



เอกสารอ้างอิง

- Anderson, D. C., "Sex-Hormone-binding globulin," Clin. Endocrinol., 3, 69-96, 1974.
- Abraham, G. E., "Radioimmunoassay of steroid in biological materials," Radioimmunoassay and relate products in Medicine. Vol. 11, p. 3, Vienna, International Atomic Energy Agency, 1974.
- Abraham, G. E., R. S. Werdloff, D. Tulchinsky, and W. D. Odell, "Radioimmunoassay of plasma progesterone," J. Clin. Endocrinol., 32, 619-625, 1971.
- Arimura, S., L. Debeljuk, and A. V. Schally, "Stimulation of FSH release in vivo by prolonged infusion of synthetic LHRH," Endocrinol., 91, 529-532, 1972.
- Asawaroengchai, H., "Bioactive versus Immunoreactive Luteinizing hormone (LH) during pituitary gland development in Macaca fascicularis," JAFES., 3, 103-108, 1983.
- Baba, Y., H. Matsuo, and A. V. Schally, "Structure of the porcine LH and FSH releasing hormone. II confirmation of the proposed structure by conventional sequential analysis," Biochem. Biophys. Res. Commun., 44, 459-463, 1971.
- Badger, T. M., J. S. Loughlin, and P. G. Naddaff, "The luteinizing hormone-releasing hormone (LHRH) desensitized rat pituitary: luteinizing hormone responsiveness to LHRH in vitro," Endocrinol., 112, 793-799, 1983.

- Belchetz, P. E., T. M. Plant, Y. Nakai, E. J. Keogh, and E. Knobil, "Hypophyseal responses to continuous and intermittent delivery of hypothalamic gonadotropin releasing hormone," Sci., 202, 631-633, 1978.
- Berson, S. A., and R. S. Yalow, "Immunochemical heterogeneity of parathyroid hormone in plasma," J. Clin. Endocrinol. Metab., 28, 1037-1047, 1968.
- Borgeat, P., G. Chavacy, A. Dupont, F. Labric, A. Arimura, and A. V. Schally, "Stimulation of adenosine 3':5'-Cyclic monophosphate accumulation in anterior pituitary gland in vivo by synthetic luteinizing hormone-releasing hormone," Proc. Natl. Acad. Sci. U.S.A., 69, 2677-2681, 1972.
- Braunstein, G. D., L. E. Jr. Reichert, E. V. vanHall, J. L. Vaitukaitis, and G. T. Ross, "The effect of desialylation on the biologic and immunologic activity of human pituitary luteinizing hormone," Biochem. Biophys. Res. Commun., 42, 962-967, 1971.
- Bruni, J. F., H. H. Huang, S. Marshall, and J. Meites, "Effect of single and multiple injections of synthetic GnRH on serum LH, FSH and testosterone in young and old male rat," Biol. Reprod., 17, 309-318, 1977.
- Carmel, P. W., S. Araki, and M. Ferin, "Pituitary stalk portal blood collection in rhesus monkeys: evidence for pulsatile release of gonadotropin-releasing hormone (GnRH)," Endocrinol., 99, 243-248, 1976.
- Celani, M. F., V. Montanini, G. F. Baraghini, C. Carani, F. Marabito, K. Cioni, A. L. Lagan, A. R. Tassell, M. Bazzani, and P.

- Marrama, "The pattern of LH bioactivity to immunoreactivity (B/I) ratio after LH-RH acute stimulation in pubertal boys and in young adult men," IRCS. Med.Sci., 11, 735-736, 1983.
- Chappel, S. C., C. Coutifaris, and S. J. Jacobs, "Studies on the microheterogeneity of follicle-stimulation hormone present within the anterior pituitary gland of ovariectomized hamsters," Endocrinol., 110, 847-854, 1982.
- Clayton, R. N., "Gonadotropin-releasing hormone modulation of its own pituitary receptors: evidence for biphasic regulation," Endocrinol., 111, 152-159, 1982.
- DeKoning, J., J. A. M. J. Van Dieten, and G. P. Van Rees, "Refractoriness of the pituitary gland after continuous exposure to luteinizing hormone-releasing hormone," J. Endocrinol., 79, 311-320, 1979.
- Drouin, J., and F. Labrie, "Interactions between 17  $\beta$ -estradiol and progesterone in the control of luteinizing hormone and follicle-stimulating hormone release in rat anterior pituitary cells in culture," Endocrinol., 108, 52-57, 1981.
- Drouin, J., L. Lagace, and F. Labrie, "Estradiol-induced increase of the LH responsiveness to LH releasing hormone (LHRH) in rat anterior pituitary cells in culture," Endocrinol., 99, 1477-1481, 1976.
- Drouin, J., M. Lavoie, and F. Labrie, "Effect of gonadal steroids on the luteinizing hormone and follicle-stimulating hormones response to 8-bromoadenosine 3':5'-monophosphate in anterior pituitary cells in culture," Endocrinol., 102, 358-361, 1978.

