

CURRICULUM VITAE

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ADDRESS:

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Date of Birth: January 3, 1945

Education:

Sea Point Boy's High School,
 Cape Matriculation in 1961, with distinction in mathematics

Degrees:

1967 M.B. Ch.B (M.D. equivalent) University of Cape Town
 1973 Ph.D. Thesis University of Cape Town
 1974 F.C.P. (S.A.) Fellow, College of Physicians of S. Africa
 Member of the Royal College of Physicians of the United Kingdom

Postgraduate Training and Career:

- '68 House Physician
Professorial, Medical and Surgical Units, Groote Schuur Hospital, University of Cape Town
- '69 Resident
Department of Pediatrics,
Kaplan Hospital, Rehovot, Israel (6 months)
- Family Doctor
Kibbutzim - Galil Elyon (6 months)
- '70-72 Research Fellow
Ph.D. Student in Research Laboratory of Professor B.L. Pimstone,
Department of Medicine, University of Cape Town
- '72-74 Resident and Tutor
Department of Medicine, Groote Schuur Hospital,
University of Cape Town (9 months Endocrine Fellow)
- '75 Senior Resident
The Middlesex (teaching) Hospital, London,
Departments of Medicine and Geriatrics
- '76 Attending (6 months)
Renal Unit and Endocrine Clinics,
Meir Hospital, Kfar Saba, Israel
- '76 Attending in Medicine and Endocrinology
Department of Medicine, Soroka Medical Center, Beersheva, Israel. Lecturer
in Medicine and Endocrinology, Soroka Health Science Center, Ben Gurion
University Medical School, Beersheva, Israel.
- '79 Senior Lecturer in Medicine and Endocrinology,
Ben Gurion University Health Science Center, Beersheva, Israel
- '79-83 Visiting Scientist
Diabetes Branch, National Institute of Arthritis, Diabetes, Digestive &
Kidney Diseases, National Institutes of Health, Bethesda, Maryland.
- '83 Associate Professor of Medicine
Dept. of Medicine, Division of Endocrinology/- Metabolism, University of

Cincinnati College of Medicine, Cincinnati, Ohio Director of University of Cincinnati Diabetes Outpatient Clinics, Cincinnati, Ohio

- 1983-86 Senior Investigator
Diabetes Branch, National Institute of Arthritis, Diabetes, Digestive & Kidney Diseases, National Institutes of Health, Bethesda, Maryland
- 1986-98 Chief, Section of Molecular and Cellular Physiology
Diabetes Branch, National Institutes of Diabetes, Digestive & Kidney Diseases, National Institutes of Health, Bethesda, Maryland
- 1999-2005 Chief, Diabetes Branch (known as Clinical Endocrinology Branch prior to October 2002)
National Institutes of Diabetes, Digestive and Kidney Diseases, National Institutes of Health, Bethesda, MD
- 2005- Chief of the Division of Endocrinology, Diabetes and Bone Diseases.
Mt Sinai School of Medicine New York, NY
- 2008- Director of the Metabolism Institute, Mt Sinai School of Medicine

Memberships in Professional Societies

- 1972 Society for Endocrinology, Metabolism and Diabetes of Southern Africa
- 1974 Fellow of the College of Physicians of South Africa
- 1975 Member of the Royal College of Physicians United Kingdom
- 1977 Israel Endocrine Society
- 1978 European Association for the Study of Diabetes
- 1979 American Endocrine Society
- 1982 American Diabetes Association

- 1982 The New York Academy of Sciences
- 1983 Central Society for Clinical Research
- 1983 Fellow of American College of Physicians (FACP)
- 1986 Society for Neuroscience
- 1986 American Physiological Society
- 1986 American Society for Cell Biology
- 1988 American Society of Clinical Investigation
- 1989 American Society for Biochemistry and Molecular Biology
- 1990 American Society for Microbiology
- 1996 American Academy of Physicians

Administrative Responsibilities

- 1983 Chairman of the Professional Education Committee, American Diabetes Association (Cincinnati)
- 1988 President, Montgomery Chapter - American Diabetes Association
- 1990 President, Washington, D.C. Affiliate - American Diabetes Association
- 1993-1996 Annual Meeting Screening Committee, The Endocrine Society
- 1994 Board of Directors, National American Diabetes Association
- 1996-2005 Chief of the Endocrine Consult Service, Clinical Center, NIH
- 1996 President, International Society for Insulin-like Growth Factor Research
- 1998 Chairperson, Research Grant Review Panel, National American Diabetes Association.

