References on the Administration of Calcitonin and Calcitriol Using ALZET® Osmotic Pumps

1. Calcitonin

ALZET Comments: Neuroendocrine peptide aminoprocalcitonin, anti-; PBS; Mice (transgenic); 1004; 28 days; Dose (500 ug/kg/day); animal info (Adult male C57BL/6 and APP/PS1 mice); neurodegenerative (Alzheimer Disease).

Q4655: J. G. Yan, et al. CALCITONIN PUMP IMPROVES NERVE REGENERATION AFTER TRANSECTION INJURY AND REPAIR. MUSCLE & NERVE 2015;51(2):229-234
ALZET Comments: Calcitonin; Water, distilled sterile; CSF/CNS (sciatic nerve); Rat; 2006; 12 weeks; Animal info (Sprague Dawley, 250-300g, 3 months old); half-life (p.233); long-term study; “To achieve a continuous and gradual mode of delivery, a mini-osmotic pump was implanted to deliver medication at a constant 0.15 ul/h” pg 233; “Calcitonin has short absorption and elimination half-lives of 10–15 minutes and 50–80 minutes, respectively; however, using an osmotic pump allows for gradual and prolonged release.” pg233; pg230 diagram of pump implantation;

ALZET Comments: Calcitonin gene related peptide (8-37); Mice; 6 weeks; Animal info (male, C57BL6J, 22 months old); functionality of mp verified by serum levels; peptides;

ALZET Comments: Parathormone (1-84), rat; calcitonin, rat; Acetate buffer; SC; Rat; 2001; 22 days; Animal info (female, Wistar, E0); replacement therapy (thyroidectomy); teratology;

ALZET Comments: Nifedipine; calcitonin; CSF/CNS (sciatic nerve); Rat; 2006; 4 weeks; Controls received mp w/ saline or sham only; animal info (3 month old, male, Sprague-Dawley 250-300g); functionality of mp verified by decrease in calcium levels; peptides; Picture of MP p56, Fig1A. MP Pump setup p56, Fig1B;

ALZET Comments: Calcitonin; Rat; 4, 12, 24 hours; Animal info (Brattleboro rats); functionality of mp verified by measuring urine output and concentration; ALZET osmotic pumps used to infuse calcitonin to increase trafficking of aquaporin 2 vesicles in collecting duct. Effect is short lived, despite continued calcitonin delivery; might need dose adjustment; diabetes;

ALZET Comments: Calcitonin gene related peptide; calcitonin gene related peptide (8-37); SC; Rat; 10 days; Controls received mp w/ saline; animal info (Sprague Dawley, male, 292-305 g, 67 days); CGRP (8-37) is a CGRP1 receptor antagonist; peptides.

ALZET Comments: Calcitonin; Saline; SC; Rat; 7 days; Controls received mp w/ vehicle; pumps removed and new pump implanted after 10 days; animal info (Brattleboro, VP-deficient, adult, male).
Q0079: B. Morte, et al. Thyroid Hormone Regulation of Gene Expression in the Developing Rat Fetal Cerebral Cortex: Prominent Role of the Ca²⁺/Calmodulin-Dependent Protein Kinase IV Pathway. Endocrinology 2010;151(2):810-820

**ALZET Comments:** Parathyroid hormone (1-84); calcitonin, rat; Acetate buffer; SC; Rat; 2001; Controls received mp w/ vehicle; animal info (female, Wistar, adult, 250-300 g); replacement therapy (parathyroidectomy).


**ALZET Comments:** Parathyroid hormone, rat (1-84); calcitonin, rat; thyroxine; Acetate buffer; SC; Rat (pregnant); 2001; 4-8 days; Teratology; peptides; animal info (Female, Wistar, 250-300 g); replacement therapy (parathyroidectomy).


**ALZET Comments:** Calcitonin, salmon; SC; Mice; 1002; 14 days; Controls received mp w/ vehicle; functionality of mp verified by residual volume; dose-response (Fig. 2); animal info (female, C57BL/6, 6 wks old).


**ALZET Comments:** Parathyroid hormone, bovine 1-34; calcitonin, salmon; Saline, physiological; cysteine hydrochloride; SC; Mice; 1003D; 2001; 12 hours; Functionality of mp verified by calcitonin plasma levels.


**ALZET Comments:** Calcitonin, salmon; Acetic acid; Sodium acetic; Sodium chloride; water, distilled; SC; Rat; 2ML1; 7 days; 24 hours; Functionality of mp verified by calcitonin plasma levels.


**ALZET Comments:** Parathyroid hormone, human 1-34; calcitonin, salmon; Acetate buffer; saline; SC; Rat; 2004; 28 days; Controls received mp w/ vehicle or sham ovx + mp w/ vehicle; functionality of mp verified by serum levels; replacement therapy (ovariectomy); comparison of daily PTH sc injections vs. mp; peptides.


**ALZET Comments:** Parathyroid hormone; Calcitonin; Vitamin D, 1,25-dihydroxy-; NaCl; HCl; Cysteine; Saline, isotonic; SC; Rat; 2002; 13 days; controls received sham tubing; functionality of mp verified by hormone assays; replacement therapy (thyroidectomy, thyroparathyroidectomy); dose-response; stress/adverse reaction: high doses led to animal death; peptides; agents given singly and in combination.


**ALZET Comments:** Calcitonin, salmon; Saline; Benzyl alcohol; Gelatin; Rat; 6 weeks; controls received mp w/vehicle; functionality of mp verified by calcitonin plasma levels by radioimmunoassay; comparison of s.c. injections vs. mp; pumps replaced after 3 weeks; peptides.


