



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

- Q6743:** H. Pierce, D. Zhang, C. Magnon, D. Lucas, J. R. Christin, M. Huggins, G. J. Schwartz and P. S. Frenette. Cholinergic Signals from the CNS Regulate G-CSF-Mediated HSC Mobilization from Bone Marrow via a Glucocorticoid Signaling Relay. *Cell Stem Cell* 2017;20(5):648-658 e4  
**ALZET Comments:** Pirenzepine; Scopolamine hydrobromide; Metyrapone; luteinizing hormone; ACTH; PBS; CSF/CNS (Third ventricle); Mice (knockout); 1002; Dose (0.6 mg/kg/day Pirenzepine; 1.0 mg/kg Scopolamine hydrobromide; 100mg/kg/day Metyrapone; 2.8 mg/kg/day ACTH; 16ug/day LH); Controls received mp w/ vehicle; animal info (wild-type and *Chrm1*<sup>-/-</sup>); luteinizing hormone aka LH and adrenocorticotrophic hormone aka ACTH; peptides; Brain coordinates (*A<sub>7</sub>B.6* mm posterior to bregma, D/V -4.7 mm);.
- Q6358:** R. I. Menzies, X. Zhao, L. J. Mullins, J. J. Mullins, C. Cairns, N. Wrobel, D. R. Dunbar, M. A. Bailey and C. J. Kenyon. Transcription controls growth, cell kinetics and cholesterol supply to sustain ACTH responses. *Endocr Connect* 2017;6(7):446-457  
**ALZET Comments:** ACTH; Uridine, bromodeoxy-; Saline; SC; Mice; 2002; 2 weeks; Dose (ACTH: 3 µg/day; BrDU: 1mg/mL); 0.154 M NaCl used; animal info (25g male C57BL6 mice);.
- Q6303:** S. H. Kang, H. A. Lee, M. Kim, E. Lee, U. D. Sohn and I. Kim. Forkhead box O3 plays a role in skeletal muscle atrophy through expression of E3 ubiquitin ligases MuRF-1 and atrogin-1 in Cushing's syndrome. *Am J Physiol Endocrinol Metab* 2017;312(6):E495-E507  
**ALZET Comments:** Adrenocorticotrophic hormone; Saline; SC; Rat; 2002; 4 weeks; Dose (40 ng/kg/day); Controls received mp w/ vehicle; animal info (10 week old male Sprague-Dawley rats);.
- Q6377:** A. L. Feldhaus, K. Anderson, B. Dutzar, E. Ojala, P. D. McNeill, P. Fan, J. Mulligan, S. Marzolf, C. Karasek, M. Scalley-Kim, E. Stewart, J. Billgren, V. Rubin, K. Schneider, D. Jurchen, K. Snow, S. Barnett, B. Bengtsson, B. Baker, J. A. Latham, D. Allison and L. F. Garcia-Martinez. ALD1613, a Novel Long-Acting Monoclonal Antibody to Control ACTH-Driven Pharmacology. *Endocrinology* 2017;158(1):1-8  
**ALZET Comments:** Adrenocorticotrophic hormone, rat; PBS; Rat; 2ML1; Dose (15, 50, or 150 mg/kg/d); Controls received mp w/ vehicle; animal info (Male Lewis rats);.
- Q6026:** S. Delcourte, E. Abrial, A. Etievant, R. Rovera, J. Arnt, M. Didriksen and N. Haddjeri. Asenapine modulates mood-related behaviors and 5-HT1A/7 receptors-mediated neurotransmission. *CNS Neurosci Ther* 2017;23(6):518-525  
**ALZET Comments:** Adrenocorticotrophic hormone; Saline; SC; Rat; 2ML1, 2ML2, 2ML4; 3, 13, 21 days; Controls received mp w/ vehicle; animal info (Sprague-Dawley, 250-300g); behavioral testing (Forced swim test, REM sleep deprivation); Electrophysiology ; Therapeutic indication (Bipolar disorder); Dose (0.1 mg/kg/day);.
- Q2364:** A. R. Pandiri, I. M. Gimeno, J. K. Mays, W. M. Reed and A. M. Fadly. Reversion to Subgroup J Avian Leukosis Virus Viremia in Seroconverted Adult Meat-Type Chickens Exposed to Chronic Stress by Adrenocorticotrophin Treatment. *Avian Diseases* 2012;56(3):578-582  
**ALZET Comments:** Adrenocorticotrophin, porcine; Saline; SC; Chicken; 2ML2; 14 days; Animal info (V-A+, V-A-, DOH, 32 wks old); wound clips used; post op. care (pine tar on surgical site to avoid cannibalism).
- Q1524:** H. J. McQuillan, M. Kusakabe and G. Young. Effects of chronic manipulation of adrenocorticotrophic hormone levels in Chinook salmon on expression of interrenal steroidogenic acute regulatory protein and steroidogenic enzymes. *General and Comparative Endocrinology* 2011;174(2):156-165  
**ALZET Comments:** Adrenocorticotrophic hormone; NaCl, sterile; IP; Fish (salmon); 1003D; 10 days; Controls received mp w/ vehicle; animal info (juvenile, Chinook); functionality of mp verified by plasma drug levels or visual inspection.
- Q1209:** W. B. Liedtke, M. J. McKinley, L. L. Walker, H. Zhang, A. R. Pfenning, J. Drago, S. J. Hochendoner, D. L. Hilton, A. J. Lawrence and D. A. Denton. Relation of addiction genes to hypothalamic gene changes subserving genesis and gratification



