References on the Administration of Parathyroid Hormone
Using ALZET® Osmotic Pumps

ALZET Comments: Parathyroid hormone (1-34); Saline; SC; Mice; 1002; 14 days; Dose (80 mg/kg/d); Controls received mp w/ vehicle; animal info (8 week-old female Hdac4ob/-/ mice).

ALZET Comments: Parathyroid hormone (1-34), human; Acetic acid; mouse serum; SC; Mice; 5 days; Dose (0.67 pmol/g of body weight/h); 10 mM acetic acid containing 2% heat inactivated mouse serum used; Controls received mp w/ vehicle; functionality of mp verified by hypercalcemia.

ALZET Comments: Parathyroid hormone (1-34), human; PBS; SC; Mice; 2ML4; 8 weeks; Dose (0.11 ug•100g_1•h_1); Controls received mp w/ vehicle; animal info (Tie2-Cre mice); cardiovascular.

ALZET Comments: Parathyroid Hormone (1-34), Human; Saline; SC; Mice; 1002; Dose (11 μg/kg/day); Controls received mp w/ vehicle; animal info (8-week-old, parathyroid hormone-supplemented, C57BL6J male mice); Parathyroid Hormone (1-34), human aka hPTH(1–34); peptides.

ALZET Comments: Parathyroid hormone, human; Saline; SC; Mice; 1002; 2 weeks; Dose (80 μg/kg/day); Controls received mp w/ vehicle; animal info (8-week-old female wild-type and MCP-1−/− mice).

ALZET Comments: Parathyroid hormone; SC; Mice; 1002; 2 weeks; Controls received mp w/ vehicle; animal info (4 months)Therapeutic indication (Osteoclast differentiation); Dose (80 ug/kg/day).

ALZET Comments: Parathyroid hormone (1-34), human; parathyroid hormone (7-34), bovine; PBS; SC; Mice; 1004; 28 days; Controls received mp w/ vehicle; animal info (male, C57Bl6J, 11 weeks old).

ALZET Comments: Human parathyroid hormone; PBS, acetic acid; SC; Mice; 5 days; Controls received mp w/ vehicle; animal info (3 months old); Dose (40 ug/kg/day).

Q4529: S. Maudsley, et al. Delineation of a Conserved Arrestin-Biased Signaling Repertoire In Vivo. MOLECULAR PHARMACOLOGY 2015;87(706-717
ALZET Comments: Parathyroid hormone (1-34), human; parathyroid hormone (7-34), bovine; PBS; SC; Mice; 1004; 28 days; Controls received mp w/ vehicle; animal info (male, WT or congenic arrestin3 null, 11 weeks old).

Q5222: J. Y. Li, et al. IL-17A Is Increased in Humans with Primary Hyperparathyroidism and Mediates PTH-Induced Bone Loss in Mice. Cell Metab 2015;22(5):799-810
ALZET Comments: Parathyroid hormone, human (1-34); SC; mice; 1002; 2 weeks; Controls received mp w/ vehicle; animal info: 16-week-old female mice, C57BL/6 WT; functionality of mp verified by flow cytometry; dose-response (pg 808); replacement therapy (human parathyroid hormone); immunology; peptides; Dose: 80 mg/kg/day.


ALZET Comments: Parathyroid hormone (1-34); Saline, isosmotic; cysteine; SC; Rat; 6 weeks; 12 weeks; Controls received mp w/ vehicle; animal info (female, Sprague Dawley, 7 weeks old); functionality of mp verified by residual volume and serum levels; 2% cysteine used; replacement therapy (parathyroid replacement); used wound clips; used 2ML size pumps; pumps primed; long-term study;.


ALZET Comments: Parathyroid hormone, rat; SC; Rat; 2002; 16 weeks; Controls received sham operation; animal info: 12-week-old male Sprague-Dawley; functionality of mp verified by urine samples; pumps replaced every 2 weeks; pumps replaced every 2 weeks; long-term study; Dose: 0.1 μg/kg/h.


ALZET Comments: Parathyroid hormone (1-34), human; HCl; BSA, PBS; SC; Mice; 1004; 12 days; 21 days; Controls received mp w/ vehicle; animal info (male, Cox2KO or wt, 3 months old); 0.1% BSA used; pumps primed for 6 hours in 37C saline;.

Q4313: M. Babey, et al. Gender-Specific Differences in the Skeletal Response to Continuous PTH in Mice Lacking the IGF1 Receptor in Mature Osteoblasts. JOURNAL OF BONE AND MINERAL RESEARCH 2015;30(1064-1076

ALZET Comments: Parathyroid hormone (1-34); NaCl; HCl; serum, heat-inactivated mouse; SC; Mice; 1004; 4 weeks; Controls received mp w/ vehicle; animal info (FVN/B12 weeks old); functionality of mp verified by serum PTH levels; cardiovascular;.


