



References on the Administration of Antihypertensive Agents Using ALZET® Osmotic Pumps

1. Atenolol

Q7241: M. N. Nguyen, *et al.* Mechanisms responsible for increased circulating levels of galectin-3 in cardiomyopathy and heart failure. *Sci Rep* 2018;8(1):8213

ALZET Comments: Isoproterenol, Atenolol, ICI-118551; Saline, ascorbic acid; SC; Mice; 48 Hours; Dose: ISO (2, 6 or 30 mg/kg/day; atenolol (2 mg/kg/day), ICI-118551 (1 mg/kg/day); 0.4 mM ascorbic used; animal info (12~14 week-old C57Bl/6 mice); cardiovascular;.

Q6161: C. Disdier, *et al.* Brain Inflammation, Blood Brain Barrier dysfunction and Neuronal Synaptophysin Decrease after Inhalation Exposure to Titanium Dioxide Nano-aerosol in Aging Rats. *Sci Rep* 2017;7(1):12196

ALZET Comments: Atenolol; PEG 200; DMSO; SC; Rat; 2001D; 4 hours; Dose (0.25 mg/kg/h); 50% PEG 200 used, 50% DMSO used; animal info (19 month old Fischer rats); Resultant plasma level (p.10);.

Q6167: W. L. Lin, *et al.* Sleep-related changes in cardiovascular autonomic regulation in left coronary artery ligation rats: Neural mechanism facilitating arrhythmia after myocardial infarction. *Int J Cardiol* 2016;225(65-72

ALZET Comments: Atenolol; DMSO, PEG 300; SC; Rat; 2002; 2 weeks; Dose (10 mg/kg/d); 50% PEG 300/50% DMSO used; animal info (8 to 10-week-old male Wistar-Kyoto rats); Atenolol is a selective beta1-blocker;.

Q4508: C. Disdier, *et al.* Tissue biodistribution of intravenously administrated titanium dioxide nanoparticles revealed blood-brain barrier clearance and brain inflammation in rat. *Particle and Fibre Toxicology* 2015;12(U1-U20

ALZET Comments: Atenolol; digoxin; prazosin; PEG 200; DMSO; SC; Rat; 2001D; Animal info (male, Fisher F344, 8 weeks old, 180-250g); 50% PEG 200 used; 50% DMSO used;.

Q4011: H. Nagai, *et al.* beta(2)-Adrenergic Receptor-Dependent Attenuation of Hypoxic Pulmonary Vasoconstriction Prevents Progression of Pulmonary Arterial Hypertension in Intermittent Hypoxic Rats. *PLoS One* 2014;9(U369-U377

ALZET Comments: Atenolol; nadolol; SC; Rat; 2006; 42 days; Animal info (male, Sprague Dawley, 7 weeks old); cardiovascular; antihypertensive; long-term study;.

Q3109: S. K. Ling, *et al.* Modulation of microRNAs in hypertension-induced arterial remodeling through the beta1 and beta3-adrenoreceptor pathways. *Journal of Molecular and Cellular Cardiology* 2013;65(;):127-136

ALZET Comments: Nebivolol; atenolol; Rat; 8 weeks; Controls received mp w/ vehicle; animal info (Dahl salt sensitive, 6 weeks old); long-term study; cardiovascular; antihypertensive;.

Q2875: Q. Lin, *et al.* Effect of Chronic Restraint Stress on Human Colorectal Carcinoma Growth in Mice. *PLoS One* 2013;8(4):U1127-U1137

ALZET Comments: Epinephrine; atenolol; ICI-118,551; PBS; Ascorbic acid; SC; Mice (nude); 1002; 2 weeks; Controls received mp w/ PBS, PHE (2mg/kg/d) and PRO (2mg/kg/d), CRS PBS, CRS PHE (2mg/kg/d) and PRO (2mg/kg/d); animal info (nude); cancer (colorectal); dose-response (Fig.4, S5); ICI 118,551 is a specific B2-AR antagonist; "Considering the critical role of stress in regulating tumor growth and the fact that stress hormones and their antagonists could be quickly metabolized, we used microsmotic pumps instead of repeated injection to administer the stress hormones and antagonists to reduce the stress response as much as possible during manipulations of the animals." pg 9.

Q5063: N. Ito, *et al.* Contribution of protein binding, lipid partitioning, and asymmetrical transport to drug transfer into milk in mouse versus human. *Pharm Res* 2013;30(9):2410-22

ALZET Comments: acetaminophen, cephalothin sodium salt, clindamycin hydrochloride, disopyramide phosphate salt, labetalol hydrochloride, nitrofurantoin +-propranolol hydrochloride, terbutaline hemisulfate salt, verapamil hydrochloride, Acyclovir, alprazolam, atenolol, anhydrous caffeine, cefotaxime sodium salt, cephalirin sodium salt, diltiazem hydrochloride, metronidazole, nitrazepam, prednisolone, 6-propyl-2-thiouracil, trazadone hydrochloride, chloramphenicol, cimetidine, theophylline, fluconazole, metoprolol, mirtazapine, praziquantel, quetiapine fumarate, triprolidine



hydrochloride, metformin, moclobemide.; DMSO; water; IP; mice; 1003D; animal info: lactating mice, postnatal age of 14 days; functionality of mp verified by measurement of drug concentration in milk and plasma; mp were used to infuse study lactational drug transfer.

Q1562: J. Angulo, *et al.* Nebivolol Dilates Human Penile Arteries and Reverses Erectile Dysfunction in Diabetic Rats through Enhancement of Nitric Oxide Signaling. *Journal of Sexual Medicine* 2010;7(8):2681-2697

ALZET Comments: Atenolol; nebivolol; DMSO; PEG 300; SC; Rat; 2002; 10 days; Controls received mp w/ vehicle; animal info (Sprague Dawley, STZ-induced diabetes, 250-400 g); 50% DMSO used; 50% PEG 300 used.

Q0090: C. Berthonneche, *et al.* Cardiovascular Response to Beta-Adrenergic Blockade or Activation in 23 Inbred Mouse Strains. *PLoS One* 2009;4(8):U233-U245

ALZET Comments: Atenolol; isoproterenol; SC; Mice; 2002; Controls received mp w/ NaCl; animal info (males, inbred, 10-12 wks old).

P9155: B. Ablad, *et al.* Prevention of ventricular fibrillation requires central beta-adrenoceptor blockage in rabbits. *SCANDINAVIAN CARDIOVASCULAR JOURNAL* 2007;41(221-229

ALZET Comments: Atenolol; metoprolol tartrate; Saline; SC; Rabbit; 2ML4; 3 weeks; Controls received mp w/ vehicle; functionality of mp verified by plasma levels of metoprolol and atenolol; animal info (male, New Zealand, White, Rabbit, 2.8-3.7 kg.).

P6925: T. J. van Brakel, *et al.* Intrapericardial delivery enhances cardiac effects of sotalol and atenolol. *Journal of Cardiovascular Pharmacology* 2004;44(1):50-56

ALZET Comments: Sotalol; atenolol; Saline; IV (jugular); intrapericardial; Rat; 2001; 7 days; Controls received mp w/ vehicle; cardiovascular; 2 day recovery period prior to attaching pumps to catheters.

P4964: L. M. Shantz, *et al.* Targeted overexpression of ornithine decarboxylase enhances beta-adrenergic agonist-induced cardiac hypertrophy. *Biochemical Journal* 2001;358(25-32

ALZET Comments: Isoproterenol; Atenolol; Saline; mice; 10 days; controls received mp w/ vehicle; cardiovascular; Atenolol is a beta-1 adrenergic agonist; 1 group received isoproterenol, 1 group received isoproterenol + atenolol in the same pump.

P4913: G. Iaccarino, *et al.* Cardiac beta ARK1 upregulation induced by chronic salt deprivation in rats. *Hypertension* 2001;38(255-260

ALZET Comments: Atenolol; DMSO; SC; Rat; 23 days; cardiovascular; antihypertensive; DMSO was 30%; atenolol is a B-adrenergic receptor agonist; researchers have stated that 2002 pumps were used, but pumps were stated to deliver for 28 days; implantation period was 23 days in this study.

P4051: H. B. Skantze, *et al.* Psychosocial stress causes endothelial injury in cynomolgus monkeys via b1-adrenoceptor activation. *Atherosclerosis* 1998;136(153-161

ALZET Comments: Atenolol; Metoprolol; monkey; 2ML1; no duration posted; controls received mp w/saline; antihypertensive; cardiovascular.

P5560: G. Iaccarino, *et al.* Reciprocal in vivo regulation of myocardial G protein-coupled receptor kinase expression by beta-adrenergic receptor stimulation and blockade. *Circulation* 1998;98(17):1783-1789

ALZET Comments: Atenolol; isoproterenol; carvedilol; Ascorbic acid; DMSO; SC; Mice; 2002; 14 days; Controls received mp w/ vehicle; functionality of mp verified by measurement of heart rates after 1 wk; cardiovascular; atenolol and isoproterenol dissolved in 0.002% ascorbic acid; carvedilol dissolved in 60% DMSO.

2. Benazepril

P9490: M. Abu-Taha, *et al.* Menopause and Ovariectomy Cause a Low Grade of Systemic Inflammation that May Be Prevented by Chronic Treatment with Low Doses of Estrogen or Losartan. *Journal of Immunology* 2009;183(2):1393-1402



ALZET Comments: Estradiol, 17b-; benazepril; DMSO; SC; Rat; 2004; Controls received mp w/ vehicle or sham operation; animal info (male, female, Sprague Dawley, OVX); 50% DMSO used; dose (5 ug/kg/d).

P6345: S. Yagi, *et al.* Combined treatment with an AT₁ receptor blocker and angiotensin converting enzyme inhibitor has an additive effect on inhibiting neointima formation via improvement of nitric oxide production and suppression of oxidative stress. *HYPERTENSION RESEARCH* 2004;27(2):129-135

ALZET Comments: Valsartan; benazepril; Potassium hydroxide; HCL; SC; Rat; Controls received mp w/ vehicle; dose-response (p131); pump model not stated.

P6612: M. Mizukami, *et al.* Gene expression profile revealed different effects of angiotensin II receptor blockade and angiotensin-converting enzyme inhibitor on heart failure. *Journal of Cardiovascular Pharmacology* 2003;42(S1-S6)

ALZET Comments: Benazepril; candesartan; SC; Rat; 2ML4; Blood pressure taken.

P3188: L. Chow, *et al.* Improved glucose metabolism following blockade of angiotensin converting enzyme but not angiotensin AT receptors. *Eur. J. Pharmacol* 1995;282(77-86)

ALZET Comments: Benazepril; Valsartan; Water, distilled; NaOH; HCl; IP; Rat; 2ML4; 12 weeks; controls received mp with saline; long-term study, pumps replaced every 28 days; valsartan is an angiotensin AT1 receptor antagonist; antihypertensive.

3. Benazeprilat

Q2883: Q. C. Yong, *et al.* Angiotensin type 1a receptor-deficient mice develop diabetes-induced cardiac dysfunction, which is prevented by renin-angiotensin system inhibitors. *Cardiovascular Diabetology* 2013;12(;):U1-U13

ALZET Comments: Aliskiren; benazeprilat; valsartan; PD123319; Saline; SC; Mice; 1004; 10 weeks; Cardiovascular; peptides; animal info (12 wks old, male, AT-KO); functionality of mp verified by echocardiography; pumps replaced every 4 weeks; enzyme inhibitor (renin);

Q2934: C. M. Thomas, *et al.* Direct renin inhibition prevents cardiac dysfunction in a diabetic mouse model: comparison with an angiotensin receptor antagonist and angiotensin-converting enzyme inhibitor. *Clinical Science* 2013;124(7-8):529-541

ALZET Comments: Insulin (Humulin N); aliskiren (renin inhibitor); benazeprilat (ACEi); valsartan (ARB); streptozotocin; Saline; SC; Mice; 1004; 10 weeks; Controls received mp w/vehicle, or (0.1M sodium citrate buffer (pH 4.5)); cardiovascular; animal info (male, C57b16/J, 12 weeks, blood glucose > 250 mg/dl); pumps replaced every 4 weeks; enzyme inhibitor (renin); diabetes;

P3939: R. L. Webb, *et al.* Effects of valsartan and hydrochlorothiazide alone and in combination on blood pressure and heart rate in conscious-telemetered spontaneously hypertensive rats (SHR). *Am. J. Hypertens* 1998;11(59-65)

ALZET Comments: Valsartan; Hydrochlorothiazide; Benazeprilat; NaOH; SC; Rat; 2ML2; 2 weeks; controls received mp w/vehicle; functionality of mp verified by residual volume and plasma assays; dose-response; stability verified by pilot expt; antihypertensive; cardiovascular; agents administered alone and in combination.

P4059: R. L. Webb, *et al.* Protective effects of valsartan and benazeprilat in salt-loaded stroke-prone spontaneously hypertensive rats. *Clin. Exp. Hypertens* 1998;20(7):775-793

ALZET Comments: Valsartan; Benazeprilat; NaOH; SC; Rat; 2ML2; 9.5 weeks; controls received mp w/vehicle; long-term study, pumps replaced every 2 weeks; radiotelemetric devices implanted concomitantly for blood pressure and heart rate measurement; antihypertensive; cardiovascular; ischemia (cerebral); long-term study.

P2830: R. L. Webb, *et al.* Development of tolerance to the antihypertensive effects of highly selective adenosine A2a agonists upon chronic administration. *J. Pharmacol. Exp. Ther* 1993;267(1):287-295

ALZET Comments: CGS-21680C; CGS-22989; CGS-22492; Benazeprilat; DMSO; Sodium bicarbonate; IV (jugular); Rat; 2ML2; 2 weeks; controls received mp w/ vehicle; tolerance.



P2181: T. Battle, *et al.* Continuous versus intermittent angiotensin converting enzyme inhibition in renal hypertensive rats. *Hypertension* 1993;22(188-196

ALZET Comments: Benazeprilat; Water; IP; Rat; 2002; 4 weeks; controls received mp w/water; pumps replaced at 2 wks; antihypertensive;

4. Bendroflumethiazide

P2385: H. E. Lunau, *et al.* Renal adaptations to continuous administration of furosemide and bendroflumethiazide in rats. *Pharmacol. Toxicol* 1994;74(216-222

ALZET Comments: Bendroflumethiazide; Furosemide; Lithium citrate; Ethanolamine; IP; Rat; 2ML1; 7 days; antihypertensive.

5. Bisoprolol

Q3145: C. C. Sucharov, *et al.* beta-Adrenergic receptor antagonism in mice: a model for pediatric heart disease. *Journal of Applied Physiology* 2013;115(7):979-987

ALZET Comments: Isoproterenol HCL; Bisoprolol; Nebivolol; Metoprolol, CGP2712A; Saline; DMSO; Ascorbic acid; SC; Mice; 1007D; 2001; 7 days; Controls received mp w/ vehicle; animal info (FVB); 40% DMSO used for CGP20712A & nebivolol vehicle; post op. care (Carpofen 5 mg/kg); cardiovascular; antihypertensive;

P3796: H. Hamada, *et al.* Age-related effects of norepinephrine on rat ventricular hypertrophy. *Jpn. Heart J* 1997;38(3):433-443

ALZET Comments: Norepinephrine HCl; Norepinephrine bitartrate; Bunazosin; Bisoprolol; SC; Rat; 2002; 7, 14 days; controls received mp w/saline or norepinephrine; dose-response; antihypertensive; cardiovascular; 2 pumps implanted in each animal.

6. Bunazosin

P3796: H. Hamada, *et al.* Age-related effects of norepinephrine on rat ventricular hypertrophy. *Jpn. Heart J* 1997;38(3):433-443

ALZET Comments: Norepinephrine HCl; Norepinephrine bitartrate; Bunazosin; Bisoprolol; SC; Rat; 2002; 7, 14 days; controls received mp w/saline or norepinephrine; dose-response; antihypertensive; cardiovascular; 2 pumps implanted in each animal.

7. Candesartan

Q7242: Y. Takeda, *et al.* Epigenetic Regulation of Aldosterone Synthase Gene by Sodium and Angiotensin II. *J Am Heart Assoc* 2018;7(10):

ALZET Comments: Angiotensin II, Candesartan; PMC6015301; SC; Rat; Pump model not stated; 4 weeks; Dose (Ang II 200 ng/kg/min, Candesartan 1mg/kg/day); animal info (Male, Wistar, 6 weeks old); Candesartan aka Ang II type 1 receptor antagonist; gene therapy; .

Q5288: S. Villapol, *et al.* Neurorestoration after traumatic brain injury through angiotensin II receptor blockage. *Brain* 2015;138(Pt 11):3299-315

ALZET Comments: Candesartan; Saline, Physiological; SC; mice; 1004; 30 days; Controls received IP injection; animal info (C57BL/6Ncr male mice weighing 20-25g); comparison of injection vs mp; comparison of injection vs mp; Dose (pg. 3301);



Q4395: S. de Seigneux, *et al.* Proteinuria Increases Plasma Phosphate by Altering Its Tubular Handling. JOURNAL OF THE AMERICAN SOCIETY OF NEPHROLOGY 2015;26(1608-1618

ALZET Comments: Candesartan; SC; Rat; 14 days; Animal info (male, Wistar or PAN nephrotic, 200-250g); cardiovascular;.

Q4360: T. T. Chang, *et al.* Direct Renin Inhibition with Aliskiren Improves Ischemia-Induced Neovasculogenesis in Diabetic Animals via the SDF-1 Related Mechanism. PLoS One 2015;10(U1637-U1653

ALZET Comments: Aliskiren; olmesartan; candesartan; PBS; Mice; 2006; 6 weeks; Controls received mp w/ vehicle; animal info (male, FVB/NJNarl, 6 weeks old); ischemia (hind limb); diabetes;.

Q2422: S. Villapol, *et al.* Candesartan, an Angiotensin II AT₁-Receptor Blocker and PPAR-gamma Agonist, Reduces Lesion Volume and Improves Motor and Memory Function After Traumatic Brain Injury in Mice. Neuropsychopharmacology 2012;37(13):2817-2829

ALZET Comments: Candesartan; NA2CO3; saline; SC; Mice; 1007D; 1004; 3, 28 days; Control animals received mp w/ vehicle; animal info (C57BL/6, male, 9 wks old, 22-28 g); incorrectly listed Model 1007.

Q2122: B. A. Kemp, *et al.* Intrarenal Angiotensin III Is the Predominant Agonist for Proximal Tubule Angiotensin Type 2 Receptors. Hypertension 2012;60(2):387-U306

ALZET Comments: Candesartan; SC; Rat; 2001D; 24 hours; Animal info (Sprague Dawley, female, 12 wks old).

Q2119: K. Aikawa, *et al.* Involvement of angiotensin II type 1 receptor on pathological remodeling and dysfunction in obstructed bladder. INTERNATIONAL JOURNAL OF UROLOGY 2012;19(5):457-464

ALZET Comments: Candesartan; Na2CO3; saline; SC; Rat; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (male, 12 wks old, Sprague Dawley).

Q2216: Y. Taniguchi, *et al.* Candesartan restored cardiac Hsp72 expression and tolerance against reperfusion injury in hereditary insulin-resistant rats. Cardiovascular Research 2011;92(3):439-448

ALZET Comments: Candesartan; IP; Rat; 2002; 2 weeks; Controls received mp w/ vehicle; animal info (male, OLETF, 4 wks old).

Q1623: T. Nijenhuis, *et al.* Angiotensin II Contributes to Podocyte Injury by Increasing TRPC6 Expression via an NFAT-Mediated Positive Feedback Signaling Pathway. American Journal of Pathology 2011;179(4):1719-1732

ALZET Comments: Angiotensin II; candesartan, ARB; SC; Rat; 2004; 3, 4 weeks; Animal info (Wistar, Ren2 Tg); peptides.

Q2245: T. Kato, *et al.* Angiotensin II type 1 receptor blocker attenuates diabetes-induced atrial structural remodeling. Journal of Cardiology 2011;58(2):131-136

ALZET Comments: Candesartan; SC; Rat; 2004; 12 weeks; Animal info (Sprague Dawley, female, 8 wks old); long-term study.

Q1074: L. Fuechtbauer, *et al.* Angiotensin II Type 1 receptor (AT1) signaling in astrocytes regulates synaptic degeneration-induced leukocyte entry to the central nervous system. BRAIN BEHAVIOR AND IMMUNITY 2011;25(5):897-904

ALZET Comments: Candesartan; Saline, physiological; sodium carbonate; IP; Mice (transgenic); 1002; 14 days; Controls received mp w/ vehicle; animal info (adult, female, GFAP-Ij-beta-alpha-dn, GFAP-EGFP-tg); wound clips used.

Q0903: J. Benicky, *et al.* Angiotensin II AT(1) Receptor Blockade Ameliorates Brain Inflammation. Neuropsychopharmacology 2011;36(4):857-870

ALZET Comments: Candesartan; SC; Rat; 2002; 14 days; Controls received mp w/ vehicle; animal info (Wistar Hannover, SHR, male, 9 wks old).

Q0350: K. Schmerbach, *et al.* Effects of Aliskiren on Stroke in Rats Expressing Human Renin and Angiotensinogen Genes. PLoS One 2010;5(11):U241-U247

ALZET Comments: Aliskiren; candesartan; SC; Rat; 12 days; Controls received sham operation; animal info (dTGR, 5-6 wks old, 125-135g); MRI; ischemia (MCAO, cerebral); enzyme inhibitor (renin);.



Q1258: N. B. Pedersen, *et al.* Vasopressin induces phosphorylation of the thiazide-sensitive sodium chloride cotransporter in the distal convoluted tubule. *Kidney International* 2010;78(2):160-169

ALZET Comments: Candesartan; vasopressin, 1-deamino-8-D arginine; Saline, physiological; SC; Rat; 2001; 4 days; Animal info (Munich Wistar, male).

P9991: T. Kishi, *et al.* Angiotensin II Type 1 Receptor-Activated Caspase-3 Through Ras/Mitogen-Activated Protein Kinase/Extracellular Signal-Regulated Kinase in the Rostral Ventrolateral Medulla Is Involved in Sympathoexcitation in Stroke-Prone Spontaneously Hypertensive Rats. *Hypertension* 2010;55(2):291-297

ALZET Comments: S-Farnesylthiosalicylic acid; Z-DEVD-FMK; candesartan; DMSO; CSF, artificial; CSF/CNS; Rat; 1003D; 14 days; Controls received mp w/ vehicle; animal info (WYKO, 14-16 wks old).

P9633: F. Praddaude, *et al.* Angiotensin II-induced hypertension regulates AT1 receptor subtypes and extracellular matrix turnover in mouse retinal pigment epithelium. *Experimental Eye Research* 2009;89(1):109-118

ALZET Comments: Angiotensin II; candesartan; PD123319; Saline; SC; Mice; 2001; 4 weeks; Controls received mp w/vehicle; peptides; animal info (adult, C57BL/6, male, 9 months old); pump infused mixture of angiotensin II and candesartan; pump infused mixture of angiotensin II and PD123319.

Q0614: Y. Naito, *et al.* The Mechanism of Distinct Diurnal Variations of Renin-Angiotensin System in Aorta and Heart of Spontaneously Hypertensive Rats. *Clinical and Experimental Hypertension* 2009;31(8):625-638

ALZET Comments: Candesartan; SC; Rat; 14 days; Animal info (male, SHR, WKY, 12 wks old, 250-275 g); systolic blood pressure (SBP) measured using a noninvasive tail cuff (Ueda Electronics).

Q1227: S. C. Luetken, *et al.* Changes of renal AQP2, ENaC, and NHE3 in experimentally induced heart failure: response to angiotensin II AT(1) receptor blockade. *American Journal of Physiology-Renal Physiology* 2009;297(6):F1678-F1688

ALZET Comments: Candesartan; Rat; 2001; 7 days; Controls received mp w/ vehicle; animal info (Wistar, 250 g); incorrectly listed model 2201.

Q0818: M. Kawamura, *et al.* Angiotensin II Receptor Blocker Candesartan Cilexetil, but Not Hydralazine Hydrochloride, Protects Against Mouse Cardiac Enlargement Resulting From Undernutrition In Utero. *REPRODUCTIVE SCIENCES* 2009;16(10):1005-1012

ALZET Comments: Hydralazine hydrochloride; candesartan cilexetil; Water, distilled; sodium carbonate; SC; Mice; 2004; 8 weeks; Controls received mp w/ vehicle; animal info (9-17 wks old, normally nourished); pumps replaced after 4 weeks; Figure 3b, image of pump implantation location.

P9417: A. M. Jensen, *et al.* Angiotensin II regulates V2 receptor and pAQP2 during ureteral obstruction. *American Journal of Physiology-Renal Physiology* 2009;296(1):F127-F134

ALZET Comments: Candesartan; Na₂CO₃; saline; SC; Rat; 3 days; Controls received mp w/ vehicle; animal info (male, Munich-Wistar, Sprague Dawley, 240 g.); nephrology.

P9229: M. Jiang, *et al.* Ang II-stimulated migration of vascular smooth muscle cells is dependent on LR11 in mice. *Journal of Clinical Investigation* 2008;118(8):2733-2746

ALZET Comments: Angiotensin II; candesartan; Saline; IA (femoral); Mice; 4 weeks; Controls received mp w/ vehicle; cardiovascular; peptides; animal info (male, C57BL/6, 20 wks old, Lr11 -/-, wt).

P8328: S. H. Padia, *et al.* Intrarenal aminopeptidase N inhibition augments natriuretic responses to angiotensin III in angiotensin type 1 receptor-blocked rats. *Hypertension* 2007;49(3):625-630

ALZET Comments: Candesartan; SC; Rat; 2001D; 24 hours; Cardiovascular; animal info (Sprague-Dawley, 250 grams).

P8263: M. Nishimura, *et al.* Upregulation of the brain renin-angiotensin system in rats with chronic renal failure. *ACTA PHYSIOLOGICA* 2007;189(4):369-377



ALZET Comments: Candesartan; CSF, artificial; IV (jugular); CSF/CNS; Rat; 2001; 6 days; Controls received mp w/ vehicle; replacement therapy (subtotal nephrectomy, dorsal rhizotomy); antihypertensive; cyanoacrylate adhesive; animal info (male, SHR/Izumo, 8 wks old, 300-350g.); AT1 receptor antagonist.

P8579: A. Eskild-Jensen, *et al.* AT1 receptor blockade prevents interstitial and glomerular apoptosis but not fibrosis in pigs with neonatal induced partial unilateral ureteral obstruction. *Am J Physiol Renal Physiol* 2007;292(6):F1771-F1781

ALZET Comments: Candesartan; Saline, physiological; Na2CO3; SC; Pig; 2ML1; 7 days; Controls received mp w/ isotonic saline; no stress (see pg. F1774); animal info (female, Danish Landrace, 23 days old, partial left ureter obstruction); renal physiology.

P8452: D. E. Doran, *et al.* Differential effects of AT₁ receptor and Ca₂₊ channel blockade on atherosclerosis, inflammatory gene expression, and production of reactive oxygen species. *Atherosclerosis* 2007;195(1):39-47

ALZET Comments: Candesartan; Saline; Na2CO3; SC; Mice; 1002; 2,4 months; 2,6 weeks; Cardiovascular; animal info (male, C57BL/6 apoE^{-/-}, 6-8 wks old); long-term study.

P8086: M. H. de Borst, *et al.* Induction of kidney injury molecule-1 in homozygous Ren2 rats is attenuated by blockade of the renin-angiotensin system or p38 MAP kinase. *American Journal of Physiology-Renal Physiology* 2007;292(1):F313-F320

ALZET Comments: Candesartan; SB-239063; Saline; water; PEG 400; NaHCO3; DMSO; SC; Rat; 2004; 2ML4; 4 weeks; Controls received no treatment; functionality of mp verified by residual volume; enzyme inhibitor (p38 MAP Kinase); animal info (male, TGR (mRen2) 27, 7 wks old, male, Sprague-Dawley); 0.1% DMSO.

P8442: I. Armando, *et al.* Angiotensin II AT₁ receptor blockade prevents the hypothalamic corticotropin-releasing factor response to isolation stress. *Brain Research* 2007;1142(92-99)

ALZET Comments: Candesartan; Sodium carbonate; saline; SC; Rat; 2002; 14 days; Controls received mp w/ vehicle; animal info (male, Wistar Hanover, 10 wks old, 250-300g).

P7933: J. Zhou, *et al.* AT₁ receptor blockade regulates the local angiotensin II system in cerebral microvessels from spontaneously hypertensive rats. *Stroke* 2006;37(5):1271-1276

ALZET Comments: Candesartan; SC; Rat; 2004; 4 weeks; Controls received mp w/ vehicle; cardiovascular; animal info (SHR, Wistar Kyoto, 12 weeks old, 250-320 grams).

P7833: C. T. Zhang, *et al.* Blockade of angiotensin II type 1 receptor improves the arrhythmia morbidity in mice with left ventricular hypertrophy. *CIRCULATION JOURNAL* 2006;70(3):335-341

ALZET Comments: Candesartan; SC; Mice; 1002; 2, 4 weeks; Controls received mp w/ saline; dose-response (table 1); no stress (see pg. 336); cardiovascular; animal info (C57BL/6, 24-27g., 11-12 wk. old, male, transverse aorta constriction).

P8000: S. Turban, *et al.* Long-term regulation of proximal tubule acid-base transporter abundance by angiotensin II. *Kidney International* 2006;70(4):660-668

ALZET Comments: Candesartan; angiotensin II; lisinopril; Saline; SC; Rat; 3 days; Controls received mp w/ vehicle; cardiovascular; peptides; animal info (male, Sprague-Dawley, 224-250 grams).

P7918: J. M. Saavedra, *et al.* A centrally acting, anxiolytic angiotensin II AT₁ receptor antagonist prevents the isolation stress-induced decrease in cortical CRF₁ receptor and benzodiazepine binding. *Neuropsychopharmacology* 2006;31(6):1123-1134

ALZET Comments: Candesartan; Saline; sodium carbonate; SC; CSF/CNS; Rat; 14 days; Controls received mp w/ vehicle; animal info (Wistar, 8 weeks old).

