**Recent References (2010-Present) on the Administration of Norepinephrine Using ALZET® Osmotic Pumps**


**Agents**: Norepinephrine **Vehicle**: Saline; **Route**: IP; **Species**: Mice; **Pump**: 1003D; 1007D; **Duration**: 18 hours; 72 hours;

**ALZET Comments**: Dose: (1.2 nmol/g/h); Controls received no mp w/ vehicle; Within this experimental group, the control mice were those that did not receive a pump nor did they get CLP (Supplemental Table S1; see https://doi.org/10.6084/m9.figshare.14896068). The second group consisted of mice that received the vehicle for 72; hanimal info: Male mice C57BL/6 mice, Six-wk-old mice; Norepinephrine aka (NE)


**Agents**: Norepinephrine; ICI-118,551 **Vehicle**: Saline; **Route**: SC; **Species**: Mice; **Pump**: 1004; **Duration**: 3 weeks;

**ALZET Comments**: Dose (10 mg /kg/day); Controls received mp w/ vehicle; animal info (4-week-old female nude mice); Norepinephrine aka NE; cancer (Tumor Growth);


**Agents**: Norepinephrine **Vehicle**: Saline; **Route**: SC; **Species**: Rat; **Pump**: 1007D; **Duration**: 1 week;

**ALZET Comments**: Dose (40 ug/hr); animal info (Male, Wistar, 150-170 g); dependence;

**Q5605**: X. P. Duan, *et al.* Norepinephrine-Induced Stimulation of Kir4.1/Kir5.1 Is Required for the Activation of NaCl Transporter in Distal Convoluted Tubule. Hypertension 2019;73(1):122-120

**Agents**: Norepinephrine **Vehicle**: Not Stated; **Route**: SC; **Species**: Mice; Mice (knockout); **Pump**: Not Stated; **Duration**: 7 days;

**ALZET Comments**: Dose (2.5 mg/kg/d); Controls received mp w/ vehicle; animal info (C57BL/6 mice (either sex, 12 weeks old); kidney-specific conditional Kcnj10−/− or Kir4.1 knockout (Ks-Kir4.1 KO) mice);


**Agents**: ICI-118,551 hydrochloride; Toxin, Diptheria; reserpine; captopril; norepinephrine **Vehicle**: PBS; **Route**: Intrasplenic; **Species**: Mice; **Pump**: 1002; **Duration**: 1, 2, 3 weeks;

**ALZET Comments**: "Dose ((ICI-118,551 12 mg/kg/hr), (Diptheria Toxin 5 mg/kg/day), (reserpine 5mg/kg/day), (captopril 6mg/kg/day), (norepinephrine 5mg/kg/day)); Controls received mp w/ vehicle; animal info (10-12 weeks, Apoe(-/-)); comparison of intrasplenic injection vs mp; ICI-118,551 hydrochloride is a selective antagonist of the beta2 adrenergic receptor. angiotensin converting enzyme (ACE) inhibitor. Reserpine blocks the uptake of catecholamines into synaptic vesicles; Reserpine is an enzyme inhibitor (vesicular monoamine transporter 2); immunology; Diptheria toxin used to deplete TH+ leukocytes. Splenic nerves were depleted by intrasplenic DT using mp for 7 days; Therapeutic indication (ICI-118,551 reduced splenic GMP proliferation and inflammatory myeloid cell generation);"


**Agents**: angiotensin II; norepinephrine; SP600125 **Vehicle**: Saline; **Route**: SC; **Species**: Mice; **Pump**: 2004; **Duration**: 4 weeks;

**ALZET Comments**: Dose ((AngII 1000 ng/kg/min), (NE 5.6 mg/kg/day), (SP600125 30 mg/kg/day)); Controls received mp w/ vehicle; animal info (6-8 weeks, male, C57BL/6, miR-21(−/−), Smad3(−/−), or S3(+/−)21(−/−), 18-25g); SP600125 is an enzyme inhibitor (c-Jun N-terminal kinase); cardiovascular; "all Smad3+/−:miR-21(−/−) double knockout (S3+/−21−/−) mice died within 23 days of AngII infusion" p.1091;

Agents: Norepinephrine Vehicle: Not Stated; Route: SC; Species: Mice (transgenic); Pump: 1002; Duration: 14 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, AT1aR knockdown, 14-16 weeks old, 25-30g); cardiovascular; Dose (3.8ug/kg/min);


Agents: A61603; Norepinephrine Vehicle: Vitamin C; NaCl; Route: SC; Species: Mice; Pump: 1002; Duration: 7 days;
ALZET Comments: Dose (A61603 10 μg/kg/d, NE 2.5 mg/kg/d); vitamin C 100 μM in 0.9% NaCl; animal info (12 w male mice); A61603 aka N-[5-(4,5-dihydro-1H-imidazol-2-yl)-2-hydroxy-5,6,7,8-tetrahydronaphthalen-1-yl]methanesulfonamide); cardiovascular;

