June, 2005

CURRICULUM VITAE

Jackie D. Corbin

A. Personal Data

Birthdate: February 8, 1941
Citizenship Status: United States of America
U.S. Social Security Number: 240-64-6182
Office Address: Department of Molecular Physiology and Biophysics
766 Medical Research Building
Vanderbilt University School of Medicine
Nashville, TN 37232-0615 USA
(615) 322-4384

B. Educational Background

1963 B.S. Tennessee Polytechnic Institute, Cookeville, Tennessee
1968 Ph.D. Vanderbilt University, Nashville, TN (Advisor: Dr. C.R. Park)
1971 Postdoctoral University of California, Davis, CA (Advisor: Dr. E.G. Krebs)

C. Professional Experience and Positions Held

1980-present Professor, Dept. of Molecular Physiology & Biophysics, Vanderbilt University School of Medicine, Nashville, TN

1975-1980 Associate Professor, Dept of Molecular Physiology & Biophysics, Vanderbilt University School of Medicine, Nashville, TN

1971-1975 Assistant Professor, Dept. of Molecular Physiology & Biophysics, Vanderbilt University School of Medicine, Nashville, TN

Jan-Jul 1978 Visiting Scientist, Department of Clinical Biochemistry, University of Otago, Dunedin, New Zealand. Studies of insulin action on phosphodiesterase in collaboration with Drs. Loten and J.G.T. Sneyd.

July 1972-Sept. 1989 Investigator Howard Hughes Medical Institute, Dept. of Physiology, Vanderbilt University, Nashville, TN

1968-1971	USPHS Predoctoral Trainee and ADA Research Awardee, Department of Biological Chemistry, University of California
Sept. 1963-Oct. 1968	Ph.D. Thesis Research, Department of Physiology, Research Vanderbilt University, Nashville, TN

Board Memberships

June 1977-Jan. 1983	Editorial Board, The Journal of Biological Chemistry
Jan. 1979-Dec. 1983	Editorial Board, Molecular and Cellular Endocrinology
June 1984-present	Editorial Board, Journal of Cyclic Nucleotide and Phosphoprotein Research
1989-present	Editorial Advisory Board, Biochemistry
1991-present	Editorial Board, The Journal of Biological Chemistry

National Service

1984	Chairman, Gordon Research Conference on Cyclic Nucleotides
1991	Chairman, FASEB Summer Research Conference "Protein Kinases"
1987	Organizer, HHMI Workshop on cGMP Action
1989	Organizer, HHMI Workshop on cAMP-Dependent Protein Kinase
1995	Chairman, Ninth International Conference on Second Messengers and Phosphoproteins
1998	Chairman, Gordon Research Conference on Cyclic Nucleotide Phosphodiestserases

Service on Study Sections and Site Visitations

Tennessee Heart Association Study Section (3 years)
American Cancer Society Study Section (ad hoc)
NIH Study Section, Metabolism (ad hoc)
NIH Study Section, Biochemistry (ad hoc)
NIH Intramural Site Visit
Howard Hughes Medical Institute Graduate Student Evaluation Panel

D. Honors or Awards

March 1974-present	Diabetes-Endocrinology Center Grant Awardee, Department of Physiology, Vanderbilt University, Nashville, TN.
May 1972-present	NIH Research Grant Awardee, Department of Physiology, Vanderbilt University, Nashville, TN.
July 1971-July 1972	American Diabetes Association Research and Development Awardee, Department of Physiology, Vanderbilt University, Nashville, TN.
October 1968-July 1971	Postdoctoral Fellow of the NIH (Advisor: Dr. E.G. Krebs) and American Diabetes Association Research and Development Awardee, Department of Biological Chemistry, University of California, Davis, CA.
1994	Wellcome Visiting Professor (Univ. of North Dakota)
1995	Chairman, Ninth International Conference on Second Messengers and Phosphoproteins
1998	Chairman, 1st Gordon Research Conference on Cyclic Nucleotide Phosphodiesterases
1971-1976	Glaxo Cardiovascular Discovery Grant Awardee
2002	John H. Exton Award for Outstanding Contribution to Research

E. Teaching

i. Graduate Students Supervised

Charles Cobb, Ph.D.	1986
Lynn Wolfe, Ph.D.	1988
Melissa Thomas, Ph.D.	1989
Hang Jiang, Ph.D.	1992
Linda McAllister, Ph.D.	1994
Celeste Poteet, Ph.D.	1996
Jeff Smith, Ph.D.	1996
Robin Reed, Ph.D.	1996
Der-Ming Chu	1994

Michelle Fosler	1994
Tamara Haik	1994
Rene Combs	1995
Robin Richey-Janetta	1977-present
Jenny Busch	1977-present
Wendall Lu	1977-present

ii. Postdoctoral Fellows Supervised

S. Keely	1972-75
P. Sugden	1973-75
D. Flockhart	1976-79
T. Lincoln	1976-79
S. Rannels	1978-83
A. Robinson-Steiner	1981-83
V. Sheorain	1985-86
S. Beebe	1982-87
T. Gettys	1985-87
S. Cordle	1986-88
T. Woodford	1986-89
A. Robichon	1987-89
J. Shabb	1988-92
J. Atkinson	1989-93
R. Sekhar	1990-95
F. Burns	1992-94
T. Wyatt	1992-95
L. Turko	1994-99
V. Gopal	1999-2000

iii. Graduate Thesis Committees
Served on ~ 25 committees

Two medical students are mentored in this lab each year in the Research Component of the first-year curriculum (two days per week for three months). At least one medical student is mentored for three summer months (five days per week).

iv. Lectures

Year	# Hours	Topic
1972-present	6 per year	Cardiac Physiology (Medical Physiology)

1985-present	1 per year	Exercise Physiology (Medical Physiology)
	1 per year	Cell Signaling (Medical Physiology)
	1 per year	Altitude/diving (Medical Physiology)
1985-present	2 per year	Molecular Endocrinology (protein phosphorylation, phosphodieterases)
1986-1987	1 per year	Insulin Secretion and Action, Diabetes
1988-present	2 per year	Signal Transduction (Meharry Graduate Biochemistry)

v. Visiting Professorships or Participation in Special Courses

February-July 1978	Otago University, Department of Clinical Biochemistry (New Zealand)
May-June 1986	University of Bergen-Anatomy Institute (Norway)

1976 Publications

1. Corbin, JD. The role of adenosine 3',5'-monophosphate in adipose tissue metabilism. Ph.D. Thesis, Vanderbilt University, 1968.

2. Sneyd, JGT, Corbin, JD, and Park, CR. The role of cyclic AMP in the actions of insulin. Presented at the International Symposium on the Pharmacology of Hormonal Polypeptides and Proteins, Milan. In: Pharmacology of Hormonal Polypeptides and Proteins 367-376, 1968.

3. Corbin, JD and Krebs, EG. A cyclic AMP-stimulated protein kinase in adipose tissue. Biochem. Biophys. Res. Commun. 36, 328-336, 1969.

4. Krebs, EG, Walsh, DH, Reimann, EM, Brostrom, MA, Corbin, JD, Hickenbottom, JP, and Soderling, TR. Cyclic AMP as a regulatory agent in carbohydrate and lipid metabolism. In: Fogarty International Proceedings 4, 127-136, 1969.

5. Park, CR, Sneyd, JGT, Corbin, JD, Jefferson, LA, and Exton, JH. Role of cyclic adenylate in the actions of insulin. In: Proceedings of the Sixth Congress of the International Diabetes Federation. Stockholm: Excerpta Medica Foundation, Diabetes, 5-15, 1969.

6. Corbin, JD, Reimann, EM, Walsh, DA, and Krebs, EG. Activation of adipose tissue lipase by skeletal muscle cyclic adenosine 3',5'- monophosphate-stimulated protein kinase. J. Biol. Chem. 245, 4849- 4851, 1970.

7. Walsh, DA, Krebs, EG, Reimann, E, Brostrom, M, Corbin, JD, Hickenbottom,

JP, Soderling, TR, and Perkins, JP. The receptor protein for cyclic AMP in the control of glycogenolysis. In: Role of cyclic AMP in cell functions: Eds. P. Greengard and E. Costa. Advances in Biochemical Psychopharmacology 3, 265-285, 1970.

