Recent References (2018-Present) on the Administration of Nicotine Using ALZET® Osmotic Pumps

Q10741: J. Zubcevic, *et al.* Nicotine Exposure During Rodent Pregnancy Alters the Composition of Maternal Gut Microbiota and Abundance of Maternal and Amniotic Short Chain Fatty Acids. Metabolites 2022;12(8):
Agents: Nicotine tartrate **Vehicle:** Saline, sterile; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 28 days;
ALZET Comments: Dose (6 mg/kg); Controls received mp w/ vehicle; animal info (Female Sprague Dawley; ~9 weeks old; Virgin); teratology; toxicology

Q10621: F. Navarrete, *et al.* Biomarkers of the Endocannabinoid System in Substance Use Disorders. Biomolecules 2022;12(3):
Agents: Nicotine **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (25 mg/kg/day); animal info (Male C57BL/6J); toxicology; dependence;

Q10757: E. Y. P. Kung Huang, *et al.* Effect of Dextromethorphan on Nicotine-Induced Reward, Behavioral Sensitization, Withdrawal Signs, and Drug Seeking-Related behavior in Rats. Nicotine and Tobacco Research 2022;
Agents: Nicotine, Dextromethorphan **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** 7 Days;
ALZET Comments: Dose (Nicotine 9 mg/kg/day; DM 10 mg/kg/day); animal info (Male Sprague Dawley; 8 weeks old; Weighed 300-400 g); behavioral testing (Locomotor activity); dependence; Therapeutic indication (Nicotine dependence);

Q10558: R. Joglekar, *et al.* Developmental Nicotine Exposure And Masculinization Of The Rat Preoptic Area. Neurotoxicology 2022;89(41-54
Agents: Nicotine **Vehicle:** DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** Not Stated;
ALZET Comments: Dose (2 mg/kg/day); Controls received mp w/ vehicle; animal info (Male; Female Sprague Dawley; Weighed 225-250 g); behavioral testing (Elevated plus maze); toxicology;

Q10532: E. R. Greco, *et al.* Maternal Nicotine Exposure Induces Congenital Heart Defects In The Offspring Of Mice. Journal of Cellular and Molecular Medicine 2022;26(3223-3234
Agents: Nicotine **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** Not Stated;
ALZET Comments: Dose: (0.75 or 1.5 mg/kg/day); animal info: adult Female mice at 8–10 weeks of age; post op. care: buprenorphine (0.05 mg/kg, s.c.) cardiovascular; good methods (pg. 3224)

Q10609: C. M. Francisco, *et al.* Resveratrol Reverses Male Reproductive Damage in Rats Exposed to Nicotine During The Intrauterine Phase and Breastfeeding. Andrology 2022;10(5):951-972
Agents: Nicotine **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 50 days;
ALZET Comments: Dose: Nicotine (2 mg/kg/day); Controls received mp w/ vehicle; animal info: Wistar rats pregnant female; cyanoacrylate glue used; pumps replaced after 28 days; dependence

Q10519: A. C. Dutra-Tavares, *et al.* Adolescent nicotine potentiates the inhibitory effect of raclopride, a D(2)R antagonist, on phencyclidine-sensitized psychotic-like behavior in mice. Toxicology and Applied Pharmacology 2022;456(116282
Agents: Nicotine **Vehicle:** Water, milli-Q; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 8 days;
ALZET Comments: Dose (24 mg/kg/day); Controls received mp w/ vehicle; animal info: C57BL/6 mice, post op. care: flunixin and enrofloxacin for pain and infection management; behavioral testing (Open field); dependence; no stress (see pg. 3)

Q10516: V. Despotovski, *et al.* Early Postnatal Exposure to Intermittent Hypercapnic Hypoxia (IHH), but Not Nicotine, Decreases Reelin in the Young Piglet Hippocampus. NEUROTOXICITY RESEARCH 2022;40(6):1859-1868
Agents: Nicotine **Vehicle:** Water, sterile; **Route:** IP; **Species:** Piglet; **Pump:** 2ML2; **Duration:** 12 days;
ALZET Comments: Dose (2 mg/kg/day); Controls received mp w/ vehicle; animal info (Piglets; Hypercapnic hypoxia exposure; 10-13 days old);

Q10509: B. Cruz, *et al.* Alcohol self-administration and nicotine withdrawal alter biomarkers of stress and inflammation and prefrontal cortex changes in Gbeta subunits. The American Journal of Drug and Alcohol Abuse 2022;1-12
Agents: Nicotine, hydrogren ditartrate **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (3.2 mg/kg/day); 0.9% saline used; animal info (Male; Rats; Weighed 250-300 g); wound clips used; dependence;

