



**Recent References (2018-Present) on the Administration of Isoproterenol
Using ALZET® Osmotic Pumps**

Q11035: W. Zhang, *et al.* Active Ingredient Paeonol of Jijiu Huiyang Decoction Alleviates Isoproterenol-Induced Chronic Heart Failure via the GSK3A/PPARalpha Pathway. *Oxidative Medicine and Cellular Longevity* 2023;2023(3271057

Agents: Isoproterenol **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Strain:** C57BL/6 **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose: 30 mg/kg/d; Controls received mp w/ vehicle; animal info: male mice 8-10 weeks; cardiovascular; chronic heart failure

Q11027: W. Wu, *et al.* Mitochondrial damage in a Takotsubo syndrome-like mouse model mediated by activation of beta-adrenoceptor-Hippo signaling pathway. *American Journal of Physiology Heart and Circulatory Physiology* 2023;324(4):H528-H541

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** Not Stated; **Pump:** 2001; **Duration:** 23 hours;
ALZET Comments: Dose (1.25 mg/kg/h); Controls received mp w/ vehicle; animal info: 9 mo. old menopausal; post op. care (antibiotic ointment); cardiovascular; Takotsubo syndrome (cardiomyopathy)

Q11016: P. Verdino, *et al.* Development of a long-acting relaxin analogue, LY3540378, for treatment of chronic heart failure. *British Pharmacological Society* 2023;180(15):1965-1980

Agents: Isoproterenol hydrochloride **Vehicle:** PBS; sodium ascorbate; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose Isoproterenol (15 mg/kg/day); Controls received mp w/ vehicle; animal info: Male, 11-week-old; post op. care: Postoperative analgesia was achieved with a single dose of meloxicam 4 mg/kg; ; half-life (p.13); cardiovascular (chronic heart failure)

Q11007: G. Subramaniam, *et al.* Integrated Proteomics Unveils Nuclear PDE3A2 as a Regulator of Cardiac Myocyte Hypertrophy. *Circulation Research* 2023;132(7):828-848

Agents: Isoproterenol **Vehicle:** Saline; ascorbic acid; **Route:** Not Stated; **Species:** Rat; **Strain:** Not Stated; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose: (0.13 mg/kg per hour) (0.9% NaCl+0.02% ascorbic acid) used; Controls received mp w/ vehicle; animal info: Male rats (circa 6–8 months)cardiovascular (cardiac myocyte hypertrophy)

Q10998: W. Simonides, *et al.* Divergent Thyroid Hormone Levels in Plasma and Left Ventricle of the Heart in Compensated and Decompensated Cardiac Hypertrophy Induced by Chronic Adrenergic Stimulation in Mice. *Metabolites* 2023;13(308):

Agents: Isoproterenol; phenylephrine **Vehicle:** Water, sterile, distilled; ascorbic acid; **Route:** SC; **Species:** Mice; **Strain:** C57BL6/J-Dio3fl/flMerCreMer+/- (cD3KO-CS); **Pump:** 1007D; 1002; **Duration:** 7 days; 14 days;
ALZET Comments: Dose: 30 mg/kg/d; 0.1% ascorbic acid used; Controls received mp w/ vehicle; animal info: 12 weeks; cardiovascular; (ventricular hypertrophy, heart failure)

Q10737: R. Zhai, *et al.* Myocardial GRK2 Reduces Fatty Acid Metabolism and beta-Adrenergic Receptor-Mediated Mitochondrial Responses. *International Journal of Molecular Sciences* 2022;23(5):

Agents: Isoproterenol **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 6, 7 days;
ALZET Comments: Dose (30 mg/kg/day); Controls received mp w/ vehicle; animal info (Male; 10-13 weeks old; Wild-type C57BL/6; Crossed with transgenic GRK2-overexpressing mice); cardiovascular; Therapeutic indication (Heart failure);

Q10849: Y. Yoshida, *et al.* Brown Adipose Tissue Dysfunction Promotes Heart Failure Via a Trimethylamine N-Oxide-Dependent Mechanism. *Scientific Reports* 2022;12(1):14883

Agents: Isoproterenol; Trimethylamine N-oxide **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** Not Stated;
ALZET Comments: Dose: (ISO 30 mg/kg/day; TMAO 25 mg/kg/day); animal info (C57BL/9 Male; 11 weeks old); cardiovascular; Therapeutic indication (Heart failure);



Q10617: D. Murashige, *et al.* Extra-Cardiac BCAA Catabolism Lowers Blood Pressure and Protects From Heart Failure. *Cell Metabolism* 2022;34(11):1749-1764 e7

Agents: Isoproterenol **Vehicle:** Saline, sterile; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Dose (30 mg/kg/day.); Controls received mp w/ vehicle; animal info (BCKDK cKO mice); cardiovascular; Therapeutic indication (Heart failure);

Q10816: J. Li, *et al.* Targeting miR-30d Reverses Pathological Cardiac Hypertrophy. *EBioMedicine* 2022;81(104108

Agents: Angiotensin II; Isoproterenol **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** 2004; 2002; **Duration:** 4 weeks; 2 weeks;

ALZET Comments: Dose (1.3 mg/kg/day Ang II, 30 mg/kg/day ISO); Controls received mp w/ vehicle; animal info C57BL/6J (Male; 8-10 weeks old); peptides; cardiovascular; Therapeutic indication (Cardiac hypertrophy);

Q10383: L. Gao, *et al.* Schisandrin A protects against isoproterenol induced chronic heart failure via miR155. *Molecular Medical Reports* 2022;25(1):

Agents: Isoproterenol hydrochloride **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** 2ML2; **Duration:** 2 weeks;

