



References on the Administration of Growth Hormones Using ALZET® Osmotic Pumps

1. Bovine

Q1384: M. Walser, *et al.* Peripheral administration of bovine GH regulates the expression of cerebrocortical beta-globin, GABAB receptor 1, and the Lissencephaly-1 protein (LIS-1) in adult hypophysectomized rats. *GROWTH HORMONE & IGF RESEARCH* 2011;21(1):16-24

ALZET Comments: Growth hormone, bovine recomb.; Phosphate buffer; glycerol; sodium azide; SC; Rat; 2004; 6 days; Animal info (female, Sprague Dawley, hx, normal); replacement therapy (hypophysectomized).

P8049: D. L. Kleinberg, *et al.* Insulin-like growth factor (IGF)-I controls prostate fibromuscular development: IGF-I inhibition prevents both fibromuscular and glandular development in eugonadal mice. *Endocrinology* 2007;148(3):1080-1088

ALZET Comments: Insulin-like growth factor I; growth hormone, bovine; insulin-like growth factor-1, binding protein; SC; Mice; 1007D; 7 days; Controls received mp w/ saline; peptides; animal info (ORX, 10 weeks old, male); drugs delivered alone or in combination.

P8552: C. Gaelman, *et al.* Age-induced hypercholesterolemia in the rat relates to reduced elimination but not increased intestinal absorption of cholesterol. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2007;293(3):E737-E742

ALZET Comments: Growth hormone, bovine; SC; Rat; 2ML1; 1 week; Controls received no treatment; peptides; animal info (male, Wistar-Hannover, 6, 18 months old); endocrinology.

P8424: C. Gardmo, *et al.* In vivo transfection of rat liver discloses binding sites conveying GH-dependent and female-specific gene expression. *Journal of Molecular Endocrinology* 2006;37(3):433-441

ALZET Comments: Growth hormone, bovine; SC; Rat; 2001; 6 days; Peptides; animal info (Sprague-Dawley, 7 wks old, male).

P6387: M. Matasconi, *et al.* Pituitary control of lipoprotein and bile acid metabolism in male rats: growth hormone effects are not mediated by prolactin. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2004;287(1):E114-E119

ALZET Comments: Growth hormone, human; growth hormone, bovine; SC; Rat; 2001; 7 days; Replacement therapy (hypophysectomy); dose-response (p. E115).

P6852: P. Kotokorpi, *et al.* Activation of the glucocorticoid receptor or liver X receptors interferes with growth hormone-induced akr1b7 gene expression in rat hepatocytes. *Endocrinology* 2004;145(12):5704-5713

ALZET Comments: Growth hormone, bovine; Rat; 2001; 6 days; Replacement therapy (hypophysectomy); peptides.

P5894: M. Jalouli, *et al.* Sex difference in hepatic peroxisome proliferator-activated receptor alpha expression: Influence of pituitary and gonadal hormones. *Endocrinology* 2003;144(1):101-109

ALZET Comments: Growth hormone, bovine; testosterone; estradiol, 17B-; Phosphate buffer; glycerol; sodium azide; propylene glycol; SC; Rat; 2001; 7 days; Replacement therapy (gonadectomy); comparison of daily injections vs. chronic mp; peptides; GH was recomb bovine & diluted in 0.05 m phosphate buffer, pH 8.6, with 1.6% glycerol & 0.02% sodium azide; testosterone & estradiol were diluted in propylene glycol.

P5810: G. P. Hedlund, *et al.* Fetal antigen 1 (FA1) in the adult rat adrenal gland, ovary and pituitary gland. *In Vivo* 2003;17(1):1-4

ALZET Comments: Growth hormone, human; prolactin, ovine; growth hormone, bovine; Saline; SC; Rat; 2ML1; 7 days; Controls received mp w/ PBS vehicle; peptides; agents infused separately or concomitantly.

P5312: F. R. Simon, *et al.* Sexual dimorphic expression of ADH in rat liver: importance of the hypothalamic-pituitary-liver axis. *American Journal of Physiology-Gastrointestinal and Liver Physiology* 2002;283(3):G646-G655



ALZET Comments: Growth hormone, bovine; Na₂PO₄; Glycerol; NaN₂; Rat; 2001; 7 days; Comparison of twice-daily injections vs. mp.

Q6832: C. GARDMO, *et al.* Cloning of a Novel Growth Hormone-Regulated Rat Complementary Deoxyribonucleic Acid with Homology to the Human a1B-Glycoprotein, Characterizing a New Protein Family. *Endocrinology* 2001;142(2695–2701

ALZET Comments: Growth hormone, bovine; SC; Rat; 7 days; Dose (0.7 mg/kg/day); Controls received mp w/ vehicle; animal info (Normal and hypophysectomized Sprague Dawley rat); comparison of twice daily SC injections vs mp;

P3959: V. Chandrashekar, *et al.* The role of growth hormone in the control of gonadotropin secretion in adult male rats. *Endocrinology* 1998;139(3):1067-1074

ALZET Comments: Growth hormone, bovine; saline, alkaline; SC; Rat; 2ML2; 2 weeks; controls received mp w/vehicle; replacement therapy (orchietomy).

