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COVER STORYCurriculum Vitae of
Mary J. Ruwart, Ph.D.**BORN:**

October 16, 1949; Detroit, Michigan

EDUCATION:1970 B.S., Biochemistry (Enzymology)
Michigan State University, East Lansing, Michigan1974 Ph.D., Biophysics (Membranology)
Michigan State University, East Lansing, Michigan**HONORS:**

1994 Upjohn Special Recognition Award

1986 Fred Kagan Lead Finding Award

1970 Phi Beta Kappa

1970 Magna cum laude, Michigan State University

1969 NSF Summer Student Program Award

1969 /70 Michigan Higher Education Tuition Scholarship

1967/68 National Association of Teachers Scholarship

1967 Detroit Metropolitan Science Fair College Scholarship

**RESEARCH AND/OR PROFESSIONAL EXPERIENCE:**

9/96-present

Senior Partner & Communications Consultant
Sci-Com, Burnet, Texas

7/95 - 8/96

Senior Research Scientist, Drug Metabolism,
The Upjohn Co., Kalamazoo, MI

8/87 - 7/95

Senior Research Scientist,
Drug Delivery Systems Research,
The Upjohn Co., Kalamazoo, MI

1/84 - 8/87

Senior Research Scientist,
Diabetes and GI Diseases Research,
The Upjohn Co., Kalamazoo, MI

2/82 - 1/84

Senior Research Scientist, Experimental Sciences,
The Upjohn Co., Kalamazoo, MI

9/76 - 2/82

Research Scientist, Experimental Biology,
The Upjohn Co., Kalamazoo, MI

6/76 - 9/76

Assistant Professor, Surgery,
St. Louis University Medical School
St. Louis, MO

6/75 - 6/76

Instructor, Surgery,
St. Louis University Medical School
St. Louis, MO

3/74 - 6/75

Research Associate, Surgery,
St. Louis University Medical School
St. Louis, MO

MAJOR AREAS OF INTEREST:

Oral, transdermal, and intrapulmonary delivery of peptides; prostaglandins; liver disease; intestinal motility; cholesterol metabolism and abnormalities. Organ preservation and function; application of biochemical expertise to clinically oriented research; nutrition.

INSTRUMENTAL AND TECHNICAL EXPERTISE:

Computers, gas chromatography, gel electrophoresis, column chromatography, radioimmunoassay, fluorimetry, thin-layer chromatography, lipid isolation, infra-red spectroscopy, electron paramagnetic resonance, microbiological culturing, enzyme purification and kinetic analysis, membrane isolation, differential scanning calorimetry, Technicon autoanalysis, density gradient centrifugation, gastrointestinal surgery (large and small animals); liver perfusion; hepatocyte culturing.

PROFESSIONAL ORGANIZATIONS (Recent memberships):

American Gastroenterology Association
Society for Experimental Biology & Medicine
American Association for the Advancement of Science
Association for The Study of Liver Disease
American Association Pharmaceutical Sciences
International Platform Association

BIOGRAPHICAL CITATIONS (Year of first citation):

American Men and Women of Science (1979)
Who's Who In Science & Technology (1980)
World Who's Who of Women (1989)
2,000 Notable American Women (1989)
5,000 Personalities of the World (1989)
International Leaders in Achievement (1990)
Dictionary of International Biography (1990)
Who's Who of American Women (1990)
Community Leaders of America (1990)

PUBLICATIONS

PAPERS:

1. Ruwart MJ and Suelter CH: Activation of yeast pyruvate kinase by natural and artificial cryoprotectants. J Biol Chem 246:5990-5993, 1971.
2. Smith GG, Ruwart MJ and Haug A: Lipid phase transition in membrane vesicles from *Thermoplasma acidophila*. FEBS Letters 45:96-98, 1974.
3. Ruwart MJ and Haug A: Mechanisms of freeze-thaw damage in *Pseudomonas* F8. Cryobiology 11:260-262, 1974.
4. Kaminski DL, Ruwart MJ and Willman VL: The effect of electrical vagal stimulation on canine pancreatic exocrine function. Surgery 77:545-552, 1975.
5. Ruwart MJ and Haug A: Membrane properties of *Thermoplasma acidophila*. Biochemistry 14:860-866, 1975.
6. Ruwart MJ, Holland JF and Haug A: Fluorometric evidence of interactions involving cryoprotectants and biomolecules.

