



References on the Administration of Cortisol Using ALZET® Osmotic Pumps

Q7120: D. F. Cobice, *et al.* Quantification of 11beta-hydroxysteroid dehydrogenase 1 kinetics and pharmacodynamic effects of inhibitors in brain using mass spectrometry imaging and stable-isotope tracers in mice. *Biochemical Pharmacology* 2018;148(88-99)

Agents: Cortisol; radio-isotopes **Vehicle:** DMSO; propylene glycol; 2H tracer; **Route:** SC; **Species:** Mice; **Pump:** 1003D;

Duration: 2 days;

ALZET Comments: Dose (1.75 mg/day); Controls received mp w/ vehicle; animal info (Male, C57Bl6, 12 weeks old); stable-isotope labelled [9,11,12,12-2H]4-cortisol; dependence;

Q6635: M. Nixon, *et al.* ABCC1 confers tissue-specific sensitivity to cortisol versus corticosterone: A rationale for safer glucocorticoid replacement therapy. *Science Translational Medicine* 2016;8(352):352-352ra109

Agents: Corticosterone; Cortisol **Vehicle:** DMSO; Propylene glycol; **Route:** SC; **Species:** Mice (knockout); **Pump:** 2001;

Duration: 7 days;

ALZET Comments: Dose (corticosterone (250 ug/day) and cortisol (250 ug/day); Controls received mp w/ vehicle; animal info (Male(Abcc1-/-) mice);

Q2977: L. Kleppe, *et al.* Cortisol treatment of prespawning female cod affects cytotogenesis related factors in eggs and embryos. *General and Comparative Endocrinology* 2013;189(1):84-95

Agents: Cortisol; propranolol **Vehicle:** Hydrocortisone; **Route:** IP; **Species:** Fish; **Pump:** Not Stated; **Duration:** 27.3 days;

ALZET Comments: Controls received mp w/ 80% 1,2-propranolol; animal info (cod, 1.8kg, female); 2ML pump used

Q3071: X. D. Feng, *et al.* Cortisol stimulates proliferation and apoptosis in the late gestation fetal heart: differential effects of mineralocorticoid and glucocorticoid receptors. *American Journal of Physiology Regulatory, Integrative, and Comparative Physiology* 2013;305(4):R343-R350

Agents: Cortisol; potassium canrenoate; mifepristone **Vehicle:** Saline; **Route:** SC; **Species:** Sheep (ewe); **Pump:** 2ML2;

Duration: 10 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (female, singleton pregnancies); teratology; cardiovascular; impact of maternal stress during late gestation

Q2583: P. Dorniak, *et al.* Cortisol and Interferon Tau Regulation of Endometrial Function and Conceptus Development in Female Sheep. *Endocrinology* 2013;154(2):931-941

Agents: Cortisol; PF915275; meloxicam; interferon, tau, recomb. ovine **Vehicle:** Ethanol; **Route:** Intrauterine (uterine horn);

Species: Sheep (ewe); **Pump:** 2ML1; **Duration:** Not Stated;

ALZET Comments: Control animals received mp w/ vehicle; animal info (mature, rambouillet, female, ewe); 2% ethanol used; vinyl catheter used (0007760); "Our previous studies found that infusion of that amount of IFNT in the uterine lumen each day mimics effects of the conceptus on endometrial expression of hormone receptors and IFNT-stimulated genes during early pregnancy in ewes" pg 932

Q5637: C. P. Cutler, *et al.* Cortisol regulates eel (*Anguilla anguilla*) aquaporin 3 (AQP3) mRNA expression levels in gill. *Gen Comp Endocrinol* 2007;152(2-3):310-3

Agents: Cortisol **Vehicle:** Cyclodextrin, 2-hydroxypropyl-b-; **Route:** Not Stated; **Species:** Fish (Eel); **Pump:** 1003D; **Duration:** 8 days;

ALZET Comments: Controls received mp w/ vehicle; functionality of mp verified by plasma levels; 30%

