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

Colony Stimulating Factor

Q0623: S. A. Lloyd, *et al.* Administration of high-dose macrophage colony-stimulating factor increases bone turnover and trabecular volume fraction. JOURNAL OF BONE AND MINERAL METABOLISM 2009;27(5):546-554
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

P3103: D. A. Vallera, *et al.* Antitumor protection from the murine T-cell leukemia/lymphoma EL4 by the continuous subcutaneous coadministration of recombinant macrophage-colony stimulating factor and interleukin-2. Cancer Research 1993;53(4273-4280
Agents: Colony-stimulating factor, Macrophage-; I-2; Colony stimulating factor, Granulocyte- **Route:** SC; **Species:** Mice
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)

Q9979: D. Szczesny, *et al.* Proof-of-concept study on improved efficacy of rHuEPO administered as a long-term infusion in rats. Pharmacological Reports 2020;72(5):1264-1270
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;

Q8440: S. Dey, *et al.* Sex-specific brain erythropoietin regulation of mouse metabolism and hypothalamic inflammation. JCI Insight 2020;5(5):
Agents: Erythropoietin, recomb. human **Vehicle:** Saline; **Route:** CSF/CNS (lateral cerebral ventricle); **Species:** Mice; **Pump:** 2006; **Duration:** 14 days;
ALZET Comments: Dose (3000 U/kg); Controls received mp w/ vehicle; animal info (Tg21 mice); recombinant human Erythropoietin aka recombinant human EPO; ALZET brain infusion kit 3 used; Brain coordinates (midline, 1.00 mm; antero-posterior, 0.34 mm; dorsoventral, 2.30 mm); dental cement used; replacement therapy (Erythropoietin);

Q8045: E. K. Kim, *et al.* Local Subcutaneous Injection of Erythropoietin Might Improve Fat Graft Survival, Whereas Continuous Infusion Using an Osmotic Pump Device Was Harmful by Provoking an Overwhelming Foreign Body Reaction in a Nude Mouse Model. Archives of Aesthetic Plastic Surgery 2018;24(3):128-133
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);

Q4880: E. H. Sanchez-Mendoza, *et al.* Implantation of Miniosmotic Pumps and Delivery of Tract Tracers to Study Brain Reorganization in Pathophysiological Conditions. Journal of Visualized Experiments 2016;107(1-9
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

Q6648: M. Rauner, *et al.* Increased EPO Levels Are Associated With Bone Loss in Mice Lacking PHD2 in EPO-Producing Cells. J Bone Miner Res 2016;31(10):1877-1887
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 Osx:cre-PHD2f/f and Vav:cre-PHD2f/f mice);

Q3130: G. B. Wang, *et al.* The AKT/mTOR pathway mediates neuronal protective effects of erythropoietin in sepsis. MOLECULAR AND CELLULAR BIOCHEMISTRY 2014;385(1-2):125-132
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);

Q3518: M. S. Jeffers, *et al.* Epidermal Growth Factor and Erythropoietin Infusion Accelerate Functional Recovery in Combination With Rehabilitation. Stroke 2014;45(185-+
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, recomb. 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);

Q0753: G. Driessens, *et al.* Development of a successful antitumor therapeutic model combining in vivo dendritic cell vaccination with tumor irradiation and intratumoral GM-CSF delivery. Cancer Immunology, Immunotherapy 2011;60(2):273-281
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)

Q9444: E. H. Sanchez-Mendoza, *et al.* Compromised Hippocampal Neuroplasticity in the Interferon-alpha and Toll-like Receptor-3 Activation-Induced Mouse Depression Model. Molecular Neurobiology 2020;57(7):3171-3182
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); ALZET brain infusion kit 3 used; Brain coordinates (0.2 mm anterior and 0.9 mm lateral to bregma);

Q8912: C. Nocito, *et al.* Centrally Acting Angiotensin-Converting Enzyme Inhibitor Suppresses Type I Interferon Responses and Decreases Inflammation in the Periphery and the CNS in Lupus-Prone Mice. Frontiers in Immunology 2020;11(573677
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);

Q8658: B. A. McLendon, *et al.* Pig conceptuses secrete interferon gamma to recruit T cells to the endometrium during the peri-implantation period dagger. Biology of Reproduction 2020;103(5):1018-1029
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;