P7883: A. M. Jensen, *et al.* Angiotensin II mediates downregulation of aquaporin water channels and key renal sodium transporters in response to urinary tract obstruction. *American Journal of Physiology-Renal Physiology* 2006;291(5):F1021-F1032

ALZET Comments: Candesartan; Saline, physiological; Na2CO3; SC; Rat; 2001; 48 hours; Controls received mp w/ vehicle; animal info (male, Munich-Wistar, 240g.); mp primed overnight in 37 celsius saline.



P8202: M. Hamai, *et al.* Comparison of inhibitory action of candesartan and enalapril on brain ischemia through inhibition of oxidative stress. *Neuropharmacology* 2006;51(4):822-828

ALZET Comments: Candesartan; enalapril; IP; Mice; 1002; 10 days; Dose-response (fig.1); cardiovascular; ischemia (cerebral, induced by MCAO); animal info (male, C57BL/6J, 10 wks old); neurology.

P8182: A. Eskild-Jensen, *et al.* Glomerular and tubular function during AT1 receptor blockade in pigs with neonatal induced partial ureteropelvic obstruction. *American Journal of Physiology-Renal Physiology* 2006;292(3):921-929

ALZET Comments: Candesartan; Saline, physiological; SC; Pig (neonate); 7 days; Controls received mp w/ vehicle; no stress (see pg. F923); animal info (female, Danish Landrace; 2, 23 days old); congenital urinary tract obstruction model.

8. Captopril

Q7067: W. L. Lin, *et al.* Neural mechanism of angiotensin-converting enzyme inhibitors in improving heart rate variability and sleep disturbance after myocardial infarction. *Sleep Med* 2018;48(61-69

ALZET Comments: Captopril; PEG 300; DMSO; SC; Rat; 2002; 2 weeks; Dose (30 mg/kg/d); Controls received mp w/ vehicle; enzyme inhibitor (ACE);.

Q4497: W. C. Li, *et al.* Angiotensin II regulates brain (pro)renin receptor expression through activation of cAMP response element-binding protein. *AMERICAN JOURNAL OF PHYSIOLOGY-REGULATORY INTEGRATIVE AND COMPARATIVE PHYSIOLOGY* 2015;309(R138-R147

ALZET Comments: Losartan; captopril; CAS92-78-4; CSF, artificial; CSF/CNS; Mice; 1004; 3 weeks; Controls received mp w/ vehicle; animal info (C57BL6J); cardiovascular; CAS92-78-4 is a CREB-CBP interaction inhibitor;.

Q4442: J. C. Hardwick, *et al.* Angiotensin receptors alter myocardial infarction-induced remodeling of the guinea pig cardiac plexus. *AMERICAN JOURNAL OF PHYSIOLOGY-REGULATORY INTEGRATIVE AND COMPARATIVE PHYSIOLOGY* 2015;309(R179-R188

ALZET Comments: Captopril; losartan; CGP42112A; SC; Guinea pig; 2ML4; 4 weeks; 6 weeks; Animal info (male, Hartley, 9 weeks old, 500-650g); pumps replaced every 3 weeks; cardiovascular; long-term study;.

Q3953: S. Lankhorst, *et al.* Treatment of Hypertension and Renal Injury Induced by the Angiogenesis Inhibitor Sunitinib Preclinical Study. *Hypertension* 2014;64(1282-U260

ALZET Comments: Captopril; SC; Rat; 2ML2; 8 days; Animal info (male, Wistar Kyoto, 280-300g); cardiovascular; antihypertensive; bp measured using radiotelemetry (DSI);.

Q2112: A. Hill, *et al.* Controlled delivery of nanosuspensions from osmotic pumps: Zero order and non-zero order kinetics. *JOURNAL OF CONTROLLED RELEASE* 2012;158(3):403-412

ALZET Comments: Fenofibrate nanosuspension; captopril; methylene blue; Hydroxypropylmethylcellulose; dioctyl sulfosuccinate sodium salt; hydroxyethylcellulose; In vitro; 1007D; 7 days; Functionality of mp verified; effect of different osmolalities, viscosities, particle size, and pump orientation on release rate kinetics.

Q1806: S. Efrati, *et al.* Effect of captopril treatment on recuperation from ischemia/reperfusion-induced acute renal injury. *NEPHROLOGY DIALYSIS TRANSPLANTATION* 2012;27(1):136-145

ALZET Comments: Captopril; IP; Rat; 24, 48, 168 hours; Controls received mp w/ saline; animal info (Sprague Dawley, male, 2 mo old, 25-300 g, nephrectomized); enzyme inhibitor (ACE).

Q2164: D. N. Capelari, *et al.* Effects of maternal captopril treatment during late pregnancy on neonatal lung development in rats. *REGULATORY PEPTIDES* 2012;177(1-3):97-106

ALZET Comments: Captopril; SC; Rat (pregnant); 2001; Controls received mp w/ saline; animal info (Wistar, female, 230-250 g); enzyme inhibitor (acetylcholinesterase, ACE).



Q0008: Y. K. Cho, *et al.* Sodium Valproate, a Histone Deacetylase Inhibitor, but Not Captopril, Prevents Right Ventricular Hypertrophy in Rats. *CIRCULATION JOURNAL* 2010;74(4):760-770

ALZET Comments: Captopril; DMSO; SC; Rat; 14 days; Cardiovascular; enzyme inhibitor (ACE); animal info (male, Sprague-Dawley, 3 weeks old); functionality of mp verified by plasma ang I and ang II levels; right ventricular hypertrophy by pulmonary artery banding.

Q0569: A. D. de Kloet, *et al.* The Effect of Angiotensin-Converting Enzyme Inhibition Using Captopril on Energy Balance and Glucose Homeostasis. *Endocrinology* 2009;150(9):4114-4123

ALZET Comments: Captopril; Saline; SC; Rat; 2ML2; 14 days; Controls received mp w/ vehicle; animal info (Adult, male, Long Evans, 250-300 g); enzyme inhibitor (ACE); wound clips used; Research Diets.

P8463: X. Z. Shen, *et al.* Mice with enhanced macrophage angiotensin-converting enzyme are resistant to melanoma. *American Journal of Pathology* 2007;170(6):2122-2134

ALZET Comments: Captopril; losartan; SC; Mice; 2 weeks; Functionality of mp verified by systolic blood pressure; enzyme inhibitor (ACE); cancer (melanoma); immunology; animal info (C56BL/6, wt, ACE 10/10, 8wks old).

P6240: L. A. Martinez, *et al.* Early and chronic captopril or losartan therapy reduces infarct size and avoids congestive heart failure after myocardial infarction in rats. *Archives of Medical Research* 2003;34(5):357-361

ALZET Comments: Captopril; losartan; SC; Rat; 2ML4; 4 weeks; Cardiovascular; enzyme inhibitor (ACE); losartan is an AT₁ receptor antagonist.

P6655: X. Li, *et al.* Increase in Cx45 gap junction channels in cerebral smooth muscle cells from SHR. *Hypertension* 2002;40(6):940-946

ALZET Comments: Angiotensin II; L-NAME; captopril; SC; Rat; 4 weeks; Enzyme inhibitor (nitric oxide synthase); cardiovascular; antihypertensive.

P3647: S. K. Laycock, *et al.* Captopril and norepinephrine-induced hypertrophy and haemodynamics in rats. *J. Cardiovasc. Pharmacol* 1996;27(6):667-672

ALZET Comments: Norepinephrine; Captopril; Ascorbic acid; Saline; SC; Rat; 2ML4; 28 days; controls received vehicle infusion; antihypertensive; multiple pumps per animal (1 or 2).

P3146: Y. Tokita, *et al.* Role of the tissue renin-angiotensin system in the action of angiotensin-converting enzyme inhibitors. *P. S. E. B. M* 1995;208(3):391-396

ALZET Comments: Captopril; Perindopril; Saline; IP; Rat; 6 days; controls received mp with saline; antihypertensive.

P3299: N. W. Morrell, *et al.* Role of angiotensin-converting enzyme and angiotensin II in development of hypoxic pulmonary hypertension. *Am. J. Physiol. (Heart Circ. Physiol. 38)* 1995;269(H1186-H1194)

ALZET Comments: Captopril; PD123319; CP-0597; Losartan; PBS; IP; Rat; 2ML2; 14 days; controls received mp w/PBS; antihypertensive; CP-0597 is a B2-receptor antagonist.

P3615: M. Kohzuki, *et al.* Cardiovascular and renal protective effects of losartan in spontaneously hypertensive rats with diabetes mellitus. *Clin. Exp. Pharmacol. Physiol* 1995;SUPPL(1):S366-S367

ALZET Comments: Losartan; Captopril; IP; Rat; 2ML4; 8 weeks; controls received no treatment; antihypertensive; cardiovascular; agents given singly and together; long-term study.

P2790: M. Kohzuki, *et al.* Antihypertensive and renal-protective effects of losartan in streptozotocin diabetic rats. *J. Hypertens* 1995;13(9):7-103

ALZET Comments: Losartan; Captopril; IP; Rat; 2ML4; 8 weeks; controls received mp w/ vehicle; long-term study, pumps replaced; agents infused separately and concomitantly; antihypertensive.

P2931: D. A. Fitts. Forebrain circumventricular organs mediate captopril-enhanced ethanol intake in rats. *Pharmacol. Biochem. Behav* 1993;45(8):811-816



ALZET Comments: Captopril; Saline, sterile; SC; Rat; 2ML2; 14 days; controls received sham surgery; enzyme inhibitor; betadine applied topically and .2 ml gentamicin given IM to control post-surgical infection; antihypertensive.

P3366: D. A. Fitts. Angiotensin and captopril increase alcohol intake. *Pharmacol. Biochem. Behav* 1993;45(35-43)
ALZET Comments: Angiotensin II; Captopril; Saline, sterile; SC; CSF/CNS; 2001; 2002; 2ML2; 7, 12 days; controls received mp w/saline; peptides; antihypertensive; captopril rats allowed 1 week recovery after ventricular cannula placement.

P2704: J. T. Crofton, *et al.* Role of vasopressin, the renin-angiotensin system and sex in Dahl salt-sensitive hypertension. *J. Hypertens* 1993;11(10):1031-1038

ALZET Comments: Captopril; Saline, sterile; SC; Rat; 2ML1; 12 days; controls received mp w/ vehicle (pH lowered to 2); pumps replaced after 6 days; antihypertensive.

P2064: P. Menasche, *et al.* Pretreatment with captopril improves myocardial recovery after cardioplegic arrest. *J. Cardiovasc. Pharmacol* 1992;19(402-407)

ALZET Comments: Captopril; Enalapril; SC; Rat; 2ML1; 48 hours; enzyme inhibitor (ace); antihypertensive.

P2145: C. van Krimpen, *et al.* DNA synthesis in the non-infarcted cardiac interstitium after left coronary artery ligation in the rat: effects of captopril. *J. Mol. Cell. Cardiology* 1991;23(1245-1253)

ALZET Comments: Captopril; Hydralazine; Uridine, bromodeoxy-; SC; Rat; 2001; 1,7,14 days; pumps replaced at 7 days; toxicology; enzyme inhibitor (ACE); pumps used for drug admin. and cell labeling (1D and 7D labeling); multiple pumps per animal (2); antihypertensive.

P2039: C. van Krimpen, *et al.* Angiotensin I converting enzyme inhibitors and cardiac remodeling. *Basic Res. Cardiol* 1991;86(51):149-155

ALZET Comments: Captopril; Uridine, bromodeoxy-; SC; Rat; 1,2,3 weeks; Multiple pumps per animal (2); antihypertensive.

P1899: Y.-J. Kuo, *et al.* Captopril increases norepinephrine spillover rate in conscious spontaneously hypertensive rats. *J. Pharmacol. Exp. Ther* 1991;258(1):223-231

ALZET Comments: Minoxidil HCl; Captopril; Enalaprilat; Acetic acid; Ethanol; Propylene glycol; Saline; Water; SC; Rat; 5 days; no comment posted; antihypertensive.

P2452: B. J. A. Janssen, *et al.* Modification of circadian blood pressure and heart rate variability by five different antihypertensive agents in spontaneously hypertensive rats. *J. Cardiovasc. Pharmacol* 1991;17(494-503)

ALZET Comments: Captopril; Metoprolol; Hydralazine; Clonidine; Prazosin; Water; DMSO; Ethanol; PEG 400; Saline; IV; Rat; 2001; 2ML1; 4-6 days; controls received mp w/ vehicle; antihypertensive.

P1734: W. C. Mabie, *et al.* Maternal and uteroplacental hemodynamic effects of chronic captopril in the hypertensive, term-pregnant rat. *American Journal of Obstetrics and Gynecology* 1990;163(6):1861-1867

ALZET Comments: Captopril; Ethanol; IP; Rat (pregnant); 2001; 14 days; dose-response (graph); vehicle was 50% ethanol; antihypertensive.

P2045: Y. Kitami, *et al.* The effect of the renin inhibitor ES-1005 on the expression of the kidney renin gene in sodium-depleted marmosets. *J. Hypertens* 1990;8(1143-1146)

ALZET Comments: ES-1005; Captopril; Saline; IP; monkey; 2001; 7 days; renin inhibitor; pump captopril infusion, but not acute administration, significantly increased kidney renin gene expression; antihypertensive.

P1868: P. Pauletto, *et al.* Ventricular myosin and creatine-kinase isoenzymes in hypertensive rats treated with captopril. *Hypertension* 1989;14(556-562)

ALZET Comments: Captopril; SC; Rat; 4 weeks; antihypertensive.

P1550: A. S. Maisel, *et al.* Regulation of cardiac B-adrenergic receptors by captopril. *Circulation* 1989;80(669-675)

ALZET Comments: Captopril; Isoproterenol; SC; Guinea pig; 2 weeks; antihypertensive.



P1329: P. Rebuffat, *et al.* Zona glomerulosa morphology and function in streptozotocin-induced diabetic rats. *Endocrinology* 1988;123(2):949-955

ALZET Comments: ACTH; Angiotensin II; Captopril; Dexamethasone; Insulin; Saline; SC; Rat; 2002; 2 weeks; dose-response (text); functionality of mp verified by plasma levels; replacement t; antihypertensive therapy (streptozotocin-induced diabetes); peptides; antihypertensive.

P1237: C. F. Ng, *et al.* The effect of chronic administration of indomethacin in captopril-treated renal hypertensive rats. *Res. Commun. Chem. Pathol. Pharmacol* 1988;59(3):321-338

ALZET Comments: Captopril; Water; SC; Rat; 2002; 14 days; controls received mp w/ water; normal and RH rats used in this study; antihypertensive.

P1424: M. Nakagawa, *et al.* Plasma kinin concentration in deoxycorticosterone-salt hypertension. *Hypertension* 1988;11(4):411-415

ALZET Comments: Captopril; IP; Rat; 2001; 3 days; antihypertensive.

P1219: K. H. Berecek, *et al.* Captopril and the response to stress in the spontaneously hypertensive rat. *Hypertension* 1988;11(1):1144-1147

ALZET Comments: Captopril; HCl; Saline; CSF/CNS; Rat; 2002; 4 weeks; controls received mp w/ vehicle; pump replaced after 2 weeks; antihypertensive.

P0942: B. Piryova, *et al.* Renin-angiotensin system and renal excretory function under conditions of hypovolemia and limited sodium intake. *Acta Physiol. Pharmacol. Bulg* 1987;12(2):21-26

ALZET Comments: Captopril; SC; Rat; 2001; 8 days; comparison of ip injections vs. mp infusion; antihypertensive.

P1036: K. H. Berecek, *et al.* Sympathetic function in spontaneously hypertensive rats after chronic administration of captopril. *Am. J. Physiol* 1987;252(H796-H806)

ALZET Comments: Captopril; HCl; Saline; CSF/CNS; Rat; 2002; 4 weeks; controls received mp w/vehicle; mp connected to catheter in lateral ventricle; pumps replaced after 2 weeks; stability of captopril stated; antihypertensive.

P1062: A. A. Attallah. Captopril reduces renal excretion of prostaglandin E2 in the sodium-depleted rabbit. *Eur. J. Pharmacol* 1987;134(3):361-363

ALZET Comments: Captopril; SC; rabbit; 2ML1; 6 days; no vehicle for Captopril specified; antihypertensive.

P1123: J. Atkinson, *et al.* Chronic treatment of the spontaneously hypertensive rat with captopril attenuates responses to noradrenaline in vivo but not in vitro. *Naunyn-Schmiedeberg's Arch. Pharmacol* 1987;335(6):624-628

ALZET Comments: Captopril; Ethanol; Water; IV (jugular); Rat; 2001; 2002; 4,15,17 days; controls received sham op or mp w. ethanol; mp connected to cannula in jugular vein; SHR rats; functionality of mp verified in separate group of rats w/ mp filled w/ [⁵¹Cr] EDTA; antihypertensive.

9. Clonidine

Q6941: W. Cao, *et al.* A renal-cerebral-peripheral sympathetic reflex mediates insulin resistance in chronic kidney disease. *EBioMedicine* 2018;37(2):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);

Q6376: G. D. Fink, *et al.* Can we predict the blood pressure response to renal denervation? *Auton Neurosci* 2017;204(1):112-118

ALZET Comments: Clonidine; Rat; 2006; Dose (125 ug/kg/day); animal info (Male SHR); antihypertensive;



Q4646: B. A. Williams, *et al.* Multimodal Perineural Analgesia with Combined Bupivacaine-Clonidine-Buprenorphine-Dexamethasone: Safe In Vivo and Chemically Compatible in Solution. *PAIN MEDICINE* 2015;16(186-198

ALZET Comments: Bupivacaine; clonidine; dexamethasone; Saline; CSF/CNS (sciatic nerve); Rat; 2ML1; 7 days; Controls received mp w/ vehicle; animal info (male, albino, CD[SD]); no stress (see pg. 192); post op. care (IM butorphanol tartrate 0.05 mg/kg, ceftiofur sodium 5 mg/kg); stability verified by (pg. 195); used polyurethane catheter 0.5mm ID 0.9 mmOD; pumps removed after 1 week; dose (66.6 ug/mL).

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;.

P6722: A. Quartilho, *et al.* Production of paradoxical sensory hypersensitivity by alpha₂-adrenoreceptor agonists. *Anesthesiology* 2004;100(6):1538-1544

ALZET Comments: Clonidine; MK-801; dexmedetomidine; idazoxan; CSF/CNS (intrathecal, lumbar); SC; Rat; 2001; 6 days; Comparison of IT injections vs. IT and SC mp; idazoxan and MK-801 infused intrathecally in a separate infusion.

P5646: M. L. Parkin, *et al.* Importance of imidazoline-preferring receptors in the cardiovascular actions of chronically administered moxonidine, rilmenidine and clonidine in conscious rabbits. *Journal of Hypertension* 2003;21(1):167-178

ALZET Comments: Moxonidine; clonidine; rilmenidine; Saline; HCl; Sodium hydroxide; SC; Rabbit; 2ML2; 4 weeks; Controls received mp w/ vehicle; functionality of mp verified by residual volume; pumps replaced after 2 weeks; antihypertensive; moxonidine dissolved in saline/HCl/NaOH; other agents dissolved in saline; moxonidine & rilmenidine are imidazoline receptor agonists.

P4057: D. Mestivier, *et al.* Use of nonlinear methods to assess effects of clonidine on blood pressure in spontaneously hypertensive rats. *J. Appl. Physiol* 1998;84(5):1795-1800

ALZET Comments: Clonidine; Saline; SC; Rat; 2ML1; 2ML2; 4 weeks, 24 hours; controls received mp w/vehicle; antihypertensive; cardiovascular.

P4056: M. C. Grubb, *et al.* Antagonist precipitated clonidine withdrawal in rat: effects on locus coeruleus neurons, sympathetic nerves and cardiovascular parameters. *J. Auton. Nerv. Syst* 1998;71(85-95

ALZET Comments: Clonidine HCl; SC; Rat; 2002; 7-13 days; controls received mp w/saline; antihypertensive.

P3828: R. L. Stornetta, *et al.* Atipamezole-precipitated clonidine withdrawal induces c-fos expression in rat central nervous system. *Brain Research* 1997;764(81-92

ALZET Comments: Clonidine; SC; Rat; 2002; 7-10 days; controls received mp w/saline; antihypertensive; tolerance; dependence.

P4084: K. Chaouche-Teyara, *et al.* Effects of clonidine and flesinoxan on blood pressure variability in conscious spontaneously hypertensive rats. *J. Cardiovasc. Pharmacol* 1997;30(241-244

ALZET Comments: Clonidine; Flesinoxan; Saline; SC; Rat; 2ML1; 2ML4; 4 weeks; 24 hours; controls received mp w/vehicle; antihypertensive.

P3384: T. Naruse, *et al.* Absence of tolerance to hypotensive effects of clonidine in spontaneously hypertensive rats. *Jpn. J. Pharmacol* 1995;67(407-410

ALZET Comments: Clonidine; SC; Rat; 2002; 5 weeks; controls received mp w/saline; functionality of mp verified by plasma levels; pumps replaced weekly; half-life (p.409); antihypertensive; tolerance.



P6298: A. D. Kennedy, *et al.* Body and fat tail growth and carcass responses to clonidine in Karakul ram lambs. *Small Ruminant Research* 1995;15(171-176

ALZET Comments: Clonidine HCl; Saline, sterile; SC; Sheep (lamb); 2ML4; 84 days; Controls received mp w/ vehicle; long-term study; pumps replaced at day 29 and day 57.

P3195: Y. Hayashi, *et al.* Desensitization to the behavioral effects of α_2 -adrenergic agonists in rats. *Anesthesiology* 1995;82(954-962

ALZET Comments: Dexmedetomidine; Clonidine; SC; Rat; 2002; 7 days; controls received mp with vehicle or sham operation; tolerance; antihypertensive.

P2883: T. S. Rieg, *et al.* Systemic clonidine increases feeding and wheel running but does not affect rate of weight loss in rats subjected to activity-based anorexia. *Pharmacol. Biochem. Behav* 1994;47(215-218

ALZET Comments: Clonidine; Saline; Ascorbic acid; SC; Rat; 2002; no duration posted; controls received mp with vehicle; catheter used to delay infusion 1 day; antihypertensive.

P3038: T. Naruse, *et al.* Relationship between hypotensive effects and plasma concentrations of clonidine in spontaneously hypertensive rats: continuous treatment and sudden termination of clonidine infusion. *Gen. Pharmacol*

1994;25(7):1421-1425

ALZET Comments: Clonidine; SC; Rat; 2002; 8 days; controls received mp with saline; functionality of mp verified by plasma levels; dose-response; antihypertensive.

P3137: Y. Takano, *et al.* Chronic spinal infusion of dexmedetomidine, ST-91 and clonidine: spinal α_2 adrenoceptor subtypes and intrinsic activity. *J. Pharmacol. Exp. Ther* 1993;264(1):327-335

ALZET Comments: Dexmedetomidine; Clonidine; Enkephalin analog ST-91; Saline; CSF/CNS (intrathecal); Rat; 2001; 7 days; controls received mp with vehicle; tolerance; externalized loop of tubing allowed cessation of flow; dose-response (pg. 330); antihypertensive.

P2601: M. Barrios, *et al.* Role of L-type calcium channels on yohimbine-precipitated clonidine withdrawal in vivo and in vitro. *Naunyn-Schmiedeberg's Arch. Pharmacol* 1993;348(601-607

ALZET Comments: Clonidine HCl; Water, deionized; SC; mice; 2001; 5 days; controls received mp w/ saline; dependence; antihypertensive.

P2111: J.-H. Yu. Effect of chronic clonidine administration on parasympathetic-evoked rat saliva. *Life Sci* 1992;51(19):1493-1499

ALZET Comments: Clonidine; IP; Rat; 2ML1; 5, 7 days; no stress (see pg. 1494); good methods (see pg. 1494); antihypertensive.

P2110: A. Yonezawa, *et al.* Chronic clonidine treatment and its termination: effects on penile erection and ejaculation in the dog. *Life Sci* 1992;51(1999-2007

ALZET Comments: Clonidine HCl; Saline; SC; dog; 2ML4; 4 weeks; tolerance; antihypertensive.

P2143: J. W. van der Laan, *et al.* Chronic infusion of clonidine does not alleviate spontaneous morphine withdrawal symptoms in rats. *Psychopharmacology* 1992;108(283-288

ALZET Comments: UK-14,304 tartrate; Clonidine HCl; Saline; SC; Rat; 2001; no duration posted; half-life (p.283); antihypertensive.

P2900: D. H. Penning, *et al.* Yohimbine-precipitated clonidine withdrawal: an experimental model of the antihypertensive drug withdrawal syndrome. *Can. J. Physiol. Pharmacol* 1992;70(853-858

ALZET Comments: Clonidine HCl; SC; Rat; 2002; 7 days; controls received mp with saline; antihypertensive.

P2311: C. A. Hamilton, *et al.* Do centrally-acting antihypertensive drugs act at non-adrenergic as well as α_2 adrenoceptor sites? *Clin. and Exper. Hyper. -Theory and Practice* 1992;A14(5):815-835



ALZET Comments: Guanabenz; Clonidine; Rilmenidine; Water, sterile; Ethanol; IV (femoral); rabbit; 6 days; controls received mp w/ vehicles; agents are antihypertensives; mp and catheter embedded in thigh muscle; antihypertensive.

P2101: H. Jin, *et al.* Intrahypothalamic clonidine infusion prevents NaCl-sensitive hypertension. *Hypertension* 1991;18(2):224-229

ALZET Comments: Clonidine HCl; Saline; CSF/CNS (hypothalamus); IV (femoral); Rat; 2002; 20 days; pumps replaced after 2 weeks; 32 gauge cannula used; antihypertensive.

P2452: B. J. A. Janssen, *et al.* Modification of circadian blood pressure and heart rate variability by five different antihypertensive agents in spontaneously hypertensive rats. *J. Cardiovasc. Pharmacol* 1991;17(4):494-503

ALZET Comments: Captopril; Metoprolol; Hydralazine; Clonidine; Prazosin; Water; DMSO; Ethanol; PEG 400; Saline; IV; Rat; 2001; 2ML1; 4-6 days; controls received mp w/ vehicle; antihypertensive.

P2169: H. Ammer, *et al.* Regulation of G proteins by chronic opiate and clonidine treatment in the guinea pig myenteric plexus. *J. Pharmacol. Exp. Ther* 1991;258(3):790-796

ALZET Comments: Clonidine; Fentanyl; U-50,488H; Saline; SC; Guinea pig; 2001; 2002; 6-14 days; controls received sham op; tolerance; dependence; antihypertensive.

P1543: L. Lambas-Senas, *et al.* Biochemical evidence that brainstem adrenaline-containing neurons are activated during clonidine withdrawal in the spontaneously hypertensive rat. *Arch. Pharm* 1988;338(5):43-54

ALZET Comments: Clonidine; Saline; IV (jugular); Rat; 2001; 7, 10 days; antihypertensive.

P1419: A. D. Kennedy, *et al.* Growth hormone, insulin, prolactin, glucose and mononuclear leukocyte insulin binding responses to clonidine in ram lambs. *Can. J. Anim. Sci* 1988;68(6):655-677

ALZET Comments: Clonidine HCl; Water; SC; sheep; 72 days; pump replaced at day 29 and 57; antihypertensive; long-term study.

P1276: J. G. Granneman. Norepinephrine infusions increase adenylate cyclase responsiveness in brown adipose tissue. *J. Pharmacol. Exp. Ther* 1988;245(3):1075-1080

ALZET Comments: Clonidine HCl; Isoproterenol HCl; Norepinephrine bitartrate; Phenylephrine HCl; Ascorbic acid; SC; Rat; 3 days; solubility limitations; antihypertensive.

P1096: D. O'Regan, *et al.* A behavioural and neurochemical analysis of chronic and selective monoamine oxidase inhibition. *Psychopharmacology* 1987;92(4):42-47

ALZET Comments: Deprenyl HCl; Clonidine HCl; Clorgyline HCl; Saline; SC; Rat; 2002; 13 days; controls received mp w/vehicle; hypothalamic electrodes implanted for self-stimulation to further access agents effects; antihypertensive.

P1042: S. J. Lewis, *et al.* Rapid eye movement sleep and the associated cardiovascular changes during and after continuous 10-day infusion of clonidine in normotensive rats: comparison with lofexidine and S3341. *J. Cardiovasc. Pharmacol* 1987;9(7):711-718

ALZET Comments: Clonidine; Lofexidine; S-3341; Saline; SC; Rat; 2002; 10 days; controls received mp w/vehicle; agents infused separately; antihypertensive.

P1142: A. D. Kennedy, *et al.* Growth and carcass composition of ram lambs treated with clonidine. *Can. J. Anim. Sci* 1987;67(2):417-425

ALZET Comments: Clonidine HCl; Water; SC; sheep (lamb); 2ML4; 85 days; controls rec'd mp w/ water; 2 doses of agent infused; stress/adverse reaction (mp expulsion); long-term study; mp replaced on days 29 and 57; antihypertensive.

P1266: B. Jarrott, *et al.* Regional brain concentrations of several putative peptide neurotransmitters in normotensive and spontaneously hypertensive rats: effect of continuous (10-day) clonidine infusion. *J. Cardiovasc. Pharmacol* 1987;10(12):S14-S21



ALZET Comments: Clonidine; Saline; SC; Rat; 2002; 10 days; controls received mp w/saline; SHR and WKY rats used in this study; antihypertensive.

P1051: J. P. M. Finberg, *et al.* Chronic clonidine treatment produces desensitisation of post-but not presynaptic alpha 2-adrenoceptors. *Eur. J. Pharmacol* 1987;138(95-100)

ALZET Comments: Clonidine; Saline; SC; Rat; 2ML2; 14 days; controls received mp w/vehicle; antihypertensive.