Q10403: S. Arakaki, *et al.* Role of noradrenergic transmission within the ventral bed nucleus of the stria terminalis in nicotine withdrawal-induced aversive behavior. Neuropsychopharmacology Reports 2022;42(2):233-237
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; 2ML4; **Duration:** Not Stated;
ALZET Comments: "Dose: (13.7 mg/kg/d) as nicotine tartrate (4.8 mg/kg/d as a nicotine base; Controls received mp w/ vehicle; animal info: Sprague–Dawley rats weighing 190–250g; behavioral testing (elevated plus-maze test; CPA test); dependence; Nicotine dependence in rats was established in rats by subcutaneous implantation with a nicotine-filled osmotic minipump (2ML2) for microdialysis experiments, 2ML4 for behavioral experiments"

Q10730: H. Xia, *et al.* Selecting Relevant Genes From Microarray Datasets Using a Random Forest Model. IEEE Access 2021;9(97813-97821
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** Not Stated;
ALZET Comments: animal info: pregnant Sprague Dawley (SD) rats; toxicology; dependence

Q10070: C. Y. Tsai, *et al.* Perinatal nicotine exposure alters lung development and induces HMGB1-RAGE expression in neonatal mice. Birth Defects Research 2021;113(7):570-578
Agents: Nicotine **Vehicle:** Saline, sterile; **Route:** SC; **Species:** Mice; **Pump:** 2001; 2004; **Duration:** 7 days; 28 days;
ALZET Comments: Dose (6 mg/kg/day); Controls received mp w/ vehicle; animal info (pregnant C57BL/6N mice); dependence;

Q10683: T. A. Slotkin, *et al.* Paternal Cannabis Exposure Prior to Mating, but Not Delta9-Tetrahydrocannabinol, Elicits Deficits in Dopaminergic Synaptic Activity in the Offspring. Toxicological Sciences 2021;184(2):252-264
Agents: Benzoapyrene, maternal; Nicotine bitartrate **Species:** Rat; **Pump:** 2ML4; **Duration:** 28 days;
ALZET Comments: Dose (benzoapyrene 30 ug/kg/day, nicotine 2 mg/kg/day); animal info (9 weeks old; Male Sprague Dawley); toxicology;

Q10662: V. S. T. Rodrigues, *et al.* Changes in Gut-Brain Axis Parameters in Adult Rats of Both Sexes with Different Feeding Pattern That Were Early Nicotine-Exposed. Food and Chemical Toxicology 2021;158(112656
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (6 mg/kg/day); Controls received mp w/ vehicle; animal info (3-month old Wistar virgin female rats caged with male rats; Pregnant rats individually housed;); toxicology;

Q9415: C. B. Pietrobon, *et al.* Pancreatic steatosis in adult rats induced by nicotine exposure during breastfeeding. Endocrine 2021;72(1):104-115
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (6 mg/kg/d); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (virgin female Wistar rats, 3 months old); Nicotine aka NIC; dependence;

Q9410: T. C. Peixoto, *et al.* Nicotine exposure during lactation causes disruption of hedonic eating behavior and alters dopaminergic system in adult female rats. Appetite 2021;160(105115
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (6 mg/kg body mass); Controls received mp w/ vehicle; animal info (Wistar rats, male and female); Nicotine aka Nic; dependence;

Q10287: T. Nemoto, *et al.* Prenatal Nicotine Exposure Induces Low Birthweight and Hyperinsulinemia in Male Rats. Frontiers in Endocrinology 2021;12(694336
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Dose: (3 mg nicotine/kg bodyweight/day); Controls received mp w/ vehicle; animal info: Wistar female rats (9 weeks old)teratology; dependence;

Q10263: M. J. Mulcahy, *et al.* Protein profiling in the habenula after chronic (-)-menthol exposure in mice. Journal of Neurochemistry 2021;158(6):1345-1358
Agents: Nicotine **Vehicle:** Ethanol; Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 10 days; 12 days;
ALZET Comments: Dose: (2 mg/kg/hr); (60% ethanol, 40% saline) vehicle used; Controls received mp w/ vehicle; animal info: Male C57/Bl6 mice 2.5–3.5 months of age and with weights of 20–32g; dependence;

Q9364: F. Matos-Ocasio, *et al.* Female rats display greater nicotine withdrawal-induced cellular activation of a central portion of the interpeduncular nucleus versus males: A study of Fos immunoreactivity within provisionally assigned interpeduncular subnuclei. Drug Alcohol Depend 2021;221(108640
Agents: Nicotine; Mecamylamine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (3.2 mg/kg/day Nicotine; 3.0 mg/kg Mecamylamine); Controls received mp w/ vehicle; animal info (Fully outbred adult Wistar rats, 260 g females, 400 g males); dependence;

