



References on the Administration of Triiodothyronine Using ALZET® Osmotic Pumps

Q7872: P. Seoane-Collazo, *et al.* Analyzing AMPK Function in the Hypothalamus. *Methods Mol Biol* 2018;1732(433-448)
Agents: Triiodothyronine **Vehicle:** Saline; NaOH; **Route:** CNS/CSF (Arcuate Nucleus of Hypothalamus; Lateral Hypothalamic Area; Ventromedial Nucleus of the Hypothalamus); **Species:** Rat; **Pump:** 2001; 1007D; 1004D; **Duration:** Not stated;
ALZET Comments: Dose (4ng/day T3); 1mM NaOH used; Controls received mp w/ vehicle; Triiodothyronine aka T3; Brain coordinates (VMH, 2.8 mm posterior to bregma, 0.6 mm lateral to midline, and 10.1 mm ventral; for ARC, 2.8 mm posterior to bregma, 0.3 mm lateral to midline, and 10.2 mm ventral; and for LHA, 2.9 mm posterior to bregma, 2 mm lateral to midline, and 8.1 mm ventral); cyanoacrylate adhesive;

Q7862: L. Sabatino, *et al.* Modification of gene expression profiling related to renin-angiotensin system in an ischemia/reperfusion rat model after T3 infusion. *Mol Cell Biochem* 2018;449(1-2):277-283
Agents: Triiodothyronine **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 3 days;
ALZET Comments: Dose (6 µg/kg/day); Controls received sham surgery and mp w/ vehicle; animal info (12-15 weeks, male, Wistar, 353+/-11g); post op. care (hydrated with physiological saline and given buprenorphin 0.05 mg/kg s.c.); ischemia (myocardial ischemia/reperfusion); cardiovascular; Therapeutic indication (T3 stimulates the expression of protective genes related to renin-angiotensin system such as AT2R/MAS1-ACE2 mainly in BZ);

Q7179: Y. Henning, *et al.* Retinal S-opsin dominance in Ansell's mole-rats (*Fukomys ansellii*) is a consequence of naturally low serum thyroxine. *Sci Rep* 2018;8(1):4337
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% propylenglycol 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 ; .

Q6089: Y. Henning, *et al.* Retinal S-opsin dominance in Ansell's mole-rats (*Fukomys ansellii*) is a consequence of naturally low serum thyroxine. *Sci Rep* 2018;8(1):4337
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% propylenglycol 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 (12 weeks); "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;.

Q6764: L. Sabatino, *et al.* T3 enhances Ang2 in rat aorta in myocardial I/R: comparison with left ventricle. *J Mol Endocrinol* 2016;57(3):139-49

ALZET Comments: Triiodothyronine; Saline; SC; Rat; 2ML4; 48 hours; Dose (6 µg/kg/day); Controls received mp w/ vehicle; animal info (adult male Wistar rats 12–15 weeks old and weighing about 300 g); tri-iodothyronine aka T3; cardiovascular;.

Q6632: G. Nicolini, *et al.* Early and Short-term Triiodothyronine Supplementation Prevents Adverse Postischemic Cardiac Remodeling: Role of Transforming Growth Factor-beta1 and Antifibrotic miRNA Signaling. *Mol Med* 2016;21(1):900-911

ALZET Comments: Triiodothyronine; Saline; SC; Rat; 2002; 48 hours; Dose (6 mg/kg/day); Controls received mp w/ vehicle; animal info (adult male Wistar rats weighing 385 ± 9 g); Triiodothyronine aka T3; cardiovascular;.

Q5167: G. Nicolini, *et al.* Early and short-term triiodothyronine supplementation prevents adverse post-ischemic cardiac remodeling: role of transforming growth factor-beta1 and anti-fibrotic miRNA signaling. *Mol Med* 2015;



ALZET Comments: Triiodothyronine; Saline; SC; Rat; 2002; 3 days; Controls received mp w/ vehicle; animal info (male, Wistar, adult, 385+/- 9 g); functionality of mp verified by serum levels; cardiovascular; pumps removed after 3 days; Dose (6 ug/kg/day);.