- Drouva, S. V., and R. V. Gallo, "Catecholamine involvement in episodic luteinizing hormone release in adult ovariectomized rats," Endocrinol., 99, 651-658, 1976.
- Dufau, M. L., G. D. Hodgen, A. L. Goodman, and K. J. Catt, "Bioassay of circulating luteinizing hormone in the rhesus monkey: comparison with radioimmunoassay during physiological changes," Endocrinol., 100, 1557-1565, 1977.
- Dufau, M. L., I. Z. Beitins, J. W. McArthur, and K. J. Catt, "Effect of luteinizing hormone-releasing hormone (LHRH) upon bioactive and immunoreactive serum LH levels in normal subjects," J. Clin. Endocrinol. Metab., 43, 658-667, 1976.
- Dufau, M. L., K. J. Catt, and T. Tsuruhara, "Retention of in vitro biological activities by desialylated human luteinizing hormone and chorionic gonadotropin," Biochem. Biophys. Res. Commun., 44, 1022-1028, 1971.
- Ekins, R. P., "Review Paper: Theoretical Aspects of Saturation Analysis," In vitro Procedure with radio isotopes in Medicine p. 325, Vienna, International Atomic Energy Agency, 1970.
- Ellinwood, W. E., and J. A. Resko, "Sex differences in biological active and immunoreactive gonadotropins in the fetal circulation of rhesus monkeys," Endocrinol., 107, 902-907, 1980.
- Ellis, S., "Observations on stability of sheep pituitary LH and FSH," Human Pituitary Gonadotropins (Albert, A., eds.) pp. 378-380, Springfield, Ill., Thomas, 1961.
- Evans, H. M., M. E. Sampson, and R. I. Pencharz, "An anterior pituitary gonadotropic fraction (ICSH) specifically stimulating

- the intersitial tissue of testis and ovary," Cold Spring Harbor Symp. Quant. Biol., 5, 229-240, 1937.
- Ferin, M., H. Rosenblatt, P. W. Carmel, J. L. Antunes, and R. L. Vande Wiele, "Estrogen-induced gonadotropin surges in female rhesus monkeys after pituitary stalk section," Endocrinol., 104, 50-52, 1979.
- Fevold, H. L., F. L. Hisaw, and S. L. Leonard, "The gonad stimulating and the luteinizing hormones of the anterior lobe of the hypophysis," Am. J. Physiol., 97, 291-301, 1931.
- Foulds, L. M., and D. M. Robertson, "Electrofocusing fractionation and characterization of pituitary follicle-stimulating hormone from male and female rats," Mol. Cell. Endocrinol., 31, 117-130, 1983.
- Galle, P. C., A. Ulloa-Aguirre, and S. C. Chappel, "Effect of oestradiol, phenobarbitone and luteinizing hormone-releasing hormone upon the isoelectric profile of pituitary follicle-stimulating hormone in ovariectomized hamster," J. Endocrinol., 99, 31-39, 1983.
- Giguere, V., F. A. Lefevre, and F. Labrie, "Androgens decrease LHRH binding sites in rat anterior pituitary cells in culture," Endocrinol., 108, 350-352, 1981.
- Goodman, A. D., R. Tanebaum, D. R. Wright, K. D. Trimble, and D. Rabinowitz, "Existence of 'big' and 'little' forms of immunoreactive growth hormone in human plasma," Heterogeneity of polypeptide hormones (Rabinowitz, D., and J. Roth, eds.) pp. 46-56, Academic Press, New York, 1974.

- Graesslin, D., A. Spies, H. C. Weise, and G. Bettendorf, "Properties of human pituitary and urinary LH," Acta Endocrinol. (Kbh), Suppl., 173, 56-65, 1973.
- Hoff, J. D., B. L. Lasley, and S. S. C. Yen, "The two pools of pituitary gonadotropin: regulation during the menstrual cycle," J. Clin. Endocrinol. Metab., 44, 302-312, 1977.
- Hsueh, A. J. W., G. F. Erickson, and S. S. C. Yen, "The sensitizing effect of estrogens and catechol estrogen on cultured pituitary cells to luteinizing hormone-releasing hormone: its antagonism by progestins," Endocrinol., 104, 807-813, 1979.
- Hunter, W. M., and F. C. Greenwood, "Preparation of Iodine-131 labelled human growth hormone of high specific activity," Natur 194, 495-496, 1962.
- Ishikawa, H., T. Nagayama, and K. Niizuma, "The mechanism of the stimulation of LH production by synthetic LH-releasing hormone (LH-RH) in tissue culture," Biochem. Biophys. Res. Commun., 55, 492-498, 1973.
- Jutisz, M., A. Berault, M. A. Novella, and G. Ribot, "Tude de L' action du facteur Hypothalamique LRF (LH-releasing factor) Chez Le Rat in vivo and in vitro," Acta Endocrinol. (Kbh.), 55, 481-496E. 1967.
- Keye, W. R. Jr., and R. B. Jaffe, "Modulation of pituitary gonadotropin response to gonadotropin-releasing hormone by estradiol," J. Clin. Endocrinol. Metab., 38, 805-810, 1974.

- Labrie, F., G. Pelletier, A. Lemay, P. Borgeat, N. Barden, A. Dupont, M. Savary, J. Cate and R. Boueher, "Control of protein synthesis in anterior pituitary gland," Acta Endocrinol. (Kbh) Suppl., 180, 301-340, 1973.
- Li, C. H., and B. Starman, "Molecular weight of sheep pituitary interstitial cell-stimulating hormone," Nature, 202, 291-292, 1964.
- Liao, T. H., and J. G. Pierce, "The presence of a common type of subunit in bovine thyroid-stimulating and luteinizing hormones," J. Biol. Chem., 245, 3275-3281, 1970.
- Libertun, C., R. Orias, and S. M. McCann, "Biphasic effect of estrogen on the sensitivity of pituitary to luteinizing hormone-releasing factor (LRF)," Endocrinol., 94, 1094-1100, 1974.
- Limonta, P., A. Ladizhenskaya, G. L. Gunsalus, C. W. Bardin, and R. B. Thau, "Regulation of pituitary gonadotropin-releasing hormone receptors by androgens in the male rabbit," Endocrinol., 118, 340-347, 1986.
- Liu, T. C., and G. L. Jackson, "Comparison of the biosynthesis and release of luteinizing hormone by rat pituitaries in vitro in response to gonadotropin-releasing hormone analogs," Endocrinol., 104, 962-966, 1979a.
- Liu, T. C., and G. L. Jackson, "Effect of in vivo treatment with estrogen on luteinizing hormone synthesis and release by rat pituitaries in vitro" Endocrinol., 100, 1294-1302, 1979b.
- Liu, T. C., G. L. Jackson, and J. Gorski, "Effects of synthetic gonadotropin-releasing hormone on incorporation of radioactive glucosamine

