



References on the Administration of Interleukin Using ALZET® Osmotic Pumps

1. Interleukin-1

Q7035: Y. P. Zhang, *et al.* Mifepristone attenuates depression-like changes induced by chronic central administration of interleukin-1beta in rats. *Behav Brain Res* 2018;347(436-445)

ALZET Comments: Interleukin-1 beta; Saline, pyrogen-free; CSF/CNS (lateral ventricle); Rat; 1002; 14 days; 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);.

Q6989: Y. P. Zhang, *et al.* Mifepristone attenuates depression-like changes induced by chronic central administration of interleukin-1beta in rats. *Behav Brain Res* 2018;347(436-445)

ALZET Comments: Interleukin-1 beta; Saline; CSF/CNS (lateral ventricle); Rat; 1002; 14 days; Dose (10 ng/7uL/rat/day); animal info (Male Sprague Dawley rats (220–260 g)); behavioral testing (open field, elevated plus maze and sucrose preference); functionality of mp verified by residual volume; ALZET brain infusion kit used; Brain coordinates (AP=–1 mm, ML=+1.4 mm, DV=–1 mm.); Cannula placement verified via sectioning the brains coronally;.

Q6320: M. L. Bonnemaïson, *et al.* Interleukin-1beta as a driver of renal NGAL production. *Cytokine* 2017;91(38-43)

ALZET Comments: Interleukin-1 beta, mouse recomb.; PBS; SC; Mice; 1002; 14 days; 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. *Am J Pathol* 2016;186(6):1481-98

ALZET Comments: Placenta growth factor, recombinant human; antibody, interleukin-1B; PBS; SC; Mice; 1007D; 7 days; 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)

ALZET Comments: Interleukin-1beta; Interleukin-6; Saline; SC; Mice; 1007D; 7 days; 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)

ALZET Comments: Antibody, anti-interleukin-1a; antibody, anti-interleukin-6; antibody, tumor necrosis factor-alpha; antibody, macrophage inflammatory protein-1 alpha; CSF/CNS (intrathecal); Rat; 1002; 2 weeks; 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; catheter was fixed to surrounding muscle with 8-0 sutures; pumps removed after 2 weeks;.

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

ALZET Comments: Losartan; interleukin-1, beta; CSF, artificial; CSF, artificial; CSF/CNS; rats; 2004; 4 weeks; 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)



ALZET Comments: Endotoxin, LPS; interleukin-1B, recombinant murine; SC; Mice; 1004; 10 weeks; 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

ALZET Comments: Interleukin-1, beta; Interleukin-6; Saline; SC; Mice; 1007D; 7 days; 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.

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

ALZET Comments: Antibody, interleukin-1 beta; CSF/CNS; Rat; 1003D; 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;;(:):U1-U11

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

Q1003: T. P. Braun, *et al.* Central nervous system inflammation induces muscle atrophy via activation of the hypothalamic-pituitary-adrenal axis. *Journal of Experimental Medicine* 2011;208(12):2449-2463

ALZET Comments: Interleukin-1 beta; CSF, artificial; CSF/CNS; IP; Rat; 2001; 1003D; 3 days; Controls received mp w/ vehicle; animal info (Sprague Dawley, 250-350 g); ALZET brain infusion kit 2 used.

Q0621: H. Kimura, *et al.* The Chondroprotective Agent ITZ-1 Inhibits Interleukin-1 beta-Induced Matrix Metalloproteinase-13 Production and Suppresses Nitric Oxide-Induced Chondrocyte Death. *JOURNAL OF PHARMACOLOGICAL SCIENCES* 2009;110(2):201-211

ALZET Comments: Interleukin-1, beta; BSA; saline, sterile; Knee (articular cavity); Rat; 1007D; 7 days; Animal info (8 wks old, male, Sprague-Dawley, CRJ:IGS).

P9451: K. Temporin, *et al.* Interleukin-1 beta promotes sensory nerve regeneration after sciatic nerve injury. *Neuroscience Letters* 2008;440(2):130-133

ALZET Comments: Interleukin-1, beta; CSF/CNS (sciatic nerve); Rat; 2002; 2 weeks; Controls received mp w/ PBS; animal info (female, Wistar, 180-220 g., sciatic nerve injury); behavioral testing (motor function, toe spreading test, sensory function).

P9325: H. Anisman, *et al.* Influence of continuous infusion of interleukin-1-beta on depression-related processes in mice: corticosterone, circulating cytokines, brain monoamines, and cytokine mRNA expression. *Psychopharmacology* 2008;199(2):231-244

ALZET Comments: Interleukin-1, beta; Saline; BSA; SC; Mice; 3, 7 days; Controls received mp w/ vehicle; animal info (male, CD-1, 6-7 wks old); behavioral testing (motor activity).

P7971: I. R. S. Sosenko, *et al.* IL-1 alpha causes lung inflammation and maturation by direct effects on preterm fetal lamb lungs. *PEDIATRIC RESEARCH* 2006;60(3):294-298

ALZET Comments: Interleukin-1, alpha, recomb. ovine; Intratracheal; Sheep (fetus); 2001D; Controls received mp w/ saline; animal info (merino, ewes + fetuses); silicone tubing used to collect lung fluid; vinyl tubing for intratracheal infusion; tissue perfusion (trachea).

P7145: B. F. Mitchell, *et al.* Intraperitoneal infusion of proinflammatory cytokines does not cause activation of the rat uterus during late gestation. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2005;289(4):E658-E664



ALZET Comments: Interleukin-1 beta; tumor necrosis factor-alpha; Saline; IP; Rat (pregnant); 2001D; Controls received mp w/ vehicle; functionality of mp verified by residual volume.

P7096: Y. G. Park, *et al.* Effects of TGF-beta, TNF-alpha-, IL-beta and IL-6 alone or in combination, and tyrosine kinase inhibitor on cyclooxygenase expression, prostaglandin E₂ production and bone resorption in mouse calvarial bone cells. INTERNATIONAL JOURNAL OF BIOCHEMISTRY & CELL BIOLOGY 2004;36(11):2270-2280

ALZET Comments: Interleukin-1, beta; PBS; SC; Mice; 1003D; 72 hours; Controls received mp w/ vehicle.

P6764: S. Frewert, *et al.* Intratumoral infusion of interleukin-1 beta and interferon-gamma; induces tumor invasion with macrophages and lymphocytes in a rat glioma model. Neuroscience Letters 2004;364(3):145-148

ALZET Comments: Interleukin-1, beta recomb. rat; Interferon-gamma, recomb. rat; Saline, physiological; albumin, human serum; CSF/CNS (intratumoral); Rat; 1003D; 48 hours; Controls received mp w/ vehicle; tissue perfusion (tumor); cancer (glioma).

P5803: H. Korekane, *et al.* Mechanisms mediating metabolic abnormalities in the livers of Ehrlich ascites tumor-bearing mice. Archives of Biochemistry and Biophysics 2003;412(2):216-222

ALZET Comments: Ornithine decarboxylase-inducing factor; Interleukin-1, alpha; tumor necrosis factor- μ ; Interleukin-6; SC; IP; Mice; 1007D; 6 days; Controls received mp w/ PBS vehicle; cancer; IL-1 μ (human recomb) & ornithine decarboxylase-inducing factor (ODC factor) were infused via IP route; IL-6 was infused (SC).

P6205: H. L. Guo, *et al.* Manganese superoxide dismutase-plasmid/liposome (MnSOD-PL) intratracheal gene therapy reduction of irradiation-induced inflammatory cytokines does not protect orthotopic Lewis Lung Carcinomas. In Vivo 2003;17(1):13-21

ALZET Comments: Tumor necrosis factor-alpha; transforming growth factor-beta; interleukin-1; Saline, normal; SC; Mice; 1007D; 7 days; Controls received mp w/ vehicle; no stress (see pg. 17); cancer (lung).

