References on the Administration of Estrogens
Using ALZET® Osmotic Pumps

Q8591: S. V. Koebele*, et al.* Characterizing the effects of tonic 17beta-estradiol administration on spatial learning and memory in the follicle-deplete middle-aged female rat. Horm Behav 2020;126(104854
Agents: Estradiol, 17-beta- **Vehicle:** PEG; **Route:** SC; **Species:** Rat; **Pump:** 2006; **Duration:** 6 weeks;
ALZET Comments: Dose (3 ug/day); Controls received mp w/ vehicle; animal info (female, virgin, Fischer-344 rats, 11 months old); 17-beta-estradiol aka E2; replacement therapy (estradiol);

Q8584: Z. Z. Kirshner*, et al.* Impact of estrogen receptor agonists and model of menopause on enzymes involved in brain metabolism, acetyl-CoA production and cholinergic function. Life Sci 2020;256(117975
Agents: 17 B-Estradiol; 4,4',4''-(4- Propyl-[1H]-pyrazole-1,3,5-triyl) trisphenol; Diarylpropiolnitrile; G-1 **Vehicle:** DMSO; Cyclodextrin, Hydroxypropl-ß-;; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 30 days;
ALZET Comments: Dose (3 ug/day 17 B-Estradiol; 5 ug/day other agonists); 10% DMSO, 20% Hydroxypropl-ß-Cyclodextrin used; Controls received mp w/ vehicle; animal info (Female Sprague–Dawley rats, 11 weeks of age); 17 B-Estradiol aka E2; 4,4',4''-(4- Propyl-[1H]-pyrazole-1,3,5-triyl) trisphenol aka PPT; Diarylpropiolnitrile aka DPN; G-1 aka GPER1 agonist; replacement therapy (estradiol);

Q8542: R. Hornung*, et al.* Reduced activity of GAD67 expressing cells in the reticular thalamus enhance thalamic excitatory activity and varicella zoster virus associated pain. Neurosci Lett 2020;736(135287
Agents: Estradiol benzoate, 17-beta- **Vehicle:** PEG; **Route:** SC; **Species:** Rat; **Pump:** Not stated; **Duration:** 28 days;
ALZET Comments: Dose (750 ng/6 ul/day); animal info (Transgenic male (300 g) and female Long Evans rats (260 g)); replacement therapy (estradiol);

Q8410: J. R. Chen*, et al.* Nox4 Expression Is Not Required for OVX-Induced Osteoblast Senescence and Bone Loss in Mice. JBMR Plus 2020;4(8):e10376
Agents: Estradiol, 17B- **Vehicle:** Not stated; **Route:** Intraovarian; **Species:** Mice; **Pump:** Not stated; **Duration:** 8 weeks;
ALZET Comments: Dose (20 ug/kg/day); animal info (Six-month-old WT C57Bl6 mice); 17B-Estradiol aka E2; replacement therapy (estradiol);

Q7504: Y. D. Wang*, et al.* 17beta-estradiol preserves right ventricular function in rats with pulmonary arterial hypertension: an echocardiographic and histochemical study. Int J Cardiovasc Imaging 2019;35(3):441-450
Agents: Estradiol, 17 beta- **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** 2ML4; **Duration:** 5 weeks;
ALZET Comments: Dose (75 µg/kg/d); Controls received mp w/ vehicle; animal info (Male 8 week old Sprague–Dawley rats (300–350 g)); cardiovascular; Therapeutic indication (Pulmonary arterial hypertension);

Q7576: Y. Lu*, et al.* Neuron-Derived Estrogen Regulates Synaptic Plasticity and Memory. J Neurosci 2019;39(15):2792-2809
Agents: Estradiol, 17 beta- **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** 7 days;
ALZET Comments: Dose (0.0167mg); Controls received mp w/ placebo; animal info (Chimera male); replacement therapy (ovariectomy);

Q7292: C. B. Herber*, et al.* 2', 3', 4'-trihydroxychalcone is an Estrogen Receptor Ligand Which Modulates the Activity of 17β-estradiol. bioRxiv 2019;1-10
Agents: Estradiol, 17beta-; trihydroxychalcone, 2', 3', 4'- **Vehicle:** DMSO, Ethanol, Water; **Route:** Not Stated; **Species:** Mice; **Pump:** 2006; **Duration:** 4 weeks;
ALZET Comments: Dose (1 µg 17beta-estradiol, 2 ug CC7); 50% DMSO, 25% ethanol, 25% deionized water used; Controls received mp w/ vehicle; animal info (8 week old C57bl/6J female ovariectomized mice); 2', 3', 4'- trihydroxychalcone aka CC7; Therapeutic indication (menopausal hormone therapy);

Q7321: Y. Wu*, et al.* Downregulation of Gproteincoupled receptor 30 in the hippocampus attenuates the neuroprotection of estrogen in the critical period hypothesis. Mol Med Rep 2018;17(4):5716-5725
Agents: Estradiol, 17b- **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Pump model not stated; **Duration:** 10 weeks;

