References on the Administration of Growth Factors Using ALZET® Osmotic Pumps

1. Epidermal Growth Factor


**ALZET Comments:** Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor; Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor; CSF/CNS (Intrathecal); Rat; 1007D; 7 days; 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.


**ALZET Comments:** Basic fibroblast growth factor; epidermal growth factor; brain-derived growth factor; CSF; artificial; gentamycin; CSF/CNS (intrathecal); Rat; 1007D; 7 days; 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 paraspinous 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 ß cells in mice with reversal of diabetes. pnas 2016;113(3):650-655

**ALZET Comments:** Gastrin; epidermal growth factor, human recombinant; Acetic acid; PBS; IP; Mice; 1007D; 7 days; Controls received mp w/ vehicle; animal info (male, WT or Ins1 CreERT); diabetes; Dose (gastrin 3 ug/kg/hr; EGF 10 ug/kg/hr).


**ALZET Comments:** Angiotensin II, CGP 42112a, Epidermal growth factor; Saline; SC; Mice (transgenic); 2 weeks; 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).


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

Q3481: C. Giachino, et al. Molecular Diversity Subdivides the Adult Forebrain Neural Stem Cell Population. Stem Cells 2014;32(70-84

**ALZET Comments:** Epidermal growth factor, human recombinant; Saline; BSA; CSF/CNS; Mice (transgenic); 1007D; 6 days; Controls received mp w/ vehicle; animal info (Hes5::GFP, 2-3 months old); ALZET brain infusion kit 3 used; 0.1% BSA used.

Q3843: F. Clausen, et al. Combination of growth factor treatment and scaffold deposition following traumatic brain injury has only a temporary effect on regeneration. Brain Research 2014;1588(37-46

**ALZET Comments:** Epidermal growth factor, recombinant human; CSF/CNS; Rat; 2001; 7 days; Controls received mp w/ saline or no mp w/ sham surgery; animal info (male, Sprague Dawley, 330-400g); ALZET brain infusion kit 2 used; behavioral testing (morris water maze); pumps removed after 7 days; traumatic brain injury.
**ALZET Comments:** Epidermal growth factor, human recombinant; ciliary neurotrophic factor, human recombinant; Acetic acid; IP; Mice; 1007D; 7 days; Controls received mp w/ vehicle; animal info (ALX35d, 13 weeks old, hyperglycemic); diabetes; ciliary neurotrophic factor aka CNTF; Epidermal growth factor aka EGF;.

**ALZET Comments:** Chondroitinase ABC; platelet-derived growth factor-AA; basic fibroblast growth factor; epidermal growth factor;; Saline; rat serum albumin; CSF/CNS (intrathecal); Rat; 1007D; 7 days; Controls received mp w/ vehicle; animal info (female, Wistar, adult, 250-275g); spinal cord injury; behavioral testing (treadmill locomotion; coordination); used ALZET rat intrathecal catheter;.

**ALZET Comments:** Epidermal growth factor; erythropoietin; CSF, artificial; CSF/CNS; Mice; 1007D; 14 days; Animal info (male, C57BL6, 9-11 weeks old); EGF-PGF pumps replaced after 7 days with pump filled with ETO; ALZET brain infusion kit 3 used; comparison of epicortical composite vs mp; stress/adverse reaction: "Unlike the ICV catheter/minipump,which causes significant tissue damage, the epicortical composite provides a minimal invasiveness and no tissue damage."(see pg.9); immunology; Pumps implanted 4 days after stroke; BIK implanted same day as stroke;.

**ALZET Comments:** Rapamycin; epidermal growth factor; DMSO; CSF/CNS; Mice (pregnant); 1007D; 7 days; Control animals received mp w/ vehicle; animal info (C57BL/6, female, 2, 10, 18 mo old); ALZET brain infusion kit 3 used.

**ALZET Comments:** Epidermal growth factor; fibroblast growth factor, basic; platelet derived growth factor-AA; Saline; albumin, rat serum; CSF/CNS (intrathecal); Rat; 1007D; 7 days; Controls received mp w/ vehicle; animal info (Wistar, female, 250 g); spinal cord injury; intrathecal catheter used (0007741).

**ALZET Comments:** Epidermal growth factor; fibroblast growth factor, beta; platelet-derived growth factor, alpha; CSF/CNS (intrathecal); Rat; 1007D; 7 days; Animal info (adult, female, tg).

**ALZET Comments**: Epidermal growth factor; fibroblast growth factor; glial-derived neurotrophic factor; BSA; PBS; IP; Rat; 7 days; Controls received mp w/ vehicle; animal info (P90).

Q0699: K. Gampe, et al. EGF induces CREB and ERK activation at the wall of the mouse lateral ventricles. Brain Research 2011;1376();31-41
**ALZET Comments**: Epidermal growth factor, recomb.; CSF, artificial; CSF/CNS; Mice; 1007D; 6 days; Controls received mp w/ vehicle; animal info (male, C57BL/6N, 8-10 wks old); artificial CSF formula.
ALZET Comments: Epidermal growth factor, recomb. human; erythropoietin; cyclosporine A; CSF/CNS; SC; Mice (NOD/SCID); 1007D; Animal info (male, C57/BL6, 8-10 wks old); pumps replaced after 7 days; ALZET brain infusion kit 3 used.

ALZET Comments: Epidermal growth factor, recomb. human; CSF, artificial; CSF/CNS; Rat; 1007D; 7 days; Controls received mp w/ vehicle; animal info (male, 3-4 mo old, Sprague Dawley, 300 g); functionality of mp verified by residual volume; ALZET brain infusion kit 2 used; artificial CSF recipe; cannula placement verified by injecting Evan’s Blue dye into the cannula.

ALZET Comments: Chondroitinase ABC; epidermal growth factor; fibroblast growth factor; platelet-derived growth factor; Penicillinase; saline; albumin, rat serum; CSF, artificial; gentamicin; BSA; CSF/CNS (intrathecal, subarachnoid space); Rat; 1007D; 7 days; Controls received mp w/ vehicle; animal info (female, Wistar, 250 g.); ALZET intrathecal catheter used (0007741).

Q0241: S. H. Im, et al. INDUCTION OF STRIATAL NEUROGENESIS ENHANCES FUNCTIONAL RECOVERY IN AN ADULT ANIMAL MODEL OF NEONATAL HYPOXIC-ISCHEMIC BRAIN INJURY. Neuroscience 2010;169(1):259-268
ALZET Comments: Brain-derived neurotrophic factor; epidermal growth factor; ara-C; CSF/CNS; Mice; 1002; 2 weeks; Controls received mp w/ PBS; ALZET brain infusion kit 3 used; animal info (ICR, 6 wks old); behavioral testing (rotarod performance, forelimb-use asymmetry test).

ALZET Comments: Epidermal growth factor; Mice; 24 hours; Animal info (Ex3 alpha ERKO).

ALZET Comments: Ara-C; epidermal growth factor; Saline; CSF/CNS (surface); CSF/CNS; Mice (transgenic); 5, 6 days; Controls received mp w/vehicle; animal info (Cnp-hEGFR); incorrectly stated model 1007.

2. Fibroblast Growth Factor

ALZET Comments: Fibroblast growth factor-21; Saline; SC; Rat; 2004; 28 days; Dose (70 μg/kg/d); Controls received mp w/ vehicle; animal info (Male Sprague-Dawley rats (180-200g)).

ALZET Comments: Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor; Platelet-Derived Growth Factor, Epidermal Growth Factor, Basic Fibroblast Growth Factor; CSF/CNS(Intrathecal); Rat; 1007D; 7 days; 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.
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Bibliography


ALZET Comments: Fibroblast growth factor 21, mouse recomb.; Saline; SC; Mice; Pump model not stated; 4 weeks; Dose (0.1 mg/kg/day); Controls received mp w/ vehicle; animal info (8 week old, FG21KO); 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;.


ALZET Comments: Uridine, bromodeoxy-; Fibroblast growth factor, basic; CSF, artificial; CSF/CNS (right lateral ventricle); Mice; 1007D; 7 days; 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);


ALZET Comments: Fibroblast growth factor -23, recomb.; Acetic Acid; Sucrose; Rat; 14 days; 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. Mottiillo, 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

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


ALZET Comments: Fibroblast growth factor-21; SC; Mice; 1002; 2 weeks; Controls received mp w/ vehicle; animal info (3-4 months old); Dose (1 mg/kg/day);.


ALZET Comments: Fibroblast growth factor-21, mouse recomb.; PBS; BSA; CSF/CNS (lateral ventricle); Mice; 1007D; 1002; 1 week; 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);.


ALZET Comments: Fibroblast growth factor-21, recomb. human; SC; Mice (knockout); 2 weeks; 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;.