8. Brostrom, CO, Corbin, JD, King, CA, and Krebs, EG. Interaction of the subunits of adenosine 3',5'-monophosphate-dependent protein kinase of muscle. Proc. Natl. Acad. Sci., USA 68, 2444-2447, 1971.

9. Reimann, EM, Brostrom, CO, Corbin, JD, King, CA, and Krebs, EG. Separation of regulatory and catalytic subunits of the cyclic 3',5'-adenosine monophosphate-dependent protein kinase(s) of rabbit skeletal muscle. Biochem. Biophys. Res. Commun. 42, 187-194, 1971.

10. Corbin, JD, Brostrom, CO, Alexander, RL, and Krebs, EG. Adenosine 3',5'-monophosphate-dependent protein kinase from adipose tissue. J. Biol. Chem. 247, 3736-3743, 1972.

11. Corbin, JD, Brostrom, CO, King, CA, and Krebs, EG. Studies on the adenosine, 3',5'-monophosphate-dependent protein kinases of rabbit skeletal muscle. J. Biol. Chem. 247, 7790-7798, 1972.

12. Corbin, JD, Soderling, TR, and Park, CR. Regulation of adenosine 3',5'-monophosphate-dependent protein kinase (I). J. Biol. Chem. 248, 1813-1821, 1972.

13. Exton, JH, Friedmann, N, Wong, EH, Brineaux, JP, Corbin, JD, and Park, CR. Interaction of glucocorticoids with glucagon and epinephrine in the control of gluconeogenesis and glycogenolysis in liver and of lipolysis in adiopose tissue. J. Biol. Chem. 247, 3579-3588, 1972.

14. Soderling, TR, Corbin, JD, and Park, CR. Regulation of adenosine 3',5'-monophosphate-dependent protein kinase (II). J. Biol. Chem. 248, 1822-1829, 1972.

15. Walsh, DA, Brostrom, MA, Brostrom, L, Chen, L, Corbin, JD, Reimann, E, Soderling, TR, and Krebs, .G. Cyclic AMP-dependent protein kinases from skeletal muscle and liver. Adv. in Cyclic Nucleotide Res. 1, 33-45, 1972.

16 Corbin, JD and Reimann, ER. Assay of cyclic AMP-dependent protein kinases. Methods Enzymol., 38, 287-290, 1974.

17. Means, AR, MacDougall, E, Soderling, T,. and Corbin, JD. Testicular adenosine 3',5'-monophosphate-dependent protein kinase. J. Biol. Chem.

249, 1231-1238, 1974.

18. Soderling, TR, Corbin, JD, and Park, CR. Techniques for the study of protein kinase activation in intact cells. Methods Enzymol. 38, 358-367, 1974.

19. Corbin, JD, Keely, SL, and Park, CR. Distribution and dissociation of adenosine 3',5'-monophosphate-dependent protein kinases in adipose cardiac and other tissues. J. Biol. Chem. 250, 218-225, 1975.

20. Corbin, JD, Keely, SR, Soderling, TR, and Park CR. Hormonal regulation of adenosine 3',5'-monophosphate-dependent protein kinase. Adv. in Cyclic Nucleotide Res. 5, 265-279, 1975.

21. Keely, SL, Corbin, JD, and Park, CR. Regulation of adenosine 3',5'-monophosphate-dependent protein kinase: Regulation of the heart enzyme by epinephrine, glucagon, insulin and 1-methyl-3-isobutylxathine. J. Biol. Chem. 250, 4832-4840, 1975.

22. Keely, SL, Corbin, JD, and Park, CR. On the question of trans- location of heart cyclic AMP-dependent protein kinase. Proc. Natl. Acad. Sci., USA 72, 1501-1504, 1975.

23. Corbin, JD, Soderling, TR, Sugden, PH, Keely, SL, and Park, CR. Control of metabolic processes by cAMP-dependent protein phosphorylation. In: Eukaryotic Cell Function and Growth. Eds. Dumont, JE, Brown, B,and Marshall, NJ, pp. 231-247, Plenum Press, London, 1976.

24. Cherrington, AD, Assimacopoulos, FD, Harper, SC, Corbin, JD, Park, CR, and Exton, JH. Studies on the alpga-adrenergic activation of hepatic glucose output. Investigation of the roles of adenosine 3',5'- monophosphate and adenosine 3',5'-monophosphate-dependent protein kinase in the actions of phenylephrine in isolated hepatocytes. J. Biol. Chem. 251, 5209-5218, 1976.

25. Lincoln, TM, Hall, CL, Park, CR, and Corbin, JD. Guanosine 3',5'-cyclic monophosphate binding proteins in rat tissues. Proc. Natl. Acad. Sci., USA 73, 2559-2563, 1976.

26. Sugden, PH, Holladay, LA, Reimann, EM, and Corbin, JD. Purification and characterization of the catalytic subunit of adenosine 3',5' cyclic monophosphate-dependent protein kinase from bovine liver. Biochem. J. 159, 409-422, 1976.

27. Sugden, PH and Corbin, JD. Adenosine 3',5'-cyclic monophosphate-binding proteins in bovine and rat tissue. Biochem. J. 159, 423-437, 1976.

28. Corbin, J. and Keely, SL. Characterization and regulation of heart adenosine 3',5'-monophosphate-dependent protein kinase isozymes. J. Biol. Chem. 252, 910-918, 1977.

29. Corbin, JD, Sugden, PH, Lincoln, TM, and Keely, SL. Compartmentalization of adenosine 3',5'-monophosphate-dependent protein kinase in heart tissue. J. Biol. Chem. 252, 3854-3861, 1977.

30. Lincoln, TM, Dills, WL, and Corbin, JD. Purification and subunit composition of guanosine 3':5'-monophosphate-dependent protein kinase from bovine lung. J. Biol. Chem. 252, 4269-4275, 1977.

31. Lincoln, T and Corbin, JD. Adenosine 3',5'-monophosphate-dependent protein kinases: Possible homologous proteins. Proc. Natl. Acad. Sci., USA 74, 3239-3243, 1977.

32. Riou, JP, Claus, TJ, Flockhart, DA, Corbin, JD, and Pilkis, SJ. In vivo and in vitro phosphorylation of rat liver fructose 1-6 diphosphatase. Proc. Natl. Acad. Sci., USA 74, 4615-4619, 1977.

33. Keely, SL and Corbin, JD. Involvement of cAMP-dependent protein kinase in the regulation of heart contractile force. Am. J. Physiol. 233, H269-H275, 1977.

34. Keely, SL, Corbin, JD, and Lincoln, TM. Alpha adrenergic involvement in heart metabolism: Effects on adenosine cyclic 3',5'- monosphosphate, adenosine cyclic 3',5'-monophosphate-dependent protein kinase, guanosine 3',5'-monophosphate, and glucose transport. Mol. Pharm. 13, 965-975, 1977.

35. Corbin, JD and Lincoln, TM. Comparison of cAMP- and cGMP- dependent protein kinases. Adv. in Cyclic Nucleotide Res. 9, 159-170, 1978.

36. Corbin, JD, Sugden, PH, West, L, Flockhart, DA, Lincoln, TM, and McCarthy, D. Studies on the properties and mode of action of the purified regulatory subunit of bovine heart adenosine 3',5'-monophosphate-dependent protein kinase. J. Biol. Chem. 253, 3997-4003, 1978.

37. Keely, SL, Lincoln, TM, and Corbin, JD. Interaction of acetylcholine and epinephrine on heart cyclic AMP-dependent protein kinase. Am. J. Physiol. 234(4), H432-H438, 1978.

38. Lincoln, TM and Corbin, JD. Purified cyclic GMP-dependent protein kinase catalyzes the phosphorylation of cardiac tropinin inhibitory subunit (TN-I). J.

Biol. Chem. 253, 337-339, 1978.

39. Lincoln, TM and Corbin, JD. On the role of the cAMP- and cGMP-dependent protein kinases in cell function. J. Cyclic Nucleotide Res. 4, 3-14, 1978.

40. Lincoln, TM, Flockhart, DA, and Corbin, JD. Studies on the structure and mechanism of activation of cGMP-dependent protein kinase. J. Biol. Chem. 253, 6002-6009, 1978.

