitoring Test, Elevated Plus Maze Test); Interferon, alpha aka IFNa; immunology;

**Agents:** Interferon, gamma; Albumin, porcine serum  
**Route:** Intrauterine (uterine horn)  
**Species:** Pig  
**Pump:** 2ML1  
**Duration:** 5 days

**ALZET Comments:** Dose (240 uL/day); animal info (Sexually mature gilts); Interferon, gamma aka IFNG;


**Agents:** Interleukin-1 beta; Interleukin-6; Interleukin-10; Interleukin-12; Interleukin-17; Interferon, gamma; Tumor Necrosis Factor, alpha; Interleukin-1 beta, anti; Transforming Growth Factor-B1, anti  
**Vehicle:** PBS  
**Route:** SC  
**Species:** Mice  
**Pump:** 1007D  
**Duration:** 10 Days

**ALZET Comments:** Dose (IL-1b (83μg/ml); IL-6 (83μg/ml); IL-10 (166μg/ml); IL-12 (83μg/ml); IL-17 (125μg/ml); IL-23 (166μg/ml); IFNg (83μg/ml); TNFa (166μg/ml); anti-TGF-b1 (166μg/ml); anti-IL-1b (150μg/ml)); Controls received mp w/ vehicle; animal info (8-12 wk female C57BL/6 mice); Immunology (“evaluate the suitability of osmotic pumps as a model for biofilms in implant associated infections,”)

Q7192: A. Kimura, et al. Protective Roles of Interferon-gamma in Cardiac Hypertrophy Induced by Sustained Pressure Overload. J Am Heart Assoc 2018;7(6);

**Agents:** Interferon, gamma  
**Vehicle:** Not Stated  
**Route:** SC  
**Species:** Mice  
**Pump:** 1007D  
**Duration:** 7 days

**ALZET Comments:** Dose (15 uM/d); animal info (8-10 week old, male, BALB/c); cardiovascular;

Q4560: L. Pereira, et al. IFN gamma regulates proliferation and neuronal differentiation by STAT1 in adult SVZ niche. Frontiers in Cellular Neuroscience 2015;9(U1-U10)

**Agents:** Interferon, gamma  
**Vehicle:** Saline  
**Route:** CSF/CNS (third ventricle)  
**Species:** Mice  
**Pump:** 1007D  
**Duration:** 7 days

**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, STAT2 KO or 129S6/SvEv); immunology;


**Agents:** Interferon-a, murine; polyinosinic/polycytidylic acid  
**Vehicle:** PBS  
**Route:** CSF/CNS  
**Species:** Mice  
**Pump:** 1002  
**Duration:** 14 days

**ALZET Comments:** Controls received mp w/ vehicle; animal info (C57BL6J); behavioral testing (open field test; tail suspension test; forced swimming test); polyinosinic/polycytidylic acid is a toll-like receptor-3 agonist; Dose (mIFN-a 250 IU/day; poly(I:C) 1 ug/day);


**Agents:** U0126; serum protein, ovine; interferon tau, recombinant ovine  
**Vehicle:** DMSO  
**Route:** Intrauterine (uterine horn)  
**Species:** Sheep (ewe)  
**Pump:** 2ML1  
**Duration:** 6 days

**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, Suffolk Ovis aries); 3% DMSO used; tissue perfusion (uterine horn); cyanoacrylate adhesive; used cyanoacrylate glue to anchor pump; interferon tau aka IFNT;


**Agents:** Interferon, gamma  
**Vehicle:** Saline  
**Route:** SC  
**Species:** Mice  
**Pump:** Not Stated  
**Duration:** 7 days

**ALZET Comments:** Controls received mp w/ vehicle; animal info (prf -/- or WT, lymphocytic choriomeningitis virus infected); functionality of mp verified by serum levels; immunology; murine model of hemophagocytic lymphohistiocytosis;
**Interleukin-1 (2014-Present)**

**Agents:** Interleukin-1 beta recombinant protein; Interleukin-1 beta neutralizing antibody  
**Vehicle:** PBS; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 4 weeks;  
**ALZET Comments:** Dose: IL-1b recombinant protein (0.75 mg/kg/day); IL-1b neutralizing antibody (4 ug/kg/day)Controls received mp w/ vehicle; animal info: male Sprague-Dawley rats (three weeks old)Blood pressure measured via Tail cuff(See pg 4) for recorded blood pressureInterleukin-1 beta aka (IL-1B)

**Q7035:** Y. P. Zhang, et al. Mifepristone attenuates depression-like changes induced by chronic central administration of interleukin-1beta in rats. Behavioural Brain Research 2018;347(436-445  
**Agents:** Interleukin-1 beta  
**Vehicle:** Saline, pyrogen-free; **Route:** CSF/CNS (lateral ventricle); **Species:** Rat; **Pump:** 1002; **Duration:** 14 days;  
**ALZET Comments:** Dose (10 ng/7uL/rat/day); Controls received mp w/ vehicle; animal info (Male Sprague Dawley rats (220–260 g)); behavioral testing (open field, elevated plus maze and sucrose preference); ALZET brain infusion kit used; Brain coordinates (AP=−1 mm, ML=+1.4 mm, DV=−1 mm); Therapeutic indication (depression);

**Q6320:** M. L. Bonnemaison, et al. Interleukin-1beta as a driver of renal NGAL production. Cytokine 2017;91(38-43  
**Agents:** Interleukin-1 beta, mouse recomb.  
**Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 14 days;  
**ALZET Comments:** Dose (10 ng/h); 0.1% bovine serum albumin used; animal info (12-week-old male C57Bl/6 mice);

**Q5171:** S. Okizaki, et al. Vascular Endothelial Growth Factor Receptor Type 1 Signaling Prevents Delayed Wound Healing in Diabetes by Attenuating the Production of IL-1beta by Recruited Macrophages. American Journal of Pathology 2016;186(6):1481-98  
**Agents:** Placenta growth factor, recombinant human; antibody, interleukin-1B  
**Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;  
**ALZET Comments:** Controls received mp w/ vehicle or control antibody; animal info (male, C57BL6, 8 weeks old, STZ); immunology; diabetes; Dose (PlGF 10 ug/mouse; anti-IL-1B 1 ug/day);