P5878: B. Schoning, *et al.* Differences in immune cell invasion into the cerebrospinal fluid and brain parenchyma during cerebral infusion of interleukin-1 beta. NEUROLOGICAL SCIENCES 2002;23(5):211-218

ALZET Comments: Interleukin-1, beta; Interleukin-6; Tumor necrosis factor- α ; Albumin, human serum; CSF/CNS (hypothalamus, lateral ventricle); Rat; 1003D; 4,8,24,48 hours; Controls received mp w/ vehicle; functionality of mp verified by CSF cell infiltration; dose-response (p. 213); ALZET brain infusion kit used; IL-1 β was rat recomb; cannula position verified histologically; cytokine levels in CSF were assayed.

R0193: H. Anisman, *et al.* Cytokines as a stressor: implications for depressive illness. INTERNATIONAL JOURNAL OF NEUROPSYCHOPHARMACOLOGY 2002;5(4):357-373

ALZET Comments: Interleukin-1, beta; Rat; 1 week; Peptides; p. 360.

2. Interleukin-2

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

ALZET Comments: Interleukin-25, recombinant mouse; SC; Mice; 1004; 4 weeks; 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)

ALZET Comments: Interleukin-2, murine; antibody, anti-interleukin-2; PBS; SC; Mice (transgenic); 10 days; 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

ALZET Comments: Interleukin-2; PBS; CSF/CNS; SC; Mice; 2 weeks; 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

ALZET Comments: Interleukin-2, human; SC; Mice (nude); 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

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.

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

ALZET Comments: Interleukin-2, recomb.; PBS; albumin, human; SC; Mice (nude); 7 days; 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.

P9309: E. L. Lane, *et al.* Neuroinflammation in the generation of post-transplantation dyskinesia in Parkinson's disease. *NEUROBIOLOGY OF DISEASE* 2008;32(2):220-228

ALZET Comments: Interleukin-2; Saline; CSF/CNS (striatum); Rat; 2002; 12 days; Controls received mp w/ vehicle; animal info (female, Sprague Dawley); neurodegenerative (Parkinson's Disease); behavioral testing (rotational behavior and locomotor; axial, limb, and orolingual movements).

P8528: Z. C. Neal, *et al.* Flt3-L gene therapy enhances immunocytokine-mediated antitumor effects and induces long-term memory. *CANCER IMMUNOLOGY IMMUNOTHERAPY* 2007;56(11):1765-1774

ALZET Comments: Interleukin-2, recomb. human; SC; Mice; 2001; 4 days; Controls received mp w/ no treatment; cancer (neuroblastoma); peptides; animal info (female, A/J, ICR, 6-8 weeks old); gene therapy.

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).

P6765: Z. C. Neal, *et al.* Enhanced activity of Hu14.18-IL2 immunocytokine against murine NXS2 neuroblastoma when combined with interleukin 2 therapy. *Clinical Cancer Research* 2004;10(14):4839-4847

ALZET Comments: Interleukin-2, recomb. human; SC; Mice; 2001; 7 days; Controls received mp w/ PBS; no stress (see pg.4841); cancer (neuroblastoma); peptides.

P6450: W. C. Jean, *et al.* Effects of combined granulocyte-macrophage colony-stimulating factor (GM-CSF), interleukin-2, and interleukin-12 based immunotherapy against intracranial glioma in the rat. *Journal of Neuro-oncology* 2004;66(1-2):39-49

ALZET Comments: Colony-stimulating factor, GM; interleukin-2; interleukin-12; SC; Rat; 2004; 4 weeks; Cancer (gliosarcoma); GM-CSF was infused alone or with cytokines.

R0190: H. Anisman, *et al.* Further evidence for the depressive effects of cytokines: Anhedonia and neurochemical changes. *BRAIN BEHAVIOR AND IMMUNITY* 2002;16(5):544-556

ALZET Comments: Interleukin-2; Mice; 7 days; Controls received mp w/ saline; peptides; examined anhedonic effects of IL-2.



P4872: J. A. Margenthaler, *et al.* Immunogenicity of Ld+ transgenic mouse hearts. *Surgery* 2001;130(217-224

ALZET Comments: Interleukin-2; mice; 1007D; 7 days; controls received no IL-2 treatment; immunology; peptides.

P4815: S. Hautmann, *et al.* Treatment of metastatic hormone-refractory prostate adenocarcinoma (MatLyLu) in Copenhagen rats with micro-osmotic interleukin-2 pumps. *Anticancer Research* 2000;20(4495-4498

ALZET Comments: Interleukin-2;; Albumin, human;; SC; Peritumoral (orthotopic); Rat;; 2002;; Controls received mp w/ vehicle; functionality of mp verified by in vitro assay; no stress (see p. 4496); good methods pumps weighed p. 4496; cancer (prostate); immunology; peptides; rats had a prostatic adenocarcinoma tumor implanted; Albumin vehicle was 20% concentration; SC & peritumoral orthotopic implantation; Note: these pumps were left in for 28 days;.

P4630: M. Ueno. Lymphokine-activated killer cells induced in vivo in mice showing IL-2 toxicity have cytoplasmic granules containing perforin and its hemolytic activity. *Immunopharmacology* 1998;39(75-82

ALZET Comments: Interleukin-2;; SC;; mice;; 2001;; 8 days;; immunology; peptides; recomb. human IL-2 was used.

P4557: V. Schirmmacher, *et al.* Antagonistic effects of systemic interleukin 2 on immune Tcell-mediated graft-versus-leukemia reactivity. *Clinical Cancer Research* 1998;4(2635-2645

ALZET Comments: Interleukin-2, recomb. human;; PEG;; mice;; 2002;; 12 days;; controls received mp w/vehicle; comparison of IP injections of PEG-IL-2 vs. IL-2 infusion via mp; cancer; immunology; peptides;.

P4089: S. Johansson, *et al.* The response of Dunning R3327 prostatic adenocarcinoma to IL-2, histamine and radiation. *Br. J. Cancer* 1998;77(8):1213-1219

ALZET Comments: Interleukin-2; SC; Rat; 2002; 6 weeks; pumps replaced every 2 weeks; cancer; immunology; peptides.

P4112: S. Hautmann, *et al.* Treatment of metastatic hormone refractory adenocarcinoma of the prostate (mat ly ly) with micro-osmotic interleukin-2 pump in male copenhagen rats. *Eur. Urol* 1998;34(265-266

ALZET Comments: Interleukin-2; Albumin; intratumoral; Rat; no duration posted; controls received mp w/albumin; tissue perfusion (intratumoral); cancer (prostate); immunology; peptides.

P3731: F. Galbiati, *et al.* Regulation of the IL-12 receptor B2 subunit by soluble antigen and IL-12 in vivo. *Eur. J. Immunol* 1998;28(209-220

ALZET Comments: Interleukin-12; Interleukin-2; Lysozyme, hen egg white; Ovalbumin; Interferon-gamma; PBS; Albumin, mouse serum; SC; mice; 2001; 9 days; controls received mp w/ PBS; comparison of ip injections vs. mp; immunology; peptides; agents infused singly or in combination in the same pump; recomb. human IL-2 used; recomb. mouse IFN-gamma used.

P6325: M. Isobe, *et al.* Regulation by Differential Development of Th1 and Th2 Cells in Peripheral Tolerance to Cardiac Allograft Induced by Blocking ICAM-1/LFA-1 Adhesion. *Circulation* 1997;96(2247-2253

ALZET Comments: Interleukin-2, recomb.; Culture medium, RPMI 1640; fetal calf serum; Mice; 1007D; 7 days; Cardiovascular.

P4466: T. A. Fehniger, *et al.* Stem cell factor enhances interleukin-2-mediated expansion of murine natural killer cells in vivo. *Blood* 1997;90(9):3647-3653

ALZET Comments: Interleukin-2; PBS; Serum, syngenic mouse; SC; Mice; 8 weeks; Controls received mp w/vehicle; functionality of mp verified by plasma levels; long-term study, pump replaced every 10 days; immunology; peptides.

P3594: K. Kuroda, *et al.* Implantation of IL-2-containing osmotic pump prolongs the survival of superantigen-reactive T cells expanded in mice injected with bacterial superantigen. *J. Immunol* 1996;157(1422-1431

ALZET Comments: Interleukin-2; SC; mice; 2001; no duration posted; immunology; peptides; penicillin g given prophylactically; recomb. human IL-2 used.