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-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 wk female C57BL/6); evaluate suitability of osmotic mp as 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;

Q5030: C. Hoyo-Becerra, *et al.* Rapid Regulation of Depression-Associated Genes in a New Mouse Model Mimicking Interferon-alpha-Related Depression in Hepatitis C Virus Infection. Mol Neurobiol 2015;52(1):318-29
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; Dose (mIFN-a 250 IU/day; poly(I:C) 1 ug/day);

Q3963: J. Lee, *et al.* Intrauterine Coadministration of ERK1/2 Inhibitor U0126 Inhibits Interferon TAU Action in the Endometrium and Restores Luteolytic PGF(2alpha) Pulses in Sheep. Biology of Reproduction 2014;91(U177-U185
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;

Q3523: T. S. Johnson, *et al.* Etoposide Selectively Ablates Activated T Cells To Control the Immunoregulatory Disorder Hemophagocytic Lymphohistiocytosis. Journal of Immunology 2014;192(1):84-91
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)

Q10614: F. Mota, *et al.* A Reactivity-Based (18)F-Labeled Probe for PET Imaging of Oxidative Stress in Chemotherapy-Induced Cardiotoxicity. Molecular Pharmaceutics 2022;19(1):18-25
Agents: Doxorubicin **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 7 days;
ALZET Comments: Dose (30 mg/kg); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (Male; Wistar; Weighed 280-300 g); enzyme inhibitor (Doxorubicin); cardiovascular (cardiotoxicity)

Q10539: M. A. Harris, *et al.* ssDNA Nanotubes For Selective Targeting Of Glioblastoma And Delivery Of Doxorubicin For Enhanced Survival. Science Advances 2021;7(49):
Agents: Doxorubicin **Vehicle:** PBS; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose: (70 uM or 0.2 mg/kg)Controls received mp w/ vehicle; animal info: Eight-week-old mice; ALZET brain infusion kit 3 used; Brain coordinates (right hemisphere from bregma: anterior, 1.0 mm; and lateral, 1.5 mm); cancer (Glioblastoma);

Q10175: L. L. Guo, *et al.* Blocking Interleukin-1 Beta Reduces the Evolution of Thoracic Aortic Dissection in a Rodent Model. European Journal of Vascular and Endovascular Surgery 2020;60(6):916-924
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:** 1002; **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;

Q4611: Q. Liu, *et al.* Interaction between interleukin-1 beta and angiotensin II receptor 1 in hypothalamic paraventricular nucleus contributes to progression of heart failure. J Interferon Cytokine Res 2014;34(11):870-5
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, APOE3L.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)

Q10373: E. Deer, *et al.* Low Dose of IL-2 Normalizes Hypertension and Mitochondrial Function in the RUPP Rat Model of Placental Ischemia. Cells 2021;10(10):
Agents: Interleukin-2, recombinant **Vehicle:** Not Stated; **Route:** IP; **Species:** Rat; **Pump:** 2002; **Duration:** Not Stated;
ALZET Comments: Dose (0.05 ng/ml); animal info (Pregnant; 12 week old rats; Female; Treated with low dose of recombinant IL-2); Blood pressure measured via pressure transducer; ischemia (Placental); cardiovascular;

Q9200: M. W. Cunningham, Jr., *et al.* Investigation of interleukin-2-mediated changes in blood pressure, fetal growth restriction, and innate immune activation in normal pregnant rats and in a preclinical rat model of preeclampsia. Biology of Sex Differences 2021;12(1):4
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;

Q7344: R. Gutierrez Jauregui, *et al.* IL-1beta Promotes Staphylococcus aureus Biofilms on Implants in vivo. Front Immunol 2019;10(1082
Agents: IL-1 beta; IL-6; IL-10; IL-12; IL-17; IL-23; Interferon, gamma; Tumor Necrosis Factor, alpha; IL-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,

Q4522: P. T. Mantani, *et al.* IL-25 Inhibits Atherosclerosis Development in Apolipoprotein E Deficient Mice. PLoS One 2015;10(U1274-U1291
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;