**Q6636:** C. S. Nunemaker. Considerations for Defining Cytokine Dose, Duration, and Milieu That Are Appropriate for Modeling Chronic Low-Grade Inflammation in Type 2 Diabetes. J Diabetes Res 2016;2016(2846570  
**Agents:** Interleukin-1beta; Interleukin-6  
**Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;  
**ALZET Comments:** Dose (32

**Q4038:** K. Pajer, et al. Cytokine signaling by grafted neuroectodermal stem cells rescues motoneurons destined to die. Experimental Neurology 2014;261(180-189  
**Agents:** Antibody, anti-interleukin-1a; antibody, anti-interleukin-6; antibody, tumor necrosis factor-alpha; antibody, macrophage inflammatory protein-1 alpha  
**Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 1002; **Duration:** 2 weeks;  
**ALZET Comments:** Controls received mp w/ control antibody; animal info (female, Sprague Dawley, adult); functionality of mp verified by decreased activity of targets; used silicone tubing 0.3 mm ID for catheter;

**Agents:** Losartan; interleukin-1, beta; CSF, artificial  
**Vehicle:** CSF; artificial; **Route:** CSF/CNS; **Species:** rats; **Pump:** 2004; **Duration:** 4 weeks;  
**ALZET Comments:** Controls: sham rats w/ no treatment; rats given artificial CSF; animal info (Male Sprague–Dawley rats, 200–250 g); functionality of mp verified by echocardiography and plasma levels; bilateral cannula used; Plastics One double cannula; cardiovascular; heart failure; brain tissue distribution; Dose: LOS 200ug/day, IL-1B 1ug/day; Resultant plasma level (pg 872-874); Brain coordinates; pg. 871 (2.0mm posterior to the bregma and 8.5mm ventral from the skull surface)
Q3976: W. Liang, et al. Metabolically induced liver inflammation leads to NASH and differs from LPS- or IL-1 beta-induced chronic inflammation. LABORATORY INVESTIGATION 2014;94(491-502
Agents: Endotoxin, LPS, interleukin-1B, recombinant murine Route: SC; Species: Mice; Pump: 1004; Duration: 10 weeks;
ALZET Comments: Controls received mp w/ PBS; animal info (male, APOE3.CETP, 10-14 weeks old); immunology;

Q3178: C. M. O’Neill, et al. Circulating Levels of IL-1B+IL-6 Cause ER Stress and Dysfunction in Islets From Prediabetic Male Mice. Endocrinology 2013;154(9):3077-3088
Agents: Interleukin-1, beta; Interleukin-6 Vehicle: Saline; Route: SC; Species: Mice; Pump: 1007D; Duration: 7 days;
ALZET Comments: Controls received mp w/ vehicle or sham surgery; animal info (male, CD1 5 weeks old, C57BL6J 11 weeks old); functionality of mp verified by measurement of serum levels; no stress (see pg. 3084); immunology; diabetes, Pumps primed 18-22 h at 37C

Interleukin-2 (2010-Present)
Agents: Interleukin-2 Vehicle: Not Stated; Route: IP; Species: Rat; Pump: 2002; Duration: 5 days;
ALZET Comments: Dose (0.05, 0.10, or 0.20 ng/ml); dose-response (p. 3); animal info (Timed-pregnant Sprague Dawley rats); 98 mmHg - 111 mmHg;Interleukin-2 aka IL-2; dependence;

Q10183: S. Hirose, et al. Type 2 Innate Lymphoid Cells Induce CNS Demyelination in an HSV-IL-2 Mouse Model of Multiple Sclerosis. iScience 2020;23(10):101549
Agents: Interleukin-2 Vehicle: Not Stated; Route: CSF/CNS; Species: Mice; Pump: Not Stated; Duration: Not Stated;
ALZET Comments: animal info: wild-type (WT) HSV-1Interleukin -2 aka (IL-2)peptides; immunology;

Agents: Interleukin-1 beta; Interleukin-6; Interleukin-10; Interleukin-12; Interleukin-17; Interleukin-23; Interferon, gamma; Tumor Necrosis Factor, alpha; Interleukin-1 beta, anti; Transforming Growth Factor-B1, anti Vehicle: PBS; Route: SC; Species: Mice; Pump: 1007D; Duration: 10 Days;
ALZET Comments: Dose (IL-1b (83μg/ml); IL-6 (83μg/ml); IL-10 (166μg/ml); IL-12 (83μg/ml); IL-17 (125μg/ml); IL-23 (166μg/ml); IFNg (83μg/ml); TNFa (166μg/ml); anti-TGF-b1 (166μg/ml); anti-IL-1b (150μg/ml)); Controls received mp w/ vehicle; animal info (Eight- to twelve-week-old female C57BL/6 mice); Immunology ("evaluate the suitability of osmotic pumps as a model for biofilms in implant associated infections,

Agents: Interleukin-25, recombinant mouse Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 1004; Duration: 4 weeks;
ALZET Comments: Controls received mp w/ control medium; animal info (Apoe -/-, 9-10 or 21 weeks old); cardiovascular; brain tissue distribution; pumps removed after 4 weeks in young mice;

Agents: Interleukin-2, murine; antibody, anti-interleukin-2 Vehicle: PBS; Route: SC; Species: Mice (transgenic); Pump: Not Stated; Duration: 10 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (HLA-DR3); comparison of injection vs mp; immunology;

**Agents:** Interleukin-2 **Vehicle:** PBS; **Route:** CSF/CNS; SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 2 weeks;

**ALZET Comments:** Controls received mp w/ Interleukin 2 without HSV-1 infection; animal info (6 weeks) ; ALZET brain infusion kit 1 used; neurodegenerative (demyelination); Therapeutic indication (CNS demyelination; Herpes simplex virus 1; HSV); Dose (1 ug/24 h);


