



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

Interleukin-1 (2012-Present)

Q10599: L. Di Cesare Mannelli, *et al.* Neuronal Alarmin IL-1alpha Evokes Astrocyte-Mediated Protective Signals: Effectiveness in Chemotherapy-Induced Neuropathic Pain. *Neurobiology of Disease* 2022;168(105716)

Agents: Interleukin-1a **Vehicle:** Saline; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 1002; **Duration:** 10 days;
ALZET Comments: Dose (0.25 mL/h); Controls received mp w/ vehicle; animal info (Male; Weighed about 200-250 g); behavioral testing (Paw pressure test; Cold plate test); immunology;

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 pressure Interleukin-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);

Q6522: S. C. van Dalen, *et al.* Interleukin-1 is not involved in synovial inflammation and cartilage destruction in collagenase-induced osteoarthritis. *Osteoarthritis Cartilage* 2017;25(3):385-396

Agents: Interleukin-1 receptor antagonist **Vehicle:** Saline; **Route:** IP; **Species:** Mice; **Pump:** 1007D; **Duration:** 2 weeks;
ALZET Comments: Dose (37.5 ug/hr); Controls received empty mp; animal info (12 week old female C57BL/6 mice);

Q5549: B. B. Mishra, *et al.* Nitric oxide prevents a pathogen-permissive granulocytic inflammation during tuberculosis. *Nat Microbiol* 2017;2(17072)

Agents: Interleukin-1 receptor antagonist; 12/15-LOX inhibitors; SCH527123; 12-HETE; **Route:** SC; **Species:** Mice; **Duration:** 4 weeks;

ALZET Comments: Dose (IL-1Rn at 25 mg/kg; 12-HETE at 50 µg/kg; SCH527123 at 5 mg/kg); animal info (Nos2–/– mice);

Q6320: M. L. Bonnemaïson, *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 (PIGF 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



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; Cannula placement verified via brain coordinates; LOS aka losartan; IL-1B aka interleukin-1B; 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;

Q2635: G. S. Cho, *et al.* N-Methyl-D-aspartate receptor antagonists memantine and MK-801 attenuate the cerebral infarct accelerated by intracorpore callosum injection of lipopolysaccharides. *Neuroscience Letters* 2013;538(9):9-14

Agents: Antibody, interleukin-1 beta **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1003D; **Duration:** Not Stated; **ALZET Comments:** Animal info (Sprague Dawley, male, 260-270 g); ischemia

Q2617: T. Chiba, *et al.* Interleukin-1beta Accelerates the Onset of Stroke in Stroke-Prone Spontaneously Hypertensive Rats. *Mediators of Inflammation* 2012;(11):U1-U11

Agents: Interleukin-1, beta, recomb. rat **Vehicle:** PBS; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 weeks; **ALZET Comments:** Control animals received mp w/ vehicle; animal info (SHR, SHRSP. male, 10 wks old)

Interleukin-2 (2013-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;

Q10182: S. Hirose, *et al.* Impact of a Demyelination-Inducing Central Nervous System Virus on Expression of Demyelination Genes in Type 2 Lymphoid Cells. *Journal of Virology* 2021;95(4):

Agents: Interleukin 2 **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Mice; **Pump:** Not Stated; **Duration:** Not Stated; **ALZET Comments:** animal info: C57BL/6 mice; Interleukin-2 aka (IL-2); peptides; immunology;

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-1; Interleukin -2 aka (IL-2); peptides; immunology;

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;



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: 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;

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(1):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

Interleukin-3

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-/-)

P9822: T. Yoshimoto, *et al.* Basophils contribute to T_H2-IgE responses in vivo via IL-4 production and presentation of peptide-MHC class II complexes to CD4⁺ T cells. *NATURE IMMUNOLOGY* 2009;10(7):706-U54

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

ALZET Comments: Animal info (DO11.10, IL-4 deficient)

Q0809: S. Kim, *et al.* Basophils Can Directly Present or Cross-Present Antigen to CD8 Lymphocytes and Alter CD8 T Cell Differentiation into IL-10-Producing Phenotypes. *Journal of Immunology* 2009;183(5):3033-3039