P4572: R. P. Junghans, *et al.* Metabolism of Tac (IL2Ra): Physiology of cell surface shedding and renal catabolism, and suppression of catabolism by antibody binding. *J. Exp. Med* 1996;183(1587-1602

ALZET Comments: Interleukin-2 receptor-alpha;; ¹³¹I tracer;; SC;; mice;; 7 days;; functionality of mp verified by plasma levels; comparison of IP injections vs. mp; IL-2 receptor-alpha also called CD25 or Tac; pumps were used to infuse radiolabeled receptor;.

P4095: U.-K. Hanisch, *et al.* Neurotoxicity induced by interleukin-2: involvement of infiltrating immune cells. *Synapse* 1996;24(104-114

ALZET Comments: Interleukin-2; CSF/CNS; Rat; 1007D; 2002; 7,14 days; controls received mp w/heat-inactivated IL-2 or IL-3; functionality of mp verified by emptied drug reservoir; good methods (pp. 105-106); ALZET brain infusion kit used; no stress - "icv delivery of solutions at a rate of 0.5 ul/h was shown previously not to cause any tissue damage due to volume overload." (p. 106); recomb. human IL-2 used.

P2849: T. Patselas, *et al.* Role of natural killer and killer cells in concordant xenograft rejection. *Transplant. Proc* 1995;27(1):262-263

ALZET Comments: Interleukin-2; mice; 3 days; no comment posted.

P2942: G. B. Schneider, *et al.* Effects of interleukin-2 on bone resorption and natural immunity in osteopetrotic (ia) rats. *Lymphokine Cytokine Res* 1994;13(6):335-341

ALZET Comments: Interleukin-2; Rat; 2002; 14 days; controls received mp with vehicle; immunology; peptides; normal and incisors absent osteopetrotic rats used; recomb. human IL-2 used.

P2510: H. Ishizu, *et al.* Immune-mediated regression of 'metastatic' neuroblastoma in the liver. *J. Pediatr. Surg* 1994;29(2):155-160

ALZET Comments: Interleukin-2; Saline; Serum; intrasplenic; mice; 14 days; tissue perfusion (spleen); dose-response (graph, p.156); cancer; immunology; peptides.

P2749: U.-K. Hanisch, *et al.* Hypothalamic-pituitary-adrenal activity during chronic central administration of interleukin-2. *Endocrinology* 1994;135(6):2465-2472

ALZET Comments: Interleukin-2; Interleukin-2, inactivated; PBS; Albumin, bovine serum; CSF/CNS; Rat; 2002; 14 days; controls received mp w/ inactivated IL-2 or only cannula implantation; functionality of mp verified by opening pump body after infusion; no stress (see pg. 2466); stability verified for up to 7 days at 37C in cat CSF w/o any decrease in biological activity; peptides; ALZET brain infusion kit used; minimal tissue damage confined to cannula tract; recomb. human IL-2 used.

P2292: P. H. Basse, *et al.* Accumulation of adoptively transferred A-NK cells in murine metastases: kinetics and role of interleukin-2. *In Vivo* 1994;8(17-24

ALZET Comments: Interleukin-2-PEG; Interleukin-2; IP; mice; no duration posted; cancer; half-life prolonged by complexing IL-2 to polyethylene glycol.

3. Interleukin-3

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);.

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

ALZET Comments: Interleukin-3; SC; Mice; 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

ALZET Comments: Interleukin-3; PBS; SC; Mice; 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

ALZET Comments: Interleukin-3; Mice (transgenic); 7 days; 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

ALZET Comments: Interleukin-3; Mice; Animal info (BALB/c, IL-3 deficient).

P8557: K. Oh, *et al.* Induction of Th2 type immunity in a mouse system reveals a novel immunoregulatory role of basophils. *Blood* 2007;109(7):2921-2927

ALZET Comments: Interleukin-3; SC; Mice; mice (transgenic); 7 days; Controls received mp w/ PBS or no treatment; immunology; peptides; animal info (C57BL/6, BIO.A Rag -/-); "Sought an alternative strategy to generate basophils in vivo by administering IL-3 into mice via a miniosmotic pump." (p. 2923).

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.

P3567: K. Tsuji-Takayama, *et al.* IFN-gamma in combination with IL-3 accelerates platelet recovery in mice with 5-fluorouracil-induced marrow aplasia. *J. Interferon and Cytokine Res* 1996;16(447-451

ALZET Comments: Interferon-gamma; Interleukin-3; Albumin, mouse serum; PBS; SC; mice; 1007D; 7 days; controls received mp w/ vehicle; stability verified after 7 day storage; immunology; peptides; cytokines given singly and together.

P2523: T. Berney, *et al.* Murine autoimmune hemolytic anemia resulting from Fc-gamma receptor-mediated erythrophagocytosis: protection by erythropoietin but not by interleukin-3, and aggravation by granulocyte-macrophage colony-stimulating factor. *Blood* 1992;79(11):2960-2964

ALZET Comments: Erythropoietin; Interleukin-3; Colony-stimulating factor, GM; PBS; Glycerol; SC; mice; 2002; 14 days; immunology; peptides.

P2970: T. Shibata, *et al.* Interleukin 3 perfusion prevents death due to acute anemia induced by monoclonal antierythrocyte autoantibody. *J. Exp. Med* 1990;171(1809-1814

ALZET Comments: Interleukin-3; Colony-stimulating factor, GM; Erythropoietin; PBS; Glycerol; LPS, e. coli; SC; mice; 2002; no duration posted; controls received mp with vehicles +/- LPS; immunology; peptides; recomb. mouse GM-CSF & IL-3 used; recomb. human EPO used.

P1603: M. Kamegai, *et al.* Interleukin 3 as a trophic factor for central cholinergic neurons in vitro and in vivo. *Neuron* 1990;2(429-436

ALZET Comments: Interleukin-3; Nerve growth factor; Albumin, bovine serum; PBS; CSF/CNS; 2002; 14 days; two doses of hIL-3 infused; B-NGF used; human IL-3 used.

R0089: A. Amkraut, *et al.* Osmotic delivery of peptides and macromolecules. *Adv. Drug Delivery Review* 1990;4(255-276

ALZET Comments: Atrial natriuretic factor; cholecystokinin; Granulocyte-colony stimulating factor.; glucagon; insulin; interleukin-2; interleukin-3; melatonin; nerve growth factor; neurotensin; prolactin; theophylline; CSF/CNS; IA (femoral); intrasplenic; IP; SC; no duration posted; peptides; ALZA-authored, review of peptide delivery issues and applications; tissue perfusion (spleen).



P1263: M. Kimoto, *et al.* Recombinant murine IL-3 fails to stimulate T or B lymphopoiesis in vivo, but enhances immune responses to T cell-dependent antigens. *J. Immunol* 1988;140(6):1889-1894

ALZET Comments: Interleukin-3, recomb. mouse; Penicillin; Streptomycin; Glycerol; PBS; IP; SC; mice; 2001; 2002; 7 days, 2 weeks; controls received mp w/vehicle; 2002 mp infused IL-3 ip for 2 weeks, additional mps implanted sc; peptides; antibiotics; IL-3 infused simultaneously with penicillin and streptomycin.

P7959: S. Kamel-Reid, *et al.* Engraftment of Immune-Deficient Mice with Human Hematopoietic Stem Cells. *Science* 1988;242(4886):1706-1709

ALZET Comments: Interleukin-3, human; colony-stimulating factor, GM, human; SC; Mice; mice (SCID); 4-5 weeks; 15 days; Controls received mp w/ saline; peptides; immunology.

P1144: T. Kalland. Physiology of Natural Killer Cells. *J. Immunol* 1987;139(11):3671-3675

ALZET Comments: Interleukin-2; Interleukin-3; SC; mice; 2001; 8, 16 days; controls received mp w/ unspecified vehicle or sham op; 2 experiments using mp, IL-2 infused for 8 days, IL-3 infused for 16 days; comparison of agents effects; pump replaced after eight days; peptides.

