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

Acetylcholine

Q9514: M. A. Ulleryd, et al. RNA sequencing data describing transcriptional changes in aorta of ApoE/- mice after alpha 7 nicotinic acetylcholine receptor (alpha7nAChR) stimulation. Data in Brief 2020;30(105415

**Agents:** Alpha 7 nicotinic acetylcholine receptor agonist **Vehicle:** Cyclodextrin; Saline; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 8 weeks;

**ALZET Comments:** Dose (50 μmo/kg/day); 28% cyclodextrin used; Controls received mp w/ vehicle; animal info (Male apoE-/- mice, 10 weeks old); pumps replaced every 4 weeks; Alpha 7 nicotinic acetylcholine receptor agonist aka α7nAChR agonist; gene therapy;

Atropine


**Agents:** Atropine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML; **Duration:** Not stated;

**ALZET Comments:** Dose (10 mg/kg); Controls received mp w/ vehicle; animal info (13 weeks old, Brown Norway); dependence;

Q4725: T. Kashihara, et al. beta(2)-Adrenergic and M(2)-muscarinic receptors decrease basal t-tubular L-type Ca(2+) channel activity and suppress ventricular contractility in heart failure. European Journal of Pharmacology 2014;724(;):122-131

**Agents:** Atropine; ICI-118,551 **Vehicle:** Saline; DMSO; **Route:** Not Stated; **Species:** Mice; **Pump:** 1004; **Duration:** 21 days;

**ALZET Comments:** Animal info (male, C57BL6, 8-10 weeks old); cardiovascular;


**Agents:** Atropine **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** 2001; **Duration:** 6 hours;

**ALZET Comments:** Animal info (male, Trpm4 -/-, 12-32 weeks old); cardiovascular;

Carbachol

Q4121: Y. Suzuki, et al. Vagal Hyperactivity Due to Ventromedial Hypothalamic Lesions Increases Adiponectin Production and Release. Diabetes 2014;63(1637-1648

**Agents:** Carbachol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 5 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, Sprague-Dawley, 13 weeks old); carbachol is a parasympathetic stimulator; obesity;


**Agents:** Carbachol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 5 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (Sprague Dawley, female, 13 wks old)


**Agents:** Physostigmine; carbachol; nicotine; pirenzepine; oxotremorine; mecamylamine **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2002; 2004; **Duration:** Not Stated;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 250 g.); neurodegenerative (Alzheimer’s Disease)
**Oxotremorine**


**Agents**: Physostigmine; carbachol; nicotine; pirenzepine; oxotremorine; mecamylamine **Vehicle**: Saline; **Route**: CSF/CNS; **Species**: Rat; **Pump**: 2002; 2004; **Duration**: Not Stated;

**ALZET Comments**: Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 250 g.); neurodegenerative (Alzheimer’s Disease)

**Physostigmine**


**Agents**: physostigmine **Vehicle**: water; **Route**: SC; **Species**: Rat; **Pump**: 2ML4; **Duration**: 3 weeks;

**ALZET Comments**: controls received mp w/ saline; animal info: sprague-dawley, male, 250-300g; functionality of mp verified by residual volume; enzyme inhibitor (Acetylcholine); neurodegenerative (Traumatic brain injury); except for model number, paper does not mention ALZET much; dose: 1.6 micromoles/kg/day


**Agents**: Physostigmine **Vehicle**: Not Stated; **Route**: Not Stated; **Species**: Mice; **Pump**: Not Stated; **Duration**: 2 weeks;

**ALZET Comments**: Animal info (C57BL/6, 9 wks old); enzyme inhibitor (acetylcholinesterase); hindlimb ischemia


**Agents**: Physostigmine; scopolamine; pyridostigmine bromide **Vehicle**: Not Stated; **Route**: SC; **Species**: Guinea pig; **Pump**: Not Stated; **Duration**: 12 days;

**ALZET Comments**: Controls received mp w/ saline; animal info (male, C57BL6, 25 g); enzyme inhibitor (cholinesterase)


**Agents**: Pyridostigmine bromide; physostigmine **Vehicle**: Not Stated; **Route**: SC; **Species**: Mice; **Pump**: Not Stated; **Duration**: 30 days;

**ALZET Comments**: Controls received mp w/saline; animal info (male, C57BL6, 25 g); enzyme inhibitor (cholinesterase)

**Pyridostigmine**


**Agents**: Sodium sulfate; Pyridostigmine bromide **Vehicle**: Saline; **Route**: IP; **Species**: Mice; **Pump**: Not Stated; **Duration**: 7 days;

**ALZET Comments**: Dose (2 mg/day/kg PB); Controls received mp w/ vehicle; animal info (Pathogen-free 5–6-week-old C57BL/6 mice); Sodium sulfate aka DSS, Pyridostigmine bromide aka PB; dependence;


