



**Recent References (2016-Present) on the Administration of Growth Factors  
Using ALZET® Osmotic Pumps**

**Epidermal Growth Factor**

**Q10999:** H. Simpson Ragdale, *et al.* Injury primes mutation-bearing astrocytes for dedifferentiation in later life. *Current Biology* 2023;33(6):1082-1098 e8

**Agents:** Epidermal growth factor, recombinant **Vehicle:** Saline; BSA; **Route:** CSF/CNS; **Species:** Mice; **Strain:** GFAP-CreERT2; LSL-tdTomato; p53wt; p53flox/flox; **Pump:** 1002; **Duration:** Not Stated;

**ALZET Comments:** Dose (60mg/ml); 0.9% saline; 1% BSA used; animal info: 2-4-month-old mice; ALZET brain infusion kit 3 used; Brain coordinates (anteroposterior -1.2, mediolateral 1.7, dorsoventral -1 relative to bregma);

**Q9885:** A. Younsi, *et al.* Treadmill training improves survival and differentiation of transplanted neural precursor cells after cervical spinal cord injury. *Stem Cell Research* 2020;45(101812

**Agents:** Platelet-derived growth factor, human recombinant; Epidermal Growth Factor; Basic fibroblast growth factor, recombinant human; **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;

**ALZET Comments:** Dose (1 ug/100uL Platelet-derived growth factor, human recombinant; 3 ug/100uLEpidermal Growth Factor; 3 ug/100mL Basic fibroblast growth factor, recombinant human); Controls received mp w/ vehicle; animal info (female Wistar rats, 250 g); behavioral testing (Basso-Beattie- Bresnahan locomotor rating scale);

**Q9884:** A. Younsi, *et al.* Three Growth Factors Induce Proliferation and Differentiation of Neural Precursor Cells In Vitro and Support Cell-Transplantation after Spinal Cord Injury In Vivo. *Stem Cells International* 2020;2020(5674921

**Agents:** Platelet-derived growth factor, human recombinant; Epidermal Growth Factor; Basic fibroblast growth factor, recombinant human; **Vehicle:** Not Stated; **Route:** CSF/CNS (spinal cord); **Species:** Rat;

**ALZET Comments:** Dose (1 ug/ml Platelet-derived growth factor, human recombinant; 30 ug/ml Epidermal Growth Factor; 30 ug/ml Basic fibroblast growth factor, recomb. human); Controls received mp w/ vehicle; animal info (female Wistar rats (250 g);

**Q8414:** Y. A. Chen, *et al.* Intraventricular Medium B Treatment Benefits an Ischemic Stroke Rodent Model via Enhancement of Neurogenesis and Anti-apoptosis. *Scientific Reports* 2020;10(1):6596

**Agents:** Epidermal growth factor; Fibronectin **Route:** CSF/CNS (right lateral ventricle); **Species:** Rat; **Pump:** 2001; **Duration:** 7d

**ALZET Comments:** Dose (100 ng/mL EGF; 10 µg/mL fibronectin); animal info (male Wistar rats, 270– 350 g); epidermal growth factor aka EGF; Brain coordinates (reference to bregma: anteroposterior = –0.8 mm, lateral = –1.5 mm, depth = 3.5 mm);

**Q7263:** L. Riemann, *et al.* Transplantation of Neural Precursor Cells Attenuates Chronic Immune Environment in Cervical Spinal Cord Injury. *Front Neurol* 2018;9(428

**Agents:** Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor **Vehicle:** Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor; **Route:** CSF/CNS(Intrathecal); **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;

**ALZET Comments:** Dose (PDGF-AA, 1 µg/100 µL; EGF, 3 µg/100 µL; bFGF, 3 µg/100mL;); 0.1% rat serum albumin used; animal info (female Wistar rats 250 g); post op. care (moxifloxacin, buprenorphine); spinal cord injury;

**Q5514:** K. Zweckberger, *et al.* Self-assembling peptides optimize the post-traumatic milieu and synergistically enhance the effects of neural stem cell therapy after cervical spinal cord injury. *Acta Biomaterialia* 2016;42(77-89

**Agents:** Basic fibroblast growth factor; epidermal growth factor; brain-derived growth factor **Vehicle:** CSF; artificial; gentamycin; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (Wistar, 250g); spinal cord injury; post op. care (0.05 mg/kg buprenorphine SC; QD SC injection of cyclosporine A (10 mg/kg); QD minocycline 50 mg/kg); “catheter tip was located sub-durally at the epicenter of the lesion. It was fixed with several sutures in the paraspinal muscles to avoid any movement-associated dislocation and finally connected to the pump located in a subcutaneous recess.” pg 79; behavioral testing (Grip strength test, Basso, Beattie, Bresnahan Locomotor Rating Scale, Inclined plane test); Therapeutic indication (spinal cord injury);Dose (Gentamycin: 50ug/mL);



**Q4918:** M. Zhang, *et al.* Growth factors and medium hyperglycemia induce Sox9+ ductal cell differentiation into  $\beta$  cells in mice with reversal of diabetes. *pnas* 2016;113(3):650-655

**Agents:** Gastrin; epidermal growth factor, human recombinant **Vehicle:** Acetic acid; PBS; **Route:** IP; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, WT or Ins1 CreERT); Dose (gastrin 3 ug/kg/hr; EGF 10 ug/kg/hr);

**Q5397:** N. K. Littlejohn, *et al.* Suppression of Resting Metabolism by the Angiotensin AT2 Receptor. *Cell Reports* 2016;16(6):1548-1560

**Agents:** AngII, CGP-42112a, Epidermal growth factor **Vehicle:** Saline; **Route:** SC; **Species:** Mice (transgenic); **Duration:** 2 wks

**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, AT2-KO mice); functionality of mp verified by plasma levels; dose-response; Angiotensin AT2 receptor; Dose (CGP 50, 100 ng/kg/min, EGF 0.833 ug/hr);

### Fibroblast Growth Factor

**Q11050:** Y. Y. Kuo, *et al.* Glibenclamide promotes FGF21 secretion in interscapular BAT and attenuates depression-like behaviors in male mice with HFD-induced obesity. *Life Sciences* 2023;328(12):1900

**Agents:** Fibroblast growth factor 21, recombinant **Vehicle:** PEG 400; DMSO; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6N; **Pump:** 1002; **Duration:** 2 weeks;

**ALZET Comments:** Dose: (3 mg/kg); 88% PEG 400, 10% DMSO; 2% Tween 80 used; controls received mp w/ vehicle; animal info: Eight-week-old male mice; obesity; depression; "This treatment regimen reduced signs of metabolic dysfunction, attenuated depressive-like behaviors and restored mesolimbic dopaminergic projections in HFD-fed animals." p. 12

**Q11079:** A. Huang, *et al.* Modulation of foraging-like behaviors by cholesterol-FGF19 axis. *Cell & Bioscience* 2023;13(1):20