**Agents:** Interleukin-2, human **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice (nude); **Pump:** Not Stated; **Duration:** Not Stated;

**ALZET Comments:** Animal info (6 wks old, male, Nu/J); 7-day pumps used


**Agents:** Interleukin-2; Interleukin-7; Interleukin-15 **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2001; **Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ PBS; animal info (6-12 wks old, gender, age matched); immunology


**Agents:** Interleukin-2, recomb. **Vehicle:** PBS; Albumin, human; **Route:** SC; **Species:** Mice (nude); **Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (8 wks old, female, Balb/C, nu/nu); cancer (melanoma); “These pumps are easily loaded and then placed s.c., minimizing discomfort and handling of the mice as needed for repeated IL2 administration by injection.” pg 2777

### Interleukin-3 (2013-Present)


**Agents:** Interleukin-31; TGF beta **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (Male Balb/c mice aged 6–8 weeks); Resultant plasma level (194 (pg/ml)); Interleukin-31 aka IL-31, TGF beta aka TGFB; dependence;


**ALZET Comments:** Dose (14 ug/day); animal info (BALB/c female mice, 10 weeks old); recombinant mouse Interleukin-31 aka IL-31; cancer (Breast Cancer);


**Agents:** Interleukin-31, recombinant mouse **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 14 days;

**ALZET Comments:** animal info (6 – 8 week old, C57BL/6 and Trpv1 knockout mice); functionality of mp verified by observation of skin phenotype; dose-response (pg. 508.e5); Dose (20 mg/day);


**Agents:** Interleukin-3 **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** Not Stated;

**ALZET Comments:** Animal info (C57BL/6:SV129 IK-/-)
Interleukin-4 (2015-Present)


**Agents:** Polyethylene, ultra high molecular mass weight; Interleukin-4, mouse recombinant  
**Vehicle:** BSA; PBS  
**Route:** SC;  
**Species:** Mice  
**Pump:** 2006;  
**Duration:** 8 weeks;  
**ALZET Comments:** Dose (15 mg/ml ultra high molecular mass weight polyethylene; 10 ug/ml Interleukin-4); 1% BSA-PBS used; Controls received mp w/ vehicle; animal info (male BALB/cByJ mice, 10-12 weeks); post op. care (buprenorphine); functionality of mp verified by residual volume; pumps replaced every 4 weeks; ultra high molecular mass weight polyethylene aka UHMWPE; mouse recombinant interleukin-4 aka IL-4; dependence;


**Agents:** Interleukin-4  
**Vehicle:** Not Stated;  
**Route:** IP;  
**Species:** Rat (pregnant);  
**Pump:** Not Stated;  
**Duration:** 19 days;  
**ALZET Comments:** Dose (600 ng/day); animal info (pregnant Sprague-Dawley rats; pumps implanted on gestational day 14); ischemia (placental);


**Agents:** Ultra-high molecular weight polyethylene particles; interleukin-4, mouse recombinant  
**Vehicle:** BSA; PBS;  
**Route:** Bone  
**Species:** Mice  
**Pump:** 2006;  
**Duration:** 4 weeks;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, BALB/cByJ, 10-12 weeks old); 1% BSA used; post op. care (buprenorphine injection SC); used vinyl tubing to connect pumps to titanium rods;


**Agents:** Interleukin-4  
**Vehicle:** Saline;  
**Route:** CSF/CNS (ventricle);  
**Species:** Mice (knockout);  
**Pump:** 2006;  
**Duration:** 7 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (C57/Bl6 mice; 8-10 weeks, 25-30 g); ischemia (cerebral; stroke model); behavioral testing (Rotarod, corner, foot fault, and Morris water maze tests); learning, memory; Therapeutic indication (Cerebral ischemia); Dose (60 ng/day); Brain coordinates: −0.20 mm anterior and 1.00 mm lateral to bregma;


**Agents:** Interleukin-4, mouse recombinant  
**Vehicle:** BSA; PBS  
**Route:** In vitro (cell culture);  
**Species:** Cell culture;  
**Pump:** 2006;  
**Duration:** 4 weeks;  
**ALZET Comments:** 1% BSA used; immunology; "Osmotic pumps delivered IL-4 at a rate that closely followed the expected delivery rate." pg 1343; used vinyl tubing; pumps lead into mouse bone marrow macrophage augmented media; incubated 37C


**Agents:** Antibody, interleukin-4Ra  
**Route:** CSF/CNS (hippocampus);  
**Species:** Mice;  
**Pump:** 1004;  
**Duration:** 28 days;  
**ALZET Comments:** Controls received mp w/ control antibody; animal info (APPSwe/SP1dE9, 7-5 months old); ALZET brain infusion kit 3 used; neurodegenerative (Alzheimer’s disease); immunology; pumps primed 48 hours in 37C saline;

Interleukin-5


**Agents:** Interleukin-5, recombinant rat  
**Vehicle:** Not Stated;  
**Route:** Not Stated;  
**Species:** Rat (pregnant);  
**Pump:** 2002;  
**Duration:** 5 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (pregnant, 14-19 days gestation); cardiovascular; bp measured using catheter; preeclampsia;
**ALZET® Bibliography**


**Agents:** Interleukin-5  
**Vehicle:** PBS; BSA  
**Route:** IP  
**Species:** Mice (transgenic)  
**Pump:** 2001  
**Duration:** 8 days

**ALZET Comments:** Controls received mp w/ vehicle; Immunology; peptides; human IL-5 used

---

**Interleukin-6 (2017-Present)**

Q9853: Y. Zhang, et al. Ultraconserved element uc.333 increases insulin sensitivity by binding to miR-223. Aging 2020

**Agents:** Interleukin-6; Tumor necrosis factor, alpha  
**Vehicle:** Not Stated  
**Route:** SC  
**Species:** Mice  
**Pump:** Not Stated  
**Duration:** 7 days

