References on the Administration of Testosterone Using ALZET® Osmotic Pumps

Q9875: A. H. Zahalka, et al. Using CT-guided stereotactic prostate radiation therapy (CT-SPRT) to assess sustained murine prostate ablation. Scientific Reports 2021;11(1):6571
Agents: Testosterone Vehicle: Not Stated; Route: SC; Species: Mice; Pump: Not Stated; Duration: 4 weeks;
ALZET Comments: Dose (1.875 μg/h); animal info (male mice, 8-weeks-old); cancer (Prostate Cancer);

Q9508: B. Tuku, et al. Testosterone Protects Against Severe Influenza by Reducing the Pro-Inflammatory Cytokine Response in the Murine Lung. Frontiers in Immunology 2020;11(697
Agents: Testosterone Vehicle: “Cyclodextrin, 2-ß-Hydroxypropl-”; Route: SC; Species: Mice; Pump: 2004; Duration: 2 weeks;
ALZET Comments: Dose (5 mg/ml); 45%% “Cyclodextrin, 2-ß-Hydroxypropl-” used; Controls received mp w/ vehicle; animal info (Six weeks old female mice); replacement therapy (testosterone);

Q8957: D. K. Singh, et al. Testosterone Acts Within the Medial Amygdala of Rats to Reduce Innate Fear to Predator Odor Akin to the Effects of Toxoplasma gondii Infection. Frontiers in Psychiatry 2020;11(630
Agents: Testosterone Vehicle: CSF, artificial; Route: CSF/CSN; Species: Rat; Pump: Not Stated; Duration: Not Stated;
ALZET Comments: Controls received mp w/ vehicle; animal info (Male, Wistar); Brain coordinates (AP = −3.0, L = ±3.8, v = −7.0); bilateral cannula used; dependence;

Q8962: J. Sellau, et al. Androgens predispose males to monocyte-mediated immunopathology by inducing the expression of leukocyte recruitment factor CXCL1. Nature Communications 2020;11(1):3459
Agents: Testosterone Vehicle: Not Stated; Route: SC; Species: Mice; Pump: 2004; Duration: Not Stated;
ALZET Comments: Dose (5 mg/ml); Controls received mp w/ vehicle; animal info (8 weeks old, Male, C57BL/6J); dependence;

Q8646: S. K. Mamta, et al. Controlled release of sex steroids through osmotic pump alters brain GnRH1 and catecholaminergic system dimorphically in the catfish, Clarias gariepinus. Brain Research Bulletin 2020;164(325-333
Agents: Estradiol, 17B; Testosterone, 17a-methyl Vehicle: Ethanol; Saline; Route: IP; Species: Fish; Pump: 1007D; Duration: 21 days;
ALZET Comments: Dose (0.48 ug/day); Controls received mp w/ vehicle; animal info (male and female catfish); functionality of mp verified by residual volume; 17B-estradiol aka E2, 17a-methyltesosterone aka MT; replacement therapy (testosterone; estradiol);

Q8612: A. Krishnan, et al. Effect of DHT-Induced Hyperandrogenism on the Pro-Inflammatory Cytokines in a Rat Model of Polycystic Ovary Morphology. Medicina (Kaunas) 2020;56(3):
Agents: Dihydrotestosterone Vehicle: Not stated; Route: SC; Species: Rat; Pump: Not stated; Duration: 90 days;
ALZET Comments: Dose (83 μg/day); Controls received mp w/ vehicle; animal info (female Wistar albino rats, 21 days old); long-term study; Dihydrotestosterone aka DHT; dependence;

Q9789: B. Huang, et al. CMKLR1 deficiency attenuates androgen-induced lipid accumulation in mice. American Journal of Physiology Endocrinology Metabolism 2020;318(3):E371-E380
Agents: 5a-dihydrotestosterone or 2-(a-Naphthoyl) ethyltrimethylammonium iodide Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 1004; Duration: 28 days;
ALZET Comments: Dose (83.3 ug/day-DHT, 1.7 ug/day- a-NETA); animal info (C57BL/6); 5a-dihydrotestosterone aka DHT, 2-(a-Naphthoyl) ethyltrimethylammonium iodide aka a-NETA ; cardiovascular;

Q9875: A. H. Zahalka, et al. Impact of CT guided high-dose prostate irradiation on rodent gland regeneration. European Urology Supplements 2019;18(1):
Agents: Testosterone Vehicle: Not Stated; Route: SC; Species: Mice; Pump: Not Stated; Duration: 2 days;
ALZET Comments: Animal info (10-12 weeks old, Male); cancer (Prostate Cancer);
Q7505: B. M. Warner, et al. Development and Characterization of a Sin Nombre Virus Transmission Model in Peromyscus maniculatus. Viruses 2019;11(2):
Agents: Testosterone enanthate Vehicle: Propylene Glycol; Route: SC; Species: Mice; Pump: 1004; Duration: 28 days;
ALZET Comments: Dose (200 g/day); Controls received mp w/ vehicle; animal info (deer mice); post op. care (meloxicam 2mg/kg);