41. Dills, WL, Goodwin, CD, Lincoln, TM, Beavo, JA, Bechtel, PJ, Corbin, JD, and Krebs, EG. Purification of cyclic nucleotide receptor proteins by cyclic nucleotide affinity chromatography. Adv. in Cyclic Nucleotide Res. 10, 199-217, 1979.

42. Rannels, SR and Corbin, JD. Characterization of small cAMP- binding fragments of cAMP-dependent protein kinase. J. Biol. Chem. 254, 8605-8610, 1979.

43. Corbin, JD and Rannels, SR. Studies of functional domains of the regulatory subunit from cAMP-dependent protein kinase isozyme I. J. of Cyclic Nuc. Res. 6, 201-215, 1980.

44. Flockhart, DA, Watterson, DM, and Corbin, JD. Studies on functional domains of the regulatory subunit of bovine heart adenosine 3',5'-monophosphate-dependent protein kinase. J. Biol. Chem. 255, 4435-4440, 1980.

45. Francis, SH, Lincoln, TM, and Corbin, JD. Characterization of a novel cGMP binding protein from lung. J. Biol. Chem. 255, 620-626, 1980.

46. Loten, EG, Francis, SH, and Corbin, JD. Proteolytic solubilization and modification of hormone-sensitive cyclic nucleotide phosphodiesterase. J. Biol. Chem. 255, 7838-7844, 1980.

47. Rannels, SR and Corbin, JD. Two different intrachain cAMP binding sites of cAMP-dependent protein kinases. J. Biol. Chem. 255, 7085- 7088, 1980.

48. Corbin, JD and Rannels, SR. Studies on the function of the two intrachain cAMP binding sites of protein kinase. J. Biol. Chem. 256, 7871- 7876, 1981.

49. Corbin, JD, Rannels, SR, Flockhart, DA, Robinson, AM, and Atkins, PD. Cyclic nucleotide-binding sites of protein kinases. In Cold Spring Harbor Conferences on Cell Proliferation, Vol. 8, Protein Phosphorylation. (Eds. O.M. Rosen and E.G. Krebs) p. 45-53. Cold Spring Harbor Laboratory, 1981.

50. Corbin, JD and Rannels, SR. Perturbation and structural organization of the two intrachian cAMP binding sites of cAMP-dependent protein kinase II. J. Biol. Chem. 256, 11671-11676, 1981.

51 Corbin, JD, Rannels, SR, Flockhart, DA, Robinson-Steiner, AM, Tigani, MC, Doskeland, SO, Suva, RH, and Miller, JP. Effect of cyclic nucleotide analogs on intrachain Site 1 of protein kinase isozymes. Eur. J. Biochem. 125, 259-266, 1982.

52. Flockhart, DA and Corbin, JD. Regulatory mechanisms in the control of protein kinases. In Critical Reviews in Biochemistry. (Ed. G.D. Fasman) CRC Press, Inc. 12, 133-186, 1982.

53. Ogreid, D, Doskeland, SO, Suva, R, Miller, J, and Corbin, JD. Analog specificity of and effect of MgATP on the binding to the two intrachain cGMP-binding sites of cGMP-dependent protein kinase. 5th Intl. Conf. on Cyclic Nucleotides and Prot. Phos., Milan, Italy, June 27-July 1 (Abstract), 1982.

54. Rannels, SR and Corbin, JD. Studies on the function of two intrachain cAMP binding sites of heart protein kinase. In Advances in Myocardiology. (Ed. E. Chazov, V. Smirnov and N.S. Dhalla) Plenum Publishing Corporation. 3, 531-539, 1982.

55. Robinson-Steiner, AM and Corbin, JD. Stimulation of [3H]cIMP binding by cAMP analogs in extracts of perfused rat hearts. J. Biol. Chem. 257, 5482-5489, 1982.

56. Corbin, JD. Determination of the cAMP-dependent protein kinase activity ratio in intact tissues. Methods Enzymol. 99, 227-232, 1983.

57. Corbin, JD and Doskeland, SO. Studies of two different intrachain cGMP-binding sites of cGMP-dependent protein kinase. J. Biol. Chem. 258, 11391-11397, 1983.

58. Corbin, JD and Hardman, JG. (Volume Editors) Hormone Action:Part F (Protein kinases) Methods Enzymol. (Ed. S.P. Colowick and N.O. Kaplan) Academic Press, New York, 1983.

59. Lincoln, TM and Corbin, JD. Characterization and biological role of the cGMP-dependent protein kinase. Adv. Cyclic Nuc. Res. 15, 139-192, 1983.

60. Rannels, SR, Beasley, A, and Corbin, JD. Regulatory subunits of bovine heart

and rabbit skeletal muscle cAMP-dependent protein kinase isozymes. Methods Enzymol. 99, 55-62, 1983.

61. Rannels, SR and Corbin, JD. Using analogs to study selectivity and cooperativity of cyclic nucleotide binding sites. Methods Enzymol. 99, 168-175, 1983.

62. Robinson-Steiner, AM and Corbin, JD. Probable involvement of both intrachain cAMP binding sites in activation of protein kinase. J. Biol. Chem. 258(2), 1032-1040, 1983.

63. Beebe, SJ and Corbin, JD. Rat adipose tissue cAMP-dependent protein kinase: A unique form of type II. J. Mol. Cell Endocrinology 36, 67-78, 1984.

64. Beebe, SJ, Holloway, R, Rannels, SR, and Corbin, JD. Two classes of cAMP analogs which are selective for the two different cAMP- binding sites of Type II protein kinase demonstrate synergism when added together to intact adipocytes. J. Biol. Chem. 259, 3539-3547, 1984.

65. Doskeland, AP, Schworer, CM, Doskeland, SO, Chrisman, TD, Soderling, TR, Corbin, JD, and Flatmark, T. Some aspects of the phosphorylation of phenylalanine 4-monooxygenases by a calcium-dependent and calmodulin-dependent protein kinase. Eur. J. Biochem. 145, 31-37, 1984.

66. Flockhart, DA and Corbin, JD. Preparation of the catalytic subunit of cAMP-dependent protein kinase. In: Brain Receptor Methodologies, Part A (Marangos, P.J., Campbell, I.C., and Cohen, R.M., eds) Orlando: Academic Press, pp. 209-215, 1984.

67. Flockhart, DA, Freist, W, Hoppe, J, Lincoln, TM, and Corbin, JD. ATP analog specificity of cAMP-dependent protein kinase, cGMP- dependent protein kinase, and phosphorylase kinase. Eur. J. Biochem. 140, 289-295, 1984.

68. Robinson-Steiner, AM, Beebe, SJ, Rannels, SR, and Corbin, JD. Microheterogeneity of type II cAMP-dependent protein kinase in various mammalian species and tissues. J. Biol. Chem. 259, 10596-10605, 1984.

69. Corbin, JD, Beebe, SJ, and Blackmore, PF. cAMP-dependent protein kinase activation lowers hepatocyte cAMP. J. Biol. Chem. 260, 8731, 1985.

70. Khatra, BS, Printz, RL, Cobb, CE, and Corbin, JD. Regulatory subunit of cAMP-dependent protein kinase inhibits phosphoprotein phosphatase. Biochem. Biophys. Res. Comm. 130, 567, 1985.

71. Ogreid, D, Ekanger, R, Suva, RH, Miller, JP, Sturm, P, Corbin, JD, and Doskeland, SO. Activation of protein kinase isozymes by cyclic nucleotide analogs used singly or in combination. Eur. J. Biochem. 150, 219, 1985.

72. Rannels, SR, Cobb, CE, Landiss, LR, and Corbin, JD. The regulatory subunit monomer of cAMP-dependent protein kinase retains the salient kinetic properties of the native dimeric subunit. J. Biol. Chem. 260, 3423-3430, 1985.

73. Sheorain, VS, Corbin, JD, and Soderling, TR. Phosphorylation of sites 3 and 4 in rabbit skeletal muscle glycogen synthase by cAMP- dependent protein kinase. J. Biol. Chem. 260, 1567-1572, 1985.

74. Beebe, SJ, Redmon, JB, Blackmore, PF, and Corbin, JD. Discriminative insulin antagonism of stimulatory effects of various cAMP analogs on adipocyte lipolysis and hepatocyte glycogenolysis. J. Biol. Chem. 260, 15781, 1985.

