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

P6896: F. Fornai*, et al.* Parkinson-like syndrome induced by continuous MPTP infusion: Convergent roles of the ubiquitin-proteasome system and alpha-synuclein. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 2005;102(9):3413-3418
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

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

P7450: S. T. Leonard*, et al.* The role of prolactin and testosterone in mediating seasonal differences in the self-grooming behavior of male meadow voles, Microtus pennsylvanicus. PHYSIOLOGY & BEHAVIOR 2005;85(4):461-468
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

P7133: P. L. Brooks*, et al.* Dopamine agonist treatment before and after the birth reduces prolactin concentration but does not impair paternal responsiveness in Djungarian hamsters *Phodopus campbelli*. Hormones and Behavior 2005;47(3):358-366
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

P7705: T. P. Combs*, et al.* Sexual differentiation, pregnancy, calorie restriction, and aging affect the adipocyte-specific secretory protein adiponectin. Diabetes 2003;52(2):268-276
Agents: Prolactin; bromocriptine **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 3 days;
ALZET Comments: Animal info (female, C57BL/6J)

P5563: D. A. Douglas*, et al.* Luteotropic hormone receptors in the ovary of the mink (Mustela vison) during delayed implantation and early-postimplantation gestation. Biology of Reproduction 1998;59(3):571-578
Agents: Bromocriptine **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mink; **Pump:** Not Stated; **Duration:** 13 days;
ALZET Comments: Controls received mp w/ vehicle

P4191: A. V. Azaryan*, et al.* Transient upregulation of m opioid receptor mRNA levels in nucleus accumbens during chronic cocaine administration. Can. J. Physiol. Pharmacol 1998;76(278-283
Agents: Cocaine HCl; 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

P4791: A. G. Gulwadi*, et al.* Dinapsoline: Characterization of a D_1 dopamine receptor agonist in a rat model of Parkinson's disease. Journal of Pharmacology and Experimental Therapeutics 2001;296(2):338-344
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

P8230: A. J. Craven*, et al.* Prolactin delays hair regrowth in mice. Journal of Endocrinology 2006;191(2):415-425
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).

P7254: T. E. Kippin*, et al.* Dopamine specifically inhibits forebrain neural stem cell proliferation, suggesting a novel effect of antipsychotic drugs. Journal of Neuroscience 2005;25(24):5815-5823
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.

P3596: G. P. Martinelli*, et al.* Prolactin suppression enhances the effects of perioperative donor-specific blood transfusions on graft survival. J. Surg. Res 1996;64(190-197
ALZET Comments: Bromocriptine; Domperidone; PEG 400; SC; Rat; 2ML2; no duration posted; controls received mp w/ PEG; immunology.

5. Dopamine

Q6442: C. Laloux*, et al.* Continuous cerebroventricular administration of dopamine: A new treatment for severe dyskinesia in Parkinson's disease? Neurobiol Dis 2017;103(24-31
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);

Q6038: P. Dubovy*, et al.* Local chemical sympathectomy of rat bone marrow and its effect on marrow cell composition. Autonomic Neuroscience: Basic and Clinical 2017;206(19-27
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

Q0098: A. Leblois*, et al.* Striatal Dopamine Modulates Basal Ganglia Output and Regulates Social Context-Dependent Behavioral Variability through D_1 Receptors. Journal of Neuroscience 2010;30(16):5730-5743
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

R0352: A. A. Boulton. Animal Models of Dementia. Springer Protocols 2010;48(1-721
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 l2-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

P6552: R. Oberbeck*, et al.* Dopexamine and cellular immune functions during systemic inflammation. Immunobiology 2004;208(5):429-438
ALZET Comments: Dopexamine; dopamine; IP; Mice; 48 hours; Controls received saline & sham operation; immunology; polymicrobial sepsis induced cecal ligation & puncture (CLP).

