



## References on the Administration of Antioxidants Using ALZET® Osmotic Pumps

### 1. AEOL10150

**P8436:** Z. N. Rabbani, *et al.* Long-term administration of a small molecular weight catalytic metalloporphyrin antioxidant, AEOL 10150, protects lungs from radiation-induced injury. *INTERNATIONAL JOURNAL OF RADIATION ONCOLOGY BIOLOGY PHYSICS* 2007;67(2):573-580

**ALZET Comments:** AEOL 10150; SC; Rat; 2002; 10 weeks; 8 days; Controls received mp w/ vehicle; functionality of mp verified by plasma AEOL 10150 concentrations; dose-response (fig. 4); long-term study; pumps replaced every 2 weeks; half-life (p. 574), short; cancer; animal info (female, Fisher-344, 150-170 grams); "Osmotic mini-pumps provided consistent and dose-dependent delivery of AEOL 10150," "a continuous availability of antioxidant via osmotic infusion pumps throughout the study." (p. 575).

**P5554:** R. P. Bowler, *et al.* A catalytic antioxidant (AEOL 10150) attenuates expression of inflammatory genes in stroke. *Free Radical Biology and Medicine* 2002;33(8):1141-1152

**ALZET Comments:** AEOL 10150; PBS; IV (jugular); Mice; 1003D; 6 hours; Controls received mp w/ vehicle; AEOL 10150 is a catalytic antioxidant metalloporphyrin; ischemia (cerebral); MCAO.

**P5314:** H. X. Sheng, *et al.* Effects of metalloporphyrin catalytic antioxidants in experimental brain ischemia. *Free Radical Biology and Medicine* 2002;33(7):947-961

**ALZET Comments:** AEOL 10150; PBS; IV (jugular); Mice; 1003D; 3 days; Controls received mp w/ vehicle; plasma levels of AEOL 10150 determined by HPLC; ischemia (cerebral); MCAO.

### 2. Ascorbic Acid

**P8402:** J. Maruyama, *et al.* Effects of antioxidants on auditory nerve function and survival in deafened guinea pigs. *NEUROBIOLOGY OF DISEASE* 2007;25(2):309-318

**ALZET Comments:** Trolox; neomycin; ascorbic acid; Perilymph, artificial; sodium bicarbonate; Ear (cochlea); Guinea pig; 2002; 26 days; Controls received mp w/ vehicle; pumps replaced after 14 days; post op. care (doxycycline); animal info (male, pigmented, 250-400g., neomycin deafening); cannula primed with 10% neomycin solution followed by a small air bubble spacer to allow neomycin infusion for first 2 days; trolox, a vitamin F analogue, and ascorbic acid delivered together in 1 mp; tissue perfusion (cochlea).

**P2797:** G. I. Keshet, *et al.* Maternal naltrexone prevents morphological and behavioral alterations induced in rats by prenatal stress. *Pharmacol. Biochem. Behav* 1995;50(3):413-419

**ALZET Comments:** Ascorbic acid; Naltrexone; Saline; SC; Rat (pregnant); Rat; 7 days; controls received mp w/ vehicle.

### 3. Catalase

**Q3458:** M. R. DiStasi, *et al.* Nox2 and p47(phox) modulate compensatory growth of primary collateral arteries. *American Journal of Physiology-Heart and Circulatory Physiology* 2014;306(U56-U64)

**ALZET Comments:** Peptide, Nox2ds-tat; polyethylene glycol-conjugated catalase; SC; Rat; mice; 2ML1; 1002; 7 days; Controls received mp w/ scramble ds-tat or vehicle; animal info (Rat male, Wister-Kyoto, 2-3 months; mice male, C57Bl6J and p47 phox -/-, 4.5-6 months old); cardiovascular; peptides; polyethylene glycol-conjugated catalase aka PEG-CAT; arterial ligation; NOX2 is NADPH oxidase;

**P4207:** K. Shimoda, *et al.* Effect of antioxidants, anti-inflammatory drugs, and histamine antagonists on Sparfloxacin-induced phototoxicity in mice. *Fundam. Appl. Toxicol* 1996;31(133-140)



**ALZET Comments:** Catalase; Dimethyl sulfoxide; Dexamethasone; Indomethacin; Ppyrilamine maleate; AA-861; Cimetidine; Phenidone; Ethanol; Saline; SC; mice; 1007D; 72 hours; all agents infused concomitantly in the same pump; preliminary study conducted to test solubility and toxicity for 5 days; enzyme inhibitors; toxicology.

**P3115:** D. Truelove, *et al.* Superoxide dismutase, catalase, and U78517F attenuate neuronal damage in gerbils with repeated brief ischemic insults. *Neurochem. Res* 1994;19(6):665-671

**ALZET Comments:** Tempol; catalase; CSF/CNS; Gerbil; 1007D; 7 days; Controls received mp with saline; agents given separately and together; ischemia (cerebral).

**P2520:** R. L. Macdonald, *et al.* Effect of intrathecal superoxide dismutase and catalase on oxyhemoglobin-induced vasospasm in monkeys. *Neurosurgery* 1992;30(4):529-539

**ALZET Comments:** Catalase; tempol; CSF/CNS (intrathecal); monkey; 2ML1; 7 days; controls received inactivated SOD and BSA; functionality of mp verified by measuring enzyme levels in CSF during infusion and testing agent released from pump in vitro for 7 days; stability verified by measuring activity of enzymes released from pumps in vitro over 7 days; daily CSF sampling performed using a subcutaneous Ommaya reservoir; authors report no cases of catheter blockage or dislodgement.

**P1931:** T. Hattori, *et al.* Changes in intra-renal scavenging enzymes activities of the reactive oxygen species in experimental glomerulo-nephritis and nephrosis in rats. *Nippon Jinzo Gakkai Shi* 1991;33(2):191-199

**ALZET Comments:** Glutathione peroxidase; Catalase; tempol; Rat; no duration posted; Japanese with English abstract.

**P1741:** B. T. Mossman, *et al.* Inhibition of lung injury, inflammation, and interstitial pulmonary fibrosis by polyethylene glycol-conjugated catalase in a rapid inhalation model of asbestosis. *Am. Rev. Respir. Dis* 1990;141(1266-1271

**ALZET Comments:** Catalase; tempol; PBS; SC; Rat; 2ML4; 10, 20 days; functionality of mp verified by serum catalase; PEG-conjugated enzymes; antioxidants; stability of enzymes questioned beyond 20 days.