7. Kaminski DL, Ruwart MJ and Willman VL: The effect of prostaglandins A1 and E1 on canine hepatic bile flow. *J Surg Res* 18:391-397, 1975.
8. Kaminski DL, Ruwart MJ and Jellinek M: Effect of glucagon on secretin- stimulated bile flow. *Am J Physiol* 229:1480-1485, 1975.
9. Kaminski DL, Ruwart MJ and Jellinek M: The effect of the histamine (H₂) inhibitor, metiamide, on histamine stimulated bile flow in dogs. *Am J Physiol* 231:516-521, 1976.
10. Ruwart MJ, Kaminski DL and Barner H: Use of automated on-line pyruvate analysis to determine perfused liver viability. *Trans Am Soc Art Int Org* 22:223-228, 1976.
11. Kaminski DL, Jellinek M, Ruwart MJ, Mueller E and Menz L: Small intestinal bypass in nutritionally obese rats receiving choline supplement. *Surg Forum* 27:449-451, 1976.
12. Kaminski DL and Ruwart MJ: The effect of vagotomy on the canine enterogastrone mechanism. *Surgery* 81:80-85, 1977.
13. Ruwart MJ and Kaminski DL: Isolation, purification, and quantitation of cAMP and cGMP in canine bile. *Anal Biochem* 81:130-135, 1977.
14. Ruwart MJ, Kaminski DL and Hahn JW: Papaverine-induced metabolic alterations in perfused canine and porcine liver. *Biochem Pharmacol* 26:1339-1343, 1977.
15. Kaminski DL, Despande W and Ruwart MJ: The effect of prostaglandin F_{2a} on canine hepatic bile flow and biliary cyclic AMP secretion. *J Surg Res* 22:545-553, 1977.
16. Kaminski DL, Ruwart MJ and Jellinek M: Structure-function relationships of peptide fragments of gastrin and cholecystokinin. *Am J Physiol* 233:E286-292, 1977.
17. Ruwart MJ, Kaminski DL and Jellinek M: Evidence for additional mediator in prostaglandin-induced choleresis. *Prostaglandins* 14:975-982, 1977.
18. Kaminski DL, Despande YG and Ruwart MJ: The effect of prostaglandin F_{2a} on canine and hepatic bile flow and biliary cyclic AMP secretion. *J Surg Res* 22:545-553, 1977.
19. Ruwart MJ, Klepper MS and Rush BD: Carbachol stimulation of gastrointestinal transit in the post-operative ileus rat. *J Surg Res* 26:18-26, 1979.
20. Ruwart MJ, Klepper MS and Rush BD: Ionic composition of small intestinal secretion induced by PGE₂. *Prostaglandins Med* 2:285-291, 1979.
21. Ruwart MJ, Kaminski DL and Hahn JW: Secretin, glucagon, and insulin-induced effects on bile flow and metabolism of isolated perfused canine and porcine liver. *J Surg Res* 26:674-680, 1979.
22. Piercey MF and Ruwart MJ: Naloxone inhibits the anti-diarrheal activity of loperamide. *Br J Pharmacol* 66:373-375, 1979.
23. Ruwart MJ, Klepper MS and Rush BD: Evidence for noncholinergic mediation of small intestinal transit in the rat. *J Pharmacol Exptl Ther* 209:462-465, 1979.
24. Kaminski DL, Ruwart MJ and Despande YG: The role of cyclic AMP in canine secretion-stimulated bile flow. *J Surg Res* 27:57-61, 1979.
25. Kaminski DL, Ruwart MJ and Despande YG: The effects of synthetic prostaglandin analogs on canine hepatic bile flow. *Prostaglandins* 18:73-82, 1979.
26. Ruwart MJ, Klepper MS and Rush BD: Mechanism of Stimulation of gastrointestinal propulsion in post-operative ileus rats by 16,16-dimethyl PGE₂. *Adv PG Thromboxane Res* 8:1603-1607, 1980.
27. Ruwart MJ, Klepper MS and Rush BD: Clonidine delays small intestinal transit in the rat. *J Pharmacol Exptl Ther* 212:487-490, 1980.
28. Ruwart MJ, Klepper MS and Rush BD: Prostaglandin stimulation of gastrointestinal transit in post-operative ileus rats.

Prostaglandins 19:415-426, 1980.

29. Ruwart MJ, Klepper MS and Rush BD: Adrenergic and cholinergic contributions to decreased gastric emptying, small intestinal transit, and colonic transit in the post-operative ileus rat. *J Surg Res* 29:126-134, 1980.