Q4156: S. Walrand, *et al.* Altered regulation of energy homeostasis in older rats in response to thyroid hormone administration. *FASEB Journal* 2014;28(1499-1510)

ALZET Comments: Triiodothyronine; Saline; SC; Rat; 14 days; Controls received mp w/ vehicle; animal info (male, Fischer 344 Brown Norway F1 hybrid, 7 and 27 months old); functionality of mp verified by blood levels; triiodothyronine aka T3;.

Q4076: A. Saba, *et al.* Quantification of Thyroxine and 3,5,3'-Triiodo-Thyronine in Human and Animal Hearts by a Novel Liquid Chromatography-Tandem Mass Spectrometry Method. *Hormone and Metabolic Research* 2014;46(628-634)

ALZET Comments: Triiodothyronine; SC; Rat; 2002; 3 days; Controls received mp w/ saline; animal info (Wistar, 280-300g); functionality of mp verified by serum levels; cardiovascular;.

Q3722: H. Nagao, *et al.* Effects of triiodothyronine on turnover rate and metabolizing enzymes for thyroxine in thyroidectomized rats. *LIFE SCIENCES* 2014;116(74-82)

ALZET Comments: Triiodothyronine; NaOH; saline; SC; Rat; 2ML4; 14 days; Control animals received mp w/ vehicle; animal info (7 wks old, male, Sprague Dawley).

Q3881: F. Forini, *et al.* Triiodothyronine Prevents Cardiac Ischemia/Reperfusion Mitochondrial Impairment and Cell Loss by Regulating miR30a/p53 Axis. *Endocrinology* 2014;155(4581-4590)

ALZET Comments: Triiodothyronine; Saline; SC; Rat; 2ML4; 48 hours; Controls received mp w/ vehicle; animal info (male, Wistar, 12-15 weeks old, 310g); ischemia (cardiac); cardiovascular;.

Q1097: C. Grijota-Martinez, *et al.* Lack of Action of Exogenously Administered T3 on the Fetal Rat Brain Despite Expression of the Monocarboxylate Transporter 8. *Endocrinology* 2011;152(4):1713-1721

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.

Q0392: K. K. Henderson, *et al.* Physiological Replacement of T3 Improves Left Ventricular Function in an Animal Model of Myocardial Infarction-Induced Congestive Heart Failure. *Circulation-Heart Failure* 2009;2(3):243-U122

ALZET Comments: Triiodothyronine; Saline; SC; Rat; 2004; 9 weeks; Controls received mp w/ vehicle; animal info (adult, male, Sprague Dawley); pumps replaced at the 4th week; long-term study; myocardial infarction.

P9482: V. A. Galton, *et al.* Life without Thyroxine to 3,5,3'-Triiodothyronine Conversion: Studies in Mice Devoid of the 5'-Deiodinases. *Endocrinology* 2009;150(6):2957-2963

ALZET Comments: Triiodothyronine, 3, 5, 3'-; SC; Mice; 1002; 14 days; Controls received mp w/ vehicle; no stress (see pg. 2958); animal info (10 wks old, wr, D1/D2KO); "none of the animals suffered any ill effects of the implants, either generally or in the area of the pumps." (pg. 2958).

Q0446: P. Flandin, *et al.* Uncoupling protein-3 as a molecular determinant of the action of 3,5,3'-triiodothyronine on energy metabolism. *Endocrine* 2009;36(2):246-254

ALZET Comments: Triiodothyronine; NaCl; SC; Mice; 2001; 3 days; Controls received mp w/ vehicle; animal info (WT, UCP3KO, 2 mo old, female); functionality of mp verified by "increase in T3 during the treatment".

P9559: E. E. Cable, *et al.* Reduction of Hepatic Steatosis in Rats and Mice After Treatment with a Liver-Targeted Thyroid Hormone Receptor Agonist. *Hepatology* 2009;49(2):407-417

ALZET Comments: MB07344; GC-1; triiodothyroacetic acid, 3,5,3'; triiodothyronine; Saline; BSA; SC; Rat; 2ML1; 7 days; Controls received mp w/vehicle; animal info (male, Sprague Dawley, 300g, 10 wks old); MB07344, GC-1 are TR-beta-selective antagonists.