**ALZET Comments:** Dose (16 ug/mL Interleukin-6; 16 ug/mL Tumor necrosis factor, alpha); animal info (8-week-old C57BL/6 mice); Interleukin-6 aka IL-6; Tumor necrosis factor, alpha aka TNF-a; diabetes

Q9854: K. Zhang, et al. Contribution of TGF-Beta-Mediated NLRP3-HMGB1 Activation to Tubulointerstitial Fibrosis in Rat With Angiotensin II-Induced Chronic Kidney Disease. Frontiers in Cell and Developmental Biology 2020;8(1)

**Agents:** Interleukin-6; Tumor necrosis factor, alpha  
**Vehicle:** Not Stated  
**Route:** SC  
**Species:** Mice  
**Pump:** Not Stated  
**Duration:** 7 days

**ALZET Comments:** Dose (1.0 mg/ml); Dose (1.0 mg/ml); Interleukin-6 aka IL-6; spinal cord injury


**Agents:** Interleukin-6; Interleukin-12; Interleukin-17; Interferon, gamma; Transforming Growth Factor-B1, anti; Interleukin-1 beta; Interleukin-10; Interleukin-12p35; Interleukin-1 beta, anti; Transforming Growth Factor-B1, anti; Interleukin-1 beta; Interleukin-6; Interleukin-10; Interleukin-12; Interleukin-17; Interferon, gamma; Transforming Growth Factor-B1, anti; Interleukin-1 beta; Interleukin-10; Interleukin-12; Interleukin-17; Interferon, gamma; Transforming Growth Factor-B1, anti

**Vehicle:** PBS  
**Route:** SC  
**Species:** Mice  
**Pump:** Not Stated  
**Duration:** 10 Days

**ALZET Comments:** Dose (IL-1b (83μg/ml); IL-6 (83μg/ml); IL-10 (166μg/ml); IL-12 (83μg/ml); IL-17 (125μg/ml); IFNγ (83μg/ml); TNFa (166μg/ml); anti-TGF-b1 (166μg/ml); anti-IL-1b (150μg/ml)); animal info (Eight- to twelve-week-old female C57BL/6 mice); Immunology


**Agents:** Interleukin-6  
**Vehicle:** Not Stated  
**Route:** SC  
**Species:** Mice  
**Pump:** Not Stated  
**Duration:** 15 days

**ALZET Comments:** Dose (1.0 mg/ml); Dose (1.0 mg/ml); Interleukin-6 aka IL-6; abdominal aortic injury


**Agents:** Interleukin-6, murine  
**Vehicle:** Not Stated  
**Route:** SC (left flank)  
**Species:** BPN3 Mice  
**Pump:** 1004  
**Duration:** 4 weeks

**ALZET Comments:** Dose (4.36 µg/kg/day); Controls were normotensive but no data about pump; animal info (wilde type male and female, 14-16 weeks); pre op. care (0.05 mg/kg buprehorphine); Interleukin-6 aka IL-6; antihypertensive IL-6; cardiovascular; Objective was to evaluate whether elevated tension may initiate IL-6 production to accumulate monocyte/macrophages and promote dilation of the abdominal aorta (AA). Result, yes, an IL-6 infusion model can initiate both macrophage accumulation and aortic dilation. Under elevated tension, IL-6 can be produced by aortic VSMCs. Proves biomechanical association between HTN and aortic dilation


**Agents:** Interleukin-6, human  
**Vehicle:** NaCl; BSA  
**Route:** Not Stated  
**Species:** Mice  
**Pump:** Not Stated  
**Duration:** 14 days

**ALZET Comments:** animal info (male, mINDY KO); 0.1% BSA used; immunology

www.alzet.com
Agents: Transforming growth factor-β1; SJN2511; Interleukin-6; Bovine serum albumin Vehicle: CSF; artificial; dextran; Route: CSF/CNS; Species: Mice; Pump: Not Stated; Duration: 7 days;
ALZET Comments: Dose (0.4mM BSA, 100 ng/ml (TGF-β1, 300μM SJN2511)); Controls received mp w/ vehicle; animal info (2- to 3-month-old FVB/N and C57BL/6 mice); SJN2511 is a selective blocker of the TGF-B type I receptor/ALK5; Brain coordinates (0.5 mm posterior, 1 mm lateral to bregma);

Agents: Interleukin-6, recomb. mouse Vehicle: Saline; Route: SC; Species: Mice; Pump: 1007D; Duration: 1 week;
ALZET Comments: Dose (16 mg/ml); Controls received mp w/ vehicle; animal info (12- to 15-wk-old male C57BL/6J mice);

Interleukin-7 (2011-Present)
Agents: Interleukin-7 Vehicle: PBS; Route: SC; Species: Mice; Pump: Not Stated; Duration: 5 days;
ALZET Comments: Controls received mp w/ vehicle; immunology; “we utilized osmotic pumps to administer recombinant IL-7 and increase IL-7 bioavailability in vivo... T-cell proliferation was dramatically increased in IL-7 pump installed mice compared to control PBS pump installed mice” pg 1671; Therapeutic indication (T-cell homeostasis); Dose (5 ug);

Agents: Interleukin-2; Interleukin-7; Interleukin-15 Route: SC; Species: Mice; Pump: 2001; Duration: 7 days;
ALZET Comments: Controls received mp w/ PBS; animal info (6-12 wks old, gender, age matched); immunology

Agents: Interleukin-7 Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 1007D; Duration: 7 days;
ALZET Comments: Controls received mp w/ PBS; animal info (C57BL/6, 6-16 wks old); post op. care (betadine)

Interleukin-8
Agents: Interleukin-8 Vehicle: BSA; Route: IA (renal); Species: Rat; Pump: 2ML1; Duration: 5 days;
ALZET Comments: controls received mp w/BSA; good methods (pg. 275); peptides; used PE-10 catheter stretched