P1110: J. Atkinson, *et al.* Effect of prolonged clonidine treatment and its withdrawal on noradrenaline turnover in the cerebral cortex and medulla oblongata of the spontaneously hypertensive rat. *Naunyn-Schmiedeberg's Arch. Pharmacol* 1987;336(77-80)

ALZET Comments: Clonidine; Radio-isotopes; 3H tracer; Saline; IV (jugular); Rat; 2001; 5, 10 days, 16, 40, 64 hrs; controls received mp w/saline; mp connected to cannula in jugular vein; dose response; 3H-clonidine used in vitro to verify functionality of mp; no tolerance; pump not replaced or surgically removed; antihypertensive.

10. Digotoxin and digoxin

Q5206: B. Sjogren, *et al.* Digoxin-Mediated Upregulation of RGS2 Protein Protects against Cardiac Injury. *J Pharmacol Exp Ther* 2016;357(2):311-9

ALZET Comments: Digoxin; DMSO; saline; SC; Mice; 2002; 3 days; 7 days; 10 days; Controls received mp w/ vehicle; animal info (male, C57BL6J or RGS2 -/-, 8-18 weeks old); 0.04% DMSO used; dependence; pumps primed overnight in 37C saline; Dose (2 ug/kg/day);.

Q5344: U. Eskioçak, *et al.* Synergistic effects of ion transporter and MAP kinase pathway inhibitors in melanoma. *Nat Commun* 2016;7(12336)

ALZET Comments: Digoxin; Promethylcellulose, Tween80, DMSO; SC; mice; Controls received mp w/ vehicle; animal info (NSG mice); 0.5% used Promethylcellulose, 0.2% Tween80 used, 5% DMSO; cancer (xenograft models); dose-response (pg. 14); Dose (10 mg/kg/day);.

Q4508: C. Disdier, *et al.* Tissue biodistribution of intravenously administered titanium dioxide nanoparticles revealed blood-brain barrier clearance and brain inflammation in rat. *Particle and Fibre Toxicology* 2015;12(U1-U20)

ALZET Comments: Atenolol; digoxin; prazosin; PEG 200; DMSO; SC; Rat; 2001D; Animal info (male, Fisher F344, 8 weeks old, 180-250g); 50% PEG 200 used; 50% DMSO used;.

Q2688: B. Sjoegren, *et al.* Cardiotonic Steroids Stabilize Regulator of G Protein Signaling 2 Protein Levels. *MOLECULAR PHARMACOLOGY* 2012;82(3):500-509

ALZET Comments: Digoxin; DMSO; saline; SC; Mice; 2002; 7 days; Control animals received mp w/ vehicle; animal info (C57BL/6, male, 8-13 wks old); 0.4% DMSO used.

R0295: M. P. Blaustein, *et al.* How NaCl raises blood pressure: a new paradigm for the pathogenesis of salt-dependent hypertension. *American Journal of Physiology-Heart and Circulatory Physiology* 2012;302(5):H1031-H1049

ALZET Comments: Digoxin; ouabain; Saline; SC; Rat; 42 days; Controls received mp w/ vehicle; animal info (normal); blood pressure measured via tail cuff.

P5253: P. Manunta, *et al.* Chronic hypertension induced by ouabain but not digoxin in the rat: antihypertensive effect of digoxin and digitoxin. *Hypertens Res* 2000;23 Suppl(S77-S85)

ALZET Comments: Ouabain; Ouabagenin; Digoxin; Digotoxin; PBS; SC; Rat; 2002; 5 weeks; Controls received mp/ vehicle; functionality of mp verified by residual volume; dose-response (p.581); pumps replaced every 14 days; antihypertensive; plasma levels of all agents verified by immunoassay; multiple pumps per animal (2) used simultaneously in one experiment.

P4750: K. Kimura, *et al.* Different effects of *in vivo* ouabain and digoxin on renal artery function and blood pressure in the rat. *Hypertens Res* 2000;23(Suppl):S67-S76



ALZET Comments: Ouabain; Digoxin; PBS, sterile; SC; Rat; 5 weeks; Controls received mp w/ vehicle; functionality of mp verified by plasma levels of ouabain and digoxin; antihypertensive; ouabain and digoxin are sodium pump inhibitors.

P5308: B. S. Huang, *et al.* Digoxin prevents ouabain and high salt intake-induced hypertension in rats with sinoaortic denervation. *Hypertension* 1999;34(4 Pt 2):733-738

ALZET Comments: Digoxin; Antibody, Fab fragments; Gamma globulin; SC; CSF/CNS; Rat; 2002; 2ML2; 12-14 days; Controls received mp w/ gamma globulin solution; peptides; antihypertensive; digoxin infused SC via 2ML2 pumps; some animals received ICV Fab fragments concomitantly via 2002 pumps.

11. Doxazosin

Q6678: J. Kim, *et al.* Renal nerves drive interstitial fibrogenesis in obstructive nephropathy. *J Am Soc Nephrol* 2013;24(2):229-42

ALZET Comments: Doxazosin; Atipamezole; Metoprolol; ICI118551; L748337; BRL44408; Imiloxan; Spiroxatine; PBS; DMSO; IP; Mice; 10 days; Dose (doxazosin (α 1-AR antagonist, 12 mg/kg/d), atipamezole (α 2-AR antagonist, 2.4mg/kg/d), metoprolol (β 1-AR antagonist, 12 mg/kg/d), ICI118551 (β 2-AR antagonist, 2.4 mg/kg/d), L748337 (β 3-AR antagonist, 2.4 mg/kg/d), BRL44408 (α 2A-AR antagonist, 12 mg/kg/d), imiloxan (α 2B-AR antagonist, 12 mg/kg/d), spiroxatine (α 2C-AR antagonist, 12mg/kg/d)); 10% DMSO used; animal info (8-10 week old male 129S1/SvImJ mice);.

P6787: M. Yono, *et al.* Doxazosin treatment causes differential alterations of α 1-adrenoceptor subtypes in the rat kidney, heart and aorta. *LIFE SCIENCES* 2004;75(21):2605-2614

ALZET Comments: Doxazosin; DMSO; SC; Rat; 12 weeks; Controls received mp w/ vehicle; functionality of mp verified by plasma doxazosin levels; long-term study; antihypertensive; 50% DMSO; doxazosin supplemented orally in drinking water.

P7070: H. J. Foster, *et al.* Effects of chronic administration of doxazosin on α 1-adrenoceptors in the rat prostate. *Journal of Urology* 2004;172(6):2465-2470

ALZET Comments: Doxazosin; DMSO; SC; Rat; 8,12 weeks; Controls received mp w/ vehicle; dose-response (table 2); long-term study; cancer (prostatic hyperplasia); 50% DMSO; due to limitations in solubility mp was combined with oral dosing to deliver higher doses.

P3785: E. M. van Kleef, *et al.* Doxazosin blocks the angiotensin II-induced smooth muscle cell DNA synthesis in the media, but not in the neointima of the rat carotid artery after balloon injury. *Cardiovasc. Res* 1996;31(324-330)

ALZET Comments: Angiotensin II, [val 5]; Doxazosin; Uridine, bromodeoxy-; Saline; DMSO;; SC;; Rat;; 2002; 2ML1;; 2 weeks;; controls received mp w/vehicle; 2ML1 pumps replaced after 1 week; antihypertensive; cardiovascular; multiple pumps per animal (2) - 1 w/drug, 1 w/BrdU.

12. Enalapril

Q5520: H. Zheng, *et al.* Centrally mediated erectile dysfunction in rats with type 1 diabetes: role of angiotensin II and superoxide. *J Sex Med* 2013;10(9):2165-76

ALZET Comments: Enalapril maleate, Losartan, Tempol; CSF, artificial; CSF/CNS (ventricle); Rat; 1003D; 14 days; Controls received mp w/ aCSF; ALZET brain infusion kit 2 used; Enalapril is an ACE inhibitor; Losartan is an ANG II AT1 receptor antagonist; tempol is a SOD mimetic; Therapeutic indication (erectile dysfunction); Dose: Enalapril (0.5 mg/m), losartan (2 mg/mL), tempol (50 mg/mL);.

Q2220: S. Bae, *et al.* Preventing progression of cardiac hypertrophy and development of heart failure by paricalcitol therapy in rats. *Cardiovascular Research* 2011;91(4):632-639

ALZET Comments: Enalapril; SC; Rat; 4 weeks; Controls received vehicle injections; animal info (HSS, Harlan Sprague Dawley); post op. care (meloxicam); low-dose enalapril at 90 mg/day;.



P8202: M. Hamai, *et al.* Comparison of inhibitory action of candesartan and enalapril on brain ischemia through inhibition of oxidative stress. *Neuropharmacology* 2006;51(4):822-828

ALZET Comments: Candesartan; enalapril; IP; Mice; 1002; 10 days; Dose-response (fig.1); cardiovascular; ischemia (cerebral, induced by MCAO); animal info (male, C57BL/6J, 10 wks old); neurology.

P4840: C. J. Blais, *et al.* Effects of the vasopeptidase inhibitor omapatrilat on cardiac endogenous kinins in rats with acute myocardial infarction. *Peptides* 2001;22(953-962

ALZET Comments: Enalapril; Omapatrilat;; Saline;; SC;; Rat;; 1007D;; 5 days;; Controls received mp w/ vehicle; functionality of mp verified by serum ACE inhibition; cardiovascular; antihypertensive; omapatrilat is a vasopeptidase inhibitor; Enalapril is an Angiotensin Converting Enzyme (ACE) inhibitor;.

P2744: V. J. D. da Silva, *et al.* Chronic converting enzyme inhibition facilitates baroreceptor resetting to hypertensive levels. *Hypertension* 1994;23(1 Supp):I68-I72

ALZET Comments: Enalapril; Hoe 140; SC; Rat; 2001; 7 days; comparison of oral dosing vs. mp; enzyme inhibitor; enalapril is an antihypertensive.

P2064: P. Menasche, *et al.* Pretreatment with captopril improves myocardial recovery after cardioplegic arrest. *J. Cardiovasc. Pharmacol* 1992;19(402-407

ALZET Comments: Captopril; Enalapril; SC; Rat; 2ML1; 48 hours; enzyme inhibitor (ace); antihypertensive.

P1573: R. D. Bunag, *et al.* Baroreceptor reflex enhancement by chronic intracerebroventricular infusion of enalapril in normotensive rats. *Hypertension* 1990;15(3):284-290

ALZET Comments: Enalapril; Saline; CSF/CNS; IV (jugular); Rat; 2002; 15 days; functionality of mp verified by checking tubing connections, demonstrating reservoir depleted; antihypertensive.

P0702: K. M. Denton, *et al.* Role of angiotensin II in renal wrap hypertension. *Hypertension* 1985;7(6):893-898

ALZET Comments: Enalapril; PBS; SC; rabbit; 2ML4; 6 weeks; Dose: 5 ug/kg/hr; Animal info (Weight range: 2-3 Kg); renal cellophane wrapping to produce hypertension; pumps replaced periodically; long-term study; comparison of captopril by bolus or iv infusion vs. enalapril mp infusion; antihypertensive;.

13. Enalaprilat

Q3528: Y. M. Kang, *et al.* Chronic infusion of enalaprilat into hypothalamic paraventricular nucleus attenuates angiotensin II-induced hypertension and cardiac hypertrophy by restoring neurotransmitters and cytokines. *TOXICOLOGY AND APPLIED PHARMACOLOGY* 2014;274(3):436-444

ALZET Comments: Angiotensin II; enalaprilat; Saline; CSF, artificial; SC; CSF/CNS (paraventricular nucleus); Rat; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, adult, 275-300g); functionality of mp verified by increased bp; post op. care (buprenorphine); tissue perfusion (bilateral paraventricular nucleus); cardiovascular; peptides; antihypertensive; bp measured using tail-cuff; pumps primed in 37C saline; used wound clips; enalaprilat is an ACE inhibitor; Plastics One bilateral PVN cannulae; bilateral infusion.

R0364: R. Gatti, *et al.* Enhanced Cough, Animal Models. *Methods in Pharmacology and Toxicology* 2012;1(17):343-360

ALZET Comments: Enalaprilat; Lisinopril; Imidapril; Saline; IP; Guinea pig; 2ML1; Dose (enalaprilat (0.1, 0.5, 1, 5, 10, 20 mg/ml), lisinopril (0.1, 0.5, 1, 5, 10, 20 mg/ml), imidapril (1, 5, 10, 20, 30 mg/ml)); Controls received mp w/ vehicle; enzyme inhibitor (angiotensin-converting-enzyme); cardiovascular;.

P5889: D. Lamireau, *et al.* Altered vascular function in fetal programming of hypertension. *Stroke* 2002;33(12):2992-2998

ALZET Comments: Enalaprilat; Saline; Rat (pregnant); 1 week; Controls received mp w/ vehicle; enzyme inhibitor (ACE).



P4975: Y. Sawada, *et al.* Comparative study of effects of angiotensin II receptor antagonist, KD 3-671, and angiotensin converting enzyme inhibitor, enalaprilat, on cough reflex in guinea pig. *European Journal of Drug Metabolism and Pharmacokinetics* 2001;26(1/2):47-52

ALZET Comments: KD3-671; enalaprilat; Sodium phosphate; Sodium carbonate; IP; Guinea pig; 2ML1; functionality of mp verified by plasma drug levels; antihypertensive dose-response (fig 2. p. 50); KD3-671 is an angiotensin II antagonist which causes persistent hypotension; enalaprilat is an angiotensin converting enzyme inhibitor, prevents inactivation of bradykinin.

P4922: K. M. Denton, *et al.* Chronic angiotensin converting enzyme inhibition enhances renal vascular responsiveness to acetylcholine in anaesthetized rabbits. *Journal of Hypertension* 2001;19(1497-1503)

ALZET Comments: Enalaprilat; PBS; SC; rabbit; 2ML4; 6 weeks; controls received "dummy pump"; pumps replaced after 4 weeks; cardiovascular; antihypertensive; dummy pump implanted in controls was PVC plastic balloon of the same size and shape as pump. Enalaprilat is an Angiotensin Converting Enzyme (ACE) inhibitor.

P3773: A. K.-. Laflamme, *et al.* Effects of renin-angiotensin blockade on sympathetic reactivity and B-adrenergic pathway in the spontaneously hypertensive rat. *Hypertension* 1997;30(pt 1):278-287

ALZET Comments: Losartan; Enalaprilat; Saline, isotonic; Sodium carbonate; Sodium bicarbonate; SC; Rat; 2002; 12 days; antihypertensive; cardiovascular.

P3545: S. Foucart, *et al.* Effects of chronic treatment with losartan and enalaprilat on 3H-norepinephrine release from isolated atria of wistar-kyoto and spontaneously hypertensive rats. *Am. J. Hypertens* 1995;9(61-69)

ALZET Comments: Losartan; Enalaprilat; SC; Rat; 2002; 12 days; controls received sham operations; antihypertensive; pumps placed on flank; cardiovascular.

P3222: L. T. Jablonskis, *et al.* Chronic central administration of enalaprilat lowers blood pressure in stroke-prone spontaneously hypertensive rats. *J. Auton. Nerv. Syst* 1992;39(119-126)

ALZET Comments: Enalaprilat; Saline, sterile; Ethanol; CSF/CNS; Rat; 2002; 2 weeks; controls received mp with saline or no treatment; enalaprilat maleate is MK-422; antihypertensive; ischemia (cerebral).

P1899: Y.-J. Kuo, *et al.* Captopril increases norepinephrine spillover rate in conscious spontaneously hypertensive rats. *J. Pharmacol. Exp. Ther* 1991;258(1):223-231

ALZET Comments: Minoxidil HCl; Captopril; Enalaprilat; Acetic acid; Ethanol; Propylene glycol; Saline; Water; SC; Rat; 5 days; no comment posted; antihypertensive.

P1600: K. P. Conrad, *et al.* The renin-angiotensin system during pregnancy in chronically instrumented, conscious rats. *Am. J. Obstet. Gynecol* 1989;161(4):1065-1072

ALZET Comments: Enalaprilat; Sodium phosphate; SC; Rat (pregnant); 40-44 hours; antihypertensive.

P0841: K. H. Berecek, *et al.* Effect of central administration of MK-422 (the diacid form of enalapril) on the development of hypertension in the spontaneously hypertensive rat. *J. Hypertens* 1984;2(3):63-66

ALZET Comments: Enalaprilat; CSF, artificial; CSF/CNS; Rat; 2002; 4 weeks; comparison of injection vs. mp infusion; pump replaced after 2 weeks; controls received mp w/artificial CSF or MK-422 intravenously; antihypertensive.

14. Eprosartan

Q0529: S. Mukaddam-Daher, *et al.* Hemodynamic and Cardiac Effects of Chronic Eprosartan and Moxonidine Therapy in Stroke-Prone Spontaneously Hypertensive Rats. *Hypertension* 2009;53(5):775-U58

ALZET Comments: Moxonidine; eprosartan; Saline; NaOH; HCl; SC; Rat; 2004; 2ML4; 8 weeks; Controls received mp w/ vehicle; animal info (SP-SHR, 14 wks old, 250-275 g); antihypertensive; pumps replaced after 4 weeks; long-term study; multiple pumps per animal (2); moxonidine or eprosartan were infused separately or in combination.



P7557: T. Karram, *et al.* Effects of spironolactone and eprosartan on cardiac remodeling and angiotensin-converting enzyme isoforms in rats with experimental heart failure. *American Journal of Physiology-Heart and Circulatory Physiology* 2005;289(4):H1351-H1358

ALZET Comments: Spironolactone; eprosartan; PEG 400; sodium bicarbonate; IP; Rat; 2ML2; 2ML4; 14, 28 days; Controls received mp w/ vehicle; functionality of mp verified by plasma levels (H1353); cardiovascular; animal info (male, Wistar 300 g); aldosterone antagonist; ANG II receptor antagonist.

P7356: A. Dendorfer, *et al.* Peripheral sympatholytic actions of four AT₁ antagonists: are they relevant for long-term antihypertensive efficacy? *Journal of Hypertension* 2005;23(10):1861-1867

ALZET Comments: Candesartan; losartan; eprosartan; irbesartan; NaOH; IP; Rat; 2ML4; 4 weeks; Controls received mp w/ vehicle; functionality of mp verified by blood pressure taken; dose-response (fig. 1); cardiovascular; antihypertensive; animal info (male, SHR, 10 wk old, 250-280 g).

P7583: Y. Chen, *et al.* Heat shock treatment suppresses angiotensin II-induced SP-1 and AP-1 and stimulates Oct-1 DNA-binding activity in heart. *INFLAMMATION RESEARCH* 2005;54(8):338-343

ALZET Comments: Angiotensin II; eprosartan; norepinephrine; Saline; SC; IP; IV (jugular); Rat; 2001; 2ML2; 3, 7 days; Controls received mp w/ vehicle or sham HS surgery; cardiovascular; peptides; animal info (male, Sprague-Dawley 280-310 g).

P6492: Y. Chen, *et al.* Heat shock treatment protects against angiotensin II-induced hypertension and inflammation in aorta. *CELL STRESS & CHAPERONES* 2004;9(1):99-107

ALZET Comments: Angiotensin II; eprosartan; norepinephrine; Saline; SC; IP; IV (vena cava); Rat; 2001; 2002; 2ML2; 1,3,5,7,11,14 days; Controls received empty mp for 7 days; functionality of mp verified by SBP; cardiovascular; peptides.

P6372: T. M. Behr, *et al.* Eprosartan improves cardiac performance, reduces cardiac hypertrophy and mortality and downregulates myocardial monocyte chemoattractant protein-1 and inflammation in hypertensive heart disease. *Journal of Hypertension* 2004;22(3):583-592

ALZET Comments: Eprosartan; Saline; IP; Rat; 2ML4; 4 weeks; Controls received mp w/ vehicle; cardiovascular.

P5237: C. T. Abrahamsen, *et al.* The angiotensin type 1 receptor antagonist, eprosartan, attenuates the progression of renal disease in spontaneously hypertensive stroke-prone rats with accelerated hypertension. *J Pharmacol Exp. Ther* 2002;301(1):21-28

ALZET Comments: Eprosartan; IP; Rat; 2ML4; 12 weeks; Controls received mp w/ vehicle; long-term study. pumps replaced every 28 days; cardiovascular; antihypertensive; angiotensin type 1 receptor antagonist; ischemia.

P4945: L. Rothermund, *et al.* Effects of angiotensin II subtype 1 receptor blockade on cardiac fibrosis and sarcoplasmic reticulum Ca²⁺ handling in hypertensive transgenic rats overexpressing the Ren2 gene. *Journal of Hypertension* 2001;19(1465-1472)

ALZET Comments: Eprosartan; Saline; IP; Rat; 2ML4; 20 weeks; Controls received mp w/ vehicle; long-term study, pumps replaced every 4 weeks; cardiovascular; antihypertensive; Eprosartan is an Angiotensin II Type 1 receptor antagonist, given at antihypertensive (6 mg/kg/day) or hypertensive (60 mg/kg/day) doses.

P4061: S. Brodsky, *et al.* Effects of eprosartan on renal function and cardiac hypertrophy in rats with experimental heart failure. *Hypertension* 1998;32(746-752)

ALZET Comments: Eprosartan; Sodium bicarbonate; IP; Rat; 2001; 7 days; controls received mp w/vehicle; selective angiotensin II receptor antagonist; antihypertensive; cardiovascular.

15. Felodipin

P5185: X. J. Zhou, *et al.* Defective calcium signalling in uraemic platelets and its amelioration with long-term erythropoietin therapy. *NEPHROLOGY DIALYSIS TRANSPLANTATION* 2002;17(992-997)



ALZET Comments: Felodipine; Rat; 6 weeks; Cardiovascular; antihypertensive; calcium channel blocker.

P3960: E. M. A. Mervaala, *et al.* Influence of dietary salts on the cardiovascular effects of low-dose combination of ramipril and felodipine in spontaneously hypertensive rats. *British J. Pharmacol* 1998;123(195-204

ALZET Comments: Felodipine; Water, distilled; SC; Rat; 2ML4; 4 weeks; controls received mp w/ NaCl; antihypertensive; cardiovascular.

P3540: E. M. A. Mervaala, *et al.* Cardiovascular effects of a low-dose combination of ramipril and felodipine in spontaneously hypertensive rats. *Br. J. Pharmacol* 1997;121(503-510

ALZET Comments: Felodipine; SC; Rat; 2ML4; 4 weeks; controls received mp w/ saline; antihypertensive; cardiovascular.

16. Furosemide

Q6899: N. Tokonami, *et al.* Uromodulin is expressed in the distal convoluted tubule, where it is critical for regulation of the sodium chloride cotransporter NCC. *Kidney Int* 2018;94(4):701-715

ALZET Comments: Furosemide; DMSO; Saline; SC; Mice; 2001; 50% DMSO used; animal info (8–12-week-old C57BL6J male mice);

Q4455: R. W. Hunter, *et al.* Hypertrophy in the Distal Convoluted Tubule of an 11-Hydroxysteroid Dehydrogenase Type 2 Knockout Model. *JOURNAL OF THE AMERICAN SOCIETY OF NEPHROLOGY* 2015;26(1537-1548

ALZET Comments: Uridine, bromodeoxy-; furosemide; DMSO; SC; Mice; 1007D; 2001; 7 days; Animal info (WT or Hsd1 1b2 -/-); 50% DMSO used; pumps primed overnight in 37C saline;

Q3156: I. M. Schiessl, *et al.* Dietary salt intake modulates differential splicing of the Na-K-2Cl cotransporter NKCC2. *American Journal of Physiology-Renal Physiology* 2013;305(8):F1139-F1148

ALZET Comments: Furosemide; Angiotensin II; NaCl; Acetic Acid; SC; Mice; 1002; 7 days; Controls received mp w/ vehicle; animal info (male, C57BL6, 8-10 weeks); functionality of mp verified by increased arterial BP; cardiovascular; bp measured using tail-cuff;

Q2841: S. Seidel, *et al.* Annexin A1 modulates macula densa function by inhibiting cyclooxygenase 2. *American Journal of Physiology-Renal Physiology* 2012;303(6):F845-F854

ALZET Comments: Furosemide; Rat; 2ML1; Control animals received mp w/ vehicle; animal info (Sprague Dawley, male).

Q1616: H. N. Lang, *et al.* Chronic Reduction of Endocochlear Potential Reduces Auditory Nerve Activity: Further Confirmation of an Animal Model of Metabolic Presbycusis. *JARO-JOURNAL OF THE ASSOCIATION FOR RESEARCH IN OTOLARYNGOLOGY* 2010;11(3):419-434

ALZET Comments: Furosemide; Ear (round window niche); Gerbil; 2004; 4 weeks; Controls were untreated; animal info (3-6 mo old, young adult); good methods, pg 421; tissue perfusion (round window).

P9880: K. L. H. Wu, *et al.* Nitric Oxide and Superoxide Anion Differentially Activate Poly(ADP-ribose) Polymerase-1 and Bax to Induce Nuclear Translocation of Apoptosis-Inducing Factor and Mitochondrial Release of Cytochrome c after Spinal Cord Injury. *Journal of Neurotrauma* 2009;26(7):965-977

ALZET Comments: Methylisothiourea, S-; PTIO, carboxy-; Coenzyme Q₁₀; tempol; FeTMPyP; furosemide; PJ-34; CSF, artificial; sesame oil; CSF/CNS (spinal cord); Rat; 1003D; 3 days; Controls received mp w/ vehicle; multiple pumps per animal (2); post op. care (procaine penicillin); adult, male, specific pathogen free, 200-250 g.); spinal cord injury; PE-10 catheter used; PTIO is a NO trapping agent; enzyme inhibitor PJ-34 is poly(ADP-ribose) polymerase PARP inhibitor.

P9525: M. R. Sheen, *et al.* Interstitial tonicity controls TonEBP expression in the renal medulla. *Kidney International* 2009;75(5):518-525

ALZET Comments: Furosemide; DMSO; SC; Rat; 2ML1; 5 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 210 g.); 50% DMSO used.



P9524: J. A. Kim, *et al.* Hypertonicity stimulates PGE₂ signaling in the renal medulla by promoting EP3 and EP4 receptor expression. *Kidney International* 2009;75(3):278-284

ALZET Comments: Furosemide; DMSO; Rat; 2ML1; 1, 5 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 200 g.); 50% DMSO used.

P8602: K. Y. Na, *et al.* Chronic furosemide or hydrochlorothiazide administration increases H⁺-ATPase B1 subunit abundance in rat kidney. *American Journal of Physiology- Renal Physiology* 2007;292(6):F1701-F1709

ALZET Comments: Furosemide; hydrochlorothiazide; Ethanolamine; SC; Rat; 2ML1; 7 days; Controls received mp w/ vehicle; no stress (see pg. F1703-4); animal info (male, Sprague-Dawley, pathogen-free, 170-230 grams).

P8596: C. Matzdorf, *et al.* COX-2 activity determines the level of renin expression but is dispensable for acute upregulation of renin expression in rat kidneys. *American Journal of Physiology- Renal Physiology* 2007;292(6):F1782-F1790

ALZET Comments: Isoproterenol; furosemide; SC; Rat; 2ML1; 2 days; Animal info (male, Sprague-Dawley, 180-200 grams, left renal artery stenosis); renovascular hypertension.

P8421: E. W. Lamont, *et al.* Restricted access to food, but not sucrose, saccharine, or salt, synchronizes the expression of period2 protein in the limbic forebrain. *Neuroscience* 2007;144(2):402-411

ALZET Comments: Furosemide; SC; Rat; 10 days; Controls received mp w/ saline; animal info (adult, male, Wistar, 300-400g.).

P6628: F. Schweda, *et al.* Upregulation of macula densa cyclooxygenase-2 expression is not dependent on glomerular filtration. *American Journal of Physiology-Renal Physiology* 2004;287(1):F95-F101

ALZET Comments: Furosemide; SC; Rat; 2ML1; 1 week;

Q0251: D. M. Mills, *et al.* Metabolic Presbycusis: Differential Changes in Auditory Brainstem and Otoacoustic Emission Responses with Chronic Furosemide Application in the Gerbil. *JARO* 2004;5(1-10)

ALZET Comments: Furosemide; Ear (round window niche); Gerbil; 2004; 3-7 days; Controls received a bulla vent tube (no mp); no stress (see pg. 2); animal info (young adult, Mongolian, 45-65g); dose-response; tissue perfusion (round window).

P6584: K. Hoecherl, *et al.* Cyclosporine A attenuates the natriuretic action of loop diuretics by inhibition of renal COX-2 expression. *Kidney International* 2004;65(6):2071-2080

ALZET Comments: Furosemide; SC; Rat; 2ML1; 5 days; Functionality of mp verified by serum or urine furosemide levels via HPLC.

P6544: B. Buffin-Meyer, *et al.* Differential regulation of collecting duct Na⁺,K⁺-ATPase and K⁺ excretion by furosemide and piretanide: Role of bradykinin. *Journal of the American Society of Nephrology* 2004;15(4):876-884

ALZET Comments: Furosemide; dexamethasone; piretanide; aldosterone; Hoe 140; Saline; SC; IP; Rat; 6 days; Controls received mp w/ vehicle; replacement therapy (adrenalectomy); solution was a pH 9.0; a third group was adrenalectomized and given dexamethasone and aldosterone by a SC ALZET pump; in a fifth set of experiments Hoe140 was infused SC.

P7092: D. Ahn, *et al.* Collecting duct-specific knockout of endothelin-1 causes hypertension and sodium retention. *Journal of Clinical Investigation* 2004;114(4):504-511

ALZET Comments: Furosemide; SC; Mice (transgenic); 1003D; 3 days; Antihypertensive.