P0804: V. Kindler, *et al.* Stimulation of hematopoiesis in vivo by recombinant bacterial murine interleukin 3. *Proc. Natl. Acad. Sci* 1986;83(1001-1005

ALZET Comments: Endotoxin, E. coli; Interleukin-3, recomb. mouse; Penicillin; Streptomycin; Glycerol; PBS; SC; mice; 3 and 7 days; infusion supplemented w/ip injections; interleukin activity in blood variable - aggregation in pump? (see p. 1004); mp infusion in normal and irradiated mice; half-life; peptides; antibiotic.

4. Interleukin-4

Q6977: Cottrell JN, *et al.* Interleukin-4 supplementation improves the pathophysiology of 4 hypertension in response to placental ischemia in RUPP rats. *Am J Physiol Regul Integr Comp Physiol.* 2019;316(2):R165-R171

ALZET Comments: Interleukin-4; IP; Rat (pregnant); 19 days; 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

ALZET Comments: Ultra-high molecular weight polyethylene particles; interleukin-4, mouse recombinant; BSA; PBS; Bone (femur); Mice; 2006; 4 weeks; 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

ALZET Comments: Interleukin-4; Saline; CSF/CNS (ventricle); Mice (knockout); 2001; 7 days; 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

ALZET Comments: Interleukin-4, mouse recombinant; BSA; PBS; In vitro (cell culture); Cell culture; 2006; 4 weeks; 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



ALZET Comments: Antibody, interleukin-4Ra; CSF/CNS (hippocampus); Mice; 1004; 28 days; 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

ALZET Comments: Interleukin-4, recomb. mouse; interleukin-13 recomb. mouse; SC; Mice; 3 days; Controls received mp w/ PBS; animal info (C57BL6, b6 Rag2 -/-, b6 Stat6 -/-); 100 ul sized pump used; immunology.

P9263: L. Wang, *et al.* Blimp-1 induced by IL-4 plays a critical role in suppressing IL-2 production in activated CD4 T cells. *Journal of Immunology* 2008;181(8):5249-5256

ALZET Comments: Interleukin-4; ovalbumin; SC; Mice; 7 days; Immunology, animal info (CD45.1, C57BL/6).

P8350: A. Mizoguchi, *et al.* Dependence of intestinal granuloma formation on unique myeloid DC-like cells. *Journal of Clinical Investigation* 2007;117(3):605-615

ALZET Comments: Interleukin-4; IP; Mice; 3 weeks; Controls received mp w/ PBS; IL-4 knockout; animal info (C57BL/6, 9 weeks old).

P6048: Y. Zavros, *et al.* Treatment of Helicobacter gastritis with IL-4 requires somatostatin. *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA* 2003;100(22):12944-12949

ALZET Comments: Interleukin-4; interferon-gamma; PBS; IP; Mice; 1007D; 7 days; Controls received mp w/ vehicle; comparison of IP injections vs. IP mp.

P5093: S. K. Basak, *et al.* Increased dendritic cell number and function following continuous in vivo infusion of granulocyte macrophage-colony-stimulating factor and interleukin-4. *Blood* 2002;99(8):2869-2879

ALZET Comments: Interleukin-4; Colony-stimulating factor, GM; Saline; SC; mice; 1007D; 7 days; controls received mp w/ vehicle; functionality of mp verified by serum levels via ELISA; immunology; peptides; recombinant cytokines; agents administered singly or concomitantly.

P4362: T. T. Lee, *et al.* Neuroprotective effects of basic fibroblast growth factor following spinal cord contusion injury in the rat. *Journal of Neurotrauma* 1999;16(5):347-356

ALZET Comments: Interleukin-1; Interleukin-4; Interleukin-6; Fibroblast growth factor, basic; Nerve growth factor; Ciliary neurotrophic factor;; Water; PBS; BSA; CHAPS;; CSF/CNS (intrathecal);; Rat;; 2001;; 7 days;; controls received mp with vehicle; tissue perfusion (injury site); good methods; peptides; 1:10 dilutional effect of CSF confirmed by dye study; PE10/50 tubing used with pump and 30 gauge needle to deliver drugs through small dural plial opening;.

P4119: A. Mathur, *et al.* Effect of IL-7 or IL-4 on reconstitution of donor lymphoid cells in congenic murine bone marrow transplantation. *Bone Marrow Transplantation* 1995;16(119-124

ALZET Comments: Interleukin-7; Interleukin-4; PBS; IP; mice; 14 days; controls received mp w/vehicle; immunology; peptides; recomb. mouse IL-4 and IL-7 used.

P4096: A. E. Levy, *et al.* Administration of intragraft interleukin-4 prolongs cardiac allograft survival in rats treated with donor-specific transfusion/cyclosporine. *Transplantation* 1995;60(5):405-406

ALZET Comments: Interleukin-4; Interleukin-10; IA (brachiocephalic); Rat; 14 days; immunology; peptides; pump infused the brachiocephalic artery of a harvested heart, which was then implanted into a recipient; recomb. mouse IL-4 & IL-10 used.

P2803: J. M. Carballido, *et al.* IL-4 induces human B cell maturation and IgE synthesis in SCID-hu mice. *J. Immunol* 1995;155(4162-4170

ALZET Comments: Interleukin-4; PBS; SC; mice (SCID); 2002; no duration posted; long-term study, pumps replaced; immunology; human IL-4 used.



5. 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; Immunology; peptides; human IL-5 used.

6. Interleukin-6

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

ALZET Comments: Interleukin-6; SC; Mice; 15 days; Dose (1.0 mg/ml); Dose (1.0 mg/ml); Interleukin-6 aka IL-6; spinal cord injury;.

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

ALZET Comments: Interleukin-6, human; NaCl; BSA; Mice; 14 days; 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

ALZET Comments: Transforming growth factor- β 1; SJN2511; Interleukin-6; Bovine serum albumin; CSF; artificial; dextran; CSF/CNS; Mice; 7 days; Dose (0.4mM BSA, 100 ng/ml (TGF)- β 1, 300 μ M SJN2511); Controls received mp w/ vehicle; animal info (2- to 3-month-old FVB/N and C57BL/6 mice); SJN2511 is a selective blocker of the TGF-B type I receptor/ALK5; Brain coordinates (0.5 mm posterior, 1 mm lateral to bregma);.

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

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

Q5090: S. Wang, *et al.* MicroRNA 152 regulates hepatic glycogenesis by targeting PTEN. *FEBS J* 2016;283(10):1935-46

ALZET Comments: Interleukin-6; Mice; 7 days; animal info (male, C57Bl6J, 12 weeks old); diabetes;.

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)

ALZET Comments: Interleukin-1beta; Interleukin-6; Saline; SC; Mice; 1007D; 7 days; Dose (32.

Q4828: N. Gomez-Lopez, *et al.* Interleukin-6 controls uterine Th9 cells and CD8+ T regulatory cells to accelerate parturition in mice. *immunology and Cell Biology* 2016;94(79-89)

ALZET Comments: Interleukin-6, recomb. human; PBS; BSA; SC; Mice (pregnant); 1007D; 7 days; Controls received mp w/ vehicle; animal info (female, pregnant, Il6 +/+ or Il6 -/-, 11.5 dpc, 8-12 weeks old); 0.1% BSA used; immunology; Dose (5 ng/h);.



Q3865: L. Dou, *et al.* MiR-301a Mediates the Effect of IL-6 on the AKT/GSK Pathway and Hepatic Glycogenesis by Regulating PTEN Expression. *CELLULAR PHYSIOLOGY AND BIOCHEMISTRY* 2015;35(1413-1424

ALZET Comments: Interleukin-6; NaCl; BSA; SC; Mice; 2001; 7 days; Animal info (male, C57BL6J, 12 weeks old); 0.1% BSA used; immunology; diabetes;.

