References on the Use of ALZET® Osmotic Pumps with Bioluminescence Imaging

Q8946: Y. Sawai, *et al.* In vivo evaluation of the effect of lithium on peripheral circadian clocks by real-time monitoring of clock gene expression in near-freely moving mice. Scientific Reports 2019;9(1):10909
Agents: Luciferin **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** C57BL/6; **Pump:** 2001; **Duration:** 1 week;
ALZET Comments: Dose (157 mM); animal info (Male,); bioluminescence

Q4841: A. Kawamura, *et al.* Teratocarcinomas Arising from Allogeneic Induced Pluripotent Stem Cell-Derived Cardiac Tissue Constructs Provoked Host Immune Rejection in Mice. SCIENTIFIC REPORTS 2016;6(1-13
Agents: Tacrolimus **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Strain:** BALB/c; **Pump:** 1002; **Duration:** 27 days;
ALZET Comments: cancer (teratocarcinoma); immunology; animal info; functionality of mp verified by plasma levels; pumps replaced after 14 days; BLI; Dose (1.5 mg/kg);

Q5313: M. Cadamuro, *et al.* Low-Dose Paclitaxel Reduces S100A4 Nuclear Import to Inhibit Invasion and Hematogenous Metastasis of Cholangiocarcinoma. Cancer Research 2016;76(16):4775-84
Agents: Paclitaxel **Vehicle:** Cremophor EL, Ethanol; **Route:** IP; **Species:** Mice; **Strain:** SCID; **Pump:** 1004; **Duration:** 2 weeks;
ALZET Comments: Controls received mp w/ vehicle; animal info (6–8 weeks old); functionality of mp verified by bioluminescence imaging to check metastatic spread; 50% Cremophor, 50% ethanol used; cancer (Cholangiocarcinoma); Xenograft model; Dose (2.6 mg/kg/d);

Q5245: J. Pajarinen, *et al.* Establishment of Green Fluorescent Protein and Firefly Luciferase Expressing Mouse Primary Macrophages for In Vivo Bioluminescence Imaging. PLoS One 2015;10(11):e0142736
Agents: ultra-high-molecular-weight polyethylene particles **Vehicle:** BSA-PBS; **Route:** Knee (medullary cavity); **Species:** Mice;
Strain: BALB/cByJ; **Pump:** 2006; **Duration:** Not Stated;
ALZET Comments: animal info (male, 8 to 12 weeks old mice); functionality of mp verified by bioluminescence imaging; good methods (pg 3, 4); Pumps were connected to hollow titanium rods (0.82 mm x 6 mm) via 6 cm long vinyl tubing prefilled with the particle solution; isoflurane anesthesia; Dose 15 mg/ml;

Q5407: J. Huang, *et al.* A novel brain metastasis xenograft model for convection enhanced delivery of targeted toxins via a microosmotic pump system enabled for realtime bioluminescence imaging. Mol Med Rep 2015;12(4):5163-8
Agents: DTATEGF, immunotoxin **Vehicle:** Not Stated; **Route:** CSF/CNS; **Species:** Mice; **Strain:** athymic; **Pump:** 1007D;
Duration: 7 days;
ALZET Comments: Controls received mp w/ T cell targeting control toxin (BIC3KDEL); animal info (Six week old female mice weighing 17-19 g); ALZET brain infusion kit 3 used; cancer; "CED was performed via a micro osmotic pump system, to provide a continuous positive pressure microinfusion... a drug may be continuously delivered at a constant rate for days without the need for anesthesia or the frequent handling of small animals... the small, flexible pump system may be fixed to the skull and therefore will not interfere with the normal activities of the mice. The system does not require an external syringe or shunt catheter, thus decreasing the chance for infection... the pump is fully biocompatible and the infusion volume is well tolerated. Therefore, the model used in the present study is a simple and effective tool for performing CED treatment experiments in small animals with brain tumors." pg 5167; DTATEGF TT is a novel recombinant bispecific TT consisting of a truncated diphtheria toxin (DT), an aminoterminal (AT) fragment of the urokinase type plasminogen activator, and a fragment of human epidermal growth factor (EGF); no stress: "...no morbidity or mortality was observed in response to the pump system or the surgical procedure. The mice implanted with pumps showed no evidence of clinical side effects over the study period. No mice experienced irritation at the wound site or attempted to remove the pump system. No neurological deficits were observed immediately following cell inoculation, pump implantation, or drug delivery. The pump system never migrated from its implanted position, and all mice tolerated the device well." (see pg. 5165); Therapeutic indication (cancer); BLI