P5930: K. Wolf, *et al.* Parallel down-regulation of chloride channel CLC-K1 and barttin mRNA in the thin ascending limb of the rat nephron by furosemide. *PFLUGERS ARCHIV-EUROPEAN JOURNAL OF PHYSIOLOGY* 2003;446(6):665-671

ALZET Comments: Furosemide; SC; Rat; 2ML1; 6 days;

P5769: F. Schweda, *et al.* Preserved macula densa-dependent renin secretion in A(1) adenosine receptor knockout mice. *American Journal of Physiology-Renal Physiology* 2003;284(4):F770-F777



ALZET Comments: Furosemide; Mice (knockout); 6 days; Controls received mp w/ saline; Furosemide is a loop diuretic.

P6654: K. Y. Na, *et al.* Upregulation of Na⁺ transporter abundances in response to chronic thiazide or loop diuretic treatment in rats. *American Journal of Physiology-Renal Physiology* 2003;284(1):F133-F143

ALZET Comments: Furosemide; hydrochlorothiazide; Ethanolamine; SC; Rat; 2ML1; 7 days; Controls received mp w/ vehicle; functionality of mp verified by daily urine analysis; no stress (see pg. F135); antihypertensive.

P6077: H. Lang, *et al.* Effects of chronic furosemide treatment and age on cell division in the adult gerbil inner ear. *JARO-JOURNAL OF THE ASSOCIATION FOR RESEARCH IN OTOLARYNGOLOGY* 2003;4(2):164-175

ALZET Comments: Furosemide; Ear (cochlea); Gerbil; 2004; 1 week; No stress (p. 165); tissue perfusion (cochlea).

P6121: G. H. Kim, *et al.* Up-regulation of organic anion transporter 1 protein is induced by chronic furosemide or hydrochlorothiazide infusion in rat kidney. *NEPHROLOGY DIALYSIS TRANSPLANTATION* 2003;18(8):1505-1511

ALZET Comments: Furosemide; hydrochlorothiazide; Ethanolamine; SC; Rat; 2ML1; 7 days; Agents dissolved in 1.7% ethanolamine.

P5793: H. Castrop, *et al.* General inhibition of renocortical cyclooxygenase-2 expression by the renin-angiotensin system. *American Journal of Physiology-Renal Physiology* 2003;284(3):F518-F524

ALZET Comments: Furosemide; SC; Rat; 2ML1; 7 days; Controls received empty mp.

P5362: H. Vitzthum, *et al.* Gene expression of prostanoid forming enzymes along the rat nephron. *Kidney International* 2002;62(5):1570-1581

ALZET Comments: Furosemide; SC; Rat; 2ML1; 7 days;

P5133: F. Theilig, *et al.* Epithelial COX-2 expression is not regulated by nitric oxide in rodent renal cortex. *Hypertension* 2002;39(848-853)

ALZET Comments: Furosemide; SC; Rat; 5 days; cardiovascular; antihypertensive; enzyme inhibitor (NOS).

P5336: R. A. Schmiedt, *et al.* Effects of furosemide applied chronically to the round window: A model of metabolic presbycusis. *Journal of Neuroscience* 2002;22(21):9643-9650

ALZET Comments: Furosemide; Ear (round window); Gerbil; 2004; 28 days; Furosemide stability verified by HPLC for 28 days; cannula was fixed in place with dental cement; tissue perfusion (round window).

P5078: H. Castrop, *et al.* Low tonicity mediates a downregulation of cyclooxygenase-1 expression by furosemide in the rat renal papilla. *Journal of the American Society of Nephrology* 2002;13(1136-1144)

ALZET Comments: Furosemide; SC; Rat; 2ML1; 7 days; controls received empty pumps; furosemide is a loop diuretic.

P4868: K. Wolf, *et al.* Differential gene regulation of renal salt entry pathways by salt load in the distal nephron of the rat. *PFLUGERS ARCHIV-EUROPEAN JOURNAL OF PHYSIOLOGY* 2001;442(498-504)

ALZET Comments: Furosemide; SC; Rat; 2ML1; 6 days; no comments posted.

Q6851: M. C. Kammerl, *et al.* Inhibition of COX-2 counteracts the effects of diuretics in rats. *Kidney Int* 2001;60(5):1684-91

ALZET Comments: Furosemide; Saline; SC; Rat; 2ML1; 7 days; Dose (12 mg day); Controls received mp w/ vehicle; animal info (Male Sprague-Dawley rats);

P5829: O. Kallskog, *et al.* Failure of loop diuretics to improve the long term outcome of ischemic damage in rat kidneys. *UPSALA JOURNAL OF MEDICAL SCIENCES* 2001;106(2):151-160

ALZET Comments: Furosemide; Saline; SC; Rat; 7 days; Controls received mp w/ vehicle; functionality of mp verified; "In order to ensure a constant drug concentration...drug was administered via an osmotic pump.." (p.152); "In all the cases the osmotic pump was found to work properly" (p.153); ischemia (kidney).



P5276: J. G. Abdallah, *et al.* Loop diuretic infusion increases thiazide-sensitive Na(+)/Cl(-)- cotransporter abundance: role of aldosterone. *J Am. Soc. Nephrol* 2001;12(7):1335-1341

ALZET Comments: Furosemide; DMSO; NaOH; SC; Rat; 2ML1; 8 days; Controls received mp w/ vehicle; no stress (p.1336); 50% DMSO used; loop diuretic; spironolactone pellets used.

17. Guanabenz

Q4951: F. G. Vieira, *et al.* Guanabenz Treatment Accelerates Disease in a Mutant SOD1 Mouse Model of ALS. *PLoS One* 2015;10(8):e0135570

ALZET Comments: Guanabenz acetate; Ethanol; water; propylene glycol; SC; Mice; 2004; Controls received mp w/ vehicle; animal info (SOD1-G93A); pumps replaced every 28 days; dose-response (pg 4); neurodegenerative (amyotrophic lateral sclerosis); post op. care (antibiotic ointment; buprenorphine 0.1 mg/kg); used lot#10284-12; Dose (0.45, 1.5, or 4.5 mg/kg/day);.

P2311: C. A. Hamilton, *et al.* Do centrally-acting antihypertensive drugs act at non-adrenergic as well as alpha-2 adrenoceptor sites? *Clin. and Exper. Hyper. -Theory and Practice* 1992;A14(5):815-835

ALZET Comments: Guanabenz; Clonidine; Rilmenidine; Water, sterile; Ethanol; IV (femoral); rabbit; 6 days; controls received mp w/ vehicles; agents are antihypertensives; mp and catheter embedded in thigh muscle; antihypertensive.

18. Hydralazine

Q6070: P. Lemkens, *et al.* Dual NEP/ECE inhibition improves endothelial function in mesenteric resistance arteries of 32-week-old SHR. *Hypertens Res* 2017;40(8):738-745

ALZET Comments: SOL1, Losartan, Hydralazine; Saline; SC; Rat; 2ML4; 4 weeks; Dose: SOL1 (50 mg/kg/d), Losartan (20 mg/kg/d), hydralazine (9 mg/kg/d); Controls received a dummy device (polyethylene tube of the same size as the 2ML4 pumps); animal info (28 week old SHR); enzyme inhibitor (endothelin-converting enzyme; neutral endopeptidase); cardiovascular;.

Q4476: H. Kawahata, *et al.* Continuous infusion of angiotensin II modulates hypertrophic differentiation and apoptosis of chondrocytes in cartilage formation in a fracture model mouse. *HYPERTENSION RESEARCH* 2015;38(382-393

ALZET Comments: Angiotensin II; olmesartan; hydralazine; Saline; sodium bicarbonate; SC; Mice; 2004; 2 weeks; 4 weeks; Controls received mp w/ vehicle; animal info (female, C57BL/6NJ, 20-22g); dose-response (p. 385); cardiovascular; antihypertensive; peptides; bp measured using tail cuff;.

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;.

Q1307: Y. Sakurai-Yamashita, *et al.* Lercanidipine Rescues Hippocampus Pyramidal Neurons from Mild Ischemia-Induced Delayed Neuronal Death in SHRSP. *Cellular and Molecular Neurobiology* 2011;31(4):561-567

ALZET Comments: Hydralazine; lisinopril; valsartan; SC; Rat; 1 week; 14 days; Controls received mp w/ vehicle; animal info (SHRHP, 16 wks old).

Q1140: M. Iwamoto, *et al.* Connective tissue growth factor induction in a pressure-overloaded heart ameliorated by the angiotensin II type 1 receptor blocker olmesartan. *HYPERTENSION RESEARCH* 2010;33(12):1305-1311

ALZET Comments: Olmesartan; hydralazine; SC; Rat; 2ML2; 14 days; Controls received mp w/ saline; animal info (male, Sprague-Dawley, 250-300 g); antihypertensive.



Q0389: S. W. M. van den Borne, *et al.* Mouse strain determines the outcome of wound healing after myocardial infarction. *Cardiovascular Research* 2009;84(2):273-282

ALZET Comments: Metoprolol; hydralazine; SC; Mice; 1007D; 7 days; Controls were sham operated; animal info (male, 10-12 wks old, 129S6/SvEv); myocardial infarction by coronary artery ligation.

Q0818: M. Kawamura, *et al.* Angiotensin II Receptor Blocker Candesartan Cilexetil, but Not Hydralazine Hydrochloride, Protects Against Mouse Cardiac Enlargement Resulting From Undernutrition In Utero. *REPRODUCTIVE SCIENCES* 2009;16(10):1005-1012

ALZET Comments: Hydralazine hydrochloride; candesartan cilexetil; Water, distilled; sodium carbonate; SC; Mice; 2004; 8 weeks; Controls received mp w/ vehicle; animal info (9-17 wks old, normally nourished); pumps replaced after 4 weeks; Figure 3b, image of pump implantation location.

P9488: M. Baumann, *et al.* Renal medullary effects of transient prehypertensive treatment in young spontaneously hypertensive rats. *ACTA PHYSIOLOGICA* 2009;196(2):231-237

ALZET Comments: Losartan; zVAD; valproate; hydralazine; SC; Rat; 2004; 4 weeks; Controls received mp w/ saline; enzyme inhibitor (glycogen synthase kinase 3B, GSK, pan caspase); animal info (WKY, SHR, 4-8 wks old).

P9054: Q. Hao, *et al.* Increased tissue perfusion promotes capillary dysplasia in the ALK1-deficient mouse brain following VEGF stimulation. *American Journal of Physiology-Heart and Circulatory Physiology* 2008;295(6):H2250-H2256

ALZET Comments: Hydralazine; nifedipine; CSF/CNS; Mice; 1002; 14 days; Controls received mp w/ saline; animal info (adult, male, ALK1 +/-); fig. 1 illustrates cannula placement; cannula placement verified by CBF measurements.

P8776: M. Baumann, *et al.* Sustained tubulo-interstitial protection in SHR by transient losartan treatment: An effect of decelerated aging? *American Journal of Hypertension* 2008;21(2):177-182

ALZET Comments: Losartan; hydralazine; antibody, anti-TGF-B1; antibody, anti-IgG-K1; SC; Rat; 2004; 4 weeks; Controls received mp w/ saline; cardiovascular; antihypertensive; animal info (male, Wistar-Kyoto, SHR, 4 wks old).

P9272: Y. W. Li, *et al.* Molecular signaling mediated by angiotensin II type 1A receptor blockade leading to attenuation of renal dysfunction-associated heart failure. *JOURNAL OF CARDIAC FAILURE* 2007;13(2):155-162

ALZET Comments: Valsartan; hydralazine; SC; Mice; 2 weeks; Controls received mp w/ saline; nephrectomy; no stress (see pg. 156); cardiovascular; animal info (male, C57BL/6, wt, AT1KO, 10 wks old); nephrology.

P8618: H. Kanamori, *et al.* Inhibition of Fas-associated apoptosis in granulation tissue cells accompanies attenuation of postinfarction left ventricular remodeling by olmesartan. *American Journal of Physiology- Heart and Circulatory Physiology* 2007;292(5):H2184-H2194

ALZET Comments: Hydralazine; olmesartan; SC; Mice; 4 weeks; 7 days; Controls received mp w/ saline; cardiovascular; animal info (male, C57BL/6J, 10 weeks old, left coronary artery ligation; ischemia (cardiac)).

P8612: N. Ito, *et al.* Renin-angiotensin inhibition reverses advanced cardiac remodeling in aging spontaneously hypertensive rats. *Am. J. Hypertens* 2007;20(7):792-799

ALZET Comments: Temocaprilat; olmesartan; hydralazine; IV (vena cava); Rat; 2ML4; 4 weeks; Controls received mp w/ saline; enzyme inhibitor (ACE); cardiovascular; antihypertensive; animal info (male, SHR, 50 weeks old, male, Wistar-Kyoto, 10 weeks old).

P8687: F. Ikeda, *et al.* Angiotensin II type 1 receptor blocker reduces monocyte adhesion to endothelial cells in spontaneously hypertensive rats. *Endocrine Journal* 2007;54(4):605-612

ALZET Comments: Valsartan; hydralazine; PEG 400; Rat; 4 weeks; Controls received mp w/ vehicle; dose-response (table 1, p. 608); cardiovascular; antihypertensive; animal info (10 weeks, male, SHR/IZM); valsartan is an angiotensin II receptor blocker; hydralazine is a vasodilator.

P8901: M. Baumann, *et al.* Transient AT₁ receptor-inhibition in prehypertensive spontaneously hypertensive rats results in maintained cardiac protection until advanced age. *Journal of Hypertension* 2007;25(1):207-215



ALZET Comments: Losartan; hydralazine; SC; Rat; 2004; 4 weeks; Controls received mp w/ saline; cardiovascular; antihypertensive; animal info (Wistar-Kyoto, SHR, 1 month old); nephrology.

P6861: J. W. Fischer, *et al.* Pharmacologic inhibition of nitric oxide synthases and cyclooxygenases enhances intimal hyperplasia in balloon-injured rat carotid arteries. *JOURNAL OF VASCULAR SURGERY* 2004;40(1):115-122

ALZET Comments: Hydralazine; SC; Rat; 14 days; Controls received vehicle per gavage; cardiovascular; antihypertensive.

P5447: N. Ishizaka, *et al.* Iron overload augments angiotensin II-induced cardiac fibrosis and promotes neointima formation. *Circulation* 2002;106(14):1840-1846

ALZET Comments: Angiotensin II; hydralazine; losartan; norepinephrine; SC; Rat; 2001; 7 days; Antihypertensive.

P4845: H. L. Keen, *et al.* Paradoxical regulation of short promoter human renin transgene by angiotensin II. *Hypertension* 2001;37(4):403-407

ALZET Comments: Angiotensin II; Hydralazine; Saline; SC; mice; 1007D; 5 days; controls received mp w/ vehicle; dose response (graphs p. 404-405); cardiovascular; peptides; antihypertensive; Ang II infused at both a pressor and subpressor dose; Hydralazine is a peripheral vasodilator and was infused either alone or in conjunction with ANG II to lower or normalize blood pressure.

19. Hydrochlorothiazide

Q4898: J. T. K. Kathryn R. Walsh, Joon W. Shim, and Richard D. Wainford. Norepinephrine-evoked salt-sensitive hypertension requires impaired renal sodium chloride cotransporter activity in Sprague-Dawley rats. *Am J Physiol Regul Integr Comp Physiol* 2016;310(R115-R124)

ALZET Comments: Norepinephrine; hydrochlorothiazide; losartan; Saline; DMSO; SC; Rat; 2ML2; 14 days; Controls received mp w/ vehicle; animal info (male, Sprague Dalwey, 275-299g); post op. care (penicillin 0.3 ml IM 300,000 units/ml); cardiovascular; Dose (losartan 3 mg/kg/day, NE 600 ng/min; HCTZ 4 mg/kg/day);

Q2139: A. Ashek, *et al.* Activation of Thiazide-Sensitive Co-Transport by Angiotensin II in the cyp1a1-Ren2 Hypertensive Rat. *PLoS One* 2012;7(4):U1890-U1899

ALZET Comments: Hydrochlorothiazide; spironolactone; losartan; Saline; DMSO; Rat; 2ML1; 7 days; Controls received mp w/ vehicle; animal info (male, cyp1a1-Ren2 TGR, Fischer 344, 12-14 wks old); 50% DMSO used.

P9509: H. R. Jang, *et al.* Effects of Thiazide on the Expression of TRPV5, Calbindin-D_{28K}, and Sodium Transporters in Hypercalciuric Rats. *Journal of Korean Medical Science* 2009;24(1):S161-S169

ALZET Comments: Hydrochlorothiazide; Ethanolamine; SC; Rat; 2ML1; 7 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 6 wks old, 160-180 g.).

P8602: K. Y. Na, *et al.* Chronic furosemide or hydrochlorothiazide administration increases H⁺-ATPase B1 subunit abundance in rat kidney. *American Journal of Physiology- Renal Physiology* 2007;292(6):F1701-F1709

ALZET Comments: Furosemide; hydrochlorothiazide; Ethanolamine; SC; Rat; 2ML1; 7 days; Controls received mp w/ vehicle; no stress (see pg. F1703-4); animal info (male, Sprague-Dawley, pathogen-free, 170-230 grams).

P7067: C. T. Lee, *et al.* Effect of thiazide on renal gene expression of apical calcium channels and calbindins. *American Journal of Physiology-Renal Physiology* 2004;287(6):F1164-F1170

ALZET Comments: Hydrochlorothiazide; PEG 300; SC; Mice; 7 days; Controls received mp w/ vehicle; comparison of IP injections vs. mp; antihypertensive.

P6654: K. Y. Na, *et al.* Upregulation of Na⁺ transporter abundances in response to chronic thiazide or loop diuretic treatment in rats. *American Journal of Physiology-Renal Physiology* 2003;284(1):F133-F143

ALZET Comments: Furosemide; hydrochlorothiazide; Ethanolamine; SC; Rat; 2ML1; 7 days; Controls received mp w/ vehicle; functionality of mp verified by daily urine analysis; no stress (see pg. F135); antihypertensive.



P6121: G. H. Kim, *et al.* Up-regulation of organic anion transporter 1 protein is induced by chronic furosemide or hydrochlorothiazide infusion in rat kidney. *NEPHROLOGY DIALYSIS TRANSPLANTATION* 2003;18(8):1505-1511

ALZET Comments: Furosemide; hydrochlorothiazide; Ethanolamine; SC; Rat; 2ML1; 7 days; Agents dissolved in 1.7% ethanolamine.

P3939: R. L. Webb, *et al.* Effects of valsartan and hydrochlorothiazide alone and in combination on blood pressure and heart rate in conscious-telemetered spontaneously hypertensive rats (SHR). *Am. J. Hypertens* 1998;11(59-65)

ALZET Comments: Valsartan; Hydrochlorothiazide; Benazeprilat; NaOH; SC; Rat; 2ML2; 2 weeks; controls received mp w/vehicle; functionality of mp verified by residual volume and plasma assays; dose-response; stability verified by pilot expt; antihypertensive; cardiovascular; agents administered alone and in combination.

P3781: J. Loffing, *et al.* Thiazide treatment of rats provokes apoptosis in distal tubule cells. *Kidney Int* 1996;50(1180-1190)

ALZET Comments: Metolazone; Hydrochlorothiazide; PEG 300; SC; Rat; 2ML1; 3 days; controls received mp w/vehicle; dose-response; no stress (see pg. 1183); toxicology.

P2070: P. Morsing, *et al.* Adaptation of distal convoluted tubule of rats, effects of chronic thiazide infusion. *Am. J. Physiol* 1991;261(F137-F143)

ALZET Comments: Hydrochlorothiazide; PEG 300; SC; Rat; 2ML1; 10-14 days; antihypertensive.

20. Imidapril

Q1882: R. Ishibashi, *et al.* Imidapril Inhibits Cerebral Aneurysm Formation in an Angiotensin-Converting Enzyme-Independent and Matrix Metalloproteinase-9-Dependent Manner. *Neurosurgery* 2012;70(3):722-730

ALZET Comments: Imidapril hydrochloride; DMSO; IP; Rat; 2ML4; 1 month; Controls received mp w/ vehicle; animal info (Sprague Dawley, male, 7 wks old); enzyme inhibitor (ACE, angiotensin converting enzyme).

R0364: R. Gatti, *et al.* Enhanced Cough, Animal Models. *Methods in Pharmacology and Toxicology* 2012;1(17):343-360

ALZET Comments: Enalaprilat; Lisinopril; Imidapril; Saline; IP; Guinea pig; 2ML1; Dose (enalaprilat (0.1, 0.5, 1, 5, 10, 20 mg/ml), lisinopril (0.1, 0.5, 1, 5, 10, 20 mg/ml), imidapril (1, 5, 10, 20, 30 mg/ml)); Controls received mp w/ vehicle; enzyme inhibitor (angiotensin-converting-enzyme); cardiovascular;

P5298: Y. Kurosawa, *et al.* Tissue Angiotensin-converting enzyme activity plays an important role in pressure overload-induced cardiac fibrosis in rats. *J Cardiovasc. Pharmacol* 2002;39(4):600-609

ALZET Comments: Imidapril; Saline; SC; Rat; 2ML4; 4 weeks; Controls received mp w/ vehicle; cardiovascular; enzyme inhibitor; imidapril is an angiotensin-converting enzyme inhibitor.

P5293: M. Kakoki, *et al.* Effects of hypertension, diabetes mellitus, and hypercholesterolemia on endothelin type B receptor-mediated nitric oxide release from rat kidney. *Circulation* 1999;99(9):1242-1248

ALZET Comments: Imidapril; SC; Rat; 2ML4; 4 weeks; Cardiovascular; enzyme inhibitor (ACE inhibitor).

P4062: Y. Hirata, *et al.* Nitric oxide release from kidneys of hypertensive rats treated with imidapril. *Hypertension* 1996;27(pt 2):672-678

ALZET Comments: Imidapril; Saline, sterile; SC; Rat; 2ML4; 4 weeks; controls received mp w/vehicle; dose-response (1 or 10 mg/kg); antihypertensive; cardiovascular.

21. Isoproterenol

Q6842: T. G. Schips, *et al.* Thrombospondin-3 augments injury-induced cardiomyopathy by intracellular integrin inhibition and sarcolemmal instability. *Nat Commun* 2019;10(1):76



ALZET Comments: Isoproterenol; PBS; Mice (tr; 2 weeks; Dose (60 mg/kg/day)); Controls received mp w/ vehicle; animal info (Eight to eleven week-old Cardiomyocyte-specific transgenic mice); post op. care (buprenex, 0.05 mg/ml, SC); Therapeutic indication (cardiomyopathy);.

Q7060: S. Park, *et al.* Genetic Regulation of Fibroblast Activation and Proliferation in Cardiac Fibrosis. *Circulation* 2018;138(12):1224-1235

ALZET Comments: Isoproterenol; Saline; IP; Mice; 14 days; 21 days; Dose (30 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6J, C3H/HeJ, KK/HIJ mice); cardiovascular;.

Q7241: M. N. Nguyen, *et al.* Mechanisms responsible for increased circulating levels of galectin-3 in cardiomyopathy and heart failure. *Sci Rep* 2018;8(1):8213

ALZET Comments: Isoproterenol, Atenolol, ICI-118551; Saline, ascorbic acid; SC; Mice; 48 Hours; Dose: ISO (2, 6 or 30 mg/kg/day; atenolol (2 mg/kg/day), ICI-118551 (1 mg/kg/day); 0.4 mM ascorbic used; animal info (12~14 week-old C57Bl/6 mice); cardiovascular;.

Q6962: D. B. McClatchy, *et al.* Quantitative temporal analysis of protein dynamics in cardiac remodeling. *J Mol Cell Cardiol* 2018;121(163-172

ALZET Comments: Isoproterenol; PBS; SC; Mice; 1002; 14 days; Dose (15 mg/kg/day); animal info (8-12 week old male C57/BL6 wildtype mice); cardiovascular;.

Q7070: Y. Li, *et al.* Aldolase promotes the development of cardiac hypertrophy by targeting AMPK signaling. *Exp Cell Res* 2018;370(1):78-86

ALZET Comments: Isoproterenol; Saline; SC; Mice; 2004; 28 days; Dose (8 mg/kg/day); animal info (Wild-type C57BL/6J mice); cardiovascular;.

Q7196: E. Lau, *et al.* Integrated omics dissection of proteome dynamics during cardiac remodeling. *Nat Commun* 2018;9(1):120

ALZET Comments: Isoproterenol; SC; Mice; 14 days; Dose (15 mg/kg/day); animal info (C57BL/6J, CE/J, A/J, DBA/2J, FVB/NJ and BALB/cJ, Male, 9–12 wk old); cardiovascular;.

Q7014: G. Katsuomi, *et al.* Catecholamine-Induced Senescence of Endothelial Cells and Bone Marrow Cells Promotes Cardiac Dysfunction in Mice. *Int Heart J* 2018;59(4):837-844

ALZET Comments: Isoproterenol; PBS; SC; Mice; 4 or 6 weeks; Dose (30 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6 mice); cardiovascular;.

Q5579: I. Bayindir-Buchhalter, *et al.* Cited4 is a sex-biased mediator of the antidiabetic glitazone response in adipocyte progenitors. *EMBO Mol Med* 2018;10(8):

ALZET Comments: Isoproterenol; Saline; SC; Mice; 1002; 14 days; Dose (30 mg/kg/d); Controls received mp w/ vehicle; animal info (p38a KO mice, Il1r1 KO mice);.

Q5550: R. S. Baliga, *et al.* Phosphodiesterase 2 inhibition preferentially promotes NO/guanylyl cyclase/cGMP signaling to reverse the development of heart failure. *Proc Natl Acad Sci* 2018;115(31):E7428-E7437

ALZET Comments: Isoproterenol; Saline, ascorbic acid; SC; Mice; 1002; 14 days; Dose (20 mg/kg/d); 0.5% ascorbic acid used; animal info (Male WT, GC-1 α -/-, and GC-A-/- mice);.

Q5400: S. A. Bageghni, *et al.* Cardiac fibroblast-specific p38alpha MAP kinase promotes cardiac hypertrophy via a putative paracrine interleukin-6 signaling mechanism. *FASEB J* 2018;32(9):4941-4954

ALZET Comments: Isoproterenol; Saline; SC; Mice; 1002; 14 days; Dose (30 mg/kg/d); Controls received mp w/ vehicle; animal info (p38a KO mice, Il1r1 KO mice);.

Q5931: K. Yang, *et al.* Knockout of the ATPase inhibitory factor 1 protects the heart from pressure overload-induced cardiac hypertrophy. *Sci Rep* 2017;7(1):10501



ALZET Comments: Isoproterenol; PBS; SC; Mice; 2002; 14 days; Controls received mp w/ vehicle; animal info (IF1 KO or WT, 3 months old); cardiovascular; Dose (60 mg/kg/day);.

Q5696: C. Vettel, *et al.* Phosphodiesterase 2 Protects Against Catecholamine-Induced Arrhythmia and Preserves Contractile Function After Myocardial Infarction. *Circ Res* 2017;120(1):120-132

ALZET Comments: Isoproterenol; Saline; SC; Mice; 2002; animal info (FV); cardiovascular; Dose (30 ug/g/day);.

Q6520: J. Tur, *et al.* Kvbeta1.1 (AKR6A8) senses pyridine nucleotide changes in the mouse heart and modulates cardiac electrical activity. *Am J Physiol Heart Circ Physiol* 2017;312(3):H571-H583

ALZET Comments: Isoproterenol; Saline; SC; Mice (knockout); 2002; 14 days; Dose (30 mg/kg/day); Controls received mp w/ vehicle; animal info (Kv_1.1 KO and WT mice); cardiovascular;.

Q6224: Y. F. Tong, *et al.* Cyclin-Dependent Kinase Inhibitor p21WAF1/CIP1 Facilitates the Development of Cardiac Hypertrophy. *Cell Physiol Biochem* 2017;42(4):1645-1656

ALZET Comments: Isoproterenol; PBS, ascorbic acid; SC; Mice; 1002; 14 days; Dose (40 mg/kg/d); 1% ascorbic acid used; Controls received mp w/ vehicle; animal info (adult male C57BJ/6J mice); cardiovascular;.

Q6494: N. C. Surdo, *et al.* FRET biosensor uncovers cAMP nano-domains at beta-adrenergic targets that dictate precise tuning of cardiac contractility. *Nat Commun* 2017;8(15031)

ALZET Comments: Isoproterenol; Ascorbic acid; SC; Rat; 2001; 7 days; Dose (3 mg/kg/day); 0.05% ascorbic acid used; Controls received mp w/ vehicle; animal info (male Sprague-Dawley rats weighing 310–360 g); cardiovascular;.

Q6120: Shen C, *et al.* Novel idiopathic DCM-related SCN5A variants localised in DI-S4 predispose electrical disorders by reducing peak sodium current density. *J Med Genet.* 2017;54(11):762-770

ALZET Comments: Isoproterenol; Saline; SC; Mice; 2004; 28 days; Dose (80 µg/g/day); Controls received mp w/ vehicle; animal info (10-week-old adult male mice);.

Q6128: S. R. Roof, *et al.* CXL-1020, a Novel Nitroxyl (HNO) Prodrug, Is More Effective than Milrinone in Models of Diastolic Dysfunction-A Cardiovascular Therapeutic: An Efficacy and Safety Study in the Rat. *Front Physiol* 2017;8(894)

ALZET Comments: Isoproterenol; SC; Rat; 2004; 4 weeks; Dose (1 mg/kg/day); animal info (250-350 gram Sprague-Dawley rats); cardiovascular;.

Q6133: I. Redondo-Angulo, *et al.* Fgf21 is required for cardiac remodeling in pregnancy. *Cardiovasc Res* 2017;113(13):1574-1584

ALZET Comments: Isoproterenol; PBS; SC; Mice; 7 days; Dose (15 mg/kg/day); animal info (4-month-old female mice);.

Q6756: C. D. Rau, *et al.* Systems Genetics Approach Identifies Gene Pathways and Adamts2 as Drivers of Isoproterenol-Induced Cardiac Hypertrophy and Cardiomyopathy in Mice. *Cell Syst* 2017;4(1):121-128 e4

ALZET Comments: Isoproterenol; IP; Mice; 1004; 21 days; Dose (30 mg/kg/day); animal info (8–10 week old female mice); cardiovascular;.

