References on Micro Perfusion of Solid Tissue
Using ALZET® Osmotic Pumps


**Agents:** calpeptin  
**Vehicle:** DMSO  
**Route:** intramuscular (infraspinatus)  
**Species:** Sheep  
**Pump:** 2ML4  
**Duration:** 6 weeks

**ALZET Comments:** Dose (0.75 mg/day); animal info (26.7+/−1.4 months, female, Swiss Alpine); pumps replaced at 2 weeks; calpeptin is a synthetic calpain inhibitor; enzyme inhibitor (calpain); tissue perfusion (m. infraspinatus); good methods (detailed pump implantation procedure on page 3.); Therapeutic indication (calpain inhibition prevented the early unloading adaptations, but not the subsequent initiation of rotator cuff disease); 75% DMSO used;


**ALZET Comments:** Angiotensin II; sodium butyrate; SC; Intrarenal (medulla); Rat; 2002; 14 days; Controls received mp w/ vehicle; animal info (male, Sprague Dawley, 250-300g); Multiple pumps per animal (2); replacement therapy (uniphrectomy); tissue perfusion (renal medulla); cardiovascular; antihypertensive; peptides; Bp measured using radio telemetry (DSI); Dose (Ang II 200 ng/kg/min; NaBu 1 ug/kg/min); good bp comparison curve (pg.4).


**ALZET Comments:** Huperzine A; Intraovarian (ovarian bursa); Rat; 2004; 4 weeks; Controls received mp w/ saline; animal info (female, Sprague Dawley, 250-300g, hemi-OVX); tissue perfusion (ovarian bursa); enzyme inhibitor (acetylcholine esterase);


**ALZET Comments:** Ultra-high molecular weight polyethylene particles; oligodeoxynucleotide, decoy; oligodeoxynucleotide, scrambled; Endotoxin, LPS; Brain-derived neurotropic factor;; Saline; In Vitro (cell culture); Bone (Femur); Mice (nude); 2006; 4 weeks; Controls received mp w/ vehicle; animal info (Male athymic nude mice, 10-15 weeks old); stability verified by (in vitro experiment); dose-response (pg. 277); good methods (pg. 276); tissue perfusion (bone); Dose (15 mg/ml UHMWPE, 50U/mL decoy, 1 ug/ml LPS); Therapeutic indication (Bone loss, chronic inflammation);

Q5311: L. Chen, et al. 20-HETE contributes to ischemia-induced angiogenesis. Vascul Pharmacol 2016;83(57-65

**ALZET Comments:** DDMS; 6,15-20-HEDGE; Intramuscular (hindlimb gracilis); Mice; 2002, 2004; 32 days; Controls received mp w/ vehicle; animal info (Balb/c mice, 12 wk old); functionality of mp verified by blood pressure and blood perfusion scans; dose-response (pg. 61); good methods (pg. 58); ischemia (peripheral); tissue perfusion (intramuscular); Polyethylene catheter tubing used (inner ID 0.8 mm); Dose (5 mg/kg/day);


**ALZET Comments:** Sphingosine, D-erythro; saline; SC; Rat; 2002; 2 weeks; Controls received mp w/ vehicle; sham operation; animal info: adult Sprague–Dawley (SD) male rats, 240 - 260 g; spinal cord injury; tissue perfusion (spinal cord); D-erythro-sphingosine aka DES; Dose: DES (200 µl 1 μg/ml solution).


**ALZET Comments:** MDL28170; DMSO; PBS; Ear (cochlea); Guinea pig; 1002; 14 days; Controls received mp w/ vehicle; animal info (Hartley strain, 350-400g); 0.3% DMSO used; tissue perfusion (cochlea); used Tefron tube with inner diameter of 180 um to cannulate cochlea; MDL28170 is a gamma-secretase inhibitor;
ALZET Comments: Antibody, anti-aminoprocalcitonin; Saline; IP; Rat; 2001D; 18 hours; Controls received mp w/ control antibody; animal info (male, Wistar, 280-300g); tissue perfusion (peritoneum); immunology; peptides; Catheter used to cannulate peritoneum;

ALZET Comments: U0126; serum protein, ovine; interferon tau, recombinant ovine; DMSO; Intrauterine (uterine horn); Sheep (ewe); 2ML1; 6 days; Controls received mp w/ vehicle; animal info (female, Suffolk Ovis aries); 3% DMSO used; tissue perfusion (uterine horn); cyanoacrylate adhesive; used cyanoacrylate glue to anchor pump; interferon tau aka IFNT;

ALZET Comments: Isoproterenol; mice; 2 weeks; animal info (C57BL/6 mice; 8-week-old mAKAPfl/fl); ischemia (cardiac); behavioral testing (physiological hypertrophy induced with 5-wk swimming regimen, Hargreaves test); tissue perfusion (heart); cardiovascular; Iso aka Isoproterenol; Dose: 60 mg/kg/day.