Q4140: A. Y. Tilahun, *et al.* Systemic Inflammatory Response Elicited by Superantigen Destabilizes T Regulatory Cells, Rendering Them Ineffective during Toxic Shock Syndrome. Journal of Immunology 2014;193(2919-2930
Agents: IL-2, murine; antibody, anti-interleukin-2 **Vehicle:** PBS; **Route:** SC; **Species:** Mice (transgenic); **Duration:** 10 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (HLA-DR3); comparison of injection vs mp; immunology;

Q5597: K. R. Mott, *et al.* Role of interleukin-2 and herpes simplex virus 1 in central nervous system demyelination in mice. J Virol 2013;87(22):12102-9
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);

Q2613: S. C. Katz, *et al.* Anti-KIT designer T cells for the treatment of gastrointestinal stromal tumor. Journal of Translational Medicine 2013;11(;):U1-U10
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

Q1289: J. Quiel, *et al.* Antigen-stimulated CD4 T-cell expansion is inversely and log-linearly related to precursor number. Proceedings of the National Academy of Sciences of the United States of America 2011;108(8):3312-3317
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

Q1189: A. S. Y. Lo, *et al.* Anti-GD3 Chimeric sFv-CD28/T-Cell Receptor zeta Designer T Cells for Treatment of Metastatic Melanoma and Other Neuroectodermal Tumors. Clinical Cancer Research 2010;16(10):2769-2780
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)

Q10479: A. Freuchet, *et al.* IL-34 deficiency impairs FOXP3(+) Treg function in a model of autoimmune colitis and decreases immune tolerance homeostasis. Clinical and Translational Medicine 2022;12(8):e988
Agents: Interleukin-34, recombinant human **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Pump:** 1004; **Duration:** 14 days;
ALZET Comments: Dose: (.42 µg/h); animal info: NOD/SCID/Il2rg−/− (NSG) 8–12-week-old; peptide; immunology;

Q9900: B. Yaseen, *et al.* Interleukin-31 promotes pathogenic mechanisms underlying skin and lung fibrosis in scleroderma. Rheumatology 2020;59(9):2625-2636
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;

Q8594: T. Kan, *et al.* IL-31 induces antitumor immunity in breast carcinoma. Journal for ImmunoTherapy of Cancer 2020;8(2):
Agents: Interleukin-31, recombinant mouse **Vehicle:** Not stated; **Route:** Not stated; **Species:** Mice; **Pump:** Not stated;
Duration: 3 weeks;
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);

Q5345: M. Feld, *et al.* The pruritus- and TH2-associated cytokine IL-31 promotes growth of sensory nerves. J Allergy Clin Immunol 2016;138(2):500-508 e24
Agents: Interleukin-31, recombinant mouse **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **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);

Q2996: K. N. Rao, *et al.* Ikaros limits basophil development by suppressing C/EBP-alpha expression. Blood 2013;122(15):2572-2581
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)

Q10053: J. Pajarinen, *et al.* Interleukin-4 repairs wear particle induced osteolysis by modulating macrophage polarization and bone turnover. Journal of Biomedical Material Research Part A 2021;109(8):1512-1520
Agents: Polyethylene, ultra high molecular mass weight; IL-4, mouse recomb. **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 L-4); 1% BSA-PBS used; Controls received mp w/ vehicle; animal info (male BALB/cByJ, 10-12 weeks); post op. care (buprenorphine); functionality of mp verified by residual volume; pumps replaced every 4 weeks;

Q6977: Cottrell JN, *et al.* Interleukin-4 supplementation improves the pathophysiology of 4 hypertension in response to placental ischemia in RUPP rats. American Journal of Physiology Regulatory, Integrative, and Comparable Physiology 2019;316(2):R165-R171
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);

Q5193: T. Sato, *et al.* The effect of local IL-4 delivery or CCL2 blockade on implant fixation and bone structural properties in a mouse model of wear particle induced osteolysis. J Biomed Mater Res A 2016;104(9):2255-62
Agents: Ultra-high molecular weight polyethylene particles; interleukin-4, mouse recombinant **Vehicle:** BSA; PBS; **Route:** Bone (femur); **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;

Q5411: X. Liu, *et al.* Interleukin-4 Is Essential for Microglia/Macrophage M2 Polarization and Long-Term Recovery After Cerebral Ischemia. Stroke 2016;47(2):498-504
Agents: Interleukin-4 **Vehicle:** Saline; **Route:** CSF/CNS (ventricle); **Species:** Mice (knockout); **Pump:** 2001; **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;