Q6299: P. B. Katare, *et al.* Toll-Like Receptor 4 Inhibition Improves Oxidative Stress and Mitochondrial Health in Isoproterenol-Induced Cardiac Hypertrophy in Rats. *Front Immunol* 2017;8(719)

ALZET Comments: TLR4 receptor inhibitor RS-LPS; agonist lipopolysaccharide; isoproterenol; Saline, pyrogen-free; SC; Rat; 14 days; Dose (RS-LPS: 5 µg/day; lipopolysaccharide: 3.12 ug/day); Controls received mp w/ vehicle; animal info (Male Sprague-Dawley rats weighing 200–250 g); comparison of sc injections vs mp; cardiovascular;.

Q6458: Y. Huang, *et al.* The PPAR pan-agonist bezafibrate ameliorates cardiomyopathy in a mouse model of Barth syndrome. *Orphanet J Rare Dis* 2017;12(1):49

ALZET Comments: Isoproterenol; SC; Mice (knockout); 1002; 14 days; Dose (30 mg/kg/day); animal info (2.5-month-old WT and TazKD mice); Isoproterenol is a β-adrenergic agonist; cardiovascular;.



Q6472: K. S. Gresham, *et al.* Sarcomeric protein modification during adrenergic stress enhances cross-bridge kinetics and cardiac output. *J Appl Physiol* (1985) 2017;122(3):520-530

ALZET Comments: Isoproterenol; Phenylephrine; Saline; SC; Mice; 14 days; Dose (Isoproterenol: 7.5 µg/g/day; Phenylephrine: 7.5 µg/g/day); Controls received mp w/ vehicle; animal info (8 week old male mice of the SV/129 strain); cardiovascular;.

Q6149: E. Giehl, *et al.* Polycystin 2-dependent cardio-protective mechanisms revealed by cardiac stress. *Pflugers Arch* 2017;469(11):1507-1517

ALZET Comments: Isoproterenol HCl; PBS; Ascorbic Acid; SC; Mice; 7 days; Dose (25 µg/g); 0.5 mmol/l ascorbic acid; Controls received mp w/ vehicle; post op. care (1 mg/ml ibuprofen for the following 48 h); cardiovascular;.

Q6260: M. H. Gao, *et al.* Cardiac-directed expression of a catalytically inactive adenylyl cyclase 6 protects the heart from sustained beta-adrenergic stimulation. *PLoS One* 2017;12(8):e0181282

ALZET Comments: Isoproterenol; Saline; Ascorbic acid; SC; Mice (transgenic); 7 days; Dose (60 mg/kg/d); Saline with 0.1% ascorbic acid used; animal info (AC6mut mice and transgene negative siblings); cardiovascular;.

Q6326: L. Gao, *et al.* KLF15 protects against isoproterenol-induced cardiac hypertrophy via regulation of cell death and inhibition of Akt/mTOR signaling. *Biochem Biophys Res Commun* 2017;487(1):22-27

ALZET Comments: Isoproterenol; Saline; SC; Mice; 1007D; 5 weeks; Dose (40 mg.kg-1.d-1); 0.9% NaCl used; animal info (KLF15 transgenicmice (KLF15p/p) or knockout mice (KLF15-/-);.

Q6264: T. Feridooni, *et al.* Effects of beta-adrenergic receptor drugs on embryonic ventricular cell proliferation and differentiation and their impact on donor cell transplantation. *Am J Physiol Heart Circ Physiol* 2017;312(5):H919-H931

ALZET Comments: Isoproterenol; Metoprolol; SC; Mice; 2001; 3 days; Dose (Isoproterenol: 0.025 g/ml; Metoprolol: 0.0684 g/ml); animal info (CD1 and C57BL/6 (BL6) mice);.

Q6407: L. Cai, *et al.* Protective Role for LPA3 in Cardiac Hypertrophy Induced by Myocardial Infarction but Not by Isoproterenol. *Front Physiol* 2017;8(356)

ALZET Comments: Isoproterenol; PBS; SC; Mice (knockout); 1002; 2 weeks; Dose (60 mg/kg/day); Controls received mp w/ vehicle; animal info (8-10 week old male LPA-/-3 and wild-type mice); cardiovascular;.

Q4772: M. Abdul-Ghani, *et al.* Cardiotrophin 1 stimulates beneficial myogenic and vascular remodeling of the heart. *Cell Res* 2017;27(10):1195-1215

ALZET Comments: Cardiotrophin 1, human; Isoproterenol; Phenylephrine; PBS; SC; Rat; Mice; 2002; 2ML4; 1002; 2 and 4 weeks; Dose (6 µg/kg/h); dose-response: (hCT1, 6 µg/kg/h), (Isoproterenol, 1 mg/kg/d), (Phenylephrine, 10 mg/kg/d); Controls received mp w/ vehicle; cardiovascular;.

Q5498: S. Xu, *et al.* CaMKII induces permeability transition through Drp1 phosphorylation during chronic beta-AR stimulation. *Nat Commun* 2016;7(13189)

ALZET Comments: Isoproterenol; KN93; Prop; Mdivi-1; SC; Mice (transgenic); 2002; 2 weeks; Controls received mp w/ sham surgery; cardiovascular; Dose (15 mg/kg/day Isoproterenol; 10 µM/kg/day KN93; Prop 10 mg/kg/day ; Mdivi-1 50 mg/kg/day);.

Q5482: K. Wang, *et al.* A circular RNA protects the heart from pathological hypertrophy and heart failure by targeting miR-223. *Eur Heart J* 2016;37(33):2602-11

ALZET Comments: Isoproterenol; SC; Mice; 1002; 14 days; Controls received mp w/ saline; animal info (male, C57Bl6 or miR-223 KO, 8-10 weeks old); cardiovascular; pumps removed after 14 days; dose (45 mg/kg/day);.

Q5087: J. J. Wang, *et al.* Genetic Dissection of Cardiac Remodeling in an Isoproterenol-Induced Heart Failure Mouse Model. *PLoS Genet* 2016;12(7):e1006038

ALZET Comments: Isoproterenol; IP; Mice; 1004; 21 days; animal info (used 104 different mouse strains, see pg 4 for list); cardiovascular; Dose (30 mg/kg/day);.



Q4890: T. Theccanat, *et al.* Regulation of cellular oxidative stress and apoptosis by G protein-coupled receptor kinase-2; The role of NADPH oxidase 4. *Cellular Signalling* 2016;28(190-203

ALZET Comments: Angiotensin II; isoproterenol; PBS; SC; Mice; 10 days; Controls received mp w/ vehicle; animal info (male, C57BL-6N, 6 weeks old); cardiovascular; peptides; Dose (Iso 17 mg/kg/day; Ang II 1.8 mg/kg/day);.

Q6504: X. Tang, *et al.* North American ginseng (*Panax quinquefolius*) suppresses beta-adrenergic-dependent signalling, hypertrophy, and cardiac dysfunction. *Can J Physiol Pharmacol* 2016;94(12):1325-1335

ALZET Comments: Isoproterenol; Saline; SC; Rat; 2ML2; 2 weeks; Dose (25 mg/kg/day or 50 mg/kg/day); Controls received mp w/ vehicle; animal info (male Sprague-Dawley rats weighing 180–220 g); cardiovascular.

Q5269: D. Shimura, *et al.* Heterozygous deletion of sarcolipin maintains normal cardiac function. *Am J Physiol Heart Circ Physiol* 2016;310(1):H92-103

ALZET Comments: Isoproterenol; Saline; SC; Mice; 1002; 2 weeks; Controls received mp w/ vehicle; animal info (SLN mutants, male and female; 3-6 months old); functionality of mp verified by ECG (echocardiography); cardiovascular; antihypertensive; Isoflurane used; Dose (30 ug/g/day);.

Q4882: A. M. Schroeder, *et al.* Cardiac Dysfunction in the BACHD Mouse Model of Huntington's Disease. *PLoS One* 2016;11(1):1-25

ALZET Comments: Isoproterenol; Saline; SC; Mice; 2001; 3 months; Controls received mp w/ vehicle; animal info (BACHD or WT, 2-3 months old); neurodegenerative (Huntington's Disease); long-term study; cardiovascular; Dose (0.24, 0.48, 0.97 mg/day);.

Q6655: Y. Ryu, *et al.* Gallic acid prevents isoproterenol-induced cardiac hypertrophy and fibrosis through regulation of JNK2 signaling and Smad3 binding activity. *Sci Rep* 2016;6(34790

ALZET Comments: Isoproterenol; Ascorbic Acid; saline; SC; Mice; 2 weeks; Dose (25mg/kg/day); 0.1% ascorbic acid; 0.9% saline used; Controls received mp w/ vehicle; animal info (Male CD-1(ICR) mice); cardiovascular; Therapeutic indication (Cardiac hypertrophy);.

Q5449: E. Monte, *et al.* Reciprocal Regulation of the Cardiac Epigenome by Chromatin Structural Proteins Hmgb and Ctcf: IMPLICATIONS FOR TRANSCRIPTIONAL REGULATION. *J Biol Chem* 2016;291(30):15428-46

ALZET Comments: Isoproterenol; Mice; 3 weeks; animal info (adult female mice, 8-10 weeks old); Hybrid Mouse Diversity Panel; isoproterenol is a beta-adrenergic agonist, used to model hypertrophy and heart failure; Dose (30 mg/kg/day);.

Q4887: Marcus R. Streit, *et al.* Cardiac Effects of Attenuating G α - Dependent Signaling. *PLoS One* 2016;10(1-19

ALZET Comments: Isoproterenol HCl; Saline, acidified isotonic; SC; Mice; 2002; 14 days; Controls received mp w/ vehicle; cardiovascular; Dose (30 ug/g/day);.

Q6688: J. D. Li, *et al.* Bilateral Renal Denervation Ameliorates Isoproterenol-Induced Heart Failure through Downregulation of the Brain Renin-Angiotensin System and Inflammation in Rat. *Oxid Med Cell Longev* 2016;2016(3562634

ALZET Comments: Isoproterenol; Irbesartan; Etanercept; Saline; SC; CSF/CNS (right lateral ventricle); Rat; 2ML2; 2004; 2 weeks; Dose (Isoproterenol: 40 mg/kg/d; Irbesartan: 125 ug/d; Etanercept 10 10 ug/h); Controls received mp w/ vehicle; AT1-R antagonist Irbe; enzyme inhibitor (TNF- α); Brain coordinates (1.0 mm caudal and 1.5 mm lateral to bregma and 4.5 mm below the skull surface);.

Q6072: E. Lau, *et al.* A large dataset of protein dynamics in the mammalian heart proteome. *Sci Data* 2016;3(160015

ALZET Comments: Isoproterenol; SC; Mice; 14 days; Dose (15 mg/kg/day); animal info (9-12 week old A/J, BALB/cJ, C57BL/6J, CE/J, DBA/2J, and FVB/NJ mice); cardiovascular;.

Q6037: Q. Duan. Deregulation of XBP1 expression contributes to myocardial vascular endothelial growth factor-A expression and angiogenesis during cardiac hypertrophy in vivo. *Aging Cell* 2016;



ALZET Comments: Isoproterenol hydrochloride; Mice; 1007D, 1002; 2 weeks; Controls received sham surgery; animal info (C57BL/6, 8 weeks old); Therapeutic indication (ER stress, Heart failure); Dose (15 mg/kg/day);.

Q5752: Tetrodotoxin-sensitive Ca²⁺ Currents, but No T-type Currents in Normal, Hypertrophied, and Failing Mouse Cardiomyocytes. *Journal of Cardiovascular Pharmacology* 2016;68(6):

ALZET Comments: Isoproterenol; PBS; SC; Mice (knockout); 2002; 11 days; Controls received mp w/ vehicle; animal info (C57BL/6J, Cav3.1knockout, 2 months old); cardiovascular; Therapeutic indication (Cardiomyocytes, Cardiac Hypertrophy); Dose (60 mg/kg/day);.

22. Ketanserin

P9838: O. Lairez, *et al.* Genetic deletion of MAO-A promotes serotonin-dependent ventricular hypertrophy by pressure overload. *Journal of Molecular and Cellular Cardiology* 2009;46(4):587-595

ALZET Comments: Ketanserin; M100907; DMSO; saline; hydrochloric acid; IP; Mice (transgenic); 4 weeks; Controls received mp w/ vehicle; animal info (male, Tg8 MAO-A KO, wt, 10 wks old); 10% DMSO used; 5-HT_{2A} receptor antagonists.

P5895: H. Jorgensen, *et al.* Serotonergic involvement in stress-induced vasopressin and oxytocin secretion. *European Journal of Endocrinology* 2002;147(6):815-824

ALZET Comments: Ketanserin; Ly-53857; ICS-205930; Saline; CSF/CNS; Rat; 2ML4; 24 hours; Stylet used; pump implanted IP; drugs were 5-HT antagonists.

P4222: Q. Gu, *et al.* Involvement of serotonin in developmental plasticity of kitten visual cortex. *Eur. J. Neurosci* 1995;7(11):1146-1153

ALZET Comments: Dihydroxytryptamine, 5,7-; Methysergide; Ketanserin; Saline; Ascorbic acid; CSF/CNS (visual cortex); cat (kitten); 2001; 3,7 days; controls received mp w/saline; 5,7-dihydroxytryptamine is a neurotoxin; serotonin receptor blockers; antihypertensive.

P2499: G. Balasubramaniam, *et al.* Differences in the chronic hypotensive mechanism of action of ketanserin in spontaneously hypertensive and wistar-kyoto rats. *J. Hypertens* 1994;12(7-14)

ALZET Comments: Ketanserin; Dextrose; IV (femoral); Rat; 2ML1; 7 days; controls received mp w/ vehicle; antihypertensive.

P2173: G. Balasubramaniam, *et al.* Differences in the acute and chronic antihypertensive mechanism of action of ketanserin in spontaneously hypertensive rats. *J. Pharmacol. Exp. Ther* 1993;264(1):129-134

ALZET Comments: Ketanserin; Dextrose, isotonic; IV (femoral); Rat; 2ML1; 7 days; antihypertensive.

23. Losartan

Q6949: T. Zera, *et al.* Microglia and brain angiotensin type 1 receptors are involved in desensitising baroreflex by intracerebroventricular hypertonic saline in male Sprague-Dawley rats. *Auton Neurosci* 2019;217(49-57)

ALZET Comments: Minocycline, Losartan; Saline, iso-osmotic, Saline, hyperosmotic; CSF/CNS; Rat; 2ML2; 2 weeks; Dose (Minocycline-5 µg/h; Losartan- 12.5 µg/h); 0.9% isosmotic saline with minocycline, 5% Hyperosmotic saline with Losartan used; animal info (Normotensive adult male Sprague-Dawley rats); enzyme inhibitor (microglia); ALZET brain infusion kit 2 used; Brain coordinates (1.2mm posterior to bregma, -1.8mm laterolateral from sagittal suture, diameter 0.5 mm) bilateral cannula used; cyanoacrylate adhesive; cardiovascular;.

Q7063: T. Nozaki, *et al.* The angiotensin II type I receptor antagonist losartan retards amygdala kindling-induced epileptogenesis. *Brain Res* 2018;1694(121-128)

ALZET Comments: Losartan; Saline; CSF/CNS (lateral ventricle); Rat; 2004; 3 weeks; Dose (0.5 mg/kg/day; 1.0 mg/kg/day; 3.0 mg/kg/day); Controls received mp w/ vehicle;.



Q7194: T. Kishi. Disruption of Central Antioxidant Property of Nuclear Factor Erythroid 2-Related Factor 2 Worsens Circulatory Homeostasis with Baroreflex Dysfunction in Heart Failure. *Int J Mol Sci* 2018;19(3):

ALZET Comments: Losartan, Butylhydroquinone, tert; CSF, artificial; CSF/CNS (lateral ventricle); Rat; 2002; 14 days; Dose (1 mg/kg/day-Losartan, 1mM -t-BHQ); Controls received mp w/ vehicle; animal info (Sprague-Dawley, 14-16 week old, 450-650 g, Male); Losartan is an AT1R blocker, tBHQ is a Nrf2 activator; cardiovascular;.

Q7186: K. L. Jackson, *et al.* Circadian Differences in the Contribution of the Brain Renin-Angiotensin System in Genetically Hypertensive Mice. *Front Physiol* 2018;9(231)

ALZET Comments: Losartan; Ringer's solution; CSF/CNS (lateral ventricle), SC; CSF/CNS (lateral ventricle), SC; 1002; 7 days; Dose (22 nmol/h); animal info (BPH/2J mice); behavioral testing (MAP responses, dirty cage-switch stress); Brain coordinates (0.5mm posterior from bregma, 1.2mm lateral from the midline, and 2.2mm ventral to the skull surface); Right angle cannula (30G) used; 1.0 cheese-head screws and dental cement used ;.

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);.

Q6487: Q. Su, *et al.* Renin-angiotensin system acting on reactive oxygen species in paraventricular nucleus induces sympathetic activation via AT1R/PKCgamma/Rac1 pathway in salt-induced hypertension. *Sci Rep* 2017;7(43107)

ALZET Comments: Losartan; CSF, artificial; SC; Rat; 2002; 2 weeks; Dose (10 µg/h); animal info (Male Wistar rats weighing 150 g to 200 g); post op. care ((0.01 mg/kg sc buprenorphine); Brain coordinates (1.8 mm caudal to the bregma, 0.4 mm lateral to central line, and 7.9 mm below the skull surface);.

Q6485: J. Skrzypecki, *et al.* Renal denervation decreases blood pressure and renal tyrosine hydroxylase but does not augment the effect of hypotensive drugs. *Clin Exp Hypertens* 2017;39(3):290-294

ALZET Comments: Losartan; Metoprolol; Indapamide; Saline; SC; Rat; 2ML2; 2ML4; 14 days; 28 days; Dose (Losartan: 10 mg/kg/day; Metoprolol: 10 mg/kg/day; Indapamide: 1 mg/kg/day); Controls received mp w/ vehicle;.

Q6070: P. Lemkens, *et al.* Dual NEP/ECE inhibition improves endothelial function in mesenteric resistance arteries of 32-week-old SHR. *Hypertens Res* 2017;40(8):738-745

ALZET Comments: SOL1, Losartan, Hydralazine; Saline; SC; Rat; 2ML4; 4 weeks; Dose: SOL1 (50 mg/kg/d), Losartan (20 mg/kg/d), hydralazine (9 mg/kg/d); Controls received a dummy device (polyethylene tube of the same size as the 2ML4 pumps); animal info (28 week old SHR); enzyme inhibitor (endothelin-converting enzyme; neutral endopeptidase); cardiovascular;.

Q6056: V. Peotta, *et al.* Neonatal growth restriction-related leptin deficiency enhances leptin-triggered sympathetic activation and central angiotensin II receptor-dependent stress-evoked hypertension. *Pediatr Res* 2016;80(2):244-51

ALZET Comments: Losartan; CSF, artificial; CSF/CNS; Mice (pregnant); 1002; 14 days; Controls received mp w/ vehicle; animal info (C57BL/6); Therapeutic indication (Hypertension); Dose (10 ug/µL);.

Q5390: H. B. Li, *et al.* TLR4/MyD88/NF-kappaB signaling and PPAR-gamma within the paraventricular nucleus are involved in the effects of telmisartan in hypertension. *Toxicol Appl Pharmacol* 2016;305(93-102)

ALZET Comments: Telmisartan; Losartan; GW9662; CSF, artificial; CSF/CNS (Hypothalamic paraventricular nucleus); Rat; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (12-week-old male normotensive Wistar-Kyoto); functionality of mp verified by blood pressure; bilateral cannula used; dose-response (pg. 94); post op. care (buprenorphine 0.04 mg/kg, sc); tissue perfusion (hypothalamic paraventricular nucleus); cardiovascular; antihypertensive; Dose (10 ug/hr TEL, 20 ug/hr LOS, 100 ug/hr GW); Brain coordinates (1.8mm posterior to bregma, 0.4mm from midline, and 7.9mm ventral to dura);.

Q4898: J. T. K. Kathryn R. Walsh, Joon W. Shim, and Richard D. Wainford. Norepinephrine-evoked salt-sensitive hypertension requires impaired renal



sodium chloride cotransporter activity in Sprague-Dawley rats. *Am J Physiol Regul Integr Comp Physiol* 2016;310(R115-R124)
ALZET Comments: Norepinephrine; hydrochlorothiazide; losartan; Saline; DMSO; SC; Rat; 2ML2; 14 days; Controls received mp w/ vehicle; animal info (male, Sprague Dalwey, 275-299g); post op. care (penicillin 0.3 ml IM 300,000 units/ml); cardiovascular; Dose (losartan 3 mg/kg/day, NE 600 ng/min; HCTZ 4 mg/kg/day);

Q4657: J. M. Yang, *et al.* Comparison of angiotensin-(1-7), losartan and their combination on atherosclerotic plaque formation in apolipoprotein E knockout mice. *ATHEROSCLEROSIS* 2015;240(544-549)

ALZET Comments: Angiotensin (1-7); losartan; SC; Mice; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (male, ApoE -/-, 8 weeks old, 20-22g); cardiovascular; antihypertensive; peptides; bp measured using tail cuff;

Q4591: M. A. Song, *et al.* Chronic Losartan Treatment Up-Regulates AT(1)R and Increases the Heart Vulnerability to Acute Onset of Ischemia and Reperfusion Injury in Male Rats. *PLoS One* 2015;10(U1154-U1168)

ALZET Comments: Losartan; SC; Rat; 2ML4; 14 days; Controls received mp w/ Saline; animal info (male, Sprague Dawley, 6 months old); ischemia (cardiac); cardiovascular; antihypertensive; bp measured using femoral catheter;

Q5243: J. Oller, *et al.* C/EBPbeta and Nuclear Factor of Activated T Cells Differentially Regulate Adamts-1 Induction by Stimuli Associated with Vascular Remodeling. *Mol Cell Biol* 2015;35(19):3409-22

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);

Q4497: W. C. Li, *et al.* Angiotensin II regulates brain (pro)renin receptor expression through activation of cAMP response element-binding protein. *AMERICAN JOURNAL OF PHYSIOLOGY-REGULATORY INTEGRATIVE AND COMPARATIVE PHYSIOLOGY* 2015;309(R138-R147)

ALZET Comments: Losartan; captopril; CAS92-78-4; CSF, artificial; CSF/CNS; Mice; 1004; 3 weeks; Controls received mp w/ vehicle; animal info (C57BL6J); cardiovascular; CAS92-78-4 is a CREB-CBP interaction inhibitor;

Q4969: A. Kelloniemi, *et al.* TSC-22 up-regulates collagen 3a1 gene expression in the rat heart. *BMC Cardiovasc Disord* 2015;15(122)

ALZET Comments: Angiotensin II; losartan; saline; SC; Rat; 6 hours; 12 hours; 72 hours; 2 weeks; Controls received mp w/ vehicle; animal info (male, SHR or WKY, 12-20 months old); cardiovascular; peptides;

Q3782: M. Katsuki, *et al.* Decreased proportion of Foxp3(+)CD4(+) regulatory T cells contributes to the development of hypertension in genetically hypertensive rats. *Journal of Hypertension* 2015;33(773-783)

ALZET Comments: Losartan; CSF, artificial; CSF/CNS; Rat; 2 weeks; Control animals received mp w/ vehicle; animal info (male, SHRSP, WKY); ALZET brain infusion kit 2 used.

Q4442: J. C. Hardwick, *et al.* Angiotensin receptors alter myocardial infarction-induced remodeling of the guinea pig cardiac plexus. *AMERICAN JOURNAL OF PHYSIOLOGY-REGULATORY INTEGRATIVE AND COMPARATIVE PHYSIOLOGY* 2015;309(R179-R188)

ALZET Comments: Captopril; losartan; CGP42112A; SC; Guinea pig; 2ML4; 4 weeks; 6 weeks; Animal info (male, Hartley, 9 weeks old, 500-650g); pumps replaced every 3 weeks; cardiovascular; long-term study;

Q4412: B. Erdos, *et al.* Brain-derived neurotrophic factor modulates angiotensin signaling in the hypothalamus to increase blood pressure in rats. *AMERICAN JOURNAL OF PHYSIOLOGY-HEART AND CIRCULATORY PHYSIOLOGY* 2015;308(H612-H622)

ALZET Comments: Losartan; Saline; CSF/CNS; Rat; 4 weeks; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 7 weeks old); pumps replaced every 2 weeks; cardiovascular; bp measured using radiotelemetry; used guide infusion cannula from Plastics One;

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;.

Q3667: J. Tchekalarova, *et al.* Strain-Dependent Effects of Sub-chronically Infused Losartan Against Kainic Acid-Induced Seizures, Oxidative Stress, and Heat Shock Protein 72 Expression. *Cellular and Molecular Neurobiology* 2014;34(1):133-142

ALZET Comments: Losartan; Saline; SC; Rat; 2 weeks; Controls received mp w/ vehicle or sham surgery; animal info (male, Wistar and Spontaneously hypertensive, adult, 200-250g); no stress (see pg. 135); behavioral testing (seizure intensity); cardiovascular; BP measured by tail cuff method;.

Q3993: P. J. Marvar, *et al.* Angiotensin Type 1 Receptor Inhibition Enhances the Extinction of Fear Memory. *Biological Psychiatry* 2014;75(864-872

ALZET Comments: Losartan; Saline, isotonic sterile; SC; Mice; 2002; 2 weeks; Controls received mp w/ vehicle; animal info (male, C57BL6J, 3-4 months old); behavioral testing (elevated plus maze); cardiovascular; bp measured using radiotelemetry;.

Q4611: Q. Liu, *et al.* Interaction between interleukin-1 beta and angiotensin II receptor 1 in hypothalamic paraventricular nucleus contributes to progression of heart failure. *J Interferon Cytokine Res* 2014;34(11):870-5

ALZET Comments: Losartan; interleukin-1, beta; CSF, artificial; CSF, artificial; CSF/CNS; rats; 2004; 4 weeks; Controls: sham rats w/ no treatment; rats given artificial CSF; animal info (Male Sprague–Dawley rats, 200–250 g); functionality of mp verified by echocardiography and plasma levels; bilateral cannula used; Plastics One double cannula; cardiovascular; heart failure; brain tissue distribution; Cannula placement verified via brain coordinates; LOS aka losartan; IL-1B aka interleukin-1B; Dose: LOS 200ug/day, IL-1B 1ug/day; Resultant plasma level (pg 872-874); Brain coordinates; pg. 871 (2.0mm posterior to the bregma and 8.5mm ventral from the skull surface).

Q3278: L. Lin, *et al.* Mechanical Stress Triggers Cardiomyocyte Autophagy through Angiotensin II Type 1 Receptor-Mediated p38MAP Kinase Independently of Angiotensin II. *PLoS One* 2014;9(2):U1349-U1356

ALZET Comments: SB203580; losartan; PBS; SC; Mice; 2002; Control animals received mp w/ vehicle; animal info (C57BL/6, male, 8-10 wks).

Q3704: W. C. Li, *et al.* Neuron-Specific (Pro) renin Receptor Knockout Prevents the Development of Salt-Sensitive Hypertension. *Hypertension* 2014;63(316-+

ALZET Comments: Losartan; CSF, artificial; CSF/CNS; Mice; 3 weeks; Animal info (nef-PRRKO or WT, 14-16 weeks old); cyanoacrylate adhesive; cardiovascular; bp measured using radiotelemetry;.

Q3826: M. A. Carrillo-Sepulveda, *et al.* Role of Vascular Smooth Muscle PPARgamma in Regulating AT(1) Receptor Signaling and Angiotensin II-Dependent Hypertension. *PLoS One* 2014;9(U221-U226

ALZET Comments: Losartan; SC; Mice (transgenic); 1002; 14 days; Controls received mp w/ saline; animal info (male, PPARy P467L, 4-5 months old); cardiovascular; bp measured using radiotelemetry (DSI); antihypertensive;.

Q5520: H. Zheng, *et al.* Centrally mediated erectile dysfunction in rats with type 1 diabetes: role of angiotensin II and superoxide. *J Sex Med* 2013;10(9):2165-76

ALZET Comments: Enalapril maleate, Losartan, Tempol; CSF, artificial; CSF/CNS (ventricle); Rat; 1003D; 14 days; Controls received mp w/ aCSF; ALZET brain infusion kit 2 used; Enalapril is an ACE inhibitor; Losartan is an ANG II AT1 receptor antagonist; tempol is a SOD mimetic; Therapeutic indication (erectile dysfunction); Dose: Enalapril (0.5 mg/m), losartan (2 mg/mL), tempol (50 mg/mL);.

Q3649: X. J. Yu, *et al.* Interaction Between AT1 Receptor and NF-kappaB in Hypothalamic Paraventricular Nucleus Contributes to Oxidative Stress and Sympathoexcitation by Modulating Neurotransmitters in Heart Failure. *Cardiovascular Toxicology* 2013;13(4):381-390



ALZET Comments: Losartan; pyrrolidine dithiocarbamate; CSF, artificial; CSF/CNS; Rat; 4 weeks; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, adult, 250-275g); ischemia (coronary artery ligation); cardiovascular; antihypertensive; Used Plastics One double-cannula; bilateral infusion;

Q2707: J. D. Walch, *et al.* Intracerebroventricular losartan infusion modulates angiotensin II type 1 receptor expression in the subfornical organ and drinking behaviour in bile-duct-ligated rats. *Experimental Physiology* 2013;98(4):922-933

ALZET Comments: Losartan; Saline; CSF/CNS; Rat; 2004; 28 days; Control animals received mp w/ vehicle; animal info (Sprague Dawley, male, adult, 250-350 g).

Q2503: M. Shum, *et al.* Angiotensin II type 2 receptor promotes adipocyte differentiation and restores adipocyte size in high-fat/high-fructose diet-induced insulin resistance in rats. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2013;304(2):E197-E210

ALZET Comments: Losartan; IP; Rat; 2006; 6 weeks; Animal info (Wistar, male, 8 wks old, 150-200 g); long-term study;.