P9394: M. S. Byerly, *et al.* Effects of BDNF, T₃, and corticosterone on expression of the hypothalamic obesity gene network in vivo and in vitro. *American Journal of Physiology-Regulatory Integrative and Comparative Physiology* 2009;296(4):R1180-R1189

ALZET Comments: Corticosterone; triiodothyronine; DMSO; propylene glycol; SC; Bird (chicken); 2001; 72 hours; Controls received mp w/ vehicle; animal info (male, 29 days old); 50% DMSO used; 50% propylene glycol used.

P8314: K. R. Short, *et al.* Effect of T₃-induced hyperthyroidism on mitochondrial and cytoplasmic protein synthesis rates in oxidative and glycolytic tissues in rats. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2007;292(2):E642-E647

ALZET Comments: Triiodothyronine; Saline; Na₂CO₃; NaOH; BSA; SC; Rat; 14 days; Controls received mp w/ vehicle; functionality of mp verified by serum T₃ levels; animal info (male, Sprague-Dawley, 325-350g.); endocrinology.

P8585: G. Fava, *et al.* Thyroid hormone inhibits biliary growth in bile duct-ligated rats by PLC/IP₃/Ca²⁺-dependent downregulation of SRC/ERK1/2. *Am J Physiol Cell Physiol* 2007;292(4):C1467-C1475

ALZET Comments: Triiodothyronine, 2,3',5 L-; NaOH; BSA; IP; Rat; 1 week; Controls received mp w/ vehicle; functionality of mp verified by serum T₃ levels; animal info (male, Fisher 344, 150-175g, bile duct ligation).

P7879: H. Lu, *et al.* Tissue distribution and thyroid hormone regulation of Pept1 and Pept2 mRNA in rodents. *Peptides* 2006;27(4):850-857

ALZET Comments: Triiodothyronine; 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).

P7595: S. Danzi, *et al.* Effect of serum triiodothyronine on regulation of cardiac gene expression: role of histone acetylation. *American Journal of Physiology-Heart and Circulatory Physiology* 2005;289(4):H1506-H1511

ALZET Comments: Triiodothyronine; NaOH; saline; SC; Rat; 1002; 3, 12 days; Controls received mp w/ vehicle or euthyroid; functionality of mp verified by serum T₃ levels; replacement therapy (thyroidectomy); dose-response (fig. 1); comparison of IM injections vs. mp; half-life (pg. H1506, H1508) 7 hours in vivo in rat; cardiovascular; animal info (male, Sprague-Dawley 200 g); mp primed 24 hrs in 37 C saline; "constant infusions leads to stable serum levels by 72 h." (p. H1508; "Bolus injection was not sufficient to normalize serum T₃" (p. H1510).

P7160: P. Cettour-Rose, *et al.* Hypothyroidism in rats decreases peripheral glucose utilisation, a defect partially corrected by central leptin infusion. *Diabetologia* 2005;48(4):624-633

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.

P5986: T. Yoshimura, *et al.* Light-induced hormone conversion of T(4) to T(3) regulates photoperiodic response of gonads in birds. *Nature* 2003;426(6963):178-181

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.

P6569: S. Lutz, *et al.* Plasma membrane-associated nucleoside diphosphate kinase (nm23) in the heart is regulated by beta-adrenergic signaling. *British Journal of Pharmacology* 2003;140(6):1019-1026

ALZET Comments: Isoproterenol; triiodothyronine; propranolol; SC; Rat; 2ML2; 14 days; Controls received mp w/ saline; cardiovascular.

P5898: J. A. Levine, *et al.* Effect of hyperthyroidism on spontaneous physical activity and energy expenditure in rats. *Journal of Applied Physiology* 2003;94(1):165-170

ALZET Comments: Triiodothyronine; BSA; NaOH (sodium hydroxide); sodium bicarbonate; SC; Rat; 14 days; Controls received mp w/ vehicle; pump model not stated.