Q10004: M. A. Kwiatkowski, *et al.* Chronic nicotine, but not suramin or resveratrol, partially remediates the mania-like profile of dopamine transporter knockdown mice. European Neuropsychopharmacology 2021;42(75-86
Agents: Nicotine Hydrogen Tartrate **Vehicle:** Saline, Sterile; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 26 days;
ALZET Comments: Dose (40 mg/kg/day); 0.9% Sterile Saline used; Controls received mp w/ vehicle; animal info (male wildtype C57BL6/J mice, 50 to 60 weeks old); behavioral testing (Behavioral Pattern Monitor); dependence;

Q9309: B. Kim, *et al.* Chronic nicotine impairs sparse motor learning via striatal fast-spiking parvalbumin interneurons. Addiction Biology 2021;26(3):e12956
Agents: Nicotine ditartrate **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 2 weeks;
ALZET Comments: Dose (24 mg/kg/day); Controls received mp w/ vehicle; animal info (2- to 3-month-old C57BL/6J male mice); behavioral testing (Open field test; light-dark transition; rotarod test); dependence;

Q10533: T. E. Grieder, *et al.* Administration of BDNF in the ventral tegmental area produces a switch from a nicotine-non-dependent D1R-mediated motivational state to a nicotine-dependent-like D2R-mediated motivational state. European Journal of Neuroscience 2021;55(3):714-724
Agents: Nicotine hydrogen tartrate **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 12 days;
ALZET Comments: Dose: (7 mg/kg/day)Controls received mp w/ vehicle; animal info: 10 weeks old C57BL/6 WT mice; dependence;

Q8732: L. R. Goldberg, *et al.* Paternal nicotine enhances fear memory, reduces nicotine administration, and alters hippocampal genetic and neural function in offspring. Addiction Biology 2021;26(1):E12859
Agents: Nicotine Hydrogen Tartrate Salt **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;
ALZET Comments: Dose (12.6 mg/kg/day); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male, 8 weeks old); dependence;

Q10377: A. C. Dutra-Tavares, *et al.* Does nicotine exposure during adolescence modify the course of schizophrenia-like symptoms? Behavioral analysis in a phencyclidine-induced mice model. PLoS One 2021;16(9):e0257986
Agents: Nicotine **Vehicle:** Water, milli-Q; NaOH; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** Not Stated;
ALZET Comments: Dose (24 mg/kg/day); Controls received mp w/ vehicle; animal info (Male; Female); behavioral testing (Open field; Novel object recognition; Memory task; 3-chamber sociability); toxicology;

Q9852: P. Zhang, *et al.* Inhibition of Autophagy Signaling via 3-methyladenine Rescued Nicotine-Mediated Cardiac Pathological Effects and Heart Dysfunctions. International Journal of Biological Sciences 2020;16(8):1349-1362
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 30 days;
ALZET Comments: Dose (4 µg/kg/min); Controls received mp w/ vehicle; animal info (Sprague-Dawley male rats (8-months-old)); ischemia (cardiac injury);

Q10071: P. C. Tsai, *et al.* Sympathetic activation of splenic T-lymphocytes in hypertension of adult offspring programmed by maternal high fructose exposure. Chinese Journal of Physiology 2020;63(6):263-275
Agents: Nicotine **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (male and virgin female adult Sprague-Dawley rats, 12-14 weeks old); Blood pressure measured via tail-cuff method;105 mmHg - 130 mmHg; cardiovascular;

Q8943: T. Sato, *et al.* Suppressive effect of ghrelin on nicotine-induced clock gene expression in the mouse pancreas. Endocrine Journal 2020;67(1):73-80
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Dose (1.67 ng/0.5 uL/hr/20 g); Controls received mp w/ vehicle; animal info (Male C57BL/6J Jcl mice) 19-21g; Resultant plasma level (23 fmol/mL Ghrelin); dependence;

Q9431: M. A. Robble, *et al.* Differential Effects of Nicotine and Nicotine Withdrawal on Fear Conditioning in Male Rats. International Journal of Neuropsychopharmacology 2020;23(7):469-479
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** SMP-200; **Duration:** 21 days;
ALZET Comments: Dose (1.0 mg/d or 0.3 mg/d); Controls received mp w/ vehicle; animal info (Male Long-Evans rats , 300–350 g); dependence;

