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EDUCATION

1984-1987 U.S.P.H.S Individual Postdoctoral Fellow, Department of Pharmacology, University of Massachusetts Medical School, Worcester, MA. Dr. R.E. Humphreys sponsor.

1982-1984 Postdoctoral Fellow, Laboratory for Experimental Oncology, Indiana University School of Medicine, Indianapolis, IN, with Dr. George Weber.

Ph.D. 1982 Purdue University, W. Lafayette, IN. Degree in Medicinal Chemistry and Pharmacognosy awarded from the School of Pharmacy and Pharmacal Sciences. Major Professors were Drs. D.J. Morre and P.F. Heinstein. Thesis title: "Biochemical Chronology of 2-Acetylaminofluorene-Induced Hepatocarcinogenesis in the Rat."

B.S. 1975 Manchester College, N. Manchester, IN. Major in biology / chemistry.

PROFESSIONAL EXPERIENCE

2003-Present Vice President, Pharmacology & Quality Assurance, MIR Preclinical Services, Ann Arbor, MI. Responsible for scientific development and oversight of client sponsored in vivo preclinical contract work with emphases in oncology, inflammation, and small animal imaging techniques.

1999-2003 Associate Research Fellow, Head, Experimental Oncology Group, PGRD, Ann Arbor, MI. (formerly, Parke-Davis Pharmaceutical Research) Responsibilities included scientific direction of oncology discovery in vivo testing efforts and supervision of all in vivo cancer drug discovery colleagues in Ann Arbor. Management and coordination of outside testing activities related to cancer discovery.

Research Interests: New in vivo model development, Radiobiology and chemotherapy. MDR reversal in vivo. Antigen processing and presentation. Current interests revolve around small molecule signal transduction antagonists, specifically tyrosine kinase inhibitors and their in vivo efficacy as well as pharmacodynamics and surrogate marker in vivo endpoints and the development of assays to assess these endpoints.

The Experimental Oncology Group at Pfizer and legacy Parke-Davis provided data used in the selection and development of several lead compounds including DNA binders (CI-958), lipophillic antifolates (CI-898),mitotitic

inhibitors (CI-980), hypoxic cell cytotoxins (CI-1010), irreversible pan HER antagonists (CI-1033), Mek inhibitors (CI-1040) general growth factor antagonists (Suramin, CI-1003), poly amine antagonists (CI-1006), metal complexes (CI-973), adenosine deaminase inhibitors (Pentostatin, CI-825), DNA repair inhibitors (PD0128763), biological response modifiers (flavone acetic acid and dimethylxanthone acetic acid), and histone deacetylase inhibitors (CI-994) , and most recently a second generation MEK inhibitor and a highly specific CDK4/6 inhibitor.

1994-1999 Senior Research Associate, Head, Experimental Oncology Group, Parke-Davis Pharmaceutical Research Division, Warner Lambert Co., Ann Arbor, MI.

1991-1994 Research Associate, Head, Experimental Oncology Group, Parke-Davis Pharmaceutical Research Division, Warner Lambert Co., Ann Arbor, MI.

1989-1991 Senior Scientist, Experimental Oncology Group, Parke-Davis Pharmaceutical Research Division, Warner Lambert Co., Ann Arbor, MI.

1987-1989 Scientist, Parke-Davis Pharmaceutical Research Division, Warner Lambert Co., Ann Arbor, MI.

1985-1987 Individual Postdoctoral Fellow U.S.P.H.S. Position in the Pharmacology Department, University of Massachusetts Medical School, Worcester, MA. Dr. R.E. Humphreys, sponsor. Research dealt with the mechanisms of regulation within the immune system, specifically B cell activation and antibody production.

1982-1984 Postdoctoral Fellow, Laboratory for Experimental Oncology, Indiana University School of Medicine, Indianapolis, IN. Research under Dr. George Weber focused on de novo purine biosynthetic enzymes in cancer cells.

1976-1982 Graduate Research Assistant, Department of Medicinal Chemistry and Pharmacognosy, Purdue University, West Lafayette, IN. Graduate research conducted under Drs. D.J. Morre and P.F. Heinstein focused on pyrimidine nucleotide biosynthesis during carcinogen induced hepatocarcinogenesis in the rat.