Q5244: D. Ono, *et al.* Circadian PER2::LUC rhythms in the olfactory bulb of freely moving mice depend on the suprachiasmatic nucleus but not on behaviour rhythms. European Journal of Neuroscience 2015;42(12):3128-37
Agents: D-Luciferin K **Vehicle:** Saline, physiological; CSF, artificial; **Route:** IP, CSF/CNS (lateral ventricle); **Species:** Mice; **Strain:** C57BL/6j; **Pump:** 2002, 1004; **Duration:** 14 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (Male and female mice 3.5-7 months); functionality of mp verified by measurement of bioluminescence; functionality of mp verified by measurement of bioluminescence; Isoflurane anesthesia; circadian rhythm measurements; Dose (100 mM)

Q4389: T. Curie, *et al.* In Vivo Imaging of the Central and Peripheral Effects of Sleep Deprivation and Suprachiasmatic Nuclei Lesion on PERIOD-2 Protein in Mice. SLEEP 2015;38(1381-+
Agents: Luciferin, D- **Vehicle:** CSF, artificial; **Route:** CSF/CNS; **Species:** Mice; **Strain:** Per2 Luc; **Pump:** 1002; **Duration:** 21 days;
ALZET Comments: Animal info (Per2 Luc); Bioluminescence; pumps primed in 37C saline overnight;

Q0705: P. G. Ren, *et al.* Continuous Infusion of UHMWPE Particles Induces Increased Bone Macrophages and Osteolysis. Clinical orthopaedics and related research 2011;469(1):113-122
Agents: Polyethylene particles, UHMWPE **Vehicle:** Saline **Route:** Bone (femur) **Species:** Mice (nude) **Pump:** 2006 **Duration:** 3w
ALZET Comments: Controls received mp w/ vehicle; animal info (12 wks old, male); post op. care (buprenorphine), pg 115; Fig 1A, diagram of pump and catheter placement; pump connected to titanium rod; Ultra High Molecular Weight Polyethylene

Q5669: G. D. Luker, *et al.* Luciferase protein complementation assays for bioluminescence imaging of cells and mice. Methods Mol Biol 2011;680(29-43
Agents: Luciferin **Vehicle:** PBS; **Route:** Not Stated; **Species:** Not Stated; **Pump:** Not Stated; **Duration:** Not Stated;
ALZET Comments: "luciferase levels in mice peak approximately 10 min after i.p. injection, then decline slowly to background levels by ≈ 6 h post injection. Luciferin biodistribution for imaging firefly luciferase PCA can be stabilized for hours or days by using an osmotic pump (Alzet). This method has the advantage of producing a relatively constant bioluminescence signal in mice…" p. 39;

Q1299: J. Rowe, *et al.* Compounds that target host cell proteins prevent varicella-zoster virus replication in culture, ex vivo, and in SCID-Hu mice. Antonie van Leeuwenhoek Journal of Microbiology 2010;86(3):276-285
Agents: Phosphonoacetic acid; Roscovitine **Vehicle:** DMSO; **Route:** SC; **Species:** Mice (NSG); **Pump:** 2001; **Duration:** 7 days;
ALZET Comments: Controls received mp w/ vehicle; animal info (SCID-Hu, 7-8 wks old); enzyme inhibitor (cyclin-dependent kinase); 50% DMSO used; bioluminescence (IVIS 200); antiviral

Q0625: H. Yoon, *et al.* Antitumor Activity of a Novel Antisense Oligonucleotide Against Akt1. Journal of Cellular Biochemistry 2009;108(4):832-838
Agents: Oligonucleotide, antisense **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice (nude); **Pump:** 1002; **Duration:** 14 days;
ALZET Comments: Animal info (nu/nu); bioluminescence

P9582: E. Moroz, *et al.* Real-Time Imaging of HIF-1-alpha Stabilization and Degradation. PLoS One 2009;4(4):U44-U56
Agents: Luciferin, D- **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice (nude); **Pump:** 1007D; **Duration:** Not Stated;
ALZET Comments: Animal info (6 wks old, Ncr *nu/nu*); IVIS Imaging

P9688: H. Harada, *et al.* Treatment regimen determines whether an HIF-1 inhibitor enhances or inhibits the effect of radiation therapy. British Journal of Cancer 2009;100(5):747-757
Agents: Luciferin, D- **Vehicle:** PBS; **Route:** SC; **Species:** Mice (nude); **Pump:** 1007D; **Duration:** Not Stated;
ALZET Comments: Animal info (BALB/c, nu/nu); IVIS-200; bioluminescence