ALZET Comments: Dose (30 mg/kg/day); 0.9% normal saline used; Controls received mp w/ vehicle; animal info (Male; 50 total; 10 weeks old; 22-25 g); cardiovascular; Therapeutic indication (Chronic heart failure);

Q10676: M. Abdullah Shamim, *et al.* Topical Carvedilol Delivery Prevents UV-Induced Skin Cancer with Negligible Systemic Absorption. *International Journal of Pharmaceutics* 2022;611(121302

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;

ALZET Comments: Dose (20 ug/kg/day); animal info (SKH-1; Female; Hairless; 7-8 weeks old); Blood pressure measured via tail-cuff method; cancer (Skin);

Q10892: T. Zhao, *et al.* Selective HDAC8 Inhibition Attenuates Isoproterenol-Induced Cardiac Hypertrophy and Fibrosis via p38 MAPK Pathway. *Frontiers in Pharmacology* 2021;12(677757

Agents: Isoproterenol **Vehicle:** DMSO; Saline; Ascorbic acid; **Route:** IP; **Species:** Mice; **Pump:** Not Stated; **Duration:** 5 days;

ALZET Comments: Dose: (25 mg/kg/day); 0.9% Saline; 0.1% Ascorbic acid vehicle used; Controls received mp w/ vehicle; animal info: Male CD-1 mice (7 weeks old and with an average weight of 33 g); cardiovascular; Cardiac Hypertrophy and Fibrosis

Q10734: L. Yanez-Bisbe, *et al.* Aging Impairs Reverse Remodeling and Recovery of Ventricular Function after Isoproterenol-Induced Cardiomyopathy. *International Journal of Molecular Sciences* 2021;23(1):

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;

ALZET Comments: Dose (30 mg/kg/day); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (young 10-weeks old; elderly 22-month old C57BL/6; Female); cardiovascular (cardiomyopathy)

Q9522: E. Walsh-Wilkinson, *et al.* Segmental analysis by speckle-tracking echocardiography of the left ventricle response to isoproterenol in male and female mice. *PeerJ* 2021;9(e11085

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 21 days;

ALZET Comments: Dose (30 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL6/J mice, 8 weeks old); Isoproterenol aka Iso; dependence;

Q10695: H. Tao, *et al.* Loss of Ten-Eleven Translocation 2 Induces Cardiac Hypertrophy and Fibrosis Through Modulating ERK Signaling Pathway. *Human Molecular Genetics* 2021;30(10):865-879

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose: (5 mg/kg/day) Controls received mp w/ vehicle; animal info: Hypertrophy model, adult male mice; Isoproterenol aka (ISO); cardiovascular; (cardiac hypertrophy and fibrosis)



Q10694: M. A. Tanner, *et al.* Immune Cell Beta(2)-Adrenergic Receptors Contribute to the Development of Heart Failure. American Journal of Physiology 2021;321(4):H633-H649

Agents: Isoproterenol **Vehicle:** PBS; Ascorbic acid; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 1 week; **ALZET Comments:** Dose: (30mg/kg/day); 0.001% Ascorbic acid vehicle used; Controls received mp w/ vehicle; animal info: Wild-type (WT) C57BL/6J mice (8–12wk) and b2ARKO mice backcrossed; cardiovascular;

Q10349: M. Tajés, *et al.* Neurohormonal activation induces intracellular iron deficiency and mitochondrial dysfunction in cardiac cells. Cell & Bioscience 2021;11(1):89

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;

ALZET Comments: Dose: (30 mg/kg/day); Controls received mp w/ vehicle; animal info: Sixteen 10-week-old male C57BL/6 mice; post op. care: Buprenorphine (0.3 mg/kg, i.p.); Isoproterenol aka (ISO); cardiovascular;

Q10688: A. M. Syed, *et al.* A review on Herbal Nrf2 Activators with Preclinical Evidence in Cardiovascular Diseases. Phytotherapy Research 2021;35(9):5068-5102

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose: (5 mg/kg/day) animal info: Male rats; Isoproterenol aka (ISO) cardiovascular;

Q10348: X. Sun, *et al.* Paroxetine Attenuates Cardiac Hypertrophy Via Blocking GRK2 and ADRB1 Interaction in Hypertension. Journal of American Heart Association 2021;10(1):e016364

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 2 weeks;

ALZET Comments: Dose: Isoproterenol (5 mg/kg per day); Controls received mp w/ vehicle; animal info: Spontaneously hypertensive rats (SHRs) 6 weeks of age, Blood pressure measured via: Tail cuff; 18.88 mmHg - 74.06 mmHg; cardiovascular; Hypertension

Q10659: T. Rehmani, *et al.* Specific Deletion of the FHA Domain Containing SLMAP3 Isoform in Postnatal Myocardium Has No Impact on Structure or Function. Cardiogenetics 2021;11(4):164-184

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2001D; **Duration:** 7 days;

ALZET Comments: Dose (30 ug/g/d per animal); 0.9% saline used; Controls received mp w/ vehicle; animal info (8-weeks old, C57BL/6); gene therapy;

Q10046: D. Mukherjee, *et al.* PARIS–DJ-1 Interaction Regulates Mitochondrial Functions in Cardiomyocytes, Which Is Critically Important in Cardiac Hypertrophy. Molecular and Cellular Biology 2021;

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose (5 mg/kg/day); 0.9% Saline used; Controls received mp w/ vehicle; animal info (24-week-old male Sprague-Dawley rats); Isoproterenol aka ISO; cardiovascular;

Q10224: J. S. Kwon, *et al.* In Vivo Stimulation of alpha- and beta-Adrenoceptors in Mice Differentially Alters Small RNA Content of Circulating Extracellular Vesicles. Cells 2021;10(5):