1976 January- July. Research Chemist, U.S. Department of the Interior, Bureau of Mines, College Park, MD. Research chemist in a group of nine scientists comprising the Mineral Surface Physics Group.

1975 June- August. Normal Volunteer, N.I.H., Bethesda, MD. First exposure to hands on biochemistry in a laboratory of the National Heart, Lung and Blood Institute.

1972-1975 Biology Teaching Assistant, Department of Biology, Manchester College, N. Manchester, IN.

ORGANIZATIONS/ HONORS

Individual Postdoctoral Fellow, U.S.P.H.S.

Active Member, American Association for Cancer Research.

American Chemical Society

Sigma Xi, The Scientific Research Society

CONSULTING

Editorial board of Oncology Reports 1996-1998

Ad Hoc Reviewer for Oncology Reports, Cancer Research, Cancer Chemotherapy Pharmacology, Biochemical Pharmacology, and Neoplasia

Publications

1. McConville, P., Elliott, W. L., Kreger, A., Lister, R., Moody, J. B., Trachet, E., Urban, F., and Leopold, W. R.. Preclinical Models of Tumor Growth and Response. Cancer Drug Discovery and Development: In Vivo Imaging of Cancer Therapy. Edited by A. F. Shields and P. Price. Totowa, N.J., Humana Press**:** pp.13-32, 2007.

2. Klutchko, S. K., Zhou, H., Winters, R. T., Bridges, A. J., Althaus, I. W., Amato, D. M., Elliott, W. L., Ellis, P. A., Meade, M. A., Roberts, B. J., Fry, D. W., Gonzales, A. J., Harvey, P. J., Nelson, J. M., Sherwood, V., Han, H-K., Pace, G., Smaill, J. B., Denny, W. A., and, Showalter, H. D. H. Tyrosine Kinase Inhibitors. 19. 6-Alkynamides of 4-Anilinoquinazolines and 4-Anilinopyrido[3,4-*d*]pyrimidines as Irreversible Inhibitors of the erbB Family of Tyrosine Kinase Receptors. J Med Chem, *49:* 1475-1485, 2006.

3. Christensen, J. G., Vincent, P. W., Klohs, W. D., Fry, D. W., Leopold, W. R., and Elliott, W. L. Plasma vascular endothelial growth factor and interleukin-8 as biomarkers of antitumor efficacy of a prototypical erbB family tyrosine kinase inhibitor. Molecular Cancer Therapeutics *4(6):* 938-947, 2005.

4. Vanderwel, S N, Harvey, P J, McNamara, D J, Repine, J T, Keller, P R, Quin III, J, Booth, R J, Elliott, W L, Dobrusin, E. M., Fry, D. W., and Toogood, P. L. Pyrido[2,3-d]pyrimidin-7-ones as Specific Inhibitors of Cyclin-Dependent Kinase 4. J Med Chem, *48:* 2371-2387, 2005.

5. Fry, D. W., Harvey, P. J., Keller, P. R., Elliott, W. L., Meade, M., Trachet, E., Albassam, M., Zheng, X., Leopold, W. R., Pryer, N. K., and Toogood, P. L. Specific inhibition of cyclin-dependent kinase 4/6 by PD 0332991 and associated antitumor activity in human tumor xenografts. Mol Cancer Ther, *3:* 1427-1438, 2004.

6. Allen, L. F., Lenehan, P. F., Eiseman, I. A., Elliott, W. L., and Fry, D. W. Potential benefits of the irreversible pan-erbB inhibitor, CI-1033, in the treatment of breast cancer. Semin Oncol, *29:* 11-21, 2002.

7. Smaill, J. B., Showalter, H. D., Zhou, H., Bridges, A. J., McNamara, D. J., Fry, D. W., Nelson, J. M., Sherwood, V., Vincent, P. W., Roberts, B. J., Elliott, W. L., and Denny, W. A. Tyrosine kinase inhibitors. 18. 6-Substituted 4-anilinoquinazolines and 4-anilinopyrido[3,4-d]pyrimidines as soluble, irreversible inhibitors of the epidermal growth factor receptor. J Med Chem, *44:* 429-440, 2001.

8. Slichenmyer, W. J., Elliott, W. L., and Fry, D. W. CI-1033, a pan-erbB tyrosine kinase inhibitor. Semin Oncol, *28:* 80-85, 2001.

