



Recent References (2019-Present) on Cerebral Ischemia Research
Using ALZET® Osmotic Pumps

Q11029: J. Xu, *et al.* Anti-Inflammatory Actions of G-Protein-Coupled Estrogen Receptor 1 (GPER) and Brain-Derived Estrogen Following Cerebral Ischemia in Ovariectomized Rats. *Biology (Basel)* 2023;12(1):
Agents: G1; G36 **Vehicle:** Cotton seed oil; DMSO; **Route:** SC; **Species:** Rat; **Strain:** Sprague-Dawley **Pump:** 2002 **Duration:** 14d
ALZET Comments: 1% DMSO used; animal info: Adult female ovariectomized rats; G1 is G-protein-coupled estrogen receptor agonist, G36 is GPER antagonist; immunology (inflammation); cerebral ischemia

Q10886: Y. Zhao, *et al.* Vascular Endothelium Deploys Caveolin-1 to Regulate Oligodendrogenesis After Chronic Cerebral Ischemia in Mice. *Nature Communications* 2022;13(1):6813
Agents: Antagomir, PEI; Antagomir, PEI, Cy5 labelled **Vehicle:** Not Stated; **Route:** CSF/CNS (corpus callosum); **Species:** Mice; **Strain:** C57BL/6J; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (2 µg /day); Controls received mp w/ vehicle; animal info (Adult male (24–29 g; for BCAS surgery) and mice (6–8 weeks old); Brain coordinates: (0.5mm anterior-posterior, 1.0mm medial-lateral, –2.1mm dorsalventral relative to bregma); ischemia (cerebral); behavioral testing (cognitive test);

R0405: S. E. Yang, *et al.* Therapeutic Potential and Mechanisms of Novel Simple O-Substituted Isoflavones against Cerebral Ischemia Reperfusion. *International Journal of Molecular Sciences* 2022;23(18):
Agents: Genistein **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** balb/c; **Pump:** Not Stated; **Duration:** 2 weeks;
ALZET Comments: Dose (0.1 mg/kg); ischemia (Cerebral); Therapeutic indication (Cerebral Ischemia); animal info. mice

Q10592: E. R. Louet, *et al.* tPA-NMDAR Signaling Blockade Reduces the Incidence of Intracerebral Aneurysms. *Translational Stroke Research* 2022;13(6):1005-1016
Agents: Angiotensin II **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL6/129; **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Dose (800 ug); 0.9% saline used; animal info (tPA null, Male; 8 weeks old); peptides; ischemia (cerebral); Therapeutic indication (Intracranial aneurysms);

Q11156: M. P. Keasey, *et al.* Liver vitronectin release into the bloodstream increases due to reduced vagal muscarinic signaling after cerebral stroke in female mice. *Physiological Reports* 2022;10(9):e15301
Agents: Bethanechol **Vehicle:** Saline; **Route:** IP; **Species:** Mice; **Strain:** B6.129S2(D2)- Vtn ^{<tm1Dgi>/J}, JAX 004371; C57BL/6; **Pump:** 1003D; **Duration:** 3 days;
ALZET Comments: Dose: 20 mg/kg/day; Controls received mp w/ vehicle; animal info: Mice 10–12 weeks of age and weighed ~18–20g; post op. care: buprenorphine 0.1 ml of a 10 µg/ml; behavioral testing: a suspended unstable grid walk test; functionality of pump verified by plasma levels; cerebral ischemia

Q10418: A. B. Caglayan, *et al.* The Unconventional Growth Factors Cerebral Dopamine Neurotrophic Factor and Mesencephalic Astrocyte-Derived Neurotrophic Factor Promote Post-ischemic Neurological Recovery, Perilesional Brain Remodeling, and Lesion-Remote Axonal Plasticity. *Translational Stroke Research* 2022;
Agents: Cerebral dopamine neurotrophic factor, recombinant human; Mesencephalic astrocyte-derived neurotrophic factor, recombinant human **Vehicle:** NaCl; **Route:** CSF/CNS (left ventricle); **Species:** Mice; **Strain:** C57Bl6/j; **Pump:** 2004 **Duration:** 28d
ALZET Comments: "Dose: (1 ug/day); (0.9% NaCl), vehicle used; Controls received mp w/ vehicle; animal info: male mice (8–10 weeks) behavioral testing: RotaRod test, Grip strength; Open field test; Elevated o maze test; ALZET BIK 3 used; Brain coordinates (contralateral motor cortex (0.5 mm rostral and 2.5 mm lateral to the bregma); neurodegenerative (stroke);