Agents: Interleukin-3 **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice (transgenic); **Pump:** Not Stated; **Duration:** 7 days;

ALZET Comments: Animal info (C57BL/6, OT-I TCR-transgenic, IL-4KO B6); immunology

P9722: T. Shen, *et al.* T cell-derived IL-3 plays key role in parasite infection-induced basophil production but is dispensable for in vivo basophil survival. *International Immunology* 2008;20(9):1201-1209

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

ALZET Comments: Animal info (BALB/c, IL-3 deficient)

Interleukin-4 (2010-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; 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;



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); ischemia (placental);

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); healing, recovery; 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: 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 at 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;

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-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 and Gynecology* 2014;211(U377-U382

ALZET Comments: Interleukin-5, recombinant rat; Rat (pregnant); 2002; 5 days; 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

ALZET Comments: Interleukin-5; PBS; BSA; IP; Mice (transgenic); 2001; 8 days; Controls received mp w/ vehicle;



Interleukin-6 (2019-Present)

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

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

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 µg/mL Interleukin-6; 16 µg/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

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 µg); Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 200-250 g); bilateral cannula used; dental cement used; neurodegenerative (Seizure);

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: 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, we implanted osmotic pumps pre-colonized with bioluminescent Staphylococcus aureus");

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 (wild 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;



Interleukin-7 (2007-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); wound clips used; post op. care (betadine)

P9932: J. H. Park, *et al.* Signaling by intrathymic cytokines, not T cell antigen receptors, specifies CD8 lineage choice and promotes the differentiation of cytotoxic-lineage T cells. *NATURE IMMUNOLOGY* 2010;11(3):257-U10

Agents: Interleukin-7, recomb, mouse **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 2 weeks;

ALZET Comments: Animal info (79Z); immunology

Q0940: J. H. Park, *et al.* 'Coreceptor tuning': cytokine signals transcriptionally tailor CD8 coreceptor expression to the self-specificity of the TCR. *NATURE IMMUNOLOGY* 2007;8(10):1049-1059

Agents: Interleukin-7, recomb. mouse **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ PBS; animal info (C57BL/6)

Interleukin-8

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

ALZET Comments: Interleukin-8; BSA; IA (renal); Rat; 2ML1; 5 days; controls received mp w/BSA; good methods (pg. 275); peptides; used PE-10 catheter stretched to further reduce its diameter.

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

ALZET Comments: Interleukin-1 receptor antagonist; Interleukin-6; Interleukin-1, beta heat inactivated; Interleukin-8;

Interleukin-1, beta; Tumor necrosis factor- α ; Saline, sterile physiological; BSA; CSF/CNS; Rat; 2001; 7 days; 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;

Interleukin-10 (2019-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 μ g/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); Interleukin-10 aka IL-10; cardiovascular;

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 mmHg; Angiotensin II aka Ang II, Interleukin-10 aka IL-10; cardiovascular;

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;

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; Interleukin-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: 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, we implanted osmotic pumps pre-colonized with bioluminescent Staphylococcus aureus");

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;



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

ALZET Comments: Interleukin-11, recombinant human; SC; Mice; 1007D; 7 days; 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

ALZET Comments: Interleukin-11; Saline; IV (jugular); Rat; 1003D; 48 hours; 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

ALZET Comments: Interleukin-11; Saline; IV (jugular); Rat; 1003D; 3 days; controls received mp w/ vehicle; 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

ALZET Comments: Interleukin-11; Stem cell factor; Granulocyte-colony stimulating factor, PEGylated; Erythropoietin;; SC;; mice;; 2002; 1007D;; 7 days;; 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);agents were given in every combination;.

