



References on the Administration of Cholecystokinin Using ALZET® Osmotic Pumps

Q8956: H. Singh, *et al.* Gut Microbial Changes in Diabetic db/db Mice and Recovery of Microbial Diversity upon Pirfenidone Treatment. *Microorganisms* 2020;8(9):

Agents: Cholecystokinin **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** Not Stated; **Duration:** 4 weeks;

ALZET Comments: Dose (1 ug/kg/hr or 5 ug/kg/hr); 0.9% Saline used; Controls received mp w/ vehicle; animal info (Male); Cholecystokinin aka CCK ; diabetes;

Q5577: J. Trevaskis. Synergistic metabolic benefits of an exenatide analogue and cholecystokinin in diet-induced obese and leptin-deficient rodents. *Diabetes, Obesity and Metabolism* 2015;17(1):61-73

Agents: Amylin, Cholecystokinin-8, AC3174, , AC170236, AC170222 **Vehicle:** DMSO, water; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 14 or 28 days;

ALZET Comments: Controls received mp w/ vehicle; animal info (Diet-induced Obese Rats); functionality of mp verified by plasma levels; Vehicle was 50% DMSO:50% water; Multiple pumps per animal (2); AC170236 is a CCK2R-selective agonist; Therapeutic indication (Obesity); Dose: amylin (50 µg/kg/day), AC3174 (10 µg/kg/day), CCK-8 (100 µg/kg/day);

Q1934: S. Miyamoto, *et al.* Cholecystokinin Plays a Novel Protective Role in Diabetic Kidney Through Anti-inflammatory Actions on Macrophage Anti-inflammatory Effect of Cholecystokinin. *Diabetes* 2012;61(4):897-907

Agents: Cholecystokinin octapeptide **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 8 weeks;

ALZET Comments: Controls received mp w/ vehicle; animal info (Sprague Dawley, male, 6 wks old, STZ induced diabetes); pumps replaced after 4 weeks; peptides; cholecystokinin octapeptide also known as CCK-8S; long-term study

P6560: D. Chen, *et al.* Altered control of gastric acid secretion in gastrin-cholecystokinin double mutant mice. *Gastroenterology* 2004;126(2):476-487

Agents: Cholecystokinin-8S; cholecystokinin-8; gastrin-17 **Vehicle:** Not Stated; **Route:** SC; **Species:** Mice; **Duration:** 2,6 days;

ALZET Comments: Comparison of single SC gastrin-17 injection vs. mp; peptides; mp incubated overnight in 0.9% NaCl at room temperature prior to implantation

P5411: L. M. Trulsson, *et al.* The influence of nitric oxide on basal and cholecystokinin-8-induced proliferation and apoptosis in the rat pancreas. *Regulatory Peptides* 2002;106(1-3):97-104

Agents: Cholecystokinin-8 **Vehicle:** Saline; BSA; **Route:** SC; **Species:** Rat; **Pump:** 1003D; **Duration:** 72,74 hours;

ALZET Comments: Peptides

R0156: J. E. Blevins, *et al.* Peptide signals regulating food intake and energy homeostasis. *Canadian Journal of Physiology and Pharmacology* 2002;80(396-406

Agents: Cholecystokinin **Vehicle:** Not Stated; **Route:** Not Stated; **Species:** Not Stated; **Pump:** Not Stated; **Duration:** Not Stated;

ALZET Comments: peptides; review article: pump mentioned on p. 399

P4827: B. Ohlsson, *et al.* The method of administration of cholecystokinin determines the effects evoked in the pancreas. *Pancreas* 2001;23(1):94-101

Agents: Cholecystokinin-8S **Vehicle:** BSA; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 4 days;

ALZET Comments: Controls received mp w/ vehicle; functionality of mp verified by CCK plasma levels by RIA; comparison of intermittent injections vs. SC infusion via mp; peptides

P5015: A. Kramer, *et al.* Regulation of daily locomotor activity and sleep by hypothalamic EGF receptor signaling. *Science* 2001;294(5551):2511-2515

