



## References on the Administration of Vitamins Using ALZET® Osmotic Pumps

### 1. RO-23-7553

**P3719:** B. W. Light, *et al.* Potentiation of cisplatin antitumor activity using a vitamin D analogue in a murine squamous cell carcinoma model system. *Cancer Res* 1997;57(3759-3764

**ALZET Comments:** RO-23-7553; PBS; IP; mice; 1007D; 7 days; controls received sham mp; cancer.

### 2. Vitamin A

**R0148:** D. Al Musawi, *et al.* Adhesion prevention: state of the art. *GYNAECOLOGICAL ENDOSCOPY* 2001;10(123-130

**ALZET Comments:** Dipyridamole; Lazaroids; Retinoic acid; Review of adhesion formation and prevention; mentions the use of mini-osmotic pumps to evaluate new agents to reduce experimental pelvic adhesions (p. 125).

**P7250:** T. Liu, *et al.* The retinoid anticancer signal: mechanisms of target gene regulation. *British Journal of Cancer* 2005;93(3):310-318

**ALZET Comments:** Retinoic acid, 13-cis-; Ethanol; SC; Mice (transgenic); 1007D; 5 weeks; Controls received mp w/ vehicle; dose-response (fig. 1); no stress (see pg. 312-13); cancer (neuroblastoma).

**P7232:** S. M. Karam, *et al.* Retinoic acid stimulates the dynamics of mouse gastric epithelial progenitors. *Stem Cells* 2005;23(3):433-441

**ALZET Comments:** Retinoic acid; uridine, bromodeoxy-; SC; Mice; 1, 3, 6 days; Controls received mp w/ vehicle; comparison of SC injections vs. mp; cancer (gastric); multiple pumps per animal (2).

**P4739:** R. D. Kopke, *et al.* Growth factor treatment enhances vestibular hair cell renewal and results in improved vestibular function. *PNAS* 2001;98(10):5886-5891

**ALZET Comments:** Transforming growth factor; insulin-like growth factor I; retinoic acid; brain-derived neurotrophic factor;; PBS; BSA;; Ear (vestibule); Guinea pig; 2002; 4 weeks; Controls received mp w/ vehicle; pumps replaced after 2 weeks; peptides; IntraEAR catheter used; GFI group pumps filled with TGF, IGF and Retinoic acid; GFII group pumps filled with TGF, IGF, BDNF and retinoic acid; tissue perfusion (vestibule).

**P4026:** K. E. Rodgers, *et al.* Reduction of adhesion formation by intraperitoneal administration of various anti-inflammatory agents. *J. Invest. Surgery* 1998;11(327-339

**ALZET Comments:** Retinoic acid; Quinacrine; Dipyridamole; PBS; Ethanol; injury site; rabbit; 2ML1; 1, 2, 3, 7 days; controls received mp w/vehicle; tissue perfusion (surgical injury site); animals given morphine i.m. for post-operative pain; catheter stabilized in sidewall w/suture; in some studies, catheter tubing was disconnected to halt flow at specific times; immunology.

**P3491:** M. Kaya, *et al.* Chemical induction of fenestrae in vessels of the blood-brain barrier. *Exp. Neurol* 1996;142(6-13

**ALZET Comments:** Retinoic acid; Phorbol myristate acetate; ETHANOL; Gibco BRL minimal essential medium; DMSO; Culture medium, serum-free; CSF/CNS (cortex); Rat; 2ML1; 21, 28 days; controls received mp w/ vehicle; functionality of mp verified by residual volume; pumps replaced weekly.

### 3. Vitamin B12

**Q4348:** E. Mutti, *et al.* 4-ethylphenyl-cobalamin impairs tissue uptake of vitamin B12 and causes vitamin B12 deficiency in mice. *PLoS One* 2013;8(9):e75312



**ALZET Comments:** Vitamin b12; Cobalamin, ethylphenyl-; saline; SC; mice; 2004; 4 weeks; controls received mp w saline; animal info: 7 wks old, female, strain 129.S6; mp used to infuse EtPhCbl in mice to see if it causes Cbl (cobalamin) deficiency; EtPhCbl (3.5 nmol/24 h), CNCbl.

**Q2430:** D. L. Lildballe, *et al.* Maximal Load of the Vitamin B12 Transport System: A Study on Mice Treated for Four Weeks with High-Dose Vitamin B12 or Cobinamide. PLoS One 2012;7(10):U386-U392

**ALZET Comments:** Cobinamide; vitamin B12; Saline; SC; Mice; 2004; 27 days; Control animals received mp w/ vehicle; animal info (129.S6, 8 wks old, female); "To avoid wound biting between mice, the mice were housed in individual cages for 3 days after surgery."; post op. care (buprenorphine in the water); cobinamide is a vitamin B12 analogue.

**P3776:** T. Kiuchi, *et al.* Effect of vitamin B12 on the sleep-wake rhythm following an 8-hour advance of the light-dark cycle in the rat. Physiol. Behav 1997;61(4):551-554

**ALZET Comments:** Vitamin B12; IP; Rat; 2002; 15 days; controls received mp w/saline.

**P1825:** E. P. Brass, *et al.* Effect of hydroxycobalamin[c-lactam] on propionate and carnitine metabolism in the rat. Biochem. J 1990;226(809-815

**ALZET Comments:** Vitamin B12 analog; SC; Rat; 2002; no duration posted; controls received pumps with saline only; pumps replaced after three weeks; cobalamin analog.