- and amino acids in luteinizing hormone and total protein by rat pituitaries in vitro," Endocrinol., 98, 151-163, 1976.
- Long, J. A., and H. M. Evan, "The oestrous cycle in the rats and its associated phenomena," Mem. Univ. California., 6, 1-148, 1922.
- Loughlin, J. S., T. M. Badger, and W. F. Crowley, "Perifused pituitary cultures: a model for LHRH regulation of LH secretion," Am. J. Physio., 240, E591-E600, 1981.
- Lucky, A. W., B. H. Rich, R. L. Rosenfield, V. S. Fang, and N. Roche-Bender, "LH bioactivity increases more than immunoreactivity during puberty," The journal of pediatrics, 97, 205-213, 1980.
- Makino, T., "Study on the intracellular mechanism of LH release in the anterior pituitary," Am. J. Obstet. Gynecol., 115, 606-614, 1973.
- Marrama, P., A. A. Zaidi, V. Montamini, M. F. Celani, K. Cioni, C. Carani, F. Morabito, M. Resentini, B. Bonati, and G. F. Baraghini, "Age and sex related variations in biologically active and immunoreactive serum luteinizing hormone," J. Endocrinol. Invest., 6, 427-433, 1983.
- Marut, E. L., R. F. Williams, B. D. Cowan, A. Lynch, S. P. Lerner, and G. D. Hodgen, "Pulsatile pituitary gonadotropin secretion during maturation of the dominant follicle in monkeys: estrogen positive feedback enhances the biological activity of LH," Endocrinol., 109, 2270-2272, 1981.
- Matsumo, H., Y. Baba, R. M. G. Nair, A. Arimura, and A. V. Schally, "Structure of the porcine LH-and FSH-releasing hormone. I the proposed amino acid sequence," Biochem. Biophys. Res. Commun., 43, 1334-1339, 1971.



- McPherson, J. C. III, A. Costoff, and V. B. Mahesh, "Influence of estrogen-progesterone combinations on gonadotropin secretion in castrate female rats," Endocrinol., 97, 771-779, 1975.
- Menon, K. M. J., K. P. Gunaga, and S. Azhar, "GnRH action in rat anterior pituitary gland: regulation of protein, glycoprotein and LH synthesis," Acta Endocrinol., 86, 473-488, 1977.
- Mittler, J. C., A. Arimura, and A. V. Schally, "Release and synthesis of luteinizing hormone and follicle-stimulating hormone in pituitary culture in response to hypothalamic preparations," Proc. Soc., exp. Biol., 33, 1321-1325, 1970.
- Montanini, V., M. F. Celani, G. F. Baraghini, C. Carani, and P. Marrama, "Effects of acute stimulation with luteinizing hormone-releasing hormone (LRH) on biologically active and immunoreactive serum luteinizing hormone (LH) in pubertal boys," Acta Endocrinol., 107, 289-294, 1984.
- Moyle, W. R., O. P. Bahl, and L. Marz, "Role of carbohydrate of human chorionic gonadotropin in the mechanism of hormone action," J. Biol. Chem., 250, 9163-9168, 1975.
- Mukhopadhyay, A. K., F. A. Leidenberger, and V. Lichtenberg, "A comparison of bioactivity and immunoactivity of luteinizing hormone stored in and released in vitro from pituitary glands of rats under various gonadal states," Endocrinol., 104, 925-931, 1979.
- Neill, J. D., and M. S. Smith, Current topic in experimental endocrinology (V. H. T. James, and L. Martini, eds.) vol. 2, p. 37, Academic Press, New York, 1974.

- Pardridge, W. M., "Transport of protein-bound hormones into tissues in vivo," Endocrinol., 95, 618-622, 1969.
- Peckham, W. D., T. Yamaji, D. J. Dierschke, and E. Knobil, "Gonadal function and the biological and physicochemical properties of follicle-stimulating hormone," Endocrinol., 92, 1660-1666, 1973.
- Pierce, J. G., O. P. Bahl, J. S. Cornell, and N. Swaminathan, "Biologically active hormones prepared by recombination of the  $\alpha$  chain of human chorionic gonadotropin and the hormone-specific chain of bovine thyrotropin or of bovine luteinizing hormone," J. Biol. Chem., 246, 2321-2324, 1971.
- Rabinowitz, D., R. Benveniste, and J. Bell, "Heterogeneity of human luteinizing hormone," Heterogeneity of polypeptide hormones (Rabinowitz, D., and J. Roth, eds.) pp. 90-97, Academic Press, New York, 1974.
- Rathnam, P., and B. B. Saxena, "Subunits of luteinizing hormone from human pituitary glands," J. Biol. Chem., 246, 7087-7094, 1971.
- Redding, T. W., A. V. Schally, A. Arimura, and H. Matsuo, "Stimulation of release and synthesis of luteinizing hormone (LH) and follicle stimulating hormone (FSH) in tissue culture of rat pituitaries in response to natural and synthetic LH-and FSH-releasing hormone," Endocrinol., 90, 764-770, 1972.
- Reddy, P. V., and K. M. J. Menon, "Existence of multiple molecular forms of luteinizing hormone in rat: difference in immunological and biological activities between stored and circulating forms," Acta Endocrinol., 97, 33-41, 1981.