ALZET Comments: Basic fibroblast growth factor; epidermal growth factor; brain-derived growth factor; CSF; artificial; gentamycin; CSF/CNS (intrathecal); Rat; 1007D; 7 days; 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);.
ALZET Comments: Fibroblast growth factor 21, human; Saline; CSF/CNS (third ventricle); Mice (knockout); Mice(transgenic); 1007D; 7 days; Dose (.4 ug/12 uL/d); Controls received mp w/ vehicle; animal info (FGF21-KO mice; Mice overexpressing human FGF21); Brain coordinates (anterior-posterior, _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 β-Klotho is necessary for FGF21 regulation of alcohol preference. Proceedings of the National Academy of Sciences 2016;113(50):
ALZET Comments: Fibroblast growth factor 21, recombinant; SC; Mice; 1004; 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);

ALZET Comments: Raf-Transducer cells, conditioned media; leukemia inhibitory factor; fibroblast growth factor 2; vascular endothelial growth factor; CSF, artificial; CSF/CNS; Mice; 1007D; 6 days; 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;

ALZET Comments: Vascular endothelial growth factor, Fibroblast Growth Factor 2; Saline; CSF/CNS (lateral ventricle); Mice; 7 days; 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));

ALZET Comments: Epithelial growth factor; Fibroblast growth factor, basic; Glial cell derived conditioned media; CSF/CNS (lateral ventricle); CSF/CNS (striatum); Rat; 2002; 14 days; animal info (Sprague–Dawley rats weighing 200–250 g); good methods (Methods paper); neurodegenerative (Parkinson’s);

ALZET Comments: Fibroblast growth factor-21, human; PBS; SC; Mice; 4 days; 7 days; Controls received mp w/ vehicle; animal info (male, C57BL6, 10 weeks old);

ALZET Comments: Fibroblast growth factor-21; SC; Mice; 7 days; Animal info (male, Fgf21 -/-);

Q4499: R. H. Lin, et al. Neurogenesis is enhanced by stroke in multiple new stem cell niches along the ventricular system at sites of high BBB permeability. NEUROBIOLOGY OF DISEASE 2015;74(229-239
ALZET Comments: Basic fibroblast growth factor, recombinant human; CSF, artificial; CSF/CNS; Rat; 14 days; Animal info (male, Sprague Dawley, adult, 275-300g, MCAO); ischemia (cerebral); cardiovascular;

ALZET Comments: Fibroblast growth factor-21, recombinant human; PBS; SC; Mice (transgenic); 1007D; 1 week; Controls received mp w/ vehicle; animal info (male, transgenic overexpress bovine growth hormone, 3-4 months old); diabetes;
Q4326: B. Bernardo, et al. FGF21 does not require interscapular brown adipose tissue and improves liver metabolic profile in animal models of obesity and insulin-resistance. SCIENTIFIC REPORTS 2015;5(U1-U13
ALZET Comments: Fibroblast growth factor-21; PBS; SC; Mice; 8 days; Controls received mp w/ vehicle; animal info (male, DIO, 16, 21, or 32 weeks old); diabetes;

ALZET Comments: Fibroblast growth factor, recombinant human; SC; Mice (transgenic); 2 weeks; Controls received mp w/ vehicle; animal info (diet induced obesity, Fgf21-Tg); functionality of mp verified by plasma levels;

ALZET Comments: Epithelial growth factor; fibroblast growth factor; platelet-derived growth factor; CSF/CNS (intrathecal); Rat; 1007D; 7 days; Animal info (female, Wistar, 10-12 weeks old); spinal cord injury; post op. care (bladders manually evacuated TID, Minocycline 50 mg/kg 10 days, cyclosporine 10 mg/kg); behavioral testing (open field test); immunology;

ALZET Comments: Fibroblast growth factor 19, c-terminal deleted; SC; Mice; 1007D; 3 days; Controls received mp w/ PBS; animal info (FGF4R KO); diabetes;c-terminal deleted Fibroblast growth factor 19 aka FGF19dCTD; obesity;

Q3388: Y. Furusawa, et al. Nrf2 induces fibroblast growth factor 21 in diabetic mice. GENES TO CELLS 2014;19(864-878
ALZET Comments: Fibroblast growth factor-21, recombinant murine; SC; Mice; 3, 7 days; Control animals received mp w/ saline; animal info (KEAP 1 flox -/-, Nrf2 KO).

ALZET Comments: Fibroblast growth factor-21, recombinant human; SC; Mice; 4 weeks; 10 days; Controls received mp w/ vehicle; animal info (male, FGF21-KO or C57BL6J WT, 20-24 weeks); immunology;

ALZET Comments: Fibroblast growth factor-21; Saline; SC; Mice; 2 weeks; Controls received mp w/ vehicle; animal info (male, WT (IRLox) and LIRKO); diabetes;

ALZET Comments: Fibroblast growth factor-21, recombinant; PBS; SC; Mice; 1003D; 3 days; Controls received mp w/ vehicle; animal info (FGF 21-KO or WT, 16 weeks old); functionality of mp verified by serum levels by ELISA;

ALZET Comments: Chondroitinase ABC; platelet-derived growth factor-AA; basic fibroblast growth factor; epidermal growth factor; Saline; rat serum albumin; CSF/CNS (intrathecal); Rat; 1007D; 7 days; Controls received mp w/ vehicle; animal info (female, Wistar, adult, 250-275g); spinal cord injury; behavioral testing (treadmill locomotion; coordination); used ALZET rat intrathecal catheter;
ALZET Comments: Fibroblast growth factor 19; fibroblast growth factor receptor 4; Saline; SC; Mice; 7 days; Controls received mp w/ vehicle; animal info (male, diet-induced obese, C57BL6, 6-8 weeks old); functionality of mp verified by plasma FGF19 levels; cardiovascular.;

ALZET Comments: Fibroblast growth factor 19; Fibroblast growth factor 21; PBS; SC; Mice; 1007D; 3 days; Dose (150 µg/kg/day); Controls received mp w/ vehicle; animal info (Six week-old B6.V- Lep ob /J male mice);

ALZET Comments: Fibroblast growth factor-21, recomb. human; Saline; SC; Hamster; 2002; 14 days; Control animals received mp w/ vehicle; animal info (adult, male); post op. care (Rimadyl).

ALZET Comments: Fibroblast growth factor-21; SC; Mice; 4 weeks; Controls received mp w/ vehicle; animal info (male, FGF21 KO, ADNKO); functionality of mp verified by plasma serum levels; immunology; diabetes.

ALZET Comments: Fibroblast growth factor-21; SC; Mice; 7, 14 days; Control animals received mp w/ vehicle; animal info (18 wks old, DIO, C57BL/6).

ALZET Comments: Fibroblast growth factor-21; PBS; SC; Mice; 2 weeks; Controls received mp w/ vehicle; animal info (Lep ob/ob, 14-16 weeks old); FGF21 dose (0.3 mg/kg); behavioral testing (energy expenditure); diabetes.

ALZET Comments: Fibroblast growth factor-21, recomb. human; Saline; SC; Mice; 7 days; Controls received mp w/ vehicle; animal info (male, C57BL6, 3 months old); functionality of mp verified by plasma serum levels; behavioral testing (energy expenditure, locomotor activity); diabetes;

ALZET Comments: Granulocyte-colony stimulating factor, Fibroblast growth factor, basic; Acetate, PBS; SC; Rat; 2004; 4 weeks; Controls (untreated); animal info (14 week old, 492 g); functionality of mp verified by In vitro pretesting where the volume delivery rate was confirmed using methylene blue; “We developed a model for continuous GF application by an osmotic pump to avoid the early clearance or required repetetive local injections.” Pg. 300; Therapeutic indication (Tendon injury); Dose (p. 301); Interesting (Tendon injury study: “the continuous application via an osmotic pump showed a relative high dislocation rate when applied in the rat Model”).;

3. Hepatocyte Growth Factor

ALZET Comments: Hepatocyte growth factor; Saline; IP; Rat; 1003D; 72 hours; Dose (1 ug/h); Controls received mp w/ vehicle; animal info (200-300g Sprague-Dawley rats):
**ALZET Comments:** Hepatocyte growth factor; HCl, Tris--; PBS; IV (jugular); Rat; 14 days; Control animals received mp w/ saline; animal info (adult, female, tg, HLA-B27).

**ALZET Comments:** Hepatocyte growth factor, human recomb.; PBS; HCl, tris; IV (jugular); Rat; 2002; 14 days; Controls received mp w/ saline; animal info (female, adult, HLA-B27, 200-250 g).

**ALZET Comments:** Hepatocyte growth factor factor; IV (jugular); Rat; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (adult, female, common, 295-350 g); ALZET rat intrathecal catheter used.

**ALZET Comments:** Hepatocyte growth factor factor; IV (jugular); Rat; 14 days; Controls received mp w/ saline; animal info (Sprague Dawley, female, adult); dose response.

**ALZET Comments:** Hepatocyte growth factor factor; HCl, Tris; PBS; IV (jugular); Rat; 1002; 14 days; Controls received mp w/ saline; animal info (female, adult, Fisher).

**ALZET Comments:** Hepatocyte growth factor factor; SC; Mice (nude); 2004; 4 weeks; Controls received mp w/ BSA buffer; cancer (prostate); peptides; animal info (female, nu/nu).

**ALZET Comments:** Hepatocyte growth factor factor; Saline, physiological; CSF/CNS; Rat; 2001; 3 days; Controls received no treatment; peptides; ischemia (cerebral); animal info (male, Wistar, 220-250 g.).