Q4408: L. Dou, *et al.* MiR-19a regulates PTEN expression to mediate glycogen synthesis in hepatocytes. *SCIENTIFIC REPORTS* 2015;5(U1-U11

ALZET Comments: Interleukin-6; NaCl; BSA; SC; Mice; 2001; 7 days; Animal info (male, C57BL6J, 12 weeks old); 0.1% BSA used; immunology;.

Q4198: S. L. Yan, *et al.* Platelet Activation and Platelet-leukocyte Aggregation Elicited in Experimental Colitis Are Mediated by Interleukin-6. *INFLAMMATORY BOWEL DISEASES* 2014;20(353-362

ALZET Comments: Interleukin-6, murine recombinant; SC; Mice; 1007D; 7 days; Controls received mp w/ saline; animal info (male, IL-6 -/- or C57BL6J, 8-12 weeks old); functionality of mp verified by plasma levels; cardiovascular; 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

ALZET Comments: Interleukin-1, beta; Interleukin-6; Saline; SC; Mice; 1007D; 7 days; 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.

Q3210: L. Dou, *et al.* miR-200s Contribute to Interleukin-6 (IL-6)-induced Insulin Resistance in Hepatocytes. *Journal of Biological Chemistry* 2013;288(31):22596-22606

ALZET Comments: Interleukin-6; NaCl; BSA; SC; Mice; 2001; 7 days; Animal info (C57BL/6J).

Q2303: A. Bonetto, *et al.* JAK/STAT3 pathway inhibition blocks skeletal muscle wasting downstream of IL-6 and in experimental cancer cachexia. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2012;303(3):E410-E421

ALZET Comments: Interleukin-6, recomb. murine; endotoxin, LPS; SC; Mice; 7 days; Animal info (C57BL/6J, male, IL-6 null); functionality of mp verified via blood IL-6 levels.

Q0597: X. L. Zhou, *et al.* Reversal of Cancer Cachexia and Muscle Wasting by ActRIIB Antagonism Leads to Prolonged Survival. *Cell* 2010;142(4):531-543

ALZET Comments: Interleukin-6, recomb.; Mice; 1, 3, 5 days; Controls received mp w/ saline; animal info (10 wks old, male, CDF1); pump infused at a rate of 1 ul/hr.

Q0175: G. C. Melendez, *et al.* Interleukin 6 Mediates Myocardial Fibrosis, Concentric Hypertrophy, and Diastolic Dysfunction in Rats. *Hypertension* 2010;56(2):225-231

ALZET Comments: Interleukin-6; Albumin, rat; IP; Rat; 2001; 7 days; Controls received mp w/ vehicle; cardiovascular; no stress (pg 227); animal info (male, Sprague-Dawley, 250-300 g); post op. care (buprenorphine HCl).

Q0616: X. L. Jin, *et al.* Interleukin-6 is an important in vivo inhibitor of intestinal epithelial cell death in mice. *Gut* 2010;59(2):186-196

ALZET Comments: Interleukin-6, recomb. murine; SC; IP; Mice; 7 days; Animal info (6-8 wks old, male, C57BL/6J).

P9453: A. A. Thomay, *et al.* Disruption of Interleukin-1 Signaling Improves the Quality of Wound Healing. *American Journal of Pathology* 2009;174(6):2129-2136

ALZET Comments: Interleukin-1 receptor antagonist, recomb. human; interleukin-6 recomb. mouse; Sodium citrate; sodium chloride; EDTA; Tween 80; PBS; SC; wound site; Mice; 1003D; 2002; 3, 14 days; Controls received mp w/ vehicle; animal info (male, B6D2F1, 8-12 wks, 27-30 g., IL-1R KO); mp was fitted with a polypropylene mesh collar containing a PVA sponge; agent also known as Anakinra; deep tissue wounds; 0.1% Tween 80 used; 0.5 mM EDTA;.



Q0523: A. Sultan, *et al.* T Cell-Mediated Inflammation in Adipose Tissue Does Not Cause Insulin Resistance in Hyperlipidemic Mice. *Circulation Research* 2009;104(8):961-U97

ALZET Comments: Interleukin-6, recomb. human; Saline; SC; Mice; 2001; 7 days; Controls received mp w/ saline; animal info (Apo^e-/-, ob/ob, 11 wks old).

P9544: P. W. Bodell, *et al.* Skeletal muscle growth in young rats is inhibited by chronic exposure to IL-6 but preserved by concurrent voluntary endurance exercise. *Journal of Applied Physiology* 2009;106(2):443-453

ALZET Comments: Interleukin-6, recomb. rat; Intramuscular (gastrocnemius); Rat; 2002; 14 days; Controls received mp w/vehicle; functionality of mp verified by residual volume; animal info (Sprague Dawley, 5.5 wks old, 118g); fenestrated catheter used.

P9235: I. Sonderegger, *et al.* GM-CSF mediates autoimmunity by enhancing IL-6-dependent Th17 cell development and survival. *Journal of Experimental Medicine* 2008;205(10):2281-2294

ALZET Comments: Interleukin-6, recomb. human; SC; Mice (transgenic); mice; 2001; 7 days; Controls received sham surgery; immunology; peptides; animal info (BALB/c, wt, GM-CSF -/-, DO11.10 TG, 8-12 wks old); "To ensure a continuous supply, we implanted osmotic minipump containing IL-6 in mice." (p. 2289).

P9220: A. G. Holmes, *et al.* Prolonged interleukin-6 administration enhances glucose tolerance and increases skeletal muscle PPAR alpha and UCP2 expression in rats. *Journal of Endocrinology* 2008;198(2):367-374

ALZET Comments: Interleukin-6, recomb. human; Saline; BSA; SC; Rat; 2ML2; 14 days; Controls received mp w/ vehicle; comparison of IP injections vs. mp; no stress (see pg. 369); peptides; animal info (male, Wistar, 220 g.); endocrinology.

P9018: E. I. Boesen, *et al.* Interleukin-1 beta, but not interleukin-6, enhances renal and systemic endothelin production in vivo. *American Journal of Physiology-Renal Physiology* 2008;295(2):F446-F453

ALZET Comments: Interleukin-6, recomb. mouse; NaCl; PBS; SC; Mice; 1002; 14 days; Controls received mp w/ vehicle; peptides; animal info (C57BL/6).

P8583: E. I. Boesen, *et al.* Effect of chronic IL-6 infusion on acute pressor responses to vasoconstrictors in mice. *Am J Physiol Heart Circ. Physiol* 2007;293(3):H1745-H1749

ALZET Comments: Interleukin-6, recomb. mouse; PBS; BSA; SC; Mice; 1002; 14 days; Controls received mp w/ vehicle; functionality of mp verified by plasma IL-6 concentrations; peptides; cardiovascular; animal info (C57BL/6, male).

P7785: X. L. Jin, *et al.* Paradoxical effects of short- and long-term interleukin-6 exposure on liver injury and repair. *Hepatology* 2006;43(3):474-484

ALZET Comments: Interleukin-6, recomb. mouse; Saline, sterile; IP; Mice; 7 days; Controls received mp w/ vehicle; functionality of mp verified by serum IL-6 levels; peptides; animal info (male, C57BL6/J).

P7821: Z. X. Cao, *et al.* The cytokine interleukin-6 is sufficient but not necessary to mimic the peripheral conditioning lesion effect on axonal growth. *Journal of Neuroscience* 2006;26(20):5565-5573

ALZET Comments: Interleukin-6, recomb. rat; Saline; CSF/CNS (intrathecal); Rat; 1002; 2 weeks; 24 hours; Controls received mp w/ vehicle; functionality of mp verified by residual volume; dose-response (fig. 7); no stress (see pg. 5571); peptides; animal info (female, Long-Evans, pg. 21-pg. 23; bilateral dorsal column lesion, 8wk old); mp primed at least 4 hours at 37 celsius.

P7192: S. P. M. Janssen, *et al.* Interleukin-6 causes myocardial failure and skeletal muscle atrophy in rats. *Circulation* 2005;111(8):996-1005

ALZET Comments: Interleukin-6, recomb. human; PBS; serum, rat; SC; Rat; 2001; 7 days; Controls received mp w/ vehicle plus human albumin; functionality of mp verified by serum rh IL-6 levels; dose-response; cardiovascular; peptides.

