Recent References on the Administration of Thyroxine Using ALZET® Osmotic Pumps


ALZET Comments: Thyroxine. L-; SC; Rat; 2001; 7 days; Dose (1 uL/hr/day); animal info (Wistar, adult, female, 250-300 g); dependence;


ALZET Comments: Thyroxine, 3,5,3′-triiodothyronine; NaOH, propylenglycol, PBS SC; Rat (mole); 2006; 12 weeks; Dose (90 ng/g of T4, 2 ng/g of T3); 15 mM NaOH, 50% propylyenglycol and PBS containing 5% BSA used; Controls received mp w/ vehicle; animal info (Ansell’s mole rats, mean age 2.6 ± 0.92 years); post op. care (Carprofen, 5 mg/kg for at least 3 days; animals were isolated for 24–48 h for recovery then housed as family group); pumps replaced every 6 weeks; long-term study; “Osmotic pumps deliver the test agents with a constant flow rate, thus being well-suited for long-term hormone treatments” pg. 9 ;


ALZET Comments: Thyroxine; Triiodothyronine, 3,5,3′-; Propylene glycol, NaOH, BSA; SC; Rat (mole); 2006; 12 weeks; Dose (T4 at 90 ng/g; T3 at 2 ng/g); Vehicle solution (15 mM NaOH, 50% propylyenglycol and PBS containing 5% BSA); Controls received mp w/ vehicle; animal info (Ansell’s mole-rats with mean age of 2.6 ± 0.92 years); post op. care (Carprofen, 5 mg/kg for at least 3 days; animals were isolated for 24–48 h for recovery then housed as family groups); pumps replaced every 6 weeks; long-term study; “Osmotic pumps deliver the test agents with a constant flow rate, thus being well-suited for long-term hormone treatments. Constant administration further overcomes the short half-life of THs in rodents” pg. 9;


ALZET Comments: Thyroxin, L-, Adenovirus vector; Gene, green fluorescent protein; Gene, AMP-activated protein kinase; Saline; CSF/CNS (hypothalamus); Rat; 1007D; 7, 21 days; bilateral cannula used; animal info (200 -250g); gene therapy; Therapeutic indication (Browning, thyroid hormones);


ALZET Comments: Triiodothyronine ; thyroxine; Propylene glycol; SC; Rat (pregnant); 2ML2; Controls received mp w/ vehicle and sham surgery; animal info (250-300 g, female, Wistar); "(T3, T4 doses) were not corrected for increasing weight" pg 1714; "Instead of administering the hormones directly to the hypothyroid fetuses, they were given via subcutaneous infusion to pregnant dams." pg 1715.


ALZET Comments: Thyroxine, L-; SC; Rat (pregnant); 2ML4; Controls received mp w/ vehicle; animal info (Wistar, P90).

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: Thyroxine, L-; doxycycline; SC; Rat; 1002; 14 days; Controls received mp w/ physiological serum; animal info (Wistar, male, 50-60 days old, 132 g);

ALZET Comments: Thyroxine; NaOH; propylene glycol; SC; Rat; 2ML2; Controls received mp w/ vehicle; animal info (male, Wistar, 320-360 g);

ALZET Comments: Thyroxine, L-; Propylene glycol; NaOH; SC; Rat; 2ML2; 10 days; Functionality of mp verified by T4 plasma concentrations; dose-response (Fig. 1); no stress (see pg. E515); post op. care (Temgesic); animal info (male, Wistar, 325-375 g.); hepatic sympathetic or parasympathetic denervation.

ALZET Comments: Triiodothyromine; thyroxine, L-; Saline; NaOH; SC; Rat; 2002; 14 days; Controls received mp w/ vehicle, or no treatment; replacement therapy (thyroidectomy); animal info (Sprague-Dawley, 5 wk old, male).

ALZET Comments: Thyroxine; leptin, human analog; triiodothyronine, reverse; Saline, isotonic; SC; Rat; 2001; 3, 6 days; Controls received mp w/ vehicle, functionality of mp verified by plasma levels, replacement therapy (hypothyroidism), enzyme inhibitor (deiodinase), peptides, multiple pumps per animal (2), agents are also known as T3 and T4.

ALZET Comments: Thyroxine; Iopanoic Acid; Triiodothyronine; NACL; NAOH (sodium hydroxide); HCL; CSF/CNS; Bird (quail); 2002; 2 weeks; ALZET brain infusion kit used; placement & patency of canula verified by injecting evans blue dye.