- 1999 Chairperson, Grant Review Committee for Endocrinology, Veterans' Administration.
- 2002-present Board of Directors, Endocrine Fellows Foundation

Honors and Awards:

- 1963 Medal for Physiology
- 1966 Medal for Obstetrics and Gynecology
- 1973 Bronte Stewart Award for Ph.D. Thesis
- 1996 British Endocrine Society Transatlantic Medal
- 1996 The Herman O. Mosenthal Memorial Lecture
- 2004 The Yogesh C. Patel Memorial Lecture
- 2008 Dell Fisher Visiting Professor, UCLA

Credentialing:

- 1979 Visa Qualifying Examination
- 1980 FLEX - New York State
- 1980 Licensed in New York State
- 1981 Licensed in Maryland
- 1981 Licensed in Virginia
- 1983 Licensed in Ohio
- 1983 Diplomate of the American Boards of Internal Medicine

1986 Boards in Endocrinology and Metabolism

Visiting Professor Lectureships

1. The Second Annual Kroc Lectureship, May 19, 1987.
2. Jack H. Mostow, M.D. Memorial Lecture Series, November 11, 1987.
3. The Warren F. Wilhelm Lectureship, 1989, Ed Bixby Research Institute, Kansas City, MO
4. 14th Michael G. Wohl Memorial Lecture, Philadelphia County Medical Society, November 8, 1989
5. 10th Annual Lind Memorial Diabetes Lecture, Bryn Mawr, PA, March, 1990
6. The John H. Moyer Visiting Professor Lectureship, January 22-24, 1991, University of Pittsburgh, PA
7. U.S.S.R. Academy of Sciences, Moscow, Kiev, and Leningrad, Sept./Oct., 1991.
8. Dozor Visiting Professor in Medicine in the Faculty of Health Sciences, Ben Gurion University of the Negev, Beer-Sheva, Israel, November, 1993
9. Meadow Brook Lecturer. OHEP Center for Medical Education, Michigan. June 6, 2000.
10. 2000 Dean's Distinguished Lecture. Wayne State University, Detroit MI June 2000 "The Future of Diabetes Treatment and Prevention".
 11. 2004 The Mackler Lecture, Montefiore NY
 12. 2004 The Yogesh Patel Memorial Lecture, Montreal
 13. 2005 The 6th Annual Nicholas T.Zervas Lecture, MGH, Boston
14. 2008 Dell Fisher Visiting professor, UCLA

Grant Support

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| 1980-1981 | American Diabetes Association Washington, D.C. Affiliate |
| 1983-1984 | Biomedical Research Support Grant |
| 1987 | American Diabetes Association, Washington, D.C. Affiliate. |
| 1987 | Diabetes Research and Education Foundation |

1993-present American Diabetes Association Mentor-Based Postdoctoral Fellowship Program

2008 NCI Grant on Diabetes and Breast Cancer 1R01CA128799-01A1

Books Edited

Purification of Fermentation Products ACS Symposium Series, 1984
Edited By: D. LeRoith, J. Shiloach and T.J. Leahy

Insulin, Insulin-like Growth Factors, and Their Receptors in the Central Nervous System. Edited by M. K. Raizada, M. I. Phillips, and D. LeRoith, 1987.

Molecular and Cellular Biology of Diabetes Mellitus, Vols. I,II, and III. Insulin Secretion. Edited by B. Draznin, S. Melmed, and D. LeRoith, 1988.

Molecular and Cellular Biology of Insulin-like Growth Factors and their Receptors. Edited by D. LeRoith, and M.K. Raizada, 1989.

Insulin-like Growth Factors: Molecular and Cellular Aspects.
Edited by D. LeRoith, 1991. C.R.C. Press, Boca Raton, Florida.

Molecular Biology and Physiology of Insulin-Like Growth Factors. Edited by Mohan K. Raizada and Derek LeRoith. Advances in Experimental Medicine and Biology, Vol. 293, 1991.

The Role of Insulin-Like Growth Factors in the Nervous System. Edited by M.K. Raizada, and D. LeRoith. Annals of the New York Academy of Sciences, Vol. 692, 1993.