Q8024: M. Hanoun, et al. Nestin(+)NG2(+) Cells Form a Reserve Stem Cell Population in the Mouse Prostate. Stem Cell Reports 2019;12(6):1201-1211
Agents: Testosterone Vehicle: Not stated; Route: SC; Species: Mice; Pump: Not stated; Duration: 3-4 weeks;
ALZET Comments: Dose (1:875 g/hour); animal info (Male, C57BL6);

Q7651: H. Zhao, et al. Chemokine-like receptor 1 deficiency leads to lower bone mass in male mice. Cellular and Molecular Life Sciences 2018;76(2):355-367
Agents: Dihydrotestosterone, 5alpha- ethyltrimethylammonium iodide, 2-(alpha-naphthoyl)- Vehicle: Not stated; Route: SC; Species: Mice; Pump: 1004; Duration: 28 days;
ALZET Comments: Dose ((DHT 83.3 μg/day), (alpha- NETA 33 μg/day)); Controls received empty mp; animal info (8 or 10 weeks, male, C57BL/6 or CMKLR1−/−); DHT is a nonaromatizable androgen. Alpha-NETA is a small molecule reported to function as a CMKLR1 antagonist; replacement therapy (testosterone);

Q8144: G. Navarro, et al. Androgen excess in pancreatic beta cells and neurons predisposes female mice to type 2 diabetes. JCI Insight 2018;3(12):
Agents: Dihydrotestosterone Vehicle: Not stated; Route: CSF/CNS (lateral ventricle); Species: Mice; Duration: 4 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (8 weeks old, Female, C57BL/6J); Dihydrotestosterone aka DHT, nonaromatizable AR agonist ; Brain coordinates (L +1 mm, AP –0.2 mm, DV –2 mm); bilateral cannula used; diabetes;

Q7922: H. Ito, et al. Castration increases PGE2 release from the bladder epithelium in male rats. Life Sci 2018;193(252-256 Agents: Testosterone Vehicle: Not Stated; Route: SC; Species: Rat; Pump: Not Stated; Duration: 2 weeks;
ALZET Comments: Dose (1 mg/kg/day); animal info (Male, 10 week old, Sprague Dawley, 31-330 g); dependence;

Q7117: C. W. Chua, et al. Differential requirements of androgen receptor in luminal progenitors during prostate regeneration and tumor initiation. eLife Journal 2018;7(Agents: Testosterone Vehicle: Ethanol; Route: SC; Species: Mice; Pump: 2004; Duration: 28 days;
ALZET Comments: Dose (1.875 ug/hr); animal info (Nkx3.1); cancer (Prostate);

Q5923: Q. Xie, et al. Transcriptional regulation of the Nkx3.1 gene in prostate luminal stem cell specification and cancer initiation via its 3‘ genomic region. J Biol Chem 2017;292(33):13521-13530
Agents: Testosterone Vehicle: Ethanol, PEG-400; Route: SC; Species: mice (transgenic); Pump: Not Stated; Duration: 4 weeks;
ALZET Comments: animal info (CK18-CreERT2 transgenic, Nkx3.1, C57BL/6N); cancer (prostate); replacement therapy (testosterone infusion); Dose (1.875 ug/h);

Q5712: Q. Xie, et al. Dissecting cell-type-specific roles of androgen receptor in prostate homeostasis and regeneration through lineage tracing. Nat Commun 2017;8(14284
Agents: Testosterone Vehicle: Ethanol; PEG 400; Route: SC; Species: Mice; Pump: Not Stated; Duration: 4 weeks;
ALZET Comments: animal info (male, adult, castrated); Dose (1.875 ug/hr);

Q6568: T. Kania, et al. Testosterone-dependent sex differences in red blood cell hemolysis in storage, stress, and disease. Transfusion 2016;56(10):2571-2583
Agents: Testosterone Vehicle: Propylene glycol; Route: SC; Species: Mice; Pump: 2004; Duration: 32 days;
ALZET Comments: Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (15-16 week old Orchiectomy FVB/NJ mice); replacement therapy (orchiectomized);
Q4821: Daniel G. Donner, et al. Testosterone and Trenbolone Improve Cardiometabolic Risk Factors and Myocardial Tolerance to Ischemia-Reperfusion in Male Rats With Testosterone-Deficient Metabolic Syndrome. Endocrinology 2016;157(1):368-381
**Agents:** Testosterone; trenbolone **Vehicle:** Cyclodextrin, 2-hydroxypropyl-ß-; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 8 weeks;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, Wistar, 12 weeks old, 300g); functionality of mp verified by plasma; pumps replaced every 4 weeks; 45% cyclodextrin used; ischemia (cardiac); post op. care (buprenorphine 10 ug/kg/day IM; enrofloxacin 5 mg/kg ip for 3 days); long-term study; Dose (2 mg/kg/day);

