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

1. Bovine


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


Agents: Insulin-like growth factor I; growth hormone, bovine; insulin-like growth factor-1, binding protein Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 1007D; Duration: 7 days; ALZET Comments: Controls received mp w/ saline; peptides; animal info (ORX, 10 weeks old, male); drugs delivered alone or in combination


Agents: Growth hormone, bovine Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2ML1; Duration: 1 week; ALZET Comments: Controls received no treatment; peptides; animal info (male, Wistar-Hannover, 6, 18 months old); endocrinology


Agents: Growth hormone, bovine Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2001; Duration: 6 days; ALZET Comments: Peptides; animal info (Sprague-Dawley, 7 wks old, male)


Agents: Growth hormone, human; growth hormone, bovine Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2001; Duration: 7 days; ALZET Comments: Replacement therapy (hyphophysectomy); dose-response (p. E115)

2. Chicken


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;


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


**Agents**: Growth hormone, human recomb. **Vehicle**: Not Stated; **Route**: SC; **Species**: Mice; **Pump**: Not Stated; **Duration**: 7 days;

**ALZET Comments**: Controls received mp w/ PBS; animal info (male, Albumin-Cre); Therapeutic indication (Hepatic apoptosis); Dose (5 ug/h);


**Agents**: Insulin-like Growth Factor 1, recomb.; Growth Hormone, human **Vehicle**: Saline; **Route**: SC; **Species**: Rat; Mice;

**Pump**: 2004; **Duration**: 4 weeks; 6 weeks;

**ALZET Comments**: 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;


**Agents**: Growth hormone, human **Vehicle**: Not Stated; **Route**: SC; **Species**: Mice (transgenic/SCID); **Pump**: Not Stated; **Duration**: 2 weeks;

**ALZET Comments**: Animal info (uPA/SCID, 20-30 days old, chimeric)


**Agents**: Growth hormone, human **Vehicle**: Not Stated; **Route**: SC; **Species**: Rat; **Pump**: 1007D; **Duration**: Not Stated;

**ALZET Comments**: Animal info (CD-1, 42 days old); replacement therapy (hypophysectomy and oophorectomy)


**Agents**: Growth hormone, human **Vehicle**: Saline; BSA; **Route**: SC; **Species**: Mice; **Pump**: 2001; **Duration**: 5 days;

**ALZET Comments**: Controls received sham surgery; animal info (dw/dw, 4-5 wks old)

4. Ovine


**Agents**: Growth hormone, ovine; insulin-like growth factor I, recomb. ovine **Vehicle**: Ringer’s solution; **Route**: Not Stated; **Species**: Fish (atlantic salmon); **Pump**: 1003D; **Duration**: 4-14 days;

**ALZET Comments**: replacement therapy (hypophysectomy); peptides; infusion proved superior to injection; comparison of injections vs. mp

Agents: 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
Vehicle: Not Stated;
Route: IV (suprarenal); Species: Not Stated; Pump: Not Stated; Duration: no duration posted;
ALZET Comments: peptides

Agents: Growth hormone, ovine; Prolactin, ovine
Vehicle: Not Stated; Route: Not Stated; Species: Rat; Pump: 2001; Duration: 5 days;
ALZET Comments: functionality of mp verified by serum levels; replacement therapy (ovariectomy) in some of the prolactin-treated animals

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

5. Porcine

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

ALZET Comments: Growth hormone, porcine; SC; Mouse; 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.

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.

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.

6. Rat

Agents: growth hormone, recomb. rat
Vehicle: Sodium bicarbonate; saline; albumin, buffered; Route: SC; Species: Mice; Pump: 1007D; Duration: 7 days;
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Bibliography

ALZET Comments: Dose (20 ng/g body weight/hour); 30 mM NaHCO3 (pH 8.3) buffer containing 0.15 M NaCl and 100 mg/mL rat albumin used; Controls received sham surgery; animal info (8-10 weeks, male, CD1); "exogenous GH infusion using an ALZET osmotic minipump overrides the normal male plasma GH pulses and leads to downregulation of a large fraction of male-biased genes and upregulation of female-biased genes" p.1382;

Agents: Growth hormone, rat, recomb. Vehicle: Not Stated; Route: Not Stated; Species: Mice; Pump: 1007D; Duration: 7 days;
ALZET Comments: Animal info (male, female, CD-1, 7-8 wks old)

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

Agents: Growth hormone, rat Vehicle: NaCl; tween 20; NaHCO3; Na2CO3; Route: CSF/CNS; Species: Rat; Pump: 2002; Duration: 6 weeks;
ALZET Comments: 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
Agents: Growth hormone, recomb. rat, human Vehicle: Not Stated; Route: Not Stated; Species: Rat; Pump: Not Stated; Duration: 7 days;
ALZET Comments: Controls were untreated; animal info (male, Fischer 344, 9-13 wks old); replacement therapy (hypophysectomy)

7. Rel Fact

Agents: Ghrelin; growth hormone-releasing peptide 6, [D-Lys-3] Vehicle: Saline; Route: CSF/CNS (ventral tegmental area); Species: Rat; Pump: 2002; Duration: 14 days;
ALZET Comments: 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
Agents: Ghrelin, acylated; ghrelin, non-acylated; ghrelin mimetic growth hormone-releasing peptide-6 Vehicle: Saline; Route: CSF/CNS; Species: Rat; Pump: Not Stated; Duration: 14 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, 250g); immunology;

Agents: Growth hormone-releasing peptide-2 Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2001D; Duration: 1 day;
**ALZET Comments:** 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  
**Agents:** Growth hormone-releasing hormone; radio-isotopes 125, tracer **Vehicle:** BSA; **Route:** SC; **Species:** Rat (pregnant);  
**Pump:** 1003D; **Duration:** 52-58 hours;  
**ALZET Comments:** 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  
**Agents:** Growth hormone-releasing peptide-6 **Vehicle:** Saline; **Route:** IV (jugular); **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;  
**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, wistar 200-250 g); ghrelin receptor agonist; peptides