P4143: L. Carlsson, *et al.* Hormonal regulation of liver fatty acid-binding protein in vivo and in vitro: effects of growth hormone and insulin. *Endocrinology* 1998;139(6):2699-2709

ALZET Comments: Growth hormone, bovine; Insulin-like growth factor I; PBS; Glycerol; Sodium azide; SC; Rat; 2001; 6-7 days; replacement therapy (hypophysectomy); dose-response; comparison of sc injections vs. mp; peptides.

P3807: E. Hedner, *et al.* Systemically and locally administered growth hormone stimulates bone healing in combination with osteopromotive membranes: an experimental study in rats. *J. Bone and Min. Res* 1996;11(12):1952-1960

ALZET Comments: Growth hormone, bovine; Growth hormone, human; Prolactin, ovine; SC; bone (mandible); Rat; 2, 3, 4 weeks; controls received mp w/saline; pumps replaced after 2 weeks; recomb. human and bovine GH used.

P2633: W. R. Baumbach, *et al.* One class of growth hormone (GH) receptor and binding protein messenger ribonucleic acid in rat liver, GHR1, is sexually dimorphic and regulated by GH. *Endocrinology* 1995;136(2):749-760

ALZET Comments: Growth hormone, bovine; PBS; SC; Rat; 3 days; controls received sham operations; replacement therapy (hypophysectomy; gonadectomy); comparison of single injections vs. mp; peptides.

P3018: K. Vikman-Adolfsson, *et al.* Growth hormone but not gonadal steroids influence lipoprotein lipase and hepatic lipase activity in hypophysectomized rats. *J. Endocrinol* 1994;140(203-209

ALZET Comments: Growth hormone, bovine; Phosphate buffer; Glycerol; Sodium azide; SC; Rat; 2001; 1 week; replacement therapy (hypophysectomy); comparison of sc injections vs. mp; peptides.

P2996: A. Sjoberg, *et al.* Insulin-like growth factor-I and growth hormone have different effects on serum lipoproteins and secretion of lipoproteins from cultured rat hepatocytes. *Endocrinology* 1994;135(4):1415-1421

ALZET Comments: Insulin-like growth factor I; Growth hormone, bovine; PBS; Glycerol; Sodium azide; SC; Rat; 2001; 7 days; replacement therapy (hypophysectomy); comparison of sc injections of growth hormone vs. mp; peptides; recomb. human IGF-1 used.

P2944: N. L. Schlechter, *et al.* Physiological evaluation of the role of the liver as a mediator of the growth-promoting action of somatotrophin. *Zoological Science* 1993;10(235-244

ALZET Comments: Growth hormone, human; Growth hormone, bovine; Growth hormone, rat; IV (jugular); IV (portal); Rat; 2001; 7 Days; controls received mp with solvent or sham operation; replacement therapy (hypophysectomy); pulsed delivery; catheter contained heparin.

P2448: K. Vikman, *et al.* Growth hormone regulation of insulin-like growth factor-I mRNA in rat adipose tissue and isolated rat adipocytes. *J. Endocrinol* 1991;131(139-145

ALZET Comments: Growth hormone, bovine; PBS; Glycerol; Sodium azide; SC; Rat; 6 days; replacement therapy (hypophysectomy); comparison of iv or sc injections vs. mp; peptides.

P3283: C. L. McLaughlin, *et al.* Finishing lamb performance responses to bovine and porcine somatotropins administered by ALZET pumps. *J. Anim. Sci* 1991;69(4039-4048



ALZET Comments: Growth hormone, bovine; Growth hormone, porcine; SC; sheep; 6 weeks; controls received no treatment; functionality of mp verified by in vitro testing; long-term study, pumps replaced every 2 weeks; peptides.

P1753: F. Sanchez-Jimenez, *et al.* Hypophysectomy eliminates and growth hormone (GH) maintains the midpregnancy elevation in GH receptor and serum binding protein in the mouse. *Endocrinology* 1990;126(2):1270

ALZET Comments: Growth hormone, bovine; Sodium hydroxide; Saline; SC; mice (pregnant); 3 days; replacement therapy (hypophysectomy); peptides.

P1814: S. B. Miller, *et al.* Effects of growth hormone and IGF-I on renal function in rats with normal and reduced renal mass. *Am. Physiol. Soc* 1990;259(28):F747-F751

ALZET Comments: Growth hormone, bovine; Insulin-like growth factor I; Acetic acid; SC; Rat; no duration posted; no comment posted.

P2308: I. P. Hallstrom, *et al.* Hypothalamo-pituitary regulation of the c-myc gene in rat liver. *J. Mol. Endocrinology* 1990;5(267-274

ALZET Comments: Growth hormone, bovine; SC; Rat; 1 week; cancer.

P2255: K. G. Engstrom, *et al.* Effect of hypophysectomy and growth hormone substitution on red blood cell morphology and filterability in rats. *J. Lab. Clin. Med* 1990;116(196-205

ALZET Comments: Growth hormone, bovine; Glycerol; PBS; Sodium azide; SC; Rat; 2002; 21 days; hypophysectomized controls received sc injections of thyroxine or cortisone; replacement therapy (hypophysectomy); pumps replaced after 14 days; peptides.

2. Chicken

P4547: C. G. Scanes, *et al.* Influence of continuous growth hormone or insulin-like growth factor I administration in adult female chickens. *General and Comparative Endocrinology* 1999;114(315-323

ALZET Comments: Growth hormone, chicken; Insulin-like growth factor I;; Saline; Albumin, bovine serum;; SC;; bird (chicken);; 2ML2;; 10 days;; controls received mp w/vehicle; functionality of mp verified by plasma levels; peptides; recomb. chicken growth hormone used;.