Q4252: R. E. Sorge, et al. Different immune cells mediate mechanical pain hypersensitivity in male and female mice. NATURE NEUROSCIENCE 2015;18(1081-+)
**Agents:** Testosterone **Vehicle:** Polyethylene glycol; **Route:** SC; **Species:** Mice (nude); **Pump:** 2002; **Duration:** 14 days;
**ALZET Comments:** animal info (naive, adult, young, 7-12 wks old, male, female, CD-1, nude CD-1);

Q4285: Y. Reizel, et al. Gender-specific postnatal demethylation and establishment of epigenetic memory. GENES & DEVELOPMENT 2015;29(923-933
**Agents:** Testosterone **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 2004; **Duration:** 3 months;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (C57BL6, 3 or 20 weeks old); pumps replaced every 28 days; replacement therapy (testosterone replacement); long-term study; pumps primed for 48 hours in 37°C saline;

Q4158: L. Wan, et al. Dietary Tomato and Lycopene Impact Androgen Signaling- and Carcinogenesis-Related Gene Expression during Early TRAMP Prostate Carcinogenesis. Cancer Prevention Research 2014;7(1228-1239
**Agents:** Testosterone propionate **Vehicle:** Cyclodextrin, sterile; **Route:** Not Stated; **Species:** Mice; **Pump:** Not Stated; **Duration:** 5 days;
**ALZET Comments:** Animal info (male, TRAMP +/- C57BL/6xFVB/N hybrid, 9 weeks old); cancer (prostate); replacement therapy (gonadectomy; testosterone replacement);

Q6779: L. Sun, et al. Anabolic steroids reduce spinal cord injury-related bone loss in rats associated with increased Wnt signaling. J Spinal Cord Med 2013;36(6):616-22
**Agents:** Nandrolone; testosterone **Vehicle:** Propylene glycol; **Route:** Not Stated; **Species:** Rat; **Duration:** 28 days;
**ALZET Comments:** Dose (0.75 mg/kg/week nandrolone; 2.8 mg/kg/week); Controls received mp w/ vehicle; animal info (Male Wistar rats aged 8 weeks); spinal cord injury;

Q2816: J. R. Chen, et al. Testosterone modulation of dendritic spines of somatosensory cortical pyramidal neurons. Brain Structure and Function 2013;218(6):1407-1417
**Agents:** Testosterone; flutamide; anastrozole **Vehicle:** DMSO;ethanol; **Route:** SC; **Species:** Rat; **Pump:** 2ML2; **Duration:** 4 weeks;
**ALZET Comments:** Control animals received mp w/ vehicle; animal info (Sprague Dawley, male, adult, 350-400 g); pumps replaced after 2 weeks; replacement therapy (castrated);

Q3401: K. Akita, et al. A novel selective androgen receptor modulator, NEP28, is efficacious in muscle and brain without serious side effects on prostate. European Journal of Pharmacology 2013;720(1-3):107-114
**Agents:** Dihydrotestosterone; methyltestosterone; NEP28 **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 2 weeks;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 13 weeks old); dose-response (pg.110-112); neurodegenerative (Alzheimer’s disease); replacement therapy (orchidectomized; androgen therapy); dihydrotestosterone aka DHT; methyltestosterone aka MT; NEP28 is a selective androgen receptor modulator (SARM); notes the use of a 21 day pump;

Q2177: Y. Wu, et al. Nandrolone Normalizes Determinants of Muscle Mass and Fiber Type after Spinal Cord Injury. Journal of Neurotrauma 2012;29(8):1663-1675
**Agents:** Testosterone; nandrolone **Vehicle:** Propylene glycol; **Route:** SC; **Species:** Rat; **Pump:** 2004; **Duration:** 56 days;
**ALZET Comments:** Controls received mp w/ vehicle; animal info (Wistar, male); post op. care (amoxicillin); pumps replaced after 28 days; long-term study
Q1844: Y. Wu, et al. Testosterone reduced methylprednisolone-induced muscle atrophy in spinal cord-injured rats. SPINAL CORD 2012;50(1):57-62