ALZET Comments: Luteinizing hormone; Thyroxine; Saline; SC; Rat; 2ML4; 4 weeks; controls received mp w/ saline; functionality of mp verified by residual volume and plasma levels of LH & T4 via radioimmunoassay; dose-response (table, p. 1364); multiple pumps per animal (1-2): one for T4 and one for LH.

P5155: V. Haberkorn, et al. Vitamin A modulates the effects of thyroid hormone on UDP-glucuronosyl transferase expression and activity in rat liver. MOLECULAR AND CELLULAR ENDOCRINOLOGY 2002;190(167-175
ALZET Comments: Thyroxine; Triiodothyronine; Saline; Sodium hydroxide; SC; Rat; 2002; 15 days; controls received mp w/ vehicle; replacement therapy (thyroidectomy, p. 168); functionality of mp verified by thyroxine plasma levels.

ALZET Comments: Growth hormone, recomb. human; thyroxine; triiodothyronine; SC; Rat; 2 weeks; Controls received teflon rods; replacement therapy (hypophysectomy).
ALZET Comments: Thyroxine; PBS; BSA; NaOH; SC; Rat (pregnant); 2004; 23 days; Controls received mp w/ vehicle; functionality of mp verified by tail bleed for TH levels; replacement therapy (thyroidectomy); teratology.

ALZET Comments: Leptin; thyroxine; triiodothyronine; Saline; SC; CSF/CNS; Rat; 2001; 6 days; Controls received mp w/ vehicle; peptides.

ALZET Comments: Angiotensin II; Thyroxine; Saline; SC; Rat; 2004; 28 days; controls received mp w/ vehicle; cardiovascular; peptides; one group received Ang II and T4 in same pump; functionality of mp verified by plasma Ang II levels.

ALZET Comments: Triiodothyronine, 3,3',5'-; Thyroxine; NaOH; Saline; IP; Rat; 2002; 10 days; Triiodothyronine (T3) & thyroxine (T4) were dissolved in 0.1M NaOH & 0.9% NaCl.

ALZET Comments: Growth hormone, recomb. human; Insulin-like growth factor I; Dexamethasone; Thyroxine, L-; Rat; 2001; 2ML2; 6 days; controls received sham operation; replacement therapy (hypophysectomy); agent infusion rates given in ug/h; recomb. human IGF-I used.

ALZET Comments: Growth hormone, rat; Thyroxine; SC; IP; Rat; 6 days; functionality of mp verified by residual volume; replacement therapy (hypophysectomy); peptides; multiple pumps per animal (2) (1 with each agent).

ALZET Comments: Thyroxine sulfate; Triiodothyronine sulfate, 3,3',5';-; Triiodothyronine sulfate, reverse; NaOH; PBS; Serum, rat; SC; Rat; 2001; 48-96 hours; controls received mp with saline; functionality of mp verified by serum levels.

ALZET Comments: Thyroxine; Triiodothyronine; Saline; Serum, rat; NaOH; SC; Rat; 2ML4; 28 days; controls received sham surgery; functionality of mp verified by serum hormone levels; replacement therapy (thyroidectomy); toxicology.

ALZET Comments: Thyroxine; SC; Rat; 7, 13 days; controls received mp w/ saline; replacement therapy (thyroidectomy).

ALZET Comments: Thyroxine; Triiodothyronine; $^{125}$I tracer; Radio-isotopes; Albumin, bovine serum; NaOH; Sodium carbonate; SC; Rat; 2001; 7 days; functionality of mp verified in pilot studies; topical and im antibiotics used.

ALZET Comments: Triiodothyronine; Thyroxine; 125I tracer; Radio-isotopes; Albumin, bovine serum; SC; Rat; 2001; 7 days; functionality of mp verified in pilot studies.

ALZET Comments: Thyroxine; Triiodothyronine; 125I tracer; 131I tracer; Radio-isotopes; Albumin, bovine serum; Saline; Sodium hydroxide; IP; Rat; 1003D; 2002; 1 week; 24 hours; replacement therapy (MMI-perchlorate induced hypothyroidism).

ALZET Comments: Thyroxine; SC; Rat; 2002; 21-24 days; replacement therapy (thyroidectomy).

ALZET Comments: Growth hormone, human; Dexamethasone; Thyroxine, l-; SC; Rat; 2001; 5 days; replacement therapy (hypophysectomy); peptides; GH given solely, or GH/Dex, GH/Dex/T4, or Dex/T4.

ALZET Comments: Thyroxine; Triiodothyronine; PBS; Serum, rat; Sodium hydroxide; Rat (pregnant); 2ML2; no duration posted; controls received mp w/ saline; functionality of mp verified by plasma levels; dose-response.