ALZET Comments: Parathyroid hormone (1-34); Rat; 50 days; animal info (6 wks old, male, Wistar); induction of nephrocalcinosis.


ALZET Comments: Parathyroid hormone (1-84); SC; Mice; 14 days; Controls received mp w/ vehicle; animal info (female, C57BL6, 4 months old, ovariectomized); comparison of injection vs mp; cardiovascular;.


ALZET Comments: Parathyroid hormone (1-34), rat; Rat; 2004; 8 weeks; Controls received sham surgery; animal info (male, Sprague Dawley, 8 weeks old); long-term study;.


ALZET Comments: Parathyroid hormone (1-34), human; vitamin D3, 1,25-dihydroxy; SC; Rat; 3 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 3 months old);.

Q3818: M. Bozic, et al. High phosphate diet increases arterial blood pressure via a parathyroid hormone mediated increase of renin. Journal of Hypertension 2014;32(1822-1832
ALZET Comments: Parathyroid hormone (1-34), recombinant rat; SC; Rat; 2002; 4 weeks; Animal info (Sprague Dawley, 200-225g); functionality of mp verified by calcium serum levels; replacement therapy (parathyroidectomy); cardiovascular;

Q2929: V. Saini, et al. Parathyroid Hormone (PTH)/PTH-related Peptide Type 1 Receptor (PPR) Signaling in Osteocytes Regulates Anabolic and Catabolic Skeletal Responses to PTH. Journal of Biological Chemistry 2013;288(28):20122-20134
ALZET Comments: Parathyroid hormone; SC; Mice; 1002; 2 weeks; Animal info (8-12 week old).

ALZET Comments: Parathyroid hormone; SC; Mice; 4 weeks; Animal info (Wistar, male, 6 wks old);

ALZET Comments: Parathyroid hormone, human (1-34); Saline, acidified; serum, rat, heat-activated; Rat; 48 hours; Animal info (Wistar, male, 13 weeks old);

ALZET Comments: Parathyroid hormone (1-34); SC; Rat; 2002; Animal info (male, Sprague Dawley, 13 weeks old, 350g);

ALZET Comments: Parathyroid hormone (1-34), human; NaCl; HCl; serum, mouse, heat-activated; SC; Mice; 1002; 8 days; Control animals received mp w/ vehicle; animal info (wt, DD, Npt 2a -/-, Npt2c -/-).

ALZET Comments: Parathyroid hormone (1-34); SC; Mice; 4 weeks; Controls received mp w/ vehicle; animal info (Gcm2 -/-); functionality of mp verified by PTH serum levels;

ALZET Comments: Parathyroid hormone (1-34); Saline, sterile; Mice; 1004; 3 weeks; Controls received mp w/ vehicle; animal info (KI -/-, PTH +/-3 wks old); peptides.

ALZET Comments: Parathyroid hormone, related peptide (1-36); SC; Mice; 2002; 12 days; Animal info (CD-1, 12 wks old);

ALZET Comments: Parathyroid hormone (1-34), rat; Cysteine; SC; Rat; 2ML4; 8 weeks; Controls received mp w/ vehicle; animal info (Wistar, male, 280-320 g); pumps replaced after 28 days; long-term study.

ALZET Comments: Parathyroid hormone related protein (1-34), rat; Cysteine HCl; saline; SC; Rat; 2001; 5 days; Controls received mp w/ vehicle; animal info (Sprague Dawley, male, 200-250 g); wound clips used.

ALZET Comments: Parathyroid hormone (1-34); Saline, sterile; SC; Mice; 1004; 3 weeks; Controls received mp w/ vehicle; animal info (Fgf -/-, Pth -/-, wt); peptides.


ALZET Comments: Parathyroid hormone; SC; Mice; 6 weeks; Controls received mp w/ no treatment; animal info (8 wks old, HJVKO); no stress "Animals in all groups seemed to tolerate treatments well." pg 94; stress/adverse effects "One animal with a PTH pump implant died unexpectedly 2 weeks postsurgery" pg 94.


ALZET Comments: Parathyroid hormone (1-34); PBS, sterile; acetic acid; SC; Mice; 1004; 28 days; Controls received mp w/ vehicle; animal info (C57BL/6, female, 8-12 wks old); functionality of mp verified by PTH 1-34 levels in the blood serum; post op. care (Baytril and Rimadyl).


ALZET Comments: Parathyroid hormone; Saline, isosmotic; SC; Rat; 2ML4; 28 days; Controls received mp w/ vehicle; animal info (male, Wistar, 200 g); replacement therapy (parathyroidectomy).


ALZET Comments: Parathyroid hormone-related peptide (1-34); Saline, physiological; cysteine, L-; SC; Mice (nude); 1007D; Controls received mp w/ vehicle; animal info (5 wls old, male, BALB/c); cancer; peptides.