Q4037: J. Pajarinen, *et al.* Modulation of mouse macrophage polarization in vitro using IL-4 delivery by osmotic pumps. JOURNAL OF BIOMEDICAL MATERIALS RESEARCH PART A 2015;103(1339-1345
Agents: IL-4, mouse recomb. **Vehicle:** BSA; PBS; **Route:** In vitro (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

Q4370: J. D. Cherry, *et al.* Arginase 1+ microglia reduce Abeta plaque deposition during IL-1beta-dependent neuroinflammation. Journal of Neuroinflammation 2015;12(U14-U26
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

Q3803: L. M. Amaral, *et al.* Progesterone supplementation attenuates hypertension and the autoantibody to the angiotensin II type I receptor in response to elevated interleukin-6 during pregnancy. American Journal of Obstetrics & Gynecology 2014;211(U377-U382
Agents: Interleukin-5, recombinant rat **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;

P5279: A. Mishra, *et al.* IL-5 promotes eosinophil trafficking to the esophagus. J Immunol 2002;168(5):2464-2469
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)

Q10978: R. Patel, *et al.* Signaling through the IL-6-STAT3 Pathway Promotes Proteolytically-Active Macrophage Accumulation Necessary for Development of Small AAA. Vascular and Endovascular Surgery 2023;57(5):433-444
Agents: Interleukin-6 **Vehicle:** Saline, sterile; **Route:** IP; **Species:** Mice; **Strain:** C57BL/6; IL-6KO; **Pump:** 1004; **Duration:** 21 days;
ALZET Comments: Dose: (4.36 µg/kg/day); Controls received mp w/ vehicle; animal info: wild-type mice; post op. care (subcutaneous injection of 0.05 mg/kg buprenorphine); functionality of mp verified by IL-6 plasma levels; cardiovascular; abdominal aortic aneurysm; immunology

R0439: Y. Chen, *et al.* Role of Interleukin-6 Family Cytokines in Organ Fibrosis. Kidney Diseases 2023;9(4):239-253
Agents: Interleukin-6; interleukin-31; transforming growth factor, beta **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (200 ng/day IL-31, 800 ng TGFb); Controls received mp w/ vehicle; animal info (Male; 6-8 weeks old); role of IL-6 in organ fibrosis

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; **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; **Duration:** 7 days;
ALZET Comments:

Q8361: E. E. Parks, *et al.* Interleukin 6 reduces allopregnanolone synthesis in the brain and contributes to age-related cognitive decline in mice. J Lipid Res 2020;61(10):1308-1319
Agents: Interleukin-6 **Vehicle:** Saline; **Route:** CNS/CSF; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (100 ng/day); Controls received mp w/ vehicle; animal info (Male, C57BL/6N); neurodegenerative

Q7344: R. Gutierrez Jauregui, *et al.* IL-1B Promotes Staphylococcus aureus Biofilms on Implants in vivo. Front Immunol 2019;10(1082
Agents: IL-1 beta; IL-6; IL-10; IL-12; IL-17; IL-23; IFN, gamma; Tumor Necrosis Factor, alpha; IL-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); evaluate suitability of osmotic mp as model for biofilms in implant associated infections

Q7205: L. Madaro, *et al.* Denervation-activated STAT3-IL-6 signalling in fibro-adipogenic progenitors promotes myofibres atrophy and fibrosis. Nat Cell Biol 2018;20(8):917-927
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; spinal cord injury;

Q10076: A. W. Akerman, *et al.* Elevated Wall Tension Initiates Interleukin-6 Expression and Abdominal Aortic Dilation. Annals of Vascular Surgery 2018;46(193-204
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 buprenorphine; 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;

Q5906: C. von Loeffelholz, *et al.* The human longevity gene homolog INDY and interleukin-6 interact in hepatic lipid metabolism. Hepatology 2017;66(2):616-630
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;