9. Schroeder, M. C., Hamby, J. M., Connolly, C. J., Grohar, P. J., Winters, R. T., Barvian, M. R., Moore, C. W., Boushelle, S. L., Crean, S. M., Kraker, A. J., Driscoll, D. L., Vincent, P. W., Elliott, W. L., Lu, G. H., Batley, B. L., Dahring, T. K., Major, T. C., Panek, R. L., Doherty, A. M., and Showalter, H. D. Soluble 2-substituted aminopyrido[2,3-d]pyrimidin-7-yl ureas. Structure-activity relationships against selected tyrosine kinases and exploration of in vitro and in vivo anticancer activity. J Med Chem, *44:* 1915-1926, 2001.

10. Vincent, P. W., Bridges, A. J., Dykes, D. J., Fry, D. W., Leopold, W. R., Patmore, S. J., Roberts, B. J., Rose, S., Sherwood, V., Zhou, H., and Elliott, W. L. Anticancer efficacy of the irreversible EGFr tyrosine kinase inhibitor PD 0169414 against human tumor xenografts. Cancer Chemother Pharmacol, *45:* 231-238, 2000.

11. Thompson, A. M., Connolly, C. J., Hamby, J. M., Boushelle, S., Hartl, B. G., Amar, A. M., Kraker, A. J., Driscoll, D. L., Steinkampf, R. W., Patmore, S. J., Vincent, P. W., Roberts, B. J., Elliott, W. L., Klohs, W., Leopold, W. R., Showalter, H. D., and Denny, W. A. 3-(3,5-Dimethoxyphenyl)-1,6-naphthyridine-2,7-diamines and related 2-urea derivatives are potent and selective inhibitors of the FGF receptor-1 tyrosine kinase. J Med Chem, *43:* 4200-4211, 2000.

12. Smaill, J. B., Rewcastle, G. W., Loo, J. A., Greis, K. D., Chan, O. H., Reyner, E. L., Lipka, E., Showalter, H. D., Vincent, P. W., Elliott, W. L., and Denny, W. A. Tyrosine kinase inhibitors. 17. Irreversible inhibitors of the epidermal growth factor receptor: 4-(phenylamino)quinazoline- and 4-(phenylamino)pyrido[3,2-d]pyrimidine-6-acrylamides bearing additional solubilizing functions. J Med Chem, *43:* 1380-1397, 2000.

13. Sun, Y., Fry, D. W., Vincent, P., Nelson, J. M., Elliott, W., and Leopold, W. R. Growth inhibition of nasopharyngeal carcinoma cells by EGF receptor tyrosine kinase inhibitors. Anticancer Res, *19:* 919-924, 1999.

14. Smaill, J. B., Palmer, B. D., Rewcastle, G. W., Denny, W. A., McNamara, D. J., Dobrusin, E. M., Bridges, A. J., Zhou, H., Showalter, H. D., Winters, R. T., Leopold, W. R., Fry, D. W., Nelson, J. M., Slintak, V., Elliot, W. L., Roberts, B. J., Vincent, P. W., and Patmore, S. J. Tyrosine kinase inhibitors. 15. 4-(Phenylamino)quinazoline and 4-(phenylamino)pyrido[d]pyrimidine acrylamides as irreversible inhibitors of the ATP binding site of the epidermal growth factor receptor. J Med Chem, *42:* 1803-1815, 1999.

15. Rewcastle, G. W., Murray, D. K., Elliott, W. L., Fry, D. W., Howard, C. T., Nelson, J. M., Roberts, B. J., Vincent, P. W., Showalter, H. D., Winters, R. T., and Denny, W. A. Tyrosine kinase inhibitors. 14. Structure-activity relationships for methylamino-substituted derivatives of 4-[(3-bromophenyl)amino]-6-(methylamino)-pyrido[3,4-d]pyrimidine (PD 158780), a potent and specific inhibitor of the tyrosine kinase activity of receptors for the EGF family of growth factors. J Med Chem, *41:* 742-751, 1998.