75. Noland, TD, Corbin, JD, and Garbers, DL. Cyclic AMP- dependent protein kinase isozymes of bovine epididymal spermatozoa: Evidence against the existence of an ectokinase. Biol. Reprod. 34, 681- 689, 1986.

76. Robinson-Steiner, AM and Corbin, JD. Protein phosphorylation in the heart. In: The Heart and Cardiovascular System (Fozzard, H.A., Haber, E., Jennings, R.B., Katz, A.M., and Morgan, H.A., eds.) New York: Raven Press, pp. 887-910, 1986.

77. Beebe, SJ, Blackmore, PF, Segaloff, DL, Koch, SR, Burks, D, Limbird, LE, Granner, DK, and Corbin, JD. The use of cAMP analogs to study cAMP-dependent protein kinase-mediated events in intact mammalian cells. In: Hormones and Cell Regulation. Ed. Nunez, J. et al. Colloque INSERM/John Libbey Eurotex Ltd., Vol. 139, pp. 159-180, 1986.

78. Beebe, SJ and Corbin, JD. Cyclic nucleotide-dependent protein kinases. In: The Enzymes, 3rd edition, vol 17 (Krebs, EG and Boyer, PD, Eds.) Orlando and London,Academic Press, Inc., pp. 43-111, 1986.

79. Corbin, JD, Beebe, SJ, Blackmore, PF, Redmon, JB, Sheorain, VS, and Gettys, TW. Discriminative insulin antagonism of effects of different cAMP analogs in intact mammalian cells. In: Mechanisms of Insulin Action (Belfrage, P, Donner, J, and Stralfors, P, eds.) Amsterdam: Elsevier, pp. 167-174, 1986.

80. Gettys, TW, Blackmore, PF, Redmon, JB, Beebe, SJ, and Corbin, JD. Short-term feedback regulation of cAMP by accelerated degradation in rat tissues. J. Biol. Chem. 262, 333-339, 1987.

81. Doskeland, SO, Vintermyr, OK, Corbin, JD, and Ogreid, D. Studies on the interactions between the cyclic nucleotide-binding sites of cGMP-dependent protein kinase. J. Biol. Chem. 262, 3534-3540, 1987.

82. Beebe, SJ, Koch, SR, Chu, TW, Corbin, JD, and Granner, D.K. Regulation of phosphoenolpyruvate carboxykinase gene transcription in H4IIE hepatoma cells: evidence for a primary role of the catalytic subunit of 3',5'-cyclic adenosine monophosphate-dependent protein kinase. Mol. Endocrinol. 1, 639-647, 1987.

83. Gettys, TW and Corbin, JD. The protein kinase family of enzymes. In: Critical Reviews in Biochemistry (Ed. Fasman, GD) CRC Press, Inc., 1987.

84. Corbin, JD, Beebe, SJ, Cobb, CE, Francis, SH, Wells, JN, Keely, SL, Gettys, TW, Blackmore, PF, Wolfe, S, and Landiss, LR. Signal transduction through cAMP. In: Signal Transduction and Protein Phosphorylation (L.M.G. Heilmeyer, Ed.) New York and London: Plenum Publishing Corporation, NATO ASI Series, Series A:Life Sciences, Vol. 135, pp. 11-15, 1987.

85. Wolfe, L, Francis, SH, Landiss, LR,and Corbin, JD. Interconvertible cGMP-free and cGMP-bound forms of cGMP-dependent protein kinase in mammalian tissues. J. Biol. Chem. 262, 18906-18913, 1987.

86. Cobb, CE, Beth, AH, and Corbin, JD. Purification and characterization of an inactive form of cAMP-dependent protein kinase containing bound cAMP. J. Biol. Chem. 262, 16566-16574, 1987.

87. Gettys, TW, Blackmore, PF, and Corbin, JD. An assessment of phosphodiesterase activity in situ after treatment of hepatocytes with hormones. Am. J. Physiol. 254, E449-E453, 1988.

88. Francis, SH, Noblett, BD, Todd, BW, Wells, JN, and Corbin, JD. Relaxation of vascular and tracheal smooth muscle by cyclic nucleotide analogs that preferentially activate purified cGMP-dependent protein kinase. Molecular Pharmacology 34, 506-517, 1988.

89. Corbin, JD, Gettys, TW, Blackmore, PF, Beebe, SJ, Francis, SH, Glass, DB, Redmon, JB, Sheorain, VS, and Landiss, LR. Purification and assay of cAMP, cGMP, and cyclic nucleotide analogs in cells treated with cyclic nucleotides analogs. Methods Enzymol. 159, 74- 82, 1988.

90. Corbin, JD, Cobb, CE, Beebe, SJ, Granner, DK, Koch, SR, Gettys, TW, Blackmore, PF, Francis, SH, and Wells, JN. Mechanism and function of cAMP- and cGMP-dependent protein kinases. In Advances in Second Messenger and Protein Phosphorylation Research, Vol. 21 (R. Adelstein, C. Klee, and M. Rodbell, Eds.) New York: Raven Press, pp. 75- 86, 1988.

91. Beebe, SJ, Blackmore, PF, Chrisman, TD, and Corbin, JD. Use of synergistic pairs of site-selective cAMP analogs in intact cells. Methods Enzymol. 159, 118-139, 1988.

92. Cobb, CE and Corbin, JD. Purification of cAMP-free and cAMP- bound forms of bovine heart cAMP-dependent protein kinase holoenzyme, 1988. Methods Enzymol. 159, 202-208.

93. Beebe, SJ, Beasley-Leach, A, and Corbin, JD. cAMP analogs used to study low-Km, hormone-sensitive phosphodiesterase. Methods Enzymol. 159, 531-540, 1988.

94. Francis, SH and Corbin, JD. Purification of cGMP-binding protein phosphodiesterase from rat lung. Methods Enzymol. 159, 722-729, 1988.

95. Gettys, TW, Vine, AJ, Simonds, MF, and Corbin, JD. Activation of the particulate low Km phosphodiesterase of adipocytes by addition of cAMP-dependent protein kinase. J. Biol. Chem. 263, 10359-10363, 1988.

96. Woodford, TA, Correll, L, Corbin, JD, and McKnight, GS. Expression and characterization of mutant forms of type I regulatory subunit of cAMP-dependent protein kinase. The effect of defective cAMP binding on holoenzyme activation. J. Biol. Chem. 264, 13321-13328, 1988.

97. Correll, L, Woodford, T, Corbin, JD, Mellon, PL, and McKnight, GS. Expression of two cAMP binding mutations in type I protein kinase decreases holoenzyme activation in purified, reconstituted holoenzyme and in cell culture. J. Biol. Chem. 264, 16672-16678, 1989.

98. Wolfe, L, Francis, SH, and Corbin, JD. Properties of a cGMP- dependent monomeric protein kinase from bovine aorta. J. Biol. Chem. 264, 4157-4162, 1989.

99. Wolfe, L, Corbin, JD, and Francis, SH. Characterization of a novel isozyme of cGMP-dependent protein kinase from bovine aorta. J. Biol. Chem. 264, 7734-7741, 1989.

100. Wolfe, L and Corbin, JD. Cyclic nucleotides and disease. Current Opinion in Cell Biol.1, 215-219, 1989.

101. Francis, SH, Thomas, MK, Corbin, JD. Cyclic GMP-binding Cyclic GMP-specific phosphodiesterase from lung. In: Cyclic Nucleotide Phosphodiesterase: Structure, Regulation and Drug Action. Molecular Pharmacology of Cell Regulation, Vol. 2 (Joseph Beavo and Miles Houslay, Eds.), John Wiley and Sons, Ltd., Chichester, England, pp 117-140, 1989.

102. Beebe, SJ, Segaloff, DL, Beasley-Leach, A, Limbird, LE, and Corbin, JD. Evidence that cAMP-dependent protein kinase activation causes pig ovarian granulosa cell differentiation, including increases in two type II subclasses of this enzyme. Biology and Reprod. 41, 295-307, 1989.

103. Weber, IT, Shabb, JB, and Corbin, JD. Predicted structures of the cGMP-dependent protein kinase: A key alanine/threonine difference in evolutionary divergence of cAMP and cGMP binding sites. Biochemistry 28, 6122-6127, 1989.