**Agents:** Methylprednisolone; testosterone  
**Vehicle:** Propylene glycol;  
**Route:** SC;  
**Species:** Rat;  
**Pump:** 2001; 2002;  
**Duration:** 24 hours; 7 days;  

**ALZET Comments:** Controls received mp w/ vehicle; animal info (Wistar, male); multiple pumps used (2); spinal cord injury

Q2389: J. A. Johnson, et al. Testosterone interacts with the feedback mechanisms engaged by Tyr985 of the leptin receptor and diet-induced obesity. Journal of Steroid Biochemistry and Molecular Biology 2012;132(3-5):212-219

**Agents:** Estradiol; testosterone  
**Vehicle:** Ethanol; propylene glycol; PBS;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** 1002; 1004;  
**Duration:** 2, 4 weeks;  

**ALZET Comments:** Control animals received mp w/ vehicle; animal info (LEPR-B Tyr985Leu, male, female, OVX, castrated); 10% ethanol used; replacement therapy (ovariectomy); post op. care (analgesic, carprofen)

Q1951: R. E. Sorge, et al. Spinal Cord Toll-Like Receptor 4 Mediates Inflammatory and Neuropathic Hypersensitivity in Male But Not Female Mice. Journal of Neuroscience 2011;31(43):15450-15454

**Agents:** Testosterone propionate  
**Vehicle:** Polyethylene glycol;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** 2002;  
**Duration:** 14 days;  

**ALZET Comments:** animal info (naive, adult, 6-12 wks old, male, female, CD-1); wound clips used

Q2246: M. Sinnesael, et al. 7a-methyl-19-nortestosterone vs. testosterone implants for hypogonadal osteoporosis: a preclinical study in the aged male orchidectomized rat model. International Journal of Andrology 2011;34(6):E601-E611

**Agents:** Testosterone; nortestosterone, androgen 7 alpha methyl 19  
**Vehicle:** Propylene glycol;  
**Route:** SC;  
**Species:** Rat;  
**Pump:** 2004;  
**Duration:** 4 months;  

**ALZET Comments:** Controls received mp w/ vehicle; mixture of nandrolone and testosterone in same pump

Q1459: X. H. Liu, et al. Nandrolone reduces activation of Notch signaling in denervated muscle associated with increased Numb expression. Biochemical and Biophysical Research Communications 2011;414(1):165-169

**Agents:** Nandrolone; testosterone  
**Vehicle:** Propylene glycol;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** Not Stated;  
**Duration:** 7, 28 days;  

**ALZET Comments:** Controls received mp w/ vehicle; mixture of nandrolone and testosterone in same pump

Q2213: P. L. Kovalenko, et al. Dietary Vitamin D and Vitamin D Receptor Level Modulate Epithelial Cell Proliferation and Apoptosis in the Prostate. Cancer Prevention Research 2011;4(10):1617-1625

**Agents:** Testosterone propionate  
**Vehicle:** DMSO; ethanol;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** Not Stated;  
**Duration:** 5 days;  

**ALZET Comments:** Animal info (castrated, TAPT121); "4:1 mixture of DMSO and ethanol"; replacement therapy (orchidectomy)

P9986: Y. Wu, et al. REDD1 Is a Major Target of Testosterone Action in Preventing Dexamethasone-Induced Muscle Loss. Endocrinology 2010;151(3):1050-1059

**Agents:** Dexamethasone; testosterone  
**Vehicle:** Propylene glycol;  
**Route:** Not Stated;  
**Species:** Rat;  
**Duration:** 7 days;  

**ALZET Comments:** Controls received mp w/ vehicle; animal info (male, Wistar, 250 g.)

Q0518: X. Wang, et al. A luminal epithelial stem cell that is a cell of origin for prostate cancer. Nature 2009;461(7263):495-U61

**Agents:** Testosterone  
**Vehicle:** Ethanol; PEG 400;  
**Route:** SC;  
**Species:** Mice;  
**Pump:** Not Stated;  
**Duration:** 4 weeks;  

**ALZET Comments:** Animal info (adult, male, castrated, Nkx3-1CreERT2/+); replacement therapy (orchidectomy)

Q0624: T. Tsuneda, et al. Deficiency of Testosterone Associates with the Substrate of Atrial Fibrillation in the Rat Model. Journal of Cardiovascular Electrophysiology 2009;20(9):1055-1060

**Agents:** Testosterone propionate  
**Vehicle:** Not Stated;  
**Route:** SC;  
**Species:** Rat;  
**Pump:** Not Stated;  
**Duration:** 3 weeks;  