**ALZET Comments:** Hepatocyte growth factor factor; Dextran sulfate; IP; Mice (nude); 1002; Controls received mp w/ vehicle; functionality of mp verified by human HGF serum levels; pumps replaced every 12 to 14 days; cancer (pancreatic); peptides; animal info (female, nu/nu).

**ALZET Comments:** Hepatocyte growth factor factor; recomb. human; SC; Mice (nude); 2004; 4 weeks; Controls received mp w/ BSA buffer; cancer (prostate); peptides; animal info (female, athymic, nude, CD-1, 4-6 wks old); HGF antagonist.
**ALZET Comments:** Hepatocyte growth factor, recomb. human; PBS, sulfoxide; CSF/CNS (intrathecal, subarachnoid space); Rat (transgenic); 2002; 2004; 2, 4 weeks; Controls received mp w/ vehicle; dose-response (fig. 2); peptides; animal info (G93A Tg, 100 and 115 days old); neurodegenerative (ALS); "we examined the effects of continuous intrathecal delivery of human recombinant HGF (hrHGF) into Tg rats using implanted infusion pumps for selective and less invasive supply of HGF to the spinal cord." (p.1038).

**ALZET Comments:** Hepatocyte growth factor; IV (jugular); Rat; 2002; 14 days; Controls received mp w/ saline; animal info (male, Sprague-Dawley, adult, 200-225 g); PE catheter used.

**ALZET Comments:** Hepatocyte growth factor, recomb. human; PBS; BSA; CSF/CNS; Mice (neonate); 1007D; 1002; 7,14 days; Animal info (C57BL/6, 10-day old).

**ALZET Comments:** Hepatocyte growth factor; CSF/CNS (right hippocampal region); Rat; 1003D; 3 days; Animal info (male, Wistar, 200-250 grams); ischemia (cerebral); tissue perfusion (hippocampal region).

**ALZET Comments:** Hepatocyte growth factor; Saline; CSF/CNS (right hippocampal region); Rat; 1003D; 3 days; Animal info (male, Wistar, 200-250 grams); ischemia (cerebral); tissue perfusion (hippocampal region).

**ALZET Comments:** Hepatocyte growth factor, recomb. human; Saline, physiological; CSF/CNS (hippocampus); Rat; 1003D; 1, 2, 3 days; 0.5, 1, 6 hours; Controls received mp w/ vehicle; dose-response (fig. 2); peptides; ischemia (cerebral); animal info (male, Wistar, 200-250g., transient forebrain ischemia by carotid artery occlusion); mp primed in 37 celsius saline.

**ALZET Comments:** Hepatocyte growth factor, recomb. human; CSF/CNS; Rat; 2001; 7 days; Controls received mp w/ physiological saline; peptides; ischemia (cerebral); animal info (male, Wistar, 180-220g, microsphere-induced cerebral embolism).

**ALZET Comments:** Hepatocyte growth factor; IP; Mice (SCID); 28 days; Controls received sham operation; pumps replaced after 14 days; cancer (gastric); peptides; post op. care (streptomycin, penicillin); animal info (male, SCID, 6-8 wks old, 20-25 g.).
**ALZET Comments:** Hepatocyte growth factor, recomb. human; IP; Rat; 2001; 7 weeks; Controls received mp w/ PBS; functionality of mp verified by serum rhHGF levels.

**ALZET Comments:** Hepatocyte growth factor factor; Ringer’s solution; CSF/CNS; Rat; 1003D; 3 days; ALZET brain infusion kit used; behavioral study.

**ALZET Comments:** Hepatocyte growth factor factor, recomb. human; PBS; IP; Rat; 7 days; Controls received mp w/ vehicle; functionality of mp verified by human HGF serum levels; replacement therapy (hepatectomy); half-life (pg. 1758) < 3 min; animal info (male, Fisher, 8 wk. old).

**ALZET Comments:** Hepatocyte growth factor factor; Saline; IV (jugular); Rat; 1 week; Controls received mp w/ vehicle; functionality of mp verified by plasma and urine HGF levels; comparison of acute IV infusions vs. mp; no stress (see pg. F12); post op. care (atipamezole).

**ALZET Comments:** Hepatocyte growth factor factor; Saline; IV (jugular); Rat; 2002; 2 weeks; Controls received mp w/ vehicle; PE-50 used.

**ALZET Comments:** Hepatocyte growth factor factor, recomb. human; Saline, physiological; CSF/CNS; Rat; 2001; 7 days; Controls received sham ischemia operation and were HGF-untreated; dose-response (fig. 1); ischemia (cerebral); memory.

**ALZET Comments:** Hepatocyte growth factor factor, recomb. human; Saline, physiological; CSF/CNS; Rat; 2001; 7 days; Controls received mp w/ vehicle; dose-response (fig 1); cardiovascular; ischemia (cerebral); learning/memory study.

**ALZET Comments:** Hepatocyte growth factor factor; Saline; IV (jugular); Rat; 2002; 14 days; Controls received mp w/ vehicle.

4. Insulin-like Growth Factor

**ALZET Comments:** Insulin-like growth factor-I; SC; Mice (knockout); 1003D; 3 days; 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. Exp Neurol 2019;311(162-172)

**ALZET Comments:** Insulin-like growth factor-I, recomb. Human; JB-1; CSF, artificial; CSF/CNS (right lateral ventricle); Rat; 1003D; 1007D; 1 day; 5 days; 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 IGFIR inhibitor; Brain coordinates (−1.0mm posterior to bregma,−1.4mm medial lateral, −3.5mm from dural surface); cyanoacrylate adhesive; ischemia (cerebral);.


**ALZET Comments:** Insulin-like growth factor 1, growth hormone; SC; Mice; 4 weeks; Dose (9 μg/g/day GH, 0.02 μg/g/day IGF-1); animal info (C57BL/6 mice);.


**ALZET Comments:** Insulin-like growth factor 1, human; SC; Mice; Dose (50 ug/kg/d); animal info (8-9 week old male C57BL/6J mice weighing 25–30 g);


**ALZET Comments:** Insulin-like Growth Factor I; CSF, artificial; CSF/CNS (motor cortex); Rat; 2002; 2 weeks; 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));.


**ALZET Comments:** Insulin-like Growth Factor-1; Saline; SC; Mice (knockout); 1 week; Dose (500ng/day); Controls received mp w/ vehicle; animal info (WT and 12 week old RIT1−/− mice);


**ALZET Comments:** NBI-31772; Insulin-like growth factor I; CSF, artificial; DMSO; CSF/CNS; Rat; 2002; 14 days; 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);


**ALZET Comments:** Insulin-like Growth Factor 1, insulin; Acetic acid, Saline, Tween; CSF/CNS (intrathecal); Rat; 2ML2; 21 days; 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;.


**ALZET Comments:** Insulin-like growth factor 1; Acetic acid; Mice (knockout); 1003D; 24 hours; Dose (0.5 mg IGF1/mL); 0.1N acetic acid used; animal info (Eight weeks or older female Ex3aERKO or ERαUtKO mice; replacement therapy (ooverectomy);.

**ALZET Comments:** Insulin-like growth factor-I, human recombinant; CSF, artificial; SC; Rat; 1003D; 48 hours; 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.;


**ALZET Comments:** Insulin-like Growth Factor 1, recomb.; Growth Hormone, human; Saline; SC; Rat; Mice; 2004; 4 weeks; 6 weeks; 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.;


**ALZET Comments:** Insulin-like Growth Factor 1, recomb. human; Saline; Bone (tibia); Rat; 1002; Controls received mp w/ vehicle; animal info (Male Fischer 344Brown-Norway hybrid rats); post op. care (buprenorphine);.


**ALZET Comments:** Insulin-like growth factor 2, Leu27; HCl; SC; 5 days; Controls received mp w/ vehicle; animal info (female, eNOS -/-, E12.5); teratology; Dose (1 mg/kg/day); noted using "100ul miniosmotic pump (200D)" pgE25;.

Q4624: L. Van Landeghem, et al. IGF1 stimulates crypt expansion via differential activation of 2 intestinal stem cell populations. FASEB JOURNAL 2015;29(2828-2842

**ALZET Comments:** Insulin-like growth factor, recombinant human; NaCl; SC; Mice; 5 days; Controls received mp w/ vehicle; animal info (Sox9-EGFP);.


**ALZET Comments:** Insulin-like growth factor-1, human recombinant; Mice; 4 weeks; Controls received mp w/ saline; animal info (Apoe -/-, 8 weeks old); cardiovascular; immunology;.

Q4592: P. Standen, et al. Maternal insulin-like growth factor 1 and 2 differentially affect the renin-angiotensin system during pregnancy in the guinea pig. GROWTH HORMONE & IGF RESEARCH 2015;25(141-147

**ALZET Comments:** Insulin-like growth factor-1; insulin-like growth factor 2; Acetic acid; SC; Guinea pig; 2002; 18 days; Controls received mp w/ vehicle; animal info (GD20); teratology; cardiovascular;.