Q3153: C. H. Shao, *et al.* Angiotensin type 2 receptor in pancreatic islets of adult rats: a novel insulinotropic mediator. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2013;305(10):E1281-E1291

ALZET Comments: Angiotensin II; Losartan; Compound 21; PD123319; Saline; SC; Rat; 2001; 1 week; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, adult, 320-360g); cardiovascular; peptides; diabetes; C21 is an AT2R agonist. PD123319 is an AT2R antagonist; bp measured using radiotelemetry (DSI);.

Q2531: C. Rius, *et al.* Arterial and Venous Endothelia Display Differential Functional Fractalkine (CX₃CL1) Expression by Angiotensin-II. *ARTERIOSCLEROSIS THROMBOSIS AND VASCULAR BIOLOGY* 2013;33(1):96-U322

ALZET Comments: Losartan; SC; Mice; 2004; 6 weeks; Animal info (C57BL/6J, ApoE -/-, female, wks old);.

Q2562: J. Qi, *et al.* Renin-Angiotensin System Modulates Neurotransmitters in the Paraventricular Nucleus and Contributes to Angiotensin II-Induced Hypertensive Response. *Cardiovascular Toxicology* 2013;13(1):48-54

ALZET Comments: Losartan; CSF, artificial; saline; CSF/CNS (paraventricular nucleus); IP; Rat; 4 weeks; Control animals received mp w/ vehicle; animal info (Sprague Dawley, male, adult, 275-300 g); bilateral infusion.

Q2765: J. Pavel, *et al.* Effect of Subpressor Dose of Angiotensin II on Pain-Related Behavior in Relation with Neuronal Injury and Activation of Satellite Glial Cells in the Rat Dorsal Root Ganglia. *Cellular and Molecular Neurobiology* 2013;33(5):681-688

ALZET Comments: Angiotensin II; losartan; IP; Rat; 2002; 7, 10 days; Animal info (Wistar, male, adult, 250-320 g); peptides; bp measured using CODA;.

Q3244: M. M. Monasky, *et al.* The beta-arrestin-biased ligand TRV120023 inhibits angiotensin II-induced cardiac hypertrophy while preserving enhanced myofilament response to calcium. *American Journal of Physiology-Heart and Circulatory Physiology* 2013;305(6):H856-H866

ALZET Comments: Angiotensin II; losartan; TRV120023; Saline; SC; Rat; 3 weeks; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 7 weeks old); no stress (see pg.H859); cardiovascular; peptides; TRV120023 is a novel angiotensin II type 1 receptor (AT1R) ligand;.

Q3001: W. D. Knight, *et al.* Central losartan attenuates increases in arterial pressure and expression of FosB/DeltaFosB along the autonomic axis associated with chronic intermittent hypoxia. *American Journal of Physiology-Regulatory Integrative and Comparative Physiology* 2013;305(9):R1051-R1058

ALZET Comments: Losartan; Saline; CSF/CNS; Rat; 2004; 7 days; Animal info (male, Sprague-Dawley, 250-300g); cardiovascular; functionality of mp verified by (mean arterial pressure, heart rate, respiratory rate); cannulae secured via dental acrylic and jeweler's screws. Paper examines the role of the CNS in the development and maintenance of chronic intermittent hypoxia induced hypertension; left lateral ventricle.

Q2559: B. S. Huang, *et al.* Inhibition of brain angiotensin III attenuates sympathetic hyperactivity and cardiac dysfunction in rats post-myocardial infarction. *Cardiovascular Research* 2013;97(3):424-431



ALZET Comments: Losartan; RB150; CSF, artificial; CSF/CNS; Rat; 2004; 4 weeks; Control animals received mp w/ vehicle; animal info (Wistar, 200-250 g); polyethylene tubing used; enzyme inhibitor (aminopeptidase A, APA).

Q2662: B. F. J. Heijnen, *et al.* Irreversible Renal Damage after Transient Renin-Angiotensin System Stimulation: Involvement of an AT(1)-Receptor Mediated Immune Response. *PLoS One* 2013;8(2):U1693-U1709

ALZET Comments: Losartan; SC; Rat; 2004; 4 weeks; Animal info (Cyp1a1-Ren2); post op. care (buprenorphine HCl).

Q2497: J. Aro, *et al.* Regulation of cardiac melusin gene expression by hypertrophic stimuli in the rat. *ACTA PHYSIOLOGICA* 2013;207(3):470-484

ALZET Comments: Angiotensin II; losartan; Saline; SC; Rat; 6, 12, 72 hours; 2 weeks; Control animals received mp w/ vehicle; animal info (Sprague Dawley); peptides.

Q2035: B. Peters, *et al.* A new transgenic rat model overexpressing the angiotensin II type 2 receptor provides evidence for inhibition of cell proliferation in the outer adrenal cortex. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2012;302(9):E1044-E1054

ALZET Comments: Losartan; angiotensin II; Saline, isotonic; SC; Rat; 2002; 3, 9, 14 days; Controls received mp w/ vehicle; animal info (male, 9-11 mo old, Sprague Dawley, TGRCXmAT₂R, wt); peptides.

Q2448: A. M. Moilanen, *et al.* (Pro)renin Receptor Triggers Distinct Angiotensin II-Independent Extracellular Matrix Remodeling and Deterioration of Cardiac Function. *PLoS One* 2012;7(7):U915-U934

ALZET Comments: Losartan; SC; Rat; 2001; 2002; 1, 2 weeks; Animal info (Sprague Dawley, male, 8 wks old).

Q2304: B. B. Boyanovsky, *et al.* Group V Secretory Phospholipase A(2) Enhances the Progression of Angiotensin II-Induced Abdominal Aortic Aneurysms but Confers Protection against Angiotensin II-Induced Cardiac Fibrosis in ApoE-Deficient Mice. *American Journal of Pathology* 2012;181(3):1088-1098

ALZET Comments: Angiotensin II; losartan; SC; Mice; 2004; 3, 7, 10, 28 days; Control animals received mp w/ saline; animal info (GV DKO, male, 8-10 wks old); peptides.

Q2139: A. Ashek, *et al.* Activation of Thiazide-Sensitive Co-Transport by Angiotensin II in the cyp1a1-Ren2 Hypertensive Rat. *PLoS One* 2012;7(4):U1890-U1899

ALZET Comments: Hydrochlorothiazide; spironolactone; losartan; Saline; DMSO; Rat; 2ML1; 7 days; Controls received mp w/ vehicle; animal info (male, cyp1a1-Ren2 TGR, Fischer 344, 12-14 wks old); 50% DMSO used.

24. Metoprolol

Q6485: J. Skrzypecki, *et al.* Renal denervation decreases blood pressure and renal tyrosine hydroxylase but does not augment the effect of hypotensive drugs. *Clin Exp Hypertens* 2017;39(3):290-294

ALZET Comments: Losartan; Metoprolol; Indapamide; Saline; SC; Rat; 2ML2; 2ML4; 14 days; 28 days; Dose (Losartan: 10 mg/kg/day; Metoprolol: 10 mg/kg/day; Indapamide: 1 mg/kg/day); Controls received mp w/ vehicle;.

Q6264: T. Feridooni, *et al.* Effects of beta-adrenergic receptor drugs on embryonic ventricular cell proliferation and differentiation and their impact on donor cell transplantation. *Am J Physiol Heart Circ Physiol* 2017;312(5):H919-H931

ALZET Comments: Isoproterenol; Metoprolol; SC; Mice; 2001; 3 days; Dose (Isoproterenol: 0.025 g/ml; Metoprolol: 0.0684 g/ml); animal info (CD1 and C57BL/6 (BL6) mice);.

Q5500: L. Yang, *et al.* Loss of beta-adrenergic-stimulated phosphorylation of CaV1.2 channels on Ser1700 leads to heart failure. *Proc Natl Acad Sci U S A* 2016;113(49):E7976-E7985

ALZET Comments: Metoprolol; SC; Mice; 4 weeks; Controls received mp w/ vehicle; animal info (SA or WT, 3 months old); cardiovascular; Dose (2.5 mg/kg/hr);.



Q4145: M. A. Ulleryd, *et al.* Metoprolol Reduces Proinflammatory Cytokines and Atherosclerosis in ApoE(-/-) Mice. BIOMED RESEARCH INTERNATIONAL 2014;;(U1-U7

ALZET Comments: Metoprolol; Saline; SC; Mice; 1002; 2006; 11 weeks; Animal info (male, C57BL6J or ApoE -/-, 12 weeks old); functionality of mp verified by plasma levels with mass spectrometry; pumps replaced every 6 weeks; cardiovascular; immunology; antihypertensive;.

Q3379: V. Saran, *et al.* Combined metoprolol and ascorbic acid treatment prevents intrinsic damage to the heart during diabetic cardiomyopathy. Canadian Journal of Physiology and Pharmacology 2014;92(827-837

ALZET Comments: Metoprolol; SC; Rat; 2ML4; 2006; Animal info (male, Wistar, 200-220 g).

Q3145: C. C. Sucharov, *et al.* beta-Adrenergic receptor antagonism in mice: a model for pediatric heart disease. Journal of Applied Physiology 2013;115(7):979-987

ALZET Comments: Isoproterenol HCL; Bisoprolol; Nebivolol; Metoprolol, CGP2712A; Saline; DMSO; Ascorbic acid; SC; Mice; 1007D; 2001; 7 days; Controls received mp w/ vehicle; animal info (FVB); 40% DMSO used for CGP20712A & nebivolol vehicle; post op. care (Carpofen 5 mg/kg); cardiovascular; antihypertensive;.

Q6678: J. Kim, *et al.* Renal nerves drive interstitial fibrogenesis in obstructive nephropathy. J Am Soc Nephrol 2013;24(2):229-42

ALZET Comments: Doxazosin; Atipamezole; Metoprolol; ICI118551; L748337; BRL44408; Imiloxan; Spiroxatine; PBS; DMSO; IP; Mice; 10 days; Dose (doxazosin (α 1-AR antagonist, 12 mg/kg/d), atipamezole (α 2-AR antagonist, 2.4mg/kg/d), metoprolol (β 1-AR antagonist, 12 mg/kg/d), ICI118551 (β 2-AR antagonist, 2.4 mg/kg/d), L748337 (β 3-AR antagonist, 2.4 mg/kg/d), BRL44408 (α 2A-AR antagonist, 12 mg/kg/d), imiloxan (α 2B-AR antagonist, 12 mg/kg/d), spiroxatine (α 2C-AR antagonist, 12mg/kg/d)); 10% DMSO used; animal info (8-10 week old male 129S1/SvlmJ mice);.

Q5063: N. Ito, *et al.* Contribution of protein binding, lipid partitioning, and asymmetrical transport to drug transfer into milk in mouse versus human. Pharm Res 2013;30(9):2410-22

ALZET Comments: acetaminophen, cephalothin sodium salt, clindamycin hydrochloride, disopyramide phosphate salt, labetalol hydrochloride, nitrofurantoin +-propranolol hydrochloride, terbutaline hemisulfate salt, verapamil hydrochloride, Acyclovir, alprazolam, atenolol, anhydrous caffeine, cefotaxime sodium salt, cephapirin sodium salt, diltiazem hydrochloride, metronidazole, nitrazepam, prednisolone, 6-propyl-2-thiouracil, trazadone hydrochloride, chloramphenicol, cimetidine, theophylline, fluconazole, metoprolol, mirtazapine, praziquantel, quetiapine fumarate, triprolidine hydrochloride, metformin, moclobemide.; DMSO; water; IP; mice; 1003D; animal info: lactating mice, postnatal age of 14 days; functionality of mp verified by measurement of drug concentration in milk and plasma; mp were used to infuse study lactational drug transfer.

Q1750: V. Sharma, *et al.* beta-receptor antagonist treatment prevents activation of cell death signaling in the diabetic heart independent of its metabolic actions. European Journal of Pharmacology 2011;657(1-3):117-125

ALZET Comments: Metoprolol; SC; Rat; 2006; 6 weeks; Animal info (Wistar, male, 200-220 g).

Q1244: S. Mu, *et al.* Epigenetic modulation of the renal beta-adrenergic-WNK4 pathway in salt-sensitive hypertension. Nature Medicine 2011;17(5):573-U92

ALZET Comments: Norepinephrine; isoproterenol; ICI-118,551; metoprolol; SC; Mice; Rat; 2 weeks; Controls received mp w/ vehicle; animal info (C57BL/6j, male, Sprague Dawley, 250-270 g, 8 wks old, nephrectomy).

Q0301: E. Mustonen, *et al.* Metoprolol Treatment Lowers Thrombospondin-4 Expression in Rats with Myocardial Infarction and Left Ventricular Hypertrophy. BASIC & CLINICAL PHARMACOLOGY & TOXICOLOGY 2010;107(3):709-717

ALZET Comments: Metoprolol; SC; Rat; 2 weeks; Controls received sham operation; animal info (Male, 2 mo old, Sprague-Dawley, 250-300 g, male 12 mo old, SHR, 360-490 g).

Q1582: G. L. Clarke, *et al.* beta-Adrenoceptor Blockers Increase Cardiac Sympathetic Innervation by Inhibiting Autoreceptor Suppression of Axon Growth. Journal of Neuroscience 2010;30(37):12446-12454



ALZET Comments: Propranolol; phentolamine; metoprolol; Rat; 7 days; Controls received mp w/ saline; animal info (Sprague Dawley, female, 60 days old);.

P9921: R. P. Mason, *et al.* Loss of Arterial and Renal Nitric Oxide Bioavailability in Hypertensive Rats With Diabetes: Effect of beta-Blockers. *American Journal of Hypertension* 2009;22(11):1160-1166

ALZET Comments: Nebivolol; metoprolol; DMSO; saline, sterile; SC; Rat; 4 weeks; Controls received mp w/ vehicle; 50% DMSO used; animal info (7-9 wks old, male, Wistar-Kyoto, SH, 250 g).

P9756: K. M. Grebe, *et al.* Sympathetic nervous system control of anti-influenza CD8⁺ T cell responses. *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA* 2009;106(13):5300-5305

ALZET Comments: Nadolol; phentolamine; metoprolol; ICI-118,551; DMSO; saline; SC; Mice; Controls received mp w/vehicle; animal info (female, 6-8 wks old); 50% DMSO used.

P9041: I. L. Signolet, *et al.* Improvement of cardiac Diastolic function by long-term centrally mediated sympathetic inhibition in one-kidney, one-clip hypertensive rabbits. *American Journal of Hypertension* 2008;21(1):54-60

ALZET Comments: Rilmenidine; metoprolol; SC; Rabbit; 2ML2; 6 weeks; Controls received mp w/ vehicle; animal info (New Zealand, White, 4-6 wks old, male, 0.7-0.9 kg., nephrectomized); long-term study.

P8804: M. Patrizio, *et al.* Propranolol promotes Egr1 gene expression in cardiomyocytes via beta-adrenoceptors. *European Journal of Pharmacology* 2008;587(1-3):85-89

ALZET Comments: Propranolol; metoprolol; isoproterenol; SC; Mice; 2002; 14 days; Controls received mp w/ vehicle; cardiovascular; animal info (male, C57BL/6, wt, B1 and B2-adrenoceptor double K/O; 12 wks old).

P9842: R. Lin, *et al.* Changes in beta-2-adrenoceptor and other signaling proteins produced by chronic administration of beta-blockers in a murine asthma model. *Pulmonary Pharmacology & Therapeutics* 2008;21(1):115-124

ALZET Comments: ICI-118,551; metoprolol; DMSO; SC; Mice; 2001; Controls received mp w/ vehicle; half-life (p. 118) "short"; animal info (male, BALB/c, 6 wks old); 50% DMSO used; "ICI 118,551 requires implantation of osmotic minipumps due to it's short half-life" pg. 118.

P8761: C. M. Hildreth, *et al.* Impaired serotonergic regulation of heart rate may underlie reduced baroreflex sensitivity in an animal model of depression. *American Journal of Physiology-Heart and Circulatory Physiology* 2008;294(1):H474-H480

ALZET Comments: Metoprolol; atropine methylnitrate; SC; Rat; 3 days; Cardiovascular; post op. care (carprofen, cephazolan); animal info (male, Sprague Dawley Flinders Resistive Line, Flinders Sensitive Line, 10-14 wks old).

P9165: K. Hanada, *et al.* Comparison of pharmacodynamics between carvedilol and metoprolol in rats with isoproterenol-induced cardiac hypertrophy: Effects of carvedilol enantiomers. *European Journal of Pharmacology* 2008;589(1-3):194-200

ALZET Comments: Isoproterenol; metoprolol; carvedilol, S-; carvedilol, R-; Polyethylene glycol; water, distilled; IP; Rat; 2ML4; 4 weeks; Animal info (male, Wistar, 200-230 g.).

P9155: B. Ablad, *et al.* Prevention of ventricular fibrillation requires central beta-adrenoceptor blockage in rabbits. *SCANDINAVIAN CARDIOVASCULAR JOURNAL* 2007;41(221-229)

ALZET Comments: Atenolol; metoprolol tartrate; Saline; SC; Rabbit; 2ML4; 3 weeks; Controls received mp w/ vehicle; functionality of mp verified by plasma levels of metoprolol and atenolol; animal info (male, New Zealand, White, Rabbit, 2.8-3.7 kg.).

P7039: Y. Kitagawa, *et al.* Reversible effects of isoproterenol-induced hypertrophy on in situ left ventricular function in rat hearts. *American Journal of Physiology-Heart and Circulatory Physiology* 2004;287(1):H277-H285

ALZET Comments: Isoproterenol; metoprolol; Saline; Ascorbic acid; SC; Rat; 1003D; 3 days; Controls received mp w/ vehicle; dose-response (fig. 1); cardiovascular.



25. Minoxidil

P1899: Y.-J. Kuo, *et al.* Captopril increases norepinephrine spillover rate in conscious spontaneously hypertensive rats. *J. Pharmacol. Exp. Ther* 1991;258(1):223-231

ALZET Comments: Minoxidil HCl; Captopril; Enalaprilat; Acetic acid; Ethanol; Propylene glycol; Saline; Water; SC; Rat; 5 days; no comment posted; antihypertensive.

26. Moxonidine

Q5529: N. Honda, *et al.* Moxonidine-induced central sympathoinhibition improves prognosis in rats with hypertensive heart failure. *J Hypertens* 2013;31(11):2300-8; discussion 2308

ALZET Comments: Moxonidine; CSF, artificial; CSF/CNS (lateral ventricle); Rat; 2006; 42 days; Controls received mp w/ vehicle; ALZET brain infusion kit 2 used; Therapeutic indication (Heart failure); Dose (4 mmol/L);

Q0906: A. M. Stabile, *et al.* Functional and molecular effects of imidazoline receptor activation in heart failure. *LIFE SCIENCES* 2011;88(11-12):493-503

ALZET Comments: Moxonidine; Saline, normal; SC; Hamster; 2ML4; 4 weeks; Controls received mp w/ vehicle; animal info (BIO 14.6, male, 6, 10 m old).

Q0529: S. Mukaddam-Daher, *et al.* Hemodynamic and Cardiac Effects of Chronic Eprosartan and Moxonidine Therapy in Stroke-Prone Spontaneously Hypertensive Rats. *Hypertension* 2009;53(5):775-U58

ALZET Comments: Moxonidine; eprosartan; Saline; NaOH; HCl; SC; Rat; 2004; 2ML4; 8 weeks; Controls received mp w/ vehicle; animal info (SP-SHR, 14 wks old, 250-275 g); antihypertensive; pumps replaced after 4 weeks; long-term study; multiple pumps per animal (2); moxonidine or eprosartan were infused separately or in combination.

P6728: R. Van Kerckhoven, *et al.* Pharmacological therapy can increase capillary density in post-infarction remodeled rat hearts. *Cardiovascular Research* 2004;61(3):620-629

ALZET Comments: Moxonidine; Saline, acidified; SC; Rat; 2001; 21 days; Pumps replaced every 7 days; cardiovascular.

R0228: S. Mukaddam-Daher, *et al.* Imidazoline receptors in the heart: a novel target and a novel mechanism of action that involves atrial natriuretic peptides. *Brazilian Journal of Medical and Biological Research* 2004;37(8):1239-1245

ALZET Comments: Moxonidine; Saline; SC; 2ML2; 2ML4; 1,4 days; Controls received mp w/ vehicle; dose-response (Fig.2); cardiovascular; antihypertensive; review.

P7027: R. El-Ayoubi, *et al.* Imidazoline receptors but not alpha₂-adrenoceptors are regulated in spontaneously hypertensive rat heart by chronic moxonidine treatment. *Journal of Pharmacology and Experimental Therapeutics* 2004;310(2):446-451

ALZET Comments: Moxonidine; Saline, isotonic; NaOH; Rat; 2ML1; 2ML4; 1,4 weeks; Controls received mp w/ vehicle; dose-response (fig. 1); cardiovascular; antihypertensive.

P5646: M. L. Parkin, *et al.* Importance of imidazoline-preferring receptors in the cardiovascular actions of chronically administered moxonidine, rilmenidine and clonidine in conscious rabbits. *Journal of Hypertension* 2003;21(1):167-178

ALZET Comments: Moxonidine; clonidine; rilmenidine; Saline; HCl; Sodium hydroxide; SC; Rabbit; 2ML2; 4 weeks; Controls received mp w/ vehicle; functionality of mp verified by residual volume; pumps replaced after 2 weeks; antihypertensive; moxonidine dissolved in saline/HCl/NaOH; other agents dissolved in saline; moxonidine & rilmenidine are imidazoline receptor agonists.

P5364: R. Van Kerckhoven, *et al.* Restored capillary density in spared myocardium of infarcted rats improves ischemic tolerance. *J. Cardiovasc. Pharmacol* 2002;40(3):370-380

ALZET Comments: Moxonidine; Saline; SC; Rat; 2001; 21 days; Pumps replaced every week; myocardial infarction; ischemia (cardiac).



P5435: A. Menaouar, *et al.* Chronic imidazoline receptor activation in spontaneously hypertensive rats. *American Journal of Hypertension* 2002;15(9):803-808

ALZET Comments: Moxonidine; Saline, isotonic; SC; Rat; 2ML1; 7 days; Controls received mp w/ vehicle; dose-response (p. 806-807); cardiovascular; antihypertensive; imidazoline receptor agonist.

P4948: R. Van Kerckhoven, *et al.* Chronic administration of moxonidine suppresses sympathetic activation in a rat heart failure model. *European Journal of Pharmacology* 2000;397(113-120)

ALZET Comments: Moxonidine; Saline buffer; SC; Rat; 2001; 20 days; controls received sham surgery; cardiovascular; antihypertensive; Moxonidine is an imidazoline I receptor agonist; rats had received coronary artery ligation, myocardial infarction.

P3982: P. Ernsberger, *et al.* Sympathetic nervous system in salt-sensitive and obese hypertension: amelioration of multiple abnormalities by a central sympatholytic agent. *Cardiovasc. Drugs & Therapy* 1996;10(275-282)

ALZET Comments: Moxonidine free base; Acetic acid; DMSO; Rat; 28 days; controls received mp w/vehicle; comparison of moxonidine in drinking water vs. mp; cardiovascular.

27. Nicardipine

Q0062: P. Fossat, *et al.* Knockdown of L Calcium Channel Subtypes: Differential Effects in Neuropathic Pain. *Journal of Neuroscience* 2010;30(3):1073-1085

ALZET Comments: Nicardipine; CSF/CNS (intrathecal); Rat; 1007D; 5 days; Animal info (adult, Wistar, 250-300 g.); PE-10 catheter used.

Q0590: E. A. Ingram, *et al.* Prolonged infusion of inhibitors of calcineurin or L-type calcium channels does not block mossy fiber sprouting in a model of temporal lobe epilepsy. *Epilepsia* 2009;50(1):56-64

ALZET Comments: Nicardipine; FK506; cyclosporin A; DMSO; ethanol; fluorescein; CSF/CNS (dorsal left dentate gyrus); Rat; 2004; 28 days; Controls were treated identically without status epilepticus; animal info (34-52 day old, male, Sprague-Dawley, status epilepticus); functionality of mp verified by fluorescein labeling; ALZET brain infusion kit 2 used; 50% DMSO used; 15% ethanol used.

P9054: Q. Hao, *et al.* Increased tissue perfusion promotes capillary dysplasia in the ALK1-deficient mouse brain following VEGF stimulation. *American Journal of Physiology-Heart and Circulatory Physiology* 2008;295(6):H2250-H2256

ALZET Comments: Hydralazine; nicardipine; CSF/CNS; Mice; 1002; 14 days; Controls received mp w/ saline; animal info (adult, male, ALK1 +/-); fig. 1 illustrates cannula placement; cannula placement verified by CBF measurements.

P4055: M. Kurooka, *et al.* High incidence of esophageal cancer in esophageal achalasia by the oral administration of N-amyl-N-methylnitrosamine and its prevention by nicardipine hydrochloride in mice. *Cancer Letters* 1998;127(55-61)

ALZET Comments: Nicardipine HCl; SC; mice; 2002; no duration posted; calcium-channel blocker; cancer; antihypertensive.

P1991: K. Hewitt, *et al.* Combined treatment with MK-801 and nicardipine reduces global ischemic damage in the gerbil. *Stroke* 1992;23(1):82-86

ALZET Comments: Nicardipine; SC; gerbil; 1003D; 3 days; no comment posted; antihypertensive; ischemia (cerebral).

28. Nifedipine

Q3125: J. G. Yan, *et al.* The effect of calcium modulating agents on peripheral nerve recovery after crush. *Journal of Neuroscience Methods* 2013;217(1-2):54-62

ALZET Comments: Nifedipine; calcitonin; CSF/CNS (sciatic nerve); Rat; 2006; 4 weeks; Controls received mp w/ saline or sham only; animal info (3 month old, male, Sprague-Dawley 250-300g); functionality of mp verified by decrease in calcium levels; peptides; Picture of MP p56, Fig1A. MP Pump setup p56, Fig1B;.



Q2251: Z. Tian, *et al.* Nifedipine increases energy expenditure by increasing PGC-1 α expression in skeletal muscle. *HYPERTENSION RESEARCH* 2011;34(11):1221-1227

ALZET Comments: Nifedipine; PEG 400; ethanol; water; SC; Mice; 2002; 4 months; Controls received mp w/ vehicle; animal info (male, eNOS KO); 15% PEG 400 used; 15% ethanol used; long-term study.

Q0127: T. Kaimoto, *et al.* Nifedipine Inhibits Vascular Smooth Muscle Cell Dedifferentiation via Downregulation of Akt Signaling. *Hypertension* 2010;56(2):247-U133

ALZET Comments: Nifedipine; Ethanol; IV (jugular); Rat; 2ML4; 3 weeks; Controls received mp w/ vehicle; cardiovascular; animal info (male, Sprague-Dawley, 12 weeks old, balloon injury model).

Q0332: J. Hajagos-Toth, *et al.* Potentiation of the uterus-relaxing effects of beta-adrenergic agonists with nifedipine: studies on rats and the human myometrium. *Acta Obstetrica et Gynecologica Scandinavica* 2010;89(10):1284-1289

ALZET Comments: Nifedipine; salmeterol xinafoate; PEG 400; ethanol; saline, physiologic; methanol; water; SC; Rat (pregnant); 2ML1; Controls received mp w/ vehicle; animal info (Sprague-Dawley, mature, female, 180-200 g, male, 240-260 g); multiple pumps per animal (2).

P8619: D. Stoller, *et al.* Mice lacking sulfonylurea receptor 2 (SUR2) ATP-sensitive potassium channels are resistant to acute cardiovascular stress. *Journal of Molecular and Cellular Cardiology* 2007;43(4):445-454

ALZET Comments: Nifedipine; DMSO; IP; Mice; 1002; >7 days; Controls received no treatment; functionality of mp verified by mp examination; cardiovascular; ischemia (cardiac); animal info (male, SUR2 $-/-$, wt FVB, 12-18 weeks old).

P8553: X. Gao, *et al.* Attenuation of monocyte chemoattractant protein-1 expression via inhibition of nuclear factor-kappa B activity in inflammatory vascular injury. *American Journal of Hypertension* 2007;20(11):1170-1175

ALZET Comments: Nifedipine; verapamil; IP; Mice; 1002; 7,14 days; Controls received mp w/ vehicle or no treatment; dose-response (fig. 1); cardiovascular; animal info (male, C57BL/6J, 10-12 weeks old).

P7003: E. Vazquez, *et al.* Angiotensin II-dependent induction of AT₂ receptor expression after renal ablation. *American Journal of Physiology-Renal Physiology* 2005;288(1):F207-F213

ALZET Comments: PD123319; angiotensin II; nifedipine; SC; Rat; 7,14 days; Controls received no agent and/or sham renal ablation; replacement therapy (nephrectomy); antihypertensive; peptides; AT₂ receptor antagonist.

P5701: D. Jacques, *et al.* Isradipine prevents the development of spontaneously occurring cardiac necrosis in cardiomyopathic hamster. *Canadian Journal of Physiology and Pharmacology* 2003;81(2):120-124

ALZET Comments: Isradipine; nifedipine; DMSO; ethanol; glucose; SC; Hamster; 4 weeks; Comparison of SC, IP (p.121) injections vs. SC mp; cardiovascular; vehicle solution contained 5% DMSO, 5% ethanol & 5% glucose; isradipine, also called PN200-110, is a calcium channel blocker.