Agents: Interleukin-1 receptor antagonist; Interleukin-6; Interleukin-1, beta heat inactivated; Interleukin-8; Interleukin-1, beta; Tumor necrosis factor-a Vehicle: Saline, sterile physiological; BSA; Route: CSF/CNS; Species: Rat; Pump: 2001; Duration: 7 day
ALZET Comments: controls received mp w/vehicle; guide cannula was used, and a sterile 29 g stainless steel obturator was used to ensure cannula patency during at least a 10 day recovery period after surgery; BSA added as stabilizing agent and carrier protein for cytokines; recomb. human IL-6 & 8 used
**Interleukin-10 (2016-Present)**

**Q8489:** E. E. Gillis, et al. IL-10 treatment decreases blood pressure in male, but not female, spontaneously hypertensive rats. American Journal of Physiology Renal Physiology 2020;319(3):F359-F365

**Agents:** Interleukin-10  
**Vehicle:** Not stated;  
**Route:** SC;  
**Species:** Rat;  
**Pump:** 2002;  
**Duration:** 2 weeks;  
**ALZET Comments:** Dose (3.5 ug/kg/day); animal info (11-wk-old male and female spontaneously hypertensive rats); Blood pressure measured via tail-cuff method;160 mmHg - 220 mmHg; Resultant plasma level (8 pg/mL IL-10); Interleukin-10 aka IL-10; cardiovascular;


**Agents:** Angiotensin II; Interleukin-10  
**Vehicle:** Saline;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** 1002;  
**Duration:** 14 days;  
**ALZET Comments:** Dose (1000 ng/kg/min Angiotensin II; 60 ng/day Interleukin-10); Controls received mp w/ vehicle; animal info (8 to 10 week old C57BL/6 male mice); Blood pressure measured via tail cuff method;121.7 mmHg - 183.3 mmHg; Angiotensin II aka Ang II, Interleukin-10 aka IL-10; cardiovascular;


**Agents:** Angiotensin II; Interleukin-10  
**Vehicle:** Saline;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** 1002;  
**Duration:** 14 days;  
**ALZET Comments:** Dose (1000 ng/kg/min Angiotensin II; 60 ng/day Interleukin-10); Controls received mp w/ vehicle; animal info (8 to 10 week old C57BL/6 male mice); Blood pressure measured via tail cuff method;121.7 mmHg - 183.3 mmHg; Angiotensin II aka Ang II, Interleukin-10 aka IL-10; cardiovascular;


**Agents:** Angiotensin II; Interleukin-10  
**Vehicle:** PBS;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** 1007D;  
**Duration:** 10 Days;  
**ALZET Comments:** Dose (Angiotensin II (1000 ng/kg/min); IL-10 (60ng/day)); Controls received mp w/ vehicle; animal info (Eight- to twelve-week-old female C57BL/6 mice); Immunology ("evaluate the suitability of osmotic pumps as a model for biofilms in implant associated infections."

**Q7344:** R. Gutierrez Jauregui, et al. IL-1beta Promotes Staphylococcus aureus Biofilms on Implants in vivo. Front Immunol 2019;10(1082

**Agents:** Interleukin-1 beta; Interleukin-6; Interleukin-10; Interleukin-12; Interleukin-23; Interferon, gamma; Tumor Necrosis Factor, alpha; Interleukin-1 beta, anti; Transforming Growth Factor-B1, anti  
**Vehicle:** PBS;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** 1007D;  
**Duration:** 10 Days;  
**ALZET Comments:** Dose (IL-1b (83μg/ml); IL-6 (83μg/ml); IL-10 (166μg/ml); IL-12 (83μg/ml); IL-17 (125μg/ml); IL-23 (166μg/ml); IFNγ (83μg/ml); TNFa (166μg/ml); anti-TGF-b1 (166μg/ml); anti-IL-1b (150μg/ml)); Controls received mp w/ vehicle; animal info (Eight- to twelve-week-old female C57BL/6 mice); Immunology ("evaluate the suitability of osmotic pumps as a model for biofilms in implant associated infections."


**Agents:** Angiotensin II, Interleukin-10  
**Vehicle:** PBS;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** 1002;  
**Duration:** 14 days;  
**ALZET Comments:** Dose (90 ng/min- Ang II, 0.5 ng/min- IL10); Controls received mp w/ vehicle; animal info (10-12 weeks old, male, C57BL/6, IL10 knockout); enzyme inhibitor (IL-10-immune-regulatory cytokine); cardiovascular;

**Q4854:** V. V. Lima, et al. Interleukin-10 limits increased blood pressure and vascular RhoA/Rho-kinase signaling in angiotensin II-infused mice. Life Sci 2016;145(137-143

**Agents:** Angiotensin II, Interleukin-10, recombinant mouse;  
**Vehicle:** Saline;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** 1002;  
**Duration:** 14 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, IL-10 -/- or WT, 10-12 weeks old); functionality of mp verified by plasma levels; immunology; bp measured using catheter; Dose (Ang II 90 ng/min; IL-10 0.5 ng/min);
**Agents:** Interleukin-10  **Vehicle:** PBS;  **Route:** SC;  **Species:** Mice;  **Pump:** 2001;  **Duration:** 9 days;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, female C57BL/6 mice, 8 – 12 weeks old); functionality of mp verified by hind limb muscle withdrawal; behavioral testing (running wheel); “Mice treated with systemic IL-10 had significantly less hyperalgesia compared with mice that received vehicle” pg. 75; analgesia produced by regular physical activity; Dose (2 ug/day);

**Interleukin-11**

Q4341: J. N. Buzzelli, et al. IL-1RT1 signaling antagonizes IL-11 induced STAT3 dependent cardiac and antral stomach tumor development through myeloid cell enrichment. ONCOTARGET 2015;6(679-695
**Agents:** Interleukin-11, recombinant human  **Vehicle:** Not Stated;  **Route:** SC;  **Species:** Mice;  **Pump:** 1007D;  **Duration:** 7 days;
**ALZET Comments:** Controls received mp w/ saline; animal info (WT or IL-1RT1, 12-14 weeks old); immunology;

