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

1. Apomorphine

**Q4660:** T. T. Yan, *et al.* Daily Injection But Not Continuous Infusion of Apomorphine Inhibits Form-Deprivation Myopia in Mice. *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE* 2015;56(2475-2485

**Agents:** Apomorphine  
**Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 4 weeks;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, C57Bl6, 4 weeks old); functionality of mp verified by residual volume; pumps replaced every 2 weeks; comparison of injection vs mp;

**Q0779:** R. Sarkis, *et al.* Chronic dizocilpine or apomorphine and development of neuropathy in two rat models I: Behavioral effects and role of nucleus accumbens. *Experimental Neurology* 2011;228(1):19-29

**Agents:** MK-801; apomorphine HCL hemihydrate  
**Vehicle:** Saline; Ascorbic acid; **Route:** CSF/CNS (nucleus accumbens); **Species:** Rat; **Pump:** 2002; **Duration:** Not Stated;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (adult, female, Sprague Dawley, 200-300 g); post op. care (dexamethasone injections to prevent brain edema); behavioral testing (mechanical allodynia, Paw withdrawal latency, cold allodynia, hotplate test, spontaneous motor activity); cannula placement verified by picomicrograph of brain section; CCI, chronic constriction injury; SNI, spared nerve injury


**Agents:** MPTP; L-dopa; apomorphine  
**Vehicle:** Not Stated; **Route:** IP; SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 1-28 days;  
**ALZET Comments:** Controls received mp w/ saline; comparison of IP injections vs. mp; neurodegenerative (Parkinson's disease); L-dopa and apomorphine group had SC implanted pumps; route is unclear for the MPTP group; "Continuous MPTP infusions thus recreate a disease state that mimics human PD better than acute MPTP bolus injections." (p. 3417); MPTP group received IP pumps (2004 model), verified by e-mailing author

**P5291:** G. Battaglia, *et al.* Continuous subcutaneous infusion of apomorphine rescues nigro-striatal dopaminergic terminals following MPTP injection in mice. *Neuropharmacology* 2002;42(3):367-373

**Agents:** Apomorphine  
**Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 28 days;  
**ALZET Comments:** Controls received mp w/ vehicle; comparison of sc bolus injections vs. mp; 20-day stability verified by HPLC (p.368); neurodegenerative (Parkinson's disease); "The neurorescue effect of continuous subcutaneous infusion of apomorphine is particularly promising from a clinical standpoint." (p.372)

**Q7707:** F. Orzi, *et al.* Apomorphine as a neuroprotective drug: a study in MPTP-treated mice and potential relevance to ischemia. *Funct Neurol* 2001;16(4 Suppl):153-8

**Agents:** Apomorphine  
**Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 28 days;  
**ALZET Comments:** Dose (3.15 mg/kg/day); Controls received mp w/ vehicle; animal info (10 week old, C57, black); ischemia (Brain);

2. Bromocriptine


**Agents:** Bromocriptine; prolactin, ovine  
**Vehicle:** Saline, sterile; **Route:** SC; **Species:** Prairie vole; **Pump:** 2004; **Duration:** Not Stated;  
**ALZET Comments:** Controls received mp w/ vehicle; replacement therapy (gonadectomy); animal info (male, meadow); animals also received testosterone via silastic implant at same time

Agents: Bromocriptine Vehicle: Saline, isotonic; ethanol; tartaric acid; Route: SC; Species: Hamster; Pump: 1003D; Duration: 3 days;
ALZET Comments: Controls received mp w/ vehicle; comparison of SC injections vs. mp; 10% ethanol; mp primed in 37 degrees celsius saline for >4 hours; wound clips used


Agents: Prolactin; bromocriptine Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 1007D; Duration: 3 days;
ALZET Comments: Animal info (female, C57BL/6J)


Agents: Bromocriptine Vehicle: Saline; Route: Not Stated; Species: Mink; Pump: Not Stated; Duration: 13 days;
ALZET Comments: Controls received mp w/ vehicle


Agents: Cocaine HCI; SKF-82958; Bromocriptine; Hydrobromide, R(+)-6-bromo-APB; PD 128907 Vehicle: Saline; Route: SC; Species: Rat; Pump: 2ML1; Duration: 24, 48, 66, 72, 90, 96, 168, 336 hours;
ALZET Comments: controls received mp w/vehicle; dopamine agonists

3. Dinapsoline


ALZET Comments: Dinapsoline; DMSO; Ascorbic acid; CSF/CNS; Rat; 2ML2; 14 days; Controls received mp w/ vehicle; neurodegenerative (Parkinson's disease); vehicle used was 50% DMSO, 12.5% ascorbic acid; dinapsoline is a potent D_1 dopamine receptor agonist.