**P1099:** B. T. Mossman, *et al.* Approaches to prevention of asbestos-induced lung disease using polyethylene glycol (PEG) - conjugated catalase. *J. Free Radicals in Biology & Medicine* 1986;2(335-338

**ALZET Comments:** Catalase, PEG-; Saline, balanced; Rat; 2ML4; 28 days; controls received surgery but no mp; dose response; 3 doses of agent infused.

#### 4. Dimethylthiourea

**P4810:** G. Wolf, *et al.* Angiotensin II induces p27<sup>Kip1</sup> expression in renal tubules in vivo: role of reactive oxygen species. *JOURNAL OF MOLECULAR MEDICINE* 2001;79(382-389

**ALZET Comments:** Angiotensin II; Dimethylthiourea;; PBS;; IP;; Rat;; 2002;; 7 days;; Controls received mp w/ vehicle; cardiovascular; peptides; Dimethylthiourea, also called DMTU, is an antioxidant; some animals received 2 pumps (IP): one pump for ANG II infusion and one for DMTU infusion;.

#### 5. Ebselen

**Q4864:** Esteban A.Moya, *et al.* Intermittent Hypoxia-Induced Carotid Body Chemosensory Potentiation and Hypertension Are Critically Dependent on Peroxynitrite Formation. *Oxidative Medicine and Cellular Longevity* 2016;2016(1-9

**ALZET Comments:** Ebselen; DMSO; saline; SC; Rat; 2ML4; 1 week; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 200g); 80% DMSO used; cardiovascular; bp measured with radiotelemetry; Dose (10 mg/kg/day);.

**Q2266:** J. G. Park, *et al.* Peroxiredoxin 2 Deficiency Exacerbates Atherosclerosis in Apolipoprotein E-Deficient Mice. *Circulation Research* 2011;109(7):739-U80

**ALZET Comments:** Ebselen; DMSO; SC; Mice; 2004; Controls received mp w/ vehicle; animal info (8 wks old, Prdx -/-, ApoE -/-); 80% DMSO used.



**Q1702:** N. J. Willett, *et al.* Redox Signaling in an In Vivo Murine Model of Low Magnitude Oscillatory Wall Shear Stress. *ANTIOXIDANTS & REDOX SIGNALING* 2011;15(5):1369-1378

**ALZET Comments:** Tempol; ebselen; DMSO; saline; SC; IV (jugular); Mice; 2ML1; 1007D; 4 days; Animal info (male, 11-13 wks old, C57BL/6, P47 phox -/-); 50% DMSO used.

**P6576:** J. J. Khatri, *et al.* Vascular oxidant stress enhances progression and angiogenesis of experimental atheroma. *Circulation* 2004;109(4):520-525

**ALZET Comments:** Ebselen; DMSO; SC; Mice (transgenic); 14 days; Controls received mp w/ vehicle; cardiovascular; 50% DMSO; ebselen is a glutathione peroxidase-mimetic antioxidant (a.k.a Harmokisane).

## 6. EUK-189

**R0300:** J. P. Williams, *et al.* Treatment for Radiation-Induced Pulmonary Late Effects: Spoiled for Choice or Looking in the Wrong Direction? *CURRENT DRUG TARGETS* 2010;11(11):1386-1394

**ALZET Comments:** EUK-189;

**Q1593:** J. Peng, *et al.* Synergistic effects of environmental risk factors and gene mutations in Parkinson's disease accelerate age-related neurodegeneration. *Journal of Neurochemistry* 2010;115(6):1363-1373

**ALZET Comments:** EUK-189; Mannitol; SC; Mice (transgenic); 2004; 7 days; Controls received mp w/ vehicle; animal info (alpha synuclein A53T Tg).

**Q0152:** A. Clausen, *et al.* Prevention of cognitive deficits and brain oxidative stress with superoxide dismutase/catalase mimetics in aged mice. *NEUROBIOLOGY OF AGING* 2010;31(3):425-433

**ALZET Comments:** EUK-189; EUK-207; Mannitol; SC; Mice; 2004; 6 months; Controls received mp w/ vehicle; long-term study; pumps replaced every 28 days; animal info (C57BL/6N Sim, 27-36 g, 17 months old).

**P9634:** J. Peng, *et al.* Iron-enhanced paraquat-mediated dopaminergic cell death due to increased oxidative stress as a consequence of microglial activation. *Free Radical Biology and Medicine* 2009;46(2):312-320

**ALZET Comments:** EUK-189; Mannitol; SC; Mice; 2004; 28 days; Controls received mp w/vehicle; animal info (C57BL/6, 2-12 months old); neurodegenerative (Parkinson's disease).

**P8003:** G. Tocco, *et al.* Prolongation of alloskin graft survival by catalytic scavengers of reactive oxygen species. *Cellular Immunology* 2006;241(2):59-65

**ALZET Comments:** EUK-189; Mice; 8-10 days; Animal info (female, 6-8 weeks old, BALB/C and C57BL/6).

**P7798:** H. J. Zhang, *et al.* Chronic antioxidant enzyme mimetic treatment differentially modulates hyperthermia-induced liver HSP70 expression with aging. *Journal of Applied Physiology* 2006;100(4):1385-1391

**ALZET Comments:** EUK-189; Water, distilled; SC; Rat; 2004; 30 days; Controls received mp w/ vehicle; functionality of mp verified by residual volume; animal info (male, Fischer 344, 6 month old, 300-400g., 24 month old, 350-450g.).

**P7236:** J. Peng, *et al.* Superoxide dismutase/catalase mimetics are neuroprotective against selective paraquat-mediated dopaminergic neuron death in the substantia nigra - Implications for Parkinson disease. *Journal of Biological Chemistry* 2005;280(32):29194-29198

**ALZET Comments:** EUK-189; Mannitol; SC; Mice; 2004; 28 days; Controls received mp w/ vehicle; neurodegenerative (Parkinson's disease).

**P6477:** S. E. Browne, *et al.* Treatment with a catalytic antioxidant corrects the neurobehavioral defect in ataxia-telangiectasia mice. *Free Radical Biology and Medicine* 2004;36(7):938-942



**ALZET Comments:** EUK-189; Mannitol; SC; Mice; 2004; 56, 84 days; Controls received mp w/ vehicle; long-term study; pumps replaced every 28 days; no stress (see pg.941); cancer (thymoma); EUK-189 is a synthetic catalytic antioxidant w/ both catalase & superoxide dismutase activities; neurodegenerative (ataxia telangiectasia).