P3407: J. P. Leonard, *et al.* Constant subcutaneous infusion of rhIL-11 in mice: efficient delivery enhances biological activity. *Exp. Hematol* 1996;24(270-276

ALZET Comments: Interleukin-11; Antibody, anti-interleukin-1 receptor; Serum, mouse; Saline, sterile; SC; mice; 3, 7, 10, 13 days; 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 (2007-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); IFNγ (83µg/ml); TNFα (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); ("evaluate the suitability of osmotic pumps as a model for biofilms in implant associated infections, we implanted osmotic pumps pre-colonized with bioluminescent S. aureus");

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:** 28 days;

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 (2010-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, 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"

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 **Route:** SC; **Species:** Mice; **Duration:** 3 days;

ALZET Comments: Controls received mp w/ PBS; animal info (C57BL6, b6 Rag2 -/-, b6 Stat6 -/-); 100 ul sized pump used;

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

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"

Q4425: S. Garofalo, *et al.* Enriched environment reduces glioma growth through immune and non-immune mechanisms in mice. *Nature Communications* 2015;6(U26-U38)

ALZET Comments: Interleukin-15; brain-derived neurotrophic factor; PBS; CSF/CNS (striatum); Mice; 1007D; 7 days; Controls received mp w/ vehicle; 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;



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

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

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

ALZET Comments: Interleukin-15, murine; Mice; 14 days; 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

ALZET Comments: Interleukin-15, recomb. human; SC; Rat; 2002; 14 days; 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

ALZET Comments: Interleukin-15, recomb. human; interleukin-2, recomb. human; PBS; albumin, human; SC; Mice (SCID); 1007D; 10 days; Controls received mp w/ vehicle; immunology; animal info (female, CB17, hu-PBL-SCID, 8-12 weeks old).

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 to ~0.125 ul/hr

Interleukin-17

Q11031: J. Youwakim, *et al.* Neurovascular Coupling in Hypertension Is Impaired by IL-17A through Oxidative Stress. International Journal of Molecular Sciences 2023;24(4):

Agents: Angiotensin II; interleukin 17A, recombinant **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1002; 1007D; **Duration:** 14 days; 7 days;

ALZET Comments: Dose: Ang II 600 ng/kg/min, IL-17A 50 pg/kg/h; Controls received mp w/ vehicle; animal info: male, 10-12 weeks old; Blood pressure measured via Tail cuff; Blood pressure results see (pg.2) cardiovascular; hypertension

Q9968: O. K. Travis, *et al.* Interleukin-17 signaling mediates cytolytic natural killer cell activation in response to placental ischemia. American Journal of Physiology, Regulatory, Integrative and Comparative Physiology 2020;318(6):R1036-R1046

Agents: Interleukin-17 Receptor C **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** Not Stated;

ALZET Comments: Dose (100 pg/day); animal info (10-13 weeks old, 250-260 g, Sprague Dawley); ischemia (Placental);

Q9366: P. Mehrotra, *et al.* Mutation of RORgammaT reveals a role for Th17 cells in both injury and recovery from renal ischemia-reperfusion injury. American Journal of Physiology Renal Physiology 2020;319(5):F796-F808

Agents: Interleukin-17, recomb. human **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (50 or 100 ng/kg/day); Controls received mp w/ vehicle; animal info (male Lewis rats, 225-300 g); Recombinant human Interleukin-17 aka IL-17; ischemia (reperfusion injury);

Q8660: P. Mehrotra, *et al.* Mutation of RORgammaT reveals a role for Th17 cells in both injury and recovery from renal ischemia-reperfusion injury. Am J Physiol Renal Physiol 2020;319(5):F796-F808

Agents: Interleukin-17, recomb. human **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (50 or 100 ng/kg/day); Controls received mp w/ vehicle; animal info (male Lewis rats, 225-300 g); Recombinant human Interleukin-17 aka IL-17; ischemia (reperfusion injury);



Q9788: S. B. Gumusoglu, *et al.* Chronic maternal interleukin-17 and autism-related cortical gene expression, neurobiology, and behavior. *Neuropsychopharmacology* 2020;45(6):1008-1017

Agents: Interleukin-17A **Vehicle:** Saline; **Route:** SC; **Species:** SC; **Pump:** 1004; **Duration:** 4 weeks;