4. Domeperidone


ALZET Comments: Prolactin, ovine; domperidone; Sodium bicarbonate buffer; PEG 400; SC; Mice; 1003D; 1007D; 1002; 3, 12, 14, days; Controls received no treatment; functionality of mp verified by plasma prolactin levels; animal info (Balb/c, 18-30 days old).


ALZET Comments: Haloperidol; domperidone; water, distilled; saline; SC; Rat; mice; 1002; 2ML2; 2ML4; 14, 30 days; Controls received mp w/ vehicle; functionality of mp verified by plasma drug levels; dose-response (fig. 1); comparison of ip injections vs. mp; dopamine D2 receptor antagonist


ALZET Comments: Bromocriptine; Domperidone; PEG 400; SC; Rat; 2ML2; no duration posted; controls received mp w/ PEG; Immunology.
5. Dopamine


**Agents**: Dopamine, anaerobia **Vehicle**: Saline; **Route**: CSF/CNS; **Species**: Mice; **Pump**: 2001; **Duration**: 7 days;

**ALZET Comments**: Controls received mp w/ vehicle; animal info (5 month old C57Bl/6 J mice); neurodegenerative (Parkinson’s disease);


**Agents**: Guanethidine, 6-hydroxydopamine hydrochloride **Vehicle**: Saline, Ascorbic acid; **Route**: SC; **Species**: Rat; **Pump**: 2002; **Duration**: 2 weeks;

**ALZET Comments**: Controls received mp w/ vehicle; animal info (240-250g); Good alzet diagram;

**Q3720**: J. Wedel, *et al.* Simultaneous subcutaneous implantation of two osmotic minipumps connected to a jugular vein catheter in the rat. Laboratory Animals 2014;48(338-341

**Agents**: Dopamine, N-octanoyl **Vehicle**: Tween 80; saline; **Route**: IV (jugular); **Species**: Rat; **Pump**: 2ML4; **Duration**: 14 days;

**ALZET Comments**: animal info (male, Brown Norway, 230-270 g, female, Wistar, 280-310 g); good methods; "Our data show that double pump implantation is a feasible alternative to changing pumps or the use of extracorporeal pump systems connected via a long wire to partly restrained animals." pg 338; N-octanoyl-dopamine also known as NOD; multiple pumps (2) used; two pumps connected to Y connector, in-house made Y-tube; "we showed that the simultaneous implantation of two slow-flow rate osmotic pumps connected to a jugular vein catheter is feasible and is not linked to additional signs of discomfort compared with single pump-implanted rats." pg 341


**Agents**: Dopamine; SCH23390 **Vehicle**: Saline; **Route**: CSF/CNS (area X); **Species**: Bird (zebra finch); **Pump**: 1002; **Duration**: Not Stated;

**ALZET Comments**: Controls received mp w/ vehicle; good methods (pg 5731); ALZET brain infusion kit used; animal info (adult, male); Y-connector used; pump externalized with a backpack; pump placed inside microcentrifuge tube; cannula placement verified by histological examination


**Agents**: Amphetamine sulfate; Dopamine **Vehicle**: Propylene Glycol; **Route**: SC; CSF/CNS (nucleus accumbens); **Species**: Rat; **Pump**: 2ML2; **Duration**: 14 days;

**ALZET Comments**: comparison of injections and sylastic pellet vs mp; pulsed delivery; PE tubing contained drug and a dye in short sections interspersed with a substance immiscible with drug, to allow 12 hour infusions of drug and 12-hour infusions of the inert substance (perfluorodecalin) throughout a 14 day infusion period.; pumps primed in a physiological saline solution at 37°C for 4 hours.

6. Dopexamine


**ALZET Comments**: Dopexamine; dopamine; IP; Mice; 48 hours; Controls received saline & sham operation; immunology; polymicrobial sepsis induced cecal ligation & puncture (CLP).