ALZET Comments: Dose (0.025 mg/day); Controls received mp w/ vehicle; animal info (female, Sprague-Dawley, 12 weeks old, 250-300 g); neurodegenerative (Alzheimer's disease);

Q7935: T. Wada*, et al.* Impact of central and peripheral estrogen treatment on anxiety and depression phenotypes in a mouse model of postmenopausal obesity. PLoS One 2018;13(12):e0209859
Agents: Estradiol **Vehicle:** CSF, artificial; **Route:** SC; CSF/CNS (lateral ventricle); **Species:** Mice; **Pump:** 1004; **Duration:** 3 weeks;
ALZET Comments: Dose ((SC 50 µg/kg/day), (ICV 1 µg/kg/day)); Controls received mp w/ vehicle; animal info (16 weeks, female, C57BL/6); behavioral testing (Open field, Light-dark box, Tail suspension, Forced swim); Multiple pumps per animal (2 for SC group); comparison of SC mp vs ICV mp; ALZET brain infusion kit 3 used; Brain coordinates (0.3 mm posterior to the bregma, 0.9 mm lateral to the central sulcus, 2.5 mm below the skull); replacement therapy (estradiol); Therapeutic indication (mouse model of postmenopausal obesity that exhibited anxiety disorder and depression phenotypes were improved by E2 replacement.);

Q7875: A. E. Tschiffely*, et al.* An exploratory investigation of brain-selective estrogen treatment in males using a mouse model of Alzheimer's disease. Horm Behav 2018;98(16-21
Agents: estradiol, 17-beta-; DHED **Vehicle:** PEG; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 8 weeks;
ALZET Comments: Dose ((E2 2 µg/day), (DHED 2 µg/day)); Controls received mp w/ vehicle; animal info (5.5-6 months, male, C57BL/6 and APPswe/PS1dE9); behavioral testing (radial-arm water maze); pumps replaced every 4 weeks; 10beta,17beta-dihydroxyestra-1,4-dien-3-one (DHED) is a brain-selective prodrug of E2; neurodegenerative (Alzheimer's); pump model not stated but flow rate listed as 0.025 µL/min; Therapeutic indication (DHED-based estrogen treatment shown to decrease APP and Abeta peptide levels concomitantly improving learning in male animals at an early stage of the neuropathology.);

Q7244: R. Thakkar*, et al.* 17beta-Estradiol Regulates Microglia Activation and Polarization in the Hippocampus Following Global Cerebral Ischemia. Oxid Med Cell Longev 2018;2018(4248526
Agents: Estradiol, 17b **Vehicle:** Cyclodextrin, B-; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 days;
ALZET Comments: Dose (0.0167 mg); 20% β-cyclodextrin used; animal info (3 month old, female, Sprague Dawley); ischemia (Cerebral);

Q7856: M. J. Ronis*, et al.* EB 2017 Article: Soy protein isolate feeding does not result in reproductive toxicity in the pre-pubertal rat testis. Experimental Biology and Medicine 2018;243(8):695-707
Agents: estradiol, 17-beta- **Vehicle:** PEG; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 13 days;
ALZET Comments: Dose (10 µg/kg/d); Controls received mp w/ vehicle; animal info (PND 21, male, Sprague-Dawley); comparison of soy protein isolate vs mp;

R0393: C. Physiology. Mechanisms of Sex Disparities in Cardiovascular Function and Remodeling. Compr Physiol 2018;9(1):375-411
Agents: Estradiol; Estrogen-dendrimer conjugate **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Not Stated; **Pump:** Not Stated; **Duration:** 2 weeks;
ALZET Comments: ischemia (placental); replacement therapy (ovarectomy);

Q8131: S. M. J. MohanKumar*, et al.* Chronic estradiol exposure - harmful effects on behavior, cardiovascular and reproductive functions. Reproduction 2018;156(5):R169-R186
Agents: 17B-Estradiol **Vehicle:** Not stated; **Route:** SC; **Species:** Rat; **Pump:** Not stated; **Duration:** 1, 3, or 7 days;
ALZET Comments: animal info (Female, Wistar;) dependence;

Q7181: B. L. Hoh*, et al.* Estrogen Deficiency Promotes Cerebral Aneurysm Rupture by Upregulation of Th17 Cells and Interleukin-17A Which Downregulates E-Cadherin. J Am Heart Assoc 2018;7(8):
Agents: Angiotensin II, estradiol, 17beta- **Vehicle:** PBS, Ethanol; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** Not Stated;

ALZET Comments: Ang-II (1000 ng/kg/min), Estradiol (0.25 ug/hr); Beta-estradiol reconstituted in a PBS-ethanol solution [9:1]; animal info (8- to 12-week-old female C57BL/6 mice);