- Reichert, L. E. Jr., "Biological studies on the relatedness of subunits of human follicle stimulating hormone and chorionic gonadotropin," Endocrinol., 90, 1119-1124, 1972.
- Reiter, E. O., I. Z. Beitins, T. Ostrea, and J. Gutai, "Bioassayable luteinizing hormone during childhood and adolescence and in patients with delayed pubertal development," J. Clin. Endocrinol. Metab., 54, 155-161, 1982.
- Rivier, C., J. Rivier, and W. Vale, "Chronic effects of (D-Trp<sup>6</sup>, Pro<sup>9</sup>-Net)-LRF on reproductive processes in the male rat," Endocrinol., 105, 1191-1201, 1980.
- Robertson, D. M., and E. Diezfalusy, "Biological and immunological characterization of luteinizing hormone. II. A Comparison of immunological and biological activities of pituitary extracts after electrofocusing using different standard preparations," Mol. Cell Endocrinol., 9, 57-67, 1977.
- Robertson, D. M., M. P. vanDamme, and E. Diezfalusy, "Biological and immunological characterization of luteinizing hormone. I. Biological profile of pituitary and plasma samples after electrofocusing," Mol. Cell Endocrinol., 9, 45-56, 1977.
- Roos, P., L. Nyberg, L. Wide, and C. Gemzell, "Human pituitary luteinizing hormone isolation and characterization of four glycoproteins with luteinizing activity," Biochem. Biophys. Acta., 405, 363-379, 1975.
- Roth, J., P. Gorden, and I. Pastan, "Big insulin. A new component of plasma insulin detected by immunoassay," Proc. Natl. Acad. Sci., 61, 138-145, 1968.

- Ryan, R. J., "On obtaining luteinizing and follicle-stimulating hormones from human pituitaries," J. Clin. Endocrinol. Metab., 28, 886-896, 1968.
- Sairam, M. R., and H. Papkoff, "Chemistry of pituitary gonadotropins," Handbook of physiology (Knobil, E., and W. H. Sayer, eds.) Vol. IV, pt. 2, pp. 111-131, American Physiological Society, Washington, 1974.
- Sairam, M. R., H. Papkoff, and C. H. Li, "The primary structure of ovine interstitial cell-stimulating hormone. I. the  $\alpha$ -subunit," Arch. Biochem. Biophys., 153, 554-571, 1972.
- Sandow, J., W. Von Rechenberg, G. Jerzabek, and W. Stoll, "Pituitary gonadotropin inhibition by a highly active analog of luteinizing hormone-releasing hormone," Fertil. Steril., 30, 205-212, 1978.
- Santen, R. J., and C. W. Bardin, "Episodic luteinizing hormone secretion in man. Pulse analysis, clonical interpretation, physiologic mechanisms," J. Clin. Invest., 52, 2617-2622, 1973.
- Scatchard, G., "\_\_\_\_\_ " Ann. N. Y. Acad. Sci., 51, 660-680, 1949.
- Sawyer-Steffan, J. E., B. L. Lasley, and S. S. C. Yen, "Comparison of in vitro bioactivity and immunoreactivity of serum LH in normal cyclic and hypogonadal women treated with low doses of LH-RH," J. Reprod. Fertil., 3, 45-51, 1982.
- Schally, A. V., A. Arimura, A. J. Kastin, H. Matsuo, Y. Baba, T. W. Redding, R. M. G. Nair, L. Debeljuk, and W. F. White, "Gonadotropin-releasing hormone: on polypeptide regulates secretion of luteinizing and follicle-stimulating hormone," Sci. 173, 1036-1038, 1971.

- Schally, A. V., A. J. Kastin, and A. Arimura, "The hypothalamus and reproduction," Amer. J. Obstet. Gynec., 114, 423-442, 1972a.
- Schally, A. V., T. W. Redding, H. Matsuo, and A. Arimura, "Stimulation of FSH and LH release in vitro by natural and synthetic LH-and FSH-releasing hormone," Endocrinol., 90, 1561-1568, 1972b.
- Schenken, R. S., L. B. Werlin, R. F. Williams, and G. D. Hodgen, "Periovulatory hormone dynamics: roles of ovarian steroids in initiating the immunoassayable and bioassayable LH surge," In Scientific Program and Abstracts of the Third Annual Meeting of the Society for Gynecologic Investigation p. 182, San Francisco, California, 1984.
- Schenken, R. S., R. F. Williams, B. D. Cowan, and G. D. Hodgen, "Progesterone and  $17\alpha$ -hydroxyprogesterone advance the estrogen induced bioassayable luteinizing hormone surge in castrate monkeys," Fertil. Steril., 43, 301-307, 1985.
- Schuling, G. A., and H. P. Gnodde, "Secretion of luteinizing hormone caused by continuous infusions of luteinizing hormone-releasing hormone in the long-term ovariectomized rat: effect of oestrogen pretreatment," J. Endocrinol., 71, 1-9, 1976.
- Schuling, G. A., J. DeKonign, A. F. Zurcher, H. P. Gnodde, and G. P. Van Rees, "Induction of LH surges by continuous infusion of LHRH," Neuroendocrin., 20, 151-158, 1976.
- Schwartz, N., and C. McCormack, "Reproduction: Gonadal function and its regulation," Ann. Rev. Physiol., 34, 425-432, 1972.
- Shome, B., and A. F. Parlow, "Human follicle-stimulating hormone (hFSH): first proposal for the amino acid sequence of the  $\alpha$ -subunit(hFSH  $\alpha$ ) and first demonstration of its identity with