**ALZET Comments**: Dopexamine; Isoprenaline; Saline; EDTA; HCl; IV (jugular); Rat; 2ML1; 7 days; controls received mp with saline.
7. Fenoldopam


**ALZET Comments:** Fenoldopam; PBS; SC; mice; 1004; 1 week, 3 weeks; Controls received mp w/ vehicle; animal info (Eight-week-old female athymic nu/nu mice; inoculated with MDA-MB-231 cells or SUM159 cells); functionality of mp verified by measurement of tumor volumes; cancer (breast cancer); dose-response (pg. 3109); Xenograft models; Dose (400 ng/kg/min or 133 ng/kg/min).

**P9731:** M. Z. Zhang, *et al.* Intrarenal Dopaminergic System Regulates Renin Expression. Hypertension 2009;53(3):564-570

**ALZET Comments:** Fenoldopam; SC; Rat; 2001; 1 week; Animal info (male, Sprague Dawley, 4-6 wks old).


**ALZET Comments:** Fenoldopam mesylate; Water, distilled; Citric acid; Propylene glycol; Sodium metabisulfate; IV (jugular); dog; 2ML2; no duration posted; controls received mp with vehicle; multiple pumps per animal (2).

**P1466:** J. Winkler, *et al.* Effect of continuous exposure to selective D1 and D2 dopaminergic agonists on rotational behavior in supersensitive mice. J. Pharmacol. Exp. Ther 1989;249(2):507-516

**ALZET Comments:** CY-208-243; Fenoldopam; N-0437; SKF-75670; Quinpirole; SKF-38393; Ascorbic acid; DMSO; Water; SC; mice; 2001; 7 days; Dopamine agonists; comparison of sc injections vs. mp infusion; stability verified in vitro at 37 degrees for 7 days.

8. Haloperidol

**Q8240:** T. A. Lanz, *et al.* Postmortem transcriptional profiling reveals widespread increase in inflammation in schizophrenia: a comparison of prefrontal cortex, striatum, and hippocampus among matched tetrads of controls with subjects diagnosed with schizophrenia, bipolar or major depressive disorder. Transl Psychiatry 2019;9(1):151

**Agents:** Haloperidol or Risperidone  
**Vehicle:** Acetic Acid;  
**Route:** CSF/CNS;  
**Species:** Rat;  
**Pump:** Not stated;  
**Duration:** 21 days;

**ALZET Comments:** Dose (haloperidol-0.25 mg/kg/day or risperidone-5 mg/kg/day); 1% Acetic Acid used; Controls received mp w/ vehicle; animal info (2 months old, Sprague Dawley, Male); neurodegenerative (Psychiatric Disorder);

**Q7829:** T. Hashimoto, *et al.* Lack of dopamine supersensitivity in rats after chronic administration of blonanserin: Comparison with haloperidol. European Journal of Pharmacology 2018;830(26-32)

**Agents:** Haloperidol; PG-01037 dihydrochloride  
**Vehicle:** Acetic Acid, glacial; NaOH; Tween 80 Buffered;  
**Route:** SC;  
**Species:** Rat;  
**Pump:** 2ML2;  
**Duration:** 14 days;

**ALZET Comments:** Dose (0.05, 0.5 mg/kg/day); distilled water containing 0.3% ascorbic acid / 10% cyclodextrin used; Controls received mp w/ vehicle; animal info (male, Sprague-Dawley, 330-380 g); behavioral testing (AMPH-induced locomotion, within-session habituation, acoustic startle response, novel object recognition); HAL is an antipsychotic drug that targets the postsynaptic D2 receptors; schizophrenia induced by amphetamine-sensitization-induced psychosis model;

**Q7829:** T. Hashimoto, *et al.* Lack of dopamine supersensitivity in rats after chronic administration of blonanserin: Comparison with haloperidol. European Journal of Pharmacology 2018;830(26-32)

**Agents:** Haloperidol; PG-01037 dihydrochloride  
**Vehicle:** Acetic Acid, glacial; NaOH; Tween 80 Buffered;  
**Route:** SC;  
**Species:** Rat;  
**Pump:** 2ML2;  
**Duration:** 14 days;