Current Directions in Insulin-Like Growth Factor Research. Edited by D. LeRoith and M.K. Raizada. Advances in Experimental Medicine and Biology, Vol. 343, 1993.

Molecular Biology of Diabetes. Volumes 1 & 2. Edited by B. Draznin and D. LeRoith. Humana Press, Totowa, N.J., 1994.

Growth Factors and Cytokines in Health and Disease. Edited by C. Bondy and D. LeRoith. JAI Press, Greenwich, Conn., 1996.

Frontiers in Endocrinology. Edited by D. LeRoith. The role of insulin-like growth factors in ovarian physiology. Ares-Serono Symposia Publications, Rome, Italy, 1996.

Diabetes Mellitus. A Fundamental and Clinical Text. Edited by D. LeRoith, J.M. Olefsky, and S.I. Taylor. Lippincott-Raven Publishers, Hagerstown, MD, 1996.

Advances in Molecular and Cellular Endocrinology (Yearly series) JAI Press Inc
Editor D. LeRoith

Reviews in Endocrine and Metabolic Disorders (Quarterly Series) Kluwer Press.
Editor-in-Chief D. LeRoith 2000-

Diabetes Mellitus. A Fundamental and Clinical Text. Second Edition. Editors D. LeRoith, J.M. Olefsky and S.I. Taylor. Lippincott Publishers. Second Edition. 2000

LeRoith, D., Zumkeller, W., Baxter, R., eds. Insulin-like Growth Factors, Landes Bioscience, Georgetown, TX and Kluwer Academic, New York, NY, 2003.

Diabetes Mellitus. A Fundamental and Clinical Text. Third Edition. Editors D. LeRoith, S.I. Taylor, and J.M. Olefsky. Lippincott Publishers. Third Edition. 2004.

Controversies in Treating Diabetes: Clinical and Research Aspects Editors D. LeRoith and A.I. Vinik. Humana Press 2008.

Editorial Board

1987 Endocrinology

- 1990 Regulatory Peptides
- 1990 Biological Signals
- 1993 Receptor
- 1993 Experimental Cell Research
- 1994 The Journal of Clinical Endocrinology & Metabolism
- 1994 The Journal of Clinical Investigation
- 1995 American Journal of Physiology
- 1996 Cytokine & Growth Factor Reviews
- 1997 Journal of Biological Chemistry
- 1997 Editor of Growth Regulation
- 1998 The Aging Male
- 1998 Editor, Growth Hormone & IGF Research
- 2000 Diabetes/Metabolism Research and Reviews
- 2003 Metabolic Syndrome and Related Disorders
- 2004 Reviews in Endocrine and Metabolic Disorders
- 2005 Endocrine Clinics of North America
- 2008
Associate Editor Endocrinology

REVIEW COMMITTEES

Veterans Administration Merit Review Committee for Endocrinology
1996-2000 (Chair 1999-2000)

American Diabetes Association Research Grant Review Committee
1997-1999 (Chair 1998-1999)

PUBLICATIONS

1. LeRoith, D., and Pimstone, B.L.: Bone metabolism and composition in the protein deprived rat. *Clin. Sci.* 44:305-319, 1973.

2. LeRoith D., and Pimstone, B.L.: The use of simultaneously administered ⁴⁷Ca in the study of calcium kinetics in the rat. *Horm. and Metab. Res.* 5(2):118, 1973.

3. LeRoith, D. and Pimstone, B.L.: Bone densitometry of the femoral midshaft in the protein deprived rat.. *S. Afr. Med. J.* 47:72-74, 1973.

4. LeRoith, D. Vinik, A.I., and Jackson, W.P.U.: Recovering on rewarming after hypothermic hyperglycaemia. *S. Afr. Med. J.* 48:1617-1619, 1974.

5. LeRoith, D. Vinik, A.I., Epstein, S., Baron, P., Olkenitsky, M.N., and Pimstone, B.L.: Somatostatin and serum gastrin in normal subjects and in patients with pernicious anaemia, chronic liver and renal disease. *S. Afr. Med. J.* 49:1601-1604, 1975.

6. Pimstone, B.L. LeRoith, D., Epstein, S., and Kronheim, S.: Disappearance rates of plasma growth hormone after intravenous somatostatin in renal and liver disease. *J. Clin. Endocrinol. Metab.* 41:393-395, 1975.