Q6408: Caesar C, et al. Cyclic Strain and Hypertension Increase Osteopontin Expression in the Aorta. Cellular and Molecular Bioengineering 2017;10(2):144-152

Agents: Angiotensin II; Norepinephrine Vehicle: Not Stated; Route: Not Stated; Species: Mice (knockout); Pump: 2004; Duration: Not Stated;
ALZET Comments: Dose (Ang II: 0.75 mg/kg/day; Norepinephrine: 5.6 mg/kg/day); animal info (C57BL/6 (Wildtype, WT) or Osteopontin Knockout (OPN KO) mice); cardiovascular;


Agents: Norepinephrine; hydrochlorothiazide; losartan Vehicle: Saline; DMSO; Route: SC; Species: Rat; Pump: 2ML2; Duration: 14 days;
ALZET Comments: animal info (male, NO-GC1 KO, 2-3 months old); cardiovascular; peptides; bp measured using tail cuff or radiotelemetry (DSI); Dose (Ang II 1.44 mg/kg/day; NE 2.88 mg/kg/day);good bp graph;


Agents: Angiotensin II; norepinephrine Vehicle: Not Stated; Route: Not Stated; Species: Mice; Pump: 1002; Duration: 2 weeks;
ALZET Comments: animal info (male, NO-GC1 KO, 2-3 months old); cardiovascular; peptides; bp measured using tail cuff or radiotelemetry (DSI); Dose (Ang II 1.44 mg/kg/day; NE 2.88 mg/kg/day);


Agents: Norepinephrine Vehicle: Not Stated; Route: Not Stated; Species: Mice; Pump: 2004; Duration: 28 days;
ALZET Comments: Animal info (Alk5 iko or Alk5 f/f or C57BL6, 7-15 weeks old, OVX or ORX); cardiovascular;


Agents: Angiotensin II; norepinephrine Vehicle: Saline; Route: SC; Species: Mice; Pump: 1002; Duration: 2 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, WT, 12-16 weeks old); cardiovascular; peptides; bp measured using tail cuff; Dose (Ang II – 1.1 mg/kg/day, Norepinephrine 5.6 mg/kg/day);


Agents: Angiotensin II, Norepinephrine Vehicle: Saline, physiological; Route: SC; Species: Mice; Pump: 1002; Duration: 2 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, 12-16 wks, WT Balb/c mice); functionality of mp verified by ECG; cardiovascular; peptides; peptides; Dose (Ang II – 1.1 mg/kg/day, Norepinephrine – 5.6 mg/kg/day);
Agents: Norepinephrine bitartrate hydrate; propranolol Vehicle: Ascorbic acid; PBS; Route: SC; Species: Mice; Pump: 1004; Duration: 20 days;
ALZET Comments: Animal info (female, BALB/c, 5-7 weeks old); cancer (colorectal carcinoma, human);

Agents: Norepinephrine; uridine, 5-bromo-2'-deoxyuridine Vehicle: Ascorbic acid; Route: Not Stated; Species: Mice; Pump: Not Stated; Duration: 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (C57BL6J or tdTomato);

Agents: Angiotensin II; Norepinephrine Vehicle: Saline; Ascorbate; Route: SC; Species: Mice; Pump: 1007D; 1002; Duration: 1 week; 2 weeks;
ALZET Comments: animal info: WT, SMKO, and SMTg mice aged 8 weeks (C57Bl/6J genetic background); functionality of mp verified by radiotelemetry; 1 mmol/L ascorbate; cardiovascular; antihypertensive, norepinephrine; Dose: 1 mg/kg per day of AngII; 10 mg/kg per day of norepinephrine

Q4375: M. J. Choi, et al. hTERT mediates norepinephrine-induced Slug expression and ovarian cancer aggressiveness. ONCOGENE 2015;34(3402-3412
Agents: Norepinephrine Vehicle: Saline; Ascorbic acid; Route: SC; Species: Mice (nude); Pump: 1004; Duration: 7 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (female, nude, 4 weeks old); cancer (ovarian);

Agents: Norepinephrine Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 1002; Duration: 14 days;
ALZET Comments: Controls received mp w/ saline; animal info (male, C57BL6, 20-25g, 8-12 weeks old); functionality of mp verified by plasma levels; good methods (see supplement); post op. care (incision cleaned with iodine); cardiovascular; immunology; bp measured using radiotelemetry (DSI);