Q8847: T. C. Peixoto, *et al.* Nicotine exposure during breastfeeding reduces sympathetic activity in brown adipose tissue and increases in white adipose tissue in adult rats: Sex-related differences. Food and Chemical Toxicology 2020;140(111328
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (6 mg/kg of nicotine per day); Controls received mp w/ vehicle; animal info (Lactating Wistar rats); teratology;

Q8667: R. A. Miranda, *et al.* Thyroid redox imbalance in adult Wistar rats that were exposed to nicotine during breastfeeding. Scientific Reports 2020;10(1):15646
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (6 mg/kg/day); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (Pregnant female Wistar rats); Nicotine aka NIC; dependence;

Q8581: B. Kim, *et al.* Chronic nicotine impairs sparse motor learning via striatal fast-spiking parvalbumin interneurons. Addict Biol 2020;e12956
Agents: Nicotine ditartrate **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 2 weeks;
ALZET Comments: Dose (24 mg/kg/day); Controls received mp w/ vehicle; animal info (2- to 3-month-old C57BL/6J male mice); behavioral testing (Open field test; light-dark transition; rotarod test); dependence;

Q9791: R. J. Keeley, *et al.* Intrinsic differences in insular circuits moderate the negative association between nicotine dependence and cingulate-striatal connectivity strength. Neuropsychopharmacology 2020;45(6):1042-1049
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 14 days;
ALZET Comments: Dose (1.2 or 4.8 mg/kg/day); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Sprague Dawley, 275-300 g); dependence;

Q8865: T. Kazemi, *et al.* Investigating the influence of perinatal nicotine exposure on genetic profiles of neurons in the sub-regions of the VTA. Scientific Reports 2020;10(1):2419
Agents: Nicotine hydrogen tartrate **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (6 mg/kg/day); Controls received mp w/ vehicle; animal info (Pregnant female Sprague Dawley rats); dependence;

Q8553: G. Jia, *et al.* Nicotine induces cardiac toxicity through blocking mitophagic clearance in young adult rat. Life Sciences 2020;257(118084
Agents: Nicotine **Vehicle:** Not stated; **Route:** SC; **Species:** Rat; **Pump:** Not stated; **Duration:** 6 weeks;
ALZET Comments: Dose (3 mg/kg/day); Controls received mp w/ vehicle; animal info (Sprague-Dawley rats, 2-4 months old); toxicology;

Q9250: I. Gorna, *et al.* Electronic Cigarette Use and Metabolic Syndrome Development: A Critical Review. Toxics 2020;8(4):
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Mice; Rat; **Pump:** Not Stated; **Duration:** 28 days;
ALZET Comments: Dose (0.8 mg/kg/d; 4 mg/kg/d); Controls received mp w/ vehicle; animal info (Male C57BL/6J mice, 8 weeks old; Female and Male Sprague Dawley OFA rats); dependence;

Q8474: K. Fukuyama, *et al.* Upregulated Connexin 43 Induced by Loss-of-Functional S284L-Mutant alpha4 Subunit of Nicotinic ACh Receptor Contributes to Pathomechanisms of Autosomal Dominant Sleep-Related Hypermotor Epilepsy. Pharmaceuticals (Basel) 2020;13(4):
Agents: Zonisamide; Nicotine **Vehicle:** Not stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** 7 days;
ALZET Comments: Dose (40 mg/kg/day Zonisamide, 10, 25 and 50 mg/kg/day Nicotine); animal info (Male S286L-TG and wild-type littermates); Zonisamide aka ZNS; neurodegenerative (Epilepsy);

Q8848: R. J. Flores, *et al.* Estradiol promotes and progesterone reduces anxiety-like behavior produced by nicotine withdrawal in female rats. Psychoneuroendocrinology 2020;119(104694
Agents: Nicotine **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (3.2 mg/kg/day); animal info (Male and female Wistar rats); behavioral testing (physical signs test, Anxiety-like behavior assessments); replacement therapy (Estradiol, progesterone);

Q8379: F. Diaz, *et al.* Simultaneous nicotine and oral contraceptive exposure alters brain energy metabolism and exacerbates ischemic stroke injury in female rats. J Cereb Blood Flow Metab 2020;271678X20925164
Agents: Nicotine Hydrogen Tartrate **Vehicle:** Saline; **Route:** CNS/CSF; **Species:** Rat; **Pump:** 2ML2; **Duration:** 21 days;
ALZET Comments: Dose (4.5 mg/kg/day); Controls received mp w/ vehicle; animal info (Sprague Dawley, 6 or 14 weeks old); ischemia (Stroke);