P7226: F. Haddad, *et al.* IL-6-induced skeletal muscle atrophy. *Journal of Applied Physiology* 2005;98(3):911-917



ALZET Comments: Interleukin-6; Saline; Intramuscular (tibialis anterior); Rat; 2002; 3,14 days; Controls received mp w/ vehicle or had contralateral muscle w/ no treatment; functionality of mp verified by residual volume; no stress (see pg. 912,913); good methods p. 912; peptides; mp primed in sterile saline at 37 degrees celsius.

P7165: S. H. Gieng, *et al.* Accumulation of retinol in the liver after prolonged hyporetinolemia in the vitamin A-sufficient rat. *Journal of Lipid Research* 2005;46(4):641-649

ALZET Comments: Interleukin-6, recomb. human; SC; Rat; 1003D, 2001; 3, 7 days; Controls received mp w/ PBS, no stress (see pg. 646), peptides.

P6991: C. Woiciechowsky, *et al.* Brain-IL-1beta triggers astrogliosis through induction of IL-6: Inhibition by propranolol and IL-10. *MEDICAL SCIENCE MONITOR* 2004;10(9):BR325-BR330

ALZET Comments: Tumor necrosis factor- α , recomb. rat; interleukin-1 beta, recomb. rat; interleukin-10, recomb. rat; interleukin-6, recomb. rat; Albumin, human serum; CSF/CNS; Rat; 1003D; 48 hours; Controls received mp w/ vehicle; dose-response (fig 1); ALZET brain infusion kit used; correct localization of cannula confirmed histologically.

P6814: Q. C. Wang, *et al.* Interleukin-6 inhibits the growth of prostate cancer xenografts in mice by the process of neuroendocrine differentiation. *International Journal of Cancer* 2004;111(4):508-513

ALZET Comments: Interleukin-6; SC; Mice (nude); 3 weeks; Controls received SC saline injections; comparison of SC injections vs. mp; no stress (see pg. 511); cancer (prostate).

P7700: M. Murata, *et al.* Interleukin-6 Protects Skin Lesion Caused by 7,12-Dimethylbenz[a]anthracene. *Journal of Vet. Med. Sci* 2003;65(4):511-513

ALZET Comments: Interleukin-6, recomb. human; PBS; serum, mouse; SC; Mice; 1007D; 6 days; Controls received mp w/ vehicle; functionality of mp verified by serum rhIL-6 levels; dose-response (table 1); toxicology; peptides; animal info (female, 20 wks old).

P5803: H. Korekane, *et al.* Mechanisms mediating metabolic abnormalities in the livers of Ehrlich ascites tumor-bearing mice. *Archives of Biochemistry and Biophysics* 2003;412(2):216-222

ALZET Comments: Ornithine decarboxylase-inducing factor; Interleukin-1, alpha; tumor necrosis factor- μ ; Interleukin-6; SC; IP; Mice; 1007D; 6 days; Controls received mp w/ PBS vehicle; cancer; IL-1 μ (human recomb) & ornithine decarboxylase-inducing factor (ODC factor) were infused via IP route; IL-6 was infused (SC).

P6074: P. J. Klover, *et al.* Chronic exposure to interleukin-6 causes hepatic insulin resistance in mice. *Diabetes* 2003;52(11):2784-2789

ALZET Comments: Interleukin-6; Saline; BSA; SC; Mice; 2001; 5 days; IL-6 plasma levels taken; 0.1% BSA used.

P5733: C. Barazzone-Argiroffo, *et al.* Glucocorticoids aggravate hyperoxia-induced lung injury through decreased nuclear factor-kappa B activity. *AMERICAN JOURNAL OF PHYSIOLOGY-LUNG CELLULAR AND MOLECULAR PHYSIOLOGY* 2003;284(1):L197-L204

ALZET Comments: Interleukin-6; SC; Mice; 1003D; 3 days; Controls received mp w/ mouse serum; functionality of mp verified by IL-6 serum levels; peptides; IL-6 is human recombinant.

P5878: B. Schoning, *et al.* Differences in immune cell invasion into the cerebrospinal fluid and brain parenchyma during cerebral infusion of interleukin-1 beta. *NEUROLOGICAL SCIENCES* 2002;23(5):211-218

ALZET Comments: Interleukin-1, beta; Interleukin-6; Tumor necrosis factor- α ; Albumin, human serum; CSF/CNS (hypothalamus, lateral ventricle); Rat; 1003D; 4,8,24,48 hours; Controls received mp w/ vehicle; functionality of mp verified by CSF cell infiltration; dose-response (p. 213); ALZET brain infusion kit used; IL-1 β was rat recomb; cannula position verified histologically; cytokine levels in CSF were assayed.

7. Interleukin-7



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

ALZET Comments: Interleukin-7; PBS; SC; Mice; 5 days; 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

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.

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

ALZET Comments: Interleukin-7; SC; Mice; 1007D; 7 days; 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

ALZET Comments: Interleukin-7, recomb, mouse; SC; Mice; 2 weeks; 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

ALZET Comments: Interleukin-7, recomb. mouse; SC; Mice; 7 days; Controls received mp w/ PBS; animal info (C57BL/6).

P8210: P. J. Lucas, *et al.* Dysregulation of IL-15-mediated T-cell homeostasis in TGF-beta dominant-negative receptor transgenic mice. *Blood* 2006;108(8):2789-2795

ALZET Comments: Interleukin-7, recomb. mouse; SC; Mice (transgenic); 7-14 days; Controls received mp w/ PBS; animal info (C57BL/6, 8-10 wk old).

P7263: B. Min, *et al.* Spontaneous and homeostatic proliferation of CD4 T cells are regulated by different mechanisms. *Journal of Immunology* 2005;174(10):6039-6044

ALZET Comments: Interleukin-7, recomb. mouse; Mice; mice (transgenic); 7, 28 days; Controls received mp w/ PBS; immunology; peptides.

P6978: Y. W. Chu, *et al.* Exogenous IL-7 increases recent thymic emigrants in peripheral lymphoid tissue without enhanced thymic function. *Blood* 2004;104(4):1110-1119

ALZET Comments: Interleukin-7, recomb. mouse; PBS; sucrose; serum, normal mouse; SC; Mice; 1007D; 1002; 7,14 days; Controls received mp w/ vehicle; replacement therapy (thymectomy); immunology.

Q5527: S. Sharma, *et al.* Intratumoral Therapy with Cytokine Gene-Modified Dendritic Cells in Murine Lung Cancer Models. *Lung Cancer* 2003;75(7):711-722

ALZET Comments: Interleukin-7; SC; Mice; 1002; 14 days; animal info (8-12 weeks); cancer (Lung cancer); Immunology (dendritic cells); Therapeutic indication (Lung cancer); Dose (5 ng/mL);.

Q6807: O. Alpdogan, *et al.* Administration of interleukin-7 after allogeneic bone marrow transplantation improves immune reconstitution without aggravating graft-versus-host disease. *Blood* 2001;98(7):2256-22656

ALZET Comments: Interleukin-7; PBS; SC; Mice (transgenic); 2002; 14 days; Dose (1 µg/d.); Controls received mp w/ vehicle; animal info (Female C57BL/6J (B6, H-2b), C3FeB6F1/J([B6 3 C3H]F1; H-2b/k), B10.BR (H-2k), and CBA/J (H-2k) mice), between 8 and 10 weeks of age or 9 months old; immunology;.



P4126: H. O. Valenzona, *et al.* Exogenous interleukin 7 as a proliferative stimulant of early precursor b cells in mouse bone marrow: efficacy of IL-7 injection, IL-7 infusion and IL-7-anti-IL-7 antibody complexes. *Cytokine* 1998;10(6):404-412

ALZET Comments: Interleukin-7; Water; Saline; Albumin, mouse serum; SC; mice; 1007D; no duration posted; controls received mp w/vehicle; functionality of mp verified by residual protein in reservoir; comparison of ip injections vs. mp; no stress (see p. 406); immunology; recomb. murine & human IL-7 used; peptides.