2-hydroxypropyl-b-cyclodextrin used; "The infusion of cortisol into FW eels using osmotic mini-pumps led to a 2.8-fold increase in the level of plasma cortisol as measured 8-days after the onset of the experiment (Fig. 1)" pg 311; Dose (15 ug/hr);

P7143: A. S. Martinez, *et al.* Cloning and expression of three aquaporin homologues from the European eel (*Anguilla anguilla*): effects of seawater acclimation and cortisol treatment on renal expression. *Biology of Sex Differences* 2005;97(8):615-627

Agents: Cortisol **Vehicle:** Cyclodextrin, beta; **Route:** IP; **Species:** Fish (eel); **Pump:** 1003D; **Duration:** 8 days;

ALZET Comments: Controls received mp w/ vehicle; functionality of mp verified by cortisol plasma levels; pumps implanted IP per contact with author; 30% cyclodextrin used



P7146: A. S. Martinez, *et al.* Regulation of expression of two aquaporin homologs in the intestine of the European eel: effects of seawater acclimation and cortisol treatment. *American Journal of Physiology Regulatory, Integrative, and Comparable Physiology* 2005;288(6):R1733-R1743

Agents: Cortisol **Vehicle:** Cyclodextrin, beta; **Route:** IP; **Species:** Fish (eel); **Pump:** 1003D; **Duration:** 8 days;
ALZET Comments: Controls received mp w/ vehicle; cortisol plasma levels; yellow/silver eels with an ambient temp. of 5-14 degrees celsius, 30 degrees celsius Cyclodextrin used; pumps implanted IP; per contact with author; 30% cyclodextrin used

P6093: J. R. Metz, *et al.* Regulation of branchial Na⁺/K⁺-ATPase in common carp *Cyprinus carpio* L. acclimated to different temperatures. *Journal of Experimental Biology* 2003;206(13):2273-2280

Agents: Cortisol **Vehicle:** Cyclodextrin, beta; **Route:** IP; **Species:** Fish (carp); **Pump:** 1007D; **Duration:** Not Stated;
ALZET Comments: Controls received mp w/ vehicle; functionality of mp verified by cortisol plasma levels taken; "this approach was used instead of cortisol injection, which evokes stress responses due to repetitive handling..." (p. 2275); 30% cyclodextrin used

P5333: K. Pacak, *et al.* Chronic hypercortisolemia inhibits dopamine synthesis and turnover in the nucleus accumbens: An in vivo microdialysis study. *Neuroendocrinology* 2002;76(3):148-157

Agents: Cortisol **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Controls received mp w/ saline

R0368: B. A. Teicher. The Combination of Antiangiogenic Therapy with Cytotoxic Therapy. *Tumor Angiogenesis and Microcirculation* 2001;506-548

Agents: Tetrahydrocortisol; Cyclodextrin-beta tetradecasulfate **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose: b-Cyclodextrin tetradecasulfate (1000 mg/kg) and tetrahydrocortisol (125 mg/kg); cancer (Lewis lung carcinoma);

P3347: E. Wolfovitz, *et al.* Effects of hypercortisolemia or hyperinsulinemia on neurochemical indices of catecholamine release and synthesis in conscious rats. *J. Auton. Nerv. Syst* 1995;54(104-112)

Agents: Cortisol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 1 week;
ALZET Comments: controls received mp w/saline

P2851: P. T. Sangild, *et al.* The prenatal development and glucocorticoid control of brush-border hydrolases in the pig small intestine. *Pediatr. Res* 1995;37(2):207-212

Agents: Cortisol **Vehicle:** Saline; **Route:** SC; **Species:** pig (fetus); **Pump:** 2001; **Duration:** 6 days;
ALZET Comments: controls received mp with saline; after surgery fetuses received 50 mg of ampicillin into the amniotic cavity; sows maintained on antibiotics 3-4 days after surgery

P2823: N. K. Popnikolov, *et al.* In vivo growth stimulation of collagen gel embedded normal human and mouse primary mammary epithelial cells. *J. Cell. Physiology* 1995;163(51-60)