30. Rush BD, Ruwart MJ and Day CE: The mechanism of action of the hypo-cholesterolemic drug p(l-adamantyloxy)-aniline. *Atherosclerosis* 39:345-351, 1981.

31. Ruwart MJ, Rush BD, Friedle NM, Piper RC and Kolaja GJ: Protective effects of 16,16-dimethyl PGE₂ on the liver and kidneys. *Prostaglandins* 21(Suppl.):97-102, 1981.

32. Reece SB, Ruwart MJ and Noah ML: Gastrointestinal propulsion measurement with radiopaque capsules during 16,16-dimethyl PGE₂ infusion. *Prostaglandins Leukotrienes and Medicine* 9:629-640, 1982.

33. Ruwart MJ, Renis HE, Erlandson AL, DeHaan RM, Nezamis JE, Lancaster C and Davis JP: 16,16-Dimethyl-PGE₂ inhibits toxin release of *Clostridium difficile*. *Adv Prostaglandin Thromboxane Res* 12:93-98, 1983.

34. Ruwart MJ, Sammons DW, Kolaja GJ, Rush BD, Friedle NM and Adams LD: Alloxan-induced hyperglycemia in rats is reduced by 16,16-dimethyl-PGE₂. *Res Comm Chem Path Pharm* 40:233-243, 1983.

35. Gilbertson TJ, Ruwart MJ, Stryd RP, Brunden MN, Friedle NM, Rush BD and Christianson CA: Partial Characterization of the Gastrointestinal Weight Changes Produced in the Female Rat by 16,16-dimethyl prostaglandin E₂. *Prostaglandins* 26:745-759, 1983.

36. Ruwart MJ and Rush BD: Prostacyclin Inhibits Gastric Emptying and Small Intestinal Transit in Rats and Dogs. *Gastroenterology* 87:392-395, 1984.

37. Ruwart MJ, Rush BD, Friedle NM, Stachura J and Tarnawski A: 16,16-Dimethyl-PGE₂ Protection Against a-Naphthyl-isothiocyanate-Induced Experimental Cholangitis in Rat. *Hepatology* 4:658-660,1984.

38. Ruwart MJ, Nezamis JE, Rush BD, Lancaster C, Davis JP, Nichols NM, and Ochoa R: Timoprazole is a Unique Cytoprotective Agent in the Rat. *Digestion* 30:33-40, 1984.

39. Rush BD and Ruwart MJ: Prazosin Inhibits Small Intestinal Transit in the Rat. *Br J Pharmacol* 82:547-548, 1984.

40. Ruwart MJ and Rush BD: The Effects of PGF_{2a} and 16,16 Dimethyl PGE₂ on Gastric Emptying and Small Intestinal Transit in Rat. *Prostaglandins* 28:915-928, 1984.

41. Rush BD and Ruwart MJ: The Role of Accelerated Colonic Transit in Prostaglandin-induced Diarrhoea and its Inhibition by Prostacyclin. *Br J Pharmacol* 83:157-159, 1984.

42. Rush BD, Ruwart MJ, Anderson BD and Higuchi WI. Evaluation of Lincomycin as a Cholesterol Gallstone Dissolution Rate Accelerator. *J Pharmaceutical Sci.* 74:621-624, 1985.

43. Robert A, Bundy GL, Field SO, Nezamis JE, Davis JP, Hanchar AJ, Lancaster C, and Ruwart MJ. Prevention of Cecitis in Hamsters by Certain Prostaglandins. *Prostaglandins* 29:961-980, 1985.

44. Ruwart MJ, Nichols NM, Hedeem K, Rush BD, and Stachura J. 16,16-Dimethyl PGE₂ and Fatty Acids Protect Hepatocytes Against CCl₄-Induced Damage. *In Vitro Cellular & Developmental Biology* 21:450-452, 1985.

45. Ruwart MJ, Nichols NM, Rush BD, Mochizuki R, Elliott,G and Brunden MN. 16,16-Dimethyl PGE₂ Partially Prevents N-Phenylanthranilic Acid-Induced Kidney Damage in the Rat. *Prostaglandins Leukotrienes and Medicine* 20:139-140, 1985.

46. Ruwart MJ, Appelman HD, Rush BD, Nichols NM, Brunden MN, Snyder KF, and Henley KS. The Effect of 16,16-Dimethyl-prostaglandin E₂ on Nutritional Injury in Rat Liver. *Proc. Internatl. Symposium on Chronic Hepatitis in Chronic Hepatitis*, Y.-F. Liaw, ed., Elsevier Science Publishers B.V., 1986, p. 257-261.