**ALZET Comments:** Dose ((haloperidol 0.75 mg/kg/day), PG-01037 (0.6 mg/kg/day)); 2% glacial acetic acid/H2O solution (pH 3.6 w/ NaOH) with 0.5% Tween 80 used; Controls received mp w/ vehicle; animal info (7 weeks, male, Wistar); post op. care (antibiotic treatment; identity not stated); behavioral testing (Quinpirole-induced hyperlocomotion); comparison of oral administration of haloperidol vs mp; PG-01037 is a selective dopamine D3 antagonist; minipumps were removed 14 days.
after implantation. "In this study, we were unable to use an osmotic pump for continuous administration of blonanserin due to poor solubility in the vehicle used for haloperidol." p.31;


**Agents:** haloperidol; olanzapine  **Vehicle:** Not Stated;  **Route:** SC;  **Species:** Mice;  **Pump:** 1007D;  **Duration:** 7 days;

**ALZET Comments:** "Dose ((Hal 0.5 mg/kg/d), (Ola 10 mg/kg/d)); Controls received mp w/ vehicle; animal info (6-12 weeks, male, C57BL/6 or homo- and heterozygous C57Bl6-D2eGFP); behavioral testing (TruScan open field); Resultant plasma level ((Hal 5.85 ± 0.27 ng/mL), (Ola 45.93 ± 5.72 ng/mL)); haloperidol (Hal) and olanzapine (Ola) are antipsychotic drugs; “Furthermore, in animal studies, APDs were often administered with regimens that fail to achieve the high D2R occupancy (>70%) required to yield therapeutic benefits (Farde et al., 1988; Kapur and Mamo, 2003; Kapur et al., 2003). To overcome such limitations, we delivered haloperidol or olanzapine via implanted osmotic mini-pumps, which offers a reliable method to obtain clinically meaningful levels of D2R blockade (Amato et al., 2011; Amato et al., 2018; Samaha et al., 2007, 2008).” pg.75 ; Vehicle control used but identity not stated. Brain concentration of agents include ((Hal 3.42 ± 0.42 ng/g), (Ola 26.32 ± 1.78 ng/g)); Therapeutic indication (chronic Hal- and Ola-treatments were able to at least partially reverse the AMPH-induced psychotic state by reversing the effects of amphetamines on reducing surface expression of GIRK channels); "


**Agents:** Haloperidol, olanzapine  **Vehicle:** Cyclodextrin, 2-Hydroxypropyl-B-;  **Route:** SC;  **Species:** Rat;  **Pump:** 2ML4;  **Duration:** 8 weeks;

**ALZET Comments:** Dose (Haloperidol- 2mg/ kg/ day, Olanzapine-10 mg/kg/ day ); Controls received mp w/ vehicle; animal info (10-week old, male, Sprague-Dawley, 240–250 g); pumps replaced every 4 weeks; long-term study; dependence;

9. L- dopa


**Agents:** L-DOPA; Benserazide  **Vehicle:** Not Stated;  **Route:** SC;  **Species:** Rat;  **Pump:** 2ML2;  **Duration:** 2 weeks;

**ALZET Comments:** Dose (12mg/kg/day); animal info (6-OHDA-lesioned male Sprague-Dawley rats weighing 275-300g); comparison of pulsatile injections vs mp; neurodegenerative (Parkinson’s disease);


**Agents:** L-DOPA Vehicle: Not Stated;  **Route:** CSF/CNS (striatum);  **Species:** Rat;  **Pump:** 2ML1; 2ML4;  **Duration:** 21 days;

**ALZET Comments:** Controls received mp w/ vehicle; pumps replaced every week; cyanoacrylate adhesive; ALZET brain infusion kit 2 used; animal info (male, Sprague Dawley)


**Agents:** L-DOPA  **Vehicle:** NaCl, isotonic; Ascorbic acid;  **Route:** CSF/CNS (striatum);  **Species:** Rat;  **Pump:** 2002;  **Duration:** 14 days;

**ALZET Comments:** Controls received mp w/ vehicle; dose-response (fig.2, pg. 302); animal info (male, Wistar, 190-230 g.); pumps incubated at 37 degree Celsius overnight in isotonic saline; behavioral (rotational behavioral); neurodegenerative (Parkinson’s Disease)