- the  $\alpha$ -subunit of human luteinizing hormone (hLH $\alpha$ )," J. Clin. Endocrinol. Metab., 39, 199-202, 1974.
- Smith, M. A., and W. W. Vale, "Desensitization to gonadotropin-releasing hormone observed in superfused pituitary cells on cytodex beads," Endocrinol., 108, 752-759, 1981.
- Smith, P. E., and E. T. Engle, "Experimental evidence regarding the role of the anterior pituitary in the development and regulation of the genital system." Am. J. Anat., 40, 159-217, 1927.
- Solano, A. R., A. Garcia-Vela, K. J. Catt, and M. L. Dufau, "Modulation of serum and pituitary luteinizing hormone bioactivity by androgen in the rat," Endocrinol., 106, 1941-1948, 1980.
- Solano, A. R., M. L. Dufau, and K. J. Catt, "Bioassay and Radioimmunoassay of serum luteinizing hormone in the male rat," Endocrinol., 105, 372-380, 1979.
- Squire, P. G., and C. H. Li, "Purification and properties of an interstitial cell-stimulating hormone from sheep pituitaries," Sci., 127, 3288-3289, 1958.
- Stockell-Hartree, A., M. Thomas, M. Braikevitch, E. T. Bell, D. W. Christie, G. V. Spaul, R. Taylor, and J. G. Pierce, "Preparation and properties of subunits of human luteinizing hormone," J. Endocrinol., 51, 169-180, 1971.
- Storring, P. L., A. A. Zaidi, Y. G. Mistry, M. Linberg, B. E. Stenning, and E. Diczfalusy, "A comparison of preparations of highly purified human pituitary luteinizing hormone potencies as determined by in vivo bioassay, in vitro bioassay and immunoassay," Acta Endocrinol., 101, 339-347, 1982.

- Tang, L. K., "Effect of serum sex steroids on pituitary LH response to LHRH and LH synthesis," The American Physiological Society, E458-E462, 1980.
- Tang, L. K., and F. Y. Tang, "Sex difference in LH response to LHRH and Dbc Amp and effect of 17  $\beta$ -estradiol," The American Physiological Society, E216-E221, 1979.
- Tang, L. K., and H. G. Spies, "Effect of gonadal steroids on the basal and LRF-induced gonadotropin secretion by cultures of rat pituitary," Endocrinol., 96, 349-356, 1975.
- Todd, J. M., and M. H. Samli, "The incorporation of [ $^3$ H] glucosamine, [ $^3$ H] fucose and [ $^{14}$ C] manose into protein in the rat anterior pituitary incubated in vitro," Biochem. Biophys. Acta., 297, 11-16, 1973.
- Van Hell, H., R. Malthijssen, and G. A. Overbeek, "Effect of human menopausal gonadotropin preparations in different bioassay methods," Acta Endocrinol., 48, 409-418, 1964.
- Vaitukaitis, J. L., G. T. Ross, L. E. Jr. Reichert, and D. N. Ward, "Immunologic basis for within and between species cross-reactivity luteinizing hormone," Endocrinol., 91, 1337-1342, 1972.
- Vilchez-Martinez, J., A. Arimura, L. Debeljuk, and A. V. Schally, "Biphasic effect of estradiol benzoate on the pituitary responsiveness to LH-RH," Endocrinol., 94, 1300-1303, 1974.
- Wakabayashi, K., T. Ogiso, and B. Tamaoki, "Acute effect of androgen and estrogen on the promotion of amino acid incorporation into luteinizing hormone and protein in anterior pituitary gland of male rats," Endocrinol., 82, 721-730, 1968.

- Ward, D. N., and J. A. Coffey, "Analysis of acetyl groups in ovine luteinizing hormone by gas chromatography," Biochem., 3, 1575-1577, 1964.
- Wilson, M. E., and T. P. Gordon, "Ontogeny of LH secretion on seasonal breeding rhesus monkeys," Society for the study of reproduction 18<sup>th</sup> Annual Meeting, p. 178 Montreal, Quebec, Canada, 1985.
- World Health Organization. Collaborating Center of Research and Reference. Service in the Immunoassay of Hormone in Human Reproduction. Method Manual, 5th ed. (January 1981).
- World Health Organization. Collaborating Center for Research and Training in Human Reproduction. Radioimmunoassay of rhesus luteinizing hormone (rhLH) and rhesus follicle-stimulating hormone (rhFSH). Method Manual 1984.
- Yeo. T., A. Grossman, P. Belchetz, and G. M. Besser, "Response of luteinizing hormone from columns of dispersed rat pituitary cells to a highly potent analogue of luteinizing hormone-releasing hormone " J. Endocrinol., 91, 33-41, 1981.