P4119: A. Mathur, *et al.* Effect of IL-7 or IL-4 on reconstitution of donor lymphoid cells in congenic murine bone marrow transplantation. *Bone Marrow Transplantation* 1995;16(119-124

ALZET Comments: Interleukin-7; Interleukin-4; PBS; IP; mice; 14 days; controls received mp w/vehicle; immunology; peptides; recomb. mouse IL-4 and IL-7 used.

8. 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; recomb. human IL-6 & 8 used.

9. Interleukin-10

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

ALZET Comments: Angiotensin II; Interleukin-10, recomb. human; PBS; SC; Mice; 1002; 14 days; 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;.

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

ALZET Comments: Angiotensin II; interleukin-10, recombinant mouse;; Saline; SC; Mice; 1002; 14 days; 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

ALZET Comments: Interleukin-10; PBS; SC; Mice; 2001; 9 days; 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);.

Q3357: F. J. Perez-Asensio, *et al.* Interleukin-10 regulates progenitor differentiation and modulates neurogenesis in adult brain. *Journal of Cell Science* 2013;126(18):4208-4219



ALZET Comments: Interleukin-10; U0126; Saline; SC; Mice; 1007D; 4 days; 7 days; Controls received mp w/ vehicle; animal info (IL-10 KO); immunology;

Q2644: K. Gotoh, *et al.* Spleen-Derived Interleukin-10 Downregulates the Severity of High-Fat Diet-Induced Non-Alcoholic Fatty Pancreas Disease. *PLoS One* 2012;7(12):U1111-U1123

ALZET Comments: Albumin, mouse; interleukin-10, recomb.; SC; Mice; 4 weeks; Animal info (C57BL/6, 22-25 g, KBT, IL-10 KO).

Q1657: K. Gotoh, *et al.* A novel anti-inflammatory role for spleen-derived interleukin-10 in obesity-induced hypothalamic inflammation. *Journal of Neurochemistry* 2012;120(5):752-764

ALZET Comments: Interleukin-10, recomb.; SC; Rat; mice; 4 weeks; Controls received mp w/ mouse serum albumin; animal info (C57Bl/6J, IL-10KO; Sprague Dawley, male).

Q0445: E. G. Hong, *et al.* Interleukin-10 Prevents Diet-Induced Insulin Resistance by Attenuating Macrophage and Cytokine Response in Skeletal Muscle. *Diabetes* 2009;58(11):2525-2535

ALZET Comments: Interleukin-10; Mice; 3 days; Controls received mp w/saline; animal info (male, C57BL/6, 10 wks old); diabetes.

P8953: A. Knedla, *et al.* The therapeutic use of osmotic minipumps in the severe combined immunodeficiency (SCID) mouse model for rheumatoid arthritis. *Annals of the Rheumatic Diseases* 2008;68(1):124-129

ALZET Comments: Interleukin-10; interleukin-1 receptor antagonist; Saline; DMSO; SC; Mice (SCID); 2004; 40 days; Controls received mp w/ vehicle; functionality of mp verified by plasma levels; good methods (p.125); peptides; animal info (female, SCID, 4-5 wks old); Rheumatoid arthritis; pump and technique schematics p. 125; stability (with an excellent description of methods) was verified for 40 days @ 37C; 50% DMSO used; "... the application of proteins via osmotic pumps is an affective tool to evaluate the effects of cytokines and inhibitors in vitro." p. 128.

P7635: B. T. Ameredes, *et al.* Alterations in nitric oxide and cytokine production with airway inflammation in the absence of IL-10. *Journal of Immunology* 2005;175(2):1206-1213

ALZET Comments: Interleukin-10; Saline; SC; 3 days; Peptides; animal info (male, C57BL/6, 6 weeks old).

P7208: B. T. Ameredes, *et al.* Enhanced nitric oxide production associated with airway hyporesponsiveness in the absence of IL-10. *AMERICAN JOURNAL OF PHYSIOLOGY-LUNG CELLULAR AND MOLECULAR PHYSIOLOGY* 2005;288(5):L868-L873

ALZET Comments: Interleukin-10, recomb.mouse; Saline; SC; Mice; 72 hours; Controls received mp w/ vehicle; dose-response (Fig. 4); peptides.

P6991: C. Woiciechowsky, *et al.* Brain-IL-1beta triggers astrogliosis through induction of IL-6: Inhibition by propranolol and IL-10. *MEDICAL SCIENCE MONITOR* 2004;10(9):BR325-BR330

ALZET Comments: Tumor necrosis factor- α , recomb. rat; interleukin-1 beta, recomb. rat; interleukin-10, recomb. rat; interleukin-6, recomb. rat; Albumin, human serum; CSF/CNS; Rat; 1003D; 48 hours; Controls received mp w/ vehicle; dose-response (fig 1); ALZET brain infusion kit used; correct localization of cannula confirmed histologically.

P6136: S. Goodman, *et al.* Modulation of bone ingrowth and tissue differentiation by local infusi on of interleukin-10 in the presence of ultra-high molecular weight polyethylene (UHMWPE) wear particles. *JOURNAL OF BIOMEDICAL MATERIALS RESEARCH PART A* 2003;65A(1):43-50

ALZET Comments: Interleukin-10; PBS; BSA; Bone; Rabbit; 2004; 3 or 6 weeks; Controls received mp w/ vehicle; immunology; peptides; diagram of pump and bone chamber (p. 44).

P3931: A. Boehler, *et al.* Adenovirus-mediated interleukin-10 gene transfer inhibits post-transplant fibrous airway obliteration in an animal model of bronchiolitis obliterans. *Human Gene Therapy* 1998;9(541-551

ALZET Comments: Interleukin-10; Saline; IP; Rat; 2002; 14 days; functionality of mp verified by IL-10 plasma levels; immunology; peptides.



P3568: S. Persson, *et al.* Interleukin-10 suppresses the development of collagen type II-induced arthritis and ameliorates sustained arthritis in rats. *Scand. J. Immunol* 1996;44(607-614

ALZET Comments: Interleukin-10; PBS, sterile; SC; Rat; 2ML2; 14 days; controls received mp w/ PBS; comparison of footpad injections vs. mp; immunology; peptides.

P4096: A. E. Levy, *et al.* Administration of intragraft interleukin-4 prolongs cardiac allograft survival in rats treated with donor-specific transfusion/cyclosporine. *Transplantation* 1995;60(5):405-406

ALZET Comments: Interleukin-4; Interleukin-10; IA (brachiocephalic); Rat; 14 days; immunology; peptides; pump infused the brachiocephalic artery of a harvested heart, which was then implanted into a recipient; recomb. mouse IL-4 & IL-10 used.

10. 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; 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

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).

11. Interleukin-12

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

ALZET Comments: Interleukin-12, recomb. human; Saline; SC; Mice (SCID; NOD/SCID); 2004; 28 days; 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

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

P8510: H. R. Djalilian, *et al.* Efficacy of an osmotic pump delivered, GM-CSF-based tumor vaccine in the treatment of upper aerodigestive squamous cell carcinoma in rats. *CANCER IMMUNOLOGY IMMUNOTHERAPY* 2007;56(8):1207-1214

ALZET Comments: Colony-stimulating factor, GM, murine; interleukin-12; PBS; SC; Rat; 28 days; Controls received mp w/ vehicle; dose-response (fig 1); no stress (see pg. 1209); cancer (upper aerodigestive tract carcinoma); peptides; animal info (Fisher 344, 125-150 g); good methods; "This latter method (mp) has several advantages. First, the use of minipumps obviates the cumbersome need to transfect tumor cells and completely characterize their cytokine repertoires. Second, it allows for independent and rigorous control over the kinetics of administration of cytokine and antigen dosages. Third, it may generate less controversy than those techniques requiring "gene therapy" IRB approval." (p. 1213).