**ALZET Comments:** Insulin-like growth factor-1, human, recomb.; Water; Mice; animal info (female, C57BL/6).

**ALZET Comments:** Insulin-like growth factor-I; NaCl; acetic acid; water, sterile, sodium acetate trihydrate; polysorbate 20; sodium citrate; citric acid monohydrate; phenol; SC; Rat; 1007D; 2001; 4 weeks; Animal info (female, Wistar, 23 days old); functionality of mp verified by ELISA of serum; pumps replaced every week; stress/adverse reaction: (see pg. 4799 seroma); post op. care (bupivacaine 1 mg/kg, carprofen 5 mg/kg); "Problems with drug absorption could also have affected the results because many animals developed a seroma at the site of pump implantation, being most pronounced in animals treated with combination therapy. The seromas did not resolve and were first noted after 2 weeks of therapy. These could theoretically have affected the uptake of the drug into the circulation. However, when evaluating the growth rates of animals with seromas with group mates without seromas, no differences were observed." pg 4805-4806;


**ALZET Comments:** Insulin-like growth factor-I, human recombinant; Saline; SC; Mice; 2001; 4 days; 7 days; Controls received mp w/ vehicle; animal info (female, Sprague Dawley, vaginal distension); functionality of mp verified by ELISA of blood serum;


**ALZET Comments:** JB-1; insulin-like growth factor-I;; CSF, artificial; CSF/CNS (third ventricle); Rat; 2002; Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 3-4 months or 9-11 months old, ovariectomized); peptides; cannula placement verified via dye infusion; used Plastics One cannula; JB-1 is a selective antagonist of IGF-Ir;


**ALZET Comments:** Insulin-like growth factor, human recombinant; CSF/CNS; Mice; 1002; 7 days; Controls received mp w/ vehicle; animal info (APP.PS1, 6 months old); neurodegenerative (Alzheimers); post op. care (ampicillin 35 mg/kg SC; 1 ml of sterile saline SC; heating pad; buprenex 0.04 mg/kg SC); cyanoacrylate adhesive; used Loctite and dental cement;


**ALZET Comments:** Insulin-like growth factor-1, recombinant human; SC; Mice; 2004; Controls received sham surgery; animal info (C57BL6J, 8-10 weeks old); immunology; peptides;

Q3419: C. D. Blackstock, et al. Insulin-like Growth Factor-1 Increases Synthesis of Collagen Type I via Induction of the mRNA-binding Protein LARP6 Expression and Binding to the 5' Stem-loop of COL1a1 and COL1a2 mRNA. Journal of Biological Chemistry 2014;289(7264-7274).

**ALZET Comments:** Insulin-like growth factor-1, human recombinant; SC; Mice; 5 days; Controls received mp w/ saline; animal info (Apoe -/-); functionality of mp verified by serum plasma levels; cardiovascular;


**ALZET Comments:** Insulin-like growth factor, human recombinant; CSF, artificial; CSF/CNS; Rat; 1003D; 24 hours; Controls received mp w/ vehicle; animal info (Female, Sprague Dawley, 9-11 months, 325-350g); ischemia (Cerebral); immunology; cyanoacrylate adhesive; "Previous studies have shown that IGF-1 is stable in Alzet minipumps for upto 7 days and the dose of IGF-1 was found to be effective" pg e91427; Pump and cannula primed overnight; cannula implanted one week prior to MCAO and pump implantation;
**ALZET Comments:** Insulin-like growth factor-1, R3, long; Acetic acid; SC; Mice; 1002; 8 weeks; Control animals received mp w/ vehicle; animal info (1 mo old, B6.WK-Lama2 dy/2j); pumps replaced every 2 weeks.

**ALZET Comments:** Bone morphogenic protein-4, recombinant human; mouse Noggin; insulin-like growth factor-1; CSF, artificial; CSF/CNS; Mice; 1002; 14 days; Animal info (C57BL/6); pumps replaced every 7 days; mp were used to sequentially deliver BMP4, Noggin, and IGF-1 during a cuprizone challenge; Bone morphogenic protein-4 aka BMP4.

**ALZET Comments:** Insulin-like growth factor-I, recomb. human; SC; Mice; 1002; 7, 14 days; Animal info (C57BL/6, male, 8 wks old); comparison of IM injections vs SC mp.

**ALZET Comments:** Insulin-like growth factor I receptor; Saline; acetic acid; SC; Mice; 2004; 28 days; Controls received mp w/ vehicle; animal info (LID, WT FVB/N, 6-9 weeks old); functionality of mp verified by serum IGF-I levels; cancer (pancreatic); post op. care (Carprofen); Increlex IGF-1; incision closed using wound clips.

**ALZET Comments:** L-NAME; Insulin-like growth factor 1 receptor; Saline; acetic acid; SC; Mice; 14 days; Controls received mp w/ vehicle; animal info (VHL-KO); 25% acetic acid used; immunology.

**ALZET Comments:** Insulin-like growth factor-1; SC; Rat; 7 days; Peptides; functionality of mp verified by counting Nissl-positive neurons and TUNEL positive cells; half-life (12 min); ischemia (cerebral ischemia); neurodegenerative (cerebral); mp were used to infuse IGF-1 to study its neuroprotective role on cerebral recovery following cardiac arrest.

**ALZET Comments:** Insulin-like growth factor-1; leptin; SC; Mice; 20 weeks; Animal Info (SENCAR mice); cancer (colon); cancer.

**ALZET Comments:** Insulin-like growth factor I; insulin-like growth factor binding protein; SC; Mice; 4 weeks; Controls received mp w/ vehicle; animal info (4 wks old, male, LID).

**ALZET Comments:** Growth hormone; insulin-like growth factor I, recombinant human; Saline; SC; Rat; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (SDR, GH-def, male, 16 wks old).

ALZET Comments: Insulin-like growth factor-1, human, recomb.; Saline; SC; Rat; 1002; 4 weeks; Animal info (male, Wistar, 10 wks old).


ALZET Comments: Insulin-like growth factor-1; SC; Mice; 1 month; Animal info (YG8R, wt, 4-6 mo old).


ALZET Comments: JB-1; insulin-like growth factor-1; CSF, artificial; CSF/CNS (third ventricle); Rat; 2002; 7 days; animal info (young, 3-4 mo old, middle-aged, retired breeders, 9-11 mo old, female Sprague Dawley, ovariohysterectomized); guide cannula used; cannula placement verified by tracking the cannula path in brain sections; artificial CSF recipe; peptides;.


ALZET Comments: Insulin-like growth factor-1, recomb. human; Mice; 4, 8, 12 weeks; Controls received mp w/ saline; animal info (Apoe -/-, C57BL/6, 8 wks old); long-term study.


ALZET Comments: Insulin-like growth factor-1, recomb. human; Saline; SC; Mice; 1002; 14 days; Controls received mp w/ vehicle; animal info (R6/2, wt, male, 9 wks old); neurodegenerative (Huntington's disease).


ALZET Comments: Insulin-like growth factor-1; 28 days; Controls received mp w/ PBS; animal info (Dysferlin null, wt).

5. Nerve Growth Factor


ALZET Comments: Antibody, anti Nerve growth factor; SC; Mice; 1002; 2 weeks; Dose (10 μg/Kg/hour); Controls received mp w/ vehicle; animal info (9-10-week-old female C57BL/6, 8 wks old); spinal cord injury).


ALZET Comments: Nerve growth factor; SC; Mice; 1002; 7 days; 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);.


ALZET Comments: Nerve growth factor; SC; Mice; 1002; 7 days; Dose (48 μg/kg/d); animal info (5-7 week old Male BALB/c Cr Slc mice); comparison of pellet vs mp;.


ALZET Comments: Nerve growth factor; Saline, sterile; IP; Rat; 1007D; 7 days; animal info (Wistar, 8 weeks old); Dose (20 ug/kg/day);.
ALZET Comments: Nerve growth factor; Methylene blue; BSA; CSF, artificial; CSF/CNS; Rat; 2002; 12 days; animal info (male, Wistar); functionality of mp verified by residual volume; ALZET brain infusion kit used; post op. care (SC injections of 0.9% saline (2ml)); pulsed delivery; used PE-60 tubing; used lynch coil;

ALZET Comments: Nerve Growth Factor; CSF, artificial; BSA; CSF/CNS (Right ventricle); Rat; 2002; 12 days; 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);

ALZET Comments: Nerve growth factor, β; CSF, artificial; CSF/CNS (intrathecal); Rat; 2001; 7 days; Controls received mp w/vehicle; animal info (male, Sprague Dawley, 250-300g); Cannula placement verified via induced lower body paralysis (IT lidocane injection); spared nerve injury; Dose (12 ug/kg/day);

ALZET Comments: Nerve Growth Factor; Saline; SC; IP; Mice; 1003D, 1007D, 1002; 3 days, 7 days, 10 days, 14 days; Controls received mp w/vehicle; Therapeutic indication (Angiogenesis);

ALZET Comments: Nerve growth factor, human B-; PBS; CSF/CNS (inferior alveolar nerve); Dog (beagle); 2ML2; 6 weeks; Controls received mp w/vehicle; animal info (male, Sprague Dawley, 250-300g); Cannula placement verified via induced lower body paralysis (IT lidocane injection); Multiple pumps per animal (2; one pump delivered NGF other delivered PBS); used rat jugular catheter, 15 cm long; pump body placed into retromandibular area; long-term study;

ALZET Comments: Nerve growth factor, β; PBS; Evans blue dye; Bone (parietal); Rat; 2001; 7 days; Controls received mp w/vehicle; animal info (male, Sprague Dawley, 250-300g); 1% Evans blue used; Multiple pumps per animal (2); pump with agent inserted into right pocket, pump with PBS inserted into left pocket; bilateral infusion;

Q3650: B. Yegla, et al. EFFECTS OF SUSTAINED PRONGF BLOCKADE ON ATTENTIONAL CAPACITIES IN AGED RATS WITH COMPROMISED CHOLINERGIC SYSTEM. Neuroscience 2014;261(;):118-132
ALZET Comments: Antibody, pro-nerve growth factor; PBS; CSF/CNS; Rat; 1004; 4 weeks; Controls received mp w/vehicle; animal info (male, Wistar, 23 months old); ALZET brain infusion kit used; good methods (picture of implant pg 413); Multiple pumps per animal (2); pump with agent inserted into right pocket, pump with PBS inserted into left pocket; bilateral infusion;

ALZET Comments: Nerve growth factor, murine; PBS; CSF/CNS; Rat; 2001; 2 weeks; Control animals received mp w/vehicle; animal info (adult, male, Sprague Dawley, 8 wks old); ALZET brain infusion kit 2 used.