**Agents:** Fibroblast growth factor 19 **Vehicle:** CSF, artificial; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Strain:** C57BL/6; **Pump:** 2006; **Duration:** 2 weeks;

**ALZET Comments:** Dose: FGF19 (15 ng/0.5 ul/h); Controls received mp w/ vehicle; animal info (Male; 5 months old); peptides; pumps replaced twice; functionality of mp verified by measuring residual volume; Brain coordinates: (Anteroposterior -0.3 mm to bregma, lateral 1 mm to bregma, -2.5 mm below skull); vinyl tubing used; behavioral testing (Open field);

**Q10606:** B. Moeckli, *et al.* FGF21 Negatively Affects Long-Term Female Fertility in Mice. *Heliyon* 2022;8(11):e11490

**Agents:** Fibroblast growth factor 21, recombinant human **Vehicle:** Saline, isotonic; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6N; **Duration:** 7 days;

**ALZET Comments:** Dose (1 mg/kg/d.); NaCl 0.9% used; Controls received mp w/ vehicle; animal info (Mice Five-week-old dams ); Fibroblast growth factor 21 aka (FGF21); obesity; non-alcoholic fatty liver disease

**Q10947:** T. Iram, *et al.* Young CSF restores oligodendrogenesis and memory in aged mice via Fgf17. *Nature* 2022;605(7910):509-515

**Agents:** CSF, young mouse; aCSF; CSF, human; Fibroblast growth factor 17; Fibroblast growth factor 8b, recombinant carrier-free human; anti-Fgf17 blocking antibody **Vehicle:** CSF, artificial; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1007D; 1004; **Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info: Aged C57BL/6 mice (18–22 months old); post op. care: buprenorphine and Baytril; ALZET brain infusion kit 3 used; good methods; lynch coil technique p. 8; Brain coordinates +1 mm medio-lateral, 0 mm anterior– and –3 mm dorso-ventral relative to the bregma; neurodegenerative (aging, memory)

**Q10457:** K. E. Clafin, *et al.* Pharmacological FGF21 signals to glutamatergic neurons to enhance leptin action and lower body weight during obesity. *Molecular Metabolism* 2022;64(10):1564

**Agents:** Fibroblast growth factor 21; Leptin; Leptin antagonist **Route:** SC; CSF/CNS; **Species:** Mice; **Pump:** 1002; 1004; **Duration:** 2 weeks;

**ALZET Comments:** Dose: FGF21 (1 mg/kg/day); Leptin (250 ng/h); Leptin antagonist (8 ug/day); Controls received mp w/ vehicle; animal info: mice: DIO WT mice: 16-18-week-old WT; 12 week-old WT mice; ALZET BIKIII used; Brain coordinates (1 mm lateral, 0.34 mm caudal to bregma, and 2.5 mm ventral from the surface of the skull.); dental cement used;;



**Q8822:** A. Recabal, *et al.* The FGF2-induced tanycyte proliferation involves a connexin 43 hemichannel/purinergic-dependent pathway. *Journal of Neurochemistry* 2021;156(2):182-199

**Agents:** Bromodeoxyuridine, Fibroblast Growth Factor 2, Gap27 **Vehicle:** CSF; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;

**ALZET Comments:** Dose (0.75 ug/h BrdU, 0.0125 ug/hr FGF2, 0.13 ug/h Gap27); Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 120-280 g); Bromodeoxyuridine aka BrdU, Fibroblast Growth Factor 2 aka FGF2, Gap27 aka selective Cx43HC inhibitor ; enzyme inhibitor (Cx43HC Inhibitor); dental cement used; dependence;

**Q9217:** D. Egli-Spichtig, *et al.* Renal Dnase1 expression is regulated by FGF23 but loss of Dnase1 does not alter renal phosphate handling. *Scientific Reports* 2021;11(1):6175

**Agents:** Fibroblast growth factor 23 **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 4 days;

**ALZET Comments:** Dose (200 ng/g/day); Controls received mp w/ vehicle; animal info (9 week old Hyp mice; 6 week old Fgf23-/- mice); Fibroblast growth factor 23 aka FGF23; replacement therapy (Fibroblast growth factor);

**Q9885:** A. Younsi, *et al.* Treadmill training improves survival and differentiation of transplanted neural precursor cells after cervical spinal cord injury. *Stem Cell Research* 2020;45(101812)

**Agents:** Platelet-derived growth factor, human recombinant; Epidermal Growth Factor; Basic fibroblast growth factor, recombinant human; **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;

**ALZET Comments:** Dose (1 ug/100uL Platelet-derived growth factor, human recombinant; 3 ug/100uLEpidermal Growth Factor; 3 ug/100mL Basic fibroblast growth factor, recombinant human); Controls received mp w/ vehicle; animal info (female Wistar rats, 250 g); behavioral testing (Basso-Beattie- Bresnahan locomotor rating scale); spinal cord injury;

**Q9884:** A. Younsi, *et al.* Three Growth Factors Induce Proliferation and Differentiation of Neural Precursor Cells In Vitro and Support Cell-Transplantation after Spinal Cord Injury In Vivo. *Stem Cells International* 2020;2020(5674921)

**Agents:** Platelet-derived growth factor, human recombinant; Epidermal Growth Factor; Basic fibroblast growth factor, recombinant human; **Route:** CSF/CNS (spinal cord); **Species:** Rat;

**ALZET Comments:** Dose (1 ug/ml Platelet-derived growth factor, human recombinant; 30 ug/ml Epidermal Growth Factor; 30 ug/ml Basic fibroblast growth factor, recombinant human); Controls received mp w/ vehicle; animal info (female Wistar rats (250 g); Platelet-derived growth factor, human recombinant aka PDGF-AA; Epidermal Growth Factor aka EGF; Basic fibroblast growth factor, recombinant human aka bFGF; spinal cord injury;

**Q9983:** Y. Sun, *et al.* Modulation of the Astrocyte-Neuron Lactate Shuttle System contributes to Neuroprotective action of Fibroblast Growth Factor 21. *Theranostics* 2020;10(18):8430-8445

**Agents:** Fibroblast Growth Factor 21 **Vehicle:** Not Stated; **Route:** CNS/CSF; **Species:** Mice; **Pump:** **Duration:** 14 days;

**ALZET Comments:** Dose (0.4 ug/day); Controls received mp w/ vehicle; animal info (6 month old); Fibroblast Growth Factor 21 aka FGF21 ; Brain coordinates (0.1 mm anteroposterior to bregma; 0.9 mm lateral from midline; 2.5 mm below the dura); bilateral cannula used; neurodegenerative (Alzheimer's Disease);

**Q8407:** T. D. Challa, *et al.* A Genetic Model to Study the Contribution of Brown and Brite Adipocytes to Metabolism. *Cell Reports* 2020;30(10):3424-3433 e4