Agents: Epidermal growth factor; Cortisol; Toxin, cholera; Uridine, bromodeoxy-; **Vehicle:** Medium 199;; **Route:** SC; gel;; **Species:** Mice (nude);; **Pump:** 1003D;; **Duration:** 3 days;;
ALZET Comments: peptides; "tissue perfusion" -- gel containing human mammary epithelial cells was infused; estradiol, progesterone, and cholesterol combinations administered via silastic capsules EGF cholera toxin and hydrocortisone stimulated DNA synthesis substantially with the greatest response seen in the gel proximal to the pump: local delivery appears to be superior to injection;

P3326: K. Pacak, *et al.* Catecholaminergic inhibition by hypercortisolemia in the paraventricular nucleus of conscious rats. *Endocrinology* 1995;136(11):4814-4819

Agents: Cortisol **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: controls received mp w/saline



P2997: J. M. Shrimpton, *et al.* Downregulation of corticosteroid receptors in gills of coho salmon due to stress and cortisol treatment. *American Journal of Physiology Regulatory, Integrative, and Comparable Physiology* 1994;267(36):R432-R438

Agents: Cortisol, 21-hemisuccinate **Vehicle:** Saline; Cyclodextrin; **Route:** IP; **Species:** fish; **Pump:** Not Stated; **Duration:** 18 days;

ALZET Comments: controls received mp w/ vehicle or no surgery; functionality of mp verified by plasma levels; comparison of ip injections and daily handling vs. mp; no stress (see pg. R433); stability verified for 18 days at 7.5 degrees C; only chronic infusion resulted in reduction of corticosteroid receptor number and affinity; cyclodextrin was Molecusol HBP

P2955: P. T. Sangild, *et al.* Developmental regulation of the porcine exocrine pancreas by glucocorticoids. *J. Pediatr. Gastroenterology and Nutrition* 1994;19(204-212)

Agents: Cortisol; ACTH **Vehicle:** Saline; **Route:** SC; **Species:** pig (fetus); **Pump:** 2001; **Duration:** 6 days;

ALZET Comments: controls received mp with saline; peptides; no stress: mp was generally well tolerated; the cortisol used was hydrocortisone hemisuccinate

P2956: P. T. Sangild, *et al.* Adrenocortical stimulation of stomach development in the prenatal pig. *Biol. Neonate* 1994;65(378-389)

Agents: Cortisol; ACTH(1-24) **Vehicle:** Saline; **Route:** SC; **Species:** pig (fetus); **Pump:** 2001; **Duration:** 6 days;

ALZET Comments: controls received mp with saline; peptides

P2957: P. T. Sangild, *et al.* Secretion of acid, gastrin, and cobalamin-binding proteins by the fetal pig stomach: developmental regulation by cortisol. *Exp. Physiology* 1994;79(135-146)

Agents: Cortisol **Vehicle:** Not Stated; **Route:** SC; **Species:** pig (fetus); **Pump:** 2001; **Duration:** 6 days;

ALZET Comments: controls received mp with saline or no operation; mp implanted just behind ribs; ampicillin given via amniotic fluid

P2903: K. Pacak, *et al.* Adrenalectomy augments in vivo release of norepinephrine in the paraventricular nucleus during immobilization stress. *Endocrinology* 1993;133(1404-1410)

Agents: Cortisol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: controls received mp with vehicle or sham operation; replacement therapy (adrenalectomy)

P3238: M. J. Lobo, *et al.* Effect of chronic intravenous injection of steroid hormones on body weight and composition of female rats. *Biochem. Molec. Biol. Intl* 1993;29(2):349-358

Agents: Progesterone; Cortisol; Cortisone; Corticosterone; Dehydroepiandrosterone; Androstenedione, 4-; Androstendiol, 5-; Testosterone; Nortestosterone, 19-; Estradiol, B-; Estrone; Estriol; Deoxycorticosterone **Vehicle:** PEG 400; **Route:** IV (lower cava); **Species:** Rat; **Pump:** 2002; **Duration:** 15 days;