7. LeRoith, D., and Keeton, F.R.: Isolated partial deficiency of adrenocorticotrophic hormone. *S. Afr. Med. J.* 49:1754-1756, 1976.

8. Epstein. S., LeRoith, D., and Rabkin, R.: The effect of different preparations of human growth hormones on plasma renin activity in normal males. *J. Clin. Endocrinol. Metab.* 42:390, 1976.

9. Pimstone, B.L., Epstein, S., Hamilton, S.M., LeRoith, D., and Hendricks, S.: Metabolic clearance and plasma half disappearance time of exogenous gonadotrophin releasing hormone in liver disease and chronic renal failure. *J. Clin. Endocrinol. Metab.* 44:356-360, 1977.

10. Botha, J.L., Vinik, A.I., LeRoith, D., Child, P.T., and Jackson, W.P.U.: The effects of somatostatin on hormonal and metabolic responses in chronic pancreatitis. *S. Afr. Med. J.* 51:872-875, 1977.

11. Epstein, S., Zylsmit, R.V, LeRoith, D., Vinik, A.I., and Pimstone,

B.L.: Effects of TRH on prolactin, plasma renin activity, water and electrolyte excretion in normal males. *Horm. and Metab. Res.* 9:495-498, 1977.

12. Bernheim, J., Shapiro, M., Spitz, I.M., Shapiro, J., and LeRoith, D.: Elevation des taux de parathormone (PTH) serique en cas d'hyperprolactinemia. *La Nouvelle Pres. Med.* 6:4143, 1977.

13. Danovitch, G.M., LeRoith, D., and Glick, S.M.: Demeclocycline in the syndrome of inappropriate ADH secretion. *Israel J. Med. Sci.* 14:852-856, 1978.

14. LeRoith, D. and Myers, B.D.: Sodium handling and the renin angiotensin -aldosterone system in adult polycystic kidney disease. *Cardiovas. Med.* 3:1215-1211, 1978.

15. Luboshitzky, R., Lavie, P., Sok, Y., Shen Orr, D., Glick, S.M., LeRoith, D., and Barzilai, D.: Antidiuretic hormone secretions and urine flow in aged catheterized patients. *T.I.T. J. of Life Sci.* 8:99-104, 1978.

16. Mahler, D., Hauben, D., LeRoith, D., and Glick, S.M.: Radioimmunoassay of ADH in burn shock period. *Burns* 5:269-273, 1979.

17. Spitz, I.M., Zylber, E., Jersky, J., and LeRoith, D.: Atropine suppression of basal and metoclopramide-induced human pancreatic polypeptide secretion in man. *Metabolism*, 28:527-530, 1979.

18. Zylber, E., LeRoith, D., Jersky, J., and Spitz, I.M.: Metoclopramide induced human pancreatic polypeptide secretion in normal subjects and maturity onset diabetics. In: *Nutrition and the Diabetic Child*. Z. Laron and M. Karp, editors. In series: *Pediatric and Adolescent Endocrinology*, pp.356-360, 1979.

19. Brenner, H., Tovi, F., Sidi, J., Zirkin, H., and LeRoith, D.: Medullary carcinoma of the thyroid. *Israel J. Med. Sci.* 15:151-155, 1979.

20. LeRoith, D., Burshell, A.C., Ilia, R., and Glick, S.M.: Short metacarpal in the patient with idiopathic hypoparathyroidism. *Israel J. Med. Sci.* 15:460-461, 1979.

21. LeRoith, D., Bark, H., and Glick, S.M.: Somatostatin and antidiuretic hormone secretion in dogs. *Horm. Metab. Res.* 11(2):177-178,

1979.