ALZET Comments: GR103691; RNA, small interfering; Transfection reagent (TransIT); SC; kidney (subcapsular space); Mice; 1007D; 4 days; 7 days; Controls received mp w/ vehicle or nonsilencing "mock siRNA"; animal info (male, C57BL6J, adult); tissue perfusion (subcapsular space; kidney); gene therapy; antihypertensive; GR103691 is a D3R antagonist; used PE tubing #0007701; pump sutured to abdominal wall; surgical glue applied at puncture site to hold catheter tubing in place and to prevent leakage;

Q3795: Y. Aghazadeh, et al. Induction of Androgen Formation in the Male by a TAT-VDAC1 Fusion Peptide Blocking 14-3-3epsilon Protein Adaptor and Mitochondrial VDAC1 Interactions. MOLECULAR THERAPY 2014;22(1779-1791
ALZET Comments: TVG167; TVS167; Water; IP; intratesticular; Rat; 24 hours; Controls received mp w/ vehicle; functionality of mp verified by serum levels of melatonin taken; 45% DMSO used; stress/adverse reaction: (see pg.2); post op. care (For two days: flunixin meglumine 50 mg/ml IM twice a day; Penicillin G procain 300,000 u/ml once per day); tissue perfusion (testis); peptide; TVS167 and TVG167; pump infused at 1.0 ul/hr;

ALZET Comments: RNA, small interfering; Kidney; Mice; 7 days; Control animals received mp w/ vehicle or non-silencing mock siRNA; animal info (C57BL/6, BALB/c, nephrectomized, adult, male); Snx -1 specific siRNA; infusion rate of 0.5 ul/hr; tissue perfusion (kidney); PE catheter used.

ALZET Comments: Melatonin; Luzindole; DMSO; water; Intrauterine (uterine horn); Sheep (ewe); 2ML4; 28 days; Controls received mp w/ vehicle; functionality of mp verified by serum levels of melatonin taken; 45% DMSO used; stress/adverse reaction: (see pg.2); post op. care (For two days: flunixin meglumine 50 mg/ml IM twice a day; Penicillin G procain 300,000 u/ml once per day); tissue perfusion (uterus mesometrium); cardiovascular;

Q3105: T. G. Landry, et al. Chronic neurotrophin delivery promotes ectopic neurite growth from the spiral ganglion of deafened cochleae without compromising the spatial selectivity of cochlear implants. Journal of Comparative Neurology 2013;521(12):2818-2832
ALZET Comments: Neurotrophin; Brain-derived neurotrophic factor; Ear (cochlea); Guinea pig; 2004; 28 days; Controls received mp w/ artificial perilymph; animal info (young adult, 300-600g); tissue perfusion (cochlea); peptides;

**ALZET Comments:** RNA, small interfering, D2R; RNA, small interfering, PON2; Kidney (renal capsule); Mice; 1007D; 7 days; Control animals received mp w/ nonsilencing control RNA; animal info (D2R deficient, 6-8 mo old, uniphrectomy); PE tubing used (item #0007701); "The body of the minipump was placed in the area previously occupied by the kidney that was removed; stabilization was achieved by suturing (4-0 ethilon) the minipump to the lateral abdominal musculature close to it."; tissue perfusion (renal capsule).


**ALZET Comments:** FGLM-NH₂; SSSR; Ear (cochlea); Guinea pig; 2002; 14 days; Control animals received mp w/ artificial perilymph; animal info (male, Hartley); FGLM-NH₂ also known as Phenylalanine-Glycine-Leucine-Methionine-Amide; SSSR also known as Serine-Serine-Serine-Arginine; tissue perfusion.


**ALZET Comments:** Brain-derived neurotrophic factor; Ear (cochlea); Guinea pig; 2004; 4 weeks; Controls received mp w/ Ringers solution; animal info (adult, male, Dunkin-Hartley pigmented, 233-815 g); post op. care (buprenorphine); "Polymers, particularly hydrogels that may be applied directly to the round window, were considered... However, most have a release profile that varies over time, so instead we chose to place a cannula attached to a mini-osmotic pump directly onto the round window." pg 2; tissue perfusion (cochlea, round window niche).


**ALZET Comments:** P234; Intraovarian; Rat; 2004; 28 days; Control animals received mp w/ saline; animal info (Sprague Dawley, male, 30, 60 days old); P234 is a kisspeptin antagonist; "the pumps were left in the animal for a total of 50 d to control the estrous cycling activity." pg 4968; tissue perfusion (ovary).


