Recent References (2003-Present) on the Administration of Luteinizing Hormone and LHRH Using ALZET® Osmotic Pumps


**Agents:** Gonadotropin-releasing Hormone  
**Vehicle:** Saline;  
**Route:** SC;  
**Species:** Horse;  
**Pump:** 2ML2;  
**Duration:** 14 days;  

**ALZET Comments:** Dose (20 mg/mL); 0.9% Saline used; animal info (Female, ); Gonadotropin-releasing Hormone aka GnRH; dependence;


**Agents:** Pirenzepine; Scopolamine hydrobromide; Metyrapone; luteinizing hormone; ACTH  
**Vehicle:** PBS;  
**Route:** CSF/CNS (Third ventricle);  
**Species:** Mice (knockout);  
**Pump:** 1002;  
**Duration:** Not Stated;  

**ALZET Comments:** Dose (0.6 mg/kg/day Pirenzepine; 1.0 mg/kg Scopolamine hydrobromide; 100mg/kg/day Metyrapone; 2.8 mg/kg/day ACTH; 16ug/day LH); Controls received mp w/ vehicle; animal info (wild-type and Chrm1−/−); luteinizing hormone aka LH and adrenocorticotropic hormone aka ACTH; peptides; Brain coordinates (A/P −1.6 mm posterior to bregma, D/V −4.7 mm);


**Agents:** Gonadotropin-releasing hormone; cetrorelix  
**Vehicle:** Saline;  
**Route:** IP;  
**Species:** Mice; mice (knockout);  
**Pump:** Not Stated;  
**Duration:** 1 week;  

**ALZET Comments:** Dose (GRH: 250 ng/kg; cetrorelix: 10 mg/kg/day); animal info (12 week old FVB/NJ wild-type and Mdr2−/− mice weighing 25-30g); Therapeutic indication (liver fibrosis);


**Agents:** Gonadotropin-releasing hormone  
**Vehicle:** Not Stated;  
**Route:** IP;  
**Species:** Rat;  
**Pump:** Not Stated;  
**Duration:** 1 week;  

**ALZET Comments:** Controls received mp w/ saline; animal info (male, Fischer 344);


**Agents:** Gonadotropin-releasing hormone  
**Vehicle:** Not Stated;  
**Route:** Not Stated;  
**Species:** Horse;  
**Pump:** Not Stated;  
**Duration:** 7 days; 12-18 days;  

**ALZET Comments:** Animal info (female, Quarter horse and mixed breed, 5-10 years old);


**Agents:** Gonadotropin-releasing hormone  
**Vehicle:** Saline;  
**Route:** SC;  
**Species:** Horse (mare);  
**Pump:** 2ML2; 2ML4;  
**Duration:** 8 weeks;  

**ALZET Comments:** Controls received mp w/ vehicle; animal info (female, Quarter Horse grade); pumps replaced every 14 days (2ML2) or 28 days (2ML4); Multiple pumps per animal (4 2ML2 or 2 2ML4); used contralateral side for next pump implantation; pumps removed at end of study;
Agents: Gonadotropin-releasing hormone Vehicle: Saline, sterile; Route: SC; Species: Horse (mare); Pump: 2ML2; Duration: 28 days;
ALZET Comments: Controls received sham pumps (silastic tubing); animal info (female, American Quarter Horses, 409-522 kg); pumps replaced every 14 days; post op. care (wound cleaned, disinfected with povidone iodine, antibacterial ointment - PO); pumps primed for 16 hours in 37C saline; used contralateral location for next pump implantation;

Agents: Gonadotropin-releasing hormone Vehicle: Saline; HCl; Route: CSF/CNS; Species: Rat; Pump: 2002; Duration: Not Stated;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, PND63); ALZET brain infusion kit 2 used; behavioral testing (sexual behavior); stability verified by (incubation of GnRH at 37C for 2 weeks - half of GnRH remains in unchanged form pg.78); teratology; Cannula placement verified via 0.1% infusion of bromophenol blue; 0.1 M HCl

Agents: Amikacin; Florfenicol; Gonadotropin-releasing hormone Vehicle: Not Stated; Route: Not Stated; Species: Snake; Iguana; Pump: Not Stated; Duration: Not Stated;
ALZET Comments: Animal info (E uttata corn snake, C scutulaus Mojave rattlesnake, green iguana); stress/adverse reaction: (see pg. 23);