ALZET Comments: controls received mp with PEG; no stress (see pg. 351); pumps placed into peritoneal cavity and sutured to musculature; surgical wound sprinkled with sulphathiazol

P3216: R. Kvetnansky, *et al.* Endogenous glucocorticoids restrain catecholamine synthesis and release at rest and during immobilization stress in rats. *Endocrinology* 1993;133(3):1411-1419

Agents: Cortisol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: no comment posted

P2025: B. A. Teicher, *et al.* Antiangiogenic agents potentiate cytotoxic cancer therapies against primary and metastatic disease. *Cancer Research* 1992;52(6702-6704)

Agents: Cyclodextrin-beta tetradecasulfate; Cortisol, tetrahydro- **Vehicle:** Not Stated; **Route:** SC; **Species:** mice; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: cancer

P2405: K. Pacak, *et al.* Hypercortisolemia inhibits yohimbine-induced release of norepinephrine in the posterolateral hypothalamus of conscious rats. *Endocrinology* 1992;131(3):1369-1376

Agents: Cortisol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: controls received mp w/ vehicle; microdialysis



P2682: R. T. Chatterton, *et al.* Depletion of luteal phase serum progesterone during constant infusion of cortisol phosphate in the cynomolgus monkey. *Fertil. Steril* 1991;56(3):547-554

Agents: Cortisol 21-phosphate **Vehicle:** Saline; **Route:** SC; **Species:** monkey; **Pump:** 2001; 2ML2; **Duration:** 8 weeks;
ALZET Comments: controls received mp w/ saline; functionality of mp verified by plasma level assay; pumps replaced every 7 or 14 days; long-term study

P2594: D. E. Andersen, *et al.* Metabolic effects associated with chronically elevated cortisol in rainbow trout (*Oncorhynchus mykiss*). *Canadian Journal of Fisheries and Aquatic Sciences* 1991;48(9):1811-1817

Agents: Cortisol **Vehicle:** Cyclodextrin, B-; **Route:** IA (dorsal aorta); **Species:** fish (rainbow trout); **Pump:** 2001; **Duration:** 10-14 days;

ALZET Comments: controls received mp w/ vehicle or sham operation; functionality of mp verified by RIA of plasma levels; stress from surgery caused hyperglycemia (p.816) for 22 hours; "Mini-osmotic pumps. . . were an effective method for chronically elevating cortisol titers in trout."; Molecusol HBP is a beta-cyclodextrin

P1548: K. Szemeredi, *et al.* Opposite effects of chronic cortisol treatment on pre- and postsynaptic actions of clonidine in pithed rats. *J. Auton. Pharmac* 1989;9(35-43)

Agents: Cortisol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: dose-response; functionality of mp verified by plasma levels

P1303: K. Szemeredi, *et al.* Sympathoadrenomedullary inhibition by chronic glucocorticoid treatment in conscious rats. *Endocrinology* 1988;123(5):2585-2590

Agents: Cortisol **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: dose-response; functionality of mp verified by plasma levels

P1269: M. B. Elam, *et al.* Stimulation of in vitro triglyceride synthesis in the rat hepatocyte by growth hormone treatment in vivo. *Endocrinology* 1988;122(4):1397-1402

Agents: Cortisol; Growth hormone, human; Triiodothyronine **Vehicle:** Sodium hydroxide; Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 7, 14 days;

ALZET Comments: pump model not stated; male rats infused for 7 days, females for 14; agents infused separately; replacement therapy (hypophysectomy); peptides

P0612: R. Phillips, *et al.* Effect of mineralocorticoids and glucocorticoids on compensatory adrenal growth in rats. *American Journal of Physiology Endocrinology and Metabolism* 1985;248(4):E450-E456

Agents: Aldosterone; Fluorocortisol acetate, 9a-; Corticosterone; Deoxycorticosterone; Dexamethasone **Vehicle:** Ethanol; Propylene glycol; Water; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 3 days;

ALZET Comments: replacement therapy (unilateral adrenalectomy); each mp used twice, 3 days in one animal, then 3 days in another; cannot tell if stability/concentration of ald. determined by RIA before or after exp