



**Recent References (2016-2019) on Teratology Research  
Using ALZET® Osmotic Pumps**

**Q7658:** C. L. Runyan, *et al.* CXCR4 signaling at the ovine fetal-maternal interface regulates vascularization, CD34+ cell presence, and autophagy in the endometrium dagger. *Biol Reprod* 2019;101(1):102-111

**Agents:** AMD3100 **Vehicle:** PBS; **Route:** Intrauterine; **Species:** Sheep (Pregnant); **Pump:** 2ML1; **Duration:** 8 days;  
**ALZET Comments:** Dose (2060 ng at 10 µl/h); Controls received mp w/ vehicle; animal info (female, western white face); AMD3100 is a CXCR4 antagonist; cyanoacrylate adhesive; teratology;

**Q7868:** S. M. Scroggins, *et al.* Elevated vasopressin in pregnant mice induces T-helper subset alterations consistent with human preeclampsia. *Clin Sci (Lond)* 2018;132(3):419-436

**Agents:** arginine vasopressin **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 1004; **Duration:** 21 days;  
**ALZET Comments:** Dose (24 ng/h); Controls received mp w/ vehicle; animal info (12–16 weeks, female, C57BL/6J); teratology;

**Q7846:** S. Ramachandra Rao, *et al.* Compromised phagosome maturation underlies RPE pathology in cell culture and whole animal models of Smith-Lemli-Opitz Syndrome. *Autophagy* 2018;14(10):1796-1817

**Agents:** AY9944 **Vehicle:** PBS; **Route:** SC; **Species:** Rat (pregnant); **Pump:** Not Stated; **Duration:** Not Stated;  
**ALZET Comments:** animal info (female, Sprague-Dawley, 6-days sperm-positive); AY9944 (aka trans-1,4-bis[2-chlorobenzylaminoethyl] cyclohexane dihydrochloride) is a cholesterol pathway inhibitor; enzyme inhibitor (DHCR7); teratology; Rats infused with agent for second and third gestational weeks. Detailed methods for use SLOS model described in reference (Kretzer FL, Hittner HM, Mehta RS. Ocular manifestations of the Smith-Lemli-Opitz syndrome. *Arch Ophthalmol.* 1981 Nov;99 (11):2000–2006. PubMed PMID: 7295150);

**Q7817:** K. J. Gibbins, *et al.* Effects of excess thromboxane A2 on placental development and nutrient transporters in a *Mus musculus* model of fetal growth restriction. *Biol Reprod* 2018;98(5):695-704

**Agents:** U-46619 **Vehicle:** Ethanol; **Route:** Not Stated; **Species:** Mice (Pregnant); **Pump:** 1007D; **Duration:** 3 days; 5 days; 7 days;  
**ALZET Comments:** Dose (4000 ng/µl at at 0.5 µl/h); 0.5% ethanol used; Controls received mp w/ vehicle; animal info (female, C57BL/6); U-46619 is a Thromboxane A2 analog; teratology; "At E15.5, E17.5, and E19, dams were re-anesthetized for caesarean sections and pups and placentae were obtained." p.696;

**Q5905:** M. von Chamier, *et al.* Impact of gestational nicotine exposure on intrauterine and fetal infection in a rodent model. *Biol Reprod* 2017;96(5):1071-1084

**Agents:** Nicotine tartrate **Vehicle:** Saline; **Route:** SC; **Species:** Rat (pregnant); **Pump:** 2ML4; **Duration:** **ALZET Comments:** Controls received mp w/ vehicle; animal info (female, Sprague Dawley, GD6); post op. care (single housed; heating pads); teratology; "To test our hypothesis, we combined a maternal nicotine infusion model that achieves high levels of plasma nicotine and cotinine without causing fetal loss or changes in birth weight." pg 1072; Used wound clips; Dose (6 mg/kg/day);

**Q5993:** P. Svitok, *et al.* Prenatal exposure to angiotensin II increases blood pressure and decreases salt sensitivity in rats. *Clin Exp Hypertens* 2017;39(6):489-494

**Agents:** Angiotensin II **Vehicle:** **Route:** SC; **Species:** Rat (pregnant); **Pump:** 2002; **Duration:** 2 weeks;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (pregnant); teratology; Dose (2 µg/kg/hr);