P2176: R. A. Barter, et al. UDP-glucuronosyltransferase inducers reduce thyroid hormone levels in rats by an extrathyroidal mechanism. Toxicol. Appl. Pharmacol 1992;113(36-42
ALZET Comments: Thyroxine; Triiodothyronine; Saline; Sodium hydroxide; SC; Rat; 2002; 10 days; functionality of mp verified by serum levels (p. 38); replacement therapy (thyroidectomy); good methods.

ALZET Comments: Triiodothyronine; Thyroxine, l-; Butanol, n-; Propylene glycol; IP; Rat; 2001; 2002; 7,14 days; controls received no treatment or mp with vehicle; functionality of mp verified by plasma levels; replacement therapy (thyroparathyroidectomy); comparison of SC T3 injections vs. mp.

ALZET Comments: Triiodothyronine; Thyroxine; Thyrotropin-rel. factor; Saline; Sodium hydroxide; Serum, rat; SC; Rat; 6 days; controls received saline via injections or did not have drug-induced hypothyroidism; replacement therapy (propylthiouracil and methimazole-induced hypothyroidism); comparison of ip, iv & sc injections vs. mp; multiple pumps per animal (2) were used concurrently.

ALZET Comments: Thyroxine; 125I tracer; Potassium iodide; Radio-isotopes; Rat (pregnant); no duration posted; no comment posted.
**ALZET Comments:** Thyroxine; Triiodothyronine; Albumin, bovine serum; Radio-isotopes; Saline; SC; Rat; 2001; 7 days; functionality of mp verified by serum hormone levels, measuring residual radioactivity.

P1468: C. H. Emerson, *et al.* Serum thyrotropin concentrations are more highly correlated with serum triiodothyronine concentrations than with serum thyroxine concentrations in thyroid hormone-infused thyroidectomized rats. Endocrinology 1989;124(2415-2418
**ALZET Comments:** Thyroxine; Triiodothyronine; Serum, rat; Sodium hydroxide; Water; SC; Rat; 14 days; dose-response; functionality of mp verified by serum levels; replacement therapy (thyroidectomy).

**ALZET Comments:** Radio-isotopes; Thyroxine; 125I tracer; 131I tracer; IP; Rat; 2001; 7 days; 4 exp., only 1 used mp; nafenopin pellets administered concomitantly in food; 2 doses of agent infused with different radio-isotopes.

**ALZET Comments:** Radio-isotopes; Thyroxine; Triiodothyronine; 125I tracer; SC; Rat; 2001; 7 days; no comment posted.

**ALZET Comments:** Radio-isotopes; Thyroxine; Triiodothyronine; 125I tracer; Albumin, human serum; Sodium hydroxide; Water; SC; Rat; 2001; 14 days; dose-response (table); half-life; second and third pumps implanted at 7 days; third pump contained labelled T-4 to measure the MCR; functionality of mp verified by serum levels; pump replaced weekly; replacement therapy (thyroidectomy); stability determin.

**ALZET Comments:** Radio-isotopes; Thyroxine; 125I tracer; IP; Rat; 2002; 7, 14 days; measured plasma clearance of T4; functionality of mp verified by serum levels; stability verified at 14 days.

**ALZET Comments:** Radio-isotopes; Thyroxine; Triiodothyronine; 125I tracer; Bile; Glycerol; Propanol; Propylene glycol; intestine (duodenum); Rat; 2001; 7 days; catheter to duodenum; dose-response (text); functionality of mp verified by plasma levels.

**ALZET Comments:** Thyroid-stimulating hormone, bovine; Thyrotropin-rel. factor; Thyroxine; Triiodothyronine; Sodium hydroxide; Saline; IV (jugular); SC; Rat; 2, 6 days; pump model not stated; mp connected to catheter; dose-response; separate and simultaneous infusion of T3 and T4; NaOH is vehicle for TRH, T3, and T4; replacement therapy (hypophysectomy); peptides.

**ALZET Comments:** Thyroxine; 3H tracer; IP; mice; 2001; 22 days; pumps replaced; replacement therapy (hemithyroidectomy); cancer.

P1002: M. O. Goumaz, *et al.* Brain cortex reverse triiodothyronine (rT3) and triiodothyronine concentrations under steady state infusions of thyroxine and rT3. Endocrinology 1987;120(1590-1596
ALZET Comments: Thyroxine; Triiodothyronine, reverse; 125I tracer; Sodium hydroxide; Saline; Serum, rat; Sodium carbonate; IP; Rat; 2001; 3/7 days; pumps primed overnight in saline; T4 of low & high specific activity (SA) infused sep; T4 of low (SA) obtained by add. of unlabeled T4; replacement ther. (thyroidectomy).