**ALZET Comments:** Liposomes, fluorescently labeled; coatasome EL-01-C, hydrated; DMSO; water, distilled; Intrauterine; Rabbit (fetus); 2ML1; 1 week; Control animals received mp w/ liposome alone; animal info (Japanese, White, 4.2-5.4 kg, teen); tissue perfusion (fetus); "5-cm sterile PE 60 silicone catheter with silicone flange was attached to each pump" pg L209; Fig 2, image of pump and catheter placement; multiple pumps used (2); teratology.


**ALZET Comments:** BQ610; Methanol; saline; Intraovarian (corpus luteum); Sheep (ewe); 2002; 14 days; Controls received mp w/ vehicle; animal info (nonpregnant, Suffolk); tissue perfusion (corpus luteum); BQ-610 is an endothelin receptor type A antagonist.


**ALZET Comments:** Interferon, tau, recomb. ovine; meloxicam; PGE2, ovine serum; PGF2a, ovine serum; PGI2, ovine serum; Ethanol; saline; Intrauterine (uterine horn); Sheep (ewe); 2ML1; 7 days; Controls received mp w/ vehicle; animal info (Mature Rambouillet); good methods (pg 2); vinyl tubing used (0007760); 2% ethanol used; enzyme inhibitor (prostaglandin synthase two); tissue perfusion (intrauterine).

ALZET Comments: Interferon, tau, recombinant ovine; meloxicam; PGE2, ovine serum; PGF2a, ovine serum; PG12, ovine serum; Ethanol; saline; Intrauterine (uterine horn); Sheep (ewe); 2ML1; 5 days; Controls received mp w/ vehicle; animal info (Mature Rambouillet); tissue perfusion (intrauterine); multiple pumps used (2); enzyme inhibitor (prostaglandin synthase two).


ALZET Comments: RNA, small interfering, DJ-1; In vivo transfection agent; Kidney; Mice; 1007D; 7 days; Controls received mp w/ non-silencing RNA; animal info (F1 hybrid; wt, 6-8 mo old, uninephrectomized, adult, male, C57BL/6J; ALZET polyethylene tubing set used (0007701); tissue perfusion (kidney); "The osmotic pump was sutured to the abdominal wall to prevent excessive movement of the pump" pg 447.


ALZET Comments: Stromal-cell-derived factor-1, alpha; bone morphogenic protein 2; transforming growth factor-1, beta; IP (abdominal wall); Rat; 2004; 4 weeks; Negative control animals received no cytokines; animal info (Sprague Dawley, adult); "A custom-made apparatus for the constant delivery of cytokines was assembled consisting in a microneedle system and Alzet osmotic pump" pg 90; fig 1b, image of custom-made cytokine delivery apparatus; tissue perfusion (anterior abdominal wall).


ALZET Comments: Semaphorin 3E; IP; Mice; 2002; 2 weeks; Controls received mp w/ mock saline; animal info (12-14 wks old, RT2); tissue perfusion (pancreas); catheter placement verified post mortem; "(silastic tubing) was passed into the peritoneal cavity and sutured to the abdominal wall to reach directly the pancreas." data supplement; protein.


ALZET Comments: Intrapenile; Mice; Animal info (A2BR-deficient, C57CL/6); tissue perfusion (corpus cavernosum); ALZET mouse jugular catheter used; 25-gauge needle inserted into the right corpus cavernosum was connected to a pressure transducer and an amplifier unit; intracavernosal pressure (ICP) measurement.


ALZET Comments: Fibroblast growth factor-2; vascular endothelial growth factor-2; platelet-derived growth factor; SC; Mice; 1004; 28 days; Controls received mp with no growth factors; animal info (C57BL/6); good methods, pg 138; tissue perfusion (internal anal sphincter); silicone catheter used; "the osmotic pumps we used completed delivery of the growth factors by 28 days, which would clearly limit the duration of exposure to the growth factor, lessening the risk of malignancy" pg 143.


ALZET Comments: Sodium hydrosulfide; propargylglycine, DL-; Ear (cochlea); Rat; 2002; Controls received mp w/ artificial perilymph; animal info (Sprague Dawley, 250-350 g); tissue perfusion (cochlear); ALZET mouse jugular catheter used (#0007700); stress/adverse effects, pg e26728 "Two rats died of post-surgical infection, and one rat died of hemorrhage."

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Bibliography

**ALZET Comments**: Brain-derived neurotrophic factor, human; Perilymph, artificial; Ear (cochlea); Cat; 1002; 2004; 10 weeks; Controls received mp w/ vehicle; long-term study; animal info (adult, 4 wks old, deafened); functionality of mp verified via residual volume; pumps replaced after two weeks then after 28 days; tissue perfusion (cochlea); "The drug-delivery cannula within the cochlear implant... was connected to vinyl tubing... which was connected to the regulator of the osmotic pump, which was implanted behind the right pinna."; artificial perilymph recipe.