ALZET Comments: Dose (25 ng/hr); 0.9% Saline used; Controls received mp w/ vehicle; animal info (C57BL/6J); behavioral testing (Elevated Plus Maze Test, Open Field Test); neurodegenerative (Neurodevelopment);

Q7493: O. K. Travis, *et al.* Chronic infusion of interleukin-17 promotes hypertension, activation of cytolytic natural killer cells, and vascular dysfunction in pregnant rats. *Physiol Rep* 2019;7(7):e14038

Agents: Interleukin-17, A-F **Vehicle:** Not Stated; **Route:** IP; **Species:** Rat; **Pump:** 2002; **Duration:** 7 days;

ALZET Comments: Dose (150 pg/day); animal info (pregnant Sprague-Dawley rats 250-275g); immunology;

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); IFNγ (83µg/ml); TNFα (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, we implanted osmotic pumps pre-colonized with bioluminescent Staphylococcus aureus");

Q3063: D. C. Cornelius, *et al.* Administration of Interleukin-17 Soluble Receptor C Suppresses T(H)17 Cells, Oxidative Stress, and Hypertension in Response to Placental Ischemia During Pregnancy. *Hypertension* 2013;62(6):1068-1073

Agents: Interleukin-17 Receptor C **Vehicle:** Not Stated; **Route:** IP; **Species:** Rat; **Pump:** 2002; **Duration:** 1 week;

ALZET Comments: Animal info (Female, pregnant, Sprague Dawley; cardiovascular; antihypertensive; peptides)

Interleukin-18

Q5250: P. Pazos, *et al.* Divergent responses to thermogenic stimuli in BAT and subcutaneous adipose tissue from interleukin 18 and interleukin 18 receptor 1-deficient mice. *Sci Rep* 2015;5(17977)

Agents: Interleukin-18 **Vehicle:** Saline; **Route:** CSF/CNS (lateral ventricle); **Species:** Mice; **Pump:** 1007D; **Duration:** Not Stated;

ALZET Comments: Controls received mp w/ vehicle; animal info (10–11 weeks old Il18r1-KO, WT mice); brain infusion kit used; behavioral testing (cold-challenge); brain tissue distribution; effects of interleukin-18 on food intake, body composition and iWAT morphology; Dose (20 µg/mouse/7 days);

Q2061: H. K. Jung, *et al.* Interleukin-18 attenuates disruption of brain-blood barrier induced by status epilepticus within the rat piriform cortex in interferon-gamma independent pathway. *Brain Research* 2012;1447(1):126-134

Agents: Interleukin-18; antibody, anti-rat, IFN gamma **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 1 week;

ALZET Comments: Controls received mp w/ vehicle; animal info (Sprague Dawley, male, 7 wks old); ALZET BIK1 used

Q0259: T. Yaguchi, *et al.* Interleukin-18 regulates motor activity, anxiety and spatial learning without affecting synaptic plasticity. *Behavioural Brain Research* 2010;206(1):47-51

Agents: Interleukin-18 **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1007D; **Duration:** 4 days;

ALZET Comments: Controls received mp w/ serum; animal info (wt, IL-18 KO); behavioral testing (water maze test)



P9377: K. Miyoshi, *et al.* Interleukin-18-Mediated Microglia/Astrocyte Interaction in the Spinal Cord Enhances Neuropathic Pain Processing after Nerve Injury. *Journal of Neuroscience* 2008;28(48):12775-12787

Agents: Immunoglobulin G, goat; Antibody, Anti-interleukin-18; Antibody, Anti-leukin-18 receptor; Interleukin-18 binding protein; RNA, small interfering **Vehicle:** PBS; **Route:** CSF/CNS (intrathecal); **Species:** Rat; Mice; **Pump:** 1003D; 2001; **Duration:** 3, 7 days;

ALZET Comments: Controls received mp w/ vehicle or IgG or negative siRNA; peptides; animal info (male, Sprague Dawley, 200-250 g.; male, C57BL/6 wt, IL-18 $-/-$, 25-30 g.); siRNA targets TLR4 (toll-like receptor 4) or negative siRNA; behavioral testing (mechanical hypersensitivity, tactile allodynia)