Agents: Isoproterenol; Phenylephrine **Vehicle:** Ascorbic acid; PBS; **Route:** Not Stated; **Species:** Mice; **Pump:** 1007D; **Duration:** 1 week;

ALZET Comments: Dose: Isoproterenol (10 mg/kg/day); Phenylephrine (30 mg/kg/day); 0.002% Ascorbic acid vehicle used; Controls received mp w/ vehicle; animal info: 9 weeks-old male C57/BL6 mice; Isoproterenol aka (ISO); Phenylephrine aka (PE); cardiovascular;

Q10391: A. Ishikita, *et al.* GFAT2 mediates cardiac hypertrophy through HBP-O-GlcNAcylation-Akt pathway. iScience 2021;24(12):103517

Agents: Isoproterenol; 6-diazo-5-oxo-L-norleucine crystalline; Phenylephrine; Angiotensin II **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** 1007D; **Duration:** 1 week;

ALZET Comments: Dose (ISO 15 mg/kg body weight/day; DON 0.05 ug/kg/day; AngII 1.44 mg/kg body weight/day; PE 100 mg/kg body weight/day); dose-response (see p. 18); animal info (Male; 8-10 weeks old); Blood pressure measured via tail cuff system; peptides; cardiovascular; Therapeutic indication (Cardiac hypertrophy);



Q10486: X. Gao, *et al.* Nociceptive nerves regulate haematopoietic stem cell mobilization. *Nature* 2021;589(7843):591-596
Agents: Peptide, calcitonin gene related; Substance P; Isoproterenol **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 1 week;

ALZET Comments: "Dose: CGRP (14 ug/day, 2.4 µg/day); Substance P (5 ug/day); Isoproterenol (40 µg per day); Controls received mp w/ vehicle; animal info: C57BL/6 CD45.1 and CD45.2 congenic mice 8–10-week-old mice of both gender; Calcitonin gene-related peptide also (CGRP); Isoproterenol aka (ISO)

Q10159: M. Flamant, *et al.* Early activation of the cardiac CX3CL1/CX3CR1 axis delays beta-adrenergic-induced heart failure. *Scientific Reports* 2021;11(1):17982

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14; 28 days;

ALZET Comments: Dose: (30 mg/kg/day); animal info: adult male mice (9–20 week-old) C57BL/6J mice; 11–13 week-old male C57BL/6J mice; Isoproterenol aka (ISO); cardiovascular;

Q9196: D. Coquerel, *et al.* Galphai-biased apelin analog protects against isoproterenol-induced myocardial dysfunction in rats. *American Journal of Physiology Heart & Circulatory Physiology* 2021;320(4):H1646-H1656

Agents: Apelin-13; Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001D; 2001; **Duration:** 7 days;

ALZET Comments: Dose (10 nmol/kg/h Apelin-13; 5 mg/kg/day Isoproterenol); Controls received mp w/ vehicle; animal info (male Sprague Dawley rats, 3 months old, 400 g); 96.8 mmHg - 105.1 mmHg; Apelin-13 aka APLN-13, Isoproterenol aka ISO; cardiovascular;

Q9171: J. E. Camacho Londono, *et al.* Transcriptional signatures regulated by TRPC1/C4-mediated Background Ca(2+) entry after pressure-overload induced cardiac remodeling. *Progress in Biophysics and Molecular Biology* 2021;159(86-104

Agents: Isoproterenol; Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1007D; 1002; **Duration:** 7 days; 14 days;

ALZET Comments: Dose (30 mg/kg/day Isoproterenol; 3 mg/kg/day Angiotensin II); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (male mice, 2.5 to 4 months old); Blood pressure measured via 1.4F Mikro-Tip Catheter pressure transducer; Isoproterenol aka Iso, Angiotensin II aka AngII; cardiovascular;

Q10100: L. Bai, *et al.* Protocatechuic acid attenuates isoproterenol-induced cardiac hypertrophy via downregulation of ROCK1-Sp1-PKCgamma axis. *Scientific Reports* 2021;11(1):17343

Agents: Isoproterenol **Vehicle:** Ascorbic acid; Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 5 days;

ALZET Comments: Dose: Isoproterenol (25 mg/kg/day); Protocatechuic acid (100 mg/kg/day); 0.1% ascorbic acid; 0.9% Saline; "Controls received mp w/ vehicle; Mice were randomly divided into three following groups (n = 8/group): vehicle-treated sham group, isoproterenol-infused group, and isoproterenol-infused group with protocatechuic acid (100 mg/kg/day). " animal info Male CD-1 (age, 7 weeks; average weight 33 g); cardiovascular; (Cardiac Hypertrophy)

Q8684: A. Ahmed, *et al.* Maternal obesity persistently alters cardiac progenitor gene expression and programs adult-onset heart disease susceptibility. *Mol Metab* 2021;43(101116

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 14 days;

ALZET Comments: Dose (60 mg/kg/day); Controls received mp w/ vehicle; animal info (8 weeks old); cardiovascular;

Q9823: X. Zhou, *et al.* TRIC-A Channel Maintains Store Calcium Handling by Interacting With Type 2 Ryanodine Receptor in Cardiac Muscle. *Circulation Research* 2020;126(4):417-435

Agents: Isoproterenol **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 2 weeks;

ALZET Comments: Dose (60 mg/kg per day); Controls received mp w/ vehicle; animal info (TRIC-A-/- mice);



Q9820: Q. Zhou, *et al.* The anti-microbial peptide LL-37/CRAMP levels are associated with acute heart failure and can attenuate cardiac dysfunction in multiple preclinical models of heart failure. *Theranostics* 2020;10(14):6167-6181