ภาคผนวก

ตารางที่ 7 ก การทดลองที่ 1 ผลของซีรัมจากลิงทางยาวระยะต่าง ๆ ต่อค่า RIA-rLH จาก  
เซลล์ต่อได้สมองส่วนหน้าของหนูขาวเพศผู้อายุ 23-25 วัน แสดงค่าเป็น ค่าเฉลี่ย  
 $\pm$  SE นก./มล. (นก./5  $\times 10^4$  เซลล์)

สภาพการเลี้ยงเซลล์	RIA-rLH นก./มล./5 $\times 10^4$ เซลล์			
	อาหารเลี้ยงเซลล์ที่เปลี่ยนครั้งที่			ปริมาณสะสม ตลอดการทดลอง
	1	2	3	
กลุ่มควบคุม (n=18)	40.25 $\pm$ 1.54	34.45 $\pm$ 1.86	22.61 $\pm$ 0.75	97.31 $\pm$ 0.71
+ ซีรัม A♂ (n=3)	46.57 $\pm$ 3.56*	30.22 $\pm$ 3.57	15.78 $\pm$ 0.19*	92.57 $\pm$ 4.52
+ ซีรัม A♀ (n=3)	48.03 $\pm$ 3.64*	27.37 $\pm$ 2.38	10.27 $\pm$ 0.76*	85.67 $\pm$ 6.09
+ ซีรัม P♂ (n=3)	57.75 $\pm$ 4.20*	31.01 $\pm$ 3.18	14.96 $\pm$ 0.72*	103.71 $\pm$ 1.21
+ ซีรัม P♀ (n=3)	63.11 $\pm$ 3.43*	53.25 $\pm$ 2.93	15.00 $\pm$ 2.54*	113.32 $\pm$ 4.47*
+ ซีรัม I♂ (n=3)	54.48 $\pm$ 4.68*	31.83 $\pm$ 1.99	20.99 $\pm$ 0.52	107.31 $\pm$ 7.08
+ ซีรัม I♀ (n=3)	57.37 $\pm$ 1.03*	31.83 $\pm$ 2.84	16.08 $\pm$ 1.53*	105.29 $\pm$ 4.54

\* แตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญที่  $P < 0.05$

ตารางที่ 7 ข การทดลองที่ 1 ผลของซีรัมจากลิงทางยาวระยะต่าง ๆ ต่อค่า BA-rLH ที่หลั่งจากเซลล์ต่อมใต้สมองส่วนหน้าของหนูขาวเพศผู้อายุ 23-25 วัน ค่า BA-rLH แสดงเป็นค่าเฉลี่ย  $\pm$  SE นก./มล. (นก./5  $\times 10^4$  เซลล์)

สภาพการเลี้ยงเซลล์	BA-rLH นก./มล./5 $\times 10^4$ เซลล์			ปริมาณสะสม ตลอดการทดลอง
	อาหารเลี้ยงเซลล์ที่เปลี่ยนครั้งที่			
	1	2	3	
กลุ่มควบคุม (n=18)	36.55 $\pm$ 1.12	43.27 $\pm$ 2.02	40.32 $\pm$ 1.92	121.15 $\pm$ 3.86
+ ซีรัม A♂ (n=3)	255.66 $\pm$ 17.18*	334.00 $\pm$ 19.28*	281.33 $\pm$ 31.01*	871.00 $\pm$ 28.14*
+ ซีรัม A♀ (n=3)	78.00 $\pm$ 11.13*	86.66 $\pm$ 8.81*	138.00 $\pm$ 9.16*	302.66 $\pm$ 01.41*
+ ซีรัม P♂ (n=3)	39.66 $\pm$ 0.88	50.33 $\pm$ 4.17*	80.66 $\pm$ 13.96*	170.66 $\pm$ 16.66*
+ ซีรัม P♀ (n=3)	97.66 $\pm$ 10.26*	108.00 $\pm$ 3.05*	104.66 $\pm$ 8.19*	310.33 $\pm$ 15.83*
+ ซีรัม I♂ (n=3)	52.33 $\pm$ 3.17*	62.66 $\pm$ 6.35*	45.33 $\pm$ 5.48	160.00 $\pm$ 2.72*
+ ซีรัม I♀ (n=3)	35.66 $\pm$ 1.20	43.66 $\pm$ 2.02	34.33 $\pm$ 2.60	113.66 $\pm$ 2.84

\* แตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญที่  $P < 0.05$

ตารางที่ 7 ก การทดลองที่ 1 ผลของซีรัมจากลิงทางยาวระยะต่าง ๆ ต่อค่าอัตราส่วนของ  
BA : RIA-rLH ที่หลังจากเซลล์ต่อมได้ส่องส่วนหน้าของหนูขาวเพศผู้อายุ  
23-25 วัน แสดงค่าเป็นค่าเฉลี่ย  $\pm$  SE

สภาพการเลี้ยงเซลล์	อัตราส่วนของ BA : RIA ของ rLH		
	อาหารเลี้ยงเซลล์ที่เปลี่ยนครั้งที่		
	1	2	3
กลุ่มควบคุม (n=18)	0.91 $\pm$ 0.05	1.26 $\pm$ 0.11	1.79 $\pm$ 0.14
+ ซีรัม AO (n=3)	5.59 $\pm$ 0.75*	11.43 $\pm$ 1.67*	17.86 $\pm$ 2.09*
+ ซีรัม AQ (n=3)	1.61 $\pm$ 0.14*	3.15 $\pm$ 0.04*	13.49 $\pm$ 0.87*
+ ซีรัม PO (n=3)	0.69 $\pm$ 0.05*	1.62 $\pm$ 0.04*	5.33 $\pm$ 0.65*
+ ซีรัม PQ (n=3)	1.55 $\pm$ 0.14*	3.09 $\pm$ 0.19*	7.55 $\pm$ 1.77*
+ ซีรัม IO (n=3)	0.97 $\pm$ 0.10	2.00 $\pm$ 0.32*	2.15 $\pm$ 0.20
+ ซีรัม IQ (n=3)	0.62 $\pm$ 0.02*	1.38 $\pm$ 2.84	2.15 $\pm$ 0.09

\* แตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญที่  $P < 0.05$

ตารางที่ 8 ก การทดลองที่ 2 ผลของ GnRH  $7.5 \times 10^{-12}$  M. ร่วมกับซีรัมลิงทางยาวระยะต่าง ๆ  
 ค่า RIA-rLH ที่หลังจากเซลล์ต่อมได้สมองส่วนหน้าของหนูขาวเพศผู้อายุ 23-25  
 วัน ค่าแสดงเป็นค่าเฉลี่ย  $\pm$  SE นก./มล. (นก./5  $\times 10^4$  เซลล์)

สภาพการเลี้ยงเซลล์	RIA-rLH นก./มล./5 $\times 10^4$ เซลล์			
	อาหารเลี้ยงเซลล์ที่เปลี่ยนครั้งที่			ปริมาณสะสม ตลอดการทดลอง
	1	2	3	
GnRH $7.5 \times 10^{-12}$ M (n=18)	41.47 $\pm$ 0.59	47.11 $\pm$ 4.51	26.10 $\pm$ 2.56	114.68 $\pm$ 1.02
+ ซีรัม A $\bar{O}$ (n=3)	51.07 $\pm$ 4.12*	27.78 $\pm$ 1.08*	22.72 $\pm$ 1.63	101.57 $\pm$ 4.61*
+ ซีรัม A $\bar{Q}$ (n=3)	52.12 $\pm$ 2.06*	37.35 $\pm$ 5.20*	18.60 $\pm$ 0.71*	108.06 $\pm$ 6.19*
+ ซีรัม P $\bar{O}$ (n=3)	59.96 $\pm$ 3.44*	38.10 $\pm$ 1.88*	18.52 $\pm$ 0.16*	116.57 $\pm$ 5.35*
+ ซีรัม P $\bar{Q}$ (n=3)	67.46 $\pm$ 5.84*	46.65 $\pm$ 5.00*	17.92 $\pm$ 1.48*	135.63 $\pm$ 11.18*
+ ซีรัม I $\bar{O}$ (n=3)	67.80 $\pm$ 2.51*	49.53 $\pm$ 5.36	21.26 $\pm$ 3.06	138.59 $\pm$ 9.61*
+ ซีรัม I $\bar{Q}$ (n=3)	65.13 $\pm$ 2.54*	44.21 $\pm$ 3.91	18.97 $\pm$ 1.63*	128.31 $\pm$ 4.55*

\* แตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญที่  $P < 0.05$

ตารางที่ 8 ข การทดลองที่ 2 ผลของ GnRH  $7.5 \times 10^{-12}$  M. ร่วมกับซีรัมลิงทางยาวระยะต่าง ๆ ต่อค่า BA-rLH ที่หลังจากเซลล์ต่อมได้ส่องส่วนหน้าของหนูขาวเพศผู้อายุ 23-25 วัน แสดงค่าเป็นค่าเฉลี่ย  $\pm$  SE นก./มล. (นก./5  $\times 10^4$  เซลล์)

สภาพการเลี้ยงเซลล์	BA-rLH นก./มล./5 $\times 10^4$ เซลล์			
	อาหารเลี้ยงเซลล์ที่เปลี่ยนครั้งที่			ปริมาณสะสม ตลอดการทดลอง
	1	2	3	
GnRH $7.5 \times 10^{-12}$ M (n=18)	40.05 $\pm$ 3.09	45.94 $\pm$ 1.05	31.33 $\pm$ 0.33	115.79 $\pm$ 2.80
+ ซีรัม A♂ (n=3)	303.33 $\pm$ 12.01*	253.33 $\pm$ 13.33*	218.33 $\pm$ 20.48*	775.00 $\pm$ 37.52*
+ ซีรัม A♀ (n=3)	88.00 $\pm$ 9.45*	122.66 $\pm$ 15.24*	50.00 $\pm$ 2.30*	260.66 $\pm$ 10.72*
+ ซีรัม P♂ (n=3)	45.66 $\pm$ 5.17	143.33 $\pm$ 24.88*	41.33 $\pm$ 3.52*	230.33 $\pm$ 21.36*
+ ซีรัม P♀ (n=3)	105.00 $\pm$ 4.35*	99.66 $\pm$ 2.60*	66.00 $\pm$ 6.00*	270.66 $\pm$ 9.13*
+ ซีรัม I♂ (n=3)	71.33 $\pm$ 3.52*	46.00 $\pm$ 1.15	35.00 $\pm$ 2.64	152.33 $\pm$ 3.28*
+ ซีรัม I♀ (n=3)	37.33 $\pm$ 1.20	45.33 $\pm$ 3.71	45.33 $\pm$ 3.75	128.00 $\pm$ 6.92

\* แตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญที่  $P < 0.05$

ตารางที่ 8 ก การทดลองที่ 2 ผลของ GnRH  $7.5 \times 10^{-12}$  M. ร่วมกับซีรัมลิงทางยาวระยะต่าง ๆ  
 ต่ออัตราส่วนของ BA : RIA-rLH ที่หลังจากเซลล์ต่อมได้สมองส่วนหน้าของ  
 หนูขาวเพศผู้อายุ 23-25 วัน แสดงค่าเป็นค่าเฉลี่ย  $\pm$  SE