**P5936:** R. L. Liu, *et al.* Reversal of age-related learning deficits and brain oxidative stress in mice with superoxide dismutase/catalase mimetics. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 2003;100(14):8526-8531

**ALZET Comments:** EUK-189; EUK-207; Mannitol; water; SC; Mice; 2004; 3 months; Controls received mp w/ vehicle; long-term study; pumps replaced every 28 days in same location; pumps primed for >40 hours in 5% mannitol; eukarion is a synthetic catalytic scavenger of reactive oxygen species; stress/adverse reaction: in 10% of mice, the pumps were replaced on the other side of hip area due to skin damage of original site of implantation; behavioral study.

## 7. Genistein

**Q3324:** R. F. Shi, *et al.* Lose dose genistein inhibits glucocorticoid receptor and ischemic brain injury in female rats. NEUROCHEMISTRY INTERNATIONAL 2014;65(:):14-22

**ALZET Comments:** Genistein; DMSO; water, distilled; SC; Rat; 1002; 14 days; Controls received mp w/ vehicle; animal info (female, ovariectomized); 50% DMSO used; ischemia (cerebral); cardiovascular;

**Q2856:** B. Cortina, *et al.* Improvement of the circulatory function partially accounts for the neuroprotective action of the phytoestrogen genistein in experimental ischemic stroke. European Journal of Pharmacology 2013;708(1-3):88-94

**ALZET Comments:** Genistein; Cyclodextrin, hydroxypropyl beta; IP; Rat; 2ML1; 3 days; Control animals received mp w/ vehicle; animal info (Wistar, male, 300-350 g).

**P6396:** I. F. Benter, *et al.* Inhibition of Ras-GTPase, but not tyrosine kinases or Ca<sup>2+</sup>/calmodulin-dependent protein kinase II, improves recovery of cardiac function in the globally ischemic heart. MOLECULAR AND CELLULAR BIOCHEMISTRY 2004;259(1-2):35-42

**ALZET Comments:** FPT III; KN-93; Genistein; Saline; IP; Rat; 2ML1; 6 days; Controls received mp w/ vehicle; enzyme inhibitor (tyrosine kinase, CaMKII); cardiovascular; ischemia (cardiac).

**P5855:** J. Wu, *et al.* Combined intervention of exercise and genistein prevented androgen deficiency-induced bone loss in mice. Journal of Applied Physiology 2003;94(1):335-342

**ALZET Comments:** Genistein; Estradiol, 17B-; DMSO; PEG 300; SC; Mice; 2002; 4 weeks; Replacement therapy (orchidectomy); dose-response (p.336); 20% DMSO used in vehicle.

**P5463:** T. P. O'Connor, *et al.* A high isoflavone soy protein diet and intravenous genistein delay rejection of rat cardiac allografts. Journal of Nutrition 2002;132(8):2283-2287

**ALZET Comments:** Genistein; DMSO; ethanol; water; IV (superior vena cava); Rat; 2ML2; 14 days; Controls received mp w/ vehicle; comparison of IP injections vs IV mp; immunology; transplantation; Genistein is a soybean isoflavone; antioxidant; Vehicle composition: DMSO, ethanol; water (50/20/30).

**P5347:** Y. Ishimi, *et al.* Genistein, a soybean isoflavone, affects bone marrow lymphopoiesis and prevents bone loss in castrated male mice. Bone 2002;31(1):180-185

**ALZET Comments:** Genistein; estradiol, 17B-; DMSO; PEG 300; SC; Mice; 2002; Controls received mp w/ vehicle.

**P4488:** Y. Ishimi, *et al.* Selective effects of genistein, a soybean isoflavone, on B-Lymphopoiesis and bone loss caused by estrogen deficiency. Endocrinology 1999;140(4):1893-1900

**ALZET Comments:** Estradiol, 17B-; Genistein; DMSO; PEG 300; SC; Mice; 2 - 4 weeks; controls received mp w/vehicle; replacement therapy (ovariectomy); genistein is an isoflavone present in soybeans; structure is similar to estrogen;



## 8. Glutathione

**Q6298:** C. K. Katashima, *et al.* iNOS promotes hypothalamic insulin resistance associated with deregulation of energy balance and obesity in rodents. *Sci Rep* 2017;7(1):9265

**ALZET Comments:** S-nitrosoglutathione; insulin; glutathione; CSF/CNS (third ventricle); Rat; mice; 1002; 2002; 1 week; Dose (GSNO (50 µM)/insulin (0.033 UI/µL) and GSH (50 µM)/insulin (0.033 UI/µL)); animal info (Male 4-week-old Wistar rats, Swiss, C57BL/6 and iNOS-null (iNOS<sup>-/-</sup>) mice); S-nitrosoglutathione is an NO donor; Brain coordinates (rats DV: -8.5 mm and AP: -0.5 mm; mice DV: -5 mm and AP: -1.8 mm);

**Q6673:** Z. M. Huang, *et al.* Convergence of G Protein-Coupled Receptor and S-Nitrosylation Signaling Determines

the Outcome to Cardiac Ischemic Injury. *Cardiovascular Physiology* 2013;6(229):ra95 (1-9)

**ALZET Comments:** S-nitrosoglutathione; PBS; SC; Mice; 24 hours; 7 days; Dose (10 mg/kg/day); Controls received mp w/ vehicle; animal info (GRK2-C340S mice); cardiovascular.

**P9636:** D. C. Irwin, *et al.* A potential role for reactive oxygen species and the HIF-1-alpha-VEGF pathway in hypoxia-induced pulmonary vascular leak. *Free Radical Biology and Medicine* 2009;47(1):55-61

**ALZET Comments:** Ascorbate; glutathione; tocopherol, alpha-; SC; Mice; 1007D; Controls received mp w/saline; animal info (male, C57BL/6J, 25-30g, 10-12 weeks old); compounds were mixed and infused together as an antioxidant cocktail.

**P9881:** A. Fernandez, *et al.* Mitochondrial Cholesterol Loading Exacerbates Amyloid-beta Peptide-Induced Inflammation and Neurotoxicity. *Journal of Neuroscience* 2009;29(20):6394-6405

**ALZET Comments:** Amyloid protein, beta (1-42), human oligomeric; lipoprotein, high density; glutathione ethyl ester; HEPES; CSF/CNS; Mice (transgenic); 1004; 28 days; Controls received mp w/ vehicle; animal info (Tg-SREBP-2, NPC1<sup>-/-</sup>, Tg-APP/PS1); neurodegenerative (Alzheimer's Disease).