Agents: Angiotensin II; Isoproterenol **Vehicle:** Saline; Acetic Acid; Ascorbic Acid; **Route:** Not Stated; **Species:** Mice; **Pump:** 2004; 2002; **Duration:** 4 weeks; 2 weeks;

ALZET Comments: Dose (1.3 mg/kg/day Angiotensin II; 30 mg/kg/day Isoproterenol); 0.006% Acetic Acid, 0.002% Ascorbic Acid used; Controls received mp w/ vehicle; animal info (Male C57BL/6 mice at 10-12 weeks old); Angiotensin II aka Ang II, Isoproterenol aka ISO; cardiovascular;

Q9845: Y. Zhang, *et al.* Cardiac beta-adrenergic receptor activation mediates distinct and cell type-dependent changes in the expression and distribution of connexin 43. *Journal of Cellular and Molecular Medicine* 2020;24(15):8505-8517

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Dose (5 mg/kg/day); Controls received mp w/ vehicle; animal info (Wild-type male mice, 12 weeks old); Isoproterenol aka ISO; cardiovascular;

Q9850: N. Zhang, *et al.* Selective targeting of ubiquitination and degradation of PARP1 by E3 ubiquitin ligase WWP2 regulates isoproterenol-induced cardiac remodeling. *Cell Death & Differentiation* 2020;27(9):2605-2619

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: Dose (60 mg/kg/day); animal info (8-10 weeks old, Male); Blood pressure measured via Tail Cuff Method ;Isoproterenol aka ISO ; cardiovascular;

Q9873: R. Zang, *et al.* JMJD1A Represses the Development of Cardiomyocyte Hypertrophy by Regulating the Expression of Catalase. *BioMed Research International* 2020;2020(5081323

Agents: Isoproterenol **Vehicle:** Saline; Acetic Acid; **Route:** Abdomen; **Species:** Mice; **Pump:** 2004; **Duration:** 28 days;

ALZET Comments: Dose (8.7 mg/kg/d); Controls received mp w/ vehicle; animal info (12 weeks old C57BL/6 mice); Isoproterenol aka ISO; cardiovascular;

Q9903: Y. Yang, *et al.* Interleukin-9 Aggravates Isoproterenol-Induced Heart Failure by Activating Signal Transducer and Activator of Transcription 3 Signalling. *Canadian Journal of Cardiology* 2020;36(11):1770-1781

Agents: Isoproterenol **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose (30 mg/kg/d); Controls received mp w/ vehicle; animal info (Male C57BL/6 mice, aged 8-10 weeks and weighing 25.2 ± 2 g); Isoproterenol aka ISO; cardiovascular;

Q9535: T. Wang, *et al.* NFATc3-dependent expression of miR-153-3p promotes mitochondrial fragmentation in cardiac hypertrophy by impairing mitofusin-1 expression. *Theranostics* 2020;10(2):553-566

Agents: Isoproterenol **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Dose (40 mg/kg/day); Controls received mp w/ vehicle; animal info (Adult male C57BL/6 mice, 10-wk-old); Isoproterenol aka ISO; cardiovascular;

Q10343: N. Stafford, *et al.* Signaling via the Interleukin-10 Receptor Attenuates Cardiac Hypertrophy in Mice During Pressure Overload, but not Isoproterenol Infusion. *Frontiers in Pharmacology* 2020;11(559220

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 10 days;

ALZET Comments: Dose: (10 mg/kg BW per day); Controls received mp w/ vehicle; animal info: mice with ubiquitous ablation of the IL-10R1 gene 8–12 weeks old mice; post op. care: The chest was sutured shut and mice administered with 0.1 mg/kg BW buprenorphine; cardiovascular;

Q9988: M. Sorribas, *et al.* Isoproterenol Disrupts Intestinal Barriers Activating Gut-Liver-Axis: Effects on Intestinal Mucus and Vascular Barrier as Entry Sites. *Digestion* 2020;101(6):717-729

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 7 days;

ALZET Comments: Dose (0.8 mmol/g/day); Controls received mp w/ vehicle; animal info (C57BL/6J); dependence;



Q9481: A. Soltani Hekmat, *et al.* Angiotensin (1-7) and Apelin co-therapy: New strategy for heart failure treatment of rats. *Anatol J Cardiol* 2020;23(4):209-217

Agents: Isoproterenol; Angiotensin (1-7); Apelin **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 10 days;
ALZET Comments: Dose (5 mg/kg Isoproterenol; 30 µg/kg/day Angiotensin (1-7); 20 µg/kg Apelin); Controls received mp w/ vehicle; animal info (Male Sprague-Dawley rats weighing 180 to 250 g); Blood pressure measured via heparin saline filled catheter; 96.7 ± 10.7 mmHg - 129.3 ± 9.3 mmHg; cardiovascular;

Q8911: K. Nishimura, *et al.* Manipulation of beta-adrenergic receptor in pressure-overloaded murine hearts mimics adverse and reverse cardiac remodeling. *Biochemical and Biophysical Research Communications* 2020;527(4):960-967

Agents: Isoproterenol **Vehicle:** Saline, Isotonic; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 7 days;
ALZET Comments: Dose (3 mg/kg/day); Controls received mp w/ vehicle; animal info (ten-week-old male mice (24-27 g)); 97.5 mmHg - 104.7 mmHg; Isoproterenol aka ISO; cardiovascular;

Q8674: S. A. Mohammed, *et al.* Allylmethylsulfide, a Sulfur Compound Derived from Garlic, Attenuates Isoproterenol-Induced Cardiac Hypertrophy in Rats. *Oxid Med Cell Longev* 2020;2020(7856318)