Q6604: D. Z. Milikovsky, *et al.* Electrocorticographic Dynamics as a Novel Biomarker in Five Models of Epileptogenesis. J Neurosci 2017;37(17):4450-4461
Agents: Transforming GF-β1; SJN2511; IL-6; BSA **Vehicle:** CSF; artificial; dextran; **Route:** CSF/CNS; **Species:** Mice; **Duration:** 7d
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); Brain coordinates (0.5 mm posterior, 1 mm lateral to bregma);

Q6218: A. K. Linnemann, *et al.* Interleukin 6 protects pancreatic beta cells from apoptosis by stimulation of autophagy. FASEB J 2017;31(9):4140-4152
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)

Q5839: H. K. Kim, *et al.* Distinct IL-7 signaling in recent thymic emigrants versus mature naive T cells controls T-cell homeostasis. European Journal of Immunology 2016;46(7):1669-80
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);

Q1289: J. Quiel, *et al.* Antigen-stimulated CD4 T-cell expansion is inversely and log-linearly related to precursor number. Proceedings of the National Academy of Sciences of the United States of America 2011;108(8):3312-3317
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

Q1758: M. J. Palmer, *et al.* Signaling thresholds govern heterogeneity in IL-7-receptor-mediated responses of naive CD8(+) T cells. Immunology and Cell Biology 2011;89(5):581-594
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

P3730: E. H. Garin, *et al.* Effect of interleukin-8 on glomerular sulfated compounds and albuminuria. Pediatric Nephrology 1997;11(274-279
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

P4097: C. R. Plata-Salaman, *et al.* Anorexia induced by chronic central administration of cytokines at estimated pathophysiological concentrations. Physiol. Behav 1996;60(3):867-875
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:** 7day
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)

Q11075: L. Gal, *et al.* Restoration of Motor Function through Delayed Intraspinal Delivery of Human IL-10-Encoding Nucleoside-Modified mRNA after Spinal Cord Injury. Research 2023;6(0056
Agents: Interleukin-10, human recombinant **Vehicle:** Not Stated; **Route:** CSF/CNS (spinal cord); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: Dose: (4 µg/ml); animal info (Female; Weighed 220-240 g); spinal cord injury;

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)

Q10023: M. F. Iulita, *et al.* CD4(+) Regulatory T Lymphocytes Prevent Impaired Cerebral Blood Flow in Angiotensin II-Induced Hypertension. Journal of American Heart Association 2019;8(1):e009372
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

Q8856: M. F. Iulita, *et al.* CD4(+) Regulatory T Lymphocytes Prevent Impaired Cerebral Blood Flow in Angiotensin II-Induced Hypertension. Journal of the American Heart Association 2019;8(1):e009372
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;

Q6788: M. F. Iulita, *et al.* CD4(+) Regulatory T Lymphocytes Prevent Impaired Cerebral Blood Flow in Angiotensin II-Induced Hypertension. J Am Heart Assoc 2019;8(1):e009372
Agents: Angiotensin II; IL-10, recomb. human **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (Angiotensin II (1000 ng/kg/min); IL-10 (60ng/day)); Controls received mp w/ vehicle; animal info (Eight- to 10-week-old C57BL/6 male mice); cardiovascular;

Q7344: R. Gutierrez Jauregui, *et al.* IL-1beta Promotes Staphylococcus aureus Biofilms on Implants in vivo. Front Immunol 2019;10(1082
Agents: IL-1 beta; IL-6; IL-10; IL-12; IL-17; IL-23; IFN, gamma; Tumor Necrosis Factor, alpha; IL-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 C57BL/6); evaluate suitability of osmotic mp as a model for biofilms in implant associated infections

Q7405: A. F. Bressan, *et al.* Interleukin-10 negatively modulates extracellular signal-regulated kinases 1 and 2 in aorta from hypertensive mouse induced by angiotensin II infusion. Fundam Clin Pharmacol 2019;33(1):31-40
Agents: Angiotensin II, Interleukin-10 **Vehicle:** Saline; **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);

Q5388: A. Leung, *et al.* Regular physical activity prevents chronic pain by altering resident muscle macrophage phenotype and increasing interleukin-10 in mice. Pain 2016;157(1):70-9
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;

P5900: K. A. Kuenzler, *et al.* IL-11 pretreatment reduces cell death after intestinal ischemia-reperfusion. Journal of Surgical Research 2002;108(2):268-272
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 recomb; ischemia (intestinal)