**Q0441:** A. L. Colombani, *et al.* Enhanced Hypothalamic Glucose Sensing in Obesity: Alteration of Redox Signaling. *Diabetes* 2009;58(10):2189-2197

**ALZET Comments:** Glutathione; CSF/CNS (third ventricle); Rat; 1003D; 3 days; Controls received mp w/PBS-HEPES; animal info (obese, lean, male, Zucker, 7 wks old); cannula placement verified by angiotensin II dipsogenic effect; Plastics One cannula used; no stress (see pg 2193) "Well being of the animals (weight gain and food intake) was preserved during the infusion"; good methods.

**P8406:** G. D. Zeevalk, *et al.* Characterization of intracellular elevation of glutathione (GSH) with glutathione monoethyl ester and GSH in brain and neuronal cultures: Relevance to Parkinson's disease. *Experimental Neurology* 2007;203(2):512-520

**ALZET Comments:** Glutathione, monoethyl ester; MPP<sup>+</sup>; Saline; SC; CSF/CNS; Rat; 2ML4; 28 days; Controls received mp w/ vehicle; dose-response (fig. 6); stability verified by incubation for 0-28 days at 37 celsius, assessed by HPLC; half-life (pg. 515) 10-14 hours in culture; brain tissue distribution; toxicology; animal info (Sprague-Dawley, 300g.); neurodegenerative (Parkinson's disease).

**P8631:** J. J. Powell, *et al.* Neutrophil-Activating Protein-2- and Interleukin-8-Mediated Angiogenesis. *Journal of Cellular Biochemistry* 2007;102(2):412-420

**ALZET Comments:** Fibroblast growth factor-2, basic, human; penicillamine, S-nitroso N-acetyl; glutathione, S-nitroso N-acetyl; SC; Mice; 14 days; Peptides; animal info (male, C57BL/6, 6-8 wks old); SNAP and SNAG are nitric oxide donors.

**P8810:** L. H. Li, *et al.* Local Nogo-66 administration reduces neuropathic pain after sciatic nerve transection in rat. *Neuroscience Letters* 2007;424(3):145-148

**ALZET Comments:** Glutathione S-transferase; glutathione S-transferase-Nogo-66; CSF/CNS (sciatic nerve); Rat; 2002; 14 days; Controls received mp w/ GST or no treatment; peptides; animal info (male, Sprague Dawley, 240-260g., Sciatic nerve transection); pain; silicon tube used.





**P8211:** S. D. Luikart, *et al.* Mactinin treatment promotes wound-healing-associated inflammation in urokinase knockout mice. *Wound Repair and Regeneration* 2006;14(2):123-128

**ALZET Comments:** Mactinin; glutathione 5-transferase; Saline; SC; Rat; mice (transgenic); 1007D; 1, 7 days; Controls received mp w/ vehicle, or GST; peptides; animal info (Tgu PA-/- or wt; Fisher, 150-200g); Polyvinyl alcohol sponges soaked in agent implanted SC, with mp catheter directed to center of sponge: "osmotic pumps were used to continually deliver the fragment and replenish the mactinin in the sponges" (p.125); wound healing.

**P6280:** M. F. Anderson, *et al.* Glutathione monoethyl ester provides neuroprotection in a rat model of stroke. *Neuroscience Letters* 2004;354(2):163-165

**ALZET Comments:** Glutathione monoethyl ester; Saline; CSF/CNS; Rat; 2001; Controls received mp w/ vehicle; ALZET brain infusion kit 2 used; dental cement used; post op. care (xylocaine/adrenaline injected into site of wound); neuroprotection; ischemia (cerebral); antioxidant.

## 9. Magnolol

**P6119:** J. H. Chen, *et al.* Magnolol induces apoptosis in vascular smooth muscle. *NAUNYN-SCHMIEDEBERGS ARCHIVES OF PHARMACOLOGY* 2003;368(2):127-133

**ALZET Comments:** Magnolol; Alcohol; SC; Rat; 2001; 2 weeks; Dose-response (p. 129); pumps replaced every 7 days; magnolol, an active component purified from magnolia officinalis, is a commonly used chinese medicinal herb, with reported anti-inflammatory and antioxidant effects.

## 10. Mannitol

**P6456:** J. A. Barcia, *et al.* Continuous intra-amygdalar infusion of GABA in the amygdala kindling model of epilepsy in rat. *Epilepsy Research* 2004;58(1):19-26

**ALZET Comments:** Aminobutyric acid, Y-; mannitol; Saline; CSF/CNS (amygdala); Rat; 2001; 7 days; Controls received mp w/mannitol; functionality of mp verified by cutting open & visual inspection; dose-response (table 1); no stress (see pg. 25).

**P5672:** L. Chelikh, *et al.* High variability of perilymphatic entry of neutral molecules through the round window. *Acta Oto-laryngologica* 2003;123(2):199-202

**ALZET Comments:** Mannitol; Inulin;; Radio-isotopes; 3H tracer; saline; ethanol; Ear (round window); Guinea pig; 1007D; 7 days; Tissue perfusion (round window).

**P4692:** B. Bittner, *et al.* The impact of co-solvents and the composition of experimental formulations on the pump rate of the ALZET® osmotic pump. *International Journal of Pharmaceutics* 2000;205(195-198

**ALZET Comments:** Mannitol; Radio-isotopes; Pyrrolidone, N-methyl-2-; Propylene glycol; PEG; 14C tracer; Water; Dimethylacetamide; in vitro; 2ML1; 8 days; Functionality of mp verified by in vitro testing; ALZAID chemical compatibility kit used; various solvents employed to find compatibility with drug reservoir.

**P2798:** S. A. Klarr, *et al.* Chronic central potassium infusion prevents deoxycorticosterone-salt hypertension in rats. *Am. J. Physiol. (Heart Circ. Physiol. 37)* 1995;268(H646-H652

**ALZET Comments:** Cerebrospinal fluid, artificial; Mannitol; CSF/CNS; Rat; 2002; no duration posted; controls were sham operated and received mixed-concentration aCSF, received no infusions, or received aCSF w/normal physiological balance of sodium and potassium; experimental groups consisted of varying the ratio of potassium to sodium in the aCSF; mannitol added to infusate in one high-potassium group to maintain isosmolality.

