



References on the Administration of Endothelins Using ALZET® Osmotic Pumps

Q8238: S. Lakhali-Littleton, *et al.* Intracellular iron deficiency in pulmonary arterial smooth muscle cells induces pulmonary arterial hypertension in mice. *Proc Natl Acad Sci U S A* 2019;116(26):13122-13130

Agents: Selective endothelin subtype-A receptor agonist **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** Not stated;

ALZET Comments: Dose (200 nmol/kg/day); Selective endothelin subtype-A receptor agonist aka cyclic peptide BQ-123 ; peptides; cardiovascular;

Q7255: I. Prada, *et al.* Glia-to-neuron transfer of miRNAs via extracellular vesicles: a new mechanism underlying inflammation-induced synaptic alterations. *Acta Neuropathologica* 2018;135(4):529-550

Agents: Endothelin A antagonist aka BQ-123 and Endothelin B antagonist aka BQ-788; **Vehicle:** Saline; **Route:** CSF/CNS (Hippocampus CA1); **Species:** Mice; **Pump:** 1007D; **Duration:** 4 days;

ALZET Comments: Dose (M1-EV 1.5 µg/µl, M2-EV 0.5 µl/h); Controls received mp w/ vehicle; animal info (4-month-old C57BL6 male mice); Brain coordinates (anteroposterior: 1.8 mm relative to bregma; mediolateral: +1 mm; dorsoventral: 1.5 mm relative to the dura); neurodegenerative (Multiple sclerosis);

Q7254: J. Polak, *et al.* Blockade of Endothelin-1 Receptor Type B Ameliorates Glucose Intolerance and Insulin Resistance in a Mouse Model of Obstructive Sleep Apnea. *Front Endocrinol (Lausanne)* 2018;9(280)

Agents: Endothelin-1 antagonist **Vehicle:** Saline, PEG; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Dose (ETA antagonist; 200 nmol/kg/day, ETB antagonist; 200 nmol/kg/day); Controls received mp w/ vehicle; animal info (Adult male C57BL6/J mice aged 6-8 weeks); Endothelin A antagonist aka BQ-123 and Endothelin B antagonist aka BQ-788;

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; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 3 weeks;

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

Q3341: T. R. Hammond, *et al.* Astrocyte-Derived Endothelin-1 Inhibits Remyelination through Notch Activation. *Neuron* 2014;81(3):588-602

Agents: Endothelin-1; PD142,893; DAPT; Jagged1 Fc, recombinant rat **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 1007D; 1002; **Duration:** 2 days; 7 days; 8 days; 15 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (TNR, C57BL6N, 8-12 weeks old); ALZET brain infusion kit 3 used; cyanoacrylate adhesive; DAPT aka N-[(3,5-Difluorophenyl)acetyl]-L-alanyl-2-phenylglycine-1,1-dimethylethyl ester; DAPT is a gamma secretase inhibitor

Q2397: M. A. Saleh, *et al.* Chronic endothelin-1 infusion elevates glomerular sieving coefficient and proximal tubular albumin reuptake in the rat. *LIFE SCIENCES* 2012;91(13-14):634-637

Agents: Endothelin-1 **Vehicle:** NaCl; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 2 weeks;

ALZET Comments: Control animals received mp w/ vehicle; animal info (Munich-Wistar, male, 200-250 g);

Q1784: F. Li, *et al.* eNOS Deficiency Acts through Endothelin to Aggravate sFlt-1-Induced Pre-Eclampsia-Like Phenotype. *Journal of the American Society of Nephrology* 2012;23(4):652-660

Agents: Preproendothelin-1 **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** Not Stated;

ALZET Comments: Controls received mp w/ saline; animal info (wt, female, nonpregnant, 3-5 mo old)

Q2547: J. M. Kim, *et al.* Increased expression of oxyproteins in the optic nerve head of an in vivo model of optic nerve ischemia. *BMC Pharmacology* 2012;12(1):U1-U6

Agents: Endothelin-1 **Vehicle:** Not Stated; **Route:** CSF/CNS (optic nerve, perineural region); **Species:** Rabbit; **Pump:** Not Stated; **Duration:** 2, 4, 8 weeks;



ALZET Comments: Animal info (New Zealand, 2.5-3.5 kg); long-term study; PE tubing used

Q1214: F. Ljuca, *et al.* Contribution of Ras farnesyl transferase, MAP kinase and cytochrome P-450 metabolites to endothelin-1 induced hypertension. *BJBMS* 2011;11(2):84-86