Agents: L-DOPA; benserazide  
Vehicle: Water, distilled  
Route: SC  
Species: Rat  
Pump: 2ML2  
Duration: 14 days  

ALZET Comments: Enzyme inhibitor (dopadecarboxylase); neurodegenerative (Parkinson's disease); animal info (male, albino Sprague-Dawley, 150-175g); nigrostriatal pathway lesions

Agents: MPTP; L-dopa; apomorphine  
Vehicle: Not Stated  
Route: IP; SC  
Species: Mice  
Pump: 2004  
Duration: 1-28 days  

ALZET Comments: Controls received mp w/ saline; comparison of IP injections vs. mp; neurodegenerative (Parkinson’s disease); L-dopa and apomorphine group had SC implanted pumps; route is unclear for the MPTP group; "Continuous MPTP infusions thus recreate a disease state that mimics human PD better than acute MPTP bolus injections." (p. 3417); MPTP group received IP pumps (2004 model), verified by e-mailing author

10. Lisuride

ALZET Comments: Lisuride; Hydrogen maleate; SC; Rat; 2ML1; Animal info (Sprague Dawley, male, 350-380 g).

ALZET Comments: Lisuride; Saline; Tartaric acid; SC; Rat; 2002; 14 days; stability.

ALZET Comments: Dopamine; Lisuride; Pergolide; Hydroxynaphthoxacine, 4-propyl-9-; HCl; Water; CSF/CNS; Rat; 1, 2 weeks; PHNO is dopamine D-2 receptor agonist;

ALZET Comments: Deprenyl; Dopamine; Lisuride; Pargyline; Pergolide; HCl; Sodium metabisulfite; Water; CSF/CNS; Rat; 2001; 6, 7 days; mp connected to cannula; stability of DA verified in several vehicles, p 146; concomitant DA infusion with pargyline; DA infusion with deprenyl; replacement therapy (dopamine deficiency); stability verified in vitro; antihypertensive; neurodegenerative (Parkinson’s disease).

ALZET Comments: Dopamine; Pargyline; Deprenyl; Lisuride; Pergolide; HCl; Sodium metabisulfate; CSF/CNS; Rat; 2001; 6, 7 days; controls received mp with vehicles; replacement therapy (lesion in dopamine pathway); stability verified for 1 week by measuring dopamine concentrations and its metabolites at varying time intervals with HPLC; concomitant dopamine infusion w/ pargyline and w/ deprenyl; antihypertensive; neurodegenerative (Parkinson's disease).

11. Metoclopramide

ALZET Comments: Angiotensin II; Dopamine; Metoclopramide; IP; IV; Rat; 2 days; simultaneous administration of MCP (iv) w/ All (ip), and MCP (iv) w/ DOP (iv); MCP and All also infused alone, all by mp; peptides.
ALZET Comments: Metoclopramide; IP; Rat; 7 days; no comment posted.

12. Nafadotride

ALZET Comments: Hydrobromide, R(+)-6-bromo-APB-SKF-38393; Nafadotride, (5)-bromocriptine; Cocaine HCl; Saline; Rat; 2ML1; 3 days; controls received mp w/ saline.

13. Other

Agents: SCH-23390 Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 2004; Duration: Not Stated;
ALZET Comments: Animal info (wt, COMT -/-); SCH-23390 is a D1-like receptor agonist

Agents: SCH-23390 Vehicle: DMSO; water, sterile; Route: SC; Species: Rat; Pump: 2001; Duration: Not Stated;
ALZET Comments: Controls received mp w/ vehicle; agent is a D1-like antagonist

Agents: SCH-23390 Vehicle: Saline, normal; Route: SC; Species: Rat; Pump: 1003D; Duration: 48 hours;
ALZET Comments: controls received mp with vehicle

Agents: Cocaine HCl; Eticlopride; SCH-23390 Vehicle: Saline; Route: SC; Species: Rat; Pump: 2001; Duration: 3 days;
ALZET Comments: controls received mp w/saline; eticlopride is a D1 & D2 receptor antagonist

Agents: SCH-23390 Vehicle: DMSO; Water; Route: SC; Species: mice; Pump: 2001; Duration: no duration posted;
ALZET Comments: controls received mp w/vehicle; pump implanted in flank

14. Pergolide

ALZET Comments: Dopamine; Lisuride; Pergolide; Hydroxynaphthoxacine, 4-propyl-9-; HCl; Water; CSF/CNS; Rat; 1, 2 weeks; PHNO is dopamine D-2 receptor agonist;..