ALZET Comments: Nerve growth factor, beta; albumin, rat serum; CSF, artificial; CSF/CNS (intrathecal); Rat; 2001; 7 days; Control animals received mp w/ animal info (male, Wistar, STZ induced diabetes).


ALZET Comments: Nerve growth factor, human recombinant; Cytochrome C; CSF, artificial; CSF/CNS; Rat; 2002; 14 days; Controls received mp w/ vehicle; animal info (male, Fischer 344 albino, 281.8 +/- 2g); used Plastics One cannula.

Q3749: P. A. Pereira, et al. Chronic alcohol consumption leads to neurochemical changes in the nucleus accumbens that are not fully reversed by withdrawal. NEUROTOXICOLOGY AND TERATOLOGY 2014;44(53-61

ALZET Comments: Nerve growth factor; CSF, artificial; methylene blue; CSF/CNS; Rat; 2002; 12 days; Control animals received mp w/ vehicle; animal info (male, Wistar); Lynch coil; PE60 tubing used; ALZET brain infusion kit used; "The cannulae were connected to methylene blue... filled Alzet osmotic minipumps... via sterile coiled polyethylene tubing... This tubing was filled with air-oil spacer at the pump end and with NGF." pg 54; pump functionality verified via residual volume.

Q3152: M. Shaqura, et al. Reduced Number, G Protein Coupling, and Antinociceptive Efficacy of Spinal Mu-Opioid Receptors in Diabetic Rats Are Reversed by Nerve Growth Factor. JOURNAL OF PAIN 2013;14(7):720-730

ALZET Comments: Nerve growth factor; CSF, artificial; rat serum albumin; CSF/CNS (intrathecal); Rat; 2001; 7 days; Control animals received mp w/ vehicle; animal info (male, Wistar, 225g); behavioral testing (paw pressure test); peptides; used PE-10 attached to PE-60 catheter.


ALZET Comments: Nerve growth factor; CSF, artificial; bovine serum albumin; CSF/CNS; SC; Rat; 2002; 12 days; Controls received mp w/ vehicle; animal info (male, Wistar, 6-24 months old); functionality of BIK verified by methylene blue staining; ALZET brain infusion kit used; 0.1% Bovine Serum Albumin used; neurodegenerative (aging); post op. care (SC injections 2ml of 0.9% saline); pulsatile delivery (used coiled Intramedic PE-60; 0.1% methylene blue with air-oil spacer at pump end with agent); peptides.


ALZET Comments: Nerve growth factor, beta; CSF, artificial; albumin, rat serum; CSF/CNS (intrathecal); Rat; 2001; 7 days; Control animals received mp w/ vehicle; animal info (male, Wistar); Lynch coil; PE60 tubing used; ALZET brain infusion kit used; "The cannulae were connected to methylene blue... filled Alzet osmotic minipumps... via sterile coiled polyethylene tubing... This tubing was filled with air-oil spacer at the pump end and with NGF." pg 54; pump functionality verified via residual volume.


ALZET Comments: Nerve growth factor, beta; CSF, artificial; CSF/CNS; Rat; 42 days; Controls received mp w/ vehicle or no surgery; animal info (Male, wistar, 250-300g); functionality of mp verified by analysis of NGF concentration in brain; behavioral testing (object recognition memory); long-term study.

ALZET Comments: Nerve growth factor; CSF, artificial; CSF/CNS; Mice; 1002; 7 days; Controls received mp w/ vehicle; animal info (BALB/c, NPC/1 -/-); aCSF recipe; brain infusion kit used.

Q0685: S. Toda, et al. A local anesthetic, ropivacaine, suppresses activated microglia via a nerve growth factor-dependent mechanism and astrocytes via a nerve growth factor-independent mechanism in neuropathic pain. Molecular Pain 2011;7();U1-U11

ALZET Comments: Nerve growth factor, beta, recomb., rat; Saline; albumin, rat, serum; CSF/CNS (intrathecal, subarachnoid space); Rat; 2001; 7 days; Controls received mp w/ vehicle; animal info (male, Sprague-Dawley, 220-300 g); chronic constrictive injury (CCI).


ALZET Comments: Nerve growth factor; Saline; Intramuscular (hindlimb); Rat; 1003D; 3 days; Controls received mp w/ vehicle to opposite leg; animal info (Sprague Dawley, male, 5-7 wks old); "Note that the pumps were placed in the femoral triangle region and outlet of the pump was 2-3 mm distal to the inguinal ligament" pg H1071.


ALZET Comments: Nerve growth factor, beta, recomb.; GM6001; CSF, artificial; albumin, rat serum; CSF/CNS (intrathecal, subarachnoid space); Rat; 2001; 7 days; Controls received mp w/ vehicle; animal info (Sprague-Dawley, male, 250-300 g); enzyme inhibitor (metalloproteinase); PE10 connected to PE60 tubing.


ALZET Comments: Nerve growth factor, 2.5S; SC; Rat; 2ML1; 1 week; Controls received mp w/ saline; animal info (adult, male, Sprague-Dawley).


ALZET Comments: Nerve growth factor, recomb; nerve growth factor TrkA agonist; CSF, artificial; CSF/CNS; Mice; 1002; 2 weeks; Controls received mp w/ vehicle; animal info (4-5 mo old, 670/671 KM-NL, 717 V-F); post op. care (buprenorphine); aCSF recipe; behavioral testing (Morris water maze test).


ALZET Comments: Nerve growth factor; CSF, artificial; CSF/CNS; Rat; 2ML2; 14 days; Controls received mp w/ vehicle; animal info (Sprague Dawley, 280-300 g.); aCSF recipe; incorrectly stated 2002 pump.


ALZET Comments: Nerve growth factor; SC; Mice (nude); 1002; 2 weeks; Controls received mp w/ saline; cancer (prostate); animal info (BALB/c, Slc, 5 wks old, nu/nu).


ALZET Comments: Nerve growth factor, beta, recomb. rat; CSF, artificial; CSF/CNS (intrathecal); Rat; 2001; 7 days; Controls received mp w/ vehicle; peptides; animal info (adult, male, Sprague-Dawley, 250-300 g); SCI; spinal cord injury; behavioral testing (thermal nociceptive testing, mechanical allodynia).
**ALZET Comments:** Nerve growth factor; SC; Rat; 1003D; 72 hours; Controls received mp w/ saline to contralateral leg; cardiovascular; peptides; multiple pumps per animal (2); ischemia (muscle); animal info (male, Sprague Dawley, 5-7 wks old); SC in the hindlimb.

**ALZET Comments:** Nerve growth factor, beta; CSF, artificial; CSF/CNS (intrathecal); Rat; 2001; 7 days; Controls received mp w/ vehicle; animal info (male, Long Evans, hooded).

**ALZET Comments:** TrkB-Fc; TrkC-Fc; brain-derived neurotrophic factor; nerve growth factor; PBS; CSF/CNS (robust nucleus of the arcopallium); Bird (Gambel's white crowned sparrow); 1002; Controls received mp w/ vehicle; functionality of mp verified by residual volume; ALZET brain infusion kit 2 used.

**ALZET Comments:** Nerve growth factor; glial-derived neurotrophic factor; Saline; CSF/CNS (sciatic nerve); Mice (transgenic); 1004; 4 weeks; Controls received mp w/ vehicle; half-life (p. 308) "short"; animal info (10 wks old, 20 g., Thy1-YFP); image of pump pg. 309; schematic of drug delivery system with pump+silicone, fig. 1); "Because of the short biological half-life of neurotrophic factors, a delivery system that protects the protein and slowly releases it locally over a prolonged period of time is required." pg. 308; tissue perfusion (sciatic nerve).

**ALZET Comments:** Nerve growth factor; Hank's based salt solution; albumin, guinea pig serum; Ear (cochlea); Guinea pig; 2002; Controls received mp w/ vehicle; animal info (pigmented, adult, 270-470 g); pumps replaced after 13 days; post op. care (daily injections of cyclosporin and doxycycline); tissue perfusion.