**P2170:** K. M. Andrews, *et al.* Water intake during chronic preoptic infusions of osmotically active or inert solutions. *Physiol. Behav* 1992;52(2):241-245

**ALZET Comments:** Potassium Chloride, hypertonic; Sodium chloride, hypertonic; Mannitol, hypertonic; Saline, isotonic; Water; CSF/CNS (preoptic area); Rat; 2002; 2 weeks; bilateral infusion to brain.



## 11. Melatonin

**R0369:** D. Ovid, *et al.* Melatonin Administration Methods for Research in Mammals and Birds. *J Biol Rhythms* 2018;33(6):567-588

**ALZET Comments:** Melatonin; Rat; animal info (Sprague-Dawley rats); comparison of infusion pump, pellets, transdermal, beads, sponge, iPRECIO vs mp; Lynch coil;.

**Q6917:** K. J. McCarty, *et al.* Effect of chronic melatonin supplementation during mid to late gestation on maternal uterine artery blood flow and subsequent development of male offspring in beef cattle. *J Anim Sci* 2018;96(12):5100-5111

**ALZET Comments:** Melatonin; Intrauterine; Sheep (pregnant);

**Q6359:** M. McMillin, *et al.* Melatonin inhibits hypothalamic gonadotropin-releasing hormone release and reduces biliary hyperplasia and fibrosis in cholestatic rats. *Am J Physiol Gastrointest Liver Physiol* 2017;313(5):G410-G418

**ALZET Comments:** Melatonin; Saline; CSF/CNS (lateral ventricle); Rat; 7 days; Dose (1 mg•kg body wt<sub>1</sub>•day<sub>1</sub>); Controls received mp w/ vehicle; animal info (Male Fischer 344 rats weighing 175–200 g); Brain coordinates (\_0.80 mm, ML: \_1.50 mm, DV: \_4.00 mm from Bregma);.

**Q3870:** A. W. Eifert, *et al.* Effect of melatonin or maternal nutrient restriction on vascularity and cell proliferation in the ovine placenta. *ANIMAL REPRODUCTION SCIENCE* 2015;153(13-21)

**ALZET Comments:** Melatonin; luzindole; DMSO; water; Intrauterine; Sheep (ewe; pregnant); 2ML4; 28 days; Controls received mp w/ vehicle; animal info (female, Western white face, GD62); functionality of mp verified by serum levels; 45% DMSO used; good methods (pg 15); no stress (see pg. 15); post op. care (BID IM injection flunixin meglumine; QD IP injection Penicillin G Procaine); teratology; cardiovascular; used 20 cm of PE 60 tubing; pumps primed overnight 37C saline with catheters;.

**Q3106:** C. O. Lemley, *et al.* Uterine Infusion of Melatonin or Melatonin Receptor Antagonist Alters Ovine Feto-Placental Hemodynamics During Midgestation. *Biology of Reproduction* 2013;89(2):U24-U32

**ALZET Comments:** Melatonin; Luzindole; DMSO; water; Intrauterine (uterine horn); Sheep (ewe); 2ML4; 28 days; Controls received mp w/ vehicle; functionality of mp verified by serum levels of melatonin taken; 45% DMSO used; stress/adverse reaction: (see pg.2); post op. care (For two days: flunixin meglumine 50 mg/ml IM twice a day; Penicillin G procain 300,000 u/ml once per day); tissue perfusion (uterus mesometrium); cardiovascular;.

**Q5391:** M. Atanasova, *et al.* Strain-dependent effects of long-term treatment with melatonin on kainic acid-induced status epilepticus, oxidative stress and the expression of heat shock proteins. *Pharmacol Biochem Behav* 2013;111(44-50)

**ALZET Comments:** Melatonin; Saline; DMSO; SC; 2 weeks; Controls received mp w/ vehicle; "The method of melatonin infusion via s.c. osmotic mini-pumps provided constant steady-state hormonal concentrations." Pg. 45; Dose (10 mg/kg/day);.

**Q2064:** E. Bas, *et al.* Efficacy of three drugs for protecting against gentamicin-induced hair cell and hearing losses. *British Journal of Pharmacology* 2012;166(6):1888-1904

**ALZET Comments:** Gentamicin; dexamethasone; melatonin; Ear (round window); Rat; 2001; 7 days; Controls received mp w/ saline; animal info (Wistar, male, 220-250 g); stability verified after 7 days (data not shown).

**Q0512:** B. J. Prendergast. MT1 Melatonin Receptors Mediate Somatic, Behavioral, and Reproductive Neuroendocrine Responses to Photoperiod and Melatonin in Siberian Hamsters (*Phodopus sungorus*). *Endocrinology* 2010;151(2):714-721

**ALZET Comments:** Melatonin; ramelteon; Saline; ethanol; SC; Hamster; 2004; 8 weeks; Controls received mp w/ vehicle; long-term study; pumps replaced after 4 weeks; animal info (Siberian, adult, male); 15% ethanol used; ramelteon is a specific MT1/MT2 agonist.



**Q0387:** L. C. Hutton, *et al.* Neuroprotective Properties of Melatonin in a Model of Birth Asphyxia in the Spiny Mouse (*Acomys cahirinus*). *Developmental Neuroscience* 2009;31(5):437-451

**ALZET Comments:** Melatonin; SC; Mice (pregnant); 1007D; 7 days; Controls received mp w/saline; animal info (pregnant, spiny).

**P9301:** P. Sallinen, *et al.* Long-term postinfarction melatonin administration alters the expression of DHPR, RyR<sub>2</sub>, SERCA2, and MT<sub>2</sub> and elevates the ANP level in the rat left ventricle. *Journal of Pineal Research* 2008;45(1):61-69

**ALZET Comments:** Melatonin; PEG 400; SC; Rat; 2002; 2 weeks; Controls received mp w/ vehicle; no stress (see pg. 62); cardiovascular; ischemia (cardiac); animal info (male, Sprague Dawley, 240-290 g., MI); "28-day subcutaneous infusion of melatonin in rats had no obvious toxicity or side effects." (p. 62).

## 12. Resveratrol

**Q6196:** L. Naia, *et al.* Comparative Mitochondrial-Based Protective Effects of Resveratrol and Nicotinamide in Huntington's Disease Models. *Mol Neurobiol* 2017;54(7):5385-5399

**ALZET Comments:** Resveratrol; Nicotinamide; Cyclodextrin, 2-hydroxypropyl- $\beta$ ; Saline; SC; Mice; 28 days; Dose (resveratrol 1 mg/kg/day; nicotinamide 250 mg/kg/day); Controls received mp w/ vehicle; animal info (9-month-old YAC128 transgenic mice and age-matched WT controls); neurodegenerative (Huntington's Disease);.