#### 4. Vitamin B12 analog

**P1825:** E. P. Brass, *et al.* Effect of hydroxycobalamin[c-lactam] on propionate and carnitine metabolism in the rat. Biochem. J 1990;226(809-815

**ALZET Comments:** Vitamin B12 analog; SC; Rat; 2002; no duration posted; controls received pumps with saline only; pumps replaced after three weeks; cobalamin analog.

#### 5. Vitamin D

**Q5205:** Stephanie R. Sisley, *et al.* Hypothalamic Vitamin D Improves Glucose Homeostasis and Reduces Weight. Diabetes 2016;1-35

**ALZET Comments:** Vitamin D3, 1,25-dihydroxy; Cyclodextrin; hydroxypropyl-B-; CSF/CNS (third ventricle); Rat; 1004; 28 days; Controls received mp w/ vehicle; animal info (male, Long Evans, adult); dose-response (Supplementary Figure 3); obesity; Dose (-.264 ug/day); Brain coordinates (i3vt 2.2A/P, 7.8D/V);.

**Q5398:** D. Ovejero, *et al.* 1,25-Dihydroxyvitamin D as Monotherapy for XLH: Back to the Future? J Bone Miner Res 2016;31(5):925-8

**ALZET Comments:** Vitamin D, 1,25-Dihydroxy-; Mice; 4 weeks; animal info (Hyp mice); "In contrast, Alzet minipump infusion of 1,25D into Hyp mice for 4 weeks after weaning, along with a diet rich in phosphate, normalizes the growth plate and dramatically improves osteoid thickness" pg 936; Oral vs. minipump (pg. 936);.

**Q3925:** M. L. Hyde, *et al.* In vivo measurement of the absorption of strontium in the rumen and small intestine of sheep as an index of calcium absorption capacity. British Journal of Nutrition 2014;112(718-724

**ALZET Comments:** Hydroxyvitamin D3, 1a-; SC; Sheep (ewe); 2002; 6 days; Animal info (merino, mature); functionality of mp verified by plasma 1,125-dihydroxycholecalciferol levels;.

**Q3900:** S. K. Halder, *et al.* Paricalcitol, a Vitamin D Receptor Activator, Inhibits Tumor Formation in a Murine Model of Uterine Fibroids. REPRODUCTIVE SCIENCES 2014;21(1108-1119

**ALZET Comments:** Vitamin D3, 1,25-dihydroxy; PEG; ethanol; SC; Mice (nude); 28 days; Controls received mp w/ vehicle; animal info (female, athymic, nude, 5-6 weeks old); 95% PEG used; 5% ethanol used; cancer (uterine fibroid tumor);.



**Q4711:** T. Chaichanasakul, *et al.* Diverse Osteoclastogenesis of Bone Marrow From Mandible Versus Long Bone 1116. JOURNAL OF PERIODONTOLOGY 2014;85(829-836)

**ALZET Comments:** Parathyroid hormone (1-34), human; vitamin D3, 1,25-dihydroxy; SC; Rat; 3 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 3 months old);.

**Q2055:** S. K. Halder, *et al.* 1,25-Dihydroxyvitamin D3 Treatment Shrinks Uterine Leiomyoma Tumors in the Eker Rat Model. Biology of Reproduction 2012;86(4):U41-U50

**ALZET Comments:** Vitamin D3, 1,25-dihydroxy; Ethylene glycol; SC; Rat; 3 weeks; Controls received mp w/ vehicle; animal info (female, Eker, 14-16 wks old); functionality of mp verified via serum drug levels; cancer (uterine leiomyomas).

**Q0314:** M. S. K. Wong, *et al.* Chronic treatment with vitamin D lowers arterial blood pressure and reduces endothelium-dependent contractions in the aorta of the spontaneously hypertensive rat. American Journal of Physiology-Heart and Circulatory Physiology 2010;299(4):H1226-H1234

**ALZET Comments:** Vitamin D3, 1,25-dihydroxy-; SC; Rat; 2006; 6 weeks; Animal info (adult, SHR, WKY, 36 wk old); long-term study.

**Q1190:** M. Lamblin, *et al.* Vitamin D receptor agonist/histone deacetylase inhibitor molecular hybrids. BIOORGANIC & MEDICINAL CHEMISTRY 2010;18(11):4119-4137

**ALZET Comments:** Vitamin D, 1 alpha 25-dihydroxy; Vitamin D hybrid, 1 alpha 25-dihydroxy; Mice; 6-7 days; Animal info (female, virgin, FVB, 8 wks old); cancer; enzyme inhibitor (histone deacetylase, HDAC).

**P8554:** G. Mailhot, *et al.* Endocrine and bone consequences of cyclic nutritional changes in the calcium, phosphate and vitamin D status in the rat: An in vivo depletion-repletion-redepletion study. Bone 2007;41(3):422-436

**ALZET Comments:** Vitamin D3; IP; Rat; 14 days; No stress (see pg. 425, 432); animal info (male, Sprague-Dawley, 7 weeks old).