**ALZET Comments:** Nerve growth factor, recomb. human; CSF, artificial; albumin, rat; CSF/CNS (septum); Rat; 2002; Controls received mp w/ vehicle; animal info (adult, female F344, 175-200 g, 3-4 months old); behavioral testing (Morris water maze test).

**ALZET Comments:** Hepatic growth factor, human; nerve growth factor; PBS; Triton-X; saline, sterile; IP; Rat; 2001; 7 days; Controls received mp w/ saline; animal info (8 wks old, Wistar).

**ALZET Comments:** Nerve growth factor, recomb. human; glial-derived neurotrophic factor, recomb. human; leukemia inhibitory factor, recomb. human; Saline; albumin, rat serum; CSF/CNS (intrathecal); Rat; 2002; 14 days; Controls received mp w/ vehicle; peptides, animal info (male, Wistar, 220-400 g.).
P8526: C. L. Randolph, et al. Regulation of NGF and NT-3 protein expression in peripheral targets by sympathetic input. Brain Research 2007;1144(59-69)

ALZET Comments: Nerve growth factor, mouse; Bisbenzimide; CSF/CNS; Rat; 2002; 2 weeks; Controls received no treatment; peptides; animal info (female, Sprague-Dawley, 3 months old); bisbenzimide (fluorescent marker) added to infusate to monitor cannula placement.


ALZET Comments: Angiotensin II; nerve growth factor; PD123319; Losartan; Saline; water; IP; Rat; 2001; 7 days; Controls received mp w/ vehicle; functionality of mp verified by systolic blood pressure; peptides; post op. care (penicillin); animal info (8 wks old, Wistar).


ALZET Comments: Adrenomedullin, recombinant human; nerve growth factor; Saline, sterile; IP; Rat; 2001; 7 days; Controls received mp w/ vehicle; dose-response (fig. 2); peptides; animal info (Wistar, 8 wk old, perivascular denervation).


ALZET Comments: Nerve growth factor, mouse; NT-4, human recombinant; brain-derived neurotrophic factor, recombinant human; CSF/CNS (visual cortex); Rat; 1007D; 8 days; Post op. care (antibiotics and local anesthetics); animal info (Long-Evans); dental cement used; 30 G cannula used; tissue perfusion (visual cortex).


ALZET Comments: Nerve growth factor; CSF, artificial; albumin, mouse; CSF/CNS (parietal cortex); Rat; 2002; 14 days; Controls received mp w/ vehicle; no stress (see pg. 321); peptides; cardiovascular; animal info (male, Sprague Dawley, 280-400 g., CCI brain injury); behavioral testing (beam balance, beam walking, Morris water maze).

6. Placental Growth Factor


ALZET Comments: Placental growth factor-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); cardiovascular; Dose (15 ug/kg/day).


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.


ALZET Comments: Placental growth factor, recombinant human; sFlt-1, recombinant human; IP; Mice; 3, 7 days; Controls received mp w/ vehicle; animal info (CS7BL/6, 12 wks old); polyethylene IP catheter used.

**ALZET Comments:** Placental growth factor; SC; Mice; 2001; 14 days; Diabetes, placenta growth factor (PIGF) is a VEGF homologue; ischemia.


**ALZET Comments:** Vascular endothelial growth factor; Vascular endothelial growth factor-E; Monocyte chemoattractant protein-1; Placental growth factor; Phosphate buffer; albumin; IA (femoral); Mice; rabbit; 1 week; Controls received mp w/ vehicle; dose-response (p.381); peptides; placenta growth factor (PIGF) is a VEGF homologue; VEGF-E is a chimera containing the heparin-binding domain of VEGF; MCP-1.


**ALZET Comments:** Placental growth factor; vascular endothelial growth factor; SC; Mice; 2001; 7 days; Angiogenesis.


**ALZET Comments:** Placental growth factor-1, recomb. human; Mice; 2001; 7 days; Controls received mp w/ vehicle; replacement therapy (PgF-/- mice); cardiovascular; ischemia (retinal); embryology.

### 7. Transforming Growth Factor


**ALZET Comments:** Transforming growth factor-b1; Hydrochloric acid; albumin; PBS; Mice (knockout); 1002; 14 days; Dose (6.2 ng/hour); animal info (BAMBI−/− mice); Therapeutic indication (chronic pain);


**ALZET Comments:** Transforming growth factor-β1; SJN2511; Interleukin-6; Bovine serum albumin; CSF; artificial; dextran; CSF/CNS; Mice; 7 days; 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);


**ALZET Comments:** Transforming growth factor-B1; endothelin-1; Saline; Mice; 3 weeks; Controls received mp w/ vehicle; animal info (FVB/N, 4 weeks old); used 28 day model pump;


**ALZET Comments:** Transforming growth factor, beta; BSA, saline; SC; Mice; 1003D; 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);


**ALZET Comments:** Transforming growth factor-B1; PBS; SC; Mice; 1007D; 7 days; Controls received mp w/ vehicle; animal info (male, C57Bl6, 8 weeks old, diabetes induced STZ); immunology; diabetes;
ALZET Comments: Transforming growth factor-B1; HCl; albumin; SC; Mice (transgenic); 1002; 14 days; Controls received mp w/ vehicle; animal info (male, Bambi-KO or WT, 14-18 weeks old); behavioral testing (von Frey monofilaments; formalin test); Transforming growth factor-B1 aka TGF-B1; sciatic nerve crush injury.

ALZET Comments: Transforming growth factor-beta-induced gene h3; Mice (SCID); Animal info (SCID, 6-8 wks old); cancer.

ALZET Comments: Stromal-cell-derived factor-1, alpha; bone morphogenic protein 2; transforming growth factor-1, beta; IP (abdominal wall); Rat; 2004; 4 weeks; Negative control animals received no cytokines; animal info (Sprague Dawley, adult); "A custom-made apparatus for the constant delivery of cytokines was assembled consisting in a microneedle system and Alzet osmotic pump" pg 90; fig 1b, image of custom-made cytokine delivery apparatus; tissue perfusion (anterior abdominal wall).

ALZET Comments: Minocycline hydrochloride; MCP-1, recomb., rat; antibody, MCP-1 neutralizing; IL-10, recomb.; transforming growth factor, beta-1; Saline, sterile, isotonic; CSF/CNS (intrathecal); Rat; 2001; 3, 7 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 250-275 g, naive, nerve-injured).

ALZET Comments: Transforming growth factor, beta 1, recomb.; CSF, artificial; CSF/CNS; Rat; 2002; 14 days; Controls received mp w/ vehicle; animal info (Fischer 344, female, 2-3 mo old, 180 g).

ALZET Comments: Transforming growth factor beta-1, recomb. human; BSA; PBS; SC; Mice (transgenic); 1002; 2 weeks; Controls received mp w/ vehicle; animal info (Tgfb1 null); "continuous supply of rhLTGFB1 by subcutaneous insertion of osmotic pumps successfully increased circulating TGFBI to detectable levels" pg 568.

ALZET Comments: Transforming growth factor, alpha; CSF, artificial; CSF/CNS (infarct border); Mice; 1002; 14 days; Controls received mp w/ vehicle; animal info (C57B, male, 4-6 wks old).

ALZET Comments: Transforming growth factor; CSF/CNS; Rat; 2004; 28 days; Controls received mp w/ PBS; ALZET brain infusion kit used; animal info (90 days old, MCAO); behavioral testing (cylinder corner test).

ALZET Comments: Transforming growth factor-1, beta; CSF/CNS (intrathecal); Rat; 1007D; 2002; 7, 14 days; Animal info (male, Sprague Dawley, 250-275 g); incorrectly stated pump model as 2002D.

ALZET Comments: Transforming growth factor-alpha; Serum, mouse; PBS; CSF/CNS (intrathecal); Mice; 2002; 14 days; Controls received mp w/ vehicle; functionality of mp verified by residual volume; post op. care (Baytril); animal info (female, adult, CS7BL/6, 10 wks old, 17-20 g.); spinal cord injury; pumps were primed in saline at 37 degree Celsius for 24 hours; pumps were weighed before and after filling; good methods; PE-50 used for catheter.

ALZET Comments: Transforming growth factor-alpha; PBS; CSF/CNS (caudate putamen); Rat; 1, 3, 5, 7, 28 days; Peptides, animal info (male, 10 wks old); neurodegenerative (Parkinson's Disease); neural stem cell research.

P9402: A. de Chevigny, et al. Fate mapping and lineage analyses demonstrate the production of a large number of striatal neuroblasts after transforming growth factor alpha and noggin striatal infusions into the dopamine-depleted striatum. Stem Cells 2008;26(9):2349-2360
ALZET Comments: Transforming growth factor-alpha; noggin; PBS; CSF/CNS (striatum); Rat; 1002; 2004; 14, 28, 41 days; Controls received mp w/ vehicle; ALZET brain infusion kit 2 used; brain tissue distribution; peptides; animal info (female, Sprague Dawley, 250-300 g.); behavioral testing (rotation behavior); noggin is a bone morphogenetic protein antagonist; neurodegenerative (Parkinson's Disease).