**Q6049:** H. D. Kim, *et al.* SIRT1 Mediates Depression-Like Behaviors in the Nucleus Accumbens. *J Neurosci* 2016;36(32):8441-52

**ALZET Comments:** Resveratrol; EX-527; DMSO; SC; Mice; 1002; 14 days; Controls received mp w/ vehicle; animal info (7-9 weeks; C57BL/6J); Multiple pumps per animal (2); behavioral testing (open field, elevated-plus maze, forced swim test, sucrose preference test); Plastics One guide cannula used; bilateral cannulae (one pump for each pedestal); Loctite adhesive used; EX-527 is a SIRT1 antagonist; Therapeutic indication (Depression); Dose (0.1 or 0.2  $\mu$ g/day, EX-527: 0.5 or 1.0  $\mu$ g/day);.

**Q5221:** H. J. Lee, *et al.* Involvement of resveratrol in crosstalk between adipokine adiponectin and hepatokine fetuin-A in vivo and in vitro. *J Nutr Biochem* 2015;26(11):1254-60

**ALZET Comments:** Resveratrol; DMSO; SC; mice; 1004; 4 weeks; Controls received mp w/ vehicle; animal info: Male, 6-week-old C57BL/6J mice; %50 of DMSO; dose-response (pg.1257-1259); Resveratrol aka RSV; Animals fed high-fat diets concurrently; Dose: 8 mg/kg/day.

**Q3651:** S. J. Yang, *et al.* Resveratrol ameliorates hepatic metaflammation and inhibits NLRP3 inflammasome activation. *METABOLISM-CLINICAL AND EXPERIMENTAL* 2014;63(693-701

**ALZET Comments:** Resveratrol; DMSO; SC; Mice; 1004; 4 weeks; Controls received mp w/ vehicle; animal info (male, C57BL6); 50% DMSO used; no stress (see pg. 697); diabetes; "Resveratrol was administered via an osmotic pump, which is a safe and standard delivery system for rodents" "no side effects were observed by monitoring weight change, behavior and inflammatory response around the implantation area." pg 697;.

**Q3733:** M. R. Kanavi, *et al.* The Sustained Delivery of Resveratrol or a Defined Grape Powder Inhibits New Blood Vessel Formation in a Mouse Model of Choroidal Neovascularization. *MOLECULES* 2014;19(17578-17603

**ALZET Comments:** Resveratrol; DMSO; ethanol; SC; Mice; 2002; 14 days; Control animals received mp w/ vehicle; animal info (6 wks old, female, C57BL/6J); 50% DMSO used; 15% ethanol used; "Owing to the limited compatibility of the osmotic pumps with DMSO and/or ethanol, as well as the limited solubility of resveratrol in aqueous solutions, it wasn't possible to achieve higher doses of resveratrol using osmotic pumps" pg 17585.

**Q3150:** S. J. Sheu, *et al.* Resveratrol Stimulates Mitochondrial Bioenergetics to Protect Retinal Pigment Epithelial Cells From Oxidative Damage. *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE* 2013;54(9):6426-6438





**ALZET Comments:** Resveratrol; Coenzyme Q10; DMSO; IP; Rat; 2004; 4 weeks; Controls received mp w/ vehicle or sham surgery; animal info (Female, Brown Norway, 200-265g); 0.8% DMSO used; post op. care (Procaine penicillin 1000 IU IM); Coenzyme Q10 aka ubiquinone;

**Q2519:** H. Kanamori, *et al.* Resveratrol Reverses Remodeling in Hearts with Large, Old Myocardial Infarctions through Enhanced Autophagy-Activating AMP Kinase Pathway. *American Journal of Pathology* 2013;182(3):701-713

**ALZET Comments:** Resveratrol; chloroquine; SC; Mice; 14 days; Control animals received mp w/ vehicle; animal info (C57BL/6J, male, 8-10 wks old).

**Q1659:** A. A. Khan, *et al.* Resveratrol Regulates Pathologic Angiogenesis by a Eukaryotic Elongation Factor-2 Kinase-Regulated Pathway. *American Journal of Pathology* 2010;177(1):481-492

**ALZET Comments:** Resveratrol; Sirt1 inhibitor III; NH125; Ethanol; SC; Mice; 14 days; Controls received mp w/ vehicle; animal info (C57BL/6, eFK2 -/-); 25% ethanol used.

**P9891:** G. Ramadori, *et al.* Central Administration of Resveratrol Improves Diet-Induced Diabetes. *Endocrinology* 2009;150(12):5326-5333

**ALZET Comments:** Resveratrol; Saline, sterile; CSF/CNS; Mice; 1004; 5 weeks; Controls received mp w/vehicle; animal info (C57BL/6, male); "This daily dose of resveratrol (0.03mg/ul) is approximately 8.5 million or approximately 152 million times lower, respectively, compared with the dose orally delivered in two previous studies" pg 5327; diabetes; endocrinology.

**P8824:** E. L. Robb, *et al.* Dietary resveratrol administration increases MnSOD expression and activity in mouse brain. *Biochemical and Biophysical Research Communications* 2008;372(1):254-259

**ALZET Comments:** Resveratrol, trans-; DMSO; SC; Mice; 2004; 4 weeks; Controls received mp w/ vehicle; comparison of oral vs. SC mp; animal info (C57/BL6); 50% degassed DMSO.

### 13. Retinoic Acid

**P7250:** T. Liu, *et al.* The retinoid anticancer signal: mechanisms of target gene regulation. *British Journal of Cancer* 2005;93(3):310-318

**ALZET Comments:** Retinoic acid, 13-cis-; Ethanol; SC; Mice (transgenic); 1007D; 5 weeks; Controls received mp w/ vehicle; dose-response (fig. 1); no stress (see pg. 312-13); cancer (neuroblastoma).

**P7232:** S. M. Karam, *et al.* Retinoic acid stimulates the dynamics of mouse gastric epithelial progenitors. *Stem Cells* 2005;23(3):433-441

**ALZET Comments:** Retinoic acid; uridine, bromodeoxy-; SC; Mice; 1, 3, 6 days; Controls received mp w/ vehicle; comparison of SC injections vs. mp; cancer (gastric); multiple pumps per animal (2).