ALZET Comments: Deprenyl; Dopamine; Lisuride; Pargyline; Pergolide; HCl; Sodium metabisulfite; Water; CSF/CNS; Rat; 2001; 6, 7 days; mp connected to cannula; stability of DA verified in several vehicles, p 146; concomitant DA infusion with
ALZET®
Bibliography

Pargyline; DA infusion with deprenyl; replacement therapy (dopamine deficiency); stability verified in vitro; antihypertensive; neurodegenerative (Parkinson’s disease).

**ALZET Comments:** Dopamine; Pargyline; Deprenyl; Lisuride; Pergolide; HCl; Sodium metabisulfate; CSF/CNS; Rat; 2001; 6,7 days; controls received mp with vehicles; replacement therapy (lesion in dopamine pathway); stability verified for 1 week by measuring dopamine concentrations and its metabolites at varying time intervals with HPLC; concomitant dopamine infusion w/ pargyline and w/ deprenyl; antihypertensive; neurodegenerative (Parkinson’s disease).

15. PHNO

**ALZET Comments:** Hydroxynaphthoxacine, 4-propyl-9-; Water, distilled; SC; Rat; 2002; 12 days; Controls received mp w/ vehicle; good methods (p.276-77); tolerance; PHNO is a selective dopamine D2 receptor agonist; "The advantages of using a continuous drug regimen are that sensitization and tolerance are produced independently of the confounding influences..." (p.275).

**ALZET Comments:** Hydroxynaphthoxacine, 4-propyl-9-;; Water, distilled;; SC;; Rat;; 2002;; 12 days;; controls received mp w/vehicle; tolerance; PHNO is a selective dopamine D2 receptor agonist.

**ALZET Comments:** Hydroxynaphthoxacine, 4-propyl-9-; SC; monkey; 7, 30, 40 days; Neurodegenerative (Parkinson’s disease); PHNO is dopamine D-2 receptor agonist.

**ALZET Comments:** Hydroxynaphthoxacine, 4-propyl-9-; SC; Rat; 2002; 11-15 days; 12 hours (intermittently); comparison of injections vs. mp infusion; functionality of mp verified in vitro; pulsed delivery using coiled tubing, intermittent inert placebo, 12h ‘on’ and 12h ‘off’; PHNO is dopamine D-2 receptor agonist.

**ALZET Comments:** Hydroxynaphthoxacine, 4-propyl-9-; SCH-23390; Water; SC; Rat; 2002; 11 days; controls received mp w/water; multiple pumps per animal (2); separate and simultaneous infusion of agents; PHNO is a dopamine antagonist.

16. Pramipexole

**ALZET Comments:** Pramipexole HCL; Mirtazapine; Pramipexole HCL; Mirtazapine; SC; Rat; 2002, 2ML4; 12 - 14 days; Controls received mp w/ vehicle; animal info (250-300 g, male Sprague-Dawley rats); For mirtazapine, saline brought to 5.5-6.0 pH with 1 N NaOH; good methods (pg. 79); neurodegenerative (Parkinson’s disease); behavioral testing (forelimb step task); PPX is a dopamine D2 receptor agonist; Mirtazapine is an atypical antidepressant; akinesia and risk-taking rat model; Dose (PPX 0.3 and 1.2 mg/kg/day; Mirtazapine 5 mg/kg/day);.

**ALZET Comments**: Pramipexole; Rat; Comparison of injections vs mp; “While higher therapeutic benefit in early morning akinesia was obtained with pramipexole CR (continuous release via ALZET pumps), motor impairment was reversed for several hours with pramipexole IR (instant release via injections)” pg 1508.


**ALZET Comments**: Pramipexole; SC; Rat; 14 days; Controls received mp w/ physiologic saline; animal info (Sprague Dawley, male, 270-320 g).