Agents: Endothelin 1; FPT III; PD-98059; baicalein; ODYA, 17- **Vehicle:** Not Stated; **Route:** IV (jugular); **Species:** Rat; **Pump:** Not Stated; **Duration:** 9 days;

ALZET Comments: Controls received no pump; animal info (male, Sprague Dawley); peptides; enzyme inhibitor (Ras farnesyl transferase, MAP kinase, COX); 17-ODYA is a CYP450 inhibitor; PE-60 tubing used

Q0303: C. J. Wang, *et al.* (-)-Epigallocatechin Gallate Inhibits Endothelin-1-Induced C-Reactive Protein Production in Vascular Smooth Muscle Cells. *Basic & Clinical Pharmacology & Toxicology* 2010;107(2):669-675

Agents: Endothelin-1 **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ saline; animal info (Male, Sprague-Dawley, 250 g)

Q0739: M. A. Saleh, *et al.* Endothelin-1 Increases Glomerular Permeability and Inflammation Independent of Blood Pressure in the Rat. *Hypertension* 2010;56(5):942-U427

Agents: Endothelin-1 **Vehicle:** Saline; **Route:** IV (jugular); **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 225-250 g); peptides

Q0217: V. V. Lima, *et al.* O-GlcNAcylation Contributes to Augmented Vascular Reactivity Induced by Endothelin 1. *Hypertension* 2010;55(1):180-188

Agents: Endothelin-1 **Vehicle:** Sodium chloride; **Route:** IV (jugular); **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ sodium chloride; animal info (male, Wistar, 8-10 wks old, 230-250 g.); 0.9% sodium chloride used

Q0138: Y. Koyama, *et al.* Decreases in rat brain aquaporin-4 expression following intracerebroventricular administration of an endothelin ET_B receptor agonist. *Neuroscience Letters* 2010;469(3):343-347

Agents: Endothelin-1, ala-1, 3, 11, 15- **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 3, 7 days;

ALZET Comments: Controls received mp w/ vehicle; ALZET brain infusion kit used; animal info (male, Wistar, 250-300 g.)

Q1439: Y. Koyama, *et al.* Intracerebroventricular Administration of an Endothelin ET(B)-Receptor Agonist Increases Expression of Matrix Metalloproteinase-2 and -9 in Rat Brain. *JOURNAL OF PHARMACOLOGICAL SCIENCES* 2010;114(4):433-443

Agents: Endothelin-1, ala-1, 3, 11, 15- **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, 250-300 g); artificial CSF recipe listed; ALZET brain infusion kit used; ala-1, 3, 11, 15-ET-1 is an ETB-receptor agonist

Q0959: Z. Aktas, *et al.* Matrix metalloproteinase-9 expression in retinal ganglion cell layer and effect of topically applied brimonidine tartrate 0.2% therapy on this expression in an endothelin-1-induced optic nerve ischemia model. *International Ophthalmology* 2010;30(3):253-259

Agents: Endothelin-1, human, porcine **Vehicle:** Not Stated; **Route:** Eye (optic nerve); **Species:** Rabbit; **Pump:** 2002; **Duration:** 2 weeks;

ALZET Comments: Animal info (New Zealand, albino); vinyl tubing used; image of pump and tubing through the upper eyelid (Fig.1, Fig 2b);

P9573: X. Wang, *et al.* Increase in endothelin B receptor expression in optic nerve astrocytes in endothelin-1 induced chronic experimental optic neuropathy. *Experimental Eye Research* 2009;88(3):378-385

Agents: Endothelin-1 **Vehicle:** Not Stated; **Route:** CSF/CNS (optic nerve); **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;

ALZET Comments: Post op. care (buprenorphine); animal info (adult, male, Brown Norway, 250-300g); fellow eye served as untreated control; silastic tubing used; brain tissue distribution

Q0277: C. J. Wang, *et al.* Endothelin-1 induces the expression of C-reactive protein in rat vascular smooth muscle cells. *Biochemical and Biophysical Research Communications* 2009;389(3):537-542

Agents: Endothelin-1 **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;



ALZET Comments: Controls received mp w/ saline; animal info (male, Sprague-Dawley, 250 g)

P8717: D. E. Brooks, *et al.* Blood flow velocity response of the ophthalmic artery and anterior optic nerve head capillaries to carbogen gas in the rhesus monkey model of optic nerve head ischemia. *VETERINARY OPHTHALMOLOGY* 2007;10(1):20-27