สภาพการเลี้ยงเซลล์	อัตราส่วนของ BA : RIA ของ rLH		
	อาหารเลี้ยงเซลล์ที่เปลี่ยนครั้งที่		
	1	2	3
GnRH $7.5 \times 10^{-12}$ M.	0.92 $\pm$ 0.06	0.98 $\pm$ 0.08	1.22 $\pm$ 0.10
+ ซีรัม A <sup>O</sup> (n=3)	6.03 $\pm$ 0.62*	9.18 $\pm$ 0.85*	9.58 $\pm$ 0.03*
+ ซีรัม A <sup>Q</sup> (n=3)	1.69 $\pm$ 0.20*	3.35 $\pm$ 0.49*	2.70 $\pm$ 0.22*
+ ซีรัม P <sup>O</sup> (n=3)	0.77 $\pm$ 0.13*	3.79 $\pm$ 0.69*	2.22 $\pm$ 0.17*
+ ซีรัม P <sup>Q</sup> (n=3)	1.58 $\pm$ 0.17*	2.18 $\pm$ 0.22*	3.70 $\pm$ 0.30*
+ ซีรัม I <sup>O</sup> (n=3)	1.05 $\pm$ 0.51	0.95 $\pm$ 0.11	1.68 $\pm$ 0.18*
+ ซีรัม I <sup>Q</sup> (n=3)	0.57 $\pm$ 0.02	1.03 $\pm$ 0.07	2.45 $\pm$ 0.42*

\* แตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญที่  $P < 0.05$

ตารางที่ 9 ก การทดลองที่ 3 ผลของส่วน Dialysable และ Non-dialysable fraction จากซีรัม PQ ต่อค่า RIA-rLH จากเซลล์ต่อมใต้สมองส่วนหน้าของหนูขาวเพศผู้ อายุ 23-25 วัน แสดงค่าเป็นค่าเฉลี่ย  $\pm$  SE นก./มล. (นก./5  $\times 10^4$  เซลล์)

สภาพการเลี้ยงเซลล์	RIA-rLH นก./มล./5 $\times 10^4$ เซลล์			
	อาหารเลี้ยงเซลล์ที่เปลี่ยนครั้งที่			ปริมาณสะสม ตลอดการทดลอง
	1	2	3	
กลุ่มควบคุม (n=6)	39.03 $\pm$ 0.92	20.97 $\pm$ 0.41	19.78 $\pm$ 1.48	79.78 $\pm$ 1.15
Dialysable fraction (PQ) (n=3)	30.66 $\pm$ 3.05	19.60 $\pm$ 2.38	21.83 $\pm$ 2.04	72.09 $\pm$ 4.88
Non-dialysable fraction (PQ) (n=3)	46.17 $\pm$ 6.15*	19.14 $\pm$ 1.99	16.84 $\pm$ 1.00	82.15 $\pm$ 5.30*

\* แตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญที่  $P < 0.05$





ตารางที่ 9 ข การทดลองที่ 3 ผลของส่วน Dialysable และ Non-dialysable fraction จากซีรัม PQ ต่อค่า BA-rLH จากเซลล์ต่อมได้สมองส่วนหน้าของหนูขาวเพศผู้ อายุ 23-25 วัน แสดงค่าเป็นค่าเฉลี่ย  $\pm$  SE นก./มล. (นก./  $5 \times 10^4$  เซลล์)

สภาพการเลี้ยงเซลล์	BA-rLH นก./มล./ $5 \times 10^4$ เซลล์			
	อาหารเลี้ยงเซลล์ที่เปลี่ยนครั้งที่			ปริมาณสะสม ตลอดการทดลอง
	1	2	3	
กลุ่มควบคุม (n=6)	40.25 $\pm$ 2.31	46.04 $\pm$ 2.88	34.82 $\pm$ 3.08	121.11 $\pm$ 3.37
Dialysable fraction (n=3)	47.25 $\pm$ 3.25	48.33 $\pm$ 7.87	29.33 $\pm$ 4.02	124.91 $\pm$ 8.74
Non-dialysable fraction (n=3)	70.66 $\pm$ 24.46	69.00 $\pm$ 14.82 *	66.00 $\pm$ 6.54 *	205.66 $\pm$ 26.45 *

\* แตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญที่  $P < 0.05$

ตารางที่ 9 ก แสดงผลของส่วน Dialysate และ Non-dialysable fraction ของซีรัม PQ ต่ออัตราส่วน BA : RIA ของ rLH จากเซลล์ต่อมใต้สมอง แสดงค่าเป็นค่าเฉลี่ย  $\pm$  SE

สภาพการเลี้ยงเซลล์	อัตราส่วน BA : RIA ของ rLH		
	การเปลี่ยนแปลงอาหารเลี้ยงเซลล์ครั้งที่		
	1	2	3
กลุ่มควบคุม (n=6)	1.03 $\pm$ 0.25	2.19 $\pm$ 0.51	1.79 $\pm$ 0.48
Dialysate PQ (n=3)	1.54 $\pm$ 0.32	2.46 $\pm$ 0.10	1.34 $\pm$ 0.02
Non-dialysable (n=3) fraction PQ	1.53 $\pm$ 0.03	3.60 $\pm$ 0.05*	3.92 $\pm$ 0.14*

\* มีความแตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญที่  $P < 0.05$

## ประวัติผู้เขียน

นาย สถาพร เกิดเกรียงไกร เกิดวันที่ 4 ธันวาคม 2501 เป็นชาวจังหวัดร้อยเอ็ด สำเร็จวิทยาศาสตร์บัณฑิต จากมหาวิทยาลัยขอนแก่น ปีการศึกษา 2524 เข้าศึกษาปริญญาวิทยาศาสตรมหาบัณฑิตในจุฬาลงกรณ์มหาวิทยาลัย ปีการศึกษา 2525 และได้รับทุนวิจัยจากบัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย ในปีการศึกษา 2527