Q8722: N. d'Adesky, *et al.* Nicotine Exposure Along with Oral Contraceptive Treatment in Female Rats Exacerbates Post-cerebral Ischemic Hypoperfusion Potentially via Altered Histamine Metabolism. Translational Stroke Research 2020;
Agents: Nicotine Hydrogen Tartrate **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** ML2; **Duration:** 16, 21 days;
ALZET Comments: Dose (4.5 mg/kg/day); Controls received mp w/ vehicle; animal info (Female, Sprague Dawley, 6 or 14 weeks old); ischemia (Hypoperfusion);

Q8388: D. Bhattacharya, *et al.* Concurrent nicotine exposure to prenatal alcohol consumption alters the hippocampal and cortical neurotoxicity. Heliyon 2020;6(1):e03045
Agents: Nicotine **Vehicle:** Alcohol, Saline; **Route:** SC; **Species:** Rat; **Pump:** Not stated; **Duration:** Not stated;
ALZET Comments: Dose (6 mg/kg/day); Controls received mp w/ vehicle; animal info (Sprague Dawley (Time pregnant) rats); behavioral testing (Y maze); toxicology;

Q8387: I. M. Bertasso, *et al.* Programming of hepatic lipid metabolism in a rat model of postnatal nicotine exposure - Sex-related differences. Environmental Pollution 2020;258(113781
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (6 mg/kg/ day); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (pregnant lactating Wistar rat); toxicology;

Q8340: J. Avraam, *et al.* Perinatal Nicotine Reduces Chemosensitivity of Medullary 5-HT Neurons after Maturation in Culture. Neuroscience 2020;446(80-93
Agents: Nicotine Bitartrate **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: Dose (6 mg/kg/day or 60 mg/kg/day); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (pregnant ePET-EYFP mice); dependence;

Q8972: P. Zanos, *et al.* Chronic nicotine administration restores brain region specific upregulation of oxytocin receptor binding levels in a G72 mouse model of schizophrenia. European Journal of Neuroscience 2019;50(3):2255-2263
Agents: Nicotine, (-) hydrogen tartrate salt **Vehicle:** Saline, Physiological; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (24 mg/kg/day); Controls received mp w/ vehicle; animal info (10-12 weeks, female, CD-1 and G72 transgenic, 31-35g); dependence; pump model not stated;

Q7644: N. L. Yohn, *et al.* Effects of nicotine and stress exposure across generations in C57BL/6 mice. Stress 2019;22(1):142-150
Agents: Nicotine hydrogen tartrate, (-)- **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 28 days;
ALZET Comments: Dose (18 mg/kg/day); Controls received mp w/ vehicle; animal info (6-8 weeks, male and female, C57BL/6NTac, 20-30g); behavioral testing (stress exposure); dependence; "While the minipump does not recapitulate the pulsatile mode of NIC delivery experienced by human smokers, it does provide several experimental advantages. For example, minipumps allow for consistent administration of NIC doses across subjects, precise temporal control over the initiation and termination of NIC treatment, and their ease of use facilitated replication across cohorts." pg.143 ; pumps implanted for PND 28–56 before being removed. Stress exposure tests described in supplementary data although access to pages is limited.;

Q9112: J. Yang, *et al.* Age- and Nicotine-Associated Gene Expression Changes in the Hippocampus of APP/PS1 Mice. Journal of Molecular Neuroscience 2019;69(4):608-622
Agents: Nicotine Hydrogen Tartrate **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (48 mg/kg/hour); Controls received mp w/ vehicle; animal info (Male, 4-6 months old); neurodegenerative (Alzheimer's Disease);

Q9019: S. Tan, *et al.* Sex differences in the reward deficit and somatic signs associated with precipitated nicotine withdrawal in rats. Neuropharmacology 2019;160(107756
Agents: Nicotine; Mecamylamine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (3.16 mg/kg/day nicotine; 1 mg/kg mecamylamine); 0.9% NaCl used; Controls received mp w/ vehicle; animal info (Wistar rats, males 200-225 g, females 175-200 g); behavioral testing (Large Open Field Test; Elevated Plus Maze Test); dependence;

Q9075: T. A. Slotkin, *et al.* The Developmental Neurotoxicity of Tobacco Smoke Can Be Mimicked by a Combination of Nicotine and Benzo[a]Pyrene: Effects on Cholinergic and Serotonergic Systems. Toxicological Sciences 2019;167(1):293-304
Agents: Nicotine bitartarate; Benzo[a]pyrene; Both **Vehicle:** H2O; DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 weeks;
ALZET Comments: Nicotine bitartarate or Benzo[a]pyrene or both