Agents: Endothelin-1 **Vehicle:** Not Stated; **Route:** CSF/CNS (optic nerve); **Species:** Monkey (Rhesus); **Pump:** 2004; **Duration:** 8 months;

ALZET Comments: Controls received mp w/ vehicle; long-term study; pumps replaced every 4 weeks; peptides; animal info (young, male, Rhesus); glaucoma

P7183: A. Migneault, *et al.* Chronically elevated endothelin levels reduce pulmonary vascular reactivity to nitric oxide. *American Journal of Respiratory and Critical Care Medicine* 2005;171(5):506-513

Agents: Endothelin-1 **Vehicle:** Water; **Route:** IV (jugular); **Species:** Rat; **Pump:** Not Stated; **Duration:** 7, 20 days;

ALZET Comments: Controls received sham surgery; functionality of mp verified by plasma E7-1 levels; stability verified by 7 and 28 day incubation at 37 degrees celsius and HPLC; cardiovascular; peptides

P7257: Y. Koyama, *et al.* Endothelin increases expression of exon III-and exon IV-containing brain-derived neurotrophic factor transcripts in cultured astrocytes and rat brain. *Journal of Neuroscience Research* 2005;80(6):809-816

Agents: Endothelin-1; Ala-1, 3, 11, 15- **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ vehicle; ALZET brain infusion kit used; peptides; endothelin B receptor agonist

P7506: Y. Koyama, *et al.* Endothelins stimulate the expression of neurotrophin-3 in rat brain and rat cultured astrocytes. *Neuroscience* 2005;136(2):425-433

Agents: Endothelin-1, Ala-1, 3, 11, 15 - **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; **Duration:** 3, 7 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, 250-300 g)

P6957: P. Beaucage, *et al.* Position of Src tyrosine kinases in the interaction between angiotensin II and endothelin in in vivo vascular protein synthesis. *Journal of Hypertension* 2005;23(2):329-335

Agents: Angiotensin II; endothelin **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 1003D; **Duration:** 26 hours;

ALZET Comments: Cardiovascular; peptides

P7010: L. Yao, *et al.* Olmesartan improves endothelin-induced hypertension and oxidative stress in rats. *HYPERTENSION RESEARCH* 2004;27(7):493-500

Agents: Endothelin-1 **Vehicle:** Saline; **Route:** IV (jugular); **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; cardiovascular; peptides

P6995: Y. P. Wang, *et al.* Prevention of endothelin-1-induced increases in blood pressure: role of endogenous CGRP. *American Journal of Physiology Heart and Circulatory Physiology* 2004;287(4):H1868-H1874

Agents: Endothelin-1 **Vehicle:** Saline, normal; **Route:** IV (external jugular); **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ vehicle; functionality of mp verified by confirming mp was empty and correct catheter position; cardiovascular; peptides

P6670: B. Luo, *et al.* ET-1 and TNF-alpha in HPS: analysis in prehepatic portal hypertension and biliary and nonbiliary cirrhosis in rats. *American Journal of Physiology Gastrointestinal and Liver Physiology* 2004;286(2):G294-G303

Agents: Endothelin-1 **Vehicle:** Saline; **Route:** IV (femoral); **Species:** Rat; **Pump:** 2002; **Duration:** 2 weeks;

ALZET Comments: Controls received mp w/ vehicle; ET-1 plasma levels taken

P6550: B. C. Chauhan, *et al.* Model of endothelin-1 - Induced chronic optic neuropathy in rat. *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE* 2004;45(1):144-152

Agents: Endothelin-1 **Vehicle:** Balanced salt solution; **Route:** Eye (retrobulbar optic nerve); **Species:** Rat; **Pump:** 2004;

Duration: 21,42,84 days;

ALZET Comments: Controls received mp w/ vehicle and fellow eye w/ no treatment; dose-response (fig.5); long-term study; pumps replaced every 28 days; peptides; post op. care (rentamicin, buprenex)



P6541: D. E. Brooks, *et al.* Functional and structural analysis of the visual system in the rhesus monkey model of optic nerve head ischemia. INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE 2004;45(6):1830-1840

Agents: Endothelin **Vehicle:** Saline; acetic acid; **Route:** CSF/CNS (optic nerve); **Species:** Monkey; **Pump:** Not Stated; **Duration:** 18 months;