**ALZET Comments:** Animal info (male, Sprague-Dawley, 6 mo old); replacement therapy (orchidectomy)
P9510: C. H. Alves, et al. Androgen Receptor is Expressed in Murine Choroid Plexus and Downregulated by 5 alpha-Dihydrotestosterone in Male and Female Mice. Journal of Molecular Neuroscience 2009;38(1):41-49
Agents: Dihydrotestosterone, 5a- Vehicle: Ethanol; polypropylene glycol; Route: SC; Species: Mice; Pump: 1007D; Duration: 1 week;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, female, 5 mo old, O VX, ORDX, 129s1/sv);

P9295: W. D. Zhao, et al. Testosterone protects against dexamethasone-induced muscle atrophy, protein degradation and MA F bx upregulation. Journal of Steroid Biochemistry and Molecular Biology 2008;110(1-2):125-129
Agents: Testosterone; Dexamethasone Vehicle: Propylene glycol; Species: Rat; Pump: Not Stated; Duration: 1, 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, Wistar, 250 g.)

P8938: T. Quintela, et al. 5alpha-dihydrotestosterone up-regulates transthyretin levels in mice and rat choroid plexus via an androgen receptor independent pathway. Brain Research 2008;1239(18-26
Agents: Dihydrotestosterone, 5 alpha- Vehicle: Ethanol; Propylene glycol; Route: SC; Species: Rat; Mice; Pump: 1007D; Duration: 1 week;
ALZET Comments: Controls received mp w/ vehicle; replacement therapy (orchidectomy); animal info (129s1/sv, HM male); 0.5% ethanol used

P9088: T. Henriques, et al. Androgen increases AT1a receptor expression in abdominal aortas to promote angiotensin II-induced AAAs in apolipoprotein E-deficient mice. Arteriosclerosis, Thrombosis, and Vascular Biology 2008;28(7):1251-1256
Agents: Dihydrotestosterone; Angiotensin II Vehicle: Saline; Route: SC; Species: Mice (knockout); Pump: 2004; Duration: 5 weeks; 28 days;
ALZET Comments: Controls received mp w/ vehicle; peptides; animal info (male, female, ApoE -/-, 12 wks old, castrated)

P9314: I. Goncalves, et al. Transthyretin is up-regulated by sex hormones in mice liver. Molecular and Cellular Biochemistry 2008;317(1-2):137-142
Agents: Estradiol, 17b-; dihydrotestosterone, 5a- Vehicle: Polypropylene glycol; Ethanol; Route: SC; Species: Mice; Pump: 1007D; Duration: 1 week;
ALZET Comments: Controls received mp w/ vehicle or sham operation; replacement therapy (ovariectomy, orchidectomy); animal info (male, female, 12951/Sv, 5 months old); 0.5% EtOH

R0253: L. Fusani. Endocrinology in field studies: Problems and solutions for the experimental design. General and Comparative Endocrinology 2008;157(3):249-253
Agents: Testosterone Vehicle: Not Stated; Route: SC; Species: Not Stated; Pump: Not Stated; Duration: Not Stated;
ALZET Comments: Replacement therapy (gonadectomy); comparison of silastic implants vs. time release pellets vs. mp; endocrinology; mp not used, just discussed as available option

P8640: J. Meitzen, et al. Steroid hormones act transsynaptically within the Forebrain to regulate neuronal phenotype and song stereotypy. Journal of Neuroscience 2007;27(44):12045-12057
Agents: Dihydrotestosterone; ICI-182,780; estradiol, 17b-; flutamide Vehicle: DMSO; PEG 300; propanediol, 1, 2-; Route: SC; CSF/CNS (HVC); CSF/CNS (robust nucleus arcopallium); Species: Bird (sparrow); Pump: 1007D; 1002; Duration: 14, 21 days;
ALZET Comments: Controls received mp w/ vehicle; pumps replaced after 14 days; cyanoacrylate adhesive; animal info (male, Gambel’s white crowned, adult); HVC is the proper name for the telencephalic song nucleus; mp placed in custom built backpack strapped to bird’s back w/harness made from surgical dressing, and a microcentrifuge tube; "pilot experiments showed that this arrangement kept the pump at its proper operating temperature (37°C), and that the pump retained saline throughout the entire release period." (p. 12047); ICI-182,780 is also known as faslodex