Agents: Norepinephrine; Cytidine, 5-aza-2'-deoxy- Vehicle: Saline; Route: SC; Species: Rat; Pump: 2ML4; Duration: 28 days;
ALZET Comments: Controls received mp w/ saline; animal info (male, Sprague Dawley, 6 months old); functionality of mp verified by plasma levels pg.375; dose-response (pg735, table 1); cardiovascular; arterial blood pressure measured using catheter in femoral artery;

Agents: Norepinephrine; Cytidine, 5-aza-2'-deoxy- Vehicle: Saline; Route: SC; Species: Rat; Pump: 2ML4; Duration: 28 days;
ALZET Comments: Dose (norepinephrine 100 mg/kg/h; norepinephrine 200 mg/kg/h; 1 mg/kg/day 5-aza-2'-deoxycytidine);

Agents: Angiotensin II; norepinephrine Vehicle: Saline; Ascorbic acid; Route: SC; Species: Mice; Pump: 2004; Duration: 28 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (Six-month-old Sprague–Dawley male rats); cardiovascular;

Agents: Angiotensin II; norepinephrine Vehicle: Saline; Ascorbic acid; Route: SC; Species: Mice; Pump: 2004; Duration: 28 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, C57BL6J or Ldlr-/-); post op. care (topical anesthetic cream); cardiovascular; peptides; bp measured using tail cuff;
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Bibliography

Q3477: Y. X. Gao, et al. ADAMTS-7 Expression Increases in the Early Stage of Angiotensin II-Induced Renal Injury in Elderly Mice. KIDNEY & BLOOD PRESSURE RESEARCH 2014;38(121-131
Agents: Angiotensin II; norepinephrine Vehicle: Saline; Route: SC; Species: Mice; Pump: Not Stated; Duration: 3 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, C57Bl6, 36 weeks old); functionality of mp verified by increased bp; cardiovascular; immunology; peptides; bp measured using tail-cuff;

Agents: Norepinephrine; propranolol Vehicle: Ascorbic acid; saline; Route: SC; Species: Mice; Pump: 1004; Duration: 14 days;
ALZET Comments: 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.

Agents: Norepinephrine; A-779 Vehicle: CSF, artifical; Route: CSF/CNS; Species: Mice (transgenic); Pump: Not Stated;
Duration: 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, SARA or RA transgenic, 6-10 weeks); ALZET brain infusion kit used; ischemia (cerebral); cardiovascular; Pumps primed overnight in 37C saline;

Agents: Norepinephrine Vehicle: Ascorbate; Route: SC; Species: Mice; Pump: 1002; Duration: 14 days;
ALZET Comments: Animal info (Lep Ob+, 55 g, 14 wks old)

Agents: Angiotensin II; norepinephrine Vehicle: Not Stated; Route: SC; Species: Mice; Pump: Not Stated; Duration: 24 hours;
ALZET Comments: Animal info (MMP9 -/-, 7 wks old); peptides

Agents: Norepinephrine; Isoproterenol; ICI-118,551; Metoprolol Vehicle: Not Stated; Route: SC; Species: Mice; Rat; Pump: Not Stated; Duration: 2 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (C57BL/6j, male, Sprague Dawley, 250-270 g, 8 wks old, nephrectomy)

Agents: Angiotensin II, [Val 5]; Norepinephrine Vehicle: Not Stated; Route: SC; Species: Rat; Pump: Not Stated; Duration: 7 days;
ALZET Comments: Animal info (male, Sprague Dawley, 10 wks old); peptides

Agents: Norepinephrine bitartrate; Vehicle: Saline; Route: IP; Species: Rat; Pump: 1007D; Duration: 5 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 300-350 g)

**Agents:** Angiotensin II; Norepinephrine; Losartan  
**Vehicle:** Saline;  
**Route:** Not Stated;  
**Species:** Mice;  
**Pump:** Not Stated;  
**Duration:** 4 weeks; 28 days;  
**ALZET Comments:** Controls received mp w/vehicle; peptides; cardiovascular; animal info (male, C57BL/6, AT1aR -/-, p47phox -/-, Id3 -/-); functionality of mp verified by systolic blood pressure


**Agents:** Angiotensin II; norepinephrine  
**Vehicle:** Not Stated;  
**Route:** Not Stated;  
**Species:** Mice;  
**Pump:** 2002;  
**Duration:** 14 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (C57BL/6, RAG1 -/-, OVA-specific, OT-II tg); peptides; blood pressure measured via telemetry or tail cuff


**Agents:** Norepinephrine  
**Vehicle:** Saline; ascorbate;  
**Route:** SC;  
**Species:** Rat; mice;  
**Pump:** 2004;  
**Duration:** 1, 3, 7, 14, 28 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (Wistar, male, 240-260 g, 7 wks old; 5 wks old, DBH-Cre/Floxed-EGFP); functionality of mp verified by plasma NE levels