P1528: C. G. Scanes, *et al.* In vivo effects of biosynthetic chicken growth hormone in broiler-strain chickens. *Growth Dev. Aging* 1990;54(95-101

ALZET Comments: Growth hormone, chicken; Albumin, bovine serum; Saline; SC; bird (chicken); 2ML4; 3 weeks; pumps were siliconized (probably using Prosil) to decrease protein binding in pumps.

3. Human

Q5334: K. Wang, *et al.* Growth Hormone Mediates Its Protective Effect in Hepatic Apoptosis through Hnf6. *PLoS One* 2016;11(12):e0167085

ALZET Comments: Growth hormone, human recomb.; SC; Mice; 7 days; Controls received mp w/ PBS; animal info (male, Albumin-Cre); Therapeutic indication (Hepatic apoptosis); Dose (5 ug/h);.

Q6633: H. Nishizawa, *et al.* IGF-I induces senescence of hepatic stellate cells and limits fibrosis in a p53-dependent manner. *Sci Rep* 2016;6(34605

ALZET Comments: Insulin-like Growth Factor 1, recomb.; Growth Hormone, human; Saline; SC; Rat; Mice; 2004; 4 weeks; 6 weeks; Dose (10 mg/mL); Controls received mp w/ vehicle; animal info (Eight-week-old male ICR mice, Sprague-Dawley (SD) rats; db/db mice with a C57BL/6 backgrounddb); Insulin-like Growth Factor aka IGF-I;.



Q0858: C. Tatenò, *et al.* Growth Hormone-Dependent Pathogenesis of Human Hepatic Steatosis in a Novel Mouse Model Bearing a Human Hepatocyte-Repopulated Liver. *Endocrinology* 2011;152(4):1479-1491

ALZET Comments: Growth hormone, human; SC; Mice (transgenic/SCID); 2 weeks; Animal info (uPA/SCID, 20-30 days old, chimeric).

Q1174: D. L. Kleinberg, *et al.* Pasireotide, an IGF-I action inhibitor, prevents growth hormone and estradiol-induced mammary hyperplasia. *Pituitary* 2011;14(1):44-52

ALZET Comments: Growth hormone, human; SC; Rat; 1007D; Animal info (CD-1, 42 days old); replacement therapy (hypophysectomy and oophorectomy).

P9566: E. F. Gevers, *et al.* Regulation of Rapid Signal Transducer and Activator of Transcription-5 Phosphorylation in the Resting Cells of the Growth Plate and in the Liver by Growth Hormone and Feeding. *Endocrinology* 2009;150(8):3627-3636

ALZET Comments: Growth hormone, human; Saline; BSA; SC; Mice; 2001; 5 days; Controls received sham surgery; animal info (dw/dw, 4-5 wks old).

P7492: M. Matasconi, *et al.* Pituitary control of cholesterol metabolism in normal and LDL receptor knock-out mice: Effects of hypophysectomy and growth hormone treatment. *BIOCHIMICA ET BIOPHYSICA ACTA-MOLECULAR AND CELL BIOLOGY OF LIPIDS* 2005;1736(3):221-227

ALZET Comments: Growth hormone, human; SC; Mice; 2001; 7 days; Controls received sham operation; replacement therapy (hypophysectomy); peptides; animal info (C57B1/6J, LDL R knockout, male).

P6387: M. Matasconi, *et al.* Pituitary control of lipoprotein and bile acid metabolism in male rats: growth hormone effects are not mediated by prolactin. *AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM* 2004;287(1):E114-E119

ALZET Comments: Growth hormone, human; growth hormone, bovine; SC; Rat; 2001; 7 days; Replacement therapy (hypophysectomy); dose-response (p. E115).

P6639: R. K. Bains, *et al.* Visceral obesity without insulin resistance in late-onset obesity rats. *Endocrinology* 2004;145(6):2666-2679

ALZET Comments: Growth hormone, human; SC; Rat; 4 weeks; Controls received no treatment; replacement therapy (GH deficiency); pumps replaced on day 13; peptides.

P5810: G. P. Hedlund, *et al.* Fetal antigen 1 (FA1) in the adult rat adrenal gland, ovary and pituitary gland. *In Vivo* 2003;17(1):1-4

ALZET Comments: Growth hormone, human; prolactin, ovine; growth hormone, bovine; Saline; SC; Rat; 2ML1; 7 days; Controls received mp w/ PBS vehicle; peptides; agents infused separately or concomitantly.

P6263: R. N. Dhir, *et al.* Interpulse growth hormone secretion in the episodic plasma profile causes the sex reversal of cytochrome P450s in senescent male rats. *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA* 2003;100(25):15224-15228

ALZET Comments: Growth hormone, human; IP; Rat; 1007D; 7 days; Peptides.

P5402: J. Zapf, *et al.* The somatostatin analog octreotide inhibits GH-stimulated, but not IGF-I-stimulated, bone growth in hypophysectomized rats. *Endocrinology* 2002;143(8):2944-2952

ALZET Comments: Insulin-like growth factor I; growth hormone, human; octreotide; Sodium acetate; benzylalcohol; water; SC; Rat; 2001; 6 days; Controls received mp w/ vehicle; functionality of mp verified by IGF-I plasma levels; peptides; recomb. human IGF-I and recomb. human GF used; some animals received 2 pumps: one with octreotide and one with GH.