P8443: W. Banach-Petrosky, et al. Prolonged exposure to reduced levels of androgen accelerates prostate cancer progression in Nkx3.1; Pten mutant mice. Cancer Research 2007;67(19):9089-9096
Agents: Testosterone propionate Vehicle: PEG 400; Route: SC; Species: Mice; Pump: 2004; Duration: 7 months;
ALZET Comments: Controls received mp w/ vehicle, or no treatment; replacement therapy (castration); dose-response (fig 1A); long-term study; pumps replaced every 28 days; cancer (prostate); animal info (male, Nkx3.1 +/-, Pten +/-, Nkx3.1 +/-, Nkx3.1 +/-, Pten +/-, 6 wks old)
P7944: T. C. Shao, et al. Comparison of the growth-promoting effects of testosterone and 7-alpha-methyl-19-nor-testosterone (MENT) on the prostate and levator ani muscle of LPB-Tag transgenic mice. PROSTATE 2006;66(4):369-376

Agents: Testosterone; nortestosterone, 7 alpha-methyl-19
Vehicle: Cyclodextrin, Route: SC; Species: Mice (transgenic);
Pump: 2004; Duration: 4 weeks;
ALZET Comments: Replacement therapy (orchidectomy); cancer (prostate); animal info (male, transgenic, 32 grams, ORX); MENT (7-alpha-methyl-19-nor-testosterone) and testosterone dissolved in 45% cyclodextrin

P7581: Y. A. Rojas-Ortiz, et al. Modulation of elevated plus maze behavior after chronic exposure to the anabolic steroid 17alpha-methyltestosterone in adult mice. Hormones and Behavior 2006;49(1):123-128

Agents: Testosterone, 17a-methyl-
Vehicle: Saline; Cyclodextrin, B-
Route: SC; Species: Mice;
Pump: 2002; Duration: 17 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (male, C57BL/6, 90 days old); behavioral study; 30% cyclodextrin used

P7300: K. Venken, et al. Bone and muscle protective potential of the prostate-sparing synthetic androgen 7alpha-methyltestosterone in adult rat model. Bone 2005;36(4):663-670

Agents: Nortestosterone, 7a-methyl-19
Vehicle: Propandiol, 1, 2-
Route: SC; Species: Rat;
Pump: 2004; Duration: 16 weeks;
ALZET Comments: Controls received mp w/ vehicle; replacement therapy (orchidectomy); dose-response (fig. 1); long-term study; pumps replaced every 4 weeks; animal info (male, 13 month old, Wistar, 600-650 g)

P7200: M. Robichaud, et al. Oestrogen and testosterone modulate the firing activity of dorsal raphe nucleus serotonergic neurones in both male and female rats. Journal of Neuroendocrinology 2005;17(3):179-185

Agents: Estradiol, 17B-; Testosterone; Progesterone; Pregnane-3, 20 dione, 5B-; Pregnane-3a-ol, 20-one, 5a-;
Dehydroepiandrosterone; Testosterone, 5a-dihydroxy
Vehicle: Ethanol; Water, distilled; Route: CSF/CNS; Species: Rat; Pump: 2ML1; Duration: 3, 7 days;
ALZET Comments: Controls received mp w/ vehicle; ALZET brain infusion kit used; 3% ethanol; animal info (Sprague-Dawley, 250-325 g)

P6259: T. Yokota, et al. Functional and anatomical effects of hormonally induced experimental prostate growth: A urodynamic model of benign prostatic hyperplasia (BPH) in the beagle. PROSTATE 2004;58(2):156-163

Agents: Dihydrotestosterone, 5 alpha-; Estradiol, 17B- Vehicle: Not Stated; Route: SC; Species: Dog; Pump: 2ML4; Duration: 28 days;
ALZET Comments: Animal info (Beagle, 3.5-7.2 yrs); testosterone induced BPH animal model

P6273: A. M. Traish, et al. Binding characteristics of [3H]Delta5-androstene-3beta 17beta-diol to a nuclear protein in the rabbit vagina. Steroids 2004;69(1):71-78

Agents: Estradiol; testosterone
Vehicle: PEG; Route: SC; Species: Rabbit; Pump: 2002; Duration: 2 weeks;
ALZET Comments: Replacement therapy (ovariectomy); animal info (female, New Zealand, white, 4.5-5.0 kg, OVX)

P6517: N. N. Kim, et al. Effects of ovariectomy and steroid hormones on vaginal smooth muscle contractility. International Journal of Impotence Research 2004;16(1):43-50

Agents: Testosterone; estradiol; dihydrotestosterone; dehydroepiandrosterone
Vehicle: PEG 300; Route: SC; Species: Rabbit; Pump: 2002; Duration: 2 weeks;
ALZET Comments: Controls received mp w/ vehicle; replacement therapy (ovariectomy); animal info (female, New Zealand, white, 4.5-5.0 kg, OVX (for some))

P6800: W. Q. Gao, et al. Comparison of the pharmacological effects of a novel selective androgen receptor modulator, the 5 alpha-reductase inhibitor inhibitor finasteride, and the antiandrogen hydroxyflutamide in intact rats: New approach for benign prostate hyperplasia. Endocrinology 2004;145(12):5420-5428