P5951: L. A. Comeau, *et al.* Modifying thyroidal status in Atlantic cod by osmotic pump delivery of thyroid and antithyroid agents. TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY 2003;132(5):1021-1026

ALZET Comments: Triiodothyronine; iodide, potassium; methimazole; Estradiol, 17B-; testosterone; thiourea; Saline; IP; Fish (cod); 2ML1; 17 days; Controls received mp w/ vehicle; functionality of mp verified by residual volume; drug plasma levels taken; potassium iodide, methimazole and thiourea are thyroid inhibitors; sex hormones were in a separate study where the ALZET pump model was not listed; "this study demonstrates the value of osmotic pumps as effective delivery vehicles for drugs in wild demersal fish." p. 1024.

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.

P6657: E. F. Gevers, *et al.* Localization and regulation of the growth hormone receptor and growth hormone-binding protein in the rat growth plate. Journal of Bone and Mineral Research 2002;17(8):1408-1419

ALZET Comments: Growth hormone, recomb. human; thyroxine; triiodothyronine; SC; Rat; 2 weeks; Controls received teflon rods; replacement therapy (hypophysectomy).

P5553: P. Cettour-Rose, *et al.* Central stimulatory effect of leptin on T-3 production is mediated by brown adipose tissue type II deiodinase. AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM 2002;283(5):E980-E987

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

P5761: K. R. Short, *et al.* T(3) increases mitochondrial ATP production in oxidative muscle despite increased expression of UCP2 and -3. Am J Physiol Endocrinol Metab 2001;280(5):E761-E769

ALZET Comments: Triiodothyronine; Saline; BSA; Sodium Hydroxide (NaOH); Sodium Carbonate; SC; Rat; 14 days; Controls received mp w/ vehicle; 5% BSA used.

P4799: A. D. Chapital, *et al.* The effects of triiodothyronine augmentation on antithrombin III levels in sepsis. American Surgeon 2001;67(253-256

ALZET Comments: Triiodothyronine;; Saline;; SC;; Rat;; 24 hours;; Controls received sham surgery; functionality of mp verified by T3 plasma levels by direct chemoluminescence assay; dose-response (graph p. 254); immunology;.

P4701: K. Ojamaa, *et al.* Thyroid hormone regulation of phospholamban phosphorylation in the rat heart. Endocrinology 2000;141(6):2139-2144

ALZET Comments: Triiodothyronine;; SC;; Rat;; 7 days;; Functionality of mp verified by T₃ plasma levels via chemiluminescent assay; cardiovascular;.

P4766: H. Minami, *et al.* Enhancement of retrovirus-mediated gene transfer to rat liver in vivo by infusion of hepatocyte growth factor and triiodothyronine. Journal of Hepatology 2000;33(183-188

ALZET Comments: Hepatocyte growth factor; Triiodothyronine;; Saline; Heparin, sodium;; IV (portal vein);; Rat;; 24 hours;; Comparison of portal vein injections vs. mp; cancer; immunology; peptides; HGH used was recombinant human.

P9022: G. Medina-Gomez, *et al.* Thermogenic effect of triiodothyroacetic acid at low doses in rat adipose tissue without adverse side effects in the thyroid axis. AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM 1999;67(4):E688-E697

ALZET Comments: Triiodothyronine; triiodothyroacetic acid; NaOH; saline; BSA; SC; Rat; 2ML2; 12 days; Controls received mp w/ placebo; animal info (female, Sprague Dawley).

P3936: A. G. Schuur, *et al.* Modulating effects of thyroid state on the induction of biotransformation enzymes by 2,3,7,8-tetrachlorodibenzo-p-dioxin. Environ. Toxicol. Pharmacol 1998;5(7-16



ALZET Comments: Triiodothyronine, 3,3',5'-; Thyroxine; NaOH; Saline; IP; Rat; 2002; 10 days; controls received mp w/vehicle or no surgery; replacement therapy (thyroidectomy); toxicology.

P3633: A. G. Schuur, *et al.* Extrathyroidal effects of 2,3,7,8-tetrachlorodibenzo-p-dioxin on thyroid hormone turnover in male Sprague-Dawley rats. *Endocrinology* 1997;138(9):3727-3734

ALZET Comments: Thyroxine; Triiodothyronine; NaOH; saline; IP; Rat; 2002; 10 days; Triiodothyronine (T3) & thyroxine (T4) were dissolved in 0.1M NaOH & 0.9% NaCl.