**ALZET Comments**: Wnt1; brain-derived neurotrophic factor; Ear (cochlea); Gerbil; 2004; 28 days; Controls received mp w/ saline or BDNF only; animal info (Mongolian, 4 mo old); pumps replaced after 72 hours; tissue perfusion (intracochlea).

**ALZET Comments**: Handle region peptide; valsartan; Kidney (renal cortex); Rat; 14 days; Controls received sham mp w/ saline; animal info (male, Sprague-Dawley, 230-260 g); tissue perfusion (renal cortex); peptides.

**ALZET Comments**: Leupeptin; z-VAD-FMK; Ear (cochlea); Guinea pig; 2001; 7 days; Controls received no treatment; animal info (albino, 400-600 g); enzyme inhibitor (caspase); artificial perilymph solution recipe; "A miniature glass pipette with a ring of glue placed next to the tip to provide a leak-proof seal protecting the cochlea from contamination was connected to the catheter." pg 988; tissue perfusion.

**ALZET Comments**: PD153035; 4557W; DMSO; artificial perilymph; Ear (cochlea); Guinea pig; 2002; Controls received mp w/ artificial perilymph; animal info (female, pigmented, 250-500 g); functionality of mp verified by residual volume; tissue perfusion (intracochlear); 0.1% DMSO used; enzyme inhibitor (tyrosine kinase).

**ALZET Comments**: Artemin; brain-derived neurotrophic factor; Ear (scala tympani); Guinea pig; 2002; 28 days; Negative controls received mp w/ artificial perilymph; animal info (deafened, pigmented, 250-450 g); pumps replaced after 14 days; tissue perfusion (scala tympani); pump connected to silicone–polyimide tubing.

**ALZET Comments**: Chorionic gonadotropin hormone, human recomb.; Saline; SC; intrauterine; Monkey (baboon); 2ML1; Animal info (C57BL/6J female, specific pathogen-free, 8 wk old); ALZET PE catheter used; catheter connected to physiologically functional bioengineered mouse internal anal sphincter; tissue perfusion (internal anal sphincter).

**ALZET Comments**: Fibroblast growth factor-2, human, recomb.; SC; Mice; 1004; 21 days; Animal info (C57BL/6J female, specific pathogen-free, 8 wk old); ALZET PE catheter used; catheter connected to physiologically functional bioengineered mouse internal anal sphincter; tissue perfusion (internal anal sphincter).
ALZET Comments: Handle region peptide; valsartan; Saline; Kidney (renal cortical interstitium); Rat; 2002; 14 days; Controls received mp w/ vehicle; animal info (Sprague Dawley. STZ-induced diabetes, male 230-260 g); peptides; good methods, pg 278; tissue perfusion (interstitium); HRP, also known as handle region peptide, is the decapeptide NH3-RILLKKMPSVCOOH; good methods, pg 278; "The osmotic minipump was implanted subcutaneously in the subscapular region of all rats. Thereafter, a midline laparotomy was performed and the left kidney was isolated. A PE-10 catheter connected to each minipump was tunneled subcutaneously through a bevel-tipped stainless-steel tube to emerge into the abdominal cavity and the distal end of the catheter was placed under the left renal capsule and glued onto the surface of the kidney using Vetbond." pg 278.

ALZET Comments: Furosemide; Ear (round window niche); Gerbil; 2004; 4 weeks; Controls were untreated; animal info (3-6 mo old, young adult); good methods, pg 421; tissue perfusion (round window).

ALZET Comments: Fibroblast growth factor-2, recomb.; PBS, sterile; SC; Mice; 1004; 25 days; Controls received mp w/ vehicle; tissue perfusion (internal anal sphincter); no stress (see pg. 57); good methods (pg. 53); animal info (female, C57BL/6, 8 wks old); "use of such pumps provided constant infusion over the postimplantation period without observed evidence of systemic effects and allowed increased efficiency of the drug owing to its proximity" pg. 57; operative photographs (pg. 54).

ALZET Comments: Glial-derived neurotrophic factor; Ear (cochlea); Guinea pig; 2002; 4 weeks; Controls received mp w/ artificial perilymph; animal info (deafened); silicone tube used; tissue perfusion (cochlea); pump replaced after 2 weeks; post op. care (lidocaine).

ALZET Comments: Chorionic gonadotropin hormone, human recomb.; Oviductal; Monkey (baboon); 5 days; Animal info (cycling, female, 7-12 years old, 12-18 kg); tissue perfusion (oviduct).

