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

1. Acetylcholine

**ALZET Comments:** Amyloid protein, beta (1-40); acetylcholinesterase; PBS; CSF/CNS (dorsal hippocampus); Rat; 2002; 4 weeks; 14 days; Comparison of acute injections vs. mp; brain tissue distribution; peptides; neurodegenerative (Alzheimer's disease).

**ALZET Comments:** Acetylcholine; Platelet activating factor; Albumin, bovine serum; Saline; IV (jugular); Guinea pig; 2002; 15 days; Cholinergic agent; stability verified by measuring biological activity of residual solution from pumps after 12 days, no loss of activity observed.

**ALZET Comments:** Acetylcholine chloride; Cefalotin; Cholecystokinin tetrapeptide; Epinephrine HCl; Bombesin; Endorphin, B-; Enkephalin, methionine-; Norepinephrine HCl; Saline; Sodium bisulfite; CSF/CNS (hypothalamus); Rat; 2002; 5-20 weeks; Cholinergic agent; pumps replaced periodically; mp connected to perm. steel cannula in hypothalamus; cannula fitted w/removable protector; (see p.217); agents infused sep. (cefalotin infused w/each agent); long-term study; peptides.

**ALZET Comments:** Acetylcholine HCl; Aminobutyric acid, Y-; Serotonin bimaleinate; Dopamine HCl; Norepinephrine bitartrate; Nitrogen; Sodium metabisulfite; CSF/CNS (nucleus accumbens); Rat; 2002; 13 days; Cholinergic agent; comparison of agents effects; no stress p. 175; stability of substances remaining in pump after 13 days was verified.

2. 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. Kashiha, 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;
   **Agents:** Gallamine triethiodide; tubocurarine; atropine; suramin **Vehicle:** Not Stated; **Route:** CSF/CNS (sciatic nerve);
   **Species:** Rat; **Pump:** 2ML4; **Duration:** 2-4 weeks;
   **ALZET Comments:** Controls received mp w/saline; animal info (female, adult, Sprague Dawley, 200-220 g); schematic illustration of pump with silastic catheter, Fig 1b

   **Agents:** Metoprolol; atropine methylnitrate **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 3 days;
   **ALZET Comments:** Cardiovascular; post op. care (carprofen, cephazolan); animal info (male, Sprague Dawley Flinders Resitive Line, Flinders Sensitive Line, 10-14 wks old)

3. Carbachol

   **ALZET Comments:** Carbachol; Saline; SC; Rat; 5 days; Controls received mp w/ vehicle; animal info (female, Sprague-Dawley, 13 weeks old); carbachol is a parasympathetic stimulator; obesity;

   **ALZET Comments:** Carbachol; Saline; SC; Rat; 5 days; Controls received mp w/ vehicle; animal info (Sprague Dawley, female, 13 wks old).

   **ALZET Comments:** Physostigmine; carbachol; nicotine; pirenzepine; oxotremorine; mecamylamine; Saline; CSF/CNS; Rat; 2002; 2004; Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 250 g.); neurodegenerative (Alzheimer’s Disease).

   **ALZET Comments:** Angiotensin II; carbachol; SC; Mice (transgenic); 14 days; Animal info (wt, ERK2 T188); peptides.

   **ALZET Comments:** Carbachol; Scopolamine; Saline; CSF/CNS; CSF/CNS (medulla); CSF/CNS (pons); Rat; 2001; 7 days; Cholinergic agent; mp w/vehicle; mp connected to cann. in brain sites; MP failed to deliver drugs after 5 days possibly due to extended length of tubing.

4. Oxotremorin

   **ALZET Comments:** Physostigmine; carbachol; nicotine; pirenzepine; oxotremorine; mecamylamine; Saline; CSF/CNS; Rat; 2002; 2004; Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 250 g.); neurodegenerative (Alzheimer’s Disease).
**ALZET Comments:** Oxotremorine; Physostigmine sulfate; Saline; SC; Rat; 2002; 3 weeks; no comment posted.

**ALZET Comments:** Methylatropine; Oxotremorine; Saline; CSF/CNS; Rat; 2ML4; 3 weeks; comparison of agents effects in young and old rats; stability of drugs at 37C determined at weekly intervals for 5 wks by bioassay; delivery into lateral cerebroventricle.

**ALZET Comments:** Oxotremorine; Physostigmine sulfate; Saline; SC; Rat; 2002; 2 weeks; comparison of single sc injec vs. daily injec vs. mp infusion of agents effects.

5. Physostigmine

**ALZET Comments:** Physostigmine; water; SC; Rat; 2ML4; 3 weeks; 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.

**ALZET Comments:** Physostigmine; Mice; 2 weeks; Animal info (C57BL/6, 9 wks old); enzyme inhibitor (acetylcholinesterase); hindlimb ischemia.

**ALZET Comments:** Physostigmine; scopalamine; pyridostigmine bromide; SC; Guinea pig; 12 days;

**ALZET Comments:** Physostigmine; carbachol; nicotine; pirenzepine; oxotremorine; mecamylamine; Saline; CSF/CNS; Rat; 2002; 2004; Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 250 g.); neurodegenerative (Alzheimer’s Disease).

**ALZET Comments:** Pyridostigmine bromide; physostigmine; SC; Mice; 30 days; Controls received mp w/saline; animal info (male, C57BL6, 25 g); enzyme inhibitor (cholinesterase).

6. Pyridostigmine

**ALZET Comments:** Pyridostigmine bromide; SC; Rat; 2ML4; 3 weeks; animal info (male, SHR, 46 weeks old); cardiovascular; bp measured using radiotelemetry; Dose (15 mg/kg/day);.
**ALZET Comments:** Pyridostigmine bromide; donepezil; SC; Rat; 2004; 16 weeks; 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);

**ALZET Comments:** Pyridostigmine; Saline, sterile; SC; Mice; 1004; 4 weeks; 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;

**ALZET Comments:** Pyridostigmine; Saline; SC; Rat; 2ML4; 14 days; 28 days; 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;

**ALZET Comments:** Phystostigmine; scopolamine; pyridostigmine bromide; SC; Guinea pig; 12 days;

7. Scopolamine

**ALZET Comments:** Pirenzepine; Scopolamine hydrobromide; Metyrapone; luteinizing hormone; ACTH; PBS; CSF/CNS (Third ventricle); Mice (knockout); 1002; 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);

**ALZET Comments:** Scopolamine; SC; Mice; 1002; 2 weeks; Dose (0.1 mg/day); animal info (10–12-week-old female C57BL/6 mice); Therapeutic indication (experimental dry eye);

**ALZET Comments:** Butylscopolamine; PBS; SC; Mice; 1007D; 3 days; 5 days; 7 days;; Animal info (male, C57BL6J, 9-10 weeks old); ischemia (colitis);

**ALZET Comments:** Scopolamine; SC; Rat; 2ML4; 28 days; Control animals received mp w/ saline; animal info (male, Sprague Dawley, 200-220 g, adult);