Q10784: L. Wang, *et al.* Coupling of GPR30 Mediated Neurogenesis and Protection With Astroglial Aromatase-STAT3 Signaling in Rat Hippocampus After Global Cerebral Ischemia. *Molecular and Cellular Endocrinology* 2021;535(11):1394
Agents: G1 **Vehicle:** DMSO; Cotton Oil; **Route:** CSF/CNS (ventricle); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** 2004; **Duration:** 28 days;
ALZET Comments: Dose: (3 ug/day); 0.1% DMSO; 0.9% Saline vehicle used Controls received mp w/ vehicle; animal info: Adult (3-month-old) female rats bilateral OVX; G1- aka G protein-coupled receptor 30 agonist; ALZET brain infusion kit 1 used; Brain coordinates (2.5–4.5 mm posterior from bregma);



Q10239: F. Liu, *et al.* Electroacupuncture Improves Cerebral Ischemic Injury by Enhancing the EPO-JAK2-STAT5 Pathway in Rats. *Neuropsychiatric Disease and Treatment* 2021;17(2489-2498

Agents: AG490 **Vehicle:** Not Stated; **Route:** CSF/CNS (lateral ventricle); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** Not Stated; **Duration:** Not Stated;

ALZET Comments: "Controls received mp w/ vehicle; animal info: Adult male: female=1:1, 200– 250 g); post op. care: After suturing the skin, analgesics and antibiotics were injected intraperitoneally to prevent postoperative pain and infection; AG-490 (a Janus-tyrosine kinase-2 (JAK-2) phosphorylation inhibitor); ALZET BIK used; Brain coordinates (bregma, 0.8 mm posterior, –4.8 mm DV, –1.5 mm L); ischemia (cerebral ischemia); "

Q8701: S. Bhattarai, *et al.* Modulation of Brain Pathology by Enhancer RNAs in Cerebral Ischemia. *Mol Neurobiol* 2021;58(4):1482-1490

Agents: Anti-eRNA oligos **Vehicle:** aCSF; **Route:** CSF/CNS; **Species:** Mice; **Strain:** C57BL/6N; **Pump:** 1003D; **Duration:** 3d

ALZET Comments: Dose (8.3 pmole/ul); animal info (3 months old, 20-30 g,); antisense (eRNA_06347: 5'-GATTGGGAATTGCTAG-3' ; eRNA_093384: 5'-GGAAGCAGGTGAACAG-3'); ALZET brain infusion kit 3 used; ischemia (Cerebral);

Q9829: L. Zheng, *et al.* Rhythmic light flicker rescues hippocampal low gamma and protects ischemic neurons by enhancing presynaptic plasticity. *Nature Communications* 2020;11(1):3012

Agents: GK23; GK13; Conotoxin, w-; **Vehicle:** CSF, Artificial; **Route:** CSF/CNS (left ventricle); **Species:** Mice;

Strain: C57Bl/6; Thy1-YFP-H; **Pump:** 1003D; **Duration:** 3 days;

ALZET Comments: Dose (2 mg/kg/day GK23, GK13; 2.28 ng/kg/day w-Conotoxin); animal info (Adult male C57Bl/6 mice (3-months-old)); behavioral testing (Open field test; Morris water maze; Y-maze test); peptides; ALZET BIK 3 used; Brain coordinates (coordinates from bregma: anterior-posterior = –0.5 mm; lateral = 1.0 mm); dental cement used; ischemia