Agents: Salmon pituitary extract; gonadotrophin, human chorionic; gonadotropin-releasing hormone analogue Vehicle: Sodium chloride; Route: IP; Species: Fish (eel); Pump: 2002; Duration: Not Stated;
ALZET Comments: Control animals received mp w/ saline, vehicle; animal info (female, cultured); functionality of mp verified via residual volume; “osmotic pump was implanted into the peritoneal cavity of each eel after cutting an approximately 8-mm opening in the abdomen with a fine scalpel. The wound was not sutured, but healed naturally within 2 weeks.” pg 31; “This study confirms the effectiveness of using osmotic pumps to induce the maturation of captive female eels...” pg 33; comparison of mp vs injections

Agents: Gonadotropin releasing hormone Vehicle: BSA; Sodium chloride; Route: IP; Species: Fish (eel); Pump: 2002; Duration: Not Stated;
ALZET Comments: Controls received mp w/ vehicle; animal info (freshwater eels, Anguilla spp.); 0.1% BSA used; dose-response (pg 118); “implantation of these osmotic pumps loaded with protein hormones, instead of repeated injections of hormones, is a reliable sustained-release delivery system for inducing sexual maturation in fish.” pg 119; picture of pump implantation pg 118; Dose (GnRHa 0.9, 1.8 or 3.6 ug/day; hCG 50 IU/day; salmon pituitary extract 2.24 mg/day);

Agents: Prolactin, mouse, recomb.; luteinizing hormone, mouse, recomb.; antibody, prolactin neutralizing Vehicle: Albumin, mouse serum; PBS; Route: SC, CSF/CNS; Species: Mice; Pump: 1003D; 1007D; Duration: 2 days;
ALZET Comments: Controls received mp w/ vehicle or normal goat antibody; animal info (8 wks old, Prlr +/-, Prlr -/-, male)

Agents: Luteinizing hormone; ara-C Vehicle: Saline; Route: SC, CSF/CNS; Species: Mice; Pump: 1007D; Duration: 2 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (8-10 wks old, female, CD1)

**Agents:** Chorionic gonadotropin hormone, human; salmon pituitary extract; gonadotropin-releasing hormone agonist

**Vehicle:** Not Stated; **Route:** IP; **Species:** Fish (eel); **Pump:** 2006; **Duration:** 42 days;

**ALZET Comments:** Animal info (male, Japanese); long-term study; comparison of IP injections vs IP mp; incorrectly listed Model 2002; “HCG administration of 50 IU day-1 by using OS was an efficient and reliable method for the artificial maturation of male Japanese eel, instead of the weekly injections method.” pg 171


**Agents:** Gonadotropin-releasing hormone

**Vehicle:** Saline, physiological; **Route:** SC; **Species:** Horse; **Pump:** 2004; **Duration:** 120 days;

**ALZET Comments:** Controls received sham pumps; long-term study; pumps replaced every 30 days; animal info (mare, 18 mo to 24 years); pumps were disinfected using chlorhexidine gluconate, sham pumps were made from silicon tubing filled with medical grade silicone adhesive to approximate the size of the ALZET pumps, then cold-sterilized (similar to pumps) before surgical insertion


**Agents:** Luteinizing HRH, D-Trple

**Vehicle:** Not Stated; **Route:** SC; **Species:** Mice (nude); **Pump:** Not Stated; **Duration:** 3 weeks;

**ALZET Comments:** Replacement therapy (gonadectomy); peptides; animal info (female, NU/J, chimeric teratoma)


**Agents:** Amikacin; gonadotropin-releasing hormone

**Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Rat; **Pump:** Not Stated; **Duration:** 35 days;

**ALZET Comments:** Peptides; animal info (corn snake); review, see p. 211; ref #9; “Alzet osmotic pumps can deliver medications continuously without the need for periodic injections. They hold promise for future delivery options in reptiles.” (p. 211)


**Agents:** Gonadotropin-releasing hormone II, analog

**Vehicle:** PBS; **Route:** SC; **Species:** Monkey; **Pump:** Not Stated; **Duration:** 6 days;

**ALZET Comments:** Controls received mp w/ vehicle; dose-response (fig. 1); stress/adverse reaction: (see pg. 160) 1 control (of 13) and 1 treated (of 19) animals died of diarrhea; half-life (pg. 160) 4 hours; peptides; animal info (Rhesus, female, 5-7 yrs. old); mp primed 16 hours in PBS; Endocrinology


**Agents:** Luteinizing HRH, D-Trple

**Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Rat; **Pump:** Not Stated; **Duration:** 35 days;

**ALZET Comments:** Peptides; animal info (female, Sprague-Dawley, 270 g); GnRH agonist


**Agents:** Luteinizing hormone; Thyroxine

**Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 4 weeks;

**ALZET Comments:** 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