of a classic instinct, sodium appetite. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 2011;108(30):12509-12514

**ALZET Comments:** Adrenocorticotrophic hormone; SC; Mice; 12 days; Controls received mp w/ NaCl; animal info (C57/B16, female).

**Q1559:** A. Lindskog, K. Ebefors, M. E. Johansson, B. Stefansson, A. Granqvist, M. Arnadottir, A. L. Berg, J. Nystroem and B. Haraldsson. Melanocortin 1 Receptor Agonists Reduce Proteinuria. Journal of the American Society of Nephrology 2010;21(8):1290-1298

**ALZET Comments:** ACTH; MS05; Saline, sterile; SC; Rat; 4 weeks; Controls received mp w/ vehicle; animal info (Sprague Dawley, male, 125-165 g); peptides.

**Q1044:** D. R. Dunbar, H. Khaled, L. C. Evans, E. A. S. Al-Dujaili, L. J. Mullins, J. J. Mullins, C. J. Kenyon and M. A. Bailey. Transcriptional and physiological responses to chronic ACTH treatment by the mouse kidney. PHYSIOLOGICAL GENOMICS 2010;40(3):158-166

**ALZET Comments:** Adrenocorticotrophic hormone; NaCl; SC; Mice; 2002; 12 days; Controls received mp w/ vehicle; animal info (C57BL/6, 25 g, age-matched).

**Q0452:** M. A. Bailey, J. J. Mullins and C. J. Kenyon. Mineralocorticoid and Glucocorticoid Receptors Stimulate Epithelial Sodium Channel Activity in a Mouse Model of Cushing Syndrome. Hypertension 2009;54(4):890-896

**ALZET Comments:** Adrenocorticotrophic hormone; NaCl; SC; Mice; 2002; 2 weeks; Controls received mp w/ vehicle; animal info (adult, male, C57BL/6J).

**Q0365:** E. A. S. Al-Dujaili, L. J. Mullins, M. A. Bailey, R. Andrew and C. J. Kenyon. Physiological and pathophysiological applications of sensitive ELISA methods for urinary deoxycorticosterone and corticosterone in rodents. Steroids 2009;74(12):938-944

**ALZET Comments:** Adrenocorticotrophic hormone; SC; Mice; 14 days; Animal info (male, wt, heterozygous, Cyp11b1 null, 6 months old, C57BL6 12 months old).

**P9033:** J. Karpac, K. Czyzewska, A. Kern, R. S. Brush, R. E. Anderson and U. Hochgeschwender. Failure of adrenal corticosterone production in POMC-deficient mice results from lack of integrated effects of POMC peptides on multiple factors. AMERICAN JOURNAL OF PHYSIOLOGY-ENDOCRINOLOGY AND METABOLISM 2008;295(2):E446-E455

**ALZET Comments:** ACTH (1-24); PBS; BSA; SC; Mice; 1007D; 7 days; Controls received mp w/ vehicle; replacement therapy (corticosterone); animal info (POMC wt, hetero, mut, male, female).