Q9564: W. Xu, *et al.* Blockade of Nogo-A/Nogo-66 receptor 1 (NgR1) Inhibits Autophagic Activation and Prevents Secondary Neuronal Damage in the Thalamus after Focal Cerebral Infarction in Hypertensive Rats. *Neuroscience* 2020;431(103-114

Agents: NEP1-40 **Vehicle:** PBS; **Route:** CSF/CNS (right lateral ventricle); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** Not Stated; **Duration:** 3 days;

ALZET Comments: Dose (270 ug/kg); Controls received mp w/ vehicle; animal info (male Sprague–Dawley rats, weighing 60–90 g); behavioral testing (adhesive removal test); NEP1-40 aka Nogo-66 receptor antagonist peptide; peptides; Brain coordinates (relative to bregma: -1.0 mm anteroposterior, 1.4 mm lateral, and -4.0 mm dorsoventral); ischemia (cerebral);

Q9553: S. K. Woo, *et al.* SUR1-TRPM4 channels, not KATP, mediate brain swelling following cerebral ischemia. *Neuroscience Letters* 2020;718(134729

Agents: Oligodeoxynucleotide **Vehicle:** Saline, sterile normal; **Route:** IV (external jugular); **Species:** Rat; **Strain:** pMCAo;

Pump: 2001D; **Duration:** 24 hours;

ALZET Comments: Dose (1.2 mg / 24 h); animal info (Male Wistar rats, aged 11–12 weeks (300–350 gm)); ischemia (cerebral);

Q9450: D. R. Seeger, *et al.* Blood-Brain Barrier Is the Major Site for a Rapid and Dramatic Prostanoid Increase upon Brain Global Ischemia. *Lipids* 2020;55(1):79-85

Agents: Ketorolac **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** Not Stated; **Duration:** 12 hours;

ALZET Comments: Dose (0.625 mg/kg/h); Controls received mp w/ vehicle; animal info (Mice (C57BL/6 background), 4–6 months of age); Resultant plasma level (2.03% Ketorolac concentration); ischemia (cerebral);

Q8670: N. Miyamoto, *et al.* The effects of A1/A2 astrocytes on oligodendrocyte lineage cells against white matter injury under prolonged cerebral hypoperfusion. *Glia* 2020;68(9):1910-1924

Agents: Flavone, 7,8-dihydroxy **Vehicle:** DMSO; PBS; **Route:** IP; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1004; **Duration:** 28 d

ALZET Comments: Dose (5 mg/kg); 17% DMSO/PBS used; Controls received mp w/ vehicle; animal info (male C57BL/6 mice (10 weeks old); behavioral testing (Y-maze test); 7,8-dihydroxyflavone aka 7.8-DHF; ischemia (cerebral);



Q8640: L. Li, *et al.* ABCA1/ApoE/HDL Signaling Pathway Facilitates Myelination and Oligodendrogenesis after Stroke. *International Journal of Molecular Sciences* 2020;21(12):

Agents: Apolipoprotein E; High density lipoprotein; **Vehicle:** CSF, artificial; **Route:** CSF/CNS (right lateral ventricle); **Species:** Mice; **Strain:** ApoE2; **Pump:** 1002; **Duration:** 14 days;

ALZET Comments: Dose (25µg); Controls received mp w/ vehicle; animal info (ABCA1-B/-B mice); behavioral testing (adhesive removal test); Apolipoprotein E aka ApoE2; High density lipoprotein aka HDL3; ischemia (cerebral);

Q8343: N. Bai, *et al.* G-protein-coupled estrogen receptor activation upregulates interleukin-1 receptor antagonist in the hippocampus after global cerebral ischemia: implications for neuronal self-defense. *Journal of Neuroinflammation* 2020;17(1):45

Agents: G1; G36; Oligodeoxynucleotide, IL1RA antisense; Scrambled Missense **Vehicle:** DMSO; Saline; **Route:** SC; CSF/CNS (left lateral ventricle); **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 2004; 2002; 2001; **Duration:** 14 days;