P5120: L. Sahlin, *et al.* Effects of estradiol and estradiol sulfamate on the liver of ovariectomized or ovariectomized and hypophysectomized rats. *Journal of Steroid Biochemistry and Molecular Biology* 2002;80(457-467)



ALZET Comments: Estradiol, 17B-; Estradiol sulfamate; Dexamethasone; Growth hormone, human; Propylene glycol; SC; Rat; 2001; 7 days; controls received mp w/ vehicle; replacement therapy (ovariectomy, hypophysectomy, p. 458); comparison of oral administration vs. mp; steroid administered in PG, human GH pre-formulated.

P5083: P. J. D. Delhanty, *et al.* Growth hormone rapidly induces resistin gene expression in white adipose tissue of spontaneous dwarf (SDR) rats. *Endocrinology* 2002;143(6):2445-2448

ALZET Comments: Growth hormone, human; Growth hormone, porcine;; SC; Rat; 24-48 hours; comparison of IP injections vs. mp; peptides; porcine or recomb. human GH used.

P5757: M. Rudling, *et al.* Growth hormone reduces plasma cholesterol in LDL receptor-deficient mice. *FASEB J* 2001;15(8):1350-1356

ALZET Comments: Growth hormone, human; SC; Mice; 2001; 6 days; Peptides.

P4778: N. A. Pampori, *et al.* Infusion of gender-dependent plasma growth hormone profiles into intact rats: Effects of subcutaneous, intraperitoneal, and intravenous routes of rat and human growth hormone on endogenous circulating growth hormone profiles and expression of sexually dimorphic hepatic CYP isoforms. *Drug Metabolism and Disposition* 2001;29(1):8-16

ALZET Comments: Growth hormone, recomb.; Growth hormone, human;; SC; IP;; Rat;; 7 days;; Controls received mp w/ vehicle; dose-response (p. 13 graphs); peptides; plasma GH differences by gender; both SC and IP routes used;

P4967: P. Tollet-Egnell, *et al.* Differential cloning of growth hormone-regulated hepatic transcripts in the aged rat. *Endocrinology* 2000;141(9):910-921

ALZET Comments: Growth hormone, human; Rat; 2004; 3 weeks; controls received mp w/ vehicle; replacement therapy (hypophysectomy p. 911); peptides; recomb. human GH used;.

P3881: O. Haraldseth, *et al.* A quantitative in-vivo MR imaging study of brain dehydration in diabetic rats and rats treated with peptide hormones. *Magnetic Resonance Imaging* 1997;15(2):203-210

ALZET Comments: Insulin; Insulin-like growth factor I; Growth hormone, human; SC; Rat;; 13-14 days; recomb. human IGF-1 and GH used; peptides.

P3564: D. LeRoith, *et al.* The effects of growth hormone and insulin-like growth factor I on the immune system of aged female monkeys. *Endocrinology* 1996;137(3):1071-1079

ALZET Comments: Insulin-like growth factor I; Growth hormone, human; Saline; Sodium acetate buffer; Benzyl alcohol; Tween 20; Sodium citrate; Phenol; SC; monkey; 2ML4; 7 weeks; controls received mp w/ vehicle; functionality of mp verified by serum levels; pumps replaced after 28 days; immunology; peptides; recomb. human IGF-1 and GH used; agents given singly and concomitantly.

P3807: E. Hedner, *et al.* Systemically and locally administered growth hormone stimulates bone healing in combination with osteopromotive membranes: an experimental study in rats. *J. Bone and Min. Res* 1996;11(12):1952-1960

ALZET Comments: Growth hormone, bovine; Growth hormone, human; Prolactin, ovine; SC; bone (mandible); Rat; 2, 3, 4 weeks; controls received mp w/saline; pumps replaced after 2 weeks; recomb. human and bovine GH used.

P3226: S. C. Low, *et al.* Sexual dimorphism of hepatic 11B-hydroxysteroid dehydrogenase in the rat: the role of growth hormone patterns. *J. Endocrinol* 1994;143(5):541-548

ALZET Comments: Growth hormone, human; SC; no duration posted; replacement therapy (GH-deficient dwarf rats used + hypophysectomized normal rats); comparison of pulsed iv injections vs. mp; peptides.

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(2):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.

P2944: N. L. Schlechter, *et al.* Physiological evaluation of the role of the liver as a mediator of the growth-promoting action of somatotrophin. *Zoological Science* 1993;10(235-244

ALZET Comments: Growth hormone, human; Growth hormone, bovine; Growth hormone, rat; IV (jugular); IV (portal); Rat; 2001; 7 Days; controls received mp with solvent or sham operation; replacement therapy (hypophysectomy); pulsed delivery; catheter contained heparin.

P3218: P. H. Jellinck, *et al.* Influence of indole carbinols and growth hormone on the metabolism of 4-androstenedione by rat liver microsomes. *J. Steroid Biochem. Molec. Biol* 1993;46(6):791-798

ALZET Comments: Growth hormone, human; Rat; 4 days; cancer; peptides.

P2667: D. F. Carmignac, *et al.* Growth hormone binding protein in the rat: effects of gonadal steroids. *Endocrinology* 1993;133(6):2445-2452

ALZET Comments: Growth hormone, human; SC; Rat; 7,12,14 days; peptides.