P4716: A. Hirata, *et al.* Nifedipine suppresses neointimal thickening by its inhibitory effect on vascular smooth muscle cell growth *via* a MEK-ERK pathway coupling with Pyk2. *British Journal of Pharmacology* 2000;131(15):1521-1530

ALZET Comments: Nifedipine; PEG 400; Ethanol; SC; Rat; 2002; 17 days; Controls received mp w/ vehicle; cardiovascular; antihypertensive; 15% ethanol : 85% PEG 400 used as vehicle;

P4250: K. Reid, *et al.* Nifedipine, an L-type calcium channel blocker, restores the hypnotic response in rats made tolerant to the α -2 adrenergic agonist dexmedetomidine. *J. Pharmacol. Exp. Ther* 1997;283(3):993-999

ALZET Comments: Dexmedetomidine; Nifedipine; SC; Rat; 1007D; 2001; 2002; 7,14 days; controls received mp w/vehicle or sham surgery; comparison of s.c. injections vs. mp; agents infused concomitantly in different pumps; antihypertensive; tolerance.

P1179: P. Gengo, *et al.* Regulation by chronic drug administration of neuronal and cardiac calcium channel, beta-adrenoceptor and muscarinic receptor levels. *Biochem. Pharmacol* 1988;37(4):627-633



ALZET Comments: Isoproterenol; Nifedipine; Propranolol; PEG 400; Saline; IP; IV (jugular); Rat; 2ML1; 10, 20 days; controls received mp w/ vehicle; mp connected to cannula in jugular vein; concomitant infusion of agents: nifedipine w/ PEG 400 and isoproterenol w/ saline infused i.p., propranol w/ saline infused IV; antihypertensive.

P0300: C. E. Hall, *et al.* Inhibition of DOC-salt and adrenal-regeneration hypertension with the calcium blocker nifedipine. *Clin. Exp. Hypertens* 1982;A4(7):1217-1230

ALZET Comments: Nifedipine; Ethanol; Propylene glycol; Water; SC; Rat; 2001; 7-10 days; comparison of injection vs. mp infusion; pumps replaced after 7 days; antihypertensive.

29. Nilvadipine

P3418: S. Kawamura, *et al.* Protective effect of nilvadipine on focal cerebral ischemia in spontaneously hypertensive rats. *Neurol. Med. Chir* 1996;36(151-155)

ALZET Comments: Nilvadipine; PEG; SC; Rat; 2ML1; 7 days; controls received vehicle infusion; antihypertensive; ischemia (cerebral).

30. pd123319

R0374: C. Shimbori, *et al.* The Role of Mast Cells in the Pathophysiology of Pulmonary Fibrosis. 2019;135-173

ALZET Comments: TY-51469, H4R antagonist, MK-571, PD123319; SC; Mice; Dose: TY-51469 (0.1 or 1.0 mg/kg/day), H4R antagonist (40 mg/kg); PD123319 (0.5 or 5 mg/kg/d); animal info (ICR, C57BL/6 mice); TY-51469 is a Chymase inhibitor; enzyme inhibitor (Chymase); cardiovascular;.

Q5654: B. A. Kemp, *et al.* AT2 Receptor Activation Prevents Sodium Retention and Reduces Blood Pressure in Angiotensin II-Dependent Hypertension. *Circ Res* 2016;119(4):532-43

ALZET Comments: Dextrose, C21, PD-123319, Angiotensin II; Water; SC; Rat; 1007D, 2001; 1 week; Controls received mp w/ vehicle; animal info (12 weeks); good methods (p. 546); Multiple pumps per animal (2); Multiple pumps per animal (2); Intrarenal infusion; Therapeutic indication (Hypertension); Dose (C21: 60ng/kg/min, PD-123319: 10 ng/kg/min, Dextrose/AngII: 200 ng/kg/min);.

Q6605: Angiotensin type II receptor protects cardiovascular functions at the onset of atherosclerosis in young apolipoprotein E-deficient mouse. *Journal of the American College of Cardiology* 2016;68(16):C175

ALZET Comments: Angiotensin II, PD123319; IP; Mice; 2002; 7 days; Dose (12 µg/kg/hr Ang II, 10mg/kg/day PD123319); Controls received mp w/ vehicle; animal info (9-week-old male C57BL/6 and apoE(-/-)); PD123319 is a AT2R antagonist; cardiovascular;.

Q4268: H. Zheng, *et al.* Treatment with angiotensin-(1-9) alleviates the cardiomyopathy in streptozotocin-induced diabetic rats. *BIOCHEMICAL PHARMACOLOGY* 2015;95(38-45)

ALZET Comments: Angiotensin (1-9); PD123319; A-779; Water, distilled; SC; Rat; 4 weeks; Controls received mp w/ vehicle; animal info (male, Sprague Dawley STZ, 2 months old); cardiovascular; peptides; diabetes;.

Q4586: K. Shimada, *et al.* Angiotensin-(1-7) protects against the development of aneurysmal subarachnoid hemorrhage in mice. *JOURNAL OF CEREBRAL BLOOD FLOW AND METABOLISM* 2015;35(1163-1168)

ALZET Comments: A-779; angiotensin (1-7); PD123319; PBS; IP; Mice; 1002; 2 weeks; Controls received mp w/ vehicle; animal info (male, WT or AT2RKO, 8-10 weeks old); cardiovascular; peptides; bp measured using tail cuff;.

Q5225: Y. Liu, *et al.* Angiotensin-(1-7) Suppresses Hepatocellular Carcinoma Growth and Angiogenesis via Complex Interactions of Angiotensin II Type 1 Receptor, Angiotensin II Type 2 Receptor and Mas Receptor. *Mol Med* 2015;21(626-36)

ALZET Comments: Angiotensin (1-7), A-779, PD123319; saline; SC; mice; 21 days; Controls received mp w/ vehicle; animal info: Male BALB/c mice (6–8 wks old); functionality of mp verified by measurement of tumor volumes; cancer



(Hepatocellular Carcinoma); peptides; Dose: (200 ng/kg/min) Ang-(1-7), (800 ng/kg/min) Ang-(1-7), (800 ng/kg/min) A779, (10 mg/kg/day) PD123319.

Q4441: P. P. Hao, *et al.* Angiotensin-(1-7) treatment mitigates right ventricular fibrosis as a distinctive feature of diabetic cardiomyopathy. AMERICAN JOURNAL OF PHYSIOLOGY-HEART AND CIRCULATORY PHYSIOLOGY 2015;308(H1007-H1019)
ALZET Comments: Angiotensin (1-7); perinodopril; A-779; PD123319; NaCl; SC; Rat; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (male, Wistar, 200g, STZ); cardiovascular; peptides; diabetes;

Q3777: S. Y. Dai, *et al.* Brain endogenous angiotensin II receptor type 2 (AT2-R) protects against DOCA/salt-induced hypertension in female rats. Journal of Neuroinflammation 2015;12(U8-U18)
ALZET Comments: PD123,319; CSF/CNS; Rat; 4 weeks; Control animal received mp w/ vehicle; animal info (male, female, 10-12 wks old, Wistar); ALZET brain infusion kit used.

Q3390: T. Yoshida, *et al.* Angiotensin Type 2 Receptor Signaling in Satellite Cells Potentiates Skeletal Muscle Regeneration. Journal of Biological Chemistry 2014;289(26239-26248)
ALZET Comments: Angiotensin II; PD123319; CGP42112; Mice; Animal info (C57BL/6, 8-10 wks old, male); peptides.

Q4189: J. Xu, *et al.* Effects of Cardiac Overexpression of the Angiotensin II Type 2 Receptor on Remodeling and Dysfunction in Mice Post-Myocardial Infarction. Hypertension 2014;63(1251-+)
ALZET Comments: PD123,319; Mice; 8 weeks; Controls received mp w/ vehicle; animal info (male, WT or AT2R transgenic, 11-12 weeks old); cardiovascular; myocardial infarction;

Q5453: G. Umschweif, *et al.* Neuroprotection after traumatic brain injury in heat-acclimated mice involves induced neurogenesis and activation of angiotensin receptor type 2 signaling. J Cereb Blood Flow Metab 2014;34(8):1381-90
ALZET Comments: PD123319; Saline; SC; Mice; 1003D; 3 days; Dose (10 mg/kg/day);.

Q5459: G. Umschweif, *et al.* Angiotensin receptor type 2 activation induces neuroprotection and neurogenesis after traumatic brain injury. Neurotherapeutics 2014;11(3):665-78
ALZET Comments: CGP42112A; PD 123319; Saline; SC; Mice; 1003D; 3 days; controls received mp w/ vehicle, dose-response (pg. 666); Dose (CGP 0.1, 1.0, 10.0 ng/kg/min; PD 10 mg/kg/day);.

Q4941: P. Rai, *et al.* Renin angiotensin system modulates mTOR pathway through AT2R in HIVAN. Exp Mol Pathol 2014;96(3):431-7
ALZET Comments: Telmisartan; PD123319; Doxycycline; aliskiren; Saline; water; SC; mice; 2004; 2, 6 weeks; Controls received mp w/ vehicle; animal info : Tg26 mice; FVBN mice, Tg26 mice; Vpr transgenic mice (4 week old); immunology; Dose: Telmisartan (AT1R blocker, 300 µg/day), PD123319 (AT2R blocker, 3 µg/day); Doxycycline + aliskiren (50 mg/kg).

Q4058: P. Rai, *et al.* Renin angiotensin system modulates mTOR pathway through AT2R in HIVAN. Experimental and Molecular Pathology 2014;96(431-437)
ALZET Comments: Aliskiren; telmisartan; PD123319; Saline; SC; Mice (transgenic); 2004; 2 weeks; 6 weeks; Controls received mp w/ vehicle; animal info (Tg26); antihypertensive; cardiovascular;

Q3586: M. P. Ocaranza, *et al.* Angiotensin-(1-9) reverses experimental hypertension and cardiovascular damage by inhibition of the angiotensin converting enzyme/Ang II axis. Journal of Hypertension 2014;32(4):771-783
ALZET Comments: Angiotensin II; angiotensin (1-9); PD123319; A779; IV (jugular); Rat; 2002; 28 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley); functionality of mp verified by plasma levels; pumps replaced every 14 days; cardiovascular; antihypertensive; peptides; bp measured using CODA 2;

Q3562: C. A. McCarthy, *et al.* Direct Angiotensin AT2 Receptor Stimulation Using a Novel AT2 Receptor Agonist, Compound 21, Evokes Neuroprotection in Conscious Hypertensive Rats. PLoS One 2014;9(U1238-U1247)



ALZET Comments: Compound 21; PD123319; Saline; CSF/CNS; Rat; 2ML2; 8 days; Controls received mp w/ vehicle; animal info (male, spontaneously hypertensive, 330-350g); ischemia (cerebral); cardiovascular; Compound 21 aka C21 aka M024; C21 is a nonpeptide AT2R agonist.

Q3524: J. P. Joseph, *et al.* The angiotensin type 2 receptor agonist Compound 21 elicits cerebroprotection in endothelin-1 induced ischemic stroke. *Neuropharmacology* 2014;81(134-141)

ALZET Comments: Compound 21; PD123319; CSF, artificial; CSF/CNS; Rat; 2002; 10 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 8 weeks old, 250-275g, MCAO); ALZET brain infusion kit 1 used; ischemia (cerebral); post op. care (buprenorphine 0.05 mg/kg SC); cannula implanted 7 days prior to pump implantation;

Q3441: B. S. M. Chow, *et al.* Relaxin requires the angiotensin II type 2 receptor to abrogate renal interstitial fibrosis. *Kidney International* 2014;86(75-85)

ALZET Comments: Relaxin, recombinant human; PD123319; SC; Mice; 1007D; 1003D; 7 days; 3 days; Controls received mp w/ vehicle; animal info (male, AT2R +/+ and AT2R -/-, 6-8 weeks old); functionality verified using plasma serum; cardiovascular; 0.5 mg/kg/day relaxin produces about 20 ng/ml plasma;.

Q2883: Q. C. Yong, *et al.* Angiotensin type 1a receptor-deficient mice develop diabetes-induced cardiac dysfunction, which is prevented by renin-angiotensin system inhibitors. *Cardiovascular Diabetology* 2013;12(1):U1-U13

ALZET Comments: Aliskiren; benazeprilat; valsartan; PD123319; Saline; SC; Mice; 1004; 10 weeks; Cardiovascular; peptides; animal info (12 wks old, male, AT-KO); functionality of mp verified by echocardiography; pumps replaced every 4 weeks; enzyme inhibitor (renin);.

Q2924: F. M. Tavares, *et al.* Angiotensin II Type 2 Receptor (AT2R) is Associated with Increased Tolerance of the Hyperthyroid Heart to Ischemia-Reperfusion. *Cardiovascular Drugs and Therapy* 2013;27(5):393-402

ALZET Comments: PD123319; SC; Rat; Animal info (Wistar, male, 250-280g); angiotensin II receptor antagonist; ditrifluoroacetate;.

Q3153: C. H. Shao, *et al.* Angiotensin type 2 receptor in pancreatic islets of adult rats: a novel insulinotropic mediator. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2013;305(10):E1281-E1291

ALZET Comments: Angiotensin II; Losartan; Compound 21; PD123319; Saline; SC; Rat; 2001; 1 week; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, adult, 320-360g); cardiovascular; peptides; diabetes; C21 is an AT2R agonist. PD123319 is an AT2R antagonist; bp measured using radiotelemetry (DSI);.

Q6740: D. M. Pechlivanova, *et al.* The role of the angiotensin AT2 receptor on the diurnal variations of nociception and motor coordination in rats. *Peptides* 2013;39(152-6)

ALZET Comments: CGP 42112A; PD123319; Saline; sterile; CSF/CNS (lateral ventricle); Rat; 2002; 14 days; Dose (12 µg/rat/day (CGP 42112A); 10 µg/rat/day (PD123319)); Controls received mp w/ vehicle; animal info (12 week old Adult male Wistar rats); comparison of injection vs mp; CGP 42112A is a selective peptide AT2 agonist; PD 123319 is a nonpeptide AT2 receptor antagonist; peptides; ALZET brain infusion kit 2 used; Brain coordinates (1 mm lateral and 3 mm posterior to Bregma and 4 mm deep from skull surface); cyanoacrylate adhesive;.

Q2967: T. Jiang, *et al.* Angiotensin-(1-7) inhibits autophagy in the brain of spontaneously hypertensive rats. *Pharmacological Research* 2013;71(1):61-68

ALZET Comments: Angiotensin (1-7); A-779; PD123319; CSF, artificial; CSF/CNS; Rat; 2004; 4 weeks; Controls received mp w/ aCSF; animal info (wistar-kyoto, SHR-spontaneous hypertensive rats).

Q2854: I. Dhande, *et al.* Proximal Tubule Angiotensin AT(2) Receptors Mediate an Anti-Inflammatory Response via Interleukin-10 Role in Renoprotection in Obese Rats. *Hypertension* 2013;61(6):1218-U196

ALZET Comments: PD123319; Saline; SC; Rat; 2 weeks; Animal info (male, lean, Zucker, 5 wks old).

Q3067: A. Daugherty, *et al.* PD123319 Augments Angiotensin II-Induced Abdominal Aortic Aneurysms through an AT2 Receptor-Independent Mechanism. *PLoS One* 2013;8(4):U895-U901



ALZET Comments: Angiotensin II; PD123319; Saline; SC; Mice; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (male, C57BL/6 LDL^{-/-}); cardiovascular; peptides; bp measured using tail-cuff;.

Q5535: A. Chakrabarty, *et al.* Angiotensin II receptor type 2 activation is required for cutaneous sensory hyperinnervation and hypersensitivity in a rat hind paw model of inflammatory pain. *J Pain* 2013;14(10):1053-65

ALZET Comments: PD123319; Water, distilled; IP; Rat; 2001; 7 days; Controls received mp w/ (DI water); animal info (female, 60 days, 190-200g); comparison of single IP injection vs mp; behavioral testing (Thermal sensitivity, mechanical sensitivity); PD123319 is an AT₂ antagonist; Therapeutic indication (Inflammatory pain); Dose (5 mg/kg/d);.

Q1863: D. Salhan, *et al.* HIV-associated nephropathy: Role of AT₂R. *Cellular Signalling* 2012;24(3):734-741

ALZET Comments: Telmisartan; PD123319; SC; Mice (trangenic); 2004; 2 weeks; Controls received mp w/ saline; animal info (Tg26, FVBN, 3 wks old).

Q1985: C. Nogueira-Silva, *et al.* Local Fetal Lung Renin-Angiotensin System as a Target to Treat Congenital Diaphragmatic Hernia. *MOLECULAR MEDICINE* 2012;18(2):231-243

ALZET Comments: PD 123319; Rat (pregnant); 2ML1; Controls received mp w/ saline; animal info (Sprague Dawley, female, 225 g).

Q2321: T. Jiang, *et al.* Suppressing inflammation by inhibiting the NF-kappaB pathway contributes to the neuroprotective effect of angiotensin-(1-7) in rats with permanent cerebral ischaemia. *British Journal of Pharmacology* 2012;167(7):1520-1532

ALZET Comments: Angiotensin (1-7); A-779; PD123319; CSF, artificial; CSF/CNS; Rat; 1003D; Control animals received mp w/ vehicle; animal info (Sprague Dawley, male, 250-280 g); peptides; ALZET brain infusion kit II used.

Q1902: M. Flores-Munoz, *et al.* Angiotensin-(1-9) Attenuates Cardiac Fibrosis in the Stroke-Prone Spontaneously Hypertensive Rat via the Angiotensin Type 2 Receptor. *Hypertension* 2012;59(2):300-U357

ALZET Comments: Angiotensin (1-9); PD123319; SC; Rat; 4 weeks; Controls received mp w/ water; animal info (SHRSP, 11, 15, 17 wks old); peptides; one group contained angiotensin (1-9) and PD123319.

31. Perindopril

Q4275: Z. Qu, *et al.* Effects of angiotensin-converting enzyme inhibition and bradykinin peptides in rats with myocardial infarction. *INTERNATIONAL JOURNAL OF CLINICAL AND EXPERIMENTAL PATHOLOGY* 2015;8(3410-3417

ALZET Comments: Perindopril; bradykinin; Saline; SC; Rat; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (male, Wister, 8-12 weeks old, 200-250 g); cardiovascular; peptides;.

P4534: J. Higaki, *et al.* In vivo evidence of the importance of cardiac angiotensin-converting enzyme in the pathogenesis of cardiac hypertrophy. *Arterioscler. Thromb. Vasc. Biol* 2000;20(428-434

ALZET Comments: Perindopril;; Saline; PEG 400;; IP;; Rat;; 3 days;; controls received mp w/vehicle; cardiovascular;.

P3146: Y. Tokita, *et al.* Role of the tissue renin-angiotensin system in the action of angiotensin-converting enzyme inhibitors. *P. S. E. B. M* 1995;208(391-396

ALZET Comments: Captopril; Perindopril; Saline; IP; Rat; 6 days; controls received mp with saline; antihypertensive.

P2387: J. M. Mathews, *et al.* B-adrenoceptor subtypes in the atrioventricular conducting system and myocardium of spontaneously hypersensitive rats: effects of angiotensin-converting enzyme inhibition by perindopril. *J. Cardiovasc. Pharmacol* 1994;23(691-697

ALZET Comments: Perindopril; Water; SC; Rat; 2002; 14 days; antihypertensive.



32. Pindolol

P4963: N. Haddjeri, *et al.* Effects of sustained (+/-)pindolol administration on serotonin neurotransmission in rats. JOURNAL OF PSYCHIATRY & NEUROSCIENCE 2000;25(378-388)

ALZET Comments: Pindolol; Saline; SC; Rat; 2 weeks; controls received mp w/ vehicle; comparison of ip injections vs. mp;.

P4052: N. Haddjeri, *et al.* Effect of the reversible monoamine oxidase-A inhibitor befloxtone on the rat 5-hydroxytryptamine neurotransmission. Eur. J. Pharmacol 1998;343(179-192)

ALZET Comments: Befloxtone; Pindolol; Water; Ethanol; SC; Rat; 2, 21 days; controls received mp w/vehicle; befloxtone is an antidepressant; agents infused separately or concomitantly; antihypertensive.

P4647: N. Haddjeri, *et al.* Acute and long-term actions of the antidepressant drug mirtazapine on central 5-HT neurotransmission. Journal of Affective Disorders 1998;51(255-266)

ALZET Comments: Mirtazapine; Pindolol;; NaCl; Ascorbic acid;; SC;; Rat;; 2, 21 days;; controls received mp w/ vehicle; comparison of IV injections vs mp; antidepressant; pindolol infused for 2 days; mirtazapine administered for 21 days.

P1826: C. Nanoff, *et al.* Desensitization pattern of cardiac B-adrenoceptor subtypes by prolonged in vivo infusion of pindolol and celiprolol in rats. Basic Res. Cardiol 1990;85(88-95)

ALZET Comments: Celiprolol; Pindolol; Isoprenaline; Propranolol; HCl; Saline; SC; Rat; 2001; 7 days; antihypertensive.

33. Prazosin

Q4508: C. Disdier, *et al.* Tissue biodistribution of intravenously administered titanium dioxide nanoparticles revealed blood-brain barrier clearance and brain inflammation in rat. Particle and Fibre Toxicology 2015;12(U1-U20)

ALZET Comments: Atenolol; digoxin; prazosin; PEG 200; DMSO; SC; Rat; 2001D; Animal info (male, Fisher F344, 8 weeks old, 180-250g); 50% PEG 200 used; 50% DMSO used;.

Q4103: M. J. Skelly, *et al.* Chronic treatment with prazosin or duloxetine lessens concurrent anxiety-like behavior and alcohol intake: evidence of disrupted noradrenergic signaling in anxiety-related alcohol use. BRAIN AND BEHAVIOR 2014;4(468-483)

ALZET Comments: Prazosin; propranolol; duloxetine; DMSO; saline, sterile; SC; Rat; 2ML4; 4 weeks; Controls received mp w/ vehicle; animal info (male, Long Evans, adult, 300g); functionality of mp verified by residual volume; 10% DMSO used; stress/adverse reaction: (see pg. 472); post op. care (ketoprofen 3 mg/kg SC); behavioral testing (ethanol intake, open field test, locomotor activity, elevated plus maze); dependence; "Drug doses were calculated based on the estimated mean weight of animals in each group halfway through the drug delivery period (taking the mean weight at baseline and adding projected weight gain across 2 weeks)" pg 470; pumps removed after 4 weeks;.

Q0916: J. Yazaki, *et al.* Alpha1-Adrenoceptor Antagonists Improve Bladder Storage Function Through Reduction of Afferent Activity in Rats With Bladder Outlet Obstruction. NEUROUROLOGY AND URODYNAMICS 2011;30(3):461-467

ALZET Comments: Silodosin; prazosin; Hartmann's solution; saline; SC; Rat; 2002; 2 weeks; Controls received mp w/ vehicle; animal info (12 wks old, male, Sprague--Dawley).

Q2249: B. M. Shao, *et al.* Prolonged Hepatomegaly in Mice That Cannot Inactivate Bacterial Endotoxin. Hepatology 2011;54(3):1051-1062

ALZET Comments: Prazosin; IP; Mice; Animal info (male, C57BL/6 Aoah -/-, uMT Aoah -/-); 100 ul sized pump used.

Q2278: N. Haga, *et al.* Effect of Long-Term Prazosin and Yohimbine Administration on c-Fos Expression in Spinal Neurons: Inhibitory Effect of Alpha-1 and Alpha-2 Adrenoceptors on Afferents from the Lower Urinary Tract. UROLOGIA INTERNATIONALIS 2011;87(2):230-237

ALZET Comments: Prazosin; yohimbine; Water, distilled; SC; Rat; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (Sprague Dawley, female, 12 wks old).



Q2247: N. Haga, *et al.* Long-term administration of prazosin improves bladder storage function: Results from a study in spontaneously hypertensive rats. *INTERNATIONAL JOURNAL OF UROLOGY* 2011;18(11):785-791

ALZET Comments: Prazosin; Water, distilled; SC; Rat; 2004; 4 weeks; Controls received mp w/ vehicle; animal info (Wistar Kyoto, 12 wks old, female, SHR, 180-210 g).

P8531: D. M. Harris, *et al.* Vascular smooth muscle G_q signaling is involved in high blood pressure in both induced renal and genetic vascular smooth muscle-derived models of hypertension. *American Journal of Physiology-Heart and Circulatory Physiology* 2007;293(5):H3072-H3079

ALZET Comments: Prazosin; SC; Mice (transgenic); mice; 7 days; Controls received mp w/ vehicle; antihypertensive; cardiovascular; animal info (male, C57BL/6, wt, VSM GRK2tg, 2-5 months old).

P5969: E. S. Kemmerer, *et al.* Treatment effects on nigrostriatal projection integrity in partial 6-OHDA lesions: comparison of L-DOPA and pramipexole. *Experimental Neurology* 2003;183(1):81-86

ALZET Comments: L-DOPA; benserazide; prazosin; IP; Rat; 2ML4; 4 weeks; Neurodegenerative (Parkinson's disease).

P5473: C. Erami, *et al.* Alpha 1-adrenoceptor stimulation directly induces growth of vascular wall in vivo. *American Journal of Physiology-Heart and Circulatory Physiology* 2002;283(4):H1577-H1587

ALZET Comments: Norepinephrine; benoxathian; prazosin; KMD-3213; AH11110A; BMY-7378; propranolol; RX-821002; Ringer's, lactated; ascorbate; Perivascular; Rat; 2ML2; 14, 28 days; Tissue perfusion (left carotid wall); pumps replaced after 14 days for prazosin; catheter constructed from thin walled vinyl tubing and fenestrated at end placed near vessel; norepinephrine is a catecholamine; propranolol is a beta adrenoceptor antagonist; all other agents are antagonists alpha antagonists.

P3818: D. H. Wang, *et al.* Regulation of type 1 angiotensin II receptor in adrenal gland - role of A1-adrenoceptor. *Hypertension* 1997;30(pt 1):345-350

ALZET Comments: Prazosin; DMSO; SC; Rat; 2ML2; 2 weeks; controls received mp w/vehicle; antihypertensive; cardiovascular.

P4611: Y. Du, *et al.* Regulation of type 1 ANG II receptor in vascular tissue: role of a1-adrenoreceptor. *Am. J. Physiol. (Regulatory Integrative Comp. Physiol. 42)* 1997;273(R1224-R1229

ALZET Comments: Norepinephrine; Prazosin;; Saline, physiological; DMSO;; SC;; Rat;; 2002; 2ML2;; 2 weeks;; controls received mp w/vehicle; antihypertensive; cardiovascular;

P2139: E. M. van Kleef, *et al.* a1-Adrenoreceptor blockade reduces the angiotensin II-induced vascular smooth muscle cell DNA synthesis in the rat thoracic aorta and carotid artery. *Circ. Res* 1992;70(6):1122-1127

ALZET Comments: Angiotensin II; Prazosin; Uridine, bromodeoxy-; DMSO; Saline; Rat; 2001; 2ML1; 2 weeks; pumps replaced at one week; peptides; multiple pumps per animal (2); antihypertensive.

P2341: A. Kiss, *et al.* Participation of alpha-adrenergic receptors in the secretion of hypothalamic corticotropin-releasing hormone during stress. *Neuroendocrinology* 1992;56(153-160

ALZET Comments: Prazosin; {Stoyanovitch, 2005 #7985}; CSF/CNS; Rat; 2001; 48 hours; antihypertensive.

P2452: B. J. A. Janssen, *et al.* Modification of circadian blood pressure and heart rate variability by five different antihypertensive agents in spontaneously hypertensive rats. *J. Cardiovasc. Pharmacol* 1991;17(494-503

ALZET Comments: Captopril; Metoprolol; Hydralazine; Clonidine; Prazosin; Water; DMSO; Ethanol; PEG 400; Saline; IV; Rat; 2001; 2ML1; 4-6 days; controls received mp w/ vehicle; antihypertensive.

P1011: R. D. Johnson, *et al.* Regulation of Alpha-1 adrenergic receptor density and functional responsiveness in rat brain. *J. Pharmacol. Exp. Ther* 1987;242(3):842-849



ALZET Comments: Norepinephrine; Prazosin; DMSO; Water; CSF/CNS; Rat; 2002; 2ML2; 14 days; controls received mp w/ appropriate vehicle; mp connected to cannula in ventricle; DMSO used as vehicle for Prazosin; agents infused separately; antihypertensive.

P1228: R. Grzanna, *et al.* In vivo administration of propranolol delays development of a murine plasmacytoma tumor. *J. Auton. Nerv. Syst* 1985;14(4):397-401

ALZET Comments: Prazosin; Propranolol, d-; Propranolol, l-; Yohimbine; Saline; SC; mice; 2002; no duration posted; controls received mp w/ saline; LPC-1 tumor cells implanted sc; separate and simultaneous infusion of d- and l- propranolol; cancer; antihypertensive.

P0908: P. Frey. Changes in cholecystokinin content in rat brain after subchronic treatment with neuroleptics. *Ann. N. Y. Acad. Sci* 1985;448(601-603

ALZET Comments: Flupenthixol, cis-; Flupenthixol, trans-; Amitriptyline; Amphetamine; Atropine; Chlorpromazine; Clozapine; Fluphenazine; Haloperidol; Morphine; Prazosin; SC; Rat; 2 weeks; mp model not stated; comparison of sc injections vs. mp infusion; antihypertensive.

P0335: D. Sugden, *et al.* B-Adrenergic receptor control of rat pineal hydroxyindole-O-methyltransferase. *Endocrinology* 1983;113(1):348-353

ALZET Comments: Isoproterenol, d-; Methoxamine; Phenylephrine, l-; ST-587; Clonidine; Epinephrine, l-; Isoproterenol, dl-; Isoproterenol, l-; Prazosin; Propranolol, dl-; Terbutaline; Ascorbic acid; DMSO; Saline; SC; Rat; 2001; 2ML1; 1 week; comparison of agents effects; saline vehicle used w/ agents 1-8, saline and ascorbic acid used w/ agents 9-11, DMSO and saline used w/ agent 12; ST-587 is an adrenergic agonist; antihypertensive.