**Agents:** Fibroblast growth factor 21, recomb human **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 2 days;

**ALZET Comments:** Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (UCP1-DTR-eGFP mice); recombinant human fibroblast growth factor 21 aka recombinant human FGF21; dependence;

**Q7646:** Z. Yu, *et al.* Recombinant FGF21 Protects Against Blood-Brain Barrier Leakage Through Nrf2 Upregulation in Type 2 Diabetes Mice. *Mol Neurobiol* 2019;56(4):2314-2327

**Agents:** Fibroblast growth factor-21, recomb. human; **Route:** IP; **Species:** Mice; **Duration:** 10 days;

**ALZET Comments:** "Dose (3 mg/kg/day); Controls were db/+ and received mp w/ vehicle; animal info (16 weeks, male, db/db); FGF21 is a robust regulator of metabolism through interactions with FGF receptor 1c and co-factor beta-Klotho.; diabetes; Therapeutic indication (obesity-induced reducing cognitive dysfunction and anxiety-like behavior through reducing glucose tolerance, insulin resistance, and hyperlipidemia); "



**Q6795:** Y. Shi, *et al.* Fibroblast Growth Factor 21 Attenuates Vascular Calcification by Alleviating Endoplasmic Reticulum Stress Mediated Apoptosis in Rats. *International Journal of Biological Sciences* 2019;15(1):138-147

**Agents:** Fibroblast growth factor-21 **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;

**ALZET Comments:** Dose (70 µg/kg/d); Controls received mp w/ vehicle; animal info (Male Sprague-Dawley rats (180-200g));

**Q9024:** S. Sharma, *et al.* Dietary Methionine Restriction Reduces Inflammation Independent of FGF21 Action. *Obesity Biology and Integrated Physiology* 2019;27(8):1305-1313

**Agents:** Recomb. fibroblast growth factor 21 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 2 Weeks;

**ALZET Comments:** Dose (13.6 ug/day); Controls received mp w/ vehicle; animal info (5 weeks old, C57BL/6J, Male);

Recombinant fibroblast growth factor 21 aka Recombinant FGF21; immunology;

**Q7303:** Y. C. Shi, *et al.* Protection Effect of Exogenous Fibroblast Growth Factor 21 on the Kidney Injury in Vascular Calcification Rats. *Chinese Medical Journal* 2018;131(5):532-538

**Agents:** Fibroblast growth factor 21 **Vehicle:** saline; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 4 weeks;

**ALZET Comments:** Dose (70 µg/kg/d); Controls received mp w/ vehicle; animal info (8-week-old, male, Sprague Dawley);

**Q7263:** L. Riemann, *et al.* Transplantation of Neural Precursor Cells Attenuates Chronic Immune Environment in Cervical Spinal Cord Injury. *Front Neurol* 2018;9(428)

**Agents:** Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor **Vehicle:** Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor; **Route:** CSF/CNS(Intrathecal); **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;

**ALZET Comments:** Dose (PDGF-AA, 1 µg/100 µL; EGF, 3 µg/100 µL; bFGF, 3 µg/100mL); 0.1% rat serum albumin used; animal info (female Wistar rats 250 g); post op. care (moxifloxacin, buprenorphine); spinal cord injury;

**Q8146:** C. N. Nelson, *et al.* Growth hormone activated STAT5 is required for induction of beige fat in vivo. *Growth Horm IGF Res* 2018;42-43(40-51)

**Agents:** Fibroblast Growth Factor 21, recombinant **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Duration:** 6 days;

**ALZET Comments:** Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (Male, GHR KO); dependence;

**Q7215:** H. Li, *et al.* Fibroblast growth factor 21 increases insulin sensitivity through specific expansion of subcutaneous fat. *Nat Commun* 2018;9(1):272

**Agents:** Fibroblast growth factor 21, mouse recomb. **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Duration:** 4 weeks;

**ALZET Comments:** Dose (0.1 mg/kg/day); Controls received mp w/ vehicle; animal info (8 week old, FGF21KO); Resultant plasma level (1.5 ng/ml, which was 2–3 times of the 8-week HFD-induced endogenous FGF21 level of 0.6 ng/ml (Fig. 3f)); dependence;

**Q7811:** J. A. Fletcher, *et al.* Fibroblast growth factor 21 increases hepatic oxidative capacity but not physical activity or energy expenditure in hepatic peroxisome proliferator-activated receptor gamma coactivator-1alpha-deficient mice. *Experimental Physiology* 2018;103(3):408-418

**Agents:** Fibroblast growth factor-21, recomb. human **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Duration:** 4 weeks;

**ALZET Comments:** Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (C57Bl/6J or LPGC-1alpha); Therapeutic indication (induced hepatic FAO and tracked with reductions in hepatic steatosis, adiposity and body weight. Was able to compensate for reduced PGC-1alpha expression and rescue fatty acid metabolism.);

**Q6551:** E. Yulyaningsih, *et al.* Acute Lesioning and Rapid Repair of Hypothalamic Neurons outside the Blood-Brain Barrier. *Cell Reports* 2017;19(11):2257-2271

**Agents:** Uridine, bromodeoxy-; Fibroblast growth factor, basic **Vehicle:** CSF, artificial; **Route:** CSF/CNS (right lateral ventricle);

**Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;

**ALZET Comments:** Dose (3.2 mg/ml BrdU; 100 µg/ml bFGF); animal info (12- to 18-week-old Npy-GFP mice and Ai14(tdTomato) mice); Brain coordinates (anteroposterior –0.3 mm, lateral +1.0 mm to bregma and dorsoventral –2.5 mm below skull);



**Q6198:** J. R. Munoz-Castaneda, *et al.* Differential regulation of renal Klotho and FGFR1 in normal and uremic rats. *FASEB J* 2017;31(9):3858-3867

**Agents:** Fibroblast growth factor -23, recomb. **Vehicle:** Acetic Acid; Sucrose; **Species:** Rat; **Duration:** 14 days;  
**ALZET Comments:** Dose (15 mg/d); Controls received mp w/ vehicle; animal info (9-10 week old Male Wistar rats weighing 230–260 g);

**Q6199:** E. P. Mottillo, *et al.* FGF21 does not require adipocyte AMP-activated protein kinase (AMPK) or the phosphorylation of acetyl-CoA carboxylase (ACC) to mediate improvements in whole-body glucose homeostasis. *Mol Metab* 2017;6(6):471-481

**Agents:** Fibroblast growth factor-21 **Vehicle:** Saline; **Route:** SC; **Species:** Mice (knockout); **Pump:** 1002; **Duration:** 2 weeks;  
**ALZET Comments:** Dose (0.35 mg/kg/day); Controls received mp w/ vehicle; animal info (Mice lacking adipocyte AMPK b1b2 (ib1b2AKO); diabetes;

**Q6052:** T. Lan, *et al.* FGF19, FGF21, and an FGFR1/beta-Klotho-Activating Antibody Act on the Nervous System to Regulate Body Weight and Glycemia. *Cell Metabolism* 2017;26(5):709-718 e3