P5148: K. A. Kuenzler, *et al.* Interleukin-11 enhances intestinal absorptive function after ischemia-reperfusion injury. Journal of Pediatric Surgery 2002;37(457-459
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)

P4291: I. Roeder, *et al.* Interactions of erythropoietin, granulocyte colony-stimulating factor, stem cell factor, and interleukin-11 on murine hematopoiesis during simultaneous administration. Blood 1998;91(9):3222-3229
Agents: Interleukin-11; Stem cell factor; Granulocyte-colony stimulating factor, PEGylated; Erythropoietin **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; recomb. human interleukin-11, EPO, & G-CSF used; recomb. rat stem cell factor used (pegylated);

P3407: J. P. Leonard, *et al.* Constant subcutaneous infusion of rhIL-11 in mice: efficient delivery enhances biological activity. Experimental Hematology 1996;24(270-276
Agents: IL-11; Antibody, anti-IL-1 receptor **Vehicle:** Serum, mouse; Saline **Route:** SC; **Species:** Mice; **Duration:** 3, 7, 10, 13days
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)

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-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)

Q3101: C. M. Krejsa, *et al.* Interleukin-21 Enhances Rituximab Activity in a Cynomolgus Monkey Model of B Cell Depletion and in Mouse B Cell Lymphoma Models. PLoS One 2013;8(6):U875-U888
Agents: Interleukin-12, recomb. 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);

Q3684: J. V. Berg, *et al.* Intratumoral IL-12 combined with CTLA-4 blockade elicits T cell-mediated glioma rejection. Journal of Experimental Medicine 2013;210(13):2803-2811
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 37C; pumps explanted after 28 days;

Interleukin-13 (2016-Present)

R0378: B. Halle, *et al.* Convection-enhanced Drug Delivery for Glioblastoma: A Systematic Review Focused on Methodological Differences in the Use of the Convection-enhanced Delivery Method. Asian-Australasian Journal of Animal Sciences 2019;14(1):5-14
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);

Q5433: A. Suzuki, *et al.* Analysis of biodistribution of intracranially infused radiolabeled interleukin-13 receptor-targeted immunotoxin IL-13PE by SPECT/CT in an orthotopic mouse model of human glioma. J Nucl Med 2014;55(8):1323-9
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);

Q0801: T. Fujisawa, *et al.* Targeting IL-13Ralpha2 in human pancreatic ductal adenocarcinoma with combination therapy of IL-13-PE and gemcitabine. International Journal of Cancer 2011;128(5):1221-1231
Agents: Interleukin-13-Pseudomonas exotoxin, recomb. **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

Q1342: T. Shimamura, *et al.* Interleukin 13 Mediates Signal Transduction through Interleukin 13 Receptor alpha 2 in Pancreatic Ductal Adenocarcinoma: Role of IL-13 Pseudomonas Exotoxin in Pancreatic Cancer Therapy. Clinical Cancer Research 2010;16(2):577-586
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, recomb. mouse; interleukin-13 recomb. 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

Q10728: H. Y. Won, *et al.* The Timing and Abundance of IL-2Rbeta (CD122) Expression Control Thymic iNKT Cell Generation and NKT1 Subset Differentiation. Frontiers in Immunology 2021;12(642856
Agents: Interleukin-15 **Vehicle:** PBS; **Route:** Not Stated; **Species:** Mice; **Pump:** 1002; **Duration:** Not Stated;
ALZET Comments: Dose: (3 µg); Controls received mp w/ vehicle; animal info: Il-2RBTg BALB/c mice; Interleukin -15 aka (IL-15)immunology; "the frequency of CD8 T cells and specifically the number of CD44hi CXCR3+ memory phenotype CD8 T cells were substantially increased in mice that were implanted with IL-15- but not with PBS-releasing pumps"

Q1289: J. Quiel, *et al.* Antigen-stimulated CD4 T-cell expansion is inversely and log-linearly related to precursor number. Proceedings of the National Academy of Sciences of the United States of America 2011;108(8):3312-3317
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

P6963: L. J. Harcourt, *et al.* Interleukin-15 administration improves diaphragm muscle pathology and function in dystrophic mdx mice. American Journal of Pathology 2005;166(4):1131-1141
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