**Agents:** Interleukin-11  **Vehicle:** Saline;  **Route:** IV (jugular);  **Species:** Rat;  **Pump:** 1003D;  **Duration:** 48 hours;
**ALZET Comments:** Controls received mp w/ vehicle; peptides; IL-11 was human recombinant; ischemia (intestinal);

**Agents:** Interleukin-11  **Vehicle:** Saline;  **Route:** IV (jugular);  **Species:** Rat;  **Pump:** 1003D;  **Duration:** 3 days;
**ALZET Comments:** controls received mp w/ vehicle; peptides; ischemia (bowel);

**Agents:** Interleukin-11; Stem cell factor; Granulocyte-colony stimulating factor, PEGylated; Erythropoietin  **Vehicle:** Not Stated;  **Route:** SC;  **Species:** Mice;  **Pump:** 2002; 1007D;  **Duration:** 7 days;
**ALZET Comments:** Controls received mp w/ saline; functionality of mp verified by pilot studies; no stress (see pg. 3223); peptides; recombinant human interleukin-11, EPO, & G-CSF used; recombinant rat stem cell factor used (pegylated);

**Agents:** Interleukin-11; Antibody, anti-interleukin-1 receptor  **Vehicle:** Serum, mouse; Saline, sterile;  **Route:** SC;  **Species:** Mice;  **Pump:** Not Stated;  **Duration:** 3, 7, 10, 13 days;
**ALZET Comments:** Controls received mp w/vehicle; comparison of sc injections vs. mp; immunology; peptides; cardiovascular; “Compared to SC injection, both the magnitude and duration of the platelet increase were significantly enhanced following continuous SC infusion.” (pg. 270)

**Interleukin-12 (2013-Present)**

**Agents:** Interleukin-1 beta; Interleukin-6; Interleukin-10; Interleukin-12; Interleukin-17; Interleukin-23; Interferon, gamma; Tumor Necrosis Factor, alpha; Interleukin-1 beta, anti; Transforming Growth Factor-B1, anti  **Vehicle:** PBS;  **Route:** SC;  **Species:** Mice;  **Pump:** 1007D;  **Duration:** 10 Days;
**ALZET Comments:** Dose (IL-1b (83μg/ml); IL-6 (83μg/ml); IL-10 (166μg/ml); IL-12 (83μg/ml); IL-17 (125μg/ml); IL-23 (166μg/ml); IFNg (83μg/ml); TNFa (166μg/ml); anti-TGF-b1 (166μg/ml); anti-IL-1b (150μg/ml)); Controls received mp w/ vehicle; animal info (8-12 week female C57BL/6 mice); Immunology (“evaluate the suitability of osmotic pumps as a model for biofilms)
ALZET®
Bibliography

Agents: Interleukin-12, recombinant human Vehicle: Saline; Route: SC; Species: Mice (SCID; NOD/SCID); Pump: 2004; Duration: 28 days;
ALZET Comments: Animal info (female, SCID and NOD/SCID, 8-10 weeks old); cancer (Lymphoma);

Agents: Interleukin-12, murine Vehicle: PBS; Route: CSF/CNS (intratumoral); Species: Mice; Pump: 1004; 2004; Duration: 28d
ALZET Comments: Controls received mp w/ vehicle; animal info (C57BL6); cancer (glioma); tissue perfusion (tumor; glioma); immunology; pumps primed at 37°C; pumps explanted after 28 days;

Interleukin-13 (2016-Present)
Agents: Etoposide, Bevacizumab, IMCA12, Interleukin-13-PE38, Tetrakis Chlorin Vehicle: Not Stated; Route: CSF/CNS (intratumoral); Species: Mice, Rat; Pump: 2001D, 1003D, 1007D, 1004, 2004; Duration: 24 hours, 3, 7, 21, 28 days;
ALZET Comments: ALZET brain infusion kit 1,2, and 3 used; cancer (Glioblastoma);

Agents: Interleukin-13 Pseudomonas exotoxin Vehicle: PBS; HSA; Route: CSF/CNS (intracranial); Species: Mice; Pump: 1003D; Duration: 3 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (tumor-bearing mice); cancer (glioblastoma multiforme); brain tissue distribution; HSA aka human serum albumin; CED model, convection-enhanced delivery; orthotopic mouse model of human glioma; Dose (3,700 kBq);

Agents: Interleukin-13 Pseudomonas exotoxin, recombinant. Route: IP; Species: Mice (nude); Duration: 14 days;
ALZET Comments: Animal info (nu/nu, 5-6 wks old); comparison of IP injections vs IP mp; IL-13-PE is a recombinant immunotoxin; "Mice receiving continuous IL-13-PE exhibited better tumor response compared to bolus administration" pg 1224

Agents: Interleukin-13 Vehicle: PBS; Albumin, human serum; Route: IP; Species: Mice (SCID); Pump: 1007D; Duration: 7 days;
ALZET Comments: Controls received vehicle injections; animal info (5-6 wks old, male, SCID); comparison of ip injections vs ip mp; cancer (pancreatic); "Compared with (bolus IP) administration of 50 ug/kg IL-13 cytotoxin daily for 7 consecutive days, (ALZET pumps) (infused over 7 days) significantly suppressed tumor growth (P = 0.022) from the beginning of the treatment until the end of the experiment... Compared with the (bolus IP) 50 ug/kg group, a significant prolonged survival time was observed in the (ALZET pump) 50 ug/kg group", pg 581

Q0583: J. D. Milner, et al. Sustained IL-4 exposure leads to a novel pathway for hemophagocytosis, inflammation, and tissue macrophage accumulation. Blood 2010;116(14):2476-2483
Agents: Interleukin-4, recombinant mouse; interleukin-13 recombinant mouse Vehicle: Not Stated; Route: SC; Species: Mice; Pump: Not Stated; Duration: 3 days;
ALZET Comments: Controls received mp w/ PBS; animal info (C57BL6, b6 Rag2 -/-, b6 Stat6 -/-); 100 ul sized pump used;
Interleukin-15