P3088: S.-Y. Wu, *et al.* Sulfation pathway of thyroid hormone metabolism in selenium-deficient male rats. *Am. J. Physiol. (Endocrinol. Metab.)* 1995;31(E572-E579)

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.

P4140: W. R. Christenson, *et al.* Extrathyroidally mediated changes in circulating thyroid hormone concentrations in the male rat following administration of an experimental oxyacetamide (FOE 5043). *Toxicol. Appl. Pharmacol* 1995;132(253-262)

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.

P3063: Y.-M. Yen, *et al.* Direct measurement of whole body thyroid hormone pool sizes and interconversion rates in fasted rats: hormone regulation implications. *Endocrinology* 1994;134(4):1700-1709

ALZET Comments: Thyroxine; Triiodothyronine; ¹²⁵I 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.

P3008: B. Freyschuss, *et al.* The hormonal regulation of the oestrogen receptor in rat liver: an interplay involving growth hormone, thyroid hormones and glucocorticoids. *J. Endocrinol* 1994;142(285-298)

ALZET Comments: Growth hormone, human; Triiodothyronine, L-; Prolactin, ovine; Dexamethasone; SC; Rat; 7 days; controls received hypophysectomy only w/ no mp; functionality of mp verified by checking pumps after usage; replacement therapy (hypophysectomy); comparison of single sc injections of GH & T3 vs. mp; agents given alone or in combination; growth hormone via mp partly restores liver estrogen receptor concentration while same dose in 2 single injections daily has no effect.

P3019: H. Vidal, *et al.* Effect of growth hormone deficiency on hormonal control of hepatic glycogenolysis in hypophysectomized rat. *Metabolism* 1993;42(5):631-637

ALZET Comments: Triiodothyronine; Corticotropin; NaOH; IP; Rat; 2002; 8-10 days; peptides.

P3138: T. T. Nguyen, *et al.* Steady state organ distribution and metabolism of thyroxine and 3,5,3'-triiodothyronine in intestines, liver, kidneys, blood, and residual carcass of the rat in vivo. *Endocrinology* 1993;133(6):2973-2983

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

P2524: H. Liang, *et al.* Effect of the antioxidant TK 12627 (Irganox) on monodeiodination and on the levels of messenger ribonucleic acid of 5'-deiodinase type I and spot 14. *Acta Endocrinol* 1993;128(451-458)

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).

P2241: J. J. DiStefano, *et al.* Enterohepatic regulation and metabolism of 3,5,3'-triiodothyronine in hypothyroid rats. *Endocrinology* 1993;132(4):1665-1670

ALZET Comments: Triiodothyronine; 125I tracer; Sodium carbonate; Sodium hydroxide; Radio-isotopes; Serum, rat; SC; Rat; 2001; 7 days; replacement therapy (thyroidectomy).



R0102: R. M. Lechan, *et al.* Feedback regulation of thyrotropin-releasing hormone gene expression by thyroid hormone in the hypothalamic paraventricular nucleus. In "Functional Anatomy of the Neuroendocrine Hypothalamus," Wiley, Chichester (Ciba Foundation Symposium 168) 1992;144-164

ALZET Comments: Triiodothyronine; IP; 7 days; replacement therapy (hypothyroidism); functionality of mp verified by measuring plasma levels of TSH.

P2570: I. Kakucska, *et al.* Thyrotropin-releasing hormone gene expression in the hypothalamic paraventricular nucleus is dependent upon feedback regulation by both triiodothyronine and thyroxine. *Endocrinology* 1992;130(5):2845-2850

ALZET Comments: Triiodothyronine; Sodium hydroxide; Saline; Serum, rat; IP; Rat; 2ML2; 7 days; controls received mp w/ vehicle; functionality of mp verified by plasma levels; replacement therapy (methimazole-induced hypothyroidism).

P2310: J. H. Hays, *et al.* Sodium ipodate increases triiodothyronine action in vivo. *J. Endocrinol. Invest* 1992;15(507-512)

ALZET Comments: Triiodothyronine, L-; Sodium hydroxide; Serum, rat; SC; Rat; 2002; 14 days; controls received thyroidectomy but no agent treatment; functionality of mp verified by in vitro testing; replacement therapy (thyroidectomy).