Agents: Isoproterenol **Vehicle:** Ascorbic Acid; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (5mg/kg/day); 0.001% Ascorbic Acid used; Controls received mp w/ vehicle; animal info (Male Sprague Dawley Rats of 200-250-gram weight); cardiovascular;

Q8614: S. Kumari, *et al.* Musa balbisiana Fruit Rich in Polyphenols Attenuates Isoproterenol-Induced Cardiac Hypertrophy in Rats via Inhibition of Inflammation and Oxidative Stress. *Oxidative Medicine and Cellular Longevity* 2020;2020(7147498)

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (5 mg/kg/day); Controls received mp w/ vehicle; animal info (Male Sprague- Dawley rats (250 g)); cardiovascular;

Q8520: N. Gupta, *et al.* Targeted Inhibition of Gut Microbial Trimethylamine N-Oxide Production Reduces Renal Tubulointerstitial Fibrosis and Functional Impairment in a Murine Model of Chronic Kidney Disease. *Arteriosclerosis, Thrombosis, and Vascular Biology* 2020;40(5):1239-1255

Agents: Isoproterenol **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;
ALZET Comments: Dose (30 mg/kg per day); animal info (male C57BL/6J mice); cardiovascular;

Q8481: W. Gao, *et al.* HTR2A promotes the development of cardiac hypertrophy by activating PI3K-PDK1-AKT-mTOR signaling. *Cell Stress and Chaperones* 2020;25(6):899-908

Agents: Isoproterenol **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Dose (50 mg/kg/day); Controls received mp w/ vehicle; animal info (8–12-week-old male C57BL/6 mice); Isoproterenol aka ISO; cardiovascular;

Q8480: W. Gao, *et al.* Carboxypeptidase A4 promotes cardiomyocyte hypertrophy through activating PI3K-AKT-mTOR signaling. *Bioscience Reports* 2020;40(5):

Agents: Isoproterenol **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Dose (50 mg/kg/day); Controls received mp w/ vehicle; animal info (8–12 weeks old male C57BL/6 mice); Isoproterenol aka ISO; cardiovascular;

Q8455: T. R. Eijgenraam, *et al.* The phospholamban p.(Arg14del) pathogenic variant leads to cardiomyopathy with heart failure and is unresponsive to standard heart failure therapy. *Scientific Reports* 2020;10(1):9819

Agents: Isoproterenol **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 4 weeks;
ALZET Comments: Dose (30 mg/kg/day); animal info (adult (10-week-old) PLN-R14Δ/+ mice); cardiovascular;



Q8444: J. Ding, *et al.* Swietenine extracted from Swietenia relieves myocardial hypertrophy induced by isoprenaline in mice. *Environmental Toxicology* 2020;35(12):1343-1351

Agents: Isoproterenol; Swietenine **Vehicle:** PBS; **Route:** SC; IP; **Species:** Mice; **Pump:** 2004D; **Duration:** 25 days;

ALZET Comments: Dose (7.5 mg/kg/day Isoproterenol; 1 or 10 mg/kg/day Swietenine); Controls received mp w/ vehicle; animal info (male mice, 8 weeks old); Isoproterenol aka ISO; cardiovascular;

Q8443: E. DiNello, *et al.* Deletion of cardiac polycystin 2/PC2 results in increased SR calcium release and blunted adrenergic reserve. *American Journal of Physiology Heart and Circulatory Physiology* 2020;319(5):H1021-H1035

Agents: Isoproterenol, D- **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 14 days;

ALZET Comments: Dose (30 mg/kg/day); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (male mice, 9 weeks old); D-isoproterenol aka ISO; cardiovascular;

Q8399: J. E. Camacho Londono, *et al.* Transcriptional signatures regulated by TRPC1/C4-mediated Background Ca(2+) entry after pressure-overload induced cardiac remodeling. *Prog Biophys Mol Biol* 2020;

Agents: Isoproterenol; Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1007D; 1002; **Duration:** 7 days; 14 days;

ALZET Comments: Dose (30 mg/kg/day Isoproterenol; 3 mg/kg/day Angiotensin II); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (male mice, 2.5 to 4 months old); Blood pressure measured via 1.4F Mikro-Tip Catheter pressure transducer; Isoproterenol aka Iso, Angiotensin II aka AngII; cardiovascular;

Q8397: I. Cabrera-Aguilera, *et al.* The conventional isoproterenol-induced heart failure model does not consistently mimic the diaphragmatic dysfunction observed in patients. *PLoS One* 2020;15(7):e0236923

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 30 days;

ALZET Comments: Dose (10 mg/kg/day); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (adult male C57BL/6J mice, 10 weeks old); cardiovascular;

Q7947: S. Binas, *et al.* miR-221 and -222 target CACNA1C and KCNJ5 leading to altered cardiac ion channel expression and current density. *Cell Mol Life Sci* 2020;77(5):903-918

Agents: Angiotensin II; Isoproterenol **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 2, 3 weeks;

ALZET Comments: Dose ((AngII 1000 ng/kg/min), (ISO 30 mg/kg/day)); Controls received did not receive treatment; animal info (6 months, male, EGFR KO); post op. care (Carprofen (5–10 mg/kg SC) repeated every 8h if needed); cardiovascular; AngII administered for 3 weeks. ISO administered for 2 weeks.;

Q8336: K. Asai, *et al.* The effect of gonadectomy and angiotensin II receptor blockade in a mouse model of isoproterenol-induced cardiac diastolic dysfunction. *Journal of Nippon Medical School* 2020;

Agents: Isoproterenol **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 28 days;