22. Spitz, I.M., Cohen, H., Almaliach, U., and LeRoith, D.: Impaired prolactin response to TRH in isolated gonadotropin deficiency and exaggerated response in seminiferous tubule failure. *J. Clin. Endocrinol. Metab.* 48:941-945, 1979.
23. LeRoith, D., Potashnik, G., and Glick, S.M.: Bromocriptine in hyperprolactinemic amenorrhea: A possible early effect on ovarian steroidogenesis. *Internat. J. of Fertil.* 24:145-147, 1979.
24. LeRoith, D., Shapiro, M.S., Gurman, A., and Spitz, I.M.: Hypothalamic pituitary dysfunction in Cushing's Disease. *J. Endocrinol. Invest.* 2:379-383, 1979.
25. Danovitz, G., LeRoith, D., Sobel, R., Sikuler, E., and Strauss, R.: Amyloid goiter in familial Mediterranean fever. *Clin. Endocrinol.* 11:595-601, 1979.
26. LeRoith, D., Shapiro, M.D., Jabotinsky, K., and Spitz, I.M.: Prolactin nonresponsiveness to arginine in diabetes mellitus. *Horm. and Metab. Res.* 11:583-584, 1979.
27. LeRoith, D., Danovitz, G., Trestian, S., and Spitz, I.M.: Dissociation of prolactin response to TRH and metoclopramide in chronic renal failure. *J. Clin. Endocrinol. Metab.* 49:815-817, 1979.
28. Spitz, I.M., Trestian, S., Cohen, H., Arnon, N., and LeRoith, D.: Failure of metoclopramide to influence LH, FSH, and TSH secretion and their responses to releasing hormones. *Acta Endocrinol.* 92:640-647, 1979.
29. Lavie, P., Luboshitzky, R., Kleinhouse, N., Shen Orr, D., Barzilai, D., Glick, S.M., LeRoith, D., and Levy, J.: Rhythms in urine flow are not correlated with rhythmic secretion of ADH in hyperhydrated normal subjects. *Horm. Metab. Res.* 12:66-70, 1980.
30. LeRoith, D., Danovitz, G., Trestian, S., and Spitz, I.M.: Dissociation of pituitary glycoproteins response to releasing hormones in chronic renal failure. *Acta Endocrinol.* 93:277-282, 1980.
31. Hauben, D.J., LeRoith, D., Glick, S.M., and Mahler, D.: Nonoliguric

vasopressin oversecretion in severely burned patients. *Israel J. Med. Sci.* 16:101-105, 1980.

32. LeRoith, D., Broitman, D., Sukenik, S., and Glick, S.M.: Isolated ACTH deficiency and primary hypothyroidism: Volume-dependent elevation of antidiuretic hormone secretion in the presence of hyponatremia. *Israel J. Med. Sci.* 16:440-443, 1980.

33. LeRoith, D., Farkash, Y., Bar Ziev, J., and Spitz, I.M.: Hypothalamic-pituitary function in the Bardet-Biedl Syndrome. *Israel J. Med. Sci.* 16: 514-518, 1980.

34. Spitz, I.M., LeRoith, D., Trestian, S., Ebert, R., and Creutzfeldt, W.: Effect of acid on GIP secretion in man. In: *Entero-Insular Axis*, Editor, Creutzfeldt, W. In: *Frontiers in Hormone Research*, volume 7, S. Karger AG (Basel), pp. 173-180, 1980.

35. LeRoith, D., Sobel, R., and Glick, S.M.: The effect of clomiphene citrate on pubertal gynecomastia. *Acta Endocrinol.* 95:177-180, 1980.

36. LeRoith, D., Shapiro, M., Luboshitzky, R., and Spitz, I.M.: The hypothalamic-pituitary axis in diabetes mellitus. *Horm. Metab. Res.* 12:608-610, 1980.

37. Spitz, I.M., LeRoith, D., Livshin, Y., Zylar-Haram E., Trestian, S., Laufer, N., Ron, M., Palti, Z., and Shenker, J.: Exaggerated Prl response to TRH and metoclopramide in primary testicular failure. *Fertil. Steril.* 34:573-580, 1980.

38. LeRoith, D., Spitz, I.M., Ebert, R., Liel, Y., Odes, S., and Creutzfeldt, W.: Acid-induced GIP secretion in man. *J. Clin. Endocrinol. Metab.* 51:1385-1389, 1980.

39. Bark, H., Le Roith, D., Nyska, M., and Glick, S.M.: Elevations in plasma ADH levels during Peep in the dog: The mechanism involved. *Am. J. Physiol.* 239:E474-E481, 1980.

40. LeRoith, D., Potashnik, G., Dunn, J., and Spitz, I.M.: The exaggerated prolactin response to TRH and metoclopramide in 1,2-dibromo-3-chloro-propane-induced Azoospermia. *J. Clin. Endocrinol. Metab.* 52:38-41, 1981.