P2831: S. W. Martin*, et al.* Effects of chronic intraveneous infusions of dopexamine and isoprenaline to rats on D1-, B1- and B2-receptor-mediated responses. Br. J. Pharmacol 1994;112(595-603
ALZET Comments: Dopexamine; Isoprenaline; Saline; EDTA; HCl; IV (jugular); Rat; 2ML1; 7 days; controls received mp with saline.

7. Fenoldpam

Q5317: D. C. Borcherding*, et al.* Expression and therapeutic targeting of dopamine receptor-1 (D1R) in breast cancer. Oncogene 2016;35(24):3103-13
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).

P3071: A. J. Nichols*, et al.* Effect of fenoldopam on the acute and subacute nephrotoxicity produced by amphotericin B in the dog. J. Pharmacol. Exp. Ther 1992;260(1):269-274
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);

Q7882: T. C. Uzuneser*, et al.* Schizophrenia dimension-specific antipsychotic drug action and failure in amphetamine-sensitized psychotic-like rats. European Neuropsychopharmacology 2018;28(12):1382-1393
Agents: haloperidol **Vehicle:** water, distilled, ascorbic acid and cyclodextrin 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;

Q7821: D. Groos*, et al.* Chronic antipsychotic treatment targets GIRK current suppression, loss of long-term synaptic depression and behavioural sensitization in a mouse model of amphetamine psychosis. J Psychopharmacol 2018;269881118812235
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);
"

Q7103: A. Calevro*, et al.* Effects of chronic antipsychotic drug exposure on the expression of Translocator Protein and inflammatory markers in rat adipose tissue. Psychoneuroendocrinology 2018;95(28-33
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

Q6625: G. Mulas*, et al.* Differential induction of dyskinesia and neuroinflammation by pulsatile versus continuous l-DOPA delivery in the 6-OHDA model of Parkinson's disease. Experimental Neurology 2016;286(83-92
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);

Q0502: M. Lebel*, et al.* Striatal inhibition of PKA prevents levodopa-induced behavioural and molecular changes in the hemiparkinsonian rat. NEUROBIOLOGY OF DISEASE 2010;38(1):59-67
Agents: L-DOPA **Vehicle:** Not Stated; **Route:** CSF/CNS (striatum); **Species:** Rat; **Pump:** 2004; 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)

P9062: T. M. Kaeaeriaeinen*, et al.* Serotonergic activation after 2-week intrastriatal infusion of L-dopa and slow recovery of circling in rats with unilateral Nigral lesions. Basic & Clinical Pharmacology & Toxicology 2008;102(3):300-307
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)

P7751: G. Bilbao*, et al.* Electrophysiological characterization of substantia nigra dopaminergic neurons in partially lesioned rats: Effects of subthalamotomy and levodopa treatment. Brain Research 2006;1084(175-184

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

P6896: F. Fornai*, et al.* Parkinson-like syndrome induced by continuous MPTP infusion: Convergent roles of the ubiquitin-proteasome system and alpha-synuclein. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 2005;102(9):3413-3418
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

Q1973: K. Zweckberger*, et al.* Effects of lisuride hydrogen maleate on pericontusional tissue metabolism, brain edema formation, and contusion volume development after experimental traumatic brain injury in rats. Neuroscience Letters 2011;499(3):189-193
ALZET Comments: Lisuride; Hydrogen maleate; SC; Rat; 2ML1; Animal info (Sprague Dawley, male, 350-380 g).

P1320: H. Wachtel*, et al.* Effect of chronic subcutaneous minipump infusion of lisuride upon locomotor activity of rats. J. Neural Transm 1988;27(177-183
ALZET Comments: Lisuride; Saline; Tartaric acid; SC; Rat; 2002; 14 days; stability.

P1446: J. Garcia de Yebenes*, et al.* Intracerebroventricular infusion of dopamine and its agonists in rodents and primates. ASAIO Transactions 1988;34(951-957
ALZET Comments: Dopamine; Lisuride; Pergolide; Hydroxynaphthoxacine, 4-propyl-9-; HCl; Water; CSF/CNS; Rat; 1, 2 weeks; PHNO is dopamine D-2 receptor agonist;.