Q1737: S. Kudo, et al. Cartilaginous repair of full-thickness articular cartilage defects is induced by the intermittent activation of PTH/PTHrP signaling. OSTEOARTHRITIS AND CARTILAGE 2011;19(7):886-894

ALZET Comments: Parathyroid hormone (1-84), recomb. human; Saline, sterile; Knee (articular cavity); Rabbit; 2002; 14 days; Controls received mp w/ vehicle; animal info (male, white, adolescent, Japanese, 3-3.4 kg); pulsatile delivery; "The program consisted of alternating segments of 5 ul PTH (50 ug/ml) solution and 5 ul sterile saline interrupted by 1 ul air bubbles." pg 888.


ALZET Comments: Parathyroid hormone (1-34); SC; Rat; 2002; 6 weeks; Animal info (Sprague Dawley, male, 13 wks old, 350 g); pumps replaced every 2 weeks.


ALZET Comments: Parathyroid hormone (1-34); SC; Rat; Animal info (female, Sprague-Dawley, 225-250 g); replacement therapy (parathyroidectomy); functionality of mp verified by plasma PTH levels.


ALZET Comments: Parathyroid hormone, human, (1-34); thymidine, methyl-3H; Ethanol; SC; Rat; mice; 12 days; 1 week; Controls received mp w/ vehicle; animal info (Sprague Dawley, 6 wks to 6 mo; DBA, adult); 2% ethanol used.

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Bibliography

ALZET Comments: Parathyroid hormone (1-34), human; Mice; 1002; 2 weeks; Controls received mp w/ vehicle; animal info (male, female, 16 wks old, C57BL/6 WT, TNF -/-).

Q0079: B. Morte, _et al._ Thyroid Hormone Regulation of Gene Expression in the Developing Rat Fetal Cerebral Cortex: Prominent Role of the Ca\textsuperscript{2+}/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 (male, Wistar, adult, 250-300 g); replacement therapy (parathyroidectomy).


ALZET Comments: Parathyroid hormone (1-34); Cysteine hydrochloride; IV (jugular); Rat; 1003D; 48 hours; animal info (Sprague Dawley, male, 176-255 g, parathyroidectomy); replacement therapy (parathyroidectomy).


ALZET Comments: Parathyroid hormone (1-34), rat; Cysteine, L-; SC; Mice; 2002; 3 days; Controls received mp w/ vehicle; animal info (C57BL/6/J, male, 5-6 wks old).


ALZET Comments: Parathyroid hormone (1-34), human; NaCl; serum, mouse, heat-activated; SC; Mice (transgenic); 2 weeks; Controls received mp w/ vehicle; animal info (C57BL/6, Dkk1 Tg, male, 12 wks old).

Q0877: M. Etoh, _et al._ Repetition of continuous PTH treatments followed by periodic withdrawals exerts anabolic effects on rat bone. JOURNAL OF BONE AND MINERAL METABOLISM 2010;28(6):641-649

ALZET Comments: Parathyroid hormone; SC; Rat; 1007D; 1003D; 56 days; Controls received mp w/ vehicle; peptides; animal info (male, Wistar, 280-330 g); functionality of mp verified by hormone serum levels; replacement therapy (parathyroidectomy, nephrectomy (5/6)); pumps replaced after 28 days; long-term study.

Q0003: P. Berbel, _et al._ Role of Late Maternal Thyroid Hormones in Cerebral Cortex Development: An Experimental Model for Human Prematurity. Cerebral Cortex 2010;20(6):1462-1475

ALZET Comments: Parathyroid hormone, rat (1-34); 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: Parathyroid hormone-related protein (1-36); Water, sterile; cysteine, L-, sterile; SC; Mice; 2002; 12 days; replacement therapy (parathyroidectomy, nephrectomy (5/6)); pumps replaced after 28 days; long-term study.

Q1549: L. Ardeshirpour, _et al._ Increased PTHrP and Decreased Estrogens Alter Bone Turnover but Do Not Reproduce the Full Effects of Lactation on the Skeleton. Endocrinology 2010;151(12):5591-5601

ALZET Comments: Parathyroid hormone-related protein (1-36); Water, sterile; cysteine, L-, sterile; SC; Mice; 2002; 12 days; Controls received mp w/ vehicle; animal info (female, 10-13 wks old, CD1, virgin, ovariectomy).

P9945: L. Kantham, _et al._ The calcium-sensing receptor (CaSR) defends against hypercalcemia independently of its regulation of parathyroid hormone secretion. AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM 2009;297(4):E915-E923

ALZET Comments: Parathyroid hormone (1-34); human; PBS; acetic acid; cysteine; SC; Mice; 1002; 14 days; Post op.care (analgesia).
ALZET Comments: Parathyroid hormone (1-34); Cysteine; SC; Rat; 2ML4; 56 days; Controls received mp w/vehicle; replacement therapy (parathyroidectomy); pumps replaced after 28 days; animal info (male, Wistar, 300-330g); long-term study.