Agents: SARM, s-1; SARM s-2; testosterone propionate
Vehicle: Ethanol; PEG 300; DMSO; Route: SC; Species: Rat; Pump: 2002; Duration: 14 days;
ALZET Comments: Controls received mp w/ vehicle; selective androgen receptor modulator (SARM) are flutamide and bicalutamide analogs; animal info (ORX, male, Sprague-Dawley, 187-214 g)
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Bibliography

P6920: J. Aronson. The Nicolas Andry Award - Modulation of distraction osteogenesis in the aged rat by fibroblast growth factor. Clinical orthopaedics and related research 2004;425):264-283
**Agents**: Fibroblast growth factor, recomb. human; dihydrotestosterone **Vehicle**: Sodium citrate; **Route**: SC; bone (tibia);
**Species**: Rat; **Pump**: 1007D; 1002; 2002; **Duration**: 7, 14 days;
**ALZET Comments**: Functionality of mp verified by residual volume; comparison of injections vs. mp; post op. care (heated cage/analgesics); pumps used for systemic or targeted delivery; silastic tubing used; “The pumps were well tolerated without inflammatory reaction, infection, or pain.” (p. 273); picture of pump and catheter (radiograph image) p. 277, fig 10A-8;

P5619: D. H. Yin, et al. Pharmacology, pharmacokinetics, and metabolism of acetothiolutamide, a novel nonsteroidal agonist for the androgen receptor. Journal of Pharmacology and Experimental Therapeutics 2003;304(3):1323-1333
**Agents**: Testosterone propionate; acetothiolutamide; bicalutamide, R- **Vehicle**: PEG 300; **Route**: SC; **Species**: Rat; **Pump**: 2002; **Duration**: 2 weeks;
**ALZET Comments**: Controls received mp w/vehicle; functionality of mp verified by residual volume; replacement therapy (orchidectomy); comparison of bolus IV injections vs. mp (p. 1327); stability verified by preliminary experiments (14 days at 37 C. of acetothiolutamide; half-life (p. 1327) acetothiolutamide (26 min); bicalutamide is a nonsteroidal androgen;

P5704: D. H. Yin, et al. Pharmacodynamics of selective androgen receptor modulators. Journal of Pharmacology and Experimental Therapeutics 2003;304(3):1334-1340
**Agents**: Testosterone propionate; bicalutamide derivatives; hydroxyflutamide derivatives **Vehicle**: PEG 300; DMSO; ethanol; **Route**: SC; **Species**: Rat; **Pump**: 2002; **Duration**: 14 days;
**ALZET Comments**: Controls received mp w/ vehicle; dose-response; multiple pumps per animal (1-2) due to limited solubility; derivatives were isomers of novel nonsteroidal androgens; functionality of mp verified by residual volume; animal info (male, Sprague-Dawley, 90-100 g, castrated)

P6480: A. M. Traish, et al. Sex steroid hormones differentially regulate nitric oxide synthase and arginase activities in the proximal and distal rabbit vagina. International Journal of Impotence Research 2003;15(6):397-404
**Agents**: Testosterone; dehydroepiandrosterone; dihydrotestosterone, 5-alpha-; androstenediol, delta 5-3B, 17B; estradiol; progesterone **Vehicle**: PEG; **Route**: SC; **Species**: Rabbit; **Pump**: 2002; **Duration**: 2 weeks;
**ALZET Comments**: Controls received mp w/ vehicle; replacement therapy (ovariectomy); multiple pumps per animal (2)

P5927: T. C. Shao, et al. In vivo preservation of steroid specificity in CWR22 xenografts having a mutated androgen receptor. PROSTATE 2003;57(1):1-7
**Agents**: Testosterone; estradiol; progesterone; flutamide **Vehicle**: Cylodextrin, 2-beta-hydroxypropil; **Route**: SC; **Species**: Mice (nude); **Pump**: 2004; **Duration**: 4 weeks;
**ALZET Comments**: Replacement therapy (castration); cancer (prostate); CWR22 xenograft used; flutamide is an anti-androgen; animal info (5-6 week old, nude, ORX)

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
**Agents**: Growth hormone, bovine; testosterone; estradiol, 17B- **Vehicle**: Phosphate buffer; glycerol; sodium asize; propylene glycol; **Route**: SC; **Species**: Rat; **Pump**: 2001; **Duration**: 7 days;
**ALZET Comments**: 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