**Q5690:** B. Carusillo Theriault, *et al.* Cerebral microbleeds in a neonatal rat model. *PLoS One* 2017;12(2):e0171163

**Agents:** Endotoxin, LPS **Vehicle:** **Route:** IV (jugular); **Species:** Rat (pregnant); **Pump:** 2001D; **Duration:** 24 hours;  
**ALZET Comments:** animal info (female, Wistar E19); ischemia (intrauterine); no stress (see pg. 4 "No mortality was experienced for dams undergoing the above protocol"); behavioral testing (Righting Reflex, negative geotaxis, open field, elevated plus maze, Morris water maze, balance beam); teratology; Dose (600 ng/hr); Resultant plasma level (4.5 EU/mL after 16 hours of infusion);



**R0347:** A. Ziv-Gal, *et al.* Evidence for bisphenol A-induced female infertility: a review (2007-2016). *Fertil Steril* 2016;106(4):827-56

**Agents:** Bisphenol A **Vehicle:** Route: **Species:** Mice; monkey; **Pump:** **Duration:** 24, 28 days;

**ALZET Comments:** animal info (mice CD-1, GD8-PND16; monkey African green); teratology; Dose (mice 25 ug/kg/day; monkey 50 ug/kg/day);

**Q5114:** S. Zhao, *et al.* A proteomic study on liver impairment in rat pups induced by maternal microcystin-LR exposure. *Environ Pollut* 2016;212(197-207

**Agents:** Microcystin-LR **Vehicle:** Saline; **Route:** IP; **Species:** Rat (pregnant); **Pump:** 2004; **Duration:** 4 weeks;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (Sprague Dawley, 12 weeks old, GD8); teratology; teratology; microcystin-LR aka MCLR; Dose (10 ug/kg/day); "It should be noted that the actual delivered dose of MCLR decreased as the pregnancy progressed because the weight of the mother at GD8 was used to calculate the MCLR dose, and the body weight increased from this point throughout pregnancy." pg 198

**Q4920:** L. Zhao, *et al.* Prenatal nicotinic exposure upregulates pulmonary C-fiber NK1R expression to prolong pulmonary C-fiber-mediated apneic response. *Toxicol Appl Pharmacol* 2016;290(107-15

**Agents:** Nicotine; mecamylamine; methyllycaconitine **Vehicle:** **Route:** SC; **Species:** Rat (pregnant); **Pump:** 2004; **Duration:** 28 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 250-300g); pumps replaced on GD7; Multiple pumps per animal (2); no stress (see pg. 110-111); teratology; Dose (Nicotine 6 mg/kg/day; mecamylamine 0.03 mg/kg/day; methyllycaconitine 3 mg/kg/day);

**Q5113:** L. Zhao, *et al.* Bronchopulmonary C-fibers' IL1RI contributes to the prolonged apneic response to intra-atrial injection of capsaicin by prenatal nicotinic exposure in rat pups. *Toxicol Appl Pharmacol* 2016;303(58-64

**Agents:** Nicotine; methyllycaconitine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 250-350g); pumps replaced every 28 days; Multiple pumps per animal (2); long-term study; teratology; MLA is an  $\alpha 7nAChR$  antagonist; methyllycaconitine aka MLA; Dose (nicotine 6 mg/kg/day; MLA 3 mg/kg/day);

**Q5513:** L. Zhao, *et al.* From the Cover: Prenatal Nicotinic Exposure Attenuates Respiratory Chemoreflexes Associated With Downregulation of Tyrosine Hydroxylase and Neurokinin 1 Receptor in Rat Pup Carotid Body. *Toxicol Sci* 2016;153(1):103-11

**Agents:** Nicotine **Vehicle:** **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;

**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 250-350g); pumps replaced every 21 days; teratology; Dose (6 mg/kg/day);

**Q5491:** L. B. Wollman, *et al.* Developmental nicotine exposure alters cholinergic control of respiratory frequency in neonatal rats. *Dev Neurobiol* 2016;76(10):1138-49

**Agents:** Nicotine bitartrate **Vehicle:** saline; **Route:** sc; **Species:** Rat (PREGNANT); **Pump:** **Duration:** **ALZET Comments:**

Controls received mp w/ vehicle or sham surgery; animal info (female, Sprague Dawley, GD5); no stress (see pg. 1141); teratology; Dose (6 mg/kg/day);

**Q5211:** O. O. Talton, *et al.* Maternal Hyperleptinemia Improves Offspring Insulin Sensitivity in Mice. *Endocrinology* 2016;157(7):2636-48