16. Klutchko, S. R., Hamby, J. M., Boschelli, D. H., Wu, Z., Kraker, A. J., Amar, A. M., Hartl, B. G., Shen, C., Klohs, W. D., Steinkampf, R. W., Driscoll, D. L., Nelson, J. M., Elliott, W. L., Roberts, B. J., Stoner, C. L., Vincent, P. W., Dykes, D. J., Panek, R. L., Lu, G. H., Major, T. C., Dahring, T. K., Hallak, H., Bradford, L. A., Showalter, H. D., and Doherty, A. M. 2-Substituted aminopyrido[2,3-d]pyrimidin-7(8H)-ones. structure-activity relationships against selected tyrosine kinases and in vitro and in vivo anticancer activity. J Med Chem, *41:* 3276-3292, 1998.

17. Boschelli, D. H., Wu, Z., Klutchko, S. R., Showalter, H. D., Hamby, J. M., Lu, G. H., Major, T. C., Dahring, T. K., Batley, B., Panek, R. L., Keiser, J., Hartl, B. G., Kraker, A. J., Klohs, W. D., Roberts, B. J., Patmore, S., Elliott, W. L., Steinkampf, R., Bradford, L. A., Hallak, H., and Doherty, A. M. Synthesis and tyrosine kinase inhibitory activity of a series of 2-amino-8H-pyrido[2,3-d]pyrimidines: identification of potent, selective platelet-derived growth factor receptor tyrosine kinase inhibitors. J Med Chem, *41:* 4365-4377, 1998.

18. Vincent, P. W., Roberts, B. J., Leopold, W. R., and Elliott, W. L. Chemotherapy with DMXAA (5, 6-dimethylxanthenone-4-acetic acid) in combination with CI-1010 (1 H-imidazole-1-ethanol, a-[[(2-bromoethyl)amino]methyl]-2-nitro-,mono-hydrobromide (R isomer) against advanced staged murine colon carcinoma 26. Oncology Reports, *4:* 143-147, 1997.

19. Thompson, A. M., Murray, D. K., Elliott, W. L., Fry, D. W., Nelson, J. A., Showalter, H. D., Roberts, B. J., Vincent, P. W., and Denny, W. A. Tyrosine kinase inhibitors. 13. Structure-activity relationships for soluble 7-substituted 4-[(3-bromophenyl)amino]pyrido[4,3-d]pyrimidines designed as inhibitors of the tyrosine kinase activity of the epidermal growth factor receptor. J Med Chem, *40:* 3915-3925, 1997.

20. Showalter, H. D., Sercel, A. D., Leja, B. M., Wolfangel, C. D., Ambroso, L. A., Elliott, W. L., Fry, D. W., Kraker, A. J., Howard, C. T., Lu, G. H., Moore, C. W., Nelson, J. M., Roberts, B. J., Vincent, P. W., Denny, W. A., and Thompson, A. M. Tyrosine kinase inhibitors. 6. Structure-activity relationships among N- and 3-substituted 2,2'-diselenobis(1H-indoles) for inhibition of protein tyrosine kinases and comparative in vitro and in vivo studies against selected sulfur congeners. J Med Chem, *40:* 413-426, 1997.

21. Roberts, B. J., Hook, K. E., Whitfield, L. R., Carter, C. A., and Elliott, W. L. Clinically relevant suramin dosing regimen in mice with no efects against PC-3 prostate xenografts. Oncology Reports, *4:* 1361-1366, 1997.

22. Kunkel, M. W., Hook, K. E., Howard, C. T., Przybranowski, S., Roberts, B. J., Elliott, W. L., and Leopold, W. R. Inhibition of the epidermal growth factor receptor tyrosine kinase by PD153035 in human A431 tumors in athymic nude mice. Invest New Drugs, *13:* 295-302, 1996.

23. Elliott, W. L., Howard, C. T., Roberts, B. J., Hook, K. E., Vincent, P. W., Corbett, T. H., and Leopold, W. R. Enhanced therapeutic effectof amaslog (CI-921) in combination with cisplatin in vitro and in vivo. Oncology Reports, *3:* 1153-1159, 1996.

24. Hoeschele, J. D., Showalter, H. D., Kraker, A. J., Elliott, W. L., Roberts, B. J., and Kampf, J. W. Synthesis, structural characterization, and antitumor properties of a novel class of large-ring platinum(II) chelate complexes incorporating the cis-1,4-diaminocyclohexane ligand in a unique locked boat conformation. J Med Chem, *37:* 2630-2636, 1994.