**Agents:** Fibroblast growth factor-21 **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (3-4 months old); Dose (1 mg/kg/day);

**Q6291:** M. Kuroda, *et al.* Peripherally derived FGF21 promotes remyelination in the central nervous system. *J Clin Invest* 2017;127(9):3496-3509

**Agents:** Fibroblast growth factor-21, mouse recomb. **Vehicle:** PBS; BSA; **Route:** CSF/CNS (lateral ventricle); **Species:** Mice; **Pump:** 1007D; 1002; **Duration:** 1 week;  
**ALZET Comments:** Dose (50 ng/kg/day); 0.5% BSA used; Brain coordinates (0 mm bregma, 1 mm lateral, and 2.5 mm ventral); Therapeutic indication (laminectomy);

**Q6414:** L. D. BonDurant, *et al.* FGF21 Regulates Metabolism Through Adipose-Dependent and -Independent Mechanisms. *Cell Metabolism* 2017;25(4):935-944 e4

**Agents:** Fibroblast growth factor-21, recomb. human; **Route:** SC; **Species:** Mice (knockout); **Duration:** 2 weeks;  
**ALZET Comments:** Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (16–18 week old WT and KLB AdipoKO male mice on HFD for 12 weeks); comparison of IP injection vs mp;

**Q5514:** K. Zweckberger, *et al.* Self-assembling peptides optimize the post-traumatic milieu and synergistically enhance the effects of neural stem cell therapy after cervical spinal cord injury. *Acta Biomaterialia* 2016;42(77-89

**Agents:** Basic fibroblast growth factor; epidermal growth factor; brain-derived growth factor **Vehicle:** CSF; artificial; gentamycin; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (Wistar, 250g); spinal cord injury; post op. care (0.05 mg/kg buprenorphine SC; QD SC injection of cyclosporine A (10 mg/kg); QD minocycline 50 mg/kg); “catheter tip was located sub-durally at the epicenter of the lesion. It was fixed with several sutures in the paraspinal muscles to avoid any movement-associated dislocation and finally connected to the pump located in a subcutaneous recess.” pg 79; behavioral testing (Grip strength test, Basso, Beattie, Bresnahan Locomotor Rating Scale, Inclined plane test); Therapeutic indication (spinal cord injury); Dose (Gentamycin: 50ug/mL);

**Q6664:** G. Singhal, *et al.* Fibroblast growth factor 21 has no direct role in regulating fertility in female mice. *Mol Metab* 2016;5(8):690-698

**Agents:** Fibroblast growth factor 21, human **Vehicle:** Saline; **Route:** CSF/CNS (third ventricle); **Species:** Mice (knockout); Mice(transgenic); **Pump:** 1007D; **Duration:** 7 days;  
**ALZET Comments:** Dose (.4 ug/12 uL/d); Controls received mp w/ vehicle; animal info (FGF21-KO mice; Mice overexpressing human FGF21); Brain coordinates (anterioposterior, \_0.5 mm and lateral, \_1 mm from the bregma.); cyanoacrylate adhesive;

**Q5978:** G. Schumann. KLB is associated with alcohol drinking, and its gene product  $\beta$ -Klotho is necessary for FGF21 regulation of alcohol preference. *Proceedings of the National Academy of Sciences* 2016;113(50):

**Agents:** Fibroblast growth factor-21, recombinant **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1004;  
**ALZET Comments:** behavioral testing (Open field foraging, maze); Controls received mp w/ vehicle; animal info (2-4 months old); Therapeutic indication (Alcohol Drinking in Mice); Dose (0.7 mg/kg/day);





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

**Agents:** Raf-Transducer cells, conditioned media; leukemia inhibitory factor; fibroblast growth factor 2; vascular endothelial growth factor **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1007D; **Duration:** 6 days;

**ALZET Comments:** Controls received mp w/ vehicle or control media; animal info (male, C57Bl6, 50-100g); ALZET brain infusion kit 2 used; immunology; cyanoacrylate adhesive; Brain coordinates;

**Q5561:** A. E. Kline, *et al.* Combination therapies for neurobehavioral and cognitive recovery after experimental traumatic brain injury: Is more better? *Prog Neurobiol* 2016;142(45-67)

**Agents:** Vascular endothelial growth factor, Fibroblast Growth Factor 2 **Vehicle:** Saline; **Route:** CSF/CNS (lateral ventricle);

**Species:** Mice; **Pump:** Not Stated; **Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; VEGF and FGF-2 were administered singly or in combination in same pump; Therapeutic indication (Traumatic brain injury);  
Dose (VEGF (10 mg/mL), FGF-2 (2.5 mg/mL));

**Q5568:** M. M. Daadi. Activation and Differentiation of Endogenous Neural Stem Cell Progeny in the Rat Parkinson Animal Model. *Neural Stem Cells: Methods and Protocols* 2016;198(265-270)

**Agents:** Epithelial growth factor; Fibroblast growth factor, basic; Glial cell derived conditioned media **Vehicle:** Not Stated;

**Route:** CSF/CNS (lateral ventricle); CSF/CNS (striatum); **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

**ALZET Comments:** animal info (Sprague-Dawley rats weighing 200–250 g); good methods (Methods paper); neurodegenerative (Parkinson's);

### Hepatocyte Growth Factor

**Q7619:** Y. Komaki, *et al.* Hepatocyte Growth Factor Facilitates Esophageal Mucosal Repair and Inhibits the Submucosal Fibrosis in a Rat Model of Esophageal Ulcer. *Digestion* 2019;99(3):227-238

**Agents:** Hepatocyte growth factor, human recombinant **Vehicle:** PBS; **Route:** IP; **Species:** Rat; **Duration:** 7 days;

**ALZET Comments:** Dose (0.2 mg/day); Controls received mp w/ vehicle; animal info (6 weeks, male, Sprague-Dawley); Hepatocyte growth factor (HGF) is a multifunctional polypeptide secreted by mesenchymal cells; Therapeutic indication (facilitates esophageal epithelial repair of ulcers);

**Q6207:** C. W. Mangieri, *et al.* Perioperative hepatocyte growth factor (HGF) infusions improve hepatic regeneration following portal branch ligation (PBL) in rodents. *Surg Endosc* 2017;31(7):2789-2797

**Agents:** Hepatocyte growth factor **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 1003D; **Duration:** 72 hours;

**ALZET Comments:** Dose (1 ug/h); Controls received mp w/ vehicle; animal info (200-300g Sprague-Dawley rats);

### Insulin-like Growth Factor

**Q11088:** A. Lozano-Urena, *et al.* IGF2 interacts with the imprinted gene Cdkn1c to promote terminal differentiation of neural stem cells. *Development* 2023;150(1):

**Agents:** Insulin-like growth factor 2 **Vehicle:** PBS; **Route:** CSF/CNS (lateral ventricle); **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1007D; **Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (Male; 2-4 months old); Brain coordinates (Anteroposterior -0.1 mm; Mediolateral -0.8 mm from bregma; Dorsoventral -3 mm from skull surface);