34. Propranolol

Q6697: Q. Long, *et al.* Chronic stress accelerates the development of endometriosis in mouse through adrenergic receptor beta2. *Hum Reprod* 2016;31(11):2506-2519

ALZET Comments: Propranolol hydrochloride; PBS; SC; Mice; 1002; 14 days; Dose (5 mg/kg/day); Controls received mp w/ vehicle; animal info (female Balb/C mice); enzyme inhibitor (ADRB antagonist); Therapeutic indication (endometriosis);.

Q4687: L. Zhao, *et al.* Effect of Chronic Psychological Stress on Liver Metastasis of Colon Cancer in Mice. *PLoS One* 2015;10(U1894-U1908

ALZET Comments: Propranolol hydrochloride; ICI-118,551; SC; Mice (nude); 1004; 35 days; Animal info (male, BALB/C nu/nu, 4 weeks old); cancer (colon, HT-29);.

Q5463: A. Perino, *et al.* Combined inhibition of PI3Kb and PI3Kg reduces fat mass by enhancing a-MSH-dependent sympathetic drive. *Science* 2015;7(352):1-13

ALZET Comments: TGX-221; AS605240; Propranolol; SR59230A; PBS; Tween 20; SC; CSF/CNS (right cerebral ventricle); Mice; 10 days; 14 days; Controls received mp w/ vehicle; animal info (Knock-in mice with catalytically inactive p110gamma (encoded by KRgamma) or p110beta (encoded by KRbeta)); ALZET brain infusion kit 2 used; 0.1% Tween 20 used; Dental cement used; Obesity; Propranolol and SR59230A are Beta blockers; Therapeutic indication (obesity); Dose (700 nM TGX-221, 500 nM AS605240, 2 mg/kg/day Propranolol, 1 mg/kg/day SR59230A); Brain coordinates (anteriorposterior, +0; medial-lateral, +1; dorsal-ventral, -2);.

Q4501: J. Liu, *et al.* The effect of chronic stress on anti-angiogenesis of sunitinib in colorectal cancer models. *PSYCHONEUROENDOCRINOLOGY* 2015;52(130-142

ALZET Comments: Norepinephrine bitartrate hydrate; propranolol; Ascorbic acid; PBS; SC; Mice; 1004; 20 days; Animal info (female, BALB/c, 5-7 weeks old); cancer (colorectal carcinoma, human);.

Q4482: R. H. Kline, *et al.* CATECHOL-O-METHYLTRANSFERASE INHIBITION ALTERS PAIN AND ANXIETY-RELATED VOLITIONAL BEHAVIORS THROUGH ACTIVATION OF beta-ADRENERGIC RECEPTORS IN THE RAT. *NEUROSCIENCE* 2015;290(561-569



ALZET Comments: Propranolol; OR486; DMSO; ethanol; saline; SC; Rat; 2002; 14 days; Controls received mp w/ saline; animal info (male, Sprague-Dawley, 325-425g); behavioral testing (thermal place preference; light/dark preference; tactile allodynia); cardiovascular; "We attribute the overall differences in exploratory activity between the acute and chronic cohorts possibly due to the anxiety-provoking effects of repetitive i.p. injections in the acute but not the chronic cohort" pg 565;.

Q3916: J. A. Herrera, *et al.* Treatment of cardiac arrhythmias in a mouse model of Rett syndrome with Na(+)-channel-blocking antiepileptic drugs. *Disease Models & Mechanisms* 2015;8(363-371

ALZET Comments: Propranolol; NaCl; Ascorbic acid; SC; Mice; 2004; 28 days; Controls received mp w/ vehicle; animal info (female, Mecp2 Null/+, 10 months old); functionality of mp verified by serum levels; 2% ascorbic acid used; cardiovascular;.

Q4103: M. J. Skelly, *et al.* Chronic treatment with prazosin or duloxetine lessens concurrent anxiety-like behavior and alcohol intake: evidence of disrupted noradrenergic signaling in anxiety-related alcohol use. *BRAIN AND BEHAVIOR* 2014;4(468-483

ALZET Comments: Prazosin; propranolol; duloxetine; DMSO; saline, sterile; SC; Rat; 2ML4; 4 weeks; Controls received mp w/ vehicle; animal info (male, Long Evans, adult, 300g); functionality of mp verified by residual volume; 10% DMSO used; stress/adverse reaction: (see pg. 472); post op. care (ketoprofen 3 mg/kg SC); behavioral testing (ethanol intake, open field test, locomotor activity, elevated plus maze); dependence; "Drug doses were calculated based on the estimated mean weight of animals in each group halfway through the drug delivery period (taking the mean weight at baseline and adding projected weight gain across 2 weeks)" pg 470; pumps removed after 4 weeks;.

Q3221: R. O. Maranon, *et al.* Postmenopausal hypertension: role of the sympathetic nervous system in an animal model. *American Journal of Physiology-Regulatory Integrative and Comparative Physiology* 2014;206(4):R248-R256

ALZET Comments: Propranolol; SHU-9119; CSF/CNS; SC; Rat; 7, 10 days; Control animals received mp w/ vehicle; animal info (retired breeder, female, 4-9 mo old, 18-20 mo old, young female SHR).

Q3532: C. Kim-Fuchs, *et al.* Chronic stress accelerates pancreatic cancer growth and invasion: A critical role for beta-adrenergic signaling in the pancreatic microenvironment. *BRAIN BEHAVIOR AND IMMUNITY* 2014;40(40-47

ALZET Comments: Propranolol, r/s-; isoproterenol, s/s-; Water; HCl; SC; Mice (nude); 1002; 1004; 28 days; Controls received mp w/ vehicle; animal info (female, BALB/c Foxn1nu nude athymic, 6 weeks old); functionality of mp verified by drug plasma; pumps replaced every 14 days or 24 days; cancer (pancreatic); 1 mM HCl;.

Q3184: G. H. Deng, *et al.* Exogenous norepinephrine attenuates the efficacy of sunitinib in a mouse cancer model. *JOURNAL OF EXPERIMENTAL & CLINICAL CANCER RESEARCH* 2014;33(;):U1-U12

ALZET Comments: Norepinephrine; propranolol; Ascorbic acid; saline; SC; Mice; 1004; 14 days; Controls received mp w/ vehicle; animal info (Female, C57BL6, 4-6 weeks old); cancer (melanoma; adenocarcinoma); immunology; "Seeing that microosmotic pumps (1004 type) are of the ability of pumping drugs contained incessantly for up to 4 weeks and exhibit reliable effects in mouse models, the pumps were taken into account in our research to deal with the short half life period of NE." pg 7; Primed pumps in 37C saline for 48 hours; Picture on pg 6 of pump and tumor on mouse.

Q5063: N. Ito, *et al.* Contribution of protein binding, lipid partitioning, and asymmetrical transport to drug transfer into milk in mouse versus human. *Pharm Res* 2013;30(9):2410-22

ALZET Comments: acetaminophen, cephalothin sodium salt, clindamycin hydrochloride, disopyramide phosphate salt, labetalol hydrochloride, nitrofurantoin +-propranolol hydrochloride, terbutaline hemisulfate salt, verapamil hydrochloride, Acyclovir, alprazolam, atenolol, anhydrous caffeine, cefotaxime sodium salt, cephapirin sodium salt, diltiazem hydrochloride, metronidazole, nitrazepam, prednisolone, 6-propyl-2-thiouracil, trazadone hydrochloride, chloramphenicol, cimetidine, theophylline, fluconazole, metoprolol, mirtazapine, praziquantel, quetiapine fumarate, triprolidine hydrochloride, metformin, moclobemide.; DMSO; water; IP; mice; 1003D; animal info: lactating mice, postnatal age of 14 days; functionality of mp verified by measurement of drug concentration in milk and plasma; mp were used to infuse study lactational drug transfer.



Q2059: D. M. Lamkin, *et al.* Chronic stress enhances progression of acute lymphoblastic leukemia via beta-adrenergic signaling. *BRAIN BEHAVIOR AND IMMUNITY* 2012;26(4):635-641

ALZET Comments: Propranolol hydrochloride; PBS; SC; Mice (SCID); Controls received mp w/ vehicle; animal info (SCID, male, 6-8 wks old).

Q2310: R. M. Camp, *et al.* Fear conditioning can contribute to behavioral changes observed in a repeated stress model. *Behavioural Brain Research* 2012;233(2):536-544

ALZET Comments: Propranolol; nadolol; Saline, endotoxin-free; SC; Rat; 2ML2; Control animals received mp w/ vehicle; animal info (Fischer 344, Sprague Dawley, 225-275 g); wound clips used; behavioral testing (exploration, social interaction).

Q1149: Y. D. Jiang, *et al.* Systemic Propranolol Reduces b-Wave Amplitude in the ERG and Increases IGF-1 Receptor Phosphorylation in Rat Retina. *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE* 2010;51(5):2730-2735

ALZET Comments: Propranolol; phentolamine; Saline; SC; Rat; 2ML4; 21 days; Controls received mp w/ vehicle; animal info (adult, male, Sprague Dawley, 180-200 g, 8 wks old).

Q0595: O. Flores, *et al.* beta-Adrenoceptor blockade depresses molecular and functional plasticities in the rat neocortex. *Brain Research Bulletin* 2010;82(5-6):284-288

ALZET Comments: Propranolol, DL; SC; Rat; 2ML1; 3 days; Controls received mp w/ saline; animal info (male, Sprague-Dawley); behavioral testing (omni-directional lever displacement, light turning on, bar pressing, pellet dispensing); propranolol is a beta-adrenoceptor antagonist.

Q1582: G. L. Clarke, *et al.* beta-Adrenoceptor Blockers Increase Cardiac Sympathetic Innervation by Inhibiting Autoreceptor Suppression of Axon Growth. *Journal of Neuroscience* 2010;30(37):12446-12454

ALZET Comments: Propranolol; phentolamine; metoprolol; Rat; 7 days; Controls received mp w/ saline; animal info (Sprague Dawley, female, 60 days old);.

Q0289: N. J. Thom, *et al.* Effects of exercise on male copulatory behavior after beta-adrenoreceptor blockade. *Brain Research Bulletin* 2009;79(6):414-417

ALZET Comments: Propranolol; PBS; CSF/CNS (third ventricle); Rat; Animal info (Long-Evans male, 60 days old); cannula placement was verified by visual inspection of frozen brains during brain slicing; ALZET brain infusion kit used.

Q0456: J. Naghshin, *et al.* Chronic intermittent hypoxia increases left ventricular contractility in C57BL/6J mice. *Journal of Applied Physiology* 2009;107(3):787-793

ALZET Comments: Propranolol; SC; Mice; 4 weeks; Animal info (male, C57BL/6J, 20-25 g, 9-12 wk old); functionality of mp verified by heart rate.

P9670: J. W. Lee, *et al.* Surgical Stress Promotes Tumor Growth in Ovarian Carcinoma. *Clinical Cancer Research* 2009;15(8):2695-2702

ALZET Comments: Propranolol hydrochloride, S-; SC; Mice (nude); 2004; Controls received mp w/ PBS; no stress (see pg. 2697) "no significant complications"; cancer (ovarian); animal info (female, athymic, Ncr-nu).

Q0564: K. Baek, *et al.* beta-Adrenergic Blockade and Leptin Replacement Effectively Mitigate Disuse Bone Loss. *Journal of Bone and Mineral Research* 2009;24(5):792-799

ALZET Comments: Propranolol; LY35510; Saline; SC; Rat; 28 days; Controls received mp w/ vehicle; animal info (adult, male, Sprague-Dawley).

35. Ramiprilat

P3734: M. S. Fernandez-Alfonso, *et al.* Early induction of angiotensin I-converting enzyme in rat carotid artery after balloon injury. *Hypertension* 1997;30(pt 1):272-277



ALZET Comments: Ramiprilat; HR 720; DMSO; Water; SC; Rat; 2ML2; 2ML4; 21 days; 2ML2 pumps replaced after 14 days; antihypertensive; cardiovascular; some animals received multiple pumps per animal (2); ramiprilat is the active metabolite of ramipril; HR 720 is an angiotensin II receptor antagonist.

36. Reserpine

Q0550: J. E. Ghia, *et al.* Reactivation of Inflammatory Bowel Disease in a Mouse Model of Depression. *Gastroenterology* 2009;136(7):2280-2288

ALZET Comments: Reserpine; choline chloride; methyllycaconitine; Water; acetic acid; CSF/CNS; IP; Mice; 5, 10, 14 days; Controls received mp w/ vehicle; animal info (male, C57BL/6, 7-9 wks old, alpha 7nAChR -/-); post op. care (buprenorphine); Plastics One cannula used with PE60 tubing.

P8751: J. E. Ghia, *et al.* Impaired parasympathetic function increases susceptibility to inflammatory bowel disease in a mouse model of depression. *Journal of Clinical Investigation* 2008;118(6):2209-2218

ALZET Comments: Reserpine; Acetic acid; CSF/CNS; Mice; 14 days; Controls received mp w/ vehicle; dose-response (Fig. 1); comparison of IP injection vs. mp; no stress (see pg. 2210); antihypertensive; cyanoacrylate adhesive; animal info (male, female, C57BL/6, op/op, wt, 7-9 wks old, colitis, vagotomy); animal model of depression; plastics one cannula used; PE-60 used.

P5124: S. Shafi, *et al.* Long-term low-dose treatment with reserpine of cholesterol-fed rabbits reduces cholesterol in plasma, non-high density lipoproteins and arterial walls. *Journal of Cardiovascular Pharmacology* 2002;40(67-79)

ALZET Comments: Reserpine; Citric acid; SC; Rabbit; 2ML4; 6 weeks; controls received mp w/ vehicle; pumps replaced after 3 wks; cardiovascular; antihypertensive; vehicle included 4% citric acid.

P0429: M. Girgis. A combined histochemical-neurophysiological technique for investigating the extent of diffusion of intracerebrally injected drugs. *Acta Anat* 1983;117(248-256)

ALZET Comments: Physostigmine; Reserpine; CSF/CNS (limbic system); cat; Guinea pig; monkey; rabbit; 3, 5, and 7 days; comparison of injec by microsyringe vs. mp infusion, infused hippocampus, septum, hypothalamus, caudate-putamen; chemitrode, mp advant. for icv admin; antihypertensive.

37. Rilmenidine

Q5047: K. L. Jackson, *et al.* Actions of rilmenidine on neurogenic hypertension in BPH/2J genetically hypertensive mice. *J Hypertens* 2014;32(3):575-86

ALZET Comments: rilmenidine; Ringer's solution; CSF/CNS (ventricles); mice; 1002; 1 week; Controls received mp w/ ringer's solution vehicle; animal info (BPH/2J and BPN/3J mice); functionality of mp verified by behavioral tests; dose-response (pg 577-582, description and graphical representation); behavioral testing (pg 577; mice were exposed to aversive behavioral stimuli; restraint stress and dirty cage-switch tests conducted); tissue perfusion (brain tissue); antihypertensive; antihypertensive; Dose: 15ug/hr of rilmenidine.

P9686: S. L. Burke, *et al.* Cardiac and renal baroreflex control during stress in conscious renovascular hypertensive rabbits: effect of rilmenidine. *Journal of Hypertension* 2009;27(1):132-141

ALZET Comments: Rilmenidine; Saline; SC; Rabbit; 2ML4; 3 weeks; Controls received mp w/ vehicle; comparison of IV injections vs. SC mp; antihypertensive; animal info (mixed breed, male, female, 2.4-3.2 kg.).

P9041: I. L. Signolet, *et al.* Improvement of cardiac Diastolic function by long-term centrally mediated sympathetic inhibition in one-kidney, one-clip hypertensive rabbits. *American Journal of Hypertension* 2008;21(1):54-60

ALZET Comments: Rilmenidine; metoprolol; SC; Rabbit; 2ML2; 6 weeks; Controls received mp w/ vehicle; animal info (New Zealand, White, 4-6 wks old, male, 0.7-0.9 kg., nephrectomized); long-term study.



P6378: L. Monassier, *et al.* Chronic treatment with rilmenidine in spontaneously hypertensive rats: Differences between two schedules of administration. *Journal of Cardiovascular Pharmacology* 2004;43(3):394-401

ALZET Comments: Rilmenidine; Saline; IP; Rat; 2002; 1 month; Comparison of IP injections vs. IP mp; pumps replaced at 15 days; stability verified (30 days at 37 degrees Celsius); cardiovascular; antihypertensive.

P5646: M. L. Parkin, *et al.* Importance of imidazoline-preferring receptors in the cardiovascular actions of chronically administered moxonidine, rilmenidine and clonidine in conscious rabbits. *Journal of Hypertension* 2003;21(1):167-178

ALZET Comments: Moxonidine; clonidine; rilmenidine; Saline; HCl; Sodium hydroxide; SC; Rabbit; 2ML2; 4 weeks; Controls received mp w/ vehicle; functionality of mp verified by residual volume; pumps replaced after 2 weeks; antihypertensive; moxonidine dissolved in saline/HCl/NaOH; other agents dissolved in saline; moxonidine & rilmenidine are imidazoline receptor agonists.

P4955: Z. J. Sun, *et al.* Central imidazoline and angiotensin II receptors in cardiovascular responses to chronic cold exposure in rats. *JOURNAL OF THERMAL BIOLOGY* 2001;26(5):513-518

ALZET Comments: Rilmenidine; SK&F-86466; CSF, artificial; CSF/CNS; Rat; 2ML4; 4 weeks; controls received mp w/ vehicle; cardiovascular; rilmenidine is a central I1 imidazoline receptor agonist, SF&F-86466 is a specific α -2 receptor blocker; cold-induced hypertension; pump implanted IP and connected to brain cannula;.

P2311: C. A. Hamilton, *et al.* Do centrally-acting antihypertensive drugs act at non-adrenergic as well as alpha-2 adrenoceptor sites? *Clin. and Exper. Hyper. -Theory and Practice* 1992;A14(5):815-835

ALZET Comments: Guanabenz; Clonidine; Rilmenidine; Water, sterile; Ethanol; IV (femoral); rabbit; 6 days; controls received mp w/ vehicles; agents are antihypertensives; mp and catheter embedded in thigh muscle; antihypertensive.

38. Tertaolol

P3658: Y. Y. Tan, *et al.* B-adrenoceptor regulation in rat heart, lung and skin after chronic treatment with (-)-tertatolol or (-)-propranolol. *J. Auton. Pharmac* 1995;15(4):421-436

ALZET Comments: Tertatolol; Propranolol; HCl; SC; Rat; 2002; 14 days; controls received mp w/ vehicle; antihypertensive; cardiovascular; beta-adrenoceptor antagonists; examined heart rate and systolic blood pressure.

39. Valsartan

Q3611: T. A. Ramirez, *et al.* Aliskiren and valsartan mediate left ventricular remodeling post-myocardial infarction in mice through MMP-9 effects. *Journal of Molecular and Cellular Cardiology* 2014;72(3):326-335

ALZET Comments: Aliskiren; valsartan; Saline; SC; Mice; 2004; 28 days; Controls received mp w/ vehicle; animal info (MMP-9 null or WT); cardiovascular; bp measured using MC4000 bp analysis system;.

Q3218: M. Zeniya, *et al.* Dietary Salt Intake Regulates WNK3-SPAK-NKCC1 Phosphorylation Cascade in Mouse Aorta Through Angiotensin II. *Hypertension* 2013;62(5):872-878

ALZET Comments: Valsartan; angiotensin II; aldosterone; IP; Mice; Animal info (C57BL/6J. male); peptides.

Q2883: Q. C. Yong, *et al.* Angiotensin type 1a receptor-deficient mice develop diabetes-induced cardiac dysfunction, which is prevented by renin-angiotensin system inhibitors. *Cardiovascular Diabetology* 2013;12(1):U1-U13

ALZET Comments: Aliskiren; benazeprilat; valsartan; PD123319; Saline; SC; Mice; 1004; 10 weeks; Cardiovascular; peptides; animal info (12 wks old, male, AT-KO); functionality of mp verified by echocardiography; pumps replaced every 4 weeks; enzyme inhibitor (renin);.

Q2934: C. M. Thomas, *et al.* Direct renin inhibition prevents cardiac dysfunction in a diabetic mouse model: comparison with an angiotensin receptor antagonist and angiotensin-converting enzyme inhibitor. *Clinical Science* 2013;124(7-8):529-541



ALZET Comments: Insulin (Humulin N); aliskiren (renin inhibitor); benazeprilat (ACEi); valsartan (ARB); streptozotocin; Saline; SC; Mice; 1004; 10 weeks; Controls received mp w/vehicle, or (0.1M sodium citrate buffer (pH 4.5)); cardiovascular; animal info (male, C57b16/J, 12 weeks, blood glucose > 250 mg/dl); pumps replaced every 4 weeks; enzyme inhibitor (renin); diabetes;

Q6760: K. P. Roos, *et al.* Adenylyl cyclase VI mediates vasopressin-stimulated ENaC activity. *J Am Soc Nephrol* 2013;24(2):218-27

ALZET Comments: Valsartan; SC; Mice (knockout); 14 days; Dose (5 mg/kg per day); animal info (CDAC6 KOmice);

Q1307: Y. Sakurai-Yamashita, *et al.* Lercanidipine Rescues Hippocampus Pyramidal Neurons from Mild Ischemia-Induced Delayed Neuronal Death in SHRSP. *Cellular and Molecular Neurobiology* 2011;31(4):561-567

ALZET Comments: Hydralazine; lisinopril; valsartan; SC; Rat; 1 week; 14 days; Controls received mp w/ vehicle; animal info (SHRHP, 16 wks old).

Q0856: J. Q. Huang, *et al.* Renal (pro)renin receptor contributes to development of diabetic kidney disease through transforming growth factor-beta1 - connective tissue growth factor signalling cascade. *Clinical and Experimental Pharmacology and Physiology* 2011;38(4):215-221

ALZET Comments: Handle region peptide; valsartan; Kindey (renal cortex); Rat; 14 days; Controls received sham mp w/ saline; animal info (male, Sprague-Dawley, 230-260 g); tissue perfusion (renal cortex); peptides.

P9903: G. Talati, *et al.* Effect of angiotensin II on the WNK-OSR1/SPAK-NCC phosphorylation cascade in cultured mpkDCT cells and in vivo mouse kidney. *Biochemical and Biophysical Research Communications* 2010;393(4):844-848

ALZET Comments: Angiotensin II; valsartan; Saline; BSA; Mice; 1002; 5, 10 days; Peptides; animal info (male, 12 wks old, C57BL6/J).

Q1229: L. C. Matavelli, *et al.* (Pro)renin receptor contributes to diabetic nephropathy by enhancing renal inflammation. *Clinical and Experimental Pharmacology and Physiology* 2010;37(3):277-282

ALZET Comments: Handle region peptide; valsartan; Saline; Kidney (renal cortical interstitium); Rat; 2002; 14 days; Controls received mp w/ vehicle; animal info (Sprague Dawley. STZ-induced diabetes, male 230-260 g); peptides; good methods, pg 278; tissue perfusion (interstitium); HRP, also known as handle region peptide, is the decapeptide NH₃-RILLKKMPSCOOH; good methods, pg 278; "The osmotic minipump was implanted subcutaneously in the subscapular region of all rats. Thereafter, a midline laparotomy was performed and the left kidney was isolated. A PE-10 catheter connected to each minipump was tunneled subcutaneously through a bevel-tipped stainless-steel tube to emerge into the abdominal cavity and the distal end of the catheter was placed under the left renal capsule and glued onto the surface of the kidney using Vetbond." pg 278.

Q0166: S. A. Imran, *et al.* Tissue-specific effects of valsartan on rstn and fiaf gene expression in the ob/ob mouse. *Diabetes and Vascular Disease Research* 2010;1-8

ALZET Comments: Valsartan; DMSO; water; sodium hydroxide; SC; Mice; 1002; 14 days; Controls received sham operation; animal info (male, C57BL/6, lean, obese, 13 wks old); wound clips used; diabetes.

Q0476: S. A. Imran, *et al.* Tissue-specific effects of valsartan on rstn and fiaf gene expression in the ob/ob mouse. *Diabetes & Vascular Disease Research* 2010;7(3):231-238

ALZET Comments: Valsartan; DMSO; sodium hydroxide; water; SC; Mice; 1002; 14 days; Lean controls received mp w/valsartan; animal info (male, C57BL/6 lean, Ob/ob, B6.V-Lepob/J); wound clips used.

Q0017: H. Hotta, *et al.* Angiotensin II Type 1 Receptor-Mediated Upregulation of Calcineurin Activity Underlies Impairment of Cardioprotective Signaling in Diabetic Hearts. *Circulation Research* 2010;106(1):129-U260

ALZET Comments: Valsartan; losartan; Rat; 2002; 14 days; Cardiovascular; animal info (OLETF, LETO, 25-30 weeks old); ischemia (cardiac).



Q1039: Y. F. Dong, *et al.* Aliskiren enhances protective effects of valsartan against type 2 diabetic nephropathy in mice. *Journal of Hypertension* 2010;28(7):1554-1565

ALZET Comments: Aliskiren; valsartan; SC; Mice; 6 weeks; Controls received mp w/ vehicle; animal info (6 wks old, Balb/C, db/db); enzyme inhibitor (renin);

Q0212: E. Yamamoto, *et al.* Aliskiren Enhances the Protective Effects of Valsartan Against Cardiovascular and Renal Injury in Endothelial Nitric Oxide Synthase-Deficient Mice. *Hypertension* 2009;54(3):633-U360

ALZET Comments: Valsartan; aliskiren; Mice; 4 weeks; Controls received mp w/ saline; animal info (male, eNOS -/-, wt); enzyme inhibitor (renin);

Q0262: A. Sakata, *et al.* Sex-different effect of angiotensin II type 2 receptor on ischemic brain injury and cognitive function. *Brain Research* 2009;1300(:):14-23

ALZET Comments: Valsartan; IP; Mice; 1002; Controls received mp w/ vehicle; animal info (adult C57BL/6, Agtr2-, Agtr2+, 3-4 mo old, male, female); behavioral testing (Morris water maze test); ischemia (cerebral).

Q0463: M. E. Campian, *et al.* Serial Noninvasive Assessment of Apoptosis During Right Ventricular Disease Progression in Rats. *Journal of Nuclear Medicine* 2009;50(8):1371-1377

ALZET Comments: Valsartan; Saline; SC; Rat; Controls received no mp; animal info (male, 8 wks old, Wistar, 225-285 g).

Q0380: T. Aoki, *et al.* Role of angiotensin II type 1 receptor in cerebral aneurysm formation in rats. *INTERNATIONAL JOURNAL OF MOLECULAR MEDICINE* 2009;24(3):353-359

ALZET Comments: Valsartan; Saline; methanol; ethanol; SC; Rat; 1 month; Controls received mp w/ vehicle; animal info (Sprague-Dawley, 7 wks old, cerebral aneurysm); 33% ethanol used.

P8877: J. M. Li, *et al.* Temporary pretreatment with the angiotensin II type 1 receptor blocker, valsartan, prevents ischemic brain damage through an increase in capillary density. *Stroke* 2008;39(7):2029-2036

ALZET Comments: Valsartan; IP; Mice; 1002; 2 weeks; Ischemia (cerebral); animal info (male, C57BL/6, 6 wks old, 20 g.); middle cerebral artery occlusion.

P8999: Y. Sagara, *et al.* Pressor response induced by central angiotensin II is mediated by activation of Rho/Rho-kinase pathway via AT₁ receptors. *Journal of Hypertension* 2007;25(2):399-406

ALZET Comments: Angiotensin II; phenylephrine; Y-27632; valsartan; CSF, artificial; SC; CSF/CNS; Rat; 1002; 2001; 7 days; Controls received mp w/ vehicle; enzyme inhibitor (Rho-kinase); antihypertensive; peptides; animal info (male, Wistar-Kyoto, SHR, 280-340 g.); catheter tip placement and connection confirmed.

P8657: T. Marumo, *et al.* Angiotensin II type I receptor blockade prevents decrease in adult stem-like cells in kidney after ureteral obstruction. *European Journal of Pharmacology* 2007;573(1-3):216-220

ALZET Comments: Valsartan; NAHCO₃; IP; Mice; 1002; 5 days; Controls received mp w/ vehicle; replacement therapy (unilateral ureteral obstruction); animal info (female, C57/BL6J, 7-8 wks old).

P9272: Y. W. Li, *et al.* Molecular signaling mediated by angiotensin II type 1A receptor blockade leading to attenuation of renal dysfunction-associated heart failure. *JOURNAL OF CARDIAC FAILURE* 2007;13(2):155-162

ALZET Comments: Valsartan; hydralazine; SC; Mice; 2 weeks; Controls received mp w/ saline; nephrectomy; no stress (see pg. 156); cardiovascular; animal info (male, C57BL/6, wt, AT1KO, 10 wks old); nephrology.

P8687: F. Ikeda, *et al.* Angiotensin II type 1 receptor blocker reduces monocyte adhesion to endothelial cells in spontaneously hypertensive rats. *Endocrine Journal* 2007;54(4):605-612

ALZET Comments: Valsartan; hydralazine; PEG 400; Rat; 4 weeks; Controls received mp w/ vehicle; dose-response (table 1, p. 608); cardiovascular; antihypertensive; animal info (10 weeks, male, SHR/IZM); valsartan is an angiotensin II receptor blocker; hydralazine is a vasodilator.



P7759: J. Suzuki, *et al.* Eplerenone with valsartan effectively reduces atherosclerotic lesion by attenuation of oxidative stress and inflammation. *ARTERIOSCLEROSIS THROMBOSIS AND VASCULAR BIOLOGY* 2006;26(4):917-921

ALZET Comments: Valsartan; IP; Mice; 1002; 6 weeks; Cardiovascular; animal info (male, adult, ApoE -/-, 6 wk. old).

P8359: M. Mogi, *et al.* Angiotensin II type-2 receptor stimulation prevents neural damage by transcriptional activation of methyl methanesulfonate sensitive 2. *Hypertension* 2006;48(1):141-148

ALZET Comments: Valsartan; IP; Mice; 1002; 13 days; Cardiovascular; ischemia (cerebral); animal info (C57BL/6J, 10 weeks old, MCA occlusion).