ALZET Comments: Glial-derived neurotrophic factor; Ear (cochlea); Guinea pig; 2002; 48 days; Controls received mp w/artificial perilymph; tissue perfusion (cochlea); long-term study; pumps replaced after 13 days; good methods (pg. 1391); animal info (male, pigmented, 250-450 g.); pumps primed; image of pump and electrode cannula device used on fig. 1.

ALZET Comments: Substance P; neurokinin-1 receptor antagonist; Ear (round window); Guinea pig; 2002; Post op. care (piperacillin sodium); animal info (Hartley); pump was connected to a PE catheter filled with artificial perilymph for a 12-hour delayed infusion; tissue perfusion (round window).

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ALZET Comments: Saline; Ear (cochlea); Guinea pig; 1007D; Controls received pump without electrode implant; animal info (albino, male, 3 to 7 months old, 290-1030 g.); good methods pg 1154; post op. care (enrofloxacine); “the pump was fixed subcutaneously between the scapulae using a vicryl 3/0 suture (Ethicon)” pg 1154; image of pump-electrode device, Fig. 1; tissue perfusion (cochlea).

ALZET Comments: Polystyrene particles, blue dyed; PBS; Bone (femur); Mice; 2004; 4 weeks; Functionality of mp verified by gross inspection of retrieved femora; animal info (9 wks old, male, C57BL/6); Fig. 1, X-ray image of pump and delivery system; tissue perfusion (femur).

ALZET Comments: Galectin-3; Ac-SDKP; Saline; Intrapericardial; Rat; 2004; 2, 4 weeks; Controls received mp w/ vehicle; tissue perfusion (heart); no stress (see pg. H407); cardiovascular; peptides; animal info (male, Sprague Dawley, 275-300 g.);
“We used intrapericardial administration of Gal-3 and/or Ac-SDKP in rats. This method allows us to target the heart and obtain site-selective drug efficiency with low-level systemic effects.” (p. H404-H405).

ALZET Comments: Nerve growth factor; Hank’s based salt solution; albumin, guinea pig serum; Ear (cochlea); Guinea pig; 2002; Controls received mp w/ vehicle; animal info (pigmented, adult, 270-470 g); pumps replaced afer 13 days; post op. care (daily injections of cyclosporin and doxycycline); tissue perfusion.

ALZET Comments: EPL001; antibody, EPL001, mouse, monoclonal; Kidney; Rat; 2002; Tissue perfusion (renal); replacement therapy (unilateral nephrectomy); peptides; animal info (male, Wistar, 250-300 g.); EPL001 is a novel sheep derived 14 amino acid peptide.

ALZET Comments: Carbaprostacyclin; cicaprost; AFP-07; L-165041; docasahexanoic acid; Ethanol; cyclodextrin, beta-; Tris; DMSO; indomethacin; Intruterine (uterine horn); Rat; 2001; Controls received mp w/ vehicle; replacement therapy (ovariectomy); good methods (pg. 551); animal info (female, Sprague Dawley, 7 wks old, 200-225 g., OVX); 50% DMSO used; AFP-07 and cicaprost are high-affinity ligands for prostacyclin receptor; carbaprostacyclin is a ligand for both prostacyclin receptor and peroxisome proliferatoractivated receptor delta; tissue perfusion (uterus); 3 mg/ml beta-cyclodextrin used.

ALZET Comments: Uridine triphosphate; uridine; Ear (cochlea); Guinea pig; 2002; 25 days; Controls received mp w/ artificial perilymph; pumps replaced on day 13; animal info (pigmented, 280-440 g); tissue perfusion.

ALZET Comments: Brain-derived neurotrophic factor; BSA; Ear (cochlea); Guinea pig; 2004; 4 weeks; Controls were untreated; animal info (albino, female, 250-350 g); pump connected to Cochlear (R) electrode array; tissue perfusion (cochlea).
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Bibliography

**P9335**: A. Abbaspour, et al. Optimal increase in bone mass by continuous local infusion of alendronate during distraction osteogenesis in rabbits. Bone 2009;44(5):917-923

**ALZET Comments**: Alendronate; PBS; Bone (tibia); Rabbit; 2ML2; 14 days; Controls received mp w/ vehicle; tissue perfusion (tibia); animal info (male, Japanese White rabbits); disphosphonate; the pump was connected to polyvinyl catheter leading to a hole drilled on the tibia (lengthened segment).