**P7970:** J. O. Mumma, J. P. Thaxton, Y. Vizzier-Thaxton and W. L. Dodson. Physiological stress in laying hens. POULTRY SCIENCE 2006;85(4):761-769

**ALZET Comments:** ACTH; Saline; SC; Bird (laying hens); 2001; 7 days; Controls received mp w/ vehicle; animal info (single comb, white leghorn, 36-65 weeks old).

**P6993:** M. Thomas, M. Keramidas, E. Monchaux and J. J. Feige. Dual hormonal regulation of endocrine tissue mass and vasculature by adrenocorticotropin in the adrenal cortex. Endocrinology 2004;145(9):4320-4329

**ALZET Comments:** Dexamethasone; ACTH (1-39), human; Cyclodextrin; SC; Mice; 2002; 1-14 days; Controls received mp w/ vehicle; functionality of mp verified by plasma ACTH and corticosterone levels; multiple pumps per animal (2).

**P4990:** J. D. Tankson, Y. Vizzier-Thaxton, J. P. Thaxton, J. D. May and J. A. Cameron. Stress and nutritional quality of broilers. POULTRY SCIENCE 2001;80(1384-1389)

**ALZET Comments:** ACTH; Saline, avian; SC; Bird (chicken); 2001; 7 days; Controls received mp w/ vehicle; functionality of mp verified by blood corticosterone levels; peptides; ACTH is adrenocorticotropin.

**P5768:** S. Puvadolpirod and J. P. Thaxton. Model of physiological stress in chickens 3. Temporal patterns of response. Poultry Sci 2000;79(3):377-382



**ALZET Comments:** ACTH; SC; Bird (chicken); 2001; 7 days; Peptides; chickens were 6 weeks old; ACTH is adrenocorticotropin.

**P4149:** Y. T. King and T. C. Chen. Chemical and physical characteristics of chicken livers following adrenocorticotropic hormone-induced stress. *J. Food Sci* 1998;63(4):589-591

**ALZET Comments:** ACTH, porcine; SC; bird (chicken); 1003D; 24,48 hours; peptides.

**P3608:** M. A. Latour, S. A. Laiche, J. R. Thompson, A. L. Pond and E. D. Peebles. Continuous infusion of adrenocorticotropin elevates circulating lipoprotein cholesterol and corticosterone concentrations in chickens. *Poult. Sci* 1996;75(1428-1432

**ALZET Comments:** ACTH; SC; bird (chicken); 2002; no duration posted; controls received no treatment of mp w/ saline; peptides.

**P3702:** J. R. Blair-West, D. A. Denton, M. I. McBurnie and R. S. Weisinger. The effect of adrenocorticotrophic hormone on water intake in mice. *Physiol. Behav* 1996;60(4):1053-1056

**ALZET Comments:** ACTH; SC; mice; 2001; 4 or 7 days; controls received mp w/ normal saline; agent also known as synacthen.

**P3318:** P. E. Sawchenko and C. Arias. Evidence for short-loop feedback effects of ACTH on CRF and vasopressin expression in parvocellular neurosecretory neurons. *J. Neuroendocrinology* 1995;7(721-731

**ALZET Comments:** ACTH; Saline, sterile; SC; Rat; 1007D; 7 days; controls received mp w/saline; replacement therapy (hypophysectomy, adrenalectomy); peptides.

**P2642:** J. R. Blair-West, D. A. Denton, M. McBurnie, E. Tarjan and R. S. Weisinger. Influence of adrenal steroid hormones on sodium appetite of balb/c mice. *Appetite* 1995;24(11-24

**ALZET Comments:** ACTH (1-24); Saline; SC; mice; 2001; 7 days; pellets used to deliver several steroids.

**P2955:** P. T. Sangild, B. R. Westrom, A. L. Fowden and M. Silver. Developmental regulation of the porcine exocrine pancreas by glucocorticoids. *J. Pediatr. Gastroenterology and Nutrition* 1994;19(204-212

**ALZET Comments:** Cortisol; ACTH; Saline; SC; pig (fetus); 2001; 6 days; controls received mp with saline; peptides; no stress: mp was generally well tolerated; the cortisol used was hydrocortisone hemisuccinate.