P2383: M. B. Elam, *et al.* In vivo growth hormone treatment stimulates secretion of very low density lipoprotein by the isolated perfused rat liver. *Endocrinology* 1992;131(6):2717-2722

ALZET Comments: Hydrocortisone; Triiodothyronine; Growth hormone; PEG; Sodium hydroxide; Saline; SC; Rat; no duration posted; peptides.

P2243: S. A. Dulchavsky, *et al.* Triiodothyronine treatment maintains surfactant synthesis during sepsis. *Surgery* 1992;112(475-479)

ALZET Comments: Triiodothyronine; Saline; SC; Rat; no duration posted; controls received mp w/saline; functionality of mp verified seven levels.

P2679: R. Calvo, *et al.* The rat placenta and the transfer of thyroid hormones from the mother to the fetus. Effects of maternal thyroid status. *Endocrinology* 1992;131(1):357-365

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.

P1855: H. G. Wilcox, *et al.* Effects of hyperthyroidism on synthesis, secretion and metabolism of the VLDL apoproteins by the perfused rat liver. *Biochim. Biophys. Acta* 1991;1081(246-252)

ALZET Comments: Triiodothyronine; IP; Rat; 7, 28 days; no comment posted.

P3097: H. G. Wilcox, *et al.* Effects of thyroid status and fasting on hepatic metabolism of apolipoprotein A-1. *J. Lipid Res* 1991;32(395-405)

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.

P2693: J. M. Connors, *et al.* Thyroid vascular conductance: differential effects of elevated plasma thyrotropin (TSH) induced by treatment with thioamides or TSH-releasing hormone. *Endocrinology* 1991;129(1):117-125

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.



P1708: S. Y. Wu, *et al.* Two pathways for thyroxine 5'-monodeiodination in brown adipose tissue in fetal sheep: ontogenesis and divergent responses to hypothyroidism and 3,5,3'-triiodothyronine replacement. *Endocrinology* 1990;126(4):1950-1958

ALZET Comments: Triiodothyronine; sheep (fetus); 8 days; functionality of mp verified by serum levels; replacement therapy (thyroidectomy).

P1778: H. L. Katzeff. Increasing age impairs the thyroid hormone response to overfeeding. *Proc. Soc. Exp. Biol. Med* 1990;194(198-203

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.

P1609: K. H. Hupart, *et al.* Differential response to L-triiodothyronine of anterior pituitary growth hormone messenger ribonucleic acid (mRNA) and B-thyrotropin mRNA in a hypothyroid Walker 256 carcinoma-bearing rat model of nonthyroidal disease. *Endocrinology* 1990;126(1):616-621

ALZET Comments: Radio-isotopes; Triiodothyronine; 125I tracer; Sodium hydroxide; Serum, rat; SC; Rat; 2001; 3 days; comparison of IP injections vs. mp infusion; cancer/immunology.

P1599: B. Comte, *et al.* Influence of thyroid hormones on gluconeogenesis from glycerol in rat hepatocytes: a dose-response study. *Metabolism* 1990;39(3):259-263

ALZET Comments: Triiodothyronine; IP; Rat; 7 days; replacement therapy (thyroidectomy).

P1590: Z. W. Lin, *et al.* Individual rabbit cardiac myocytes have different thresholds for alpha myosin heavy chain regulation by thyroid hormone. *Am. J. Anat* 1989;185(455-461

ALZET Comments: Triiodothyronine, L-; SC; rabbit; 5 days; functionality of mp verified by daily blood LT3 levels using RIA; replacement therapy (propylthiouracil diet-induced hypothyroid); various LT3 doses infused.

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).

P1323: H. G. Wilcox, *et al.* Stimulation of intestinal secretion of apolipoprotein AI by triiodothyronine. *Biochem. Biophys. Res. Commun* 1988;153(2):606-611

ALZET Comments: Triiodothyronine; Butanol, n-; PEG; IP; Rat; 2001; 7 days; no comment posted.