41. Spitz, I.M., Halperin, Y., Shilo, S., LeRoith, D., Zylber-Haram, E., Laufer, N., and Schenker, J.: Clomiphene effects the exaggerated Prl response to TRH and metoclopramide occurring in primary testicular failure. *J. Clin. Endocrinol. Metab.* 52:289-293, 1981.
42. Spitz, I.M., LeRoith, D., Hirsch, H., Carayon, L.P., Pekonen, F., Liel, Y., Sobel, R., Chorier, Z., and Weintraub, B.: Dissociation of biologic and receptor binding activity in a large molecular weight human TSH. *New Engl. J. Med.* 304:278-282, 1981.
43. LeRoith, D., Liel, Y., Caine, M., and Spitz, I.M.: The prolactin response to TRH is intact in the human male castrate. *Acta Endocrinol.* 96:163-167, 1981.
44. LeRoith, D., Liel, Y., Sack, J., Livshin, Y., Laufer, N., Schenker, J., and Spitz, I.M.: The TSH response to TRH is exaggerated in primary testicular failure and intact in the male castrate. *Acta Endocrinol* 97:103-208, 1981.
45. Spitz, I.M. Halperin, Y., Zylber-Haran, E., Shilo, S., LeRoith, D., Liel, Y., Livshin, Y., Laufer, N., and Schenker, J.: Prolactin response to metoclopramide and chlorpromazine in primary testicular failure and isolated gonadotropin deficiency. *Clin. Endocrinol.* 14:375-380, 1981.
46. Le Roith, D., Bark, H., Nyska, M., and Glick, S.M.: The effect of abdominal pressure on plasma antidiuretic hormone levels in the dog. *J. Surg. Res.* 32(1):65-69, 1982.
47. Gardus, D., LeRoith, D., Karplus, M., Zmora, E., Grief, M., and Bar-Ziev, J.: Congenital hyperparathyroidism and rickets: Secondary to maternal hypoparathyroidism and vitamin D deficiency. *Israel J. of Med. Sci.* 17:705-708, 1981.
48. Spitz, I.M., Novis, B.H., Ebert, E., Trestian, S., LeRoith, D., and Creutzfeldt, W.: Betazole-Induced G.I.P. secretion is not mediated by gastric HCL. *Metabolism* 31:380-383, 1982.
49. Rabinowitz, S., Cohen, R., and LeRoith, D.: Anxiety and hirsutism. *Psychological Reports* 53:827-830, 1983.
50. LeRoith, D., Shiloach, J., Roth, J., and Lesniak, M.A.: The

evolutionary origins of vertebrate hormones: Insulin in unicellular organisms. Proc. Natl. Acad. Sci. USA 77:6184-6188, 1980.

51. LeRoith, D., Lesniak, M.A., and Roth, J.: Insulin in insects and annelids. Diabetes 30:70-76, 1981.

52. LeRoith, D., Shiloach, J., Roth, J. and Lesniak, M.A.: Insulin or a closely related molecule is native to E.coli. J. Biol. Chem. 256:6533-6536, 1981.

53. LeRoith, D., Shiloach, J., Roth, J., Liotta, A.S., Krieger, D.T., Lewis, M., and Pert, C.B.: Evolutionary origins of vertebrate hormones: Material very similar to adrenocorticotrophic hormone, beta-endorphin and dynorphin in protozoa. Trans. Assoc. Am. Phys. 94:54-60, 1981.

54. Roth, J., LeRoith, D., Shiloach, J., Rosenzweig, J.L., Lesniak, M.A., and Havrankova, J.: The evolutionary origins of hormones, neurotransmitters, and other extracellular chemical messengers: Implications for mammalian biology. N. Engl. J. Med. 306:523-527, 1982.

55. LeRoith, D., Liotta, A.S., Roth, J., Shiloach, J., Lewis, M.E., Pert, C.B. and Krieger, D.T. Corticotropin and β -endorphin-like materials are native to unicellular organisms. Proc. Natl. Acad. Sci. U.S.A., 79:2086-2090, 1982.

56. Berelowitz, M., LeRoith, D., Von Schenk, H., Newgard, C., Szabo, M., Frohman, L.A., Shiloach, J., and Roth, J. Somatostatin-like immunoreactivity and biological activity is native to tetrahymena pyriformis, a ciliated protozoan. Endocrinology 110:1939-1944, 1982.