ALZET Comments: Transforming growth factor-B1, recomb.; CSF, artificial; CSF/CNS; Rat; 2002; 7 days; Controls received mp w/ vehicle; peptides; animal info (female, Fischer-344, 2-3 months old, 180 g.).

ALZET Comments: Transforming growth factor-alpha; BSA; acetic acid; CSF, artificial; CSF/CNS (third ventricle); Hamster; 2002; 16-20 days; Circadian; plastics one cannula; cannula/tubing were filled with aCSF to allow for a 48 delay; behavioral study; delayed delivery.;

ALZET Comments: Transforming growth factor-B3 receptor, recomb. soluble; PBS; SC; Mice (nude); 2002; 14 days; Controls received mp w/ vehicle; comparison of IP injections vs. mp; no stress (see pg. 84,88); cancer (prostate); multiple pumps per animal (2).

ALZET Comments: Amyloid protein, beta; transforming growth factor-B2; receptor-associated protein; HEPES buffer; CSF/CNS; Mice; 1002; 2 weeks; Controls received mp w/ vehicle; stability verified by incubation at 37 degree Celsius for 2,4 weeks; peptides; RAP is a LRP (lipoprotein receptor-related protein) antagonist; memory.

**ALZET Comments:** Transforming growth factor, alpha; PBS; CSF/CNS (striatum); Rat; 2004; 1, 2, 4 weeks; Controls received mp w/ vehicle; ALZET brain infusion kit 2 used; animal info (naive, adult, male, Sprague Dawley); neurodegenerative (Parkinson's Disease); brain tissue distribution; tissue perfusion (striatum).


**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).


**ALZET Comments:** Fibroblast growth factor-2; epidermal growth factor; transforming growth factor; Saline; serum albumin; CSF/CNS; Mice; 1007D; 6,12 days; Pumps replaced at day 7 for 12 d EGF infusions.


**ALZET Comments:** Monocyte chemoattractant protein-1; doxorubicin; transforming growth factor-B1; IA (femoral); Rabbit; 2ML1; 24 hours; Cardiovascular.


**ALZET Comments:** Monocyte chemoattractant protein-1; Transforming Growth Factor-B; Doxorubicin; IA (femoral); Rabbit; 2ML1; 24 hours; Cardiovascular; peptides; MCP-1 is monocyte chemoattractant protein 1.


**ALZET Comments:** Transforming Growth Factor-B2, soluble receptor; Polymyxin B; IP; mice; 1007D; 2002; 7,14 or 21 days; Arthritis; controls received empty pumps or mp w/ vehicle; functionality of mp verified by residual aspiration; pumps replaced after 14 days; stability verified by ELISA after infusion (p. 508, 510); soluble TGF-B RII selectively inhibits transforming growth factor-B; peptides; polymyxin B included as endotoxin inhibitor; 2002 pumps used for 7 and 14 day administration, 21-day group received a 1007D pump for final 7 days.


**ALZET Comments:** Transforming Growth Factor-B1; Saline; CSF/CNS; Rat; 2001D; controls received mp w/ vehicle; comparison of ICV injections vs. mp; peptides; human recombinant TGF-B used.


**ALZET Comments:** Transforming Growth Factor-B; insulin-like Growth Factor I; Rabbit; 6 weeks; peptides; review article: TGF administration via pump mentioned p. 1034; IGF-I administration mentioned on p. 1037.


**ALZET Comments:** Transforming growth factor-a; PB1 medium; Intrauterine; Rat; 2001; 2 days; controls received mp w/ vehicle; tissue perfusion (uterine horn lumen); TGF-a was recombinant human.
**P5015:** A. Kramer, *et al.* Regulation of daily locomotor activity and sleep by hypothalamic EGF receptor signaling. Science 2001;294(5551):2511-2515

**ALZET Comments:** Transforming growth factor-a; Brain-derived neurotrophic factor; Vasoactive intestinal polypeptide; Peptide, histidine-isoleucine; Gastrin releasing peptide; Substance P; Neuropephin-C; Neurokinin A; Neuropeptide K; Neuropeptide Y; Somatostatin; Antrin; Cholecystokin; Thyrotropin-releasing hormone; Neurotensin; Neuropeptides; CSF, artificial; CSF/CNS (third ventricle); hamster; 2002; 18-22 days; peptides.

**P4739:** R. D. Kopke, *et al.* Growth factor treatment enhances vestibular hair cell renewal and results in improved vestibular function. PNAS 2001;98(10):5886-5891

**ALZET Comments:** Transforming growth factor; insulin-like growth factor I; retinoic acid; brain-derived neurotrophic factor; PBS; BSA; Ear (vestibule); Guinea pig; 2002; 4 weeks; Controls received mp w/ vehicle; pumps replaced after 2 weeks; peptides; IntraEAR catheter used; GFI group pumps filled with TGF, IGF and Retinoic acid; GFII group pumps filled with TGF, IGF, BDNF and retinoic acid; tissue perfusion (vestibule).

**P4780:** D. G. Dillard, *et al.* Transforming growth factor and neutralizing antibodies in subglottic stenosis. Annals of Otology Rhinology and Laryngology 2001;110(393-400

**ALZET Comments:** Transforming growth factor-B1; Antibody, anti-human TGF-B1; PBS; BSA; Larynx; Rat; 1, 7, 21 days; Controls received mp w/ vehicle; immunology; peptides; special delivery device attached to pump, p. 394; wound healing study.

**8. Vascular Endothelial Growth Factor**

**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

**ALZET Comments:** Vascular endothelial growth factor, mouse recomb.; Vascular endothelial growth factor, synthetic peptide (Nano-VEGF); CSF, artificial; CSF/CNS (right lateral ventricle); Mice; 1002; 2 weeks; animal info (8-10, and 24 week-old mice); behavioral testing (rotating rod assy); Brain coordinates (A/P -0.5mm, M/L -1.1mm, D/V -2.5mm).


**ALZET Comments:** Vascular endothelial growth factor; PBS; Rat serum albumin; CSF/CNS; Rat; 2001; 1007D; 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. Behav Brain Res 2017;332(99-109

**ALZET Comments:** Vascular Endothelial Growth Factor; Saline; CSF/CNS (Left Lateral Ventricle); Rat; 2001; 7 days; Controls received mp w/ vehicle; animal info (17 weeks); behavioral testing (Morris water maze); Therapeutic indication (Hypoxia-inducible factor-1α; 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

**ALZET Comments:** Raf-Transducer cells, conditioned media; leukemia inhibitory factor; fibroblast growth factor 2; vascular endothelial growth factor; CSF, artificial; CSF/CNS; Mice; 1007D; 6 days; 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.

ALZET Comments: Vascular endothelial growth factor, Fibroblast Growth Factor 2; Saline; CSF/CNS (lateral ventricle); Mice; 7 days; 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)).

Q4609: S. L. Taylor, et al. VEGF can protect against blood brain barrier dysfunction, dendritic spine loss and spatial memory impairment in an experimental model of diabetes. NEOBIOLOGY OF DISEASE 2015;78(1-11

ALZET Comments: Vascular endothelial growth factor (165); CSF, artificial; CSF/CNS; Mice; 2006; 8 weeks; Controls received mp w/ vehicle; animal info (male, C57BL6J, 2 months old); ALZET brain infusion kit 3 used; behavioral testing (Morris water maze); diabetes;


ALZET Comments: Vascular Endothelial Growth Factor, Angiotensin II, Losartan, Cyclosporine; Saline; SC; Mice; 21 days; Controls received mp w/ vehicle; animal info (Calcineurin (CN) B1 (Cnb1_/fl) conditional knockout mice, C57BL/6 mice); dose-response; vegf aka vascular endothelial growth factor; Dose (VEGF 25 ug/kg/day, AngII 1 ug/kg/min, CsA 5 mg/kg/day, Losartan 10 mg/kg/day).


ALZET Comments: Vascular endothelial growth factor, recombinant human; Heparin; Saline; Intrapericardial; Pig; 2ML4; 4 weeks; Animal info (male, Yorkshire miniswine, 13-22kg); ischemia (cardiac, chronic); stress/adverse reaction: (see pg. 746); post op. care (Enrofloxacin 68mg PO daily for 5 days; aspirin 325 mg/day for 5 days; buprenorphine HCL 0.3 mg/kg, transdermal fentanyl patch 4mcg/kg for 72h); cardiovascular;


ALZET Comments: Vascular endothelial growth factor; platelet-derived growth factor-BB; PBS; CSF/CNS (intrathecal); Rat; 2001; 7 days; Controls received mp w/ saline; animal info (female, Wistar, 20-25 weeks, 300g); spinal cord injury; post op. care (cephalothin; buprenorphine; manual bowel and bladder expression BID); behavioral testing (locomotor behavior; gait and footprint analysis); used Rat intrathecal catheter; pumps primed in 37C saline overnight;


ALZET Comments: Vascular endothelial growth factor; Saline; CSF/CNS; Mice; 2004; 3, 10 days; Controls received mp w/ saline; animal info (male C57BL6/j, 20-25g); ischemia.