Q6791: R. Saravia, *et al.* Anti-inflammatory agents for smoking cessation? Focus on cognitive deficits associated with nicotine withdrawal in male mice. Brain, Behavior, and Immunity 2019;75(228-239
Agents: Nicotine hydrogen tartate salt **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (25 mg/kg/day); animal info (8-weeks old male C57BL/6J mice (Charles River).); dependence;

Q8816: N. Raikwar, *et al.* Renal denervation and CD161a immune ablation prevent cholinergic hypertension and renal sodium retention. American Journal of Physiology Heart and Circulatory Physiology 2019;317(3):H517-H530
Agents: Nicotine Bitartarate Salt **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 2 weeks;
ALZET Comments: Dose (15 mg/kg/day); Controls received mp w/ vehicle; animal info (3-4 week old, Male); post op. care (Buprenorphine); Blood pressure measured via Tail-cuff Plethysmography; cardiovascular;

Q8791: S. J. Page, *et al.* Effects of acute and chronic nicotine on catecholamine neurons of the nucleus of the solitary tract. American Journal of Physiology Regulatory Integrative and Comparative Physiology 2019;316(1):R38-R49
Agents: Nicotine **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 14 days;
ALZET Comments: Dose (24 mg/kg/day); animal info (8-16 weeks old, 20-30 g, C57BL/6J); dependence;

Q10253: D. Malin, *et al.* Inverse agonists of the 5-HT2A receptor reduce nicotine withdrawal signs in rats. Neuroscience Letters 2019;713(134524
Agents: Nicotine bitartrate **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** 7 days;
ALZET Comments: Dose: (9 mg/kg/day); Controls received mp w/ vehicle; animal info: Thirty-seven male Sprague-Dawley rats, weighing from 284 to 323 g; behavioral testing: (Fisher's LSD and Dunnett's tests); dependence;

Q9359: D. Malin, *et al.* Inverse agonists of the 5-HT2A receptor reduce nicotine withdrawal signs in rats. Neuroscience Letters 2019;713(134524
Agents: Nicotine bitartrate **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML1; **Duration:** 7 days;
ALZET Comments: Dose (9 mg/kg/day); Controls received mp w/ vehicle; animal info (male Sprague-Dawley rats, 284 to 323 g); behavioral testing (Fisher's LSD and Dunnett's tests); dependence;

Q7535: E. D. Levin, *et al.* Prolonging the Reduction of Nicotine Self-Administration in Rats by Coadministering Chronic Nicotine With Amitifadine, a Triple Monoamine Reuptake Inhibitor With CYP2B6 Inhibitory Actions. Nicotine Tob Res 2019;
Agents: Nicotine Ditartrate **Vehicle:** Saline; **Route:** SC, IV (jugular); **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 weeks;
ALZET Comments: Dose (2.5 mg/kg/day); animal info (Young adult female Sprague-Dawley rats); post op. care (ketoprofen, bupivacaine); behavioral testing (dual-lever experiment);

Q6064: R. F. Keller, *et al.* Comparison between dopaminergic and non-dopaminergic neurons in the VTA following chronic nicotine exposure during pregnancy. Sci Rep 2019;9(1):445
Agents: Nicotine hydrogen tartrate salt **Vehicle:** Saline; **Route:** SC; **Species:** Rat (pregnant); **Pump:** Not Stated; **Duration:** 28 days;
ALZET Comments: Dose (6 mg/kg/d); Controls received mp w/ vehicle; animal info (Pregnant female Sprague–Dawley (SD) rats); dependence;

Q8219: R. J. Keeley, *et al.* Differential expression of nicotine withdrawal as a function of developmental age in the rat. Pharmacol Biochem Behav 2019;187(172802
Agents: Nicotine Hydrogen Bitartrate salt **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (1.2 mg/kg/d or 4.8 mg/kg/d); Controls received mp w/ vehicle; animal info (Male Sprague-Dawley rats, p25-p28 or p59-p62); post op. care (buprenorphine); behavioral testing (Precipitated withdrawal test); dependence;

Q7598: L. M. Hsu, *et al.* Intrinsic Insular-Frontal Networks Predict Future Nicotine Dependence Severity. J Neurosci 2019;39(25):5028-5037
Agents: Nicotine hydrogen tartrate salt **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 2ML4; **Duration:** 14 days;
ALZET Comments: Dose (1.2, 4.8 mg/kg/day); saline pH adjusted to 7.2+/-0.5 used; Controls received mp w/ vehicle; animal info (male, Sprague-Dawley, 275-300g); behavioral testing (Precipitated withdrawal); pulsed delivery (Lynch coil 1hr-ON-1hr-OFF); dependence;