**P9687**: J. Yatabe, et al. Effects of Decreased Renal Cortical Expression of G Protein-Coupled Receptor Kinase 4 and Angiotensin Type 1 Receptors in Rats. HYPERTENSION RESEARCH 2008;31(7):1455-1464

**ALZET Comments**: Oligodeoxynucleotide, antisense; oligodeoxynucleotide, scrambled; G-protein-coupled receptor kinase 4; Ringer's solution, lactated; Kidney; Rat; 5 weeks; Controls received mp w/ vehicle; pumps replaced following 1 week recovery period; antisense (GRK4, AT1R); animal info (4 wks old, male, WKY, SHR, uninephrectomized); tissue perfusion (kidney).


**ALZET Comments**: Dexamethasone base; Perilymph, artificial; Ear ( scala tympani); Guinea pig; 2001; 8 days; Controls received mp w/ vehicle; replacement therapy (cochleostomy); tissue perfusion (scala tympani); animal info (pigmented, 250-300 g.).


**ALZET Comments**: Cisplatin; Sodium thiosulfate; Brain-derived neurotrophic factor; Fibroblast growth factor; D-JNKI-1; BN82270; Tetrodotoxin; Perilymph, artificial; Dexamethasone; Methylprednisone, Caroverine; Methionine, D; Thiourea; Liposome, cationic; Neomycin; SC; Ear ( round window membrane); Ear (cochlea); Ear ( scala tympani); Ear; Guinea pig; 3, 7, 14, 28 days; Gene therapy; peptides; no stress; enzyme inhibitor (peroxidase); stress/adverse reaction (see pg 1593) "Ref #161 found local trauma and inflammatory responses"; tissue perfusion (scala tympani, cochlea, round window membrane); comparison of middle ear injections vs. mp; Review, see pgs. 1587 - 1589, 1591, 1593 - 1595, refs #49, 50, 60, 63, 72, 75, 102, 104,180, 181, 194-201.


**ALZET Comments**: Brain-derived neurotrophic factor, recomb. human; Albumin, rat; Ringer’s solution; Ear ( cochlea); Rat; 2004; 28 days; Controls received mp w/ vehicle; animal info (male, albino, Sprague Dawley, 10-12 wks old, 220-250 g.); tissue perfusion (cochlea); functionality of mp verified by residual volume; good methods pg. 1191; pumps were primed in sterile saline at 37 degree Celsius for 48 hours; 1-cm len.


**ALZET Comments**: Angiotensin II; dye, coomassie blue R250; G86976; tempol; SC; kidney (outer medulla); Rat; 1007D; 4, 7 days; Controls received mp w/ vehicle; tissue perfusion (kidney); functionality of mp verified by residual volume and dye infusion; enzyme inhibitor (PKC a/b); cardiovascular; antihypertensive; peptide; cyanoacrylate adhesive; animal info (Sprague Dawley, 7 wks old, 200-250 g.); catheter fenestrated in one side 10 mm from the tip.


**ALZET Comments**: Brain-derived neurotrophic factor, recomb. human; Ringer’s solution; albumin, guinea pig; Ear (scala tympani); Guinea pig; 2004; 4 weeks; Controls received no treatment to contralateral cochlea; functionality of mp verified by residual volume and intact connections; peptides; post op. care (Carprofen, Baytril); tissue perfusion (scala tympani); animal info (pigmented, 400-844 g., kanamycin/furosemide deafened).
ALZET Comments: Doxycycline; brain-derived neurotrophic factor; glial cell line-derived neurotrophic factor; Ear (scala tympani); Guinea pig; 2002; 27 days; Controls received no treatment to contralateral ear; pumps replaced; peptides; tissue perfusion (scala tympani); animal info (NIH strain, 275-315 g., deafened); cannula and catheter contained doxycycline, mp contained BDNF/GDNF (delayed delivery) to follow, thus providing 2 days Dox, 25 days BDNF/GDNF.

ALZET Comments: Gene, Wnt3a, recomb.; Bone; Mice (SCID); 1004; 4 weeks; Controls received mp w/ PBS; animal info (Myelomatous SCID-hu); tissue perfusion (myelomatous bone); Wnt3a is a human gene; ALZET pump was "directly connected to the open side of the implanted bone, allowing continual exposure of the myelomatous bone to rWnt3a".

ALZET Comments: Midazolam; Ear (round window niche); Rat; 2001; 7 days; Controls received mp w/ artificial perilymph; comparison of systemic injections vs. mp; animal info (female, Wistar, 200 -300 g., cochlear trauma); behavioral testing (tinnitus perception via sound/reward); tissue perfusion (round window niche).

ALZET Comments: Polystyrene; polyethylene, high molecular weight; Serum, mouse; Bone (femur); Mice; 2004; 2, 4 weeks; Controls received mp w/ vehicle; functionality of mp verified by blue-dyed polystyrene particles; tissue perfusion (femur); dose-response (fig. 4); no stress (see pg. 443); animal info (male, C57BL/6, 12-16 wks old); mp connected to hollow titanium rod by vinyl catheter; titanium rod inserted into femur ex vivo; femur/pump assemblies placed in sterile flasks at 37 degree for 2, 4 wks; "There were no cases of infection or malfunction of the pumps apparatus over the course of the experiment." (p. 443).