P2928: M. Rudling, *et al.* Importance of growth hormone for the induction of hepatic low density lipoprotein receptors. *Proc. Natl. Acad. Sci. USA* 1992;89(6983-6987

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

P1748: F. M. Ng, *et al.* Effects of exogenous growth hormone on lipid metabolism in the isolated epididymal fat pad of the growth hormone-deficient little mouse. *J. Mol. Endocrinology* 1990;4(43-49

ALZET Comments: Growth hormone, human; Saline; SC; mice; 2001; 2, 4, 8 days; replacement therapy (genetic GH deficiency); peptides.

P1710: T. Bick, *et al.* The interrelationship of growth hormone (GH), liver membrane GH receptor, serum GH-binding protein activity, and insulin-like growth factor I in the male rat. *Endocrinology* 1990;126(4):1914-1920

ALZET Comments: Growth hormone, human; SC; Rat; 2001; 6 days; tissue perfusion (graphs, p. 1916-7); replacement therapy (hypophysectomy).

4. Ovine

P6300: S. D. McCormick. Effects of Growth Hormone and Insulin-like Growth Factor I on Salinity Tolerance and Gill Na⁺, K⁺-ATPase in Atlantic Salmon (*Salmo salar*): Interaction with Cortisol. *General and Comparative Endocrinology* 1996;101(3-11

ALZET Comments: Growth hormone, ovine; insulin-like growth factor I, recomb. ovine; Ringer's solution; Fish (atlantic salmon); 1003D; 4-14 days;

P3171: A. L. Albiston, *et al.* Sex- and tissue- specific regulation of 11B-hydroxysteroid dehydrogenase mRNA. *Molec. and Cell. Endocrinol* 1995;109(183-188

ALZET Comments: Growth hormone, ovine; Rat; 2002; 4 days; replacement therapy (hypophysectomy); peptides; infusion proved superior to injection; comparison of injections vs. mp.

R0097: C. S. Nicoll, *et al.* Analysis of the role of hormones and growth factors in growth control and tissue differentiation using transplanted mammalian embryos and fetal structures. *Growth Reg* 1991;1(133-144

ALZET Comments: Antibody, anti-fibroblast growth factor; Antibody, anti-IGF I; Insulin; Growth hormone, ovine; Fibroblast growth factor; Epidermal growth factor; Insulin-like growth factor II; Antibody, anti-epidermal growth factor; IV (suprarenal); no duration posted; peptides.



P1589: R. J. Madon, *et al.* Hypoinsulinaemia in the lactating rat is caused by a decreased glycaemic stimulus to the pancreas. *J. Endocrinol* 1990;125(81-88)

ALZET Comments: Growth hormone, ovine; Prolactin, ovine; Rat; 2001; 5 days; functionality of mp verified by serum levels; replacement therapy (oviarectomy) in some of the prolactin-treated animals.

P1177: D. R. Smith, *et al.* Hepatic estrogen and androgen receptors and binding proteins in streptozotocin-diabetic male wistar rats. *Diabetologia* 1987;30(957-962)

ALZET Comments: Growth hormone, ovine; Saline; SC; Rat; 2001; no duration posted; streptozotocin induced diabetes; comparison of sc injections vs. mp infusion; peptides.

P1094: J. A. Quail, *et al.* Modulation of catechol estrogen synthesis by rat liver microsomes: Effects of treatment with growth hormone or testosterone. *Endocrinology* 1987;121(987-992)

ALZET Comments: Growth hormone, bovine; Growth hormone, human; Growth hormone, ovine; Growth hormone, rat; Saline; Sodium bicarbonate; SC; Rat; 2001; 7 days; GH, in some cases dissolved in sodium bicarbonate; agents infused separately; peptides.

P0639: C. C. W. Mick, *et al.* Prolactin directly stimulates the liver in vivo to secrete a factor (synlactin) which acts synergistically with the hormone. *Endocrinology* 1985;116(5):2049-2053

ALZET Comments: Growth hormone, ovine; Prolactin, ovine; Citric acid; Glycerol; IV (hepatic portal); IV (jugular); bird (pigeon); 2001; 1 week; comparison of agents effects; citric acid added to solvent for bacteriostatic effects; pulsed delivery of hormone or solvent (intermittent w/ air); peptides; tissue perfusion.

P0667: T. C. Dembinski, *et al.* Evidence for a novel pituitary factor that potentiates the mitogenic effect of estrogen in human breast cancer cells. *Cancer Res* 1985;45(7):3083-3089

ALZET Comments: Growth hormone, human; Growth hormone, ovine; Prolactin, ovine; mice; 49-56 days; comparison of daily sc injec. vs. mp infusion; comparison of agents effects; cancer; peptides.

P0450: R. C. Baxter, *et al.* Rat growth hormone (GH) but not prolactin (PRL) induces both GH and PRL receptors in female rat liver. *Endocrinology* 1984;114(5):1893-1901

ALZET Comments: Growth hormone, ovine; Growth hormone, rat; Prolactin, ovine; Prolactin, rat; Sodium hydroxide; Saline; SC; Rat; 1 week; comparison of agents effects; peptides.