P1440: H. L. Katzeff, *et al.* Exercise regulation of triiodothyronine metabolism. *Am. J. Physiol* 1988;255(E824-E828

ALZET Comments: Radio-isotopes; Triiodothyronine; 125I tracer; Albumin, bovine serum; Saline; SC; mice; 2001; 7 days; dose-response; functionality of mp verified by serum levels.

P1173: J. R. Goldberg, *et al.* Altered triiodothyronine metabolism in Zucker fatty rats. *Endocrinology* 1988;122(2):689-693

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

P1331: L. A. Gavin, *et al.* Carbohydrate feeding increases total body and specific tissue 3,5,3'-triiodothyronine neogenesis in the rat. *Endocrinology* 1988;123(2):1075-1081

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.

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



ALZET Comments: Cortisol; Growth hormone, human; Triiodothyronine; Sodium hydroxide; Saline; SC; Rat; 7, 14 days; pump model not stated; male rats infused for 7 days, females for 14; agents infused separately; replacement therapy (hypophysectomy); peptides.

P1304: J. J. DiStefano, *et al.* Rat enterohepatic circulation and intestinal distribution of enterally infused thyroid hormones. *Endocrinology* 1988;123(5):2526-2539

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.

P1223: J. M. Conners, *et al.* Effects of thyrotropin on the vascular conductance of the thyroid gland. *Endocrinology* 1988;122(3):921-929

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.

P1324: A. Anagnostou, *et al.* Effects of triiodothyronine replacement on the anemia of chronic renal failure. *Exp. Hematol* 1988;16(159-162)

ALZET Comments: Triiodothyronine; Sodium hydroxide; Serum, rat; Water; IP; Rat; 2002; 14 days; dose-response (table); comparison of sc injections vs. mp infusion; functionality of mp verified.

P1049: B. Lacour, *et al.* Chronic triiodothyronine supplementation does not improve the lipoprotein disorders of mildly uremic rats. *Nephron* 1987;45(129-134)

ALZET Comments: Triiodothyronine; IP; Rat; 2002; 35 days; pumps replaced twice; some animals received contralateral nephrectomy; long-term study.

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).

P1127: L. A. Gavin, *et al.* Brain lipoprotein lipase is responsive to nutritional and hormonal modulation. *Metabolism* 1987;36(10):919-924

ALZET Comments: Insulin; Triiodothyronine; SC; Rat; 2001; 4, 7 days; dose-response; replacement therapy (streptozotocin induced diabetes, thyroidectomy); peptides.

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 (thyroparathyroidectomy).

P1063: G. Abraham, *et al.* The effects of a constant T3 level and thermoneutrality in diet-induced hyperphagia. *Horm. Metab. Res* 1987;19(96-100)

ALZET Comments: Triiodothyronine; Saline; SC; Rat; 2002; no duration posted; controls received sham operation w/placebo mp; replacement therapy (thyroidectomy) pumps replaced at day 14 and day 28; long-term study.

P0862: C. A. Kaiser, *et al.* In vivo inhibition of the 5'-deiodinase type II in brain cortex and pituitary by reverse triiodothyronine. *Endocrinology* 1986;119(2):762-770



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).

P0714: J. O. Olubadewo, *et al.* Differential effects of alanine on ketogenesis and triacylglycerol formation by isolated perfused livers from euthyroid and hyperthyroid rats. *Metabolism* 1985;34(12):1139-1145

ALZET Comments: Triiodothyronine; Butanol, n-; Propylene glycol; IP; Rat; 7 days; control group received mp w/ vehicle; mp infusion of T3 to induce hyperthyroidism in rats.

P0727: L. A. Gavin, *et al.* Modulation of adipose lipoprotein lipase by thyroid hormone and diabetes. *Diabetes* 1985;34(12):1266-1271

ALZET Comments: Insulin; Triiodothyronine; SC; Rat; 2001; 72 hours; replacement therapy (thyroidectomy, streptozocin induced diabetes); peptides.