Q7585: E. D. Holliday, *et al.* Stress and nicotine during adolescence disrupts adult hippocampal-dependent learning and alters stress reactivity. Addiction Biology 2019;e12769
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 12 days;
ALZET Comments: Dose (12.6 mg/kg/day); Controls received mp w/ vehicle; animal info (preadolescent (P23), adolescent (P38), or adult (P54), male, C57BL/6J); behavioral testing (fear conditioning); dependence; "While noncontingent nicotine administration does not recapitulate all aspects of human smoking, this dose and method of nicotine administration was used because it maintains blood plasma levels of nicotine similar to levels reported in smokers and it ensures that all mice receive identical doses of nicotine." pg.3; pumps were removed on day 12 of infusion;

Q7526: A. B. Hawkey, *et al.* Paternal nicotine exposure in rats produces long-lasting neurobehavioral effects in the offspring. Neurotoxicol Teratol 2019;74(106808
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 56 days;
ALZET Comments: Dose (2 mg/kg/day); Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 200-250 g); behavioral testing (Housing and behavioral test, Elevated plus maze test, Figure 8 apparatus test); pumps replaced every 4 weeks; dependence

Q8027: A. Hawkey, *et al.* Gestational exposure to nicotine and/or benzo[a]pyrene causes long-lasting neurobehavioral consequences. Birth Defects Res 2019;111(17):1248-1258
Agents: Nicotine or benzo [a]pyrene, or Nicotine +BaP **Vehicle:** DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 weeks;
ALZET Comments: Dose (Nicotine-2 mg/kg/day or BaP- 0.03 mg/kg/day); Controls received mp w/ vehicle; animal info (Sprague Dawley, Female); behavioral testing (Elevated Plus Maze Test, Radial Maze Test); benzo [a]pyrene aka BaP ; neurodegenerative (Neurobehavioral Impairment);

Q8009: D. Gittings, *et al.* Chronic Nicotine Exposure Alters Uninjured Tendon Vascularity and Viscoelasticity. Foot & Ankle Orthopaedics 2019;4(2):
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 12 weeks;
ALZET Comments: Dose (36 mg/ml); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Sprague Dawley, 10-13 weeks old, 367-425 g); long-term study; dependence;

Q7998: X. Fu, *et al.* Brain Region Specific Single-Molecule Fluorescence Imaging. Anal Chem 2019;91(15):10125-10131
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 12 days;
ALZET Comments: Dose (0.7 mg/kg/h); Controls received mp w/ vehicle; animal info (2-5 months old, Male); dependence;

Q7471: K. E. Eklund, *et al.* Examination of the Gateway Hypothesis in a rat model. Pharmacol Biochem Behav 2019;179(89-97
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 21 days;
ALZET Comments: Dose (6 mg/kg/day); Controls received mp w/ vehicle; animal info (Sprague Dawley); post op. care (buprenorphine); dependence;

Q9764: J. B. Dwyer, *et al.* Prenatal nicotine sex-dependently alters adolescent dopamine system development. Translational Psychiatry 2019;9(1):304
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 2 weeks;
ALZET Comments: Dose (3 mg/kg/day); Controls received mp w/ vehicle; animal info (Sprague Dawley); dependence;

Q7468: G. Donvito, *et al.* N-Oleoyl-glycine reduces nicotine reward and withdrawal in mice. Neuropharmacology 2019;148(320-331
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (24 mg/kg/day); Controls received mp w/ vehicle; animal info (6-8 weeks old, Male, 27-32 g); dependence;

Q6079: D. DiPalma, *et al.* Persistent attenuation of nicotine self-administration in rats by co-administration of chronic nicotine infusion with the dopamine D1 receptor antagonist SCH-23390 or the serotonin 5-HT2C agonist lorcaserin. Pharmacol Biochem Behav 2019;176(16-22
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 weeks;
ALZET Comments: Dose (2.5 mg/kg/day); Controls received mp w/ vehicle; animal info (young adult female Sprague-Dawley rats, aged 66–72 days with an average weight of 210 g); post op. care (ketoprofen (5 mg/kg, s.c.); topical bupivacaine); behavioral testing (lever press);

Q7279: Y. Ding, *et al.* Peroxynitrite-Mediated SIRT (Sirtuin)-1 Inactivation Contributes to Nicotine-Induced Arterial Stiffness in Mice. Arteriosclerosis, Thrombosis, and Vascular Biology 2019;ATVBAHA118312346
Agents: Nicotine **Vehicle:** Saline; **Route:** Not Stated; **Species:** Mice; **Pump:** 2006; **Duration:** 4 weeks;
ALZET Comments: Dose (5 mg/kg/day); Controls received mp w/ vehicle; animal info (8 weeks of age, WT and Sirt1Super mice); cardiovascular;