P0322: L. L. Ewing, *et al.* Effect of luteinizing hormone on Leydig cell structure and testosterone secretion. *Endocrinology* 1983;112(5):1763-1769

ALZET Comments: Follicle stimulating hormone; Growth hormone, ovine; Luteinizing hormone; Prolactin, ovine; Thyroid-stimulating hormone; Borate; Peanut oil; SC; Rat; 5 days; replacement therapy (hypophysectomy); simultaneous infusion of testosterone & estradiol implants w/ mp infusion of polypeptides; pulsed delivery of agents (intermittent w/ vehicle); peptides; ovine LH used.

5. Porcine

Q4548: H. Nishida, *et al.* Dexamethasone and BCAA Failed to Modulate Muscle Mass and mTOR Signaling in GH-Deficient Rats. *PLoS One* 2015;10(U459-U478)

ALZET Comments: Growth hormone, porcine; SC; Rat; 2002; 14 days; Animal info (Sprague Dawley, 6 weeks old);

Q3456: M. E. Diaz, *et al.* GH administration patterns differently regulate epidermal growth factor signaling. *Journal of Endocrinology* 2014;221(309-323)

ALZET Comments: Growth hormone, porcine; SC; Mice; 1007D; 5 days; Controls received mp w/ saline; animal info (Swiss-Webster, 3-4 months old, 26-30g); functionality of mp verified by plasma levels; comparison of SC injection BID vs mp; toxicology; "The results indicate that sustained delivery systems that allow continuous GH plasma patterns would be



beneficial in terms of treatment safety with regard to the actions of GH on EGFR signaling and its promitogenic activity." pg 309.

P5083: P. J. D. Delhanty, *et al.* Growth hormone rapidly induces resistin gene expression in white adipose tissue of spontaneous dwarf (SDR) rats. *Endocrinology* 2002;143(6):2445-2448

ALZET Comments: Growth hormone, human; Growth hormone, porcine;; SC; Rat; 24-48 hours; comparison of IP injections vs. mp; peptides; porcine or recomb. human GH used.

P4893: M. A. Conlon, *et al.* Porcine growth hormone and LongR (3)IGF-I can improve recovery from surgery-induced weight loss in guinea pigs. *General and Comparative Endocrinology* 2001;123(332-336

ALZET Comments: Growth hormone, porcine; Insulin-like growth factor I analog; Disodium hydrogen orthophosphate; Acetic acid; SC; Guinea pig; 2001; 7 days; controls received mp w/ vehicle; functionality of mp verified by serum drug levels; dose response (text, graph p. 334-5); peptides; LR3IGF-1 is an IGF-I analog; multiple pumps per animal (2), one containing each solution; pGH was dissolved in 0.1M disodium hydrogen orthophosphate; L3IGF-1 was dissolved in 0.1 M acetic acid.

P2167: M. J. Azain, *et al.* Comparison of the growth-promoting properties of daily versus continuous administration of somatotropin in female rats with intact pituitaries. *J. Anim. Sci* 1993;71(384-392

ALZET Comments: Growth hormone, recomb. bovine; Growth hormone, porcine; Sodium bicarbonate; SC; Rat; 2ML2; 2ML4; 2,4 weeks; controls received mp w/buffer; functionality of mp verified in vitro using spectrophotometry; dose-response (sc injection vs continuous infusion); pumps replaced at 2 weeks; good methods; peptides; weight gain same between 28-day pump-implanted rats and rats receiving 2 14-day pumps (graph p. 388).

P3283: C. L. McLaughlin, *et al.* Finishing lamb performance responses to bovine and porcine somatotropins administered by ALZET pumps. *J. Anim. Sci* 1991;69(4039-4048

ALZET Comments: Growth hormone, bovine; Growth hormone, porcine; SC; sheep; 6 weeks; controls received no treatment; functionality of mp verified by in vitro testing; long-term study, pumps replaced every 2 weeks; peptides.

6. Rat

Q1792: Y. J. Zhang, *et al.* Dynamic, Sex-Differential STAT5 and BCL6 Binding to Sex-Biased, Growth Hormone-Regulated Genes in Adult Mouse Liver. *MOLECULAR AND CELLULAR BIOLOGY* 2012;32(4):880-896

ALZET Comments: Growth hormone, rat, recomb.; Mice; 1007D; 7 days; Animal info (male, female, CD-1, 7-8 wks old).

P9969: T. J. Zhao, *et al.* Ghrelin O-acyltransferase (GOAT) is essential for growth hormone-mediated survival of calorie-restricted mice. *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA* 2010;107(16):7467-7472

ALZET Comments: Ghrelin, recomb. rat; growth hormone, recomb. rat; Saline; sodium bicarbonate; albumin, rat; SC; Mice; 1002; 2004; 10, 11 days; Controls received mp w/ vehicle; peptides; animal info (male, wt, Goat-/-, 8 weeks old).

Q0258: P. Pathipati, *et al.* Delayed and chronic treatment with growth hormone after endothelin-induced stroke in the adult rat. *Behavioural Brain Research* 2009;204(1):93-101

ALZET Comments: Growth hormone, rat; NaCl; tween 20; NaHCO₃; Na₂CO₃; CSF/CNS; Rat; 2002; 6 weeks; Controls received mp w/ vehicle; animal info (adult, male, Sprague-Dawley, 280-350 g); pumps replaced every 2 weeks; stability verified by for 2 weeks in vitro.