P0539: J. M. Tibaldi, *et al.* Response of hepatic mitochondrial α -glycerophosphate dehydrogenase and malic enzyme to constant infusions of L-triiodothyronine in rats bearing the Walker 256 carcinoma. *J. Clin. Invest* 1984;74(3):705-714

ALZET Comments: Triiodothyronine; Sodium hydroxide; Serum, rat; SC; Rat; 3 days; 1.2 and 4.5 ug T3/100g body weight/day; dose-response data; cancer.

P0436: A. H. Klein, *et al.* Thyroid hormones augment catecholamine-stimulated brown adipose tissue thermogenesis in the ovine fetus. *Endocrinology* 1984;114(4):1065-1069

ALZET Comments: Triiodothyronine; SC; sheep (fetus); 8 days; replacement therapy (thyroidectomy); 25 ug/h and 50 ug/h infusions of T3.

P0448: A. R. Glass, *et al.* Low serum thyroxine and high serum triiodothyronine in nephrotic rats: etiology and implications for bioavailability of protein-bound hormone. *Endocrinology* 1984;114(5):1745-1753

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

P0392: R. R. Cavalieri, *et al.* Effects of dexamethasone on kinetics and distribution of triiodothyronine in the rat. *Endocrinology* 1984;114(1):215-221

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.

P0355: A. H. Klein, *et al.* Effect of changes in thyroid status on tissue respiration in fetal and newborn sheep. *Am. J. Physiol* 1983;244(6):E603-E606

ALZET Comments: Triiodothyronine; SC; sheep (fetus); sheep (lamb); 8 days; replacement therapy (thyroidectomy).

P0350: J. G. Brown, *et al.* Dose response of protein turnover in rat skeletal muscle to triiodothyronine treatment. *Biochim. Biophys. Acta* 1983;757(182-190)

ALZET Comments: Triiodothyronine, 3,5,3'-; PEG 300; Water; IP; Rat; 2001; 1 week; replacement therapy (thyroidectomy).

P0367: P. L. Ballard, *et al.* Thyroid hormones and plasma corticosteroid binding globulin capacity in fetal and newborn lambs. *Endocrinology* 1983;113(4):1197-1200

ALZET Comments: Triiodothyronine; sheep (fetus); sheep (lamb); 8 days; replacement therapy (thyroidectomy); doses of T3 were 8 ug/h, 25 ug/h, 50 ug/h.

P0214: O. Senga, *et al.* Comparison of peripheral thyroid hormone metabolism in normal rats and in rats receiving prolonged glucagon infusion. *Endocrinology* 1982;110(6):2011-2017



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.

P0213: L. Luciani, *et al.* Metabolic effects of 3,5-dimethyl-3'-isopropyl-L-thyronine (DIMIT) in constant infusion by osmotic minipump to hypothyroid rat. C. R. Acad. Sc. Paris (French, English abstract) 1982;294(3):361-364

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

P0135: M. M. El-Zaheri, *et al.* Maternal thyroid function is the major determinant of amniotic fluid 3,3',5'-triiodothyronine in the rat. J. Clin. Invest 1981;67(1126-1133

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

P0130: J. M. Connors, *et al.* Effect of continuous thyroxine administration on thyrotropin secretion in thyroidectomized rats. Endocrinology 1981;108(6):2098-2102

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

P0069: R. H. W. Lorijn, *et al.* Induced fetal hyperthyroidism: cardiac output and oxygen consumption. Am. J. Physiol 1980;239(3):H302-H307

ALZET Comments: Triiodothyronine; PEG; SC; sheep (fetus); 5 days; no comment posted.

P0045: R. H. W. Lorijn, *et al.* Clinical and physiologic implications of increased fetal oxygen consumption. Am. J. Obstet. Gynecol 1980;136(4):451-457

ALZET Comments: Triiodothyronine; PEG; SC; sheep (fetus); 4-5 days; Harvard pump used to infuse NE during control period of 30-60 mins.

P0059: J. M. Connors, *et al.* Feedback effectiveness of periodic versus constant triiodothyronine replacement. Endocrinology 1980;106(3):911-917

ALZET Comments: Triiodothyronine; Sodium hydroxide; Propanediol, 1,2-; SC; Rat; no duration posted; Intermittent injections vs. infusion; organ replacement therapy (thyroidectomy).