**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).

**R0148:** D. Al Musawi, *et al.* Adhesion prevention: state of the art. *GYNAECOLOGICAL ENDOSCOPY* 2001;10(123-130

**ALZET Comments:** Dipyridamole; Lazaroids; Retinoic acid; Review of adhesion formation and prevention; mentions the use of mini-osmotic pumps to evaluate new agents to reduce experimental pelvic adhesions (p. 125).

**P4026:** K. E. Rodgers, *et al.* Reduction of adhesion formation by intraperitoneal administration of various anti-inflammatory agents. *J. Invest. Surgery* 1998;11(327-339



**ALZET Comments:** Retinoic acid; Quinacrine; Dipyrindamole; PBS; Ethanol; injury site; rabbit; 2ML1; 1, 2, 3, 7 days; controls received mp w/vehicle; tissue perfusion (surgical injury site); animals given morphine i.m. for post-operative pain; catheter stabilized in sidewall w/suture; in some studies, catheter tubing was disconnected to halt flow at specific times; immunology.

**P3491:** M. Kaya, *et al.* Chemical induction of fenestrae in vessels of the blood-brain barrier. *Exp. Neurol* 1996;142(6-13)  
**ALZET Comments:** Retinoic acid; Phorbol myristate acetate; ETHANOL; Gibco BRL minimal essential medium; DMSO; Culture medium, serum-free; CSF/CNS (cortex); Rat; 2ML1; 21, 28 days; controls received mp w/ vehicle; functionality of mp verified by residual volume; pumps replaced weekly.

#### 14. Tempol

**Q7198:** O. Le, *et al.* INK4a/ARF Expression Impairs Neurogenesis in the Brain of Irradiated Mice. *Stem Cell Reports* 2018;10(6):1721-1733

**ALZET Comments:** Porphyrin-based superoxide dismutase mimetic (MnHex); SC; Mice; 1004; 8 weeks; Dose (450 ug/kg/day); pumps replaced every 4 weeks; Porphyrin-based potent superoxide dismutase mimetic aka (Mn(III) meso-tetrakis-(n-hexylpyridinium-2-yl) porphyrin (MnTnHex-2-PyP5+ ); neurodegenerative (Ionizing radiation);

**Q7118:** J. M. Cline, *et al.* Post-Irradiation Treatment with a Superoxide Dismutase Mimic, MnTnHex-2-PyP(5+), Mitigates Radiation Injury in the Lungs of Non-Human Primates after Whole-Thorax Exposure to Ionizing Radiation. *Antioxidants (Basel)* 2018;7(3):

**ALZET Comments:** mitochondrial superoxide dismutase mimetic (Hexyl); Saline; SC; Monkey; 6 weeks; Dose (0.1 mg/kg/day); Controls received mp w/ vehicle; animal info (Rhesus monkeys); MnTnHex-2-PyP5+ aka hexyl; cardiovascular;.

**Q6941:** W. Cao, *et al.* A renal-cerebral-peripheral sympathetic reflex mediates insulin resistance in chronic kidney disease. *EBioMedicine* 2018;37(281-293

**ALZET Comments:** Losartan; Tempol; Clonidine; CSF, artificial; CSF/CNS (lateral ventricle); Rat; Dose (1 mg/kg/day losartan; 4.5 ug/kg/day tempol; 5.76 ug/kg/day clonidine); Controls received mp w/ vehicle; animal info (Five-week-old male Sprague-Dawley rats); Therapeutic indication (5/6 nephrectomy);.

**Q6541:** K. L. Wu, *et al.* Effects of high fructose intake on the development of hypertension in the spontaneously hypertensive rats: the role of AT1R/gp91(PHOX) signaling in the rostral ventrolateral medulla. *J Nutr Biochem* 2017;41(73-83

**ALZET Comments:** Tempol; Saline; CSF/CNS (cisterna magna); Rat; 1002; 14 days; Dose (10 mM); Controls received mp w/ vehicle; animal info (Male, adult spontaneously hypertensive rats and Wistar–Kyoto rats); ALZET brain infusion kit 2 used;.

**Q5333:** C. Y. Tsai, *et al.* Nitrosative Stress-Induced Disruption of Baroreflex Neural Circuits in a Rat Model of Hepatic Encephalopathy: A DTI Study. *Sci Rep* 2017;7(40111

**ALZET Comments:** FeTMPyP; Tempol; CSF, artificial; CSF/CNS (intracisternal); Rat; 2001; 6 days; Controls received mp w/ vehicle; animal info (male adult Sprague-Dawley rats 278 +/-28 g); FeTMPyP is an active peroxynitrite decomposition catalyst; tempol is an antioxidant; Dose: FeTMPyP (100 pmol/ul/hr); tempol (4 nmol/ul/hr); tissue perfusion (cisternae);.

**Q5692:** H. Z. Toklu, *et al.* Intracerebroventricular tempol administration in older rats reduces oxidative stress in the hypothalamus but does not change STAT3 signalling or SIRT1/AMPK pathway. *Appl Physiol Nutr Metab* 2017;42(1):59-67

**ALZET Comments:** Tempol; CSF, artificial; CSF/CNS; Rat; 3 weeks; Controls received mp w/ vehicle; animal info (male, Fischer 344 x Brown Norway, 3 months or 23 months old); functionality of mp verified by ; Vehicle pumps replaced after one week; Dose (300 ug/h);.

**Q6024:** M. J. De Blasio, *et al.* The superoxide dismutase mimetic tempol blunts diabetes-induced upregulation of NADPH oxidase and endoplasmic reticulum stress in a rat model of diabetic nephropathy. *Eur J Pharmacol* 2017;807(12-20



**ALZET Comments:** Tempol; Water; SC; Rat; 4 weeks; Controls received mp w/ vehicle; animal info (Diabetic rats); diabetes; Therapeutic indication (Diabetes); Dose (1.5 mM/kg/day);.

**Q6113:** E. Bouvier, *et al.* Nrf2-dependent persistent oxidative stress results in stress-induced vulnerability to depression. *Mol Psychiatry* 2017;22(12):1701-1713

**ALZET Comments:** Butylhydroquinone, tert-; Tempol; Water, distilled; Ethanol; CSF/CNS (right lateral ventricle); Rat; 6 days, 4 weeks; Tempol 8 umol kg/day dissolved in distilled water and delivered for 4 weeks; t-BHQ (1 mM) dissolved in 1% Ethanol in water and delivered for 6 days ICV; Controls received mp w/ vehicle; animal info (9 week old Sprague-Dawley rats weighing 290–310 g); Tempol is an antioxidant; Brain coordinates (1 mm caudal; – 1.5 mm lateral; – 3.4 mm below the surface);.