**P2956:** P. T. Sangild, M. Silver, A. L. Fowden, A. Turvey and B. Foltmann. Adrenocortical stimulation of stomach development in the prenatal pig. *Biol. Neonate* 1994;65(378-389

**ALZET Comments:** Cortisol; ACTH(1-24); Saline; SC; pig (fetus); 2001; 6 days; controls received mp with saline; peptides.

**P2359:** A. Meseguer and J. F. Catterall. Effects of pituitary hormones on the cell-specific expression of the KAP gene. *Mol. and Cellular Endocrin* 1992;89(153-162

**ALZET Comments:** Luteinizing hormone; ACTH, human; Thyroid-stimulating hormone, rat; Follicle stimulating hormone, rat; Growth hormone, rat; Prolactin, ovine; SC; mice; 2001; 7 days; controls received mp w/ vehicles; replacement therapy (hypophysectomy); peptides.

**P2344:** W. Kowalski and R. T. Chatterton Jr. Peripheral and not central suppression of ovarian function during osmotic pump infusion of adrenocorticotropin- (1-24) for one menstrual cycle in the cynomolgus monkey and its partial compensation by a transitory elevation of sex hormone-binding globulin. *Endocrinology* 1992;130(6):3582-3592

**ALZET Comments:** ACTH (1-24); Saline; SC; monkey; 2001; 81-120 days (see chart, pg. 3589); long-term study, pumps replaced after 7 days; stability verified when residual pump solution given i.v. to test bioactivity; peptides; animals received saline mps, ACTH(1-24), then saline mps for 3 menstrual cycles.

**P1614:** W. F. McDaniel, E. J. Davall and P. E. Walker. ACTH 4-9 analog can retard spatial alternation learning in brain damaged and normal rats. *Behav. Neural. Biol* 1989;52(271-278

**ALZET Comments:** ACTH; Saline; SC; Rat; 2002; 14, 15 days; peptides.



**P1284:** C. E. E. M. Van der Zee, J. H. Brakkee and W. H. Gispen. Alpha-MSH and ORG-2766 in peripheral nerve regeneration: different routes of delivery. *Eur. J. Pharmacol* 1988;147(351-357)

**ALZET Comments:** ACTH analog; ORG-2766; Melanocyte-stimulating hormone,  $\alpha$ -; Saline; CSF/CNS (sciatic nerve); SC; Rat; 2002; 2 weeks; Comparison of oral admin. and admin. by s.c. microspheres; comparison of s.c. injections vs. mp infusion; tissue perfusion (sciatic nerve).

**P1329:** P. Rebuffat, A. S. Belloni, L. K. Malendowicz, G. Mazzochi, G. Gottardo and G. G. Nussdorfer. Zona glomerulosa morphology and function in streptozotocin-induced diabetic rats. *Endocrinology* 1988;123(2):949-955

**ALZET Comments:** ACTH; Angiotensin II; Captopril; Dexamethasone; Insulin; Saline; SC; Rat; 2002; 2 weeks; dose-response (text); functionality of mp verified by plasma levels; replacement t; antihypertensive therapy (streptozotocin-induced diabetes); peptides; antihypertensive.

**P1381:** F. E. Estivariz, M. Carino, P. J. Lowry and S. Jackson. Further evidence that N-terminal pro-opiomelanocortin peptides are involved in adrenal mitogenesis. *J. Endocrinol* 1988;116(201-206)

**ALZET Comments:** ACTH (1-24); Pro-opiomelanocortin(1-28), N-; Pro-opiomelanocortin(1-36), N-; Gelatin; Saline; SC; Rat; 2001; 6 days; replacement therapy (hypophysectomy); peptides.

**P1003:** D. R. Mann, C. Free, C. Nelson, C. Scott and D. C. Collins. Mutually independent effects of adrenocorticotropin on luteinizing hormone and testosterone secretion. *Endocrinology* 1987;120(1542-1550)

**ALZET Comments:** ACTH (1-24); Corticosterone; Propylene glycol; Saline; SC; Rat; 2001; 2ML1; 72/96 hours; controls received mp w/vehicle; peptides; replacement therapy (adrenalectomy).