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
**Agents**: Triiodothyronine; iodide, potassium; methimazole; Estradiol, 17B-; testosterone; thiourea **Vehicle**: Saline; **Route**: IP; **Species**: Fish (cod); **Pump**: 2ML1; **Duration**: 17 days;
**ALZET Comments**: 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
P5405: P. Val, et al. A 77-base pair LINE-Like sequence elicits androgen-dependent mvdp/akr1-b7 expression in mouse vas deferens, but is dispensable for adrenal expression in rats. Endocrinology 2002;143(9):3435-3448

**Agents:** Testosterone; Dexamethasone acetate  
**Vehicle:** Cyclodextrin; PEG  
**Route:** SC  
**Species:** Rat  
**Pump:** 2001; 2002  
**Duration:** 8, 10 days;  
**ALZET Comments:** Replacement therapy (orchidectomy); testosterone dissolved in cyclodextrin solution and delivered for 10 days via 2002 pumps; dexamethasone acetate infused via 2001 pumps in PEG vehicle; animal info (adult, male, Wistar)

P5313: G. Shetty, et al. Inhibition of recovery of spermatogenesis in irradiated rats by different androgens. Endocrinology 2002;143(9):3385-3396

**Agents:** Testosterone; nortestosterone, 7a-methyl-19-  
**Vehicle:** Molecusol (cyclodextrin); water  
**Route:** SC  
**Species:** Rat  
**Pump:** 2004  
**Duration:** 4 weeks;  
**ALZET Comments:** Testosterone plasma levels checked; 45% aqueous solution of Molecusol (cyclodextrin) used; nortestosterone, 7a-methyl-19- is a.k.a MENT; animal info (adult, male, 9-12 weeks old)

P5319: S. G. Ramachandra, et al. Effect of chronic administration of 7 alpha-methyl-19-nortestosterone on serum testosterone, number of spermatozoa and fertility in adult male bonnet monkeys (Macaca radiata). Reproduction 2002;124(2):301-309

**Agents:** Nortestosterone, 7 a-methyl-19-  
**Vehicle:** Not Stated  
**Route:** SC  
**Species:** Monkey  
**Pump:** 2ML4  
**Duration:** 195 days;  
**ALZET Comments:** Long-term study, pumps replaced every 28 days; a.k.a MENT; animal info (m, bonnet,

P6166: K. Min, et al. Effects of ovariectomy and estrogen and androgen treatment on sildenafil il-mediated changes in female genital blood flow and vaginal lubricati on in the animal model. American Journal of Obstetrics & Gynecology 2002;187(5):1370-1376

**Agents:** Estradiol; testosterone  
**Vehicle:** PEG  
**Route:** SC  
**Species:** Rabbit  
**Pump:** 2002  
**Duration:** 14 days;  
**ALZET Comments:** Controls received mp w/ vehicle; estradiol plasma levels taken; replacement therapy (ovariectomy); multiple pumps per animal used (2) for estradiol and testosterone group; animal info (female, New Zealand, white, 3.5-4.0 kg)

P5169: Y. Gotoh, et al. Gender difference in the Oatp1-mediated tubular reabsorption of estradiol 17 beta-D-glucuronide in rats. American Journal of Physiology Endocrinology and Metabolism 2002;282(E1245-E1254

**Agents:** Testosterone  
**Vehicle:** PEG 400  
**Route:** SC  
**Species:** Rat  
**Pump:** 2001  
**Duration:** 1 week;  
**ALZET Comments:** Controls received mp w/ vehicle; replacement therapy (orchidectomy); multiple pumps per animal (2)

P4636: L.-J. Zhu, et al. Effects of andorgen on androgen receptor expression in rat testicular and epididymal cells: A quantitative immunohistochemical study. Biology of Reproduction 2000;63(2):368-376

**Agents:** Azaline B; Testosterone, 7a-methyl-19-nor  
**Vehicle:** Water; Mannitol; Cyclodextrin, hydroxypropyl (molecusol)  
**Route:** Not Stated  
**Species:** Rat  
**Pump:** 2ML2; 2ML4  
**Duration:** 1,2,3,4,8 weeks;  
**ALZET Comments:** Replacement therapy; Azaline B is a LHRH-antagonist; agents infused together or singly; the vehicle for nortestosterone was hydroxypropyl beta-cyclodextrin (trappsol); long-term study

P4656: C. E. L. Dammann, et al. Androgen regulation of signaling pathways in late fetal mouse lung development. Endocrinology 2000;141(8):2923-2929

**Agents:** Dihydrotestosterone  
**Vehicle:** Not Stated  
**Route:** Not Stated  
**Species:** Mice (pregnant)  
**Pump:** Not Stated  
**Duration:** 7 days;  
**ALZET Comments:** Teratology; pellets also used to administer DHT