**P8289:** W. Banach-Petrosky, *et al.* Vitamin D inhibits the formation of prostatic intraepithelial neoplasia in Nkx3.1; Pten mutant mice. Clinical Cancer Research 2006;12(19):5895-5901

**ALZET Comments:** Vitamin D3, 1,25-dihydroxy-; Propylene glycol; SC; Mice; 2004; 1-4 months; Controls received mp w/ vehicle; long-term study; pumps replaced every 4 weeks; stability verified by serum calcium levels; cancer (prostate); animal info (4-7 months old, male).

**P7307:** K. Nakagawa, *et al.* 22-oxa-1alpha,25-dihydroxyvitamin D<sub>3</sub> inhibits metastasis and angiogenesis in lung cancer. Carcinogenesis 2005;26(6):1044-1054

**ALZET Comments:** Vitamin D3, 1, 25-dihydroxy-; vitamin D3, 22-oxa-1a, 25-dihydroxy-; Tween 20; ethanol; SC; Mice; 2ML4; 3 weeks; 10, 18 days; Controls received mp w/ vehicle; dose-response; cancer (lung carcinoma); 10% ethanol; millipore chamber ring; sc dorsal air sac model.

**P7170:** G. Duque, *et al.* 1,25(OH)<sub>2</sub>D<sub>3</sub> acts as a bone-forming agent in the hormone-independent senescence-accelerated mouse (SAM-P/6). AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM 2005;288(4):E723-E730

**ALZET Comments:** Vitamin D3, 1, 25-dihydroxy-; Mice; 6 weeks; Controls received mp w/ vehicle; pumps replaced after 3 weeks, no stress (see pg. E728).

**P6832:** R. Narayanan, *et al.* Differential skeletal responses of hindlimb unloaded rats on a vitamin D-deficient diet to 1,25-dihydroxyvitamin D<sub>3</sub> and its analog, seocalcitol (EB1089). Bone 2004;35(1):134-143

**ALZET Comments:** Vitamin D3, 1,25-dihydroxy; EB 1089; Polypropylene glycol; sodium phosphate; SC; Rat; 28 days; Controls received mp w/ vehicle; functionality of mp verified by plasma 25(OH)-D and 1,25-D levels; stress/adverse reaction: (see pg. 137) 5 animals died due to anesthesia complications and to tail irritation and diarrhea.

**P6206:** G. Duque, *et al.* Vitamin D treatment of senescence accelerated mice (SAM-P/6) induces several regulators of stromal cell plasticity. BIOGERONTOLOGY 2004;5(6):421-429



**ALZET Comments:** Vitamin D3, 1,25-dihydroxy-; Mice; 2004; 6 weeks; Controls received mp w/ vehicle; pumps replaced after 3 weeks.

## 6. Vitamin E

**Q1590:** C. Y. Hsieh, *et al.* Inhibition of vascular smooth muscle cell proliferation by the vitamin E derivative pentamethylhydroxychromane in an in vitro and in vivo study: pivotal role of hydroxyl radical-mediated PLC-gamma-1 and JAK2 phosphorylation. *Free Radical Biology and Medicine* 2010;49(5):881-893

**ALZET Comments:** PMC; tocopherol, alpha; SC; Rat; 14 days; Controls received mp w/ normal saline; animal info (Wistar, male, 350-400 g); PMC, also known as (2,2,5,7,8-pentamethyl-6-hydroxychromane, is a vitamin E derivative; tocopherol also known as vitamin E.

**P9636:** D. C. Irwin, *et al.* A potential role for reactive oxygen species and the HIF-1-alpha-VEGF pathway in hypoxia-induced pulmonary vascular leak. *Free Radical Biology and Medicine* 2009;47(1):55-61

**ALZET Comments:** Ascorbate; glutathione; tocopherol, alpha-; SC; Mice; 1007D; Controls received mp w/saline; animal info (male, C57BL/6J, 25-30g, 10-12 weeks old); compounds were mixed and infused together as an antioxidant cocktail.

**P3759:** T. Udaka, *et al.* The effect of combination therapy with EPC-K1 and low-dose cyclosporine to pulmonary allograft after rat lung transplantation. *J. Heart Lung Transplant* 1997;16(839-845

**ALZET Comments:** Vitamin E; IP; Rat; 2001; 7 days; functionality of mp verified by measuring EPC-K1 plasma levels; immunology; EPC-K1 is a diester of a-tocopherol and ascorbic acid; agent also called D-alpha-tocopherol.

**P2013:** D. G. Stein, *et al.* Intracerebral administration of alpha-tocopherol-containing liposomes facilitates behavioral recovery in rats with bilateral lesions of the frontal cortex. *J. Neurotrauma* 1991;8(4):281-292

**ALZET Comments:** Phosphatidylcholine; vitamin E; Liposomes; CSF/CNS (cortex); Rat; 2001; 7 days; Multiple pumps per animal (2); agent also called D-alpha-tocopherol.