104. Paveto, C, Passeron, S, Corbin, JD, and Moreno, S. Two different intrachain cAMP sites in the cAMP-dependent protein kinase of the dimorphic fungus Mucor rouxii. Eur. J. Biochem. 179, 429-434, 1989.

105. Wagner, C, Decha-Umphai, W, and Corbin, J. Phosphorylation modulates the activity of glycine N-methyltransferase, a folate binding protein. J. Biol. Chem. 264, 9638-9642, 1989.

106. Van Sande, J, Lefort, A, Beebe, S, Roger, P, Perret, J, Corbin, JD, and Dumont, JE. Pairs of cyclic AMP analogs, that are specifically synergistic for type I and type II cAMP-dependent protein kinases, mimic thyrotropin effects on the function, differentiation expression and mitogenesis of dog thyroid cells. Eur. J. Biochem. 183, 699-708, 1989.

107. Inagami, T, Takayanagi, R, Pandey, KN, Snajdar, RM, Corbin, JD, and Francis, SH. Mechanism of action of atrial natriuretic factor in the adrenal gland. In: Endocrinology of the Heart (W. Kaufman and G. Wambach, Eds.), Springer-Verlag, Berlin, 46-52, 1989.

108. Wolfe, L, Woodford, TA, Francis, SH, and Corbin, JD. Direct involvement of the cyclic nucleotide binding sites in the cyclic nucleotide-induced charge shift of protein kinases. NATO ASI series, Vol. H44. Activation and Desensitization of Transducing Pathways. Edited by T.M. Konijn, M.D. Houslay, and P.J.M. Van Haastert, Springer-Verlag, Berlin, p. 133-149, 1989.

109. Corbin, JD, Thomas, MK, Wolfe, L, Shabb, JB, Woodford, TA, and Francis, SH. New insights into cGMP action. Adv. Second Messenger Phosphoprotein Res., 24, 411-418, 1990.

110. Francis, SH, Thomas, MK, and Corbin, JD. cGMP-binding phosphodiesterase: Novel effects of cGMP binding on the interaction between functional domains in the enzyme. In: Purines in Cellular Signalling. Ed. K. Jacobson, Springer-Verlag, New York , 1990.

111. Francis, SH, Wolfe, L, and Corbin, JD. Purification of type Ia and type Iß isozymes of and proteolyzed types Iß monomeric enzyme of cGMP-dependent protein kinase from bovine aorta. Meth. Enzymol. 200, 332-341, 1990.

112. Thomas, MK, Francis, SH, and Corbin, JD. Substrate- and kinase-directed regulation of a cGMP-binding phosphodiesterase by cGMP. J. Biol. Chem.265, 14971-14978, 1990.

113. Redmon, JB, Gettys, TW, Sheorain, VS, Corbin, JD, and Taylor, IL. Failure of insulin to antagonize cAMP-mediated glycogenolysis in rat ventricular myocytes. Am. J. Physiol. 258, E871-877, 1990.

114. Light, DB, Corbin, JD, and Stanton, BA. Dual ion-channel regulation by cyclic GMP and cyclic GMP-dependent protein kinase. Nature 344, 336-339, 1990.

115. Thomas, MK, Francis, SH, and Corbin, JD, Characterization of a purified bovine lung cGMP-binding cGMP phosphodiesterase. J. Biol. Chem. 265, 14964-14970, 1990.

116. Thomas, MK, Francis, SH, and Corbin, JD. Substrate- and kinase-directed regulation of phosphorylation of a cGMP-binding phosphodiesterase by cGMP. J. Biol. Chem. 265, 14971-14978, 1990.

117. Shabb, JB, Ng, L, and Corbin, JD. One amino acid change produces a high affinity cGMP-binding site in cAMP-dependent protein kinase. J. Biol. Chem. 265, 16031-16034, 1990.

118. Shabb, JB, Buzzeo, BD, Ng, L, and Corbin, JD. Mutating protein kinase cAMP-binding sites into cGMP-binding sites. J. Biol. Chem. 266, 24320-24326, 1991.

119. Jiang, H and Corbin, JD. Effect of epinephrine or cAMP on cAMP- bound protein kinase holoenzymes in rat heart. Am. J. Physiol. 260, H722-729, 1991.

120. Woodford, TA, Taylor, SJ, and Corbin, JD. The biological functions of phosphorylation-dephosphorylation. In: Fundamentals of Medical Cell Biology, vol. 3B, Chemistry of the Living Cell, JAI Press Inc. pp. 117-171, 1991.

121. Corbin, JD. Two lobes and a cleft. Current Biol.1, 400-401, 1991.

122. Shabb, JB and Corbin, JD. Protein phosphorylation in the heart. In: The Heart and Cardiovascular System, Second Edition. (Fozzard, HA, Haber, E, Jennings, RB, Katz, AM, and Morgan, HA, eds.) New York: Raven Press, 1991.

123. Jiang, H, Colbran, JL, Francis, SH, and Corbin, JD. Direct evidence for cross-activation of cGMP-dependent protein kinase by cAMP in pig coronary arteries. J. Biol. Chem. 267, 1015-1019, 1992.

124. Shabb, JB, and Corbin, JD. Cyclic nucleotide-binding domains in proteins having diverse functions. J. Biol Chem. 267, 5723-5726, 1992.

125. Colbran, JL, Francis, SH, Leach, AB, Thomas, MK, Jiang, H, McAllister, LM, and Corbin, JD. A phenylalanine in peptide substrates provides for selectivity between cGMP- and cAMP-dependent protein kinases. J. Biol Chem. 267, 9589-9594, 1992.

126. Sekhar, RR, Hatchett, RJ, Shabb, JB, Wolfe, L, Francis,SH, Wells, JN, Jastorff, B, Butt, E, Chakinala, MM,and Corbin, J.D. Relaxation of pig coronary arteries by new and potent cGMP analogs that selectively activate type Ia, compared with type Iß, cGMP-dependent protein kinase. Molec. Pharmacol. 42, 103-108, 1992.

127. Forte, LR, Thorne, PK, Eber, SL, Krause, WJ, Freeman, RH, Francis, SH, and Corbin, JD. Stimulation of intestinal Cl- transport by heat-stable enterotoxin: activation of a cAMP-dependent protein kinase by cGMP. Am. J. Physiol. 263, C607-C615, 1992.

128. Colbran, JL, Roach, PJ, Fiol, CJ, Dixon, JE, Andrisani, OM, and Corbin, JD. cAMP-dependent protein kinase, but not the cGMP-dependent enzyme, rapidly phosphorylates Δ-CREB and a synthetic Δ-CREB peptide. Biochem. Cell Biol. 70, 1277-1282, 1992.

129. Thomas, MK, Francis, SH, Beebe, SJ, Gettys, TW, and Corbin, JD. Partial mapping of cyclic nucleotide sites and studies of regulatory mechanisms of phosphodiesterases using cyclic nucleotide analogs. Adv. Second Messenger

Phosphoprotein Res., 25, 45-53, 1992.

130. Forte, LR, Krause, WJ, Freeman, RH, Francis, SH, and Corbin, JD. Regulation of Intestinal Chloride Channels by E. Coli Heat-Stable Enterotoxin: Molecular Mechanisms in: Recent Advances in Toxicology Research,
Vol. 3, Eds., Gopalakrishankane, P and Tan, CK. National University of Singapore, Singapore, pp 485-500, 1992.

131. McAllister-Lucas, L, Kadlecek, A, Sonnenburg, WK, Seger, D, Le Trong, H, Colbran, JL, Thomas, MK, Walsh, KA, Francis, SH, Corbin, JD, Beavo, JA, The structure of a bovine lung cGMP-binding, cGMP-specific phosphodiesterase deduced from a cDNA clone. J. Biol. Chem. 268, 22863-22873, 1993.

132. Smith, JA, Francis, SH, and Corbin, JD. Autophosphorylation: A salient feature of protein kinases. In: Molecular and Cellular Biochemistry, "Reversible Protein Phosphorylation in Cell Regulation" ed. R.L. Khandelwal and J.H. Wang, Vol. 127/128, Kluwer Academic Publishers, Dordrecht, pp.51-70, 1993.