P9700: J. S. Do, *et al.* IL-15 produced and trans-presented by DCs underlies homeostatic competition between CD8 and gamma-delta T cells in vivo. Blood 2009;113(25):6361-6371
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)

P8943: E. E. Pistilli, *et al.* Systemic elevation of interleukin-15 in vivo promotes apoptosis in skeletal muscles of young adult and aged rats. Biochemical and Biophysical Research Communications 2008;373(1):20-24
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)

P7460: S. Roychowdhury, *et al.* IL-15 but not IL-2 rapidly induces lethal xenogeneic graft-versus-host disease. Blood 2005;106(7):2433-2435
Agents: Interleukin-15, recomb. human; interleukin-2, recomb. human **Vehicle:** PBS; albumin, human; **Route:** SC; **Species:** Mice (SCID); **Pump:** 1007D; **Duration:** 10 days;
ALZET Comments: Controls received mp w/ vehicle; immunology; animal info (female, CB17, hu-PBL-SCID, 8-12 weeks old)

Q4425: S. Garofalo, *et al.* Enriched environment reduces glioma growth through immune and non-immune mechanisms in mice. Nature Communications 2015;6(U26-U38
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; animal info (male, C57BL6, 3 weeks or 2 months old); ALZET BIKIII; cancer (glioma, U87MG human); tissue perfusion (right striatum); immunology; pumps primed in 37C saline overnight;

Interleukin-31

P7009: S. R. Dillon, *et al.* Interleukin 31, a cytokine produced by activated T cells, induces dermatitis in mice. Nature Immunology 2004;5(7):752-760
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

Q5345: M. Feld, *et al.* The pruritus- and TH2-associated cytokine IL-31 promotes growth of sensory nerves. J Allergy Clin Immunol 2016;138(2):500-508 e24
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);

Q8594: T. Kan, *et al.* IL-31 induces antitumor immunity in breast carcinoma. Journal for ImmunoTherapy of Cancer 2020;8(2):
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);

Q9900: B. Yaseen, *et al.* Interleukin-31 promotes pathogenic mechanisms underlying skin and lung fibrosis in scleroderma. Rheumatology 2020;59(9):2625-2636
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;

Leukemia Inhibitory Factor (2013-Present)

Q6323: M. Engelhardt, *et al.* Leukemia inhibitory factor impairs structural and neurochemical development of rat visual cortex in vivo. Mol Cell Neurosci 2017;79(81-92
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);

Q5190: Y. H. Rhee, *et al.* Neural stem cells secrete factors facilitating brain regeneration upon constitutive Raf-Erk activation. Sci Rep 2016;6(32025
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;

Q3111: Y. Liu, *et al.* Leukemia inhibitory factor promotes nestin-positive cells, and increases gp130 levels in the Parkinson disease mouse model of 6-hydroxydopamine. Neurosciences 2013;18(4):363-370
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)

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; **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 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-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,

Q8783: L. Wu, *et al.* C1QTNF1 attenuates angiotensin II-induced cardiac hypertrophy via activation of the AMPKa 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: 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/6J 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;

Q8779: S. Wang, *et al.* miR3383p mediates gluconeogenesis via targeting of PP4R1 in hepatocytes. Molecular Medicine Reports 2018;18(4):4129-4137
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;

Q7844: Z. Qing, *et al.* Vitamin C deficiency aggravates tumor necrosis factor alpha-induced insulin resistance. European Journal of Pharmacology 2018;829(1-11
Agents: Tumor necrosis factor, alpha **Vehicle:** Saline, BSA Buffered; **Route:** SC; **Species:** Mice; **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;

Q5898: M. C. L. Tse, *et al.* Tumor Necrosis Factor-alpha Promotes Phosphoinositide 3-Kinase Enhancer A and AMP-Activated Protein Kinase Interaction to Suppress Lipid Oxidation in Skeletal Muscle. Diabetes 2017;66(7):1858-1870
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);

Q5764: F. Charlton, *et al.* The protective effect of apolipoprotein in models of trophoblast invasion and preeclampsia. American Journal of Physiology Regulatory, Integrative, and Comparable Physiology 2017;312(1):R40-R48
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/6JArc); MRI; Therapeutic indication (Hypertension, pre-eclampsia, pregnancy); Dose (500 ng/kg/day);