ALZET Comments: Tumor necrosis factor-alpha; Ear (cochlea); Guinea pig; 2001; 2-4 days; Controls received mp w/vehicle; animal info (Hartley albino); tissue perfusion.

ALZET Comments: Tetrodotoxin; Citrate buffer; Ear (round window niche); Mice; 1003D; 24 hours; Controls received mp w/ saline or no treatment to contralateral side; tissue perfusion (round window niche); comparison of cochlear removal vs. mp; animal info (male, female, C57BL/6J, 21 days old).

ALZET Comments: BQ123; BQ610; BQ788; Methanol; saline; Intraovarian (corpus luteum); Sheep; 2002; 14 days; Controls received mp w/ vehicle; tissue perfusion (corpus luteum); good methods (pg. 689); post op. care (penicillin); animal info (female); pumps were primed overnight prior to surgery; vinyl catheter tubing (0007760) used; catheter stabilized to connective tissue capsule and ovarian tunica albuginea using nylon monofilament; all compounds are EDNRA type-A endothelin antagonists.

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Bibliography

**ALZET Comments:** Vascular endothelial growth factor 165, recomb. human; Heparin; Intramyocardial; Pig (miniswine); 2ML4; 4 weeks; Tissue perfusion (myocardial); half-life (p. 649) "short"; cardiovascular; peptides; ischemia (cardiac); animal info (Yucatan mini-swine, 20-30 kg.).

**P8930:** A. Abbaspour, *et al.* Continuous local infusion of fibroblast growth factor-2 enhances consolidation of the bone segment lengthened by distraction osteogenesis in rabbit experiment. Bone 2008;42(1):98-106

**ALZET Comments:** Fibroblast growth factor-2, recomb. human; Bone (tibia); Rabbit; 2ML4; 14 days; half-life (p. 104) "relatively short"; tissue perfusion (tibia); animal info (male, 1.8-2.2 kg., osteotomized); polyvinyl catheter tubing used; pump image fig. 1e.


**ALZET Comments:** Bone sialoprotein, recomb., rat, -DNP; bone sialoprotein, recomb., rat, -DNP, mutated; Bone (hemimandible); Rat; 1003D; 2001D; 1, 3 days; Negative controls received mp w/ sodium chloride or were sham operated; peptides; tissue perfusion (right hemimandible); post op. care (buprenorphine hydrochloride); animal info (Wistar, 100g.); bone sialoprotein (BSP) is an anionic phosphoprotein; prBSP-DNP's are prokaryotic recombinant BSP's tagged with dinitrophenol.

**P8368:** J. Wang, *et al.* Inhibition of the c-Jun N-terminal kinase-mediated mitochondrial cell death pathway restores auditory function in sound-exposed animals. MOLECULAR PHARMACOLOGY 2007;71(3):654-666

**ALZET Comments:** Jun, c-, N-Terminal kinase Inhibitor-1, D-; peptide, D-TAT; Jun, c-, N-Terminal kinase Inhibitor-1-mutant; Perilymph, artificial; PBS; Ear (round window membrane); Guinea pig; 2001; 7 days; Controls received mp w/ vehicle, or inactive JNKI-1-mutant or TAT-empt peptide or contralateral untreated ear; dose-response (fig 6); comparison of acute infusion vs. hyaluronic acid gel vs.; enzyme inhibitor (c-Jun N-terminal kinase); peptides; animal info (pigmented, 250-300g.; sound trauma); D-JNKI-1 peptide contains a 10-amino acid HIV-TAT transporter sequence to facilitate its entry into cells; tissue perfusion (round window membrane).


**ALZET Comments:** Amikacin; Sub-masseteric tunnel; Pig; 2ML2; 14 days; Bone healing; x-ray image showing pump adjacent to mandible bone (p. 189); pump positioned near mandible bone to deliver antibiotics for infection control; tissue perfusion (sub-masseteric tunnel).

**P9024:** B. Skoglund, *et al.* Locally applied Simvastatin improves fracture healing in mice. BMC MUSCULOSKELETAL DISORDERS 2007;8(1):U1-U6

**ALZET Comments:** Simvastatin; PEG 400; SC; bone (femur); Mice; 1002; 14 days; Comparison of SC injections vs. SC mp vs. localized delivery; half-life (p. 2 of 6) "about 2 hours in humans"; animal info (male, female, Balb-C); tissue perfusion (femur); compound passed through sterile filter before filling in pumps; silicone tube used; "continuous systemic delivery resulted in a 160% larger force at failure."; "Continuous local delivery... resulted in a 170% larger force at failure as well as a twofold larger energy uptake."