Interleukin-20

P9860: K. Stenderup, *et al.* Interleukin-20 plays a critical role in maintenance and development of psoriasis in the human xenograft transplantation model. *British Journal of Dermatology* 2009;160(2):284-296

Agents: Interleukin-20, recomb. human **Species:** Mice (SCID); **Pump:** 2002; **Duration:** 4 weeks;

ALZET Comments: Controls received mp w/ vehicle; animal info (CB-17, 6-8 wks old)

Interleukin-23

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 (83 μ g/ml); IL-6 (83 μ g/ml); IL-10 (166 μ g/ml); IL-12 (83 μ g/ml); IL-17 (125 μ g/ml); IL-23 (166 μ g/ml); IFN γ (83 μ g/ml); TNF α (166 μ g/ml); anti-TGF-b1 (166 μ g/ml); anti-IL-1b (150 μ g/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, we implanted osmotic pumps pre-colonized with bioluminescent Staphylococcus aureus");

Interleukin-25

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;

Interleukin-27

Q11122: D. Kim, *et al.* Cell type specific IL-27p28 (IL-30) deletion in mice uncovers an unexpected regulatory function of IL-30 in autoimmune inflammation. *Scientific Reports* 2023;13(1):1812

Agents: IL-27, recombinant; IL-30, recombinant **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1007D; **Duration:** 7 days;

ALZET Comments: Dose (400 ng); Controls received mp w/ vehicle; immunology;

Q8390: K. A. Bockerstett, *et al.* Interleukin 27 Protects From Gastric Atrophy and Metaplasia During Chronic Autoimmune Gastritis. *Cellular and Molecular Gastroenterology Hepatology* 2020;10(3):561-579

Agents: Interleukin-27, recombinant **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 4 weeks;

ALZET Comments: Dose (800 ng); Controls received mp w/ vehicle; animal info (TxA23 mice, 20 g, 5 weeks of age); recombinant Interleukin-27 aka rIL27; cancer (gastric cancer);



Q2476: S. Shibata, *et al.* IL-27 Activates Th1-Mediated Responses in Imiquimod-Induced Psoriasis-Like Skin Lesions. *Journal of Investigative Dermatology* 2013;133(2):479-488

Agents: Interleukin-27, recomb. mouse **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** Not Stated; **ALZET Comments:** Animal info (C57BL/6, BALB/c, male, 7-11 wks old)

P8629: D. C. Fitzgerald, *et al.* Suppressive effect of IL-27 on encephalitogenic Th17 cells and the effector phase of experimental autoimmune encephalomyelitis¹. *Journal of Immunology* 2007;179(5):3268-3275

Agents: Interleukin-27, recomb. mouse **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 7 days; **ALZET Comments:** Controls received mp w/ vehicle; animal info (female, C57BL/6, 8-12 wks old); neurodegenerative (multiple sclerosis); "initially we tested i.p. injection of recombinant carrier-free IL-27 however, these experiments did not provide reproducible findings. To achieve continual, consistent delivery of cytokine throughout the treatment period, we implanted osmotic minipumps." (p. 3273); immunology

Interleukin-30

Q11122: D. Kim, *et al.* Cell type specific IL-27p28 (IL-30) deletion in mice uncovers an unexpected regulatory function of IL-30 in autoimmune inflammation. *Scientific Reports* 2023;13(1):1812

Agents: IL-27, recombinant; IL-30, recombinant **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1007D; **Duration:** 7 days; **ALZET Comments:** Dose (400 ng); Controls received mp w/ vehicle; immunology;

Interleukin-31

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. *J Immunother Cancer* 2020;8(2):

Agents: Interleukin-31, recombinant mouse; **Species:** Mice; **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

ALZET Comments: Interleukin-31, recombinant mouse; SC; Mice; 14 days; 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);

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

ALZET Comments: Interleukin-31, mouse; PBS; BSA; SC; Mice; 7-14 days; Controls received mp w/ vehicle; immunology.

Interleukin-34

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;