**Agents:** Leptin **Vehicle:** Saline; **Route:** SC; **Species:** Mice (pregnant); **Pump:** 2004; **Duration:** **ALZET Comments:** Controls received mp w/ vehicle; animal info (female, WT); stress/adverse reaction: (see pg. 2645); teratology; diabetes; Dose (350 ng/h);

**Q5684:** Y. L. Tain, *et al.* Maternal melatonin or N-acetylcysteine therapy regulates hydrogen sulfide-generating pathway and renal transcriptome to prevent prenatal N(G)-Nitro-L-arginine-methyl ester (L-NAME)-induced fetal programming of hypertension in adult male offspring. *Am J Obstet Gynecol* 2016;215(5):636 e1-636 e72



**Agents:** L-NAME **Vehicle:** Route: SC; **Species:** Rat (pregnant); **Pump:** **Duration:** **ALZET Comments:** Controls received mp w/ saline; animal info (female, Sprague Dawley); teratology; cardiovascular; Bp measured using tail cuff; Bp measured using tail cuff; Dose (60 mg/kg/day);

**Q5396:** W. Ling, *et al.* In Utero Bisphenol A Exposure Induces Abnormal Neuronal Migration in the Cerebral Cortex of Mice. *Front Endocrinol (Lausanne)* 2016;7(7)

**Agents:** Bisphenol A **Vehicle:** Route: IP; **Species:** Mice (pregnant); **Pump:** 1007D; **Duration:** 4 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (pregnant ICR mice); dose-response (embryo); teratology; Therapeutic indication (teratogen, brain development); Dose (0, 40, 400 ug/kg); embryonic brain development during pregnancy

**Q4810:** Kang Chen, *et al.* Early postnatal nicotine exposure disrupts the  $\alpha 2^*$  nicotinic acetylcholine receptor-mediated control of oriens-lacunosum moleculare cells during adolescence in rats. *Neuropharmacology* 2016;101(57-67)

**Agents:** Nicotine **Vehicle:** Saline; **Route:** SC; **Species:** Rat (lactating); **Pump:** 2ML2; **Duration:** 14 days;  
**ALZET Comments:** animal info (female, Sprague Dawley, ); teratology; Dose (6 mg/kg/day);

**Q4807:** Jayne C. Charnock, *et al.* The impact of a human IGF-II analog ([Leu27]IGF-II) on fetal growth in a mouse model of fetal growth restriction. *Am J Physiol Endocrinol Metab* 2016;310:E24-E31

**Agents:** Insulin-like growth factor 2, Leu27 **Vehicle:** HCl; **Route:** SC; **Species:** Pump: **Duration:** 5 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, eNOS -/-, E12.5); teratology; Dose (1 mg/kg/day); noted using "100ul miniosmotic pump (200D)" pgE25;

**Q4827:** S. Gizurarson, *et al.* Placental Protein 13 Administration to Pregnant Rats Lowers Blood Pressure and Augments Fetal Growth and Venous Remodeling. *Fetal Diagnosis and Therapy* 2016;39(56-63)

**Agents:** Placental protein 13 **Vehicle:** Route: SC; **Species:** Rat (pregnant); **Pump:** 2ML1; **Duration:** 1 week;  
**ALZET Comments:** Controls received mp w/ mutant PP13  $\Delta$ ( $\Delta$ IT221) or saline; animal info (female, Sprague Dawley, 12 weeks old, GD8); teratology; cardiovascular; bp measured using tail cuff; Dose (0.625 ng/hour); Industry authored (Telemarpe Ltd.);

**Q5631:** K. Bravo, *et al.* Perinatal Fluoxetine Exposure Impairs the CO<sub>2</sub> Chemoreflex. Implications for Sudden Infant Death Syndrome. *Am J Respir Cell Mol Biol* 2016;55(3):368-76

**Agents:** Fluoxetine **Vehicle:** DMSO; **Route:** SC; **Species:** Mice (pregnant); **Pump:** 2004; **Duration:** **ALZET Comments:** Controls received mp w/ vehicle (dimethyl sulfoxide 40%); animal info (CF-1 mice: 5-7 days of gestation); functionality of mp verified by Plasma fluoxetine concentration determined by HPLC with a diode array detector; 40% DMSO used; teratology; "Delivering fluoxetine by osmotic minipumps was less stressful for dams than were oral gavages or injections; this avoided maternal stress, which has consequences on fetal brain development. The plasma concentration of fluoxetine in dams was similar to the reported plasma level in patients under fluoxetine treatment" pg 372; Therapeutic indication (Hypercapnia; respiration); Dose (7 mg/kg/day);