Agents: Transforming growth factor- α ; Brain-derived neurotrophic factor; Vasoactive intestinal polypeptide; Peptide, histidine-isoleucine; Gastrin releasing peptide; Substance P; Neuromedin-C; Neurokinin A; Neuropeptide K; Neuropeptide Y; Somatostatin; Antrin; Cholecystokinin; Thyrotropin-releasing hormone; Neurotensin; Neuromedin N; **Vehicle:** CSF, artificial; **Route:** CSF/CNS (third ventricle); **Species:** Hamster; **Pump:** 2002; **Duration:** 18,22 days;

ALZET Comments: Peptides



P4796: M. Covasa, *et al.* Diminished satiation in rats exposed to elevated levels of endogenous or exogenous cholecystokinin. *American Journal of Physiology Regulatory, Integrative, and Comparable Physiology* 2001;280(R331-R337)

Agents: Cholecystokinin-8 **Vehicle:** Saline; **Route:** IP;; **Species:** Rat; **Pump:** 2004; **Duration:** 28 days;

ALZET Comments: Controls received mp w/ vehicle; comparison of IP injections vs. mp; peptides

P3635: B. Ohlsson, *et al.* Devazepide-induced hyperplasia in the rat liver and bile ducts. *European Surgical Research* 1996;28(299-305)

Agents: Cholecystokinin-8S; Devazepide **Vehicle:** Albumin, bovine serum; DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2001; 2002; 2ML2; 1003D; **Duration:** 36 hours, 3, 7, 28 days;

ALZET Comments: controls received mp w/ saline or DMSO; peptides

P3327: B. Ohlsson, *et al.* Time-course of the pancreatic changes following long-term stimulation or inhibition of the CCK-A receptor. *Int. J. Pancreatology* 1995;18(1):59-66

Agents: Cholecystokinin-8; Devazepide; Cholecystokinin-8S **Vehicle:** DMSO; Albumin, bovine serum; **Route:** SC; **Species:** Rat; **Pump:** 2001; 2002; 2ML2; 1003D; **Duration:** 3, 7, 28 days; 36 hrs;

ALZET Comments: controls received mp w/NaCl or DMSO; pumps replaced after 14 days; peptides

P3671: P. E. Mann, *et al.* Investigation into the role of cholecystokinin (CCK) in the induction and maintenance of maternal behavior in rats. *Horm. Behav* 1995;29(392-406)

Agents: Cholecystokinin-8 **Vehicle:** Saline, physiological; **Route:** IP; CSF/CNS; **Species:** Rat (pregnant); **Pump:** 2001; **Duration:** Not Stated;

ALZET Comments: Controls received saline; peptides; non-pregnant rats were ovariectomized

P3027: E. J. Verspohl, *et al.* Evidence for cholecystokinin receptor subtype in endocrine pancreas. *Peptides* 1994;15(8):1353-1360

Agents: Cholecystokinin-8; cholecystokinin-4; cholecystokinin-4 analogs **Vehicle:** Not Stated; **Route:** IP; **Species:** Mice; **Pump:** 2001; **Duration:** 8 days;

ALZET Comments: Controls received no surgery or mp with saline; functionality of mp verified by residual volume; peptides

P2379: A.-G. Nylander, *et al.* Portacaval shunt increases the trophic effect of cholecystokinin on the rat pancreas. *Scand. J. Gastroenterol* 1993;28(2):145-148

Agents: Cholecystokinin-8; MK-329 **Vehicle:** Albumin; Saline; DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 10 days;

ALZET Comments: peptides; devazepide is a cholecystokinin receptor antagonist, aka L-364,718 and MK-329

P2380: A.-G. Nylander, *et al.* Enterochromaffin-like cells in rat stomach respond to short-term infusion of high doses of cholecystokinin but not to long-term, sustained, moderate hyperCCKemia caused by continuous cholecystokinin infusion or pancreaticobiliary diversion. *Scand. J. Gastroenterol* 1993;28(73-79)

Agents: MK-329; Cholecystokinin 8-sulfate **Vehicle:** DMSO; Water; Albumin, bovine serum; Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 7 weeks, 4,7 hours;

ALZET Comments: Long-term study, pumps replaced every 10th day; peptides; devazepide is L-364, 718 or MK-329 and is a CCK-A receptor antagonist

P2413: A. C. Petropoulos, *et al.* Effect of short-term treatment with gastrin and related peptides on gastrointestinal histamine H2-receptors. *J. Pharmacol. Exp. Ther* 1992;262(2):624-631