**Agents**: Pyridostigmine bromide **Vehicle**: Not Stated; **Route**: SC; **Species**: Mice; **Pump**: Not Stated; **Duration**: 6 weeks;

**ALZET Comments**: Dose (1 mg/kg/day); animal info (Twelve-month-old female mice/15-month old male mice); dependence;
Q8832: C. Rocha-Resende, et al. Immunomodulatory role of non-neuronal cholinergic signaling in myocardial injury. JCI Insight 2019;5; 1002; Duration: 7 days; ALZET Comments: Dose (3 mg/kg/day); Controls received mp w/ vehicle; animal info (C57BL/6J, 8-10 weeks old); Pyridostigmine aka PYR; immunology;

Q7531: R. M. Lataro, et al. Chronic Treatment With Acetylcholinesterase Inhibitors Attenuates Vascular Dysfunction in Spontaneously Hypertensive Rats. American Journal of Hypertension 2019;32(6):579-587; Agents: Pyridostigmine Bromide; Donepezil; Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2004; Duration: 16 weeks; ALZET Comments: Dose (Pyridostigmine bromide at 1.5 mg/kg/day; Donepzeil at 1.4 mg/kg/day); animal info (male, Wistar-Kyoto or SHR); pumps replaced every 4 weeks; long-term study; cardiovascular; Four pump replacements were performed; BP measured via Tail-cuff method;

Q4881: B. C. Halil Sayin, Philippe Chevalier, Christian Barrés, Claude Julien. Assessment of cardiac autonomic tone in conscious rats. Autonomic Neuroscience: Basic and Clinical 2016;194(26-31; Agents: Pyridostigmine bromide; Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2ML4; Duration: 3 weeks; ALZET Comments: animal info (male, SHR, 46 weeks old); cardiovascular; bp measured using radiotelemetry; Dose (15 mg/kg/day);

Q5005: R. M. Lataro, et al. Acetylcholinesterase Inhibition Attenuates the Development of Hypertension and Inflammation in Spontaneously Hypertensive Rats. American Journal of Hypertension 2015;28(10):1201-8; Agents: Pyridostigmine bromide; donepezil; Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2004; Duration: 16 weeks; ALZET Comments: animal info (male, Wistar-Kyoto or SHR); pumps replaced every 4 weeks; long-term study; cardiovascular; bp measured using tail cuff; Dose (Pyridostigmine bromide 1.5 mg/kg/day; donepezil 1.4 mg/kg/day);

Q3860: M. T. Durand, et al. Pyridostigmine Restores Cardiac Autonomic Balance after Small Myocardial Infarction in Mice. PLoS One 2014;9(U327-U335; Agents: Pyridostigmine; Vehicle: Saline, sterile; Route: SC; Species: Mice; Pump: 1004; Duration: 4 weeks; ALZET Comments: Controls received mp w/ vehicle; animal info (male, C57BL6, 10-15 weeks old, 25-30g); ischemia (cardiac); cardiovascular; pyrostigmine is an acetylcholinesterase inhibitor; pyrostigmine aka PYR; bp measured using radiotelemetry; pumps primed at 37C saline for 48 hours;

Q3265: M. Richtsfeld, et al. Prolonged Administration of Pyridostigmine Impairs Neuromuscular Function with and without Downregulation of Acetylcholine Receptors. Anesthesiology 2013;119(2):412-421; Agents: Pyridostigmine; Vehicle: Saline, sterile; Route: SC; Species: Rat; Pump: 2ML4; Duration: 14 days; 28 days; ALZET Comments: Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 220-260g); dose-response (p.416, 418); post op. care (antibiotic ointment); incision closed with (4-0) suture;

R0292: H. P. M. Van Helden, et al. Non-enzymatic pretreatment of nerve agent (soman) poisoning: A brief state-of-the-art review. TOXICOLOGY LETTERS 2011;206(1):35-40; Agents: Physostigmine; scopolamine; pyridostigmine bromide; Vehicle: Not Stated; Route: SC; Species: Guinea pig; Pump: Not Stated; Duration: 12 days; ALZET Comments:

Q0425: B. Mauck, et al. Cholinesterase inhibitors and stress: Effects on brain muscarinic receptor density in mice. Neurotoxicology 2010;31(5):461-467; Agents: Pyridostigmine bromide; physostigmine; Vehicle: Not Stated; Route: SC; Species: Mice; Pump: Not Stated; Duration: 30 days; ALZET Comments: Controls received mp w/saline; animal info (male, C57BL6, 25 g); enzyme inhibitor (cholinesterase)
Scopolamine


Agents: Scopolamine hydrobromide Vehicle: Saline; Route: SC; Species: Rat; Pump: 2002; Duration: 14 days;

ALZET Comments: Dose (0.5 mg/kg); Controls received mp w/ vehicle; animal info (adult male Wistar rats, 190-300 g); neurodegenerative (Traumatic brain injury);