P7935: J. C. Chen, *et al.* Effects of irradiated tumor vaccine and infusion of granulocyte-macrophage colony-stimulating factor and interleukin-12 on established gliomas in rats. *CANCER IMMUNOLOGY IMMUNOTHERAPY* 2006;55(7):873-883

ALZET Comments: Colony-stimulating factor, GM, recomb. mouse; interleukin-12, recomb. mouse; BSA; PBS; SC; Rat; 2002; 14 days; Controls received mp w/ vehicle or no treatment; cancer (RT-2 glioma); peptides; animal info (Fischer, 200-350 grams, SC and ICV tumors); "continuously infused cytokine using an osmotic mini pump to...avoid the side effects of a single large dose of cytokine and one with a concept similar to that of gene-therapy." (p. 874).

P6460: H. Sasaki, *et al.* Gamma interferon (IFN-gamma;) and IFN-gamma;-inducing cytokines interleukin-12 (IL-12) and IL-18 do not augment infection-stimulated bone resorption in vivo. *Clinical and Diagnostic Laboratory Immunology* 2004;11(1):106-110

ALZET Comments: Interleukin-12; recomb.; PBS; SC; Mice; 1007D; 21 days; Controls received mp w/ vehicle;pumps replaced at day 7 & day 14.

P6379: I. Mendel, *et al.* A novel protective model against experimental allergic encephalomyelitis in mice expressing a transgenic TCR-specific for myelin oligodendrocyte glycoprotein. *Journal of Neuroimmunology* 2004;149(1-2):10-21

ALZET Comments: Interleukin-12; PBS; SC; Mice; 2001; 7 days; Immunology.

P6450: W. C. Jean, *et al.* Effects of combined granulocyte-macrophage colony-stimulating factor (GM-CSF), interleukin-2, and interleukin-12 based immunotherapy against intracranial glioma in the rat. *Journal of Neuro-oncology* 2004;66(1-2):39-49

ALZET Comments: Colony-stimulating factor, GM; interleukin-2; interleukin-12; SC; Rat; 2004; 4 weeks; Cancer (gliosarcoma); GM-CSF was infused alone or with cytokines.

P6352: N. Akhtar, *et al.* Interleukin-12 inhibits tumor growth in a novel angiogenesis canine hemangiosarcoma xenograft model. *NEOPLASIA* 2004;6(2):106-116

ALZET Comments: Interleukin-12; PBS; SC; Mice (SCID); 2004; 1 week; Controls received mp w/ vehicle; functionality of mp verified by pump explantation, examination and tumor reduction; cancer (Hemangiosarcoma); peptides; pump model not listed; tumor cells from a canine.

P4117: W. C. Jean, *et al.* Interleukin-12-based immunotherapy against Rat 9L glioma. *Neurosurgery* 1998;42(4):850-857

ALZET Comments: Interleukin-12; PBS; Albumin, bovine serum; SC; Rat; 2004; 20 days; controls received mp w/vehicle; dose-response (p. 851); "an immunotherapeutic approach using cytokine-infusing minipumps and irradiated tumor cells can circumvent many of the problems associated with most popular methods..." (p. 854); cancer; immunology; peptides; recomb. mouse IL-12 used.

P3731: F. Galbiati, *et al.* Regulation of the IL-12 receptor B2 subunit by soluble antigen and IL-12 in vivo. *Eur. J. Immunol* 1998;28(209-220)



ALZET Comments: Interleukin-12; Interleukin-2; Lysozyme, hen egg white; Ovalbumin; Interferon-gamma; PBS; Albumin, mouse serum; SC; mice; 2001; 9 days; controls received mp w/ PBS; comparison of ip injections vs. mp; immunology; peptides; agents infused singly or in combination in the same pump; recomb. human IL-2 used; recomb. mouse IFN-gamma used.

12. Interleukin-13

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 J Neurosurg* 2019;14(1):5-14

ALZET Comments: Etoposide, Bevacizumab, IMCA12, Interleukin-13-PE38, Tetrakis Chlorin; CSF/CNS (intratumoral); Mice, Rat; 2001D, 1003D, 1007D, 1004, 2004; 24 hours, 3, 7, 21, 28 days; 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

ALZET Comments: Interleukin-13 Pseudomonas exotoxin; PBS; HSA; CSF/CNS (intracranial); Mice; 1003D; 3 days; 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

ALZET Comments: Interleukin-13-Pseudomonas exotoxin, recomb.; IP; Mice (nude); 14 days; 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

ALZET Comments: Interleukin-13; PBS; albumin, human serum; IP; Mice (SCID); 1007D; 7 days; 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

ALZET Comments: Interleukin-4, recomb. mouse; interleukin-13 recomb. mouse; SC; Mice; 3 days; Controls received mp w/ PBS; animal info (C57BL6, b6 Rag2 -/-, b6 Stat6 -/-); 100 ul sized pump used; immunology.

P7434: K. Kawakami, *et al.* Evidence that IL-13R alpha-2 chain in human glioma cells is responsible for the antitumor activity mediated by receptor-directed cytotoxin therapy. *Journal of Immunotherapy* 2005;28(3):193-202

ALZET Comments: Interleukin-13-PE38; interleukin-13Ra2, pME18S-; CSF/CNS (intratumoral); Mice (nude); 1003D; 1007D; 7 days; Controls received mp w/ vehicle or antisense IL-13Ra2 plasmid vector; pumps replaced after 3 days; cancer (glioblastoma); cyanoacrylate adhesive; convection enhanced delivery; IL-13Ra2 cDNA encoding plasmid vector; "the upregulated IL-13 Ra2 chain was successfully targeted with a continuous infusion of IL-13 cytotoxin." (p. 199).

P6373: M. M. Souweidane, *et al.* Interstitial infusion of IL13-PE38QQR in the rat brain stem. *Journal of Neuro-oncology* 2004;67(3):287-293



ALZET Comments: Interleukin-13, PE38QQR; Saline; serum albumin; CSF/CNS (brain stem); Rat; 2001D; 24 hours; Tissue perfusion (brain stem); stability verified (7 days at 37 degrees Celsius); good methods p. 288; cancer; pump incorrectly labeled as a 2001; IL13-PE38QQR is a tumor specific, chimeric cytotoxin; 30 g Plastics One Cannula used; vinyl catheter tubing from DURECT used.

P6923: K. Kawakami, *et al.* Distribution kinetics of targeted cytotoxin in glioma by bolus or convection-enhanced delivery in a murine model. *Journal of Neurosurgery* 2004;101(6):1004-1011

ALZET Comments: Interleukin-13, PE38; Albumin, human serum; PBS; CSF/CNS; Mice (nude); 1007D; 7 days; Comparison of CNS injections vs. mp; cancer (glioma); ALZET brain infusion kit; cyanoacrylate adhesive.

P5439: K. Kawakami, *et al.* Improved anti-tumor activity and safety of interleukin-13 receptor targeted cytotoxin by systemic continuous administration in head and neck cancer xenograft model. *MOLECULAR MEDICINE* 2002;8(8):487-494

ALZET Comments: Interleukin-13 endotoxin; PBS; IP; Mice (nude); 7 days; Comparison of IV injections vs mp; cancer (head and neck); IL-13 endotoxin, also called IL13-PE38QQR, is composed of IL-13 and a mutated form of a Pseudomonas endotoxin; compared to IV injections, continuous infusion decreased the toxicity and increased the efficacy of IL-13 cytotoxin.

P4522: Y. H. Lai, *et al.* Mouse IL-13 enhances antibody production in vivo and acts directly on B cells in vitro to increase survival and hence antibody production. *The Journal of Immunology* 1999;162(78-87)

ALZET Comments: Interleukin-13; PBS; IP; mice; 7 days; controls received mp w/vehicle; functionality of mp verified by plasma levels; Immunology; peptides; Recomb. mouse interleukin-13 used;

P3409: Y. H. Lai, *et al.* Continuous administration of IL-13 to mice induces extramedullary hemopoiesis and monocytosis. *J. Immunol* 1996;156(3166-3173)

ALZET Comments: Interleukin-13; IP; mice; 7 days; controls received phosphate buffered saline infusion; peptides.

13. Interleukin-15

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

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

14. Interleukin-31

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.