133. Jiang, H and Corbin, JD. Concerning the form of cGMP-dependent protein kinase that is the target for cAMP cross-activation. Nova Science Publishers, Inc. Proceedings of the International Conference "Modern Enzymology: Problems and Trends", 1993.

134. Corbin, JD, Woodall, CC, Colbran, JL, McAllister, LM, Sekhar, KR, and Francis, SH. Identifying protein kinases in crude extracts that phosphorylate cGMP-binding cGMP-specific phosphodiesterase. Agents and Actions Supplements "New Drugs in Allergy and Asthma" pp. 27-33, 1993.

135. Francis, SH and Corbin, JD. Structure and function of cyclic nucleotide-dependent protein kinases. Ann. Rev. Physiol., Vol, 56, (ed., J. Hoffmann) Ann. Review Publishers, Palo Alto, pp. 237-272, 1994.

136. Francis, SH and Corbin, JD. Progress in understanding the mechanism and function of cyclic GMP-dependent protein kinase. In: Adv. in Pharmacology, "Cyclic GMP: Synthesis, Metabolism and Function" (ed., F. Murad) Vol. 26, Academic Press, New York, pp. 115-170, 1994.

137. Francis, SH, Colbran, JL, McAllister-Lucas, LM, and Corbin, JD. Zinc interactions and conserved motifs of the cGMP-binding cGMP-specific phosphodiesterase suggest that it is a zinc hydrolase. J. Biol. Chem. 269, 22477-22480, 1994.

138. Gamm, DM, Francis, SH, Anglotti, TP, Corbin, JD, and Uhler, MD. The type II isoform of cGMP-dependent protein kinase is dimeric and possesses regulatory and catalytic properties distinct from the type I isoforms. J. Biol. Chem. 270, 27380-27388, 1995.

139. Woodford, TA, Taylor, SJ, and Corbin, JD. The biological functions of phosphorylation-dephosphorylation. In: Principles of Medical Biology, Vol. 5, Cell Chemistry and Physiology: Part II, JAI Press Inc. pp. 123-177, 1995.

140. McAllister-Lucas, LM, Haik, TL, Colbran, JL, Sonnenburg, WK, Seger, D, Turko, IV, Beavo, JA, Francis, SH, and Corbin, JD. An essential aspartic acid at each of two allosteric cGMP-binding sites of a cGMP-specific phosphodiesterase. J. Biol. Chem. 270, 30671-30679, 1995.

141. Shabb, JB, Poteet, CE, Kapphahn, MA, Muhonen, WM, Baker, NE, and Corbin, JD. Characterization of the isolated cAMP-binding B domain of cAMP-dependent protein kinase. Protein Science 4, 2100-2106, 1995.

142. Wood, JS, Yan, X, Mendelow, M, Corbin, JD, Francis, SH, and Lawrence, DS. Precision substrate targeting of protein kinases. The cGMP- and cAMP-dependent protein kinases. J. Biol. Chem. 270, 174-179, 1996.

143. Yan, X, Corbin, JD, Francis, SH, and Lawrence, DS. Precision targeting of protein kinases: An affinity label that inactivates the cGMP- but not the cAMP-dependent protein kinase. J. Biol. Chem. 171, 1845-1848, 1996.

144. Sekhar, KR, Grondin, P, Francis, SH, and Corbin, JD. Design and synthesis of xanthines and cyclic GMP analogues as potent inhibitors of PDE5. Handbook of Immunopharmacology C. Schudt, Ed. Academic Press. pp. 135-146, 1996.

145. Francis, SH, Smith, JA, Colbran, JL, Grimes, K, Walsh, KA, Kumar, S, and Corbin, JD. Arginine-75 in the pseudosubstrate sequence of type Iß cGMP-dependent protein kinase provides for potent autoinhibition, although autophosphorylated Serine-63 is outside this sequence. J. Biol. Chem. 271, 20748-20755, 1996.

146. Smith, JA, Francis, SH, Walsh, KA, Kumar, S, and Corbin, JD. Autophosphorylation of type Iß cGMP-dependent protein kinase increases basal catalytic activity and enhances allosteric activation by cGMP or cAMP. J. Biol. Chem. 271, 27056-20762, 1996.

147. Reed, RB, Sandberg, M, Jahnsen, T, Lohmann, SM, Francis, SH, and Corbin, JD. Fast and slow cyclic nucleotide-dissociation sites in cAMP-dependent

protein kinase are transposed in type Iß cGMP-dependent protein kinase. J. Biol. Chem. 271, 17570-17575, 1996.

148. Turko, IV, Haik, TL, McAllister-Lucas, L, Burns, F, Francis, SH, and Corbin, JD. Identification of key amino acids in a conserved cGMP-binding site of cGMP-binding phosphodiesterases. J. Biol. Chem. 271, 22240-22244, 1996.

149. Yan, X, Lawrence, DS, Corbin, JD, and Francis, SH. Distinguishing between closely related protein kinases: a variation on the bisubstrate inhibitor theme. J. of Am. Chem. Soc. 118, 6321-6322, 1996.

150. Togawa, K, Kaya, S, Shimada, A, Imagawa, T, Mardh, S, Corbin, JD, Kikkawa, U, and Taniguchi, K. Ser-27, Tyr-10 and Tyr-7 in the a-chain of pig stomach H+, K+-ATPase as Ca2+ dependent phosphorylatable sites by intrinsic and extrinsic protein kinases. Biochem. Biophys. Res. Commun. 227, 810-815, 1996.

151. Francis, SH and Corbin, JD. Cyclic AMP and cyclic GMP in cell signaling. In: Signal Transduction, C.-H Heldin and M. Purton, Eds. Chapman and Hall, London, pp. 223-240, 1996.

152. Smith, JA, Francis, SH, Walsh, KA, Kumar, S, and Corbin, JD. Autophosphorylation of type Iß cGMP-dependent protein kinase increases basal catalytic activity and enhances allosteric activation by cGMP or cAMP. J. Biol. Chem. 271, 27056-20762, 1996.

153. Yan, X, Lawrence, DS, Corbin, JD, and Francis, SH. Distinguishing between a mitogenic and two closely related nonmitogenic protein kinases. J. Am. Chem. Soc. 118, 11684-11685, 1996.

154. Poteet-Smith, CE, Shabb, JB, Francis, SH, and Corbin, JD. Identification of critical determinants for autoinhibition in the pseudosubstrate region of type Ia cAMP-dependent protein kinase. J. Biol. Chem. 272, 379-388, 1997.

155. Smith, CP, Corbin, JD, and Francis, SH. Autoinhibition of cAMP- and cGMP-dependent protein kinases involves multiple structural components as determined by synthetic peptide analysis. Signal Transduction in Health and Disease: Adv. in Second Mess. and Phosphoproteins, (eds., Corbin, JD and Francis, SH) Lippincott-Raven Publishers, Philadelphia, pp 219-235, 1997.

156. Reed, RB, Sandberg, M, Jahnsen, T, Lohmann, SM, Francis, SH, and Corbin, JD. Structural order of the slow and fast intrasubunit cGMP-binding sites of type I a cGMP-dependent protein kinase. Signal Transduction in Health and Disease: Adv. in Second Mess. and Phosphoproteins, (eds., Corbin, JD and

Francis, SH) Lippincott-Raven Publishers, Philadelphia, pp 205-217, 1997.

157. Wyatt, TA, Naftilan, AJ, Francis, SH, and Corbin, JD. ANF elicits phosphorylation of the cGMP phosphodiesterase (PDE5) in vascular smooth muscle cells. Am. J. Physiol. 273, H448-H455, 1997.

158. Zhao, J, Trewhella, J, Corbin, JD, Francis, SH, Mitchell, R, Brushia, R, and Walsh, D. Progressive cyclic nucleotide-induced conformational changes in the cGMP-dependent protein kinase studied by small-angle x-ray scattering in solution. J. Biol. Chem. 272, 31929-31936, 1997.

159. Dremier, S, Poteet-Smith, C, Corbin, JD, Doskeland, SO, Roger, PP, DuMont, JE, and Maenhaut, C. Activation of cyclic AMP-dependent kinase is required but may not be sufficient to mimic cyclic AMP-dependent DNA synthesis and thyroglobulin expression in dog thyroid cells. Mol. and Cell. Biol. 17, 6717-6726, 1997.