P9606: H. Harada, *et al.* The Akt/mTOR Pathway Assures the Synthesis of HIF-1-alpha Protein in a Glucose- and Reoxygenation-dependent Manner in Irradiated Tumors. Journal of Biological Chemistry 2009;284(8):5332-5342
Agents: Luciferin, D-; glucose, 2-deoxy-D- **Vehicle:** PBS; water; **Route:** SC; **Species:** Mice (nude); **Pump:** Not Stated;
Duration: Not Stated;
ALZET Comments: Controls received mp/vehicle; cancer; animal info (6 weeks old, male, BALB/c, nu/nu) IVIS-200;

P9878: C. Antczak, *et al.* Revisiting Old Drugs as Novel Agents for Retinoblastoma: In Vitro and In Vivo Antitumor Activity of Cardenolides. INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE 2009;50(7):3065-3073
Agents: Ouabain **Vehicle:** DMSO; **Route:** SC; **Species:** Mice (SCID); **Pump:** 1007D; **Duration:** 19 days;
ALZET Comments: Controls received mp w/ vehicle; pumps replaced every week; cancer (retinoblastoma); animal info (8 wks old, male); 10% DMSO used; bioluminescence; IVIS 200

P8467: Y. M. Zhang, *et al.* ABCG2/BCRP expression modulates D-luciferin-based bioluminescence imaging. Cancer Research 2007;67(19):9389-9397
Agents: Luciferin **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice (nude); **Pump:** 1007D; **Duration:** 1 hour;
ALZET Comments: Cancer; bioluminescence imaging (BLI); animal info (female, nude, 6 wks old); tumor cells injected SC; cancer (HEK 293); peptides; pg 939s shows images with pumps implanted; IVIS 200 bioluminescence

P8244: N. Redjal, *et al.* CXCR4 inhibition synergizes with cytotoxic chemotherapy in gliomas. Clinical Cancer Research 2006;12(22):6765-6771
Agents: AMD 3100 **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 15 days;
ALZET Comments: Controls received mp w/ vehicle; comparison of SC injections vs. mp; cancer (glioma); bioluminescence, IVIS imaging system; combination therapy; CXCR4 inhibitor

R0236: R. T. Sadikot, *et al.* Bioluminescence imaging. Proc Am Thorac Soc 2005;2(6):537-540
Agents: Endotoxin, LPS **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Pump:** 2001D; **Duration:** 24 hours;
ALZET Comments: Comparison of IP injections vs. mp; ALZET see pg. 538; BLI (bioluminescence)

P7435: S. Gross, *et al.* Real-time imaging of ligand-induced IKK activation in intact cells and in living mice. Nature Methods 2005;2(8):607-614
Agents: Luciferin, D- **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Pump:** 1007D; **Duration:** Not Stated;
ALZET Comments: Cancer; bioluminescence imaging (BLI); IVIS; animal info (balb/c, 6 weeks old, male); "By eliminating constraints of intraperitoneal (i.p.) bolus reinjections of substrate, the implanted pump allowed continuous real-time molecular imaging of reporter activity throughout the time course of a multi-day experiment, while simultaneously allowing rapid temporally resolved analysis of short time constants that characterize drug action. This innovation should be generalizable to a variety of other imaging strategies in vivo." P. 613

P7688: U. Abraham, *et al.* Independent circadian oscillations of Period1 in specific brain areas in vivo and in vitro. Journal of Neuroscience 2005;25(38):8620-8626
Agents: Luciferin, beetle-D- **Vehicle:** PBS; **Route:** IP; **Species:** Rat (transgenic); **Pump:** 2ML1; **Duration:** 7 days;
ALZET Comments: Post op. care (Baytril); animal info (male, transgenic, Wistar); (BLI), bioluminescence; IVIS; olfactory bulb imaging; circadian rhythm; image levels were 10 fold lower than cannula delivered luciferin; "...pump-implantation procedure yielded a higher success rate." (than luciferin injected rats.) (p. 8623); peptides

P5991: J. B. Rubin, *et al.* A small-molecule antagonist of CXCR4 inhibits intracranial growth of primary brain tumors. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 2003;100(23):13513-13518
Agents: AMD 3100 **Vehicle:** PBS; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 21 days;
ALZET Comments: Controls received mp w/ vehicle; tissue perfusion (intratumoral); comparison of 2x daily injections vs. mp; cancer (glioblastoma); CXCR4 antagonist; 0.5 ul/hr pumps used; In vivo tumor imaging performed with IVIS imaging system (Xenogen); bioluminescence imaging (BLI)