**ALZET Comments:** Calcitonin, salmon; Aminocaproic acid; HCl; Rat; 2ML1; 4 days; controls received mp with vehicle.


**ALZET Comments:** Calcitonin, human; intrauterine; SC; Rat; 2001; 14 days; tissue perfusion (uterus); dose-response (graph, p.832); comparison of polyurethane matrices vs mp.
ALZET Comments: Calcitonin analog; Calcitonin, synthetic salmon; Gelatin; Saline; SC; mice; 2001; 48 hours; pumps were reimplanted in a second animal; analog is RG-12851.

ALZET Comments: Parathyroid hormone, bovine; calcitonin; Saline, cysteine hydrochloride; SC; mice; 2001; 7 days; Controls received mp w/ vehicle; animal info (4-5 wk old); Dose: calcitonin (2 IU/ul), PTH (1 IU/ul);.

ALZET Comments: Calcitonin, Parathyroid hormone; Saline, Physiologic; SC; Mice; 2001; 3, 6, 12, 18, 24, 48 and 72 hrs; Controls received mp w/ vehicle; dose-response (0.1, 0.375, 0.5, 0.75, 1.0, or 1.25 IU/h); Multiple pumps per animal (2): Animals receiving both hormones were implaned through separate skin incisions with two pumps. “To control the uniformity of the applied stimulus, we used surgically implantable Alzet osmotic minipumps... for continuous subcutaneous infusion of calcitonin.” pg 15; Dose (0.5 IU/hr);.

ALZET Comments: Calcitonin, salmon; Aminocaproic acid; SC; Rat; 2002; 1, 4, 7 days; controls received mp w/vehicle; dose-response; mp primed w/saline 12 hours before implantation; stability; peptides.

ALZET Comments: Calcitonin; SC; Rat; 2002; 6-12 days; controls received sham implantation; replacement therapy (thyroparathyroidectomy); peptides.

ALZET Comments: Calcitonin, salmon; Albumin, bovine serum; PBS; SC; Rat (pregnant); 5 days; pump model not stated; replacement therapy (thyroparathyroidectomy); peptides.

ALZET Comments: Calcitonin; Parathyroid hormone, bovine; Cysteine HCl; HCl; Saline; SC; Rat; 7 days; organ replacement therapy (thyroparathyroidectomy); peptides.

ALZET Comments: Calcitonin, salmon; SC; Rat; 1-14 days; comparison of human vs. animal data; intermittent vs. mp infusion; peptides.

2. Calcitriol


**ALZET Comments:** Calcitriol; SC; Rat; 6 weeks; Controls received mp w/ vehicle; animal info (male, Spontaneously hypertensive rats, stroke-prone, 8 weeks old); cardiovascular; long-term study.;


**ALZET Comments:** Calcitriol; Ethanol; propylene glycol; SC; Rat; 2004; Control animals received mp w/ vehicle; animal info (Sprague Dawley, P9); 50% ethanol used; 50% propylene glycol used.


**ALZET Comments:** Calcitriol; DMSO; SC; Mice; 6 weeks; Controls received mp w/ vehicle; animal info (9 month old); 15% DMSO used; Dose (18pm/d); Therapeutic indication (osteoporosis);.

**P8449: K. D. Goodwin, et al.** Preventing oxidative stress in rats with aldosteronism by calcitriol and dietary calcium and magnesium supplements. **American Journal of the Medical Sciences** 2006;332(2):73-78

**ALZET Comments:** Aldosterone; calcitriol; SC; Rat; 2004; 2ML4; 4 weeks; no comment posted.


**ALZET Comments:** Parathyroid hormone (1-34); Calcitriol;; Cysteine; Propylene glycol; Saline;; Rat;; 2002;; 14 days;; controls received mp w/vehicle; replacement therapy (parathyroidectomy); nephrectomy); peptides.;


**ALZET Comments:** Oxacalcitriol, 22-; Vitamin D3, 24,25-dihydroxy-; Vitamin D3, 1,25-dihydroxy-; Propylene glycol; SC; Rat; 2002; 14 days; no comment posted.

**P2664: A. J. Brown, et al.** The mechanism for the disparate actions of calcitriol and 22-oxacalcitriol in the intestine. **Endocrinology** 1993;133(3):1158-1164

**ALZET Comments:** Oxacalcitriol, 22-; Vitamin D3, 1,25-dihydroxy-; Propylene glycol; SC; Rat; 2002; 3 days; controls received mp w/vehicle; comparison of ip injections vs. mp; agent is 1,25-(OH)2D3.


**ALZET Comments:** Calcitriol; Propylene glycol; SC; rabbit; 7, 28 days; functionality of mp verified by plasma levels; toxicology.

**ALZET Comments:** Calcitriol; Propylene glycol; SC; rabbit; 2 weeks; dose-response; functionality of mp verified by serum levels.


**ALZET Comments:** Calcitriol; Vitamin D3, 1,25-dihydroxy-; Ethanol; Propylene glycol; SC; Rat; 2001; 1 week; functionality of mp verified by measuring residual volume.


**ALZET Comments:** Calcitriol; Propylene glycol; SC; rabbit; 2ML1; 2ML4; 7, 28 days; functionality of mp verified by serum calcitriol levels; dose-response (graphs); 3 doses of calcitriol infused.


**ALZET Comments:** Calcitriol; Propylene glycol; SC; Rat; 2002; 40 days; comparison of calcitriol or OHD2 po 3x/wk vs. mp infusion; intermittent oral dosing; mp replaced every 2 weeks; no stress implied by the normal growth of the animals.