ALZET Comments: Controls received mp w/ vehicle; long-term study; pumps replaced every 6 weeks; no stress (see pg. 1833); peptides; "The osmotic minipumps were well tolerated by the monkeys for the length (1.5 years) of the experiment." The long exposure time was used to "mimic more closely the prolonged human glaucomatous condition." p. 1838; pump model not listed; ischemia

P5771: L. Smith, *et al.* Endothelin-induced increases in Ca²⁺ entry mechanisms of vascular contraction are enhanced during high-salt diet. Hypertension 2003;41(3):787-793

Agents: Endothelin-1 **Vehicle:** Not Stated; **Route:** IV; **Species:** Rat; **Pump:** Not Stated; **Duration:** 5 days;

ALZET Comments: Controls received mp w/ saline

P6059: M. H. Sedeeq, *et al.* Role of reactive oxygen species in endothelin-induced hypertension. Hypertension 2003;42(4):806-810

Agents: Endothelin-1; tempol **Vehicle:** Not Stated; **Route:** IV (jugular); **Species:** Rat; **Pump:** 2002; **Duration:** 9 days;

ALZET Comments: Peptides

P5747: S. D. Rogers, *et al.* Endothelin B receptors are expressed by astrocytes and regulate astrocyte hypertrophy in the normal and injured CNS. Glia 2003;41(2):180-190

Agents: Endothelin-1; Bosentan; Dye, Evans blue **Vehicle:** CSF, artificial; **Route:** CSF/CNS (optic nerve); **Species:** Rabbit; **Pump:** 2ML2; **Duration:** 14 days;

ALZET Comments: Controls received mp w/ vehicle; functionality of mp verified by Evans Blue Dye; good methods p.182, 181; antihypertensive; Bosentan (commercial drug name is traclear) is an endothelin receptor antagonist (ERA); Vialon catheter with holes used; pump/catheter schematic (p.182); pump is described as advantageous for optic nerve infusion (p.182)

P5690: B. Luo, *et al.* Increased pulmonary vascular endothelin B receptor expression and responsiveness to endothelin-1 in cirrhotic and portal hypertensive rats: a potential mechanism in experimental hepatopulmonary syndrome. Journal of Hepatology 2003;38(5):556-563

Agents: Endothelin-1 **Vehicle:** Not Stated; **Route:** IV (femoral); **Species:** Rat; **Pump:** 2002; **Duration:** 2 weeks;

ALZET Comments: Functionality of mp verified by pump assessment; 2-week stability verified by previous studies by other groups; ET-1 plasma levels measured

P5147: B. R. Brehm, *et al.* Modulation of the beta-adrenergic receptor system of vascular smooth muscle cells in vitro and in vivo by chronically elevated endothelin-1 levels. Biochemical Pharmacology 2002;63(1361-1369

Agents: Endothelin-1 **Vehicle:** Saline; **Route:** IV (superior vena cava); **Species:** Rat; **Pump:** 2ML4; **Duration:** 3 weeks;

ALZET Comments: controls received mp w/ vehicle; functionality of mp verified by ET-1 levels; cardiovascular; peptides

P5051: Y. M. Ahn, *et al.* Sustained arterial narrowing after prolonged exposure to perivascular endothelin. Neurosurgery 2002;50(843-848

Agents: Endothelin-1 **Vehicle:** Saline; **Route:** Perivascular (femoral artery adventitia); **Species:** Rat; **Pump:** Not Stated; **Duration:** 3 or 5 days;

ALZET Comments: controls received mp w/ vehicle; tissue perfusion (adventitia); cardiovascular; peptides; ET-1 is a vasoconstrictor peptide; Arteries perfused via a custom silastic artery cuff attached to catheter tube; pump placed sc

P4878: M. Iglarz, *et al.* Chronic blockade of endothelin receptors improves ischemia-induced angiogenesis in rat hindlimbs through activation of vascular endothelial growth factor-NO pathway. Arteriosclerosis, Thrombosis, and Vascular Biology 2001;21(1598-1603

Agents: Endothelin-1 **Vehicle:** Not Stated; **Route:** SC; IP; **Species:** Rat; **Pump:** 2002; **Duration:** 3 or 28 days;

ALZET Comments: ET-1 infused at a subpressor dose of 2 pmol/kg/min; ischemia (hind-limb); cardiovascular