160. Francis, SH, Wolfe, L, and Corbin, JD. Purification of type Ia and type Iß isozymes and proteolyzed type Iß monomeric enzyme of cGMP-dependent protein kinase from bovine aorta. Selected Methods in Enzymology Series (eds. Sefton, BM and Hunter, T) Academic Press, San Diego, 1998.

161. Francis, SH, Chu, D-M, Thomas, MK, Beasley, A, Grimes, K, Busch, JL, Turko, IV, Haik, TL, and Corbin, JD. Ligand-induced conformational changes in cyclic nucleotide phosphodiesterases and cyclic nucleotide-dependent protein kinases. Methods: A Companion to Methods in Enzymology. "Methods in Phosphodiesterase Research" (ed. Conti, M) Academic Press, New York, Vol 14, p. 81-92, 1998.

162. Chu, D-M, Corbin, JD, Grimes, KA, and Francis, SH. Activation by cyclic GMP binding causes an apparent conformational change in cGMP-dependent protein kinase. J. Biol. Chem. 272, 31922-31928, 1998.

163. Turko, IV, Francis, SH, and Corbin, JD. The potential roles of conserved amino acids in the catalytic domain of the cGMP-binding cGMP-specific phosphodiesterase (PDE5). J. Biol. Chem., 273, 6460-6466, 1998.

164. Turko, IV, Francis, SH, and Corbin, JD. Binding of cGMP to both binding sites of cGMP-binding cGMP-specific phosphodiesterase is required for its phosphorylation. Biochemical J., 329, 505-510, 1998.

165. Turko, IV, Francis, SH, and Corbin, JD. Hydropathic analysis and mutagenesis of the catalytic domain of the cGMP-binding cGMP-specific phosphodiesterase (PDE5). cGMP versus cAMP substrate specificity.

Biochemistry 37, 4200-4205, 1998.

166. Chu, D-M, Francis, SH, Thomas, J, Maksymovitch, E, and Corbin, JD. Activation by autophosphorylation or cGMP binding produces a similar apparent conformational change in cGMP-dependent protein kinase. J. Biol. Chem. 273, 14649-14656, 1998.

167. Loughney, K, Hill, TR, Florio, VA, Uher, L, Rosman, GJ, Wolda, SL, Jones, BA, Howard, ML, McAllister-Lucas, LM, Sonnenberg, WK, Francis, SH, Corbin, JD, Beavo, JA, and Ferguson, K. Isolation and characterization of cDNAs encoding PDE5A, a human cGMP-binding, cGMP-specific 3',5'-cyclic nucleotide phosphodiesterase. Gene 216, 139-147, 1998.

168. Granovsky, AE, Natochin, M, McEntaffer, R, Haik, TL, Francis, SH, Corbin, JD, and Artemyev, NO. Probing domain functions of chimeric PDE6a'/PDE5 cGMP-phosphodiesterase. J. Biol. Chem. 273, 24485-24490, 1998.

169. Corbin, JD, Beasley, A, Turko, IV, Haik, TL, Mangum, KA, Wells, JN, Francis, SH, and Sekhar, KR. A photoaffinity probe covalently modifies the catalytic site of the cGMP-binding phosphodiesterase (PDE5). Cell Biochem. and Biophys. 29, 145-157, 1998.

170. LaFevre-Bernt, M, Corbin, JD, Francis, SH, and Miller, WT. Phosphorylation and activation of cGMP-dependent protein kinase. BBA. 1386, 97-105, 1998.

171. Corbin, JD and Francis, SH. Cyclic GMP phosphodiesterase-5: target of sildenafil. J. Biol. Chem. 274, 13729-13732, 1999.

172. Francis, SH and Corbin, JD. Cyclic nucleotide-dependent protein kinases: intracellular receptors for cAMP and cGMP action. Crit. Rev. Clin. Lab. Sci. 36(4), 275-328, 1999.

173. Wallis, RM, Corbin, JD, Francis, SH, and Ellis, P. Tissue distribution of phosphodiesterase families and the effects of sildenafil on tissue cyclic nucleotides, platelet function, and the contractile responses of trabeculae carneae and aortic rings in vitro. Am. J. Cardiol. 84(5A), 3C-12C, 1999.

174. Turko, IV, Ballard, SA, Francis, SH, and Corbin, JD. Inhibition of cyclic GMP-binding cGMP specific phosphodiesterase (type 5) by sildenafil and related compounds. Mol. Pharm. 56, 124-130, 1999.

175. Francis, SH and Corbin, JD. Structure and function of cyclic nucleotide

phosphodiesterases. In: Progress in Nucleic Acid Research and Molecular Biology, eds. Cohn, WE and Moldavie, K. Academic Press, pp 1-52, 1999.

176. Fink, TL, Francis, SH, Beasley, A, Grimes, KA, and Corbin, JD. Expression of an active, monomeric catalytic domain of the cGMP-binding cGMP-specific phosphodiesterase (PDE5). J. Biol Chem. 274, 34613-34620, 1999.

177. Corbin, JD, Turko, IV, Beasley, A, and Francis, SH. Phosphorylation of phosphodiesterase-5 by cyclic nucleotide-dependent protein kinase alters its catalytic and allosteric cGMP-binding activity. Eur. J. Biochem. 267, 2760-2767, 2000.

178. Turko, IV. Francis, SH, and Corbin, JD. Studies of the molecular mechanisms of discrimination between cGMP and cAMP in the allosteric sites of the cGMP-binding cGMP-specific phosphodiesterase (PDE5). J. Biol. Chem. 274, 29038-29041, 1999.

179. Smith, JA, Reed, RB, Francis, SH, Grimes, K, and Corbin, JD. Distinguishing the roles of the two different cGMP-binding sites for modulating phosphorylation of exogenous substrate (heterophosphorylation) and autophosphorylation of cGMP-dependent protein kinase. J. Biol. Chem 275, 154-158, 2000.

180. Francis, SH, Turko, IV, Grimes, KA, and Corbin, JD. Histidine-607 and histidine-643 provide important interactions for metal support of catalysis in phosphodiesterase-5. Biochemistry 39, 9591-9596, 2000.

181. Francis, SH and Corbin, JD. Cyclic nucleotide-dependent protein kinases. In: Principles of Molecular Regulation, eds. Conn, PM and Means, AR. Humana Press Inc., Totowa, N.J., pp. 277-296, 2000.

182. Gopal, VK, Francis, SH, and Corbin, JD. Allosteric sites of phosphodiesterase-5 (PDE5): A potential role in negative fedback regulation of cGMP signaling in corpus cavernosum. Eur. J. Biochem. 268, 3304-3312, 2001.

183. Corbin, JD, Francis, SH, and Osterloh, IH. Effects of sildenafil on cAMP and cGMP levels in isolated human cavernous and cardiac tissue. Urology 56, 545-546, 2000.

184. Francis, S.H., Poteet-Smith, C., Busch, J.L., Richie-Jannetta, R., & Corbin, J.D. (2002) Mechanisms of autoinhibition in cyclic nucleotide-dependent protein kinases. Frontiers in Bioscience 580-92.

185. Busch, J.L., Bessay, E.P., Francis, S.H., & Corbin, J.D. (2002) A conserved serine juxtaposed to the pseudosubstrate site of type I cGMP-dependent protein kinase contributes strongly to autoinhibition and lower cGMP affinity. J. Biol. Chem. 277: 34048-54.

186. Francis, S.H., Turko, I.V.,Grimes, and Corbin, J.D. (2000) Histidine-607 and histidine-643 provide important interactions for metal support of catalysis in phosphodiesterase-5. Biochemistry, 39, 9591-96.

187. Francis, S.H., Bessay, E.P., Kotera, J., Grimes, K.A., Liu, L., Thompson, W.J., & Corbin, J.D. (2002) Phosphorylation of isolated human PDE5 regulatory domain induces an apparent conformational change and increases cGMP-binding affinity. (2002) J. Biol. Chem. 277, 47581-47587.

188. Dzura, I., Yuejin, W., Colbran, R.J., Corbin, J.D., Balser, J.R., & Anderson, M.E. (2002) Cytoskeletal disrupting agents prevent calmodulin kinase, IQ domain, and voltage-dependent facilitation of L-type Ca^{++} channels. J. Physiol. 545, 399-406.