Q6978: R. D. Cole, *et al.* Adolescent and adult nicotine exposure differentially impacts oral nicotine and oral saccharin self-administration in mice. Behavioural Brain Research 2019;359(836-844
Agents: nicotine hydrogen tartrate **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1002; **Duration:** 2 weeks;
ALZET Comments: Dose (3.0 mg/kg/d - adolescent, 6.3 mg/kg/d-adult); Controls received mp w/ vehicle; animal info (adolescent, adult); stability verified by (measuring the residual volume following surgical removal
at the end of the exposure period for each time point); half-life 10 min (p.841); dependence;

Q7968: K. J. Clemens, *et al.* Pre-quit nicotine decreases nicotine self-administration and attenuates cue- and drug-induced reinstatement. J Psychopharmacol 2019;33(3):364-371
Agents: Nicotine, (-) hydrogen tartrate salt **Vehicle:** Saline, heparin buffered; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Dose (2.1 mg/kg/day); saline (pH 7.4 with sodium hydroxide) with 25IU helparin used; Controls received sham surgery; animal info (male, Sprague-Dawley and Long Evans, 175–200g and 200–250g); post op. care (betadine ointment and recovery on a heating pad); behavioral testing (cue-reinstatement test); functionality of mp verified by weight after mp removal; dependence; pumps removed and reinstated on days 7 and 13. procedure listed on p.366;

Q7275: A. N. Cheema, *et al.* Nicotine impairs intra-substance tendon healing after full thickness injury in a rat model. J Orthop Res 2019;37(1):94-103
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 3 months;
ALZET Comments: Dose (61 mg/mL); Controls received mp w/ vehicle; animal info (adult male Sprague-Dawley rats 400-450g); pumps replaced every 4 weeks;

Q8173: L. Buls Wollman, *et al.* Developmental Nicotine Exposure Alters Synaptic Input to Hypoglossal Motoneurons and Is Associated with Altered Function of Upper Airway Muscles. eNeuro 2019;6(6):
Agents: Nicotine Tartrate, Bi- **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 1007D; **Duration:** 16 days;
ALZET Comments: Dose (6 mg/kg/d); Controls received mp w/ vehicle; animal info (Sprague Dawley rat pups of either sex, ranging in age from P1 through P7); dependence;

Q7398: M. Biet, *et al.* In utero exposure to nicotine abolishes the postnatal response of the cardiac sodium current to isoproterenol in newborn rabbit atrium. Heart Rhythm 2019;16(4):494-501
Agents: Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rabbit; **Pump:** 2ML2; **Duration:** 14 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (New Zealand, female); Multiple pumps per animal (2); Resultant plasma level ((100 and 150 ng/mL)); cardiovascular;

Q6986: R. B. Bassey, *et al.* Combined early life stressors: Prenatal nicotine and maternal deprivation interact to influence affective and drug seeking behavioral phenotypes in rats. Behavioural Brain Research 2019;359(814-822
Agents: Nicotine hydrogen tartrate **Vehicle:** Saline; **Route:** SC; **Species:** Rat (pregnant); **Pump:** 2004; **Duration:** 14 days;
ALZET Comments: Dose (4 mg/kg/day); 0.9% saline used; Controls received mp w/ vehicle; animal info (Timed-pregnant Sprague-Dawley rats 250 g- 300 g); pumps implanted during gestation); behavioral testing (open field test, forced swim test); dependence;

Q7365: M. C. Arvin, *et al.* Chronic Nicotine Exposure Alters the Neurophysiology of Habenulo-Interpeduncular Circuitry. J Neurosci 2019;39(22):4268-4281
Agents: Nicotine hydrogen-tartrate **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Dose (12 mg/kg/d); animal info (6-24 weeks old); dependence;

Q10268: A. Adeluyi, *et al.* Microglia morphology and proinflammatory signaling
in the nucleus accumbens during nicotine withdrawal. Science Advances 2019;5(**Agents:** Nicotine tartrate **Vehicle:** Saline;
Route: SC; **Species:** Mice; **Pump:** 2002; **Duration:** 14 days;
ALZET Comments: Dose (18 mg/kg/day); Controls received mp w/ vehicle; animal info (Male B6/129; 8–10 weeks of age; 20–31 g); B6/129 F1 mouse strain is a hybrid of C57BL/6 and 129SvEv strains that are commonly used for the development of knockout mouse models); behavioral testing (OF test; MB test); dependence;