P1009: W. J. DeVito, et al. The pituitary TSH response to TRH is inversely related to the plasma TSH concentration and directly related to the pituitary TSH content during hypothyroidism in the rat. Acta Endocrinol 1987;114(27-36
ALZET Comments: Thyroxine; Triiodothyronine; Sodium hydroxide; Saline; Serum, rat; SC; Rat; 2002; 7/14 days; pumps replaced after 7 days; dose-response; intact euthyroid control rats were left untreated; replacement therapy (thyroidectomy).

ALZET Comments: Thyroxine; Triiodothyronine, reverse; Sodium hydroxide; Saline; Serum, hypothyroid rat; Sodium carbonate; IP; Rat; 2001; 7 days; controls received mp w/vehicle; dose response data; pumps primed overnight in buffer; various doses of agents infused; functionality of mp verified by labelling agent (extensive serum level data); replacement therapy (thyroidectomy).

ALZET Comments: MK-771; Thyroxine; Sodium hydroxide; Saline; CSF/CNS; SC; Rat; 1 week; comparison of once daily each icv & ip injec vs. mp infusion vs. icv injec every 2 hr; T4 in saline & NaOH given sc, MK-771 in saline only given by icv route; stability of MK-771 verified; comparison of agent's effects; MK-771 is a TRH analog.

ALZET Comments: ACTH (1-24); Dexamethasone disodium phosphate; Melanocyte-stimulating hormone, a-; Thyroxine, l-; SC; Rat; 6 days; comparison of agents effects; replacement therapy (hypophysectomy); peptides.

ALZET Comments: Thyroxine; Sodium hydroxide; SC; Rat; 1 week; comparison of sc injec vs. mp infusion.

ALZET Comments: Thyroxine; Triiodothyronine; Sodium hydroxide; Serum, rat; SC; Rat; 2002; 12 days; replacement therapy (thyroidectomy).

ALZET Comments: Dexamethasone; Radio-isotopes; Thyroxine, l-; Triiodothyronine; 125I tracer; Albumin, human serum; Sodium hydroxide; Saline; IP; SC; Rat; 2001; 2002; 5, 6, and 12 days; comparison of agents effects; replacement therapy (thyroidectomy); no stress - see p. 220; T3 and T4 used w/ and w/o 125I tracer; T4 used in 2002 pump sc, T3 in 2001 sc, Dex. in 2001 ip or sc; 3 pumps/animal.

ALZET Comments: Thyroxine; DMSO; SC; Guinea pig; 2002; 13 days; no comment posted.

ALZET Comments: Glucagon; Somatostatin; Thyroxine; SC; Rat; 2001; 2-3 days; separate pumps delivering glucagon and somatostatin were implanted simultaneously in same rat; peptides.
**ALZET Comments:** Glucagon; Radio-isotopes; Thyroxine; Triiodothyronine; 125I tracer; Sodium hydroxide; Saline; IP; IV (jugular); Rat; 7-9 days; glucagon ip simultaneous infusion w/T3 & T4 in vehicles iv; 2 pumps/animal.

**ALZET Comments:** Triiodothyronine analog (DIMIT); Thyroxine; Triiodothyronine; SC; Rat; 8 days; comparison of daily sc injection vs. infusion; organ replacement therapy (thyroidectomy).

**ALZET Comments:** Thyroxine, I-; In vitro (egg); chorioallantoic membrane; Bird (chicken embryo); 2001; 7 days; mp placed in small test tube filled w/ water and then sealed w/ parafilm; mp connected to catheter that bathed the chorioallantoic membrane.

**ALZET Comments:** Insulin; Thyroxine; Sodium hydroxide; SC; Rat; 2001; 2-4 days; NaOH in T4 only; peptides.

**ALZET Comments:** Thyroxine; Sodium hydroxide; SC; Rat; 3 days; no comment posted.

**ALZET Comments:** Triiodothyronine, 3,3',5'-; Thyroxine; SC; Rat; no duration posted; 2 days T4, 5 days rT3; comparison of injections vs. infusion.

**ALZET Comments:** Thyroxine; Triiodothyronine; Sodium hydroxide; Propanediol, 1,2-; Serum, rat; SC; Rat; 4-6 days; organ replacement therapy (thyroidectomy).

**ALZET Comments:** Thyroxine; Sodium hydroxide; Propanediol, 1,2-; IP; SC; Rat; 2 days; comparison of oral admin. vs. infusion; organ replacement therapy (thyroidectomy).

**ALZET Comments:** Radio-isotopes; Thyroxine; 125I tracer; Saline; SC; Rat; 1701; no duration posted; organ replacement therapy (thyroidectomy).