**Q5581:** J. Bai, *et al.* Central administration of tert-butylhydroquinone attenuates hypertension via regulating Nrf2 signaling in the hypothalamic paraventricular nucleus of hypertensive rats. *Toxicol Appl Pharmacol* 2017;333(100-109

**ALZET Comments:** Butylhydroquinone, tert-; Tempol;; CSF, artificial; DMSO; CSF/CNS (hypothalamic paraventricular nucleus); Rat; 1004; 2 weeks; Dose; tBHQ (0.8 µg/day), or tempol (20 µg/h); 1% DMSO used; Controls received mp w/ vehicle; animal info (250 g–270 g spontaneously hypertensive rats and Wistar-Kyoto rats); antihypertensive; bilateral cannula used;.

**Q5838:** H. K. Kim, *et al.* Tempol Ameliorates and Prevents Mechanical Hyperalgesia in a Rat Model of Chemotherapy-Induced Neuropathic Pain. *Front Pharmacol* 2016;7(532

**ALZET Comments:** Tempol; Saline; IP; Rat; 2001; 7 days; Controls received mp w/ vehicle; animal info (200-350 g); cancer (Chemotherapy); behavioral testing; Therapeutic indication (Pain study, chemotherapy-induced neuropathic pain); Dose (200 mg/kg);.

**Q4451:** Y. H. Ho, *et al.* Peripheral inflammation increases seizure susceptibility via the induction of neuroinflammation and oxidative stress in the hippocampus. *JOURNAL OF BIOMEDICAL SCIENCE* 2015;22(U1-U14

**ALZET Comments:** Endotoxin, LPS; NS398; tempol; Saline; DMSO; IP; CSF/CNS; Rat; 1007D; 7 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 10 weeks old, 250-282g); ALZET brain infusion kit 2 used; 1% DMSO used; Multiple pumps per animal (2); post op. care (IM procaine penicillin 1000IU); immunology; used dental cement; NS398 is a COX-2 inhibitor and anti-inflammatory; tempol scavenges ROS;.

**Q4343:** W. Cao, *et al.* A Salt-Induced Reno-Cerebral Reflex Activates Renin-Angiotensin Systems and Promotes CKD Progression. *JOURNAL OF THE AMERICAN SOCIETY OF NEPHROLOGY* 2015;26(1619-1633

**ALZET Comments:** Losartan; clonidine; tempol; hydralazine; PBS; CSF, artificial; CSF/CNS; intragastric; Rat; 2 weeks; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 5 weeks old, 5/6x nephrectomy); dose-response (pg 1627); cardiovascular; bp measured using catheter;.

## 15. Thioredoxin

**Q4605:** C. Y. R. Tan, *et al.* Thioredoxin-Interacting Protein: A Potential Therapeutic Target for Treatment of Progressive Fibrosis in Diabetic Nephropathy. *NEPHRON* 2015;129(109-127

**ALZET Comments:** Thioredoxin-interacting protein DNAzyme; SC; Rat; 2006; 12 weeks; Controls received mp w/ scrambled TXNIP DNAzyme; animal info (female, heterozygous (mRen-2)27, 6 weeks old); pumps replaced every 6 weeks; cardiovascular; diabetes; Thioredoxin-interacting protein aka TXNIP;.

**P7999:** S. Ueda, *et al.* Recombinant human thioredoxin suppresses lipopolysaccharide-induced bronchoalveolar neutrophil infiltration in rat. *LIFE SCIENCES* 2006;79(12):1170-1177

**ALZET Comments:** Thioredoxin, human recomb.; SC; Mice (nude); 2002; 2 weeks; Controls received mp w/ PBS; plasma levels taken; cancer (colon, carcinoma); peptides; animal info (female, 6 weeks old, nude); xenograft.



**P3398:** R. L. Hawkins, *et al.* Proline, ascorbic acid, or thioredoxin affect jaundice and mortality in Long Evans Cinnamon rats. *Pharmacol. Biochem. Behav* 1995;52(3):509-515

**ALZET Comments:** Thioredoxin; IP; Rat; 2002; 4 weeks; controls received mp w/saline; pumps replaced after 2 weeks; immunology; peptides; thioredoxin is an endogenous antioxidant protein.

## 16. Vitamin E

**Q1590:** C. Y. Hsieh, *et al.* Inhibition of vascular smooth muscle cell proliferation by the vitamin E derivative pentamethylhydroxychromane in an in vitro and in vivo study: pivotal role of hydroxyl radical-mediated PLC-gamma-1 and JAK2 phosphorylation. *Free Radical Biology and Medicine* 2010;49(5):881-893

**ALZET Comments:** PMC; tocopherol, alpha; SC; Rat; 14 days; Controls received mp w/ normal saline; animal info (Wistar, male, 350-400 g); PMC, also known as (2,2,5,7,8-pentamethyl-6-hydroxychromane, is a vitamin E derivative; tocopherol also known as vitamin E.

**P9636:** D. C. Irwin, *et al.* A potential role for reactive oxygen species and the HIF-1-alpha-VEGF pathway in hypoxia-induced pulmonary vascular leak. *Free Radical Biology and Medicine* 2009;47(1):55-61

**ALZET Comments:** Ascorbate; glutathione; tocopherol, alpha-; SC; Mice; 1007D; Controls received mp w/saline; animal info (male, C57BL/6J, 25-30g, 10-12 weeks old); compounds were mixed and infused together as an antioxidant cocktail.

**P3759:** T. Udaka, *et al.* The effect of combination therapy with EPC-K1 and low-dose cyclosporine to pulmonary allograft after rat lung transplantation. *J. Heart Lung Transplant* 1997;16(839-845

**ALZET Comments:** Vitamin E; IP; Rat; 2001; 7 days; functionality of mp verified by measuring EPC-K1 plasma levels; immunology; EPC-K1 is a diester of a-tocopherol and ascorbic acid; agent also called D-alpha-tocopherol.

**P2013:** D. G. Stein, *et al.* Intracerebral administration of alpha-tocopherol-containing liposomes facilitates behavioral recovery in rats with bilateral lesions of the frontal cortex. *J. Neurotrauma* 1991;8(4):281-292

**ALZET Comments:** Phosphatidylcholine; vitamin E; Liposomes; CSF/CNS (cortex); Rat; 2001; 7 days; Multiple pumps per animal (2); agent also called D-alpha-tocopherol.