Agents: Interleukin-2; Interleukin-7; Interleukin-15 Route: SC; Species: Mice; Pump: 2001; Duration: 7 days;
ALZET Comments: Controls received mp w/ PBS; animal info (6-12 wks old, gender, age matched); immunology


Agents: Interleukin-15 Vehicle: Saline; Route: SC; Species: Mice; Pump: 1002; Duration: 4 weeks;
ALZET Comments: Pump modified to a 4 week infusion by partially dipping the pump in paraffin wax to reduce infusion rate to ~0.125 ul/hr


Agents: Interleukin-15, murine Vehicle: Not Stated; Route: Not Stated; Species: Mice; Pump: Not Stated; Duration: 14 days;
ALZET Comments: Animal info (Thy 1.1 C57BL/6)


Agents: Interleukin-15, recomb. human Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2002; Duration: 14 days;
ALZET Comments: Peptides; animal info (Fischer Brown Norway)

 Results and Discussion


Agents: Interleukin-15; brain-derived neurotrophic factor Vehicle: PBS; Route: CSF/CNS (striatum); Species: Mice; Pump: 1007D; Duration: 7 days;
ALZET Comments: Controls received mp w/ vehicle; immunology; animal info (male, C57BL6, 3 weeks or 2 months old); ALZET brain infusion kit 3 used; cancer (glioma, U87MG human); tissue perfusion (right striatum); immunology; pumps primed in 37C saline overnight;

Interleukin-31


Agents: Interleukin-31, mouse Vehicle: PBS; BSA; Route: SC; Species: Mice; Pump: Not Stated; Duration: 7-14 days;
ALZET Comments: Controls received mp w/ vehicle; immunology


Agents: Interleukin-31, recombinant mouse Route: SC; Species: Mice; Pump: Not Stated; Duration: 14 days;
ALZET Comments: animal info (6 – 8 week old, C57BL/6 and Trpv1 knockout mice); functionality of mp verified by observation of skin phenotype; dose-response (pg. 508.e5); Dose (20 mg/day);


Agents: Interleukin-31, recombinant mouse Vehicle: Not stated; Route: Not stated; Species: Mice; Duration: 3 weeks;
ALZET Comments: Dose (14 ug/day); animal info (BALB/c female mice, 10 weeks old);
Agents: Interleukin-31; TGF beta Vehicle: Saline; Route: SC; Species: Mice; Pump: Not Stated; Duration: 14 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (Male Balb/c mice aged 6–8 weeks); Resultant plasma level (194 (pg/ml)); Interleukin-31 aka IL-31, TGF beta aka TGFβ; dependence;

Leukemia Inhibitory Factor (2013-Present)
Agents: Leukemia inhibitory factor; Cytochrome C Vehicle: Saline; Route: CSF/CNS (secondary visual cortex); Species: Rat; Pump: 1007D; Duration: 7 days;
ALZET Comments: Dose (0.083 μg/μl); Controls received mp w/ vehicle; To control for unspecific effects of the infusion protocol, 2 animals were infused with cytochrome C (cytC, 8.3 μg/μl).animal info (Pigmented Long Evans); Brain coordinates (1 mm lateral to lambda into medial area 18);

Agents: Raf-Transducer cells, conditioned media; leukemia inhibitory factor; fibroblast growth factor 2; vascular endothelial growth factor Vehicle: CSF, artificial; Route: CSF/CNS; Species: Mice; Pump: 1007D; Duration: 6 days;
ALZET Comments: Controls received mp w/ vehicle or control media; animal info (male, C57Bl6, 50-100g); ALZET brain infusion kit 2 used; immunology; cyanoacrylate adhesive; Brain coordinates;

Agents: Leukemia inhibitory factor Vehicle: Saline; Route: CSF/CNS (intrathecal); Species: Mice; Pump: 2002; Duration: 3wk
ALZET Comments: Controls received mp w/ vehicle or sham surgery; animal info (C57BL, 8 weeks old); neurodegenerative (Parkinson’s disease); no stress (see pg. 368); behavioral testing (rotarod, bar grabbing, tremor analysis);

Q6718: C. Laterza, et al. iPSC-derived neural precursors exert a neuroprotective role in immune-mediated demyelination via the secretion of LIF. Nat Commun 2013;4(2597
Agents: Antibody, leukemia inhibitory factor neutralizing Vehicle: PBS; Route: CSF/CNS (lateral ventricle); Species: Mice; Pump: 1007D; Duration: 7 days;
ALZET Comments: Dose (2 micrograms per day); Controls received mp w/ vehicle; animal info (E2.5 pseudo-pregnant CD1 females,); ALZET brain infusion kit 3 used; Brain coordinates ((from bregma, 0.3mm anterior, 0.8 lateral);

Tumor Necrosis Factor (2017-Present)
Agents: Interleukin-6; Tumor necrosis factor, alpha Vehicle: Not Stated; Route: SC; Species: Mice; Pump: Not Stated; Duration: 7 days;
ALZET Comments: Dose (16 ug/mL Interleukin-6; 16 ug/mL Tumor necrosis factor, alpha); animal info (8-week-old C57BL/6 mice); Interleukin-6 aka IL-6; Tumor necrosis factor, alpha aka TNF-α; diabetes;

Q9854: K. Zhang, et al. Contribution of TGF-Beta-Mediated NLRP3-HMGB1 Activation to Tubulointerstitial Fibrosis in Rat With Angiotensin II-Induced Chronic Kidney Disease. Frontiers in Cell and Developmental Biology 2020;8(1
Agents: Interleukin-6; Tumor necrosis factor, alpha Vehicle: Not Stated; Route: SC; Species: Mice; Pump: Not Stated; Duration: 7 days;
ALZET Comments:
Q9546: X. Wang, et al. CTRP12 Alleviates Isoproterenol Induced Cardiac Fibrosis via Inhibiting the Activation of P38 Pathway. Chemical and Pharmaceutical Bulletin 2020; Agents: Tumor necrosis factor-alpha, recomb Vehicle: Not Stated; Route: SC; Species: Mice; Duration: 2 weeks; ALZET Comments: Dose (0.2 ug/g/d); animal info (C57BL6J male mice, 8-10 weeks old, 23.5-27.5 g);