**Q5699:** A. Heinen, *et al.* IGF1 Treatment Improves Cardiac Remodeling after Infarction by Targeting Myeloid Cells. *Mol Ther* 2019;27(1):46-58

**Agents:** Insulin-like growth factor-I **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice (knockout); **Pump:** 1003D; **Duration:** 3 days;

**ALZET Comments:** Dose (1 µg/g/day); Controls received mp w/ vehicle; animal info (IGF1RKO mice); post op. care (buprenorphine (0.05–0.1 mg/kg body weight, s.c.) for 5 days); cardiovascular;



**Q4964:** S. Bake, *et al.* Insulin-like Growth Factor (IGF)-1 treatment stabilizes the microvascular cytoskeleton under ischemic conditions. *Experimental Neurology* 2019;311(162-172

**Agents:** Insulin-like growth factor-I, recomb. Human; **JB-1** **Vehicle:** CSF, artificial; **Route:** CSF/CNS (right lateral ventricle); **Species:** Rat; **Pump:** 1003D; 1007D; **Duration:** 1 day; 5 days;

**ALZET Comments:** Dose (100 µg/ml rhIGF-1; 20 µg/ml JB-1); Controls received mp w/ vehicle; animal info (Female Sprague Dawley rats; 10–12 months; weight range 325–350 g); JB-1 is an IGFR inhibitor; Brain coordinates (– 1.0mm posterior to bregma, –1.4mm medial lateral, –3.5mm from dural surface); cyanoacrylate adhesive; ischemia (cerebral);

**Q7295:** A. Santi, *et al.* Circulating insulin-like growth factor I modulates mood and is a biomarker of vulnerability to stress: from mouse to man. *Transl Psychiatry* 2018;8(1):142

**Agents:** Insulin-like growth factor-1 **Vehicle:** Saline; **Route:** CSF/CNS (lateral ventricle), SC; **Species:** Mice; **Pump:** 1002, 1004; **Duration:** 10 days, 25 days;

**ALZET Comments:** Dose (1 µg/day CF/CNS, 50 µg/kg/day SC); Controls received mp w/ vehicle; animal info (male, C56BL/6JolaHsd, 28–35 g); (male, LID, 27–38 g); behavioral testing (predator exposure, open field, elevated plus maze); ALZET brain infusion kit 3 used; Brain coordinates (–0.6 mm from bregma, 1.4 mm lateral, 2 mm of depth);

**Q7102:** D. Cabrera, *et al.* Somatotrophic Axis Dysfunction in Non-Alcoholic Fatty Liver Disease: Beneficial Hepatic and Systemic Effects of Hormone Supplementation. *Int J Mol Sci* 2018;19(5):

**Agents:** Insulin-like growth factor-1, growth hormone; **Route:** SC; **Species:** Mice; **Duration:** 4 weeks;

**ALZET Comments:** Dose (9 µg/g/day GH, 0.02 µg/g/day IGF-1); animal info (C57BL/6 mice);

**Q7775:** D. Aguado-Llera, *et al.* The Protective Effects of IGF-I against beta-Amyloid-related Downregulation of Hippocampal Somatostatinergic System Involve Activation of Akt and Protein Kinase A. *Neuroscience* 2018;374(104-118

**Agents:** Insulin-like growth factor-I **Vehicle:** Saline; **Route:** CSF/CNS (right cerebral ventricle); **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

**ALZET Comments:** Dose (50 µg/kg/day); Controls received mp w/ vehicle; animal info (Male, Wistar, 230–250 g); Insulin-like growth factor-I aka IGF-I; Brain coordinates (–0.3 mm anteroposterior, 1.1 mm lateral); bilateral cannula used; neurodegenerative (Alzheimer's Disease);

**Q6519:** A. Trueba-Saiz, *et al.* Circulating Insulin-Like Growth Factor I Regulates Its Receptor in the Brain of Male Mice. *Endocrinology* 2017;158(2):349-355

**Agents:** Insulin-like growth factor 1, human **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated;

**ALZET Comments:** Dose (50 µg/kg/d); animal info (8-9 week old male C57BL/6J mice weighing 25–30 g);

**Q6627:** J. Mysoet, *et al.* Reorganization of motor cortex and impairment of motor performance induced by hindlimb unloading are partially reversed by cortical IGF-1 administration. *Behavioural Brain Research* 2017;317(434-443

**Agents:** Insulin-like Growth Factor I **Vehicle:** CSF, artificial; **Route:** CSF/CNS (motor cortex); **Species:** Rat; **Pump:** 2002; **Duration:** 2 weeks;

**ALZET Comments:** Dose (50 µg/mL); animal info (Male wistar rats weighing 280–320 g); Brain coordinates (coordinates from Bregma: 3.5 mm posterior and 3 mm lateral));

**Q6698:** S. Mir, *et al.* IGF-1 mediated Neurogenesis Involves a Novel RIT1/Akt/Sox2 Cascade. *Sci Rep* 2017;7(1):3283

**Agents:** Insulin-like Growth Factor-1 **Vehicle:** Saline; **Route:** SC; **Species:** Mice (knockout); **Duration:** 1 week;

**ALZET Comments:** Dose (500ng/day); Controls received mp w/ vehicle; animal info (WT and 12 week old RIT1–/– mice);

**Q6438:** A. H. Leko, *et al.* Insulin-like growth factor I and its binding protein-3 are regulators of lactation and maternal responsiveness. *Sci Rep* 2017;7(1):3396

**Agents:** NBI-31772; Insulin-like growth factor I **Vehicle:** CSF, artificial; DMSO; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

**ALZET Comments:** Dose (48 µg IGF-I/day; 19,92 µg NBI-31772/day); 1% DMSO used; Controls received mp w/ vehicle; animal info (85 female Wistar rats weighing 250–300 g); post op. care (Tardomyocel® comp. III antibiotics (0.1 ml/kg body weight) was given s.c. to the animals for 5 days); enzyme inhibitor (brain IGFBP-3); ALZET brain infusion kit 2 used; Brain coordinates (antero-posterior, –0.5; lateral, 1.4; ventral, 3.6 mm);



**Q6431:** M. Hlavica, *et al.* Intrathecal insulin-like growth factor 1 but not insulin enhances myelin repair in young and aged rats. *Neurosci Lett* 2017;648(41-46

**Agents:** Insulin-like Growth Factor 1, insulin **Vehicle:** Acetic acid, Saline, Tween; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 2ML2; **Duration:** 21 days;

**ALZET Comments:** Dose (100 µg/day); 0.1% Tween used; Controls received mp w/ vehicle; animal info (12–14 weeks-old and 12 months-old female Long Evans rats); Insulin-like Growth Factor 1 aka IGF-1;