Agents: Gastrin; Pentagastrin; Cholecystokinin-8S; Tiotidine **Vehicle:** Saline; **Route:** SC; **Species:** Guinea pig; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: peptides

P3235: A. Linden, *et al.* Relationship between the concentration of cholecystokinin-like immunoreactivity in plasma and food intake in male rats. *Physiol. Behav* 1990;48(859-863)

Agents: Cholecystokinin-8 **Vehicle:** Not Stated; **Route:** IP; **Species:** Not Stated; **Pump:** 2001; **Duration:** Not Stated;

ALZET Comments: Controls received mp with saline; comparison of injections vs. mp; peptides; infusion produced more physiological levels than did injection



P1686: A. J. Bilchik, *et al.* Effects of a specific cholecystokinin receptor antagonist in a traumatic model of pancreatitis. *Surg. Res. Comm* 1990;8(1):47-57

Agents: Cholecystokinin antagonist **Vehicle:** DMSO; Water; **Route:** SC; **Species:** Guinea pig; **Pump:** 2001; **Duration:** 72 hours; **ALZET Comments:** agent is L364,718; 'L364,718 given on a constant infusion... successfully ameliorated the progression of acute 'traumatic pancreatitis'.' (p. 56)

P3686: J. Axelson, *et al.* Effects of endogenous and exogenous cholecystokinin and of infusion with the cholecystokinin antagonist L-364,718 on pancreatic and gastrointestinal growth. *Scand. J. Gastroenterol* 1990;25(471-480)

Agents: Cholecystokinin-8; L-364,718 **Vehicle:** Albumin, human serum; DMSO; **Route:** SC; **Species:** Rat; **Pump:** 2002; 2ML2; **Duration:** 7 weeks;

ALZET Comments: controls received mp w/ DMSO only or no treatment; long-term study, pumps replaced every 12 days; peptides; 80% DMSO used; L-364,718 is a CCK antagonist; 2 mps used - one with CCK, one with L364,718

R0089: A. Amkraut, *et al.* Osmotic delivery of peptides and macromolecules. *Advanced Drug Delivery Reviews* 1990;4(255-276)

Agents: Atrial natriuretic factor; cholecystokinin; Granulocyte-colony stimulating factor.; glucagon; insulin; interleukin-2; interleukin-3; melatonin; nerve growth factor; neurotensin; prolactin; theophylline **Vehicle:** Not Stated; **Route:** CSF/CNS; IA (femoral); intrasplenic; IP; SC; **Species:** Not Stated; **Pump:** Not Stated; **Duration:** Not Stated;

ALZET Comments: Peptides; ALZA-authored, review of peptide delivery issues and applications; tissue perfusion (spleen)

P3207: A. Linden, *et al.* Stimulation of maternal behaviour in rats with cholecystokinin octapeptide. *J. Neuroendocrinology* 1989;1(6):389-392

Agents: Cholecystokinin-8 **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 2001; **Duration:** Not Stated;

ALZET Comments: Controls received mp with saline; peptides

P1325: R. R. Schick, *et al.* Chronic intraventricular administration of cholecystokinin octapeptide (CCK-8) suppresses feeding in rats. *Brain Research* 1988;448(294-298)

Agents: Cholecystokinin octapeptide **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; **Duration:** 8 days;

ALZET Comments: peptides

P1187: L. Lukaszewski, *et al.* Effect of continuous infusions of CCK-8 on food intake and body and pancreatic weights in rats. *American Journal of Physiology Regulatory, Integrative, and Comparable Physiology* 1988;254(R17-R22)

Agents: Cholecystokinin octapeptide **Vehicle:** Saline; **Route:** IV (jugular); **Species:** Rat; **Pump:** 2ML1; **Duration:** 7 days;

ALZET Comments: controls received mp w/ saline; 2 doses of agent infused; peptides

P1147: A. P. N. Majumdar, *et al.* Acceleration of pancreatic regeneration by cholecystokinin in rats. *Pancreas* 1987;2(2):199-204

Agents: Cholecystokinin octapeptide **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2001; **Duration:** 7 days;

ALZET Comments: controls received mp w/ saline; 2 doses of agent infused; peptides