57. LeRoith, D., Shiloach, J., and Roth, J.: Is there an earlier phylogenetic precursor that is common to both the nervous and endocrine systems?: Peptides 3:211-215, 1982.

58. LeRoith, D., Shiloach, J., Berelowitz, M., Frohman, L.A., Liotta, A.S., Krieger, D.T., and Roth, J., Are messenger molecules in microbes the ancestors of the vertebrate hormones and tissue factors? Fed. Proc. 42:2602-2607, 1983.

59. Rosenzweig, J.L., LeRoith, D., Lesniak, M.A., MacIntyre, I., Sawyer W.H., and Roth, J. Two distinct insulins in the guinea pig: the broad

relevance of these findings to evolution of peptide hormones. *Fed. Proc.* 42(9):2608-14, 1983.

60. LeRoith, D., Shiloach, J., and Roth, J.: Coexistence of multiple neuroactive substances in single neurons: Do recent evolutionary studies provide a rational interpretation In: *Coexistence of Neuroactive Substances*. Chan-Palay, V. and Palay, S.L. (Eds.). John Wiley and Sons (New York); 411-421, 1983.

61. Schwabe, C., LeRoith, D., Thompson, R.P., Shiloach, J., and Roth, J.: Relaxin extracted from protozoa (*T. Pyriformis*): Molecular and immunological properties. *J. Biol. Chem.* 258:2778-2781, 1983.

62. LeRoith, D., Hendricks, S.A., Lesniak, M.A., Rishi, S., Becker, K.L., Havrankova, J., Rosenzweig, J.L. Brownstein, M.J., and Roth, J. Insulin in Brain and Other Extrapaneatic Tissues of Vertebrates and Nonvertebrates. In: *Advances in Metabolic Disorders*, Vol. 10, Chapter 11, pp.303-340, 1983. Szabo, A.J., Luft, R., and Levine, R. (Eds.), Academic Press, Inc. N.Y.

63. Lesniak, M.A., Hendricks, S.A., LeRoith, D., Young, S., Rosenzweig, J.L., Havrankova, J., Brownstein, M.J., Rishi, S., Becker, K.L., and Roth, J.: Insulin receptors and insulin in brain and other extrapancreatic tissues of vertebrates and nonvertebrates. *Proceedings of the XIth Congress of the International Diabetes Federation Excerpta Medica* pp. 213-322, 1983.

64. Roth, J. and LeRoith, D.: Intercellular Communication: The evolution of scientific concepts and of messenger molecules. In: *Medicine, Science, and Society: Symposia Celebrating The Harvard Medical School Bicentennial*, p. 425-447, John Wiley Med. Publishers, 1984.

65. Roth, J. and LeRoith, D.: Evolutionary origins of intercellular communication: Implications for human biology. In: *Receptors and the Upper G.I. tract*, p. 1-10, Eds. B.I. Hirschowitz and J.G. Spenner, Adis Press, 1983.

66. LeRoith, D. and Roth, J. Vertebrate hormones and neuropeptides in microbes: evolutionary origins of intercellular communication. In: *Frontiers in Neuro-endocrinology*, Vol. 8:1-25, Eds. L. Martini and W.F. Ganong. Raven Press, 1984.

67. Roth, J., LeRoith, D., Shiloach, J., and Rubinovitz, C.: Intercellular communication: An attempt at a unifying hypothesis. *Clin. Res* 31:354-363, 1983.
68. Deftos, L., LeRoith, D., Shiloach, J., and Roth, J.: Salmon calcitonin-like immunoactivity in extracts of *Tetrahymena pyriformis*. *Horm. Metab. Res.* 17:82-85, 1985.
69. Shiloach, J., Rubinovitz, C., and LeRoith, D. Extraction of insulin-related material and other peptide hormones from *Tetrahymena pyriformis*. In: *Recovery and Purification Processes for Fermentation Products*. Amer. Chem. Society Symposium Series 271, pp. 175-192, Eds. D. LeRoith, J. Shiloach, and T. Leahy, 1985.
70. LeRoith, D. Phylogenetic conservation of hormone-related peptides: immunocytochemical and physicochemical studies in non-vertebrates and unicellular organisms. In: *Immunolabelling for Electron Microscopy*, pp. 305-332, Eds. J.M. Polak and I.M. Varndell, Elsevier Press, 1984.
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