**P1019:** D. de Catanzaro, M. D. Maerz, R. K. B. Heaven and W. Wilson. Repeated failure of prenatal ACTH administration to alter masculine behavior in mice. *Dev. Psychobiol* 1986;19(6):501-510

**ALZET Comments:** ACTH (1-24); ACTH, porcine; Saline; SC; mice (pregnant); 2001; 7 days; controls received mp w/vehicle; peptides; comparison of sc injections vs. mp infusion.

**P0624:** E. A. Stone, A. V. Slucky, J. E. Platt and R. Trullas. Reduction of the cyclic adenosine 3',5'-monophosphate response to catecholamines in rat brain slices after repeated restraint stress. *J. Pharmacol. Exp. Ther* 1985;233(2):382-388

**ALZET Comments:** ACTH (1-24); Epinephrine bitartrate; Norepinephrine bitartrate; Acetic acid; Ascorbic acid; SC; Rat; 12 days; mp model not stated; comparison of ACTH sc inject vs. mp infusion; comparison of agents effects; mp functionality pp. 386, 388; acetic acid was vehicle w/ACTH, ascorbic acid was w/NE and EPI; peptides.

**P0559:** Y. Shenker, J. Z. Villareal, R. S. Sider and R. J. Grekin.  $\alpha$ -Melanocyte-stimulating hormone stimulation of aldosterone secretion in hypophysectomized rats. *Endocrinology* 1985;116(1):138-141

**ALZET Comments:** ACTH (1-24); Dexamethasone disodium phosphate; Melanocyte-stimulating hormone,  $\alpha$ -; Thyroxine, I-; SC; Rat; 6 days; comparison of agents effects; replacement therapy (hypophysectomy); peptides.

**P0611:** D. R. Mann, D. Evans, F. Edoimioya, F. Kamel and G. M. Butterstein. A detailed examination of the in vivo and in vitro effects of ACTH on gonadotropin secretion in the adult rat. *Neuroendocrinology* 1985;40(297-302)

**ALZET Comments:** ACTH (1-24); Saline; CSF/CNS; SC; Rat; 2001; 6 days; peptides.

**P0717:** R. J. Kempainen, F. N. Thompson, M. D. Lorenz and J. Brown. Effects of continuous  $\alpha$ (1-24)ACTH infusion in the dog. *Horm. Metab. Res* 1985;17(58-62)

**ALZET Comments:** ACTH (1-24),  $\alpha$ -; IV (jugular); dog; 2ML1; 2 weeks; mp replaced on day 7; dose-response data; controls received empty mp; mp attached to silastic rubber catheter in jugular vein; peptides.

**P0737:** T. F. Davison, B. M. Freeman and J. Rea. Effects of continuous treatment with synthetic ACTH(1-24) or corticosterone on immature *Gallus domesticus*. *Gen. Comp. Endocrinol* 1985;59(416-423)

**ALZET Comments:** ACTH (1-24); SC; bird (chicken); 2002; 14 days; comparison of implantable corticosterone pellets vs. mp infusion of ACTH; peptides.



**P0452:** D. R. Mann, M. S. Blank, R. Sridaran, V. D. Castracane, C. Eldridge and D. C. Collins. Influence of anti-oestrogens on gonadotrophin secretion in control and ACTH-infused immature rats. *Acta Endocrinol* 1984;105(3):308-313

**ALZET Comments:** ACTH (1-24); Saline; SC; Rat; 2001; 6 days; estrogen antagonists nafoxidine & MER-25 also admin.; peptides.

**P0446:** W. E. Grizzle and N. E. Dunlap. Aldosterone blocks adrenal compensatory hypertrophy in the rat. *Am. J. Physiol* 1984;246(E306-E310)

**ALZET Comments:** ACTH (1-24); Aldosterone; Dexamethasone; Propylene glycol; Saline; IP; Rat; 3 days; comparison of im Dexam. injec vs. mp infusion; comparison of agents effects; replacement therapy (adrenalectomy & hypophysec.); stability of ACTH in mp verified; hormones given alone & in combination; states pumping rate was low; peptides.

**P0449:** N. E. Dunlap and W. E. Grizzle. Golden syrian hamsters: a new experimental model for adrenal compensatory hypertrophy. *Endocrinology* 1984;114(5):1490-1495

**ALZET Comments:** ACTH (1-24); Aldosterone; Dexamethasone; Propylene glycol; Saline; IP; hamster; 3 days; comparison of daily im injec of Dex. vs mp infusion; comparison of agents effects; replacement therapy (adrenalectomy & hypophysect.); agents given alone & in combination; stability of ACTH verified by assay; peptides.