189. Corbin, J.D., Blount, M.A., Weeks, J.L., Beasley, A., Kuhn, K.P., Ho, Y.S.J., Saidi, L.F., Hurley, J.H., Kotera, J., & Francis, S.H.. (2003) [^{3}H]sildenafil binding to phosphodiesterase-5 is specific, kinetically heterogeneous, and stimulated by cGMP. Mol. Pharm. 63, 1364-1372.

190. Corbin, J.D., Rannels, S.R., & Francis, S.H. (2002) PDE5 inhibition-importance to cardiovascular system. In; Heart Disease and Erectile Dysfunction, R. Kloner, Ed. Humana Press, Inc. Totowa, NJ pp 117-130.

191. Wall, M.E., Francis, S.H., Corbin, J.D., Grimes, K., Richie-Janetta, R., Kotera, J., Macdonald, B.A., Gibson, R.R., & Trewhella, J. (2003) Mechanisms associated with cGMP binding and activation of cGMP-dependent protein kinase. PNAS. 100, 2380-2385.

192. Kotera, J., Grimes, K., Corbin, J.D., Francis, S.H. (2003) Cyclic GMP-dependent protein kinase protects cGMP from hydrolysis by phosphodiesterase-5. Biochem. J. 372, 419-426.

193. Francis, S.H., Rouse, A., Grimes, K., & Corbin, J.D. (2003) Single step isolation of sildenafil from commercially available Viagra™ tablets. Int. J. Impot. Res. 15, 369-372.

194. Kotera, J., Francis, S.H., Grimes, K.A., Rouse, A., Blount, M.A., & Corbin, J.D. (2003) Allosteric sites of phosphodiesterase-5 sequester cGMP. Front. Biosci. 9, 378-386.

195. Corbin, J., Rannels, S.R., Neal, D., Chang, P., Grimes, K.A., Beasley, A., & Francis, S. (2003) Sildenafil citrate does not affect cardiac contractility in human or dog heart. Curr. Med. Res. & Opinion 19, 747-752.

196. Francis, S.F., and Corbin, J.D. (2003) Molecular mechanisms and pharmacokinetics of phosphodiesterase-5 antagonists. Curr. Urol. Rep. 4, 457-465.

197. Corbin, J.D., and Francis, S.F. (2003) Molecular biology and pharmacology of PDE-5-inhibitor therapy for erectile dysfunction. J. Androl. 24, 6-9.

198. Richie-Jannetta, R., Francis, S.H. & Corbin, J.D. (2003) Dimerization of cGMP-dependent protein kinase Iβ is mediated by an extensive amino-terminal leucine zipper motif, and dimerization modulates enzyme function. J. Biol. Chem. 278, 50070-50079.

199. Corbin, J.D., Kotera, J., Gopal, V.G., Cote, R.H., & Francis, S.H. (2004) Regulation of cyclic nucleotide levels by sequestration. In: Handbook of Cell Signaling. Vol. 2. eds. Bradshaw, R.H. & Dennis, E.A. Academic Press, New York pp. 465-470.

200. Francis, S.F. & Corbin, J.D. (2004) Phosphodiesterase-5. In: Handbook of Cell Signaling. Vol. 2. eds. Bradshaw, R.H. & Dennis, E.A. Academic Press, New York pp. 447-451.

201. Adaikan, G., Becher, E., Brock, G., Carrier, S., Carson, C., Corbin, J., Francis, S., DeBusk, R., Eardley, I., Hedlund, H., Hutter, A., Jackson, G., Kloner, R., Lin, C., McVary, K., McCullough, A., Nehra, A., Porst, H., Schulman, C., Seftel, A., Sharlip, I., Stief, C., Teloken, C. (2004) Pharmacotherapy for erectile dysfunction. Sexual Medicine, Sexual Dysfunctions in Men and Women, Ed 2004, Health Publications – 2004, pp 503-565.

202. Blount, MA, Beasley A, Zoraghi R, Sekhar KR, Bessay EP, Francis SH and Corbin JD (2004) Binding of tritiated sildenafil, tadalafil, or vardenafil to the phosphodiesterase-5 catalytic site displays potency, specificity, heterogeneity, and cGMP stimulation. Mol Pharmacol 66:144-52.

203. Corbin JD (2004) Mechanisms of action of PDE5 inhibition in erectile dysfunction. Int J Impot Res 16 Supl 1:S4-7.

204. Corbin JD, Beasley A, Blount MA and Francis SH (2004) Vardenafil: structural basis for higher potency over sildenafil in inhibiting cGMP-specific phosphodiesterase-5 (PDE5). Neurochem Int 45:859-63.

205. Weeks, JL, Zoraghi R, Beasley A, Sekhar KR, Francis SH and Corbin JD (2005) High biochemical selectivity of tadalafil, sildenafil and vardenafil for human phosphodiesterase 5A1 (PED5) over PDE11A4 suggests the absence of PDE11A4 cross-reaction in patients. Int J Impot Res 17:5-9.

206. Zhu CB, Hewlett WA, Francis SH, Corbin JD and Blakely RD (2004) Stimulation of serotonin transport by the cyclic GMP phosphodiesterase-5 inhibitor sildenafil. Eur J Pharmacol 504:1-6.

207. Zoraghi R, Corbin JD and Francis SH (2004) Properties and functions of GAF domains in cyclic nucleotidephosphodiesterases and other proteins. Mol Pharmacol 65:267-78.

208. Francis SH and Corbin JD (2004) Cyclic GMP Phosphodiesterases. In: *Encyclopedia of Biological Chemistry*, Elsevier Inc., **1**:494-500.

209. Francis SH and Corbin JD (2004) Sildenafil, pharmacology of a highly selective PDE5 inhibitor. In: *Sildenafil*, Ed. U. Dunzendorfer, Birkhauser Verlag/Switzerland, p. 15-33.

210. Padma-Nathan H, Becher E, Brock G, Carrier S, Carson C, Corbin J, Francis S, DeBusk R, Eardley I, Hedlund H, Hutter A, Jackson G, Kloner R, Lin C, McVary K, McCullough A, Nehra A, Porst H, Schulman C, Seftel A, Sharlip I, Stief C, Teloken C (2004) Pharmacotherapy for Erectile Dysfunction. P. 505-528.

211. Zoraghi R, Bessay EP, Corbin JD and Francis SH (2005) Structural and functional features in human PDE5A1 regulatory domain that provide for allosteric cGMP binding, dimerization, and regulation. *J Biol Chem*. In Press.

212. Huai, Q., Liu, Y., Francis, S.H., Corbin, J.D., & Ke, H. (2004) Crystal structures of phosphodiesterases 4 and 5 in complex with inhibitor IBMX suggest a conformation determinant of inhibitor selectivity. J. Biol. Chem. 279: 13095-13101.

213. Francis, S.H and Corbin, J.D. Cyclic Nucleotide Phosphodiesterase: Complex regulators of cyclic nucleotide signaling pathways. Phosphodiesterase Type 5 and the Pulmonary Circulation (eds., M. Wilkins, G. Burtous, H. Ghofrani) In Press.

214. Corbin, J.D., Rannels, S.R., and Francis, S.H. (2003) Phosphodiesterase-5 Inhibition: Importance to the Cardiovascular System. Contemporary Cardiology: Heart Disease and Erectile Dysfunction (ed., R.A. Kloner); pp 117-130, Humana Press, Inc., Totowa, NJ.

215. Francis, S.H. and Corbin, J.D. PDE5 Inhibition: The molecular biology of erectile function and dysfunction. Urologic Clinics of North America, In Press.

216. Francis, S.H. and Cobin, J.D. Sildenafil: Efficacy, Safety, Tolerability and Mechanism of Action in Treating Erectile Dysfunction. Expert Opinion on Drug Metabolism and Toxicology. In Press.

217. Francis, S.H. and Corbin, J.D. Comparative pharmacokinetics of the phosphodiesterase-5 inhibitors used in the treatment of erectile dysfunction. Clinical Pharamacokinetics. In Press.

G. Patent Awards

Cyclic GMP-Binding, Cyclic GMP-Specific Phosphodiesterase Materials and Methods.

Date March 14, 2000 Patent Number 6,037,119