P0812: T. Shimazu, *et al.* Chronic infusion of norepinephrine into the ventromedial hypothalamus induces obesity in rats. *Brain Research* 1986;369(1/2):215-223

Agents: Acetylcholine chloride; Cefalotin; Cholecystokinin tetrapeptide; Epinephrine HCl; Bombesin; Endorphin, B-; Enkephalin, methionine-; Norepinephrine HCl **Vehicle:** Saline; Sodium bisulfite; **Route:** CSF/CNS (hypothalamus); **Species:** Rat; **Pump:** 2002; **Duration:** 5, 20 weeks;

ALZET Comments: Cholinergic agent; pumps replaced periodically; mp connected to perm. steel cannula in hypothalamus; cannula fitted w/removable protector; (see p.217); agents infused sep. (cefalotin infused w/each agent); long-term study; peptides

P0879: D. S., *et al.* Effect of chronic intracerebroventricular infusion of cholecystokinin on respiration and sleep. *Brain Research* 1986;378(127-132)

Agents: Cholecystokinin 8-sulfate **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; **Duration:** 5 days;

ALZET Comments: controls received mp w/ saline; study of effects of CCK on sleep; stability of CCK-8S verified; peptides



P0916: T. Mori, *et al.* Intracranial infusion of CCK-8 derivatives suppresses food intake in rats. *American Journal of Physiology Regulatory, Integrative, and Comparable Physiology* 1986;251(R718-R723)

Agents: Cholecystokinin, glutaryl-; Cholecystokinin, pyroglutamyl-; Cholecystokinin octapeptide **Vehicle:** HCl; Saline; Sodium bicarbonate; **Route:** CSF/CNS (suprachiasmatic nucleus); **Species:** Rat; **Pump:** 1701; **Duration:** 7 days;

ALZET Comments: controls received mp w/saline; mp connected to catheter in SCN; peptides

P0849: G. Katsuura, *et al.* Preventive effect of cholecystokinin octapeptide on experimental amnesia in rats. *Peptides* 1986;7(1):105-110

Agents: Cholecystokinin octapeptide **Vehicle:** Saline; **Route:** CSF/CNS; **Species:** Rat; **Pump:** 2001; **Duration:** Not Stated;

ALZET Comments: mp connected to cannula in left ventricle; comparison of ICV injections via microsyringe vs. mp infusion; peptides

P0736: M. Z. Schwartz, *et al.* Can gastrointestinal hormones enhance intestinal absorption? *Surgery* 1985;98(3):430-436

Agents: Cholecystokinin octapeptide; Glucagon **Vehicle:** Saline; **Route:** SC; **Species:** Rat; **Pump:** 2002; **Duration:** 14 days;

ALZET Comments: controls received mps w/ saline; peptides

P0324: S. Hsiao, *et al.* Continuous infusion of cholecystokinin and meal pattern in the rat. *Peptides* 1983;4(15-17)

Agents: Cholecystokinin-33 **Vehicle:** Water; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** Not Stated;

ALZET Comments: 2 + 2 days; pump in 1 rat for 2 days, removed & implanted in 2nd rat for 2 days; peptides

P0310: J. N. Crawley, *et al.* Rapid development of tolerance to the behavioural actions of cholecystokinin. *Nature* 1983;302(703-706)

Agents: Cholecystokinin 8-sulfate **Vehicle:** Saline; **Route:** IP; **Species:** Rat; **Pump:** 2001; 2002; **Duration:** 1, 2 weeks;

ALZET Comments: Peptides

P1363: R. van der Zee, *et al.* The effect of exogenous CCK-8 on the transit time and colonization resistance of decontaminated mice. *Antiviral Research* 1981;47(82-85)

Agents: Cholecystokinin octapeptide **Vehicle:** Saline; **Route:** SC; **Species:** Mice; **Pump:** 2002; **Duration:** 2, 7 days;

ALZET Comments: peptides

P0039: S. Hsiao, *et al.* Cholecystokinin, meal pattern, and the intermeal interval: Can eating be stopped before it starts? *Physiology & Behavior* 1979;23(909-914)

Agents: Cholecystokinin **Vehicle:** Not Stated; **Route:** SC; **Species:** Rat; **Pump:** Not Stated; **Duration:** 2 days;

ALZET Comments: Preliminary experiment listed @end of Gen. Disc.; peptides