**P8156:** P. J. Lowry, L. Silas, C. McLean, E. A. Linton and F. E. Estivariz. Pro-gamma-melanocyte-stimulating hormone cleavage in adrenal gland undergoing compensatory growth. *Nature* 1983;306(70-73)

**ALZET Comments:** Antiserum, anti-ACTH (4-10); antiserum, anti-proopiocortin (1-76), N-; antiserum, anti-proopiocortin (51-74); serum, rabbit; antiserum, anti-proopiocortin (1-28), N-; SC; IP; Rat; 2001; 72 hours; Controls received mp w/ normal rabbit serum; animal info (female, Wistar, 5 weeks old).

**P0326:** D. E. Gmerek and A. Cowan. ACTH(1-24) and RX 336-M induce excessive grooming in rats through different mechanisms. *Eur. J. Pharmacol* 1983;88(339-346)

**ALZET Comments:** ACTH (1-24); Saline; CSF/CNS; Rat; 2001; 1 week; comparison of agents; peptides.

**P0388:** S. F. Akana, J. Shinsako and M. F. Dallman. Relationships among adrenal weight, corticosterone, and stimulated adrenocorticotropin levels in rats. *Endocrinology* 1983;113(6):2226-2231

**ALZET Comments:** ACTH (1-24), a-; HCl; Protein standard; Saline; SC; Rat; 2001; 60 hours; pumps primed at room temp. before implant; pumps retrieved from 1st group and reimplanted in 2nd group of rats; peptides.

**P0387:** S. F. Akana, J. Shinsako and M. F. Dallman. Drug-induced adrenal hypertrophy provides evidence for reset in the adrenocortical system. *Endocrinology* 1983;113(6):2232-2237

**ALZET Comments:** ACTH (1-24); Saline; SC; Rat; 3 and 7 days; peptides.

**P0203:** D. R. Mann, G. G. Jackson and M. S. Blank. Influence of adrenocorticotropin and adrenalectomy on gonadotropin secretion in immature rats. *Neuroendocrinology* 1982;34(20-26)

**ALZET Comments:** ACTH (1-24); ACTH (4-10); ACTH, porcine; Saline; SC; Rat; 2001; 6 days; comparison of sc injection vs. infusion; peptides.

**P8189:** F. E. Estivariz, F. Iturriza, C. McLean, J. Hope and P. J. Lowry. Stimulation of adrenal mitogenesis by N-terminal proopiocortin peptides. *Nature* 1982;297(5865):419-422

**ALZET Comments:** ACTH (1-24); pro-opiocortin (1-28), N-; pro-opiocortin (1-76), N-; Acetic acid; SC; Rat; 2001; 7 days; Controls received mp w/ vehicle; peptides; animal info (female, Sprague-Dawley, 10 weeks old); human pituitary glycopeptide N-POC.

**P0062:** J. M. Stewart, R. E. Chipkin, K. Channabasavaiah, M. L. Gay and W. A. Krivoy. Inhibition of development of tolerance to morphine by a peptide related to ACTH. In 'Neural Peptides and Neuronal Communication,' E. Costa and M. Trabucchi (eds. ), Raven Press, New York 1980;305-312

**ALZET Comments:** ACTH (1-10)-amide, (D-Phe7)-; Morphine sulfate; SC; mice; 7 days; comparison of injections vs. infusion; separate and simultaneous infusion of agents; peptides.



**P0054:** R. H. Freeman, J. O. Davis and D. Fullerton. Chronic ACTH administration and the development of hypertension in rats (40799). Proc. Soc. Exp. Biol. Med 1980;163(4):473-477

**ALZET Comments:** ACTH; Saline; SC; Rat; 1701; 5-7 days; peptides.

**P0037:** D. O. Cooper and J. M. Stolk. Differences between inbred rat strains in the alteration of adrenal catecholamine synthesizing enzyme activity after immobilization stress. Neuroscience 1979;4(1163-1172

**ALZET Comments:** ACTH; Saline; SC; Rat; 5 days; comparison of adrenal denervation vs. hypophysectomy; organ replacement therapy (hypophysectomy); peptides.