References on the Administration of Liposomes Using ALZET® Osmotic Pumps


Agents: Liposomes, fluorescently labeled; coatasome EL-01-C, hydrated Vehicle: DMSO; water, distilled; Route: Intrauterine; Species: Rabbit (fetus); Pump: 2ML1; Duration: 1 week;

ALZET Comments: 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


Agents: Fibroblast growth factor-2; syndecan-4, proteoliposome Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 1004; Duration: 7-16 days;

ALZET Comments: Controls received mp w/ PBS; animal info (Sprague Dawley); wound clips used; ischemia


Agents: Cisplatin; Sodium thiosulfate; Brain-derived neurotrophic factor; Fibroblast growth factor; D-JNKI-1; BN82270; Tetrodotoxin; Perilymph, artificial; Dexamethasone; Methylprednisolone; Caroverine; Methionine, D-; Thiourea; Liposome, cationic; Neomycin Vehicle: Not Stated; Route: SC; Species: Guinea pig; Pump: Not Stated; Duration: 3, 7, 14, 28 days;

ALZET Comments: 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


Agents: Liposomes; FITC-dextran-lysine Vehicle: Saline; Tris buffer; Route: CSF/CNS (caudate putamen); CSF/CNS (intratumoral); Species: Rat; Pump: 2001D; Duration: 24 hours;

ALZET Comments: Tissue perfusion (intratumoral); comparison of acute CSF/CNS injection vs. mp; half-life (p. 151) 9.9 hours; cancer (glioblastoma); ALZET brian infusion kit 2 used; brain tissue distribution; post op. care (buprenophine)


Agents: Liposomes, cationic Vehicle: Not Stated; Route: Ear (cochlea); Species: Guinea pig; Pump: Not Stated; Duration: Not Stated;

ALZET Comments: Gene therapy; tissue perfusion (cochlea)


Agents: Liposomes, cationic; Gene, beta-galactosidase Vehicle: Dextrose solution;; Route: Ear; Species: Guinea pig; Pump: 1007D; Duration: Not Stated;

ALZET Comments: Tissue perfusion (cochlea); comparison of micro injections vs. mp; stress/adverse reaction: significant fibrosis and acute immune response localized at the site of cochleostomy; gene therapy; prophylactic antibiotics provided; PE50 tubing was connected to PE10;
Agents: Oestrone, oleoyl; Liposomes Vehicle: Not Stated; Route: IV (jugular); Species: Rat; Pump: 2ML2; Duration: 3, 6, 10, 14 days;
ALZET Comments: controls received mp w/ liposomes; functionality of mp verified by radioimmunoanalysis of 3H-oestrone; Merlin-2 is code name for oestrone, oleoyl in liposomes

Agents: Estrone, oleoyl-; Liposomes Vehicle: Not Stated; Route: IV (jugular); Species: Rat; Pump: 2ML2; Duration: 28 days;
ALZET Comments: controls received mp w/liposome suspension; pumps replaced after 14 days; oleoyl-estrone in liposomes was named Merlin-2

Agents: Estrone, oleoyl-; Liposomes Vehicle: Not Stated; Route: IV (left jugular); Species: Rat; Pump: 2ML2; Duration: 28 days;
ALZET Comments: controls received mp w/liposomes; pumps replaced after 2 weeks; stress/adverse reaction: transient weight loss after surgical implantation of mp (pg. 790); oleoyl-estrone in liposomes referred to as "merlin-2"

Agents: Liposomes; Gene, herpes simplex virus thymidine kinase; Gene, lacZ Vehicle: Not Stated; Route: CSF/CNS (caudate nucleus); Species: Rat; Pump: 1003D; Duration: 3 days;
ALZET Comments: controls received mp w/LacZ gene; tissue perfusion (tumor); functionality of mp verified by gene expression; comparison of intracerebral injections vs. mp; no stress (see pg.473); stability verified by gene expression; ALZET brain infusion kit used; cancer; gene therapy; “DNA-liposome complexes were stable within minipumps at body temperature (37°C) for 1-3 days.” (pg.474); “continuous administration of DNA-liposome complexes did not result in significant in vivo toxicity.” (pg.474)

Agents: Estrone, oleoyl-; Liposomes Vehicle: Not Stated; Route: IV (jugular); Species: Rat; Pump: 2ML2; Duration: 14 days;
ALZET Comments: no comment posted

Agents: Interferon-gamma; S-MDP, free; S-MDP, liposome-encapsulated Vehicle: Not Stated; Route: SC; Species: Rat; Pump: Not Stated; Duration: 7 days;
ALZET Comments: comparison of bolus tracheal injections, iv administration and mp; immunology; peptides; IFN-gamma and S-MDP were most effective when delivered either intravenously or via osmotic minipump infusion; S-MDP is lipophilic N-acetylmuramyl-6-O-stearoyl-alanyl-D-isoglutamine; recomb. mouse IFN-gamma used

Agents: Liposomes Vehicle: Not Stated; Route: Eye (lens); Species: Rabbit; Pump: 2ML1; Duration: Not Stated;
ALZET Comments: Pulsed delivery described; detailed surgical methods

Agents: Lovastatin; Pravastatin; Liposomes; Simvastatin Vehicle: Propylene glycol; Route: Not Stated; Species: Rat; Pump: 2ML4; Duration: Not Stated;
ALZET Comments: comparison of injections and oral administration vs. mp; stress/adverse reaction: local cystic reaction to simvastatin and lovastatin (p. 271, 275); enzyme inhibitor (HMG-CoA reductase), sc injections of simvastatin also caused subcutaneous toxicity
Agents: Phosphatidylcholine; vitamin E; Liposomes Vehicle: Not Stated; Route: CSF/CNS (cortex); Species: Rat; Pump: 2001; Duration: 7 days;
ALZET Comments: Multiple pumps per animal (2); agent also called D-alpha-tocopherol

P1722: S. Lerman. Test models to determine potential ocular drug induced side effects. Lens and Eye Toxicity Research 1989;6(1/2):1-36
Agents: 8-MOP; Chromophore; Sorbinil; Liposomes Vehicle: Radio-isotopes; Route: Eye (lens); Species: Rabbit; Pump: 2ML1; Duration: 7 days;
ALZET Comments: Tissue perfusion (ocular lens); liposome-encapsulated agents

Agents: Interferon-gamma; Liposomes Vehicle: Not Stated; Route: SC; Species: Rat; Pump: 2001; Duration: 7 days;
ALZET Comments: controls received mp w/empty liposomes; liposome encapsulated agent and free agent; comparison of iv injections vs. mp infusion; cancer/immunology; peptides