P1313: J. G. de Yebenes*, et al.* Continuous intracerebroventricular infusion of dopamine and dopamine agonists through a totally implanted drug delivery system in animal models of Parkinson's disease. J. Neural Transm 1988;27(141-160
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).

P2709: J. G. de Yebenes*, et al.* Continuous intracerebroventricular infusion of dopamine and dopamine agonists through a totally implanted drug delivery system in animal models of Parkinson's disease. Movement Disorders 1987;2(3):143-158
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

P0391: G. Aguilera*, et al.* Dopaminergic modulation of aldosterone secretion in the rat. Endocrinology 1984;114(1):176-181
ALZET Comments: Angiotensin II; Dopamine; Metoclopramide; IP; IV; Rat; 2 days; simultaneous administration of MCP (iv) w/ AII (ip), and MCP (iv) w/ DOP (iv); MCP and AII also infused alone, all by mp; peptides.

P0124: V. Chan*, et al.* Hormonal regulation of testicular luteinizing hormone and prolactin receptors. Endocrinology 1981;108(5):1607-1612
ALZET Comments: Metoclopramide; IP; Rat; 7 days; no comment posted.

12. Nafadotride

P3446: A. V. Azaryan*, et al.* Mu opioid receptor mRNA in nucleus accumbens is elevated following dopamine receptor activation. Neurochem. Res 1996;21(11):1411-1415
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

Q0202: B. Yao*, et al.* Intrarenal Dopamine Attenuates Deoxycorticosterone Acetate/High Salt-Induced Blood Pressure Elevation in Part Through Activation of a Medullary Cyclooxygenase 2 Pathway. Hypertension 2009;54(5):1077-1083
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

P5474: E. M. Byrnes*, et al.* Dopamine antagonists during parturition disrupt maternal care and the retention of maternal behavior in rats. Pharmacology Biochemistry and Behavior 2002;73(4):869-875
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

P4367: S. A. Davidoff*, et al.* Acute administration of SCH23390 increases D_1 receptors on nonpyramidal neurons in rat mPFC. Synapse 2000;35(173-181
Agents: SCH-23390 **Vehicle:** Saline, normal; **Route:** SC; **Species:** Rat; **Pump:** 1003D; **Duration:** 48 hours;
ALZET Comments: controls received mp with vehicle

P3313: A. V. Azaryan*, et al.* Effect of chronic cocaine treatment on m- and d-opioid receptor mRNA levels in dopaminergically innervated brain regions. J. Neurochem 1996;66(443-448
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

P3341: T. Suzuki*, et al.* Morphine-induced place preference in the CXBK mouse: characteristics of u opioid receptor subtypes. Brain Research 1993;602(45-52
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

P1446: J. Garcia de Yebenes*, et al.* Intracerebroventricular infusion of dopamine and its agonists in rodents and primates. ASAIO Transactions 1988;34(951-957
ALZET Comments: Dopamine; Lisuride; Pergolide; Hydroxynaphthoxacine, 4-propyl-9-; HCl; Water; CSF/CNS; Rat; 1, 2 weeks; PHNO is dopamine D-2 receptor agonist;.

P1313: J. G. de Yebenes*, et al.* Continuous intracerebroventricular infusion of dopamine and dopamine agonists through a totally implanted drug delivery system in animal models of Parkinson's disease. J. Neural Transm 1988;27(141-160
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).

P2709: J. G. de Yebenes*, et al.* Continuous intracerebroventricular infusion of dopamine and dopamine agonists through a totally implanted drug delivery system in animal models of Parkinson's disease. Movement Disorders 1987;2(3):143-158
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

P5258: M. Ruzich*, et al.* Pinealectomy blocks stress-induced motor stimulation but not sensitization and tolerance to a dopamine D2 receptor agonist. Psychopharmacology (Berl) 2000;152(3):275-282
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).