ALZET Comments: Dose (30 ug/g/day); Controls received mp w/ vehicle; animal info (male and female ddY mice (7–8 weeks old) weighing 24 to 32 grams); 91.6 mmHg - 90.6 mmHg; Isoproterenol aka ISO; cardiovascular;

Q7655: J. Zou, *et al.* Transient inhibition of neddylation at neonatal stage evokes reversible cardiomyopathy and predisposes the heart to isoproterenol-induced heart failure. *American Journal of Physiology Heart and Circulatory Physiology* 2019;316(6):H1406-H1416

Agents: isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Dose (30 mg/kg/day); animal info (3 months, Sprague-Dawley); isoproterenol is a beta-adrenergic receptor agonist; cardiovascular; pump removed on day 14 of infusion. Cohort selected from previous group receiving IP injection;

Q8969: W. B. Zhao, *et al.* Stimulation of beta-adrenoceptors up-regulates cardiac expression of galectin-3 and BIM through the Hippo signaling pathway. *British Journal of Pharmacology* 2019;176(14):2465-2481

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Dose (6 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6J, 12-16 weeks old); cardiovascular;



Q7518: M. X. Zhang, *et al.* Exchange-protein activated by cAMP (EPAC) regulates L-type calcium channel in atrial fibrillation of heart failure model. *European Review for Medical and Pharmacological Sciences* 2019;23(5):2200-2207

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 3 weeks;

ALZET Comments: Dose (30 mg/kg/day); Controls received mp w/ vehicle; animal info (8-week C57BL6 male mice); cardiovascular; Therapeutic indication (atrial fibrillation, heart failure);

Q8985: S. Yoon, *et al.* Inhibition of heat shock protein 70 blocks the development of cardiac hypertrophy by modulating the phosphorylation of histone deacetylase 2. *Cardiovascular Research* 2019;115(13):1850-1860

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose (30 mg/kg/day); animal info (C57BL/6, Hsp70 KO and TgHsp70); comparison of pressure overload model vs mp; cardiovascular; Vehicle used but identity not stated. mp model not stated.;

Q7491: S. Takahara, *et al.* New Noonan syndrome model mice with RIT1 mutation exhibit cardiac hypertrophy and susceptibility to beta-adrenergic stimulation-induced cardiac fibrosis. *EBioMedicine* 2019;42(43-53

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 7 days;

ALZET Comments: Dose (10 mg/kg/day); Controls received mp w/ vehicle; animal info (11-week-old mice); cardiovascular; Therapeutic indication (cardiac fibrosis); Isoproterenol aka ISO;

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

Agents: Isoproterenol **Vehicle:** PBS; **Route:** Not Stated; **Species:** Mice (tr; **Pump:** Not Stated; **Duration:** 2 weeks;

ALZET Comments: 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);

Q8819: A. Raso, *et al.* Therapeutic Delivery of miR-148a Suppresses Ventricular Dilation in Heart Failure. *Molecular Therapy* 2019;27(3):584-599

Agents: Chronic cardiotrophin 1 or isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 2 weeks;

ALZET Comments: Dose (Chronic cardiotrophin 1-20 ug/kg/day or isoproterenol- 60 mg/kg/day); Controls received mp w/ vehicle; animal info (2 months old); cardiovascular;

Q8290: D. Muehleman, *et al.* Regression from pathological hypertrophy is sexually dimorphic and stimulus-specific. *bioRxiv* 2019;

Agents: Angiotensin II; Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: Dose (2.88 mg/kg/day-Ang II or 30 mg/kg/day- Iso); Controls received mp w/ vehicle; animal info (C57BL/6,); Isoproterenol aka Iso, hypertrophic agonist; cardiovascular;

Q8656: J. R. Martins, *et al.* Systemic beta adrenergic stimulation/ sympathetic nerve system stimulation influences intraocular RAS through cAMP in the RPE. *Experimental Eye Research* 2019;189(107828

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 2 days;

ALZET Comments: Dose (10 mg/kg/day); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (C57BL/6 mice 8-10 weeks of age); dependence;

Q8600: M. Keck, *et al.* Cardiac inflammatory CD11b/c cells exert a protective role in hypertrophied cardiomyocyte by promoting TNFR2- and Orai3- dependent signaling. *Scientific Reports* 2019;9(1):6047

Agents: Isoproterenol **Vehicle:** Not stated; **Route:** SC; **Species:** Rat; Mice; **Pump:** Not stated; **Duration:** 14 days; 28 days;

ALZET Comments: Dose (1.5 mg/kg/day for rat, 30 mg/kg/day for mouse); animal info (6 week-old male Wistar rats; 10-11 week-old male C57BL/6JRj); Isoproterenol aka iso; cardiovascular;

Q7449: N. C. Chung, *et al.* Unsupervised classification of multi-omics data during cardiac remodeling using deep learning. *Methods* 2019;

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 14 days;

ALZET Comments: Dose (15 mg/kg/day); animal info (Male, 9-12 weeks old); Isoproterenol aka ISO; cardiovascular;