P4669: C. Ramirez, *et al.* Role of intrarenal endothelin 1, endothelin 3, and angiotensin II expression in chronic cyclosporin A nephrotoxicity in rats. *Experimental Nephrology* 2000;8(161-172

Agents: Cyclosporin A; Endothelin-1; Endothelin-3; **Vehicle:** Saline; propylene glycol; **Route:** SC;; **Species:** Rat;; **Pump:** 2ML4;; **Duration:** 56 days;;

ALZET Comments: Controls received mp w/ vehicle; functionality of mp verified by whole blood CsA levels; long-term study, pumps replaced after 28 days; antihypertensive; cardiovascular; secretion in nephrotoxicity, relationship with Angiotensin II in renal expression propylene glycol used as vehicle for CsA.

P4492: M. Zhang, *et al.* Endothelin-1 stimulation of endothelial nitric oxide synthase in the pathogenesis of hepatopulmonary syndrome. *American Journal of Physiology Gastrointestinal and Liver Physiology* 1999;277(G944-G952

Agents: Endothelin-1; **Vehicle:** Saline;; **Route:** IV (femoral);; **Species:** Rat;; **Pump:** 2002;; **Duration:** 2 weeks;;

ALZET Comments: controls received mp w/vehicle; functionality of mp verified by residual volume; stability verified by RIA after 2 weeks in vitro incubation in the pumps; peptides;

P4526: D. Henrion, *et al.* Chronic endothelin-1 improves nitric oxide-dependent flow-induced dilation in resistance arteries from normotensive and hypertensive rats. *Arteriosclerosis, Thrombosis, and Vascular Biology* 1999;19(2148-2153

Agents: Endothelin-1; **Vehicle:** Saline;; **Route:** SC;; **Species:** Rat;; **Pump:** 2002;; **Duration:** 2 weeks;;

ALZET Comments: controls received mp w/vehicle; peptides;

P4351: G. A. Cioffi, *et al.* The effect of chronic ischemia on the primate optic nerve. *European Journal of Ophthalmology* 1999;9(Supp. 1):S34-S36

Agents: Endothelin-I **Vehicle:** Not Stated; **Route:** CSF/CNS (optic nerve);; **Species:** monkey; **Pump:** Not Stated; **Duration:** 2-6 months;;

ALZET Comments: long-term study, pumps replaced after 4 weeks; peptides; abstract states pump implanted in rabbits also but no mention of rabbits throughout paper; ischemia

P3977: E. Thorin, *et al.* Endothelin-1 regulates tone of isolated small arteries in the rat. *Hypertension* 1998;31(1035-1041

Agents: Endothelin-1 **Vehicle:** Saline; **Route:** IV (jugular); **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: functionality of mp verified by plasma levels; cardiovascular

Q0938: M. G. Neerhof, *et al.* Endothelin1 1 Induced Placental and Fetal Growth Restriction in the Rat. *The Journal of Maternal-Fetal Medicine* 1997;6(125-128

Agents: Endothelin-1 **Vehicle:** BSA; **Route:** IV (jugular); **Species:** Rat; **Pump:** Not Stated; **Duration:** 7 days;

ALZET Comments: Controls received mp w/ normal saline; animal info (female, Sprague-Dawley, 250-300 g); functionality of mp verified by residual volume

P3475: S. Orgul, *et al.* An endothelin-1 induced model of optic nerve ischemia in the rabbit. *Invest. Ophthalmol. Vis. Sci* 1996;37(9):1860-1869

Agents: Endothelin-1 **Vehicle:** Not Stated; **Route:** CSF/CNS (optic nerve); **Species:** rabbit; **Pump:** Not Stated; **Duration:** 2, 8 weeks;

ALZET Comments: controls received mp w/ balanced salt solution; tissue perfusion (perineural region of optic nerve); long-term study, pumps replaced every 2 weeks; peptides; pump implanted above the eye; ischemia (optic nerve)

P3477: S. Orgul, *et al.* An endothelin-1-induced model of chronic optic nerve ischemia in rhesus monkeys. *J. Glaucoma* 1996;5(135-138

Agents: Endothelin-1 **Vehicle:** Not Stated; **Route:** CSF/CNS (optic nerve); **Species:** monkey; **Pump:** 2002; **Duration:** 7 days;

ALZET Comments: controls received saline infusion; good methods; peptides; ischemia (optic nerve)