25. Fry, D. W., Kraker, A. J., Connors, R. C., Elliott, W. L., Nelson, J. M., Showalter, H. D., and Leopold, W. R. Strategies for the discovery of novel tyrosine kinase inhibitors with anticancer activity. Anticancer Drug Des, *9:* 331-351, 1994.

26. Elliott, W. L., Roberts, B. J., Howard, C. T., and Leopold, W. R., 3rd Chemotherapy with [SP-4-3-(R)]-[1,1-cyclobutanedicarboxylato(2-)](2- methyl-1,4-butanediamine-N,N')platinum (CI-973, NK121) in combination with standard agents against murine tumors in vivo. Cancer Res, *54:* 4412-4418, 1994.

27. Sebolt-Leopold, J. S., Vincent, P. W., Beningo, K. A., Elliott, W. L., Leopold, W. R., Heffner, T. G., Wiley, J. N., Stier, M. A., and Suto, M. J. Pharmacologic/pharmacokinetic evaluation of emesis induced by analogs of RSU 1069 and its control by antiemetic agents. Int J Radiat Oncol Biol Phys, *22:* 549-551, 1992.

28. Kraker, A. J., Hoeschele, J. D., Elliott, W. L., Showalter, H. D., Sercel, A. D., and Farrell, N. P.

Anticancer activity in murine and human tumor cell lines of bis(platinum) complexes incorporating straight-chain aliphatic diamine linker groups. J Med Chem, *35:* 4526-4532, 1992.

29. Cole, S., Stratford, I. J., Fielden, E. M., Adams, G. E., Leopold, W., Elliott, W., Suto, M., and Sebolt-Leopold, J. Dual function nitroimidazoles less toxic than RSU 1069: selection of candidate drugs for clinical trial (RB 6145 and/or PD 130908. Int J Radiat Oncol Biol Phys, *22:* 545-548, 1992.

30. Suto, M. J., Stier, M. A., Werbel, L. M., Arundel-Suto, C. M., Leopold, W. R., Elliott, W. E., and Sebolt-Leopold, J. S. A new class of analogues of the bifunctional radiosensitizer alpha-(1-aziridinylmethyl)-2-nitro-1H-imidazole-1-ethanol (RSU 1069): the cycloalkylaziridines. J Med Chem, *34:* 2484-2488, 1991.

31. Suto, M. J., Stier, M. A., Winters, R. T., Turner, W. R., Pinter, C. D., Elliott, W. E., and Sebolt-Leopold, J. S. Synthesis and evaluation of a series of 3,5-disubstituted benzisoxazole-4,7-diones. Potent radiosensitizers in vitro. J Med Chem, *34:* 3290-3294, 1991.

32. Kraker, A. J., Moore, C. W., Roberts, B. J., Leopold, W. R., and Elliott, W. L. Preclinical antitumor activity of CI-973,[SP-4-3-(R)]-[1,1- cyclobutanedicarboxylato(2-)](2 methyl-1,4-butane-diamine-N,N')platinum. Invest New Drugs, *9:* 1-7, 1991.

33. Elliott, W. L., Fry, D. W., Anderson, W. K., Nelson, J. M., Hook, K. E., Hawkins, P. A., and Leopold, W. R., 3rd In vivo and in vitro evaluation of the alkylating agent carmethizole. Cancer Res, *51:* 4581-4587, 1991.

34. Waud, W. R., Leopold, W. R., Elliott, W. L., Dykes, D. J., Laster, W. R., Jr., Temple, C. G., Jr., Harrison, S. D., Jr., and Griswold, D. P., Jr. Antitumor activity of ethyl 5-amino-1,2-dihydro-2-methyl-3-phenyl-pyrido [3,4-b]pyrazin-7-ylcarbamate, 2-hydroxyethanesulfonate, hydrate (NSC 370147) against selected tumor systems in culture and in mice. Cancer Res, *50:* 3239-3244, 1990.

35. Jayaram, H. N., Lui, M. S., Plowman, J., Pillwein, K., Reardon, M. A., Elliott, W. L., and Weber, G. Oncolytic activity and mechanism of action of a novel L-cysteine derivative, L-cysteine, ethyl ester, S-(N-methylcarbamate) monohydrochloride. Cancer Chemother Pharmacol, *26:* 88-92, 1990.

36. Elliott, W. L., Sorli, C. H., Reisert, P. S., and Humphreys, R. E. Testing for cell surface forms of class II major histocompatibility complex antigens and Ii by radioiodination, biotinylation, and membrane immunofluorescence. Am J Hematol, *30:* 4-13, 1989.