- Q7950:** W. Cai, *et al.* Translationally controlled tumor protein (TCTP) plays a pivotal role in cardiomyocyte survival through a Bnip3-dependent mechanism. *Cell Death Dis* 2019;10(8):549
Agents: isoproterenol **Vehicle:** Not stated; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 2, 7 days;
ALZET Comments: Dose (60 mg/kg/day); animal info (2-3 months, male, C57BL/6); comparison of IP DOX injection and TAC vs mp; cardiovascular; mp used for ISO-induced heart failure model. mp model not stated;
- Q8169:** K. K. Bjorkman, *et al.* miR-206 Enforces a Slow Muscle Phenotype. *BioRxiv* 2019;
Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (30 or 45 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6J, miR-206 KO, mdx4cv between 4 and 7 months old); dependence;
- Q7332:** L. Zhou, *et al.* Cardioprotective Role of Myeloid-Derived Suppressor Cells in Heart Failure. *Circulation* 2018;138(2):181-197
Agents: Isoproterenol **Vehicle:** saline, ascorbic acid; **Route:** SC; **Species:** Mice; **Pump:** pump model not stated; **Duration:** 2 weeks;
ALZET Comments: Dose (30 mg/kg); 0.002% ascorbic acid; Controls received mp w/ vehicle; animal info (Male, BALB/c and C57BL/6, 8 weeks old, 25±1 g); cardiovascular;
- Q6908:** R. R. Zhao, *et al.* Targeting Chondroitin Sulfate Glycosaminoglycans to Treat Cardiac Fibrosis in Pathological Remodeling. *Circulation* 2018;137(23):2497-2513
Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 4 weeks;
ALZET Comments: Dose (3 mg/kg/day); animal info (adult rats); cardiovascular; Therapeutic indication (cardiac fibrosis);
- Q7325:** S. Yoon, *et al.* PP2A negatively regulates the hypertrophic response by dephosphorylating HDAC2 S394 in the heart. *Experimental & Molecular Medicine* 2018;50(7):83
Agents: Isoproterenol **Vehicle:** Saline, Acidified; **Route:** SC; **Species:** Mice; **Pump:** pump model not states; **Duration:** 14 days;
ALZET Comments: Dose (30 mg/kg/day); Controls received mp w/ vehicle; animal info (male, 8-week-old, CD1); (7-week-old, transgenic expressing PPP2CA); cardiovascular;
- Q8835:** J. Xiao, *et al.* Notoginsenoside R1, a unique constituent of Panax notoginseng, blinds proinflammatory monocytes to protect against cardiac hypertrophy in ApoE(-/-) mice. *European Journal of Pharmacology* 2018;833(441-450
Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 2 weeks;
ALZET Comments: Dose (25 mg/kg/day); Controls received mp w/ vehicle; animal info (8 weeks, male, ApoE(-/-), 23-27g); comparison of IP injection of Notoginsenoside R1 vs mp; cardiovascular; isoproterenol used to induce myocardial hypertrophy and fibrosis;
- Q8777:** Y. Wang, *et al.* Targeting Calpain for Heart Failure Therapy: Implications From Multiple Murine Models. *JACC: Basic to Translational Science* 2018;3(4):503-517
Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 2 weeks;
ALZET Comments: Dose (30 mg/kg/day); Controls received mp w/ agent; animal info (9-10 weeks, male, C57BL/6N or CAPN1-OExJP2-OE); comparison of myocardial infarction surgery or transverse aortic banding vs mp; ischemia (Myocardial infarction); cardiovascular; mp used to induce chronic heart failure in mice;
- Q7834:** J. Wang, *et al.* Integrated Dissection of Cysteine Oxidative Post-translational Modification Proteome During Cardiac Hypertrophy. *J Proteome Res* 2018;17(12):4243-4257
Agents: isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 1, 3, 5, 7, 10, and 14 days;
ALZET Comments: Dose (15 mg/kg/day); Controls received mp w/ vehicle; animal info (9-12 weeks, male, C57BL/6J); cardiovascular; isoproterenol used to induce cardiac hypertrophy in mice;



Q7297: M. Sarikhani, *et al.* SIRT2 deacetylase regulates the activity of GSK3 isoforms independent of inhibitory phosphorylation. *eLife Journal* 2018;7(**Agents:** Isoproterenol **Vehicle:** saline; **Route:** IP; **Species:** Mice; **Pump:** 2001, 2002; **Duration:** 7 days;

ALZET Comments: Dose (10 mg/kg/day); 150 mM NaCl buffered with 1 mM acetic acid used; Controls received mp w/ vehicle; animal info (8 weeks, 129/SvJ); cardiovascular;

Q7296: M. Santolini, *et al.* A personalized, multiomics approach identifies genes involved in cardiac hypertrophy and heart failure. *NPJ Syst Biol Appl* 2018;4(12)

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Pump:** Not Stated; **Duration:** 21 days;

ALZET Comments: Dose (30 mg/kg/day); Controls were of same strain but received no treatment; animal info (female, 8-10 weeks); cardiovascular;

Q7294: E. Roussel, *et al.* Multiple short-chain dehydrogenases/reductases are regulated in pathological cardiac hypertrophy. *FEBS Open Bio* 2018;8(10):1624-1635

Agents: Isoproterenol, Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 14 days;

ALZET Comments: Dose (Iso 30 mg/kg/day, AngII 4 mg/kg/day); Controls received mp w/ vehicle; animal info (male and female, C57Bl6J, 20–25 g); cardiovascular;

Q7991: C. Rees, *et al.* Variability and compensation of cardiomyocyte ionic conductances at the population level. *bioRxiv* 2018;

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Pump:** 1004; **Duration:** 21 days;

ALZET Comments: Dose (30 mg/kg/d); Controls received mp w/ agent; animal info (8-10 weeks, female, hybrid mouse diversity panel); cardiovascular; HMDP strains used are listed on Table 3 (p.19);

Q7054: W. Qian, *et al.* Wogonin Attenuates Isoprenaline-Induced Myocardial Hypertrophy in Mice by Suppressing the PI3K/Akt Pathway. *Front Pharmacol* 2018;9(896)

Agents: Isoproterenol **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 14 days;

ALZET Comments: Dose (5 mg/kg/day); Controls received mp w/ vehicle; animal info (male ICR mice); cardiovascular;