P3586: F. Martinez, *et al.* Chronic effects of endothelin-3 on blood pressure and renal haemodynamics in rats. *Nephrol. Dial. Transplant* 1996;11(270-274

Agents: Endothelin-3 **Vehicle:** Water, distilled; **Route:** IV (jugular); **Species:** Rat; **Pump:** Not Stated; **Duration:** 3 days;

ALZET Comments: controls received mp w/ vehicle; stability verified by injection of ET-3 from minipump; stable for 3 days - lost biological activity thereafter; peptides



P3469: G. A. Cioffi, *et al.* An in vivo model of chronic optic nerve ischemia: the dose-dependent effects of endothelin-1 on the optic nerve microvasculature. *Curr. Eye Res* 1995;14(1147-1153

Agents: Endothelin-1 **Vehicle:** Balanced salt solution; **Route:** CSF/CNS (optic nerve); **Species:** rabbit; **Pump:** Not Stated;

Duration: 4 weeks, 3 days;

ALZET Comments: controls received mp w/ vehicle; peptides; pumps implanted above the eye; ischemia (optic nerve)

P2661: G. A. Cioffi, *et al.* Microvasculature of the anterior optic nerve. *Survey of Ophthalmol* 1994;38(Suppl):S107-S117

Agents: Endothelin-1 **Vehicle:** Balanced salt solution; **Route:** CSF/CNS (optic nerve); **Species:** rabbit; **Pump:** Not Stated;

Duration: no duration posted;

ALZET Comments: controls received mp w/ vehicle; comparison of intravitreal injections vs. mp; peptides; pumps implanted above upper eyelid

P3116: J. D. Trachtenberg, *et al.* Effect of endothelin-1 infusion on the development of intimal hyperplasia after balloon catheter injury. *J. Cardiovasc. Pharmacol* 1993;22(SUPL8):S355-S359

Agents: Endothelin-1 **Vehicle:** Albumin, bovine serum; Saline; **Route:** IV (inferior vena cava); **Species:** Rat; **Pump:** 2ML2;

Duration: 2 weeks;

ALZET Comments: peptides; pump implanted in groin; transmitter catheters implanted in suprarenal aorta to measure blood pressure and heart rate continuously

P3039: M. Naruse, *et al.* Is chronic elevation of plasma endothelin levels a cause of hypertension? *Hypertension Res* 1993;16(247-251

Agents: Endothelin-1 **Vehicle:** Saline; **Route:** IV (jugular); **Species:** Rat; **Pump:** 2ML1; 2ML4; **Duration:** 4 weeks;

ALZET Comments: controls received mp with vehicle; functionality of mp verified by plasma levels; stability verified by examining pressor activity after 4 weeks at 37 degrees; peptides

P2451: K. Yoshida, *et al.* Endothelin-I augments pressor response to angiotensin II infusion in rats. *Hypertension* 1992;20(3):292-297

Agents: Norepinephrine; Angiotensin II; Endothelin **Vehicle:** Acetic acid; Saline; **Route:** IP; IV (jugular); **Species:** Rat; **Pump:** Not Stated; **Duration:** 6 days;

ALZET Comments: controls received mp w/ vehicle; functionality of mp verified upon removal; peptides

P1940: H. Kobayashi, *et al.* Cerebral vasospasm and vasoconstriction caused by endothelin. *Neurosurgery* 1991;28(5):673-679

Agents: Endothelin-1 **Vehicle:** Water; **Route:** CSF/CNS (intrathecal); **Species:** dog; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: controls received sham op or mp w/ water; peptides

P1803: M. Yasujima, *et al.* Chronic effects of synthetic endothelin on blood pressure and sodium excretion in rats. *American Journal of Hypertension* 1990;3(635-637

Agents: Endothelin **Vehicle:** Saline; **Route:** IV (jugular); **Species:** Rat; **Pump:** Not Stated; **Duration:** 6 days;

ALZET Comments: stability assessed by monitoring elevated blood pressure throughout infusion period; peptides

P1810: M. Yasujima, *et al.* Calcium channel blockers reverse the sustained elevation of blood pressure induced by chronic infusion of endothelin in conscious rats. *Tohoku J. Exp. Med* 1990;160(157-165

Agents: Endothelin **Vehicle:** Saline; **Route:** IV (jugular); **Species:** Rat; **Pump:** Not Stated; **Duration:** 6 days;

ALZET Comments: stability assessed by comparing BP elevating activity of solution recovered from pump with fresh solution; peptides