Q0698: R. D. Meyer, *et al.* Male-Specific Hepatic Bcl6: Growth Hormone-Induced Block of Transcription Elongation in Females and Binding to Target Genes Inversely Coordinated with STAT5. *MOLECULAR ENDOCRINOLOGY* 2009;23(11):1914-1926

ALZET Comments: Growth hormone, recomb. rat, human; Rat; 7 days; Controls were untreated; animal info (male, Fischer 344, 9-13 wks old); replacement therapy (hypophysectomy).



Q0457: D. G. Blackmore, *et al.* Exercise Increases Neural Stem Cell Number in a Growth Hormone-Dependent Manner, Augmenting the Regenerative Response in Aged Mice. *Stem Cells* 2009;27(8):2044-2052

ALZET Comments: Growth hormone, recomb. rat; Saline; CSF/CNS; Mice; 1007D; 7 days; Controls received mp w/ vehicle; cyanoacrylate adhesive; animal info (C57BL/6J 6-8 wks old, female).

P7903: M. G. Holloway, *et al.* Codependence of growth hormone-responsive, sexually dimorphic hepatic gene expression on signal transducer and activator of transcription 5b and hepatic nuclear factor 4 alpha. *MOLECULAR ENDOCRINOLOGY* 2006;20(3):647-660

ALZET Comments: Growth hormone, recomb. rat; Saline; albumin, rat; sodium bicarbonate; SC; Mice; 1003D; 1007D; 1002; 1,2,4,7,14 days; 10 hours; Controls received mp w/ vehicle; peptides; animal info (male, female, ICR, 8-10 wk. old).

P6848: J. Kamegai, *et al.* The role of pituitary ghrelin in growth hormone (GH) secretion: GH-releasing hormone-dependent regulation of pituitary ghrelin gene expression and peptide content. *Endocrinology* 2004;145(8):3731-3738

ALZET Comments: Growth hormone, rat; insulin-like growth factor-1, recomb. human; Saline; SC; Rat; 1003D; 72 hours; Controls received mp w/ vehicle; peptides.

P6509: A. Ahluwalia, *et al.* Sexual dimorphism of rat liver gene expression: Regulatory role of growth hormone revealed by deoxyribonucleic acid microarray analysis. *MOLECULAR ENDOCRINOLOGY* 2004;18(3):747-760

ALZET Comments: Growth hormone, rat; Rat; 7 days; Controls received no treatment; peptides; pump model not listed.

P5826: F. J. Obal, *et al.* Sleep in mice with nonfunctional growth hormone-releasing hormone receptors. *American Journal of Physiology-Regulatory Integrative and Comparative Physiology* 2003;284(1):R131-R139

ALZET Comments: Growth hormone, mouse; growth hormone, rat; Saline; SC; Mice; 1002; 14 days; Functionality of mp verified by IGF-1 plasma levels; peptides.

P4423: J. Kamegai, *et al.* Hypothalamic/pituitary-axis of the spontaneous dwarf rat: autofeedback regulation of growth hormone (GH) includes suppression of GH releasing-hormone receptor messenger ribonucleic acid. *Endocrinology* 1998;139(3554-3560)

ALZET Comments: Growth hormone, rat; Insulin-like growth factor I; Saline; SC; Rat; 1003D; 72 hours; controls received mp w/vehicle; functionality of mp verified by serum levels; recomb. human IGFI used;.

P3963: N. A. Pampori, *et al.* Feminization of hepatic cytochrome P450s by nominal levels of growth hormone in the feminine plasma profile. *Mol. Pharmacol* 1996;50(1148-1156)

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).

P3258: Y. Labrie, *et al.* Multihormonal regulation of dehydroepiandrosterone sulfotransferase messenger ribonucleic acid levels in adult rat liver. *Endocrinology* 1994;134(4):1693-1699

ALZET Comments: Growth hormone, rat; Saline; SC; Rat; 2001; 7 days; replacement therapy (hypophysectomy); comparison of injections vs. mp; peptides.

P3162: S. D. Hursting, *et al.* Inhibition of rat mononuclear cell leukemia by corn oil gavage: in vivo, in situ and immune competence studies. *Carcinogenesis* 1994;15(2):193-199

ALZET Comments: Growth hormone, rat; Saline; BSA; SC; Rat; 2001; no duration posted; controls received mp with saline; cancer; toxicology; peptides.

P2944: N. L. Schlechter, *et al.* Physiological evaluation of the role of the liver as a mediator of the growth-promoting action of somatotrophin. *Zoological Science* 1993;10(235-244)

ALZET Comments: Growth hormone, human; Growth hormone, bovine; Growth hormone, rat; IV (jugular); IV (portal); Rat; 2001; 7 Days; controls received mp with solvent or sham operation; replacement therapy (hypophysectomy); pulsed delivery; catheter contained heparin.



P2359: A. Meseguer, *et al.* Effects of pituitary hormones on the cell-specific expression of the KAP gene. *Mol. and Cellular Endocrin* 1992;89(153-162)

ALZET Comments: Luteinizing hormone; ACTH, human; Thyroid-stimulating hormone, rat; Follicle stimulating hormone, rat; Growth hormone, rat; Prolactin, ovine; SC; mice; 2001; 7 days; controls received mp w/ vehicles; replacement therapy (hypophysectomy); peptides.