**Q6244:** S. C. Hewitt, *et al.* Role of ERalpha in Mediating Female Uterine Transcriptional Responses to IGF1. *Endocrinology* 2017;158(8):2427-2435

**Agents:** Insulin-like growth factor 1 **Vehicle:** Acetic acid; **Species:** Mice (knockout); **Pump:** 1003D; **Duration:** 24 hours;

**ALZET Comments:** Dose (0.5 mg IGF1/mL); 0.1N acetic acid used; animal info (Eight weeks or older female Ex3aERKO or ERaUtkKO mice); replacement therapy (ooverectomy);

**Q4783:** Shameena Bake, *et al.* Insulin-Like Growth Factor (IGF)-I Modulates Endothelial Blood-Brain Barrier Function in Ischemic Middle-Aged Female Rats. *Endocrinology* 2016;157(1):61-69

**Agents:** Insulin-like growth factor-I, human recombinant **Vehicle:** CSF, artificial; **Route:** SC; **Species:** Rat; **Pump:** 1003D; **Duration:** 48 hours;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 9-11 months old); animal info (female, Sprague Dawley, 9-11 months old); animal info (female, Sprague Dawley, 9-11 months old); immunology; cyanoacrylate adhesive; pumps primed overnight;

**Q6633:** H. Nishizawa, *et al.* IGF-I induces senescence of hepatic stellate cells and limits fibrosis in a p53-dependent manner. *Sci Rep* 2016;6(34605

**Agents:** Insulin-like Growth Factor 1, recomb.; Growth Hormone, human **Vehicle:** Saline; **Route:** SC; **Species:** Rat; Mice; **Pump:** 2004; **Duration:** 4 weeks; 6 weeks;

**ALZET Comments:** Dose (10 mg/mL); Controls received mp w/ vehicle; animal info (Eight-week-old male ICR mice, Sprague-Dawley (SD) rats; db/db mice with a C57BL/6 background); Insulin-like Growth Factor aka IGF-I;

**Q6611:** T. D. Luo, *et al.* Effects of age and insulin-like growth factor-1 on rat neurotrophin receptor expression after nerve injury. *Muscle Nerve* 2016;54(4):769-75

**Agents:** Insulin-like Growth Factor 1, recomb. human **Vehicle:** Saline; **Route:** Bone (tibia); **Species:** Rat; **Pump:** 1002;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (Male Fischer 3443Brown-Norway hybrid rats); post op. care (buprenorphine);

**Q4807:** Jayne C. Charnock, *et al.* The impact of a human IGF-II analog ([Leu27]IGF-II) on fetal growth in a mouse model of fetal growth restriction. *American Journal of Physiology Endocrinology and Metabolism* 2016;310(1):E24-E31

**Agents:** Insulin-like growth factor 2, Leu27 **Vehicle:** HCl; **Route:** SC; **Species:** Not Stated; **Pump:** 2002; **Duration:** 5 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, eNOS -/-, E12.5); teratology; Dose (1 mg/kg/day); noted using "100ul miniosmotic pump (200D)" pgE25;

## Nerve Growth Factor

**R0399:** S. Mitra, *et al.* A Review of Techniques for Biodelivery of Nerve Growth Factor (NGF) to the Brain in Relation to Alzheimer's Disease. *Advances in Experimental Medicine and Biology* 2021;1331(171-191

**Agents:** Nerve growth factor; Brain-derived neurotropic factor; **Route:** CSF/CNS (intracerebral); **Species:** Rat; **Pump:** 2004;

**ALZET Comments:** dependence; Different invasive strategies of NGF delivery to the brain have been reported to show that indeed NGF could be a promising therapeutic in AD, either intracerebroventricular administration (pg.194)"

**Q9155:** A. Benitez, *et al.* Nerve Growth Factor: A Dual Activator of Noradrenergic and Cholinergic Systems of the Rat Ovary. *Frontiers in Endocrinology* 2021;12(636600

**Agents:** Nerve growth factor **Vehicle:** Saline; **Route:** Intraovarian; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (adult female rats, 3.5 months old); functionality of mp verified by position; Nerve growth factor aka NGF; peptides; dependence;





**Q8567:** H. Kawasaki, *et al.* Nerve growth factor (NGF) has an anti-tumor effects through perivascular innervation of neovessels in HT1080 fibrosarcoma and HepG2 hepatitis tumor in nude mice. *Journal of Pharmacological Sciences* 2019;140(1):1-7

**Agents:** Nerve growth factor, human **Vehicle:** Saline, sterile; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days; **ALZET Comments:** Dose (40 or 80 ng/h); Controls received mp w/ vehicle; animal info (Five-week-old BALB/c Slc nu/nu mice); human nerve growth factor aka NGF; cancer (Tumor growth);

**Q7045:** N. Shimizu, *et al.* Effects of nerve growth factor neutralization on TRP channel expression in laser-captured bladder afferent neurons in mice with spinal cord injury. *Neurosci Lett* 2018;683(100-103

**Agents:** Antibody, anti Nerve growth factor **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks; **ALZET Comments:** Dose (10 µg/Kg/hour); Controls received mp w/ vehicle; animal info (9-10-week-old female C57BL/6 N mice weighing 18-22 g); spinal cord injury;

**Q5675:** Y. Sone, *et al.* Nerve Growth Factor Facilitates the Innervation of Perivascular Nerves in Tumor-Derived Neovasculature in the Mouse Cornea. *Pharmacology* 2017;99(1-2):57-66

**Agents:** Nerve growth factor **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 7 days; **ALZET Comments:** Controls received mp w/ saline; animal info (male BALB/C Cr Slc, 5 weeks old); cancer (prostate DU145 or fibrosarcoma HT1080); cardiovascular; Dose (40 ng/h);

**Q6595:** A. Matsuyama, *et al.* Effect of Nerve Growth Factor on Innervation of Perivascular Nerves in Neovasculatures of Mouse Cornea. *Biological and Pharmaceutical Bulletin* 2017;40(4):396-401

**Agents:** Nerve growth factor **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 7 days; **ALZET Comments:** Dose (48 µg/kg/d); animal info (5-7 week old Male BALB/c Cr Slc mice); comparison of pellet vs mp;

**Q4917:** A. Yokomizo, *et al.* Nerve growth factor facilitates redistribution of adrenergic and non-adrenergic non-cholinergic perivascular nerves injured by phenol in rat mesenteric resistance arteries. *European Journal of Pharmacology* 2016;770(110-6

**Agents:** Nerve growth factor **Vehicle:** Saline, sterile; **Route:** IP; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days; **ALZET Comments:** animal info (Wistar, 8 weeks old); Dose (20 ug/kg/day);

**Q5177:** P. A. Pereira, *et al.* Effects of chronic alcohol consumption, withdrawal and nerve growth factor on neuropeptide Y expression and cholinergic innervation of the rat dentate hilus. *Neurotoxicology* 2016;54(153-60

**Agents:** Nerve GF **Vehicle:** Methylene blue; BSA; CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 12 days; **ALZET Comments:** animal info (male, Wistar); functionality of mp verified by residual volume; Pumps were pre-tested to confirm delivery rate; ALZET brain infusion kit used; post op. care (SC injections of 0.9% saline (2ml)); pulsed delivery; lynch coil; the cannulae were connected to methylene blue (0.01%) filled minipumps via sterile coiled PE-60 tubing. The tubing was filled with air-oil spacer at the pump end and with NGF (150 mg diluted in 150 ml of vehicle).