Q8871: T. J. Lee, et al. Dual functions of CNS inflammation in food intake and metabolic regulation. Brain Research 2020;1740(146859 Agents: Tumor necrosis factor, alpha Vehicle: Saline; Route: CSF/CNS (third ventricle); Species: Rat; Pump: 1004; Duration: 3 weeks; ALZET Comments: Dose (0.5 pg/day); Controls received mp w/ vehicle; animal info (Male Sprague Dawley rats, 250-300 g); Brain coordinates (2.2 mm posterior to bregma, and 7.5 mm ventral to the dura); cardiovascular;

Q8864: W. Jiang, et al. CTRP1 prevents sepsis-induced cardiomyopathy via Sirt1-dependent pathways. Free Radical Biology and Medicine 2020;152(810-820 Agents: Tumor necrosis factor related protein 1, C1q, recomb. human globular domain Vehicle: Not Stated; Route: SC; Species: Mice; Pump: Not Stated; Duration: 3 days; ALZET Comments: Dose (0.2 μg/g per day); animal info (C57BL/6 mice, 8–12 weeks old, body weight: 24.5 ± 2 g); recombinant human globular domain C1q/tumor necrosis factor-related protein 1 aka rhCTRP1; cardiovascular;

Q9060: X. Wang, et al. Neuronal NMDAR Currents of the Hippocampus and Learning Performance in Autoimmune Anti-NMDAR Encephalitis and Involvement of TNF-alpha and IL-6. Frontiers in Neurology 2019;10(684 Agents: Tumor necrosis factor-a; Interleukin-6 Vehicle: CSF; Route: CSF/CSN; Species: Rat; Duration: 7 days; ALZET Comments: Dose (5 ug); Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 200-250 g); ALZET brain infusion kit XX used; bilateral cannula used; dental cement used;neurodegenerative (Seizure);

Q8796: A. Parker, et al. Elevated apoptosis impairs epithelial cell turnover and shortens villi in TNF-driven intestinal inflammation. Cell Death & Disease 2019;10(2):108 Agents: Tumor Necrosis Factor Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 2002; Duration: 2 weeks; ALZET Comments: Dose (35 ng/hr); animal info (C57BL/6, Female, 10-12 weeks old, 25 g); Tumor Necrosis Factor aka TNF;

Q7344: R. Gutierrez Jauregui, et al. IL-1beta Promotes Staphylococcus aureus Biofilms on Implants in vivo. Front Immunol 2019;10(1082 Agents: Interleukin-1 beta; Interleukin-6; Interleukin-10; Interleukin-12; Interleukin-23; Interferon, gamma; Tumor Necrosis Factor, alpha; Transforming Growth Factor-B1, anti Vehicle: PBS; Route: SC; Species: Mice; Pump: 1007D; Duration: 10 Days; ALZET Comments: Dose (IL-1b (83μg/ml); IL-6 (83μg/ml); IL-10 (166μg/ml); IL-12 (83μg/ml); IL-17 (125μg/ml); IL-23 (166μg/ml); IFNg (83μg/ml); TNFa (166μg/ml); anti-TGF-b1 (166μg/ml); anti-IL-1b (150μg/ml)); Controls received mp w/ vehicle; animal info (Eight- to twelve-week-old female C57BL/6 mice); Immunology (*evaluate the suitability of osmotic pumps as a model for biofilms in implant associated infections,

Q8783: L. Wu, et al. C1QTNF1 attenuates angiotensin II-induced cardiac hypertrophy via activation of the AMPKα pathway. Free Radical Biology and Medicine 2018;121(215-230 Agents: Angiotensin II; Tumor necrosis factor related protein 1, C1q, human recombinant Vehicle: Saline; Route: SC; Species: Mice; Pump: 1007D; Duration: 2, 4 weeks; ALZET Comments: Dose ((AngII 1.4 mg/kg/day), (C1QTNF1 0.2 μg/g/day)); Controls received sham surgery; animal info (8-10 weeks, male, C57BL/6 and C1QTNF1 KO, 25+/-2g); Multiple pumps per animal (2); C1QTNF1 is a member of the CTRP superfamily expressed in the myocardium; cardiovascular; recombinant human globular domain of C1QTNF1 used in mp. C1QTNF1 mp implanted 2 weeks after AngII infusion;
Agents: Tumor necrosis factor, alpha Vehicle: Saline; Route: Not Stated; Species: Mice; Pump: Not Stated; Duration: 2 weeks;
ALZET Comments: Dose (15 μg/ml at 0.5 μl/h); Controls received mp w/ vehicle; animal info (16 weeks, male, C57BL/6J, 30g); gene therapy; diabetes; pump route and model not stated. mp used for TNF-alpha-induced insulin resistance model;

Agents: Tumor necrosis factor, alpha Vehicle: Saline, BSA Buffered; Route: SC; Species: Mice; Pump: Not Stated; Duration: 7 days;
ALZET Comments: Dose (6.44 μg/ml at 1 μl/h); Controls received mp w/ vehicle; animal info (9 weeks, male, Gulo(-/-)); diabetes;

Agents: Tumor necrosis factor, alpha human recombinant Vehicle: PBS; Route: SC; Species: Mice; Pump: 1003D; Duration: 24 hours;
ALZET Comments: Controls received mp w/ vehicle; animal info (female, C57BL6, 5-6 months old); Dose (1 ug/kg/day);

Agents: Tumor necrosis factor-a Vehicle: Saline; Route: SC; Species: Mice; Pump: 1007D; Duration: Not Stated;
ALZET Comments: Controls received mp w/ vehicle; animal info (C57BL/6JAr); MRI; Therapeutic indication (Hypertension, pre-eclampsia, pregnancy); Dose (500 ng/kg/day);