7. Rel Fact

Q4888: A. Veronique St-Onge, Alfonso Abizaid. Ghrelin enhances cue-induced bar pressing for high fat food. *Horm. Behav* 2016;78(141-149)

ALZET Comments: Ghrelin; growth hormone-releasing peptide 6, [D-Lys-3]; Saline; CSF/CNS (ventral tegmental area); Rat; 2002; 14 days; Controls received mp w/ vehicle; animal info (male, Long evans, 216-375g); post op. care (SC injection of meloxicam; feed of mashed food); behavioral testing (food operant responses); used Plastics One cannula; obesity;.

Q3886: C. Garcia-Caceres, *et al.* The Opposing Effects of Ghrelin on Hypothalamic and Systemic Inflammatory Processes Are Modulated by Its Acylation Status and Food Intake in Male Rats. *Endocrinology* 2014;155(2868-2880)

ALZET Comments: Ghrelin, acylated; ghrelin, non-acylated; ghrelin mimetic growth hormone-releasing peptide-6; Saline; CSF/CNS; Rat; 14 days; Controls received mp w/ vehicle; animal info (male, Wistar, 250g); immunology;.

Q0371: S. Sheriff, *et al.* Ghrelin receptor agonist, GHRP-2, attenuates burn injury-induced MuRF-1 and MAFbx expression and muscle proteolysis in rats. *Peptides* 2009;30(10):1909-1913

ALZET Comments: Growth hormone-releasing peptide-2; SC; Rat; 2001D; 1 day; Controls received mp w/ saline; animal info (male, Sprague Dawley, 50-70 g); peptides.

P8904: M. L. Fiorotto, *et al.* Transplacental transfer of a growth hormone-releasing hormone peptide from mother to fetus in the rat. *DNA and Cell Biology* 2006;25(8):429-437

ALZET Comments: Growth hormone-releasing hormone; radio-isotopes 125_i tracer; BSA; SC; Rat (pregnant); 1003D; 52-58 hours; Controls received sham operation; functionality of mp verified by residual volume, total activity; no stress (see pg. 433); half-life (p. 432) 8 hours; teratology; peptides; animal info (female, Sprague Dawley, gd18).

P7613: L. M. Frago, *et al.* Growth hormone-releasing peptide-6 increases insulin-like growth factor-I mRNA levels and activates Akt in RCA-6 cells as a model of neuropeptide Y neurones. *Journal of Neuroendocrinology* 2005;17(11):701-710

ALZET Comments: Growth hormone-releasing peptide-6; Saline; IV (jugular); Rat; 2001; 7 days; Controls received mp w/ vehicle; animal info (male, wistar 200-250 g); ghrelin receptor agonist; peptides.

P6600: C. Paneda, *et al.* Growth hormone-releasing peptide-6 inhibits cerebellar cell death in aged rats. *NeuroReport* 2003;14(12):1633-1635

ALZET Comments: Growth hormone-rel. peptide-6; IV (external jugular); Rat; 2ML1; 7 days; Controls received mp w/ saline; peptides; GHRP-6 is a synthetic ligand for the ghrelin receptor.

P5580: L. M. Frago, *et al.* Growth hormone (GH) and GH-releasing peptide-6 increase brain insulin-like growth factor-I expression and activate intracellular signaling pathways involved in neuroprotection. *Endocrinology* 2002;143(10):4113-4122

ALZET Comments: Growth hormone; Growth hormone-rel. peptide; IV (jugular); Rat; 2001; 7 days; controls received mp with saline; peptides.

P3546: S.-G. Roh, *et al.* Characteristics of growth hormone secretion responsiveness to growth hormone-releasing peptide-2 (GHRP-2 or KP102) in calves. *Endocrine J* 1996;43(3):291-298

ALZET Comments: Growth hormone-rel. factor-2; DMSO; PEG 400; Tween 80; Saline; SC; cattle; 2ML2; 14 days; controls received mp w/ vehicle; peptides; agent also called KP102; multiple pumps per animal (3 or 4); comparison between injections vs. mp.



P2214: L. Stefanescu, *et al.* Effect of intravenous infusion of growth hormone-releasing hormone on the morphology of rat pituitary somatotrophs. *Endocr. Pathol* 1993;4(131-139)

ALZET Comments: Growth hormone-rel. factor; Acetate buffer; IV; Rat; 2001; 2ML2; 1 week; controls received mp w/vehicle.

P2946: M. Sato, *et al.* Effects of long-term infusion of growth hormone (GH)-releasing factor on pulsatile GH secretion in the male rat. *Life Sci* 1993;54(2):79-86

ALZET Comments: Growth hormone-rel. factor (1-44) -NH₂, human; IV (femoral); Rat; 2002; 14 days; comparison of acute infusion vs. mp; peptides; pumps placed near abdomen.

P1742: J. A. Godfredson, *et al.* Growth performance and carcass composition of lambs infused for 28 days with a growth hormone-releasing factor analogue. *J. Anim. Sci* 1990;68(3624-3632)

ALZET Comments: Growth hormone-rel. factor analog; DMSO; Water; SC; sheep; 28 days; functionality of mp verified by measurement of residual volume; pumps replaced weekly; stability in vehicle verified at 37 degrees celsius for 7 days.

P1492: J. E. Wheaton, *et al.* Use of osmotic pumps for subcutaneous infusion of growth hormone-releasing factors in steers and wethers. *J. Anim. Sci* 1988;66(2876-2895)

ALZET Comments: 4SG-29; RO-23-7863; Growth hormone-rel. factor; DMSO; Water; SC; cattle; sheep; 2002; 2ML1; 7 days; functionality of mp verified by plasma levels; peptides.