**Q6640:** P. A. Pereira, *et al.* Nerve growth factor-induced plasticity in medial prefrontal cortex interneurons of aged Wistar rats. *Experimental Gerontology* 2016;85(59-70

**Agents:** Nerve Growth Factor **Vehicle:** CSF, artificial; BSA; **Route:** CSF/CNS (Right ventricle); **Species:** Rat; **Pump:** 2002; **Duration:** 12 days; **ALZET Comments:** Dose (10.1 ± 2.4 µg per rat); 0.1% bovine serum albumin used; animal info (Adult (6 months) and old (26-27 months) male Wistar rats); Nerve Growth Factor aka NGF; ALZET brain infusion kit used; Brain coordinates (1.1 mm posterior to the bregma, 1.7 mm lateral to the midline, and 4.0 mm below the surface of the skull);

**Q4820:** C. D. Luca, *et al.* Astrocytes and Microglia-Mediated Immune Response in Maladaptive Plasticity is Differently Modulated by NGF in the Ventral Horn of the Spinal Cord Following Peripheral Nerve Injury. *Cellular and Molecular Neurobiology* 2016;36):37-46

**Agents:** Nerve GF, b- **Vehicle:** CSF, artificial; **Route:** CSF/CNS (intrathecal); **Species:** Rat; **Pump:** 2001; **Duration:** 7 days; **ALZET Comments:** Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 250-300g); Cannula placement verified via induced lower body paralysis (IT lidocaine injection); spared nerve injury; Dose (12 ug/kg/day);



**Q5856:** M. Goda, *et al.* Nerve growth factor facilitates perivascular innervation in neovasculatures of mice. *J Pharmacol Sci* 2016;131(4):251-8

**Agents:** Nerve Growth Factor **Vehicle:** Saline; **Route:** SC; IP; **Species:** Mice; **Pump:** 1003D, 1007D, 1002; **Duration:** 3 days, 7 days, 10 days, 14 days;

**ALZET Comments:** Controls received mp w/ vehicle; Therapeutic indication (Angiogenesis);

### Placental Growth Factor

**Q4908:** MingWu, *et al.* Placental growth factor 2 — A potential therapeutic strategy for chronic myocardial ischemia. *International Journal of Cardiology* 2016;203(534-542

**ALZET Comments:** Placental GFr-2, recombinant human; PBS; IV; Pig; 2ML2; 14 days; Controls received mp w/ vehicle; animal info (Sus Scrofa, 20-25kg); functionality of mp verified by plasma levels; ischemia (myocardial); Dose (15 ug/kg/day);

**Q3967:** J. Li, *et al.* Impaired proliferation of pancreatic beta cells, by reduced placental growth factor in pre-eclampsia, as a cause for gestational diabetes mellitus. *Cell Proliferation* 2015;48(166-174

**ALZET Comments:** Placental growth factor, human; PBS; SC; Mice; 10 days; Controls received mp w/ vehicle; animal info (female, Balb/c, GD9); functionality of mp verified by plasma levels; cardiovascular; bp measured using tail cuff;

### Transforming Growth Factor

**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);

**Q11001:** D. J. Smyth, *et al.* Protection from T cell-dependent colitis by the helminth-derived immunomodulatory mimic of transforming growth factor-beta, Hp-TGM. *Discovery Immunology* 2023;2(1):1-12

**Agents:** H. polygyrus excretory-secretory; Transforming growth factor, sterile; PBS/OVA protein control, sterile **Vehicle:** PBS; **Route:** IP; **Species:** Mice; **Strain:** RAG1-/-; **Pump:** 1002; 1004; **Duration:** 14 days; 28 days;

**ALZET Comments:** Dose: HES (6.8 ug/day); TGM (50 ng/day); Controls received mp w/ vehicle; animal info: delayed delivery (14 days) w/ 28 day pump; pumps primed in 37degC PBS overnight

**Q10250:** N. Ludwig, *et al.* Novel TGFbeta Inhibitors Ameliorate Oral Squamous Cell Carcinoma Progression and Improve the Antitumor Immune Response of Anti-PD-L1 Immunotherapy. *Molecular Cancer Therapeutics* 2021;20(6):1102-1111

**Agents:** Transforming growth factor beta-2 **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 4 weeks;

**ALZET Comments:** Dose: (10 ug per day); animal info: female, immunocompetent C57BL/6J mice ages 8 weeks; cancer (Oral squamous cell carcinoma);

**Q9099:** P. J. Wermuth, *et al.* Abrogation of transforming growth factor-beta-induced tissue fibrosis in mice with a global genetic deletion of Nox4. *Laboratory Investigation* 2019;99(4):470-482

**Agents:** Transforming Growth Factor-B1 **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 28 days;

**ALZET Comments:** Dose (2.5 ug); Controls received mp w/ vehicle; animal info (C57BL6/J, 8 weeks old);

**Q8736:** M. Hamaguchi, *et al.* Circulating transforming growth factor-beta1 facilitates remyelination in the adult central nervous system. 2019;8(**Agents:** Transforming Growth Factor-BI Inhibitor **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1002;

**ALZET Comments:** Dose (7.25 ug/kg/day); animal info (Female, 8-10 weeks old); Transforming growth factor-BRI Inhibitor aka TGF0BRI ; enzyme inhibitor (Transforming growth factor-BI Inhibitor); neurodegenerative (Myelination);



**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");

**Q6900:** Tramullas M, *et al.* MicroRNA-30c-5p modulates neuropathic pain in rodents. *Science Translational Medicine* 2018;10(453);

**Agents:** Transforming growth factor-b1 **Vehicle:** Hydrochloric acid; albumin; PBS; **Route:** Not Stated; **Species:** Mice (knockout); **Pump:** 1002; **Duration:** 14 days;

**ALZET Comments:** Dose (6.2 ng/hour); animal info (BAMBI-/- mice); Therapeutic indication (chronic pain);

**Q6604:** D. Z. Milikovsky, *et al.* Electroconvulsive Dynamics as a Novel Biomarker in Five Models of Epileptogenesis. *J Neurosci* 2017;37(17):4450-4461

**Agents:** Transforming growth factor-β1; SJN2511; Interleukin-6; Bovine serum albumin **Vehicle:** CSF; artificial; dextran; **Route:** CSF/CNS; **Species:** Mice; **Pump:** Not Stated; **Duration:** 7 days;