**ALZET Comments:** Gentamicin; Ear (round window); Chinchilla; 2002; 1, 3, 6, 14 days; 4, 8 hours; Comparison of transtympanic injections vs. mp; tissue perfusion (round window); animal info (male, female, chinchilla langier).

**P8661:** J. M. Miller, *et al.* Delayed neurotrophin treatment following deafness rescues spiral ganglion cells from death and promotes regrowth of auditory nerve peripheral processes: Effects of brain-derived neurotrophic factor and fibroblast growth factor. Journal of Neuroscience Research 2007;85(9):1959-1969

**ALZET Comments:** Brain-derived neurotrophic factor; fibroblast growth factor-1; Perilymph, artificial; albumin, guinea pig serum; Ear (scala tympani); Guinea pig; 2002; 26 days; Controls received mp w/ vehicle; pumps replaced at day 13; peptides; tissue perfusion (scala tympani); animal info (male, female, pigmented, 250-300g, deafened).

ALZET Comments: Uridine, bromodeoxy-; Saline; SC; Mice (nude); 2001; 7 days; Tissue perfusion (tumor); cancer; animal info (Balb/cA, nude); labeling of tumor cells.


ALZET Comments: Trolox; neomycin; ascorbic acid; Perilymph, artificial; sodium bicarbonate; Ear (cochlea); Guinea pig; 2002; 26 days; Controls received mp w/ vehicle; pumps replaced after 14 days; post op. care (doxycycline); animal info (male, pigmented, 250-400g., neomycin deafening); cannula primed with 10% neomycin solution followed by a small air bubble spacer to allow neomycin infusion for first 2 days; trolox, a vitamin F analogue, and ascorbic acid delivered together in 1 mp; tissue perfusion (cochlea).


ALZET Comments: Fibroblast growth factor-2; osteogenic protein-1, recombinant human; Water, distilled; acetate buffer; Bone (tibia); Rabbit; 2004; 4,36 weeks; Controls received no treatment to contralateral side; long-term study; pumps replaced every 4 weeks, with 4 week rest periods between 4 week infusion periods; animal info (New Zealand white, 6-12 months old, 3.5-4.2 kg); peptides; OP-1 also known as bone morphogenic protein-7 (BMP-7); tissue perfusion (tibia); unique drug test chamber and bone harvest chamber used in conjunction with mp.


ALZET Comments: Stromal cell-derived factor-1a, recombinant human; dye, methylene blue; PBS; hypaque; Bone (tibial physis); Rabbit; 2001D; 2004; 2,4 weeks; 24 hours; Controls received mp w/ vehicle and control leg w/ no treatment; functionality of mp verified by methylene blue study, hypaque; good methods (p. 103-105); peptides; multiple pumps per animal (2); animal info (New Zealand white, 6 weeks old, 2.5 kg); catheter with 16 fenestrations used; 30% hypaque, which "served as a radio-opaque marker of pump reservoir level."; "A continuous, implantable, direct delivery system offers a practical model for studying the local effects of various reagents on the physis and a therapeutic model by which agents for use in epiphysiodesis may be evaluated." (p. 110).


ALZET Comments: Conceptus secretory proteins, porcine; Intrauterine; Pig; 2ML1; Controls received mp w/ albumin, porcine serum; tissue perfusion (uterus); good methods p. 4421; peptides; multiple pumps per animal (2); animal info (female).


ALZET Comments: Conceptus secretory proteins, porcine; Albumin, porcine serum; dye, india ink; PBS; Intrauterine (uterine horn); Pig; 2ML1; 4 days; Controls received mp w/ PSA; peptides; multiple pumps per animal (2); animal info (female, pseudopregnant); india ink used to confirm agent distribution in uterus; tissue perfusion (uterine horn).


ALZET Comments: MDL 28170; DMSO; PBS; Ear (cochlea); Guinea pig; 1002; 14 days; Tissue perfusion (cochlea); enzyme inhibitor (gamma secretase); peptides; animal info (Hartley strain, 350-400g); MDL 28170 is a gamma-secretase inhibitor; 0.3% DMSO used; "a silicon tube (180 micron OD) connected to a micro-osmotic minipump...".

ALZET Comments: Erythropoietin; Ear (round window); Guinea pig; 1007D; 1 week; Controls received mp w/ saline; replacement therapy (noise-induced hearing impairment); comparison of acute admin. vs. mp; peptides; animal info (male, Dunkin-Hartley); tissue perfusion (round window); mp primed 6 hours in 37 Celsius saline; correct catheter placement confirmed.