ALZET Comments: Parathyroid hormone (1-84), human; NaCl; acetic acid; BSA; SC; Mice; 1003D; 24 hours; Controls received mp w/vehicle; animal info (female, Swiss Webster).

ALZET Comments: Parathyroid hormone; Mice; 1003D; 24 hours; Animal info (C57BL/6J, wt, Hyp, Cre-Phex-d-flox/y, OC-Cre-Phex-d-flox/y).

ALZET Comments: Parathyroid hormone (1-34), recomb. human; SC; Mice; 1, 2, 4, 6, 20 days; Pumps replaced after 10 days; peptides; animal info (3 months old, male C57BL/6).

ALZET Comments: Parathyroid hormone (1-34), human; SC; Rat; 1, 3, 5, 7, 14, 28 days; Controls received mp w/vehicle; peptides; animal info (mature, female, Sprague Dawley, 3 or 6 months old).

Q5672: X. Li, et al. In Vivo Parathyroid Hormone Treatments and RNA Isolation and Analysis. Methods in Molecular Biology 2008;455(79-87
ALZET Comments: Parathyroid hormone (1-34), synthetic human; Saline, 1% heat inactivated sera; SC; Rat; animal info (Sprague-Dawley); Dose (4 mg/100 g/day);.

ALZET Comments: Parathyroid hormone (1-34), human; Mice (nude); 1002; 2 weeks; Controls received mp w/vehicle; peptides; animal info (female, C57BL/6, 8 wks old).

ALZET Comments: Parathyroid hormone (1-34) human; PBS; SC; Mice; 5 days; Controls received mp w/vehicle; peptides; animal info (Ckb -/-, wt, 8 wks old).

ALZET Comments: Parathyroid hormone, human; SC; Rat; 1003D; 48 hours; Controls received mp w/vehicle; animal info (male, Munich-Wistar, 230-260 grams).

ALZET Comments: Parathyroid hormone, human 1-34; parathyroid hormone, human 1-84; parathyroid hormone, rat 1-34; parathyroid hormone, rat 1-84; parathyroid hormone, rat 7-84; parathyroid hormone, rat 39-84; Saline; cysteine HCl, L-; IV
P8740: X. Li, et al. Parathyroid hormone stimulates osteoblastic expression of MCP-1 to recruit and increase the fusion of pre/osteoclasts. Journal of Biological Chemistry 2007;282(45):33098-33106
**ALZET Comments:** Parathyroid hormone, human 1-34; Saline, physiological; SC; Rat; 2001; 3, 6, 14 days; 6 hours; Controls received mp w/ vehicle; comparison SC injections vs. mp; peptides; animal info (female, Sprague-Dawley, 3 months old, 250 g.).

**ALZET Comments:** Parathyroid hormone (1-34); parathyroid hormone (3-34); parathyroid hormone (1-31); Saline; SC; Rat; 2001; 6, 14 days; Functionality of mp verified by hPTH (1-34) levels; peptides; animal info (female, Sprague-Dawley, 3 months old, 250 g.).

**ALZET Comments:** Parathyroid hormone-related protein (7-34); IP; Fish (sea bream); Controls received mp w/ vehicle; peptides; animal info (Sparus auratus, juvenile).

P8974: H. Mizuta, et al. Expression of the PTH/PTHrP receptor in chondrogenic cells during the repair of full-thickness defects of articular cartilage. OSTEOARTHRITIS AND CARTILAGE 2006;14(9):944-952
**ALZET Comments:** Parathyroid hormone (1-84), recomb. human; Saline, sterile; Knee (articular cavity); Rabbit; 2002; 2, 4 weeks; Controls received mp w/ vehicle; pumps replaced after 2 weeks; peptides; animal info (male, Japanese White, 3-3.4 kg., adolescent).

P8239: G. S. Bounoutas, et al. Impact of impaired receptor internalization on calcium homeostasis in knock-in mice expressing a phosphorylation-deficient parathyroid hormone (PTH)/PTH-related peptide receptor. Endocrinology 2006;147(10):4674-4679
**ALZET Comments:** Parathyroid hormone, rat 1-34; Acetic acid; serum, mouse, heat-inactivated; SC; Mice; 1003D; 3 days; Controls received mp w/ vehicle; dose-response (table 3); peptides; animal info (male, 12 weeks old, C57BL/J6).

**ALZET Comments:** Parathyroid hormone (1-34), human; Cysteine, L-; SC; Mice; 4 days; Controls received mp w/ vehicle; peptides; animal info (female, BALB/cA, 8 wks old).