**ALZET Comments:** Dose (0.4mM BSA, 100 ng/ml (TGF)- β1, 300µM SJN2511); Controls received mp w/ vehicle; animal info (2- to 3-month-old FVB/N and C57BL/6 mice); SJN2511 is a selective blocker of the TGF-B type I receptor/ALK5; Brain coordinates (0.5 mm posterior, 1 mm lateral to bregma);

**Q5489:** P. J. Wermuth, *et al.* Stimulation of Transforming Growth Factor-beta1-Induced Endothelial-To-Mesenchymal Transition and Tissue Fibrosis by Endothelin-1 (ET-1): A Novel Profibrotic Effect of ET-1. *PLoS One* 2016;11(9):e0161988

**Agents:** Transforming growth factor-B1; endothelin-1 **Vehicle:** Saline; **Species:** Mice; **Duration:** 3 weeks;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (FVB/N, 4 weeks old); used 28 day model pump;

**Q5879:** F. Heindryckx, *et al.* Endoplasmic reticulum stress enhances fibrosis through IRE1alpha-mediated degradation of miR-150 and XBP-1 splicing. *EMBO Molecular Medicine* 2016;8(7):729-44

**Agents:** Transforming growth factor, beta **Vehicle:** BSA, saline; **Route:** SC; **Species:** Mice; **Pump:** 1003D; **Duration:** Not Stated;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (8 weeks old); post op. care (Temgesic); Therapeutic indication (Fibrosis, cirrhosis); Dose (200 ng in .1% BSA in saline);

### Vascular Endothelial Growth Factor

**Q9229:** O. Gawrys, *et al.* Polyphenol-Based Lipofecting Agents for In Vivo Delivery of Therapeutic DNA to Treat Hypertensive Rats. *Biochemical Genetics* 2021;59(1):62-82

**Agents:** VEGF, DNA **Vehicle:** Glucose; **Route:** CSF/CNS (medulla); **Species:** Rat; **Pump:** 2001; **Duration:** 1 week;

**ALZET Comments:** 5% glucose used; Controls received mp w/ vehicle; animal info (Male, adult spontaneously hypertensive rats, 16 weeks old, 299 +- 4); Blood pressure measured via telemetry transmitters;vascular endothelial growth factor aka VEGF-A; ALZET brain infusion kit 2 used; gene therapy;

**Q8486:** O. Gawrys, *et al.* Polyphenol-Based Lipofecting Agents for In Vivo Delivery of Therapeutic DNA to Treat Hypertensive Rats. *Biochem Genet* 2020;

**Agents:** VEGF, DNA **Vehicle:** Glucose; **Route:** CSF/CNS (medulla); **Species:** Rat; **Pump:** 2001; **Duration:** 1 week;

**ALZET Comments:** 5% glucose used; Controls received mp w/ vehicle; animal info (Male, adult spontaneously hypertensive rats, 16 weeks old, 299 +- 4); Blood pressure measured via telemetry transmitters;vascular endothelial growth factor aka VEGF-A; ALZET brain infusion kit 2 used; gene therapy;



**Q7573:** R. Lin, *et al.* Systemic Factors Trigger Vasculature Cells to Drive Notch Signaling and Neurogenesis in Neural Stem Cells in the Adult Brain. *Stem Cells* 2019;37(3):395-406

**Agents:** Biotin, recombinant vascular endothelial growth factor 165 **Vehicle:** Saline; **Route:** IV (Femoral); **Species:** Mice; **Duration:** 3 days;

**ALZET Comments:** Dose (1 mg/kg); Controls received mp w/ vehicle; animal info (9-week old CD-1 mice);

**Q6971:** Y. S. Hu, *et al.* Self-assembling vascular endothelial growth factor nanoparticles improve function in spinocerebellar ataxia type 1. *Brain* 2019;142(2):312-321

**Agents:** Vascular endothelial growth factor, mouse recomb.; Vascular endothelial growth factor, synthetic peptide (Nano-VEGF) **Vehicle:** CSF, artificial; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks;

**ALZET Comments:** animal info (8-10, and 24 week-old mice); behavioral testing (rotating rod assay); Brain coordinates (A/P -0.5mm, M/L -1.1mm, D/V -2.5mm);

**Q7841:** Z. H. Dailiana, *et al.* Vascular endothelial growth factor for the treatment of femoral head osteonecrosis: An experimental study in canines. *World J Orthop* 2018;9(9):120-129

**Agents:** Vascular Endothelial Growth Factor **Vehicle:** Saline; **Route:** SC; **Species:** Dog; **Pump:** Not Stated; **Duration:** Duration;

**ALZET Comments:** Dose (500 ng); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Beagle);

**Q6340:** M. Piazza, *et al.* Simulating vasogenic brain edema using chronic VEGF infusion. *J Neurosurg* 2017;127(4):905-916

**Agents:** Vascular endothelial growth factor **Vehicle:** PBS; Rat serum albumin; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; 1007D; **Duration:** Not Stated;

**ALZET Comments:** Dose (2, 10, and 20 ng/hr); 0.1% rat serum albumin used; Controls received mp w/ vehicle; animal info (275-350g Male Fischer-344 rats); Brain coordinates (2.5 mm to the right of and 1 mm anterior to bregma); cyanoacrylate adhesive;

**Q6022:** Y. Dai, *et al.* The paracrine effect of cobalt chloride on BMSCs during cognitive function rescue in the HIBD rat. *Behavioural Brain Research* 2017;332(99-109

**Agents:** Vascular Endothelial Growth Factor **Vehicle:** Saline; **Route:** CSF/CNS (Left Lateral Ventricle); **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (17 weeks); behavioral testing (Morris water maze); Therapeutic indication (Hypoxia-inducible factor-1 $\alpha$  Cobalt chloride Hypoxic-ischemic encephalopathy);

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

**Agents:** Raf-Transducer cells, conditioned media; leukemia inhibitory factor; fibroblast growth factor 2; vascular endothelial growth factor **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1007D; **Duration:** 6 days;

**ALZET Comments:** Controls received mp w/ vehicle or control media; animal info (male, C57Bl6, 50-100g); ALZET brain infusion kit 2 used; immunology; cyanoacrylate adhesive; Brain coordinates;

**Q5561:** A. E. Kline, *et al.* Combination therapies for neurobehavioral and cognitive recovery after experimental traumatic brain injury: Is more better? *Prog Neurobiol* 2016;142(45-67

**Agents:** Vascular endothelial growth factor, Fibroblast Growth Factor 2 **Vehicle:** Saline; **Route:** CSF/CNS (lateral ventricle); **Species:** Mice; **Pump:** Not Stated; **Duration:** 7 days;

**ALZET Comments:** Controls received mp w/ vehicle; VEGF and FGF-2 were administered singly or in combination in same pump; Therapeutic indication (Traumatic brain injury); Dose (VEGF (10 mg/mL), FGF-2 (2.5 mg/mL));