Q7736: A. J. Pollak, *et al.* A secretory pathway kinase regulates sarcoplasmic reticulum Ca(2+) homeostasis and protects against heart failure. *eLife Journal* 2018;7(**Agents:** Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;

ALZET Comments: Dose (30 mg/kg/day); animal info (alpha-MHC-Cre); post op. care (Buprenorphine); cardiovascular;

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

Agents: Isoproterenol **Vehicle:** Saline; **Route:** IP; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days; 21 days;

ALZET Comments: 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

Agents: Isoproterenol, Atenolol, ICI-118551 **Vehicle:** Saline, ascorbic acid; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 48 Hours;

ALZET Comments: 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;

Q8122: L. Medzikovic, *et al.* Nur77 protects against adverse cardiac remodeling by limiting neuropeptide Y signaling in the sympathoadrenal-cardiac axis. *Cardiovasc Res* 2018;114(12):1617-1628

Agents: Isoproterenol, NPY1R-selective antagonist, or a mix **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not stated; **Duration:** 1 week;

ALZET Comments: Dose (60 mg/kg/day-Isoproterenol or 15 mg/kg/day-NPY1R selective antagonist); Controls received mp w/ vehicle; animal info (C57BL/6J, Nur77-KO); NPY1R-selective antagonist aka BIBO3304 ; cardiovascular;



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

Agents: Isoproterenol **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: 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. *Experimental Cell Research* 2018;370(1):78-86

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: 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

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: 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;

Q8047: U. Kirchhefer, *et al.* Chronic beta-adrenergic stimulation reverses depressed Ca handling in mice overexpressing inhibitor-2 of protein phosphatase 1. *J Mol Cell Cardiol* 2018;125(195-204

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Dose (30 mg/kg/day); 0.9% NaCl used; 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

Agents: Isoproterenol **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 4 or 6 weeks;
ALZET Comments: Dose (30 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6 mice); cardiovascular;

Q8771: W. J, *et al.* Integrated Dissection of Cysteine Oxidative Post-translational Modification Proteome During Cardiac Hypertrophy. *Journal of Proteome Research* 2018;17(3):695-700

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 1, 3, 5, 7, 10, 14 days;
ALZET Comments: Dose (15 mg/kg/day); Controls received mp w/ vehicle; animal info (9-12 weeks, male, C57BL/6J); cardiovascular; isoproterenol used to induce cardiac hypertrophy in mice;

Q7029: J. Gao, *et al.* Analyzing gene expression profiles with preliminary validations in cardiac hypertrophy induced by pressure overload. *Canadian Journal of Physiology and Pharmacology* 2018;96(8):701-709

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (5 mg/kg/day); Controls received mp w/ vehicle; animal info (Male Kunming mice weighing 24–28 g, 4 weeks old); animal model of cardiac hypertrophy;

Q7898: A. Galindo-Tovar, *et al.* Phosphodiesterase PDE2 activity, increased by isoprenaline, does not reduce beta-adrenoceptor-mediated chronotropic and inotropic effects in rat heart. *Naunyn Schmiedeberg's Arch Pharmacol* 2018;391(6):571-585

Agents: Isoproterenol **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 3 days;
ALZET Comments: Dose (2.4 mg/kg/day); animal info (Male, Sprague Dawley, 220-300 g); cardiovascular;

Q7116: D. D. Child, *et al.* Cardiac mTORC1 Dysregulation Impacts Stress Adaptation and Survival in Huntington's Disease. *Cell Reports* 2018;23(4):1020-1033

Agents: Isoproterenol **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (30 mg/kg/day); animal info (Male, B6C3F1/J or C56B6/J); neurodegenerative (Huntington's disease);



Q10140: S. C. Chang, *et al.* Isoproterenol-Induced Heart Failure Mouse Model Using Osmotic Pump Implantation. *Methods in Molecular Biology* 2018;1816(207-220)

Agents: Isoproterenol **Vehicle:** NaCl; **Route:** IP; **Species:** Mice; **Pump:** 1004; **Duration:** 3 weeks;

ALZET Comments: Dose (0.11 μ L/h); 0.9% NaCl%; 4% DMSO; used; Controls received mp w/ vehicle; animal info (C57BL/6, 8-10, 12-15 wks male; 100+ Hybrid, 10-12 wks female; BALB/c 8-10 wks male; AS-Ren 3-5 mos); post op. care (Buprenorphine; Carprofen; Amoxicillin); Isoproterenol aka (ISO); ischemia (Ischemic heart failure); cardiovascular; stress/adverse reaction: (see pg.215); Industry authored (Division of Cardiology, Department of Medicine, David Geffen School of Medicine at UCLA, Los Angeles, USA);

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

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: 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

Agents: Isoproterenol **Vehicle:** Saline, ascorbic acid; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: 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 Journal* 2018;32(9):4941-4954

Agents: Isoproterenol **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Dose (30 mg/kg/d); Controls received mp w/ vehicle; animal info (p38a KO mice, Il1r1 KO mice);

Q7791: R. Acin-Perez, *et al.* Ablation of the stress protease OMA1 protects against heart failure in mice. *Science Translational Medicine* 2018;10(434):

Agents: isoproterenol, angiotensin II, MitoQ **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 7, 28 days;

ALZET Comments: Dose ((ISO 10mg/kg/d), (AngII 1 μ g/kg/d), (MQ 0.15mg/d)); Controls were received mp w/ ISO and no MQ; animal info (C57BL/6JOLA^{Hsd} or CD1); MQ is a specific mtROS scavenger; cardiovascular; ISO-infused mice compared to AngII model of heart failure; Therapeutic indication (cardioprotective effect of administered MQ (prior to TAC) through preserved cardiac mitochondrial performance);