**Q0092**: B. Ferger, *et al.* Continuous Dopaminergic Stimulation by Pramipexole Is Effective to Treat Early Morning Akinesia in Animal Models of Parkinson’s Disease: A Pharmacokinetic-Pharmacodynamic Study Using in Vivo Microdialysis in Rats. Synapse 2010;64(7):533-541

**ALZET Comments**: Pramipexole; Saline; SC; Rat; 1007D; 2004; 2, 14 days; Controls received mp w/ vehicle; animal info (male, Wistar, 250-300 g.); comparison of SC injections vs mp; neurodegenerative (Parkinson’s Disease); “...this study highlights the potential benefit of CDS (continuous dopaminergic stimulation) using PPX-CR and the advantage over PPX-IR in two symptomatic PD models” pg 540; half-life "long" pg 534; haloperidol-induced catalepsy; pk study.


**ALZET Comments**: Pramipexole; Saline; SC; Rat; 2, 14 days; Controls received mp w/saline, physiological; animal info (male, Sprague Dawley, 270-320 g).


**ALZET Comments**: Cocaine; pramipexole; Saline; SC; Rat; 2ML2; 14 days; Functionality of mp verified by measuring residual volume; pulsed delivery - drugs administered either continuously or for 16 or 20 hrs per day (p. 409); study included behavioral testing; pramipexole is a direct dopamine agonist; microdialysis fiber attached to pump via catheter to minimize tissue necrosis caused by the cocaine (p. 408); intermittent delivery made possible by disconnecting and reconnecting an externalized catheter.

17. Quinpirole


**ALZET Comments**: Quinpirole hydrochloride; Water, sterile; SC; Rat; 2ML1; 7 days; Controls received sham mp; animal info (male, Sprague Dawley, adult, 250-300g); functionality of mp verified by incubating pumps after explantation in 37C saline and noted collected amount of fluid - post explantation in vitro testing; behavioral testing (tactile and cold allodynia); neuropathic pain; pumps primed in 37C saline for 2 hours;.


**ALZET Comments**: Apamin; muscimol; quinpirole; riluzole; FPL64176; nimodipine; picrotoxin; benzimidazolone; CSF/CNS (midbrain); CSF/CNS (dorsal striatum); Mice; 1002; 2 weeks; Animal info (eight-week-old, C57BL6/J, male); ALZET brain infusion kit 1 used; neurodegenerative (Parkinson’s disease).

**Q1584**: S. Hood, *et al.* Endogenous Dopamine Regulates the Rhythm of Expression of the Clock Protein PER2 in the Rat Dorsal Striatum via Daily Activation of D(2) Dopamine Receptors. Journal of Neuroscience 2010;30(42):14046-14058
**ALZET® Bibliography**

**ALZET Comments:** SCH23390; raclopride; quinpirole; SKF 81297; Water, distilled; SC; Rat; 2ML2; 5, 10 days; Controls received sham surgery; animal info (Wistar, male, 180-210 g); SCH23390 is a D1DA receptor antagonist; raclopride is a D2Da receptor antagonist; wound clips used.

**P2254:** T. M. Engber, *et al.* Differential effects of chronic dopamine D1 and D2 receptor agonists on rotational behavior and dopamine receptor binding. Eur. J. Pharmacol 1993;236(3):385-393

**ALZET Comments:** Quinpirole; SKF-38393; Ascorbate; DMSO; Water; IP; Rat; 2ML2; 19 days; Quinpirole is a dopamine agonist; controls received mp w/vehicle; functionality of mp verified upon removal; comparison of intermittent ip injections vs mp.

**P2670:** J. F. Chen, *et al.* Continuous treatment with the D2 dopamine receptor agonist quinpirole decreases D2 dopamine receptors, D2 dopamine receptor messenger RNA and proenkephalin messenger RNA, and increases mu opioid receptors in mouse striatum. Neuroscience 1993;54(3):669-680

**ALZET Comments:** Quinpirole; SKF-38393; Ascorbic acid; DMSO; mice; 6 days; Quinpirole is a dopamine agonist; controls received mp w/ vehicle.

18. **Remoxipride**


**ALZET Comments:** Remoxipride HCl; Sodium chloride; SC; Rat; 2002; 14 days; controls received sodium chloride; functionality of mp verified by checking blood levels of drug and determining residual drug amount; comparison of sc injections vs mp; remoxipride is an antipsychotic drug.


**ALZET Comments:** Remoxipride HCl; Haloperidol; Water; Acetic acid; SC; Rat; 3,14 days; controls received sham operations.