ALZET Comments: Vascular endothelial growth factor, A; Mice; 2004; Animal info (C57BL/6, MIP-GFP, male, 8 wks old);


ALZET Comments: Vascular endothelial growth factor, 121; Mice (pregnant); 5 days; Animal info (C57BL/6).
Q2990: J. W. Shim, et al. VEGF, which is elevated in the CSF of patients with hydrocephalus, causes ventriculomegaly and ependymal changes in rats. Experimental Neurology 2013;247(;):703-709

ALZET Comments: Vascular endothelial growth factor-A165; Bevacizumab; Saline; BSA; CSF/CNS; Rat; 2001D; 1 day; Controls received mp w/vehicle, or (saline, BSA); Peptides; animal info (male Sprague-Dawley rats, 250g); Brain infusion kit (2) used;


ALZET Comments: Vascular endothelial growth factor B; CSF, artificial; CSF/CNS; Rat; 1007D; Control animals received mp w/ vehicle; Animal info (Lewis, VEGF KO, hepatectomy); infusion rate of 1 ul/hr.

Q1819: O. Thau-Zuchman, et al. SUBACUTE TREATMENT WITH VASCULAR ENDOTHELIAL GROWTH FACTOR AFTER TRAUMATIC BRAIN INJURY INCREASES ANGIogenesis AND GliogenesIS. Neuroscience 2012;202(;):334-341

ALZET Comments: Vascular endothelial growth factor; Saline; CSF/CNS; Mice; 7 days; Controls received mp w/ vehicle; animal info (adult, Sabra, 40 g).
**ALZET Comments:** Vascular endothelial growth factor; CSF/CNS (cortex); Rat; 1007D; 7 days; Controls received mp w/ PBS or no implantation; animal info (Long-Evans, P18); cyanoacrylate adhesive; ALZET brain infusion kit 3 used; "Total operating time was approximately 25 min." pg 137.

**ALZET Comments:** Fibroblast growth factor-2; vascular endothelial growth factor-2; platelet-derived growth factor; SC; Mice; 1004; 28 days; Controls received mp w/ no growth factors; animal info (C57BL/6); good methods, pg 138; tissue perfusion (internal anal sphincter); silicone catheter used; "the osmotic pumps we used completed delivery of the growth factors by 28 days, which would clearly limit the duration of exposure to the growth factor, lessening the risk of malignancy" pg 143.

**ALZET Comments:** Vascular endothelial growth factor 121; PBS; SC; Mice (pregnant); 2002; 10 days; Controls received mp w/ vehicle; animal info (CD-1); functionality of mp verified by residual volume and plasma drug levels.

**ALZET Comments:** Vascular endothelial growth factor, recomb. human; Intrapericardial; Pig; Animal info (intact, male, Yorkshire); stress/adverse effects "sudden cardiac death", pg 393.

**ALZET Comments:** Vascular endothelial growth factor; CSF/CNS; Mice; 6, 7 days; Controls received mp w/ vehicle or were sham operated; animal info (adult, Sabra, male, 40 g); infusion rate of 0.5 ul/hr.

**ALZET Comments:** Isoxazolopropionate, alpha amino-3-hydroxy-5-; vascular endothelial growth factor, recomb., 164; SU14980, tyrphostin; LY294002; neurodegenerative (amyotrophic lateral sclerosis); PBS; DMSO; CSF/CNS (intrathecal, spinal cord); Rat; 2004; 2, 10, 20 days; Controls received mp w/ vehicle; animal info (Wistar, male, 270-290 g, adult); alpha amino-3-hydroxy-5-isoxazolopropionate also known as AMPA; wound clips used; post op. care, pg 1091 (penicillin); good methods, pg 1091; multiple pumps used (2); multiple intrathecal catheters used; wound clips used; 2% DMSO used; enzyme inhibitor (p38 mitogen-activated protein kinase, p38MAPK).

**ALZET Comments:** Vascular endothelial growth factor, 165, recomb. human; vascular endothelial growth factor, inactivated; PBS, sterile; CSF/CNS (hippocampus); Rat; 2002; 2 weeks; Controls received no surgical manipulations or protein infusions; animal info (male Sprague-Dawley, 250-350 g); behavioral testing (Morris water maze, Grid locomotor activity, Light-dark exploration).

**ALZET Comments:** Vascular endothelial growth factor 164; SU5416; uridine, bromodeoxy; CSF, artificial; DMSO; CSF/CNS; Rat; 2002; 13 days; Controls received mp w/ vehicle; animal info (young, Sprague Dawley, male, 270-300 g); 1% DMSO used.
ALZET® Bibliography

ALZET Comments: Vascular endothelial growth factor, alpha; BSA; IP; Rat; 1 week; animal info (BDL+HAL).

Q0400: E. Bogaert, et al. VEGF protects motor neurons against excitotoxicity by upregulation of GluR2. NEUROBIOLOGY OF AGING 2010;31(12):2185-2191
ALZET Comments: Vascular endothelial growth factor; CSF/CNS; Rat; 2004; 1 week; Controls received mp w/ vehicle; animal info (80 days old).

ALZET Comments: Vascular endothelial growth factor (121); PBS, sterile; SC; Mice; 7 days; Animal info (CBA/J x DBA/2 and CBA/J x BALB/c).

ALZET Comments: Vascular endothelial growth factor, recomb. human; CSF/CNS (parenchyma); Mice (nude); 2004; Controls received mp w/ PBS; animal info (6 wks old).

ALZET Comments: Vascular endothelial growth factor (165); SC; Rat; 1002; 10 days; Controls received mp w/ PBS; animal info (male, Wistar, 234-254 g); functionality of mp verified by residual volume; post op. care (buprenorphine); pump connected to a porous polyurethane construct, schematic on Figure 1A.

ALZET Comments: Vascular endothelial growth factor-15; vascular endothelial growth factor-165; QK; IA (femoral); Rat; 2002; 14 days; Peptides; animal info (12 wks old, WKY, normosensitive); QK is a de novo engineered VEGF mimicking peptide.

ALZET Comments: Vascular endothelial growth factor (164); SU5416; CSF, artificial; DMSO; CSF/CNS; Rat; 1002; 13 days; Controls received mp w/ vehicle; animal info (young, male, Sprague Dawley, 270-330 g.); cannula placement verified by histology; 1% DMSO used; artificial CSF recipe.

P8799: A. Tsuchiya, et al. Sca-1+ endothelial cells (SPECs) reside in the portal area of the liver and contribute to rapid recovery from acute liver disease. Biochemical and Biophysical Research Communications 2008;365(3):595-601
ALZET Comments: Vascular endothelial growth factor-inhibitor; DMSO; IP; Mice; 9, 11 days; Controls received mp w/ vehicle; animal info (C57BL/6; 4, 8, 12 wks old; anti-Fas Ab-induced liver damage); agent also known as CBO-P11.

ALZET Comments: Vascular endothelial growth factor 164, recomb. rat; PBS; CSF/CNS; Rat; 1003D; 3 days; 24 hours; Controls received mp w/ vehicle; brain tissue distribution; peptides; animal info (male, Sprague Dawley, 175-200 g.); delayed delivery (in the 48 hour infusion, PBS infused for 24 hours to “avoid the influence of cannulation and anesthesia.” (p. 11354) then VEGF infused for 24 hours).

**ALZET Comments:** Vascular endothelial growth factor-165-b, recomb.; NaCl, sterile; SC; Mice; 28 days; No stress (see pg. 1888); half-life (p. 1893) 25 min in mice, 13.8-72 min in rats; cancer (colon); post op. care (Temgesic); animal info (C57/Bl6, 720 g.); silk sutures used; "no adverse effects were observed with this infusion of VEGF165b" pg. 1888; compound is an antiangiogenic isoform of VEGF.


**ALZET Comments:** Vascular endothelial growth factor-B186, recomb. mouse; CSF, artificial; CSF/CNS; Rat; 2004; 100 days; Controls received mp w/ vehicle; long-term study; pumps replaced every 25 days; no stress (see pg. 10456); stability verified by 4 weeks in mp at 37 degrees Celsius; animal info (HAN-Wistar x Sprague Dawley-hSOD1G93A, 60 days old); behavioral testing (Rotarod test); "this delivery route was chosen because previous studies demonstrated that intracerebroventricularly delivered VEGF diffuses from the CSF into the neural parenchyma, where it reaches it's target motor neurons." (p. 10456).


**ALZET Comments:** Vascular endothelial growth factor, recomb. human; BowAng1; Flt-Fc; CSF/CNS (dorsal hippocampus); Rat; 5 days; Controls received mp w/ PBS; animal info (male, Sprague Dawley, adult, 250-350 g.); cannula, polyvinyl catheter from Plastics One used; BowAng1 is a fusion of four molecules of angiopoietin-1 with two molecules of hFC; Flt-Fc is an immunoadhesin.


**ALZET Comments:** Vascular endothelial growth factor 165, recomb. human; Heparin; Intramyocardial; Pig (miniswine); 2ML4; 4 weeks; Tissue perfusion (myocardial); half-life (p. 649) "short"; cardiovascular; peptides; ischemia (cardiac); animal info (Yucatan mini-swine, 20-30 kg.).


**ALZET Comments:** Antibody, TGF beta neutralizing; Vascular endothelial growth factor; SC; Pig (mini); 28 days; animal info (Yucatan mini pigs); enzyme inhibitor (pSmad2);