P4536: J. D. Munro*, et al.* Circadian rhythm-dependent development of melatonin effects and tolerance to PHNO in rats. Pharmacology Biochemistry and Behavior 2000;65(3):495-501
ALZET Comments: Hydroxynaphthoxacine, 4-propyl-9-;; Water, distilled;; SC;; Rat;; 2002;; 12 days;; controls received mp w/vehicle; tolerance; PHNO is a selective dopamine D_2 receptor agonist.

P1884: G. M. Alexander*, et al.* Dopamine receptor changes in untreated and (+)-PHNO-treated MPTP parkinsonian primates. Brain Research 1991;547(181-189
ALZET Comments: Hydroxynaphthoxacine, 4-propyl-9-; SC; monkey; 7, 30, 40 days; Neurodegenerative (Parkinson's disease); PHNO is dopamine D-2 receptor agonist.

P1557: M. T. Martin-Iverson*, et al.* Chronic administration of a selective dopamine D-2 agonist: factors determining behavioral tolerance and sensitization. Psychopharmacology 1988;95(534-539
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.

P1233: M. T. Martin-Iverson*, et al.* Long-term motor stimulant effects of (+) -4-propyl-9-hydroxynaphthoxazine (PHNO), a dopamine D-2 receptor agonist: interactions with a dopamine D-1 receptor antagonist and agonist. Eur. J. Pharmacol 1988;149(25-31
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

Q5373: N. A. Holtz*, et al.* Pharmacologically distinct pramipexole-mediated akinesia vs. risk-taking in a rat model of Parkinson's disease. Prog Neuropsychopharmacol Biol Psychiatry 2016;70(77-84
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);.

R0319: M. Silindir*, et al.* The benefits of pramipexole selection in the treatment of Parkinson's disease. NEUROLOGICAL SCIENCES 2014;35(1505-1511
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.

Q1781: O. Chernoloz*, et al.* Long-term administration of the dopamine D3/2 receptor agonist pramipexole increases dopamine and serotonin neurotransmission in the male rat forebrain. JOURNAL OF PSYCHIATRY & NEUROSCIENCE 2012;37(2):113-121
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.

P9907: O. Chernoloz*, et al.* Sustained Administration of Pramipexole Modifies the Spontaneous Firing of Dopamine, Norepinephrine, and Serotonin Neurons in the Rat Brain. Neuropsychopharmacology 2009;34(3):651-661
ALZET Comments: Pramipexole; SC; Rat; 2, 14 days; Controls received mp w/saline, physiological; animal info (male, Sprague Dawley, 270-320 g).

P5488: E. H. Ellinwood*, et al.* Effect of daily dosing duration of direct and indirect dopamine receptor agonists: cocaine cross-tolerance following chronic regimens. European Neuropsychopharmacology 2002;12(5):407-415
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

Q3844: N. Cobacho*, et al.* Dopaminergic modulation of neuropathic pain: Analgesia in rats by a D2-type receptor agonist. Brain Research Bulletin 2014;106(62-71
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;.

Q0720: T. D. Aumann*, et al.* Neuronal activity regulates expression of tyrosine hydroxylase in adult mouse substantia nigra pars compacta neurons. Journal of Neurochemistry 2011;116(4):646-658
ALZET Comments: Apamin; muscimol; quinpirole; riluzole; FPL64176; nimodipine; picrotoxin; benzimidazolinone; 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 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(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

P2736: J. Georgieva*, et al.* Neurochemical effects of prolonged treatment with remoxipride as assessed by intracerebral microdialysis in freely moving rats. Prog. Neuro-Psychopharmacol. Biol. Psychiat 1994;18(1187-1201
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.

P2204: H. Ericson*, et al.* Subchronic treatment of rats with remoxipride fails to modify sigma binding sites in the brain. Eur. J. Pharmacol. - Mol. Pharmacol. Sect 1992;226(157-161
ALZET Comments: Remoxipride HCl; Haloperidol; Water; Acetic acid; SC; Rat; 3,14 days; controls received sham operations.