37. Elliott, W. L., Howard, C. T., Dykes, D. J., and Leopold, W. R. Sequence and schedule-dependent synergy of trimetrexate in combination with 5-fluorouracil in vitro and in mice. Cancer Res, *49:* 5586-5590, 1989.

38. Thomas, L. J., Nguyen, Q. V., Elliott, W. L., and Humphreys, R. E. Proteolytic cleavage of Ii to p25. J Immunol, *140:* 2670-2674, 1988.

39. Pillwein, K., Reardon, M. A., Jayaram, H. N., Natsumeda, Y., Elliott, W. L., Faderan, M. A., Prajda, N., Sperl, W., and Weber, G. Insulin regulatory effects on purine- and pyrimidine metabolism in alloxan diabetic rat liver. Padiatr Padol, *23:* 135-144, 1988.

40. Owerbach, D. I., Elliott, W. L., and Humphreys, R. E. Hairy leukemic cells which hyperexpress Ii do not demonstrate Ii genome alterations by restriction endonuclease analysis. Am J Hematol, *25:* 285-289, 1987.

41. Elliott, W. L., Lu, S., Nguyen, Q., Reisert, P. S., Sairenji, T., Sorli, C. H., Stille, C. J., Thomas, L. J., and Humphreys, R. E. Hyperexpressed hairy leukemic cell Ii might bind to the antigen-presenting site of class II MHC molecules. Leukemia, *1:* 395-396, 1987.

42. Elliott, W. L., Stille, C. J., Thomas, L. J., and Humphreys, R. E. An hypothesis on the binding of an amphipathic, alpha helical sequence in Ii to the desetope of class II antigens. J Immunol, *138:* 2949-2952, 1987.

43. Sun, I., MacKellar, W. C., Crane, F. L., Barr, R., Elliott, W. L., Lem, N., Varnold, R. L., Heinstein, P. F., and Morre, D. J. Decreased NADH-oxidoreductase activities as an early response in rat liver to the carcinogen 2-acetylaminofluorene. Cancer Res, *45:* 157-163, 1985.

44. Elliott, W. L. and Weber, G. In vivo inactivation of formylglycinamidine ribonucleotide synthetase in rat hepatoma. Biochem Pharmacol, *34:* 243-248, 1985.

45. Weber, G., Natsumeda, Y., Lui, M. S., Faderan, M. A., Liepnieks, J. J., and Elliott, W. L. Control of enzymic programs and nucleotide pattern in cancer cells by acivicin and tiazofurin. Adv Enzyme Regul, *22:* 69-93, 1984.

46. Elliott, W. L., Sawick, D. P., Creek, K. E., Deutscher, S. L., Quinn, J. F., Yeo, E., Webb, W. R., Morre, D. M., Harrington, D. D., Heinstein, P. F., and et al. Early biochemical alterations induced by 2-acetylaminofluorene in rat liver. Int J Biochem, *16:* 947-956, 1984.

47. Elliott, W. L. and Weber, G. Proliferation-linked increase in phosphoribosylformylglycinamidine synthetase activity (EC 6.3.5.3). Cancer Res, *44:* 2430-2434, 1984.

48. Elliott, W. L., Sawick, D. P., DeFrees, S. A., Heinstein, P. F., Cassady, J. M., and Morre, D. J. Cyclic modulation of enzymes of pyrimidine nucleotide biosynthesis precedes sialoglycoconjugate changes during 2-acetylaminofluorene-induced hepatocarcinogenesis in the rat. Biochim Biophys Acta, *800:* 194-201, 1984.

49. Creek, K. E., Walter, V. P., Evers, D., Yeo, E., Elliott, W. L., Heinstein, P. F., Morre, D. M., and Morre, D. J. Sialoglycoconjugate changes during 2-acetylaminofluorene-induced hepatocarcinogenesis in the rat. Biochim Biophys Acta, *793:* 133-140, 1984.

50. Schiller-Smith, S. L., Varnold, R. L., Morre, D. J., Elliott, W. L., and Heinstein, P. F. Changes in protein kinase activities during 2-acetylaminofluorene-induced hepatocarcinogenesis in the rat. Int J Biochem, *15:* 997-1002, 1983.