Agents: Scopolamine, N-methyl; Vehicle: Saline; Route: Abdomen; Species: Rat; Pump: Not stated; Duration: 14 days;

ALZET Comments: Dose (25 mg kg⁻¹ day⁻¹); Controls received mp w/ vehicle; N-methyl-Scopolamine aka muscarinic antagonist; dependence;


Agents: Scopolamine Vehicle: Saline; Route: SC; Species: Mice; Pump: 2001; 2006; Duration: 7 days;

ALZET Comments: Dose (0.5 mg/KG BW/day); Controls received mp w/ vehicle; animal info (mice aged 8–10 weeks); Scopolamine aka nonselective cholinergic muscarinic receptor antagonist; dependence;


Agents: Scopolamine Vehicle: Not Stated; Route: SC; Species: Rat; Pump: Not stated; Duration: 3 days;

ALZET Comments: Dose (12.5 mg/day); animal info (Sprague-Dawley rats); dependence;


Agents: Scopolamine Vehicle: PBS; Route: SC; Species: Mice; Pump: 1002; Duration: 28 days;

ALZET Comments: Dose (0.2 mg/kg/day); Controls received mp w/ vehicle; animal info (8-week-old WT BALB/c male mice 27–31 g); Therapeutic indication (experimental dry eye);


Agents: Pirenzepine; Scopolamine hydrobromide; Metyrapone; luteinizing hormone; ACTH Vehicle: PBS; Route: CSF/CNS (Third ventricle); Species: Mice (knockout); Pump: 1002; Duration: Not Stated;

ALZET Comments: Dose (0.6 mg/kg/day Pirenzepine; 1.0 mg/kg Scopolamine hydrobromide; 100mg/kg/day Metyrapone; 2.8 mg/kg/day ACTH; 16ug/day LH); Controls received mp w/ vehicle; animal info (wild-type and Chrm1−/−); luteinizing hormone aka LH  and adrenocorticotropic hormone aka ACTH; peptides; Brain coordinates (A/P −1.6 mm posterior to bregma, D/V −4.7 mm);


Agents: Scopolamine Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 1002; Duration: 2 weeks;

ALZET Comments: Dose (0.1 mg/day); animal info (10–12-week-old female C57BL/6 mice); Therapeutic indication (experimental dry eye);


Agents: Butylscopolamine Vehicle: PBS; Route: SC; Species: Mice; Pump: 1007D; Duration: 3 days; 5 days; 7 days;

ALZET Comments: Animal info (male, C57BL6 J, 9-10 weeks old); ischemia (colitis);


Agents: Scopolamine Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2ML4; Duration: 28 days;

ALZET Comments: Control animals received mp w/ saline; animal info (male, Sprague Dawley, 200-220 g, adult);

Agents: Scopolamine  Vehicle: Saline;  Route: SC;  Species: Rat;  Pump: 2ML4;  Duration: 28 days;

ALZET Comments: Controls received mp w/ vehicle; Dose (44 mg/ml delivered at 2.5 ml/h); functionality of mp verified (The release of SCO was confirmed by the increase of locomotor activity and mydriasis);


Agents: Scopolamine  Vehicle: Saline;  Route: IP;  Species: Mice;  Pump: Not Stated;  Duration: 3, 7, 14 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (SERTKO, TPH1KO, wt)


Agents: Scopolamine  Vehicle: Saline, physiological;  Route: SC;  Species: Rat;  Pump: 2ML4;  Duration: 28 days;

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


Agents: Scopolamine  Vehicle: Saline;  Route: SC;  Species: Rat;  Pump: Not Stated;  Duration: 28 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, 5 wks old)


Agents: Scopolamine  Vehicle: Not Stated;  Route: SC;  Species: Rat;  Pump: 2ML4;  Duration: 28 days;

ALZET Comments: Controls did not receive any scopolamine; animal info (male, Sprague Dawley, 6-8 wks old)


Agents: Physostigmine; scopolamine; pyridostigmine bromide  Vehicle: Not Stated;  Route: SC;  Species: Guinea pig;  Pump: Not Stated;  Duration: 12 days;

ALZET Comments: Co


Agents: Scopolamine butylbromide  Vehicle: PBS;  Route: SC;  Species: Mice;  Pump: 2004;  Duration: 8 weeks;

ALZET Comments: Controls received mp w/ vehicle; animal info (6 wks old, male, APC min/+); pumps replaced after 4 weeks; post op. care (betadine)


Agents: Scopolamine hydrobromide  Vehicle: Not Stated;  Route: SC;  Species: Rat;  Pump: 2ML2; 2ML4;  Duration: 14, 28 days;

ALZET Comments: Controls did not receive any scopolamine; animal info (male, Sprague Dawley, 6-8 wks old)