ALZET Comments: Dose (10 ug/day; 10 nmol/day); 1% DMSO, 0.9% saline used; Controls received mp w/ vehicle; animal info (Adult female Sprague-Dawley rats); G1 aka GPER agonist; G36 aka GPER antagonist; ALZET brain infusion kit Lot no 10331-14 used; Brain coordinates (anteroposterior, 0.8 mm; lateral, 1.5 mm; depth, 3.5 mm; from bregma); ischemia (GPER neuroprotective effects);

Q9124: Z. Y. Zhai, *et al.* Constraint-induced movement therapy enhances angiogenesis and neurogenesis after cerebral ischemia/reperfusion. *Neural Regeneration Research* 2019;14(10):1743-1754

Agents: NEP1-40 **Vehicle:** DMSO/Saline; **Route:** CSF/CNS; **Species:** Rat **Strain:** Sprague Dawley **Pump:** 2ML4 **Duration:** 1, 3 w

ALZET Comments: Dose (1 mg); Controls received mp w/ vehicle; animal info (Male, Sprague Dawley, 8-10 weeks old, 280-320 g); behavioral testing (Beam Walking Test, Morris Water Maze Test); NEP1-40 aka Specific antagonist of the Nogo-66 receptor; ALZET brain infusion kit 2 used; Brain coordinates (anteroposterior -0.9 mm and mediolateral +2.0 mm); ischemia (Cerebral);

Q9117: M. Yli-Karjanmaa, *et al.* Topical Administration of a Soluble TNF Inhibitor Reduces Infarct Volume After Focal Cerebral Ischemia in Mice. *Frontiers in Neuroscience* 2019;13(781)

Agents: XPro1595; Etancercept **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 1003D; **Duration:** 3 days;

ALZET Comments: Dose (XPro1595- 2.5 mg/ml/ul/hr or Etancercept- 2.5 mg/ml/ul/hr); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male, C57BL/6, 7-8 weeks old); behavioral testing (Grip Strength Test); ischemia (Cerebral);

Q7677: R. Wang, *et al.* Photobiomodulation for Global Cerebral Ischemia: Targeting Mitochondrial Dynamics and Functions. *Mol Neurobiol* 2019;56(3):1852-1869

Agents: Mdivi-1 **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Rat; **Strain:** Sprague Dawley; **Pump:** 1003D;

ALZET Comments: Dose (1 mg/kg/day); Controls received mp w/ vehicle; animal info (Adult male Sprague-Dawley rats 250-300 g); behavioral testing (Barnes Maze Task, Morris Water Maze Test); enzyme inhibitor (selective inhibitor of mitochondrial fission protein Drp1);

Q8836: S. Xing, *et al.* EphrinB2 activation enhances angiogenesis, reduces amyloid-b deposits and secondary damage in thalamus at the early stage after cortical infarction in hypertensive rats. *Journal of Cerebral Blood Flow & Metabolism* 2019;39(1776-1789)

Agents: Ephrin B2-Fc, human recombinant; Fc-IgG, human recombinant **Vehicle:** PBS, Human Serum Albumin buffered; **Route:** CSF/CNS (lateral ventricle); **Species:** Rat; **Strain:** Sprague-Dawley; **Pump:** Not Stated; **Duration:** 3 days;

ALZET Comments: Dose ((EphB2-Fc 100 µl), (IgG-Fc 100 µl)); 0.01M phosphate-buffered saline (pH7.4) containing 0.1% human serum albumin used; Controls received sham surgery; animal info (male, Sprague-Dawley, 80-100g); post op. care (Body temperature of animals kept at 37+/-0.5C with a heating pad during recovery); behavioral testing (Adhesive removal test); Brain coordinates (1.0 mm anteroposterior, 1.4 mm lateral, 4.0 mm dorsoventral relative to bregma); Cannula placement verified via stereotaxic frame; ischemia (cerebral infarction); pump model not stated although flow rate listed as 100ul; Therapeutic indication (EphB2-Fc treatment significantly accelerated the sensory recovery compared with those in the IgG-Fc group. Activation of ephrinB2 can promote angiogenesis, decrease Abeta deposits and rescue the secondary neurodegeneration of thalamus after cerebral infarction.);