47. Rush BD, Merritt MV, Kaluzny M, Van Schoick T, Brunden MN, Ruwart MJ. Studies on the Mechanism of the Protective Action of 16,16-Dimethyl PGE₂ in Carbon Tetrachloride Induced Acute Hepatic Injury in the Rat. *Prostaglandins* 32:439-455, 1986.

48. Meren H, Sato N, Kamada T, Ruwart MJ, Varin F, Thurman RG. Effect of 16,16 Dimethylprostaglandin E₂ on Hepatic Oxygenation in Choline-Deficient Rats. In: "Cyto-protection and Cytobiology," Vol. 4, Proceedings of the Fourth Symposium on Cytoprotection, Kyoto, January 1986.

49. Meren H, Varin F, Ruwart MJ and Thurman R. Effect of 16,16-Dimethyl Prostaglandin E2 on Oxygen Uptake and Microcirculation in the Perfused Rat Liver. *Hepatology* 6:917-921, 1986.
50. Meren H, Sato N, Kamada T, Ruwart MJ, Varin F, Thurman RG. Effect of 16,16-Dimethylprostaglandin E2 on Hepatic Oxygenation in Choline-Deficient Rats. *Curr. Clin. Pract. Ser.* 43:66-72, 1987.
51. Ruwart MJ, Rush BD, Snyder KF, Peters KM, Appelman HD, and Henley KS. 16,16-Dimethyl Prostaglandin E2 Delays Collagen Formation in Nutritional Injury in Rat Liver. *Hepatology* 8:61-64, 1988.
52. Peters KM, Snyder KF, Rush BD, Ruwart MJ, and Henley KS. 16, 16 Dimethyl Prostaglandin E2 Decreases the Formation of Collagen in Fibrotic Rat Liver Slices. *Prostaglandins* 37:445-456 (1989).
53. Rush BD, Wilkinson KF, Nichols NM, Ochoa R, Bruden MN, and Ruwart MJ. Hepatic Protection by 16, 16-Dimethyl Prostaglandin E2 (DMPG) Against Acute Aflatoxin B1-Induced Injury in the Rat. *Prostaglandins* 37:683-693 (1989).
54. Bowes LG, Dumble LJ, Pollak R, Ruwart MJ, Francis DMA, Hunter S, and Clunie GJA. Prostaglandin E1 and E2 Suppression of In Vitro Lymphoid Responses to Alloantigen. *Transplantation Proc.* 21:3769-3770 (1989).
55. Ruwart MJ, Wilkinson KF, Rush BD, Vidmar TJ, Peters KM, Henley KS, Appelman HD, Kim KY, Schuppan D, and Hahan EG. The Integrated Value of Serum Procollagen III Peptide Over Time Predicts Hepatic Hydroxyproline Content and Stainable Collagen In a Model of Dietary Cirrhosis in the Rat. *Hepatology* 10:801-806 (1989).
56. Ruwart MJ, Sharma, SK, Harris DW, Lakings DB, Rush BD, Wilkison KF, Cornette JC, Evans DB, Friis JM, Cook KJ, and Johnson GA. Development of a Sensitive Activity Assay for High-volume Evaluation of Human Renin Inhibitory Peptides in Rat Serum: Results with U-71038. *Pharmaceutical Research* 7:407-410 (1990).
57. Redgrave NG, Dumble LJ, Pollack R, Bowes LG, Ruwart MJ, Clunie GJA An In vitro Comparison of the Immunosuppressive Potential of Synthetic Prostaglandin Analogues. *Transplantation Proceedings* 23: 346-347 (1991).
58. Karls MS, Rush BD, Wilkinson KF, Burton PS, Ruwart MJ. Desolvation Energy: A Major Determinant of Absorption But Not Clearance of Peptides in Rats. *Pharmaceutical Research* 8: 1477-1481 (1991).
59. Rush BD, Wilkinson KF, Zhong WZ, Closson SK, Lakings DB, Ruwart MJ. Absolute Oral bioavailability of Ditekiren, A Renin Inhibitory Peptide, In Conscious Rats. *Int. J. Pharmaceutics* 73: 231-237 (1991).
60. Kolars JC, Stetson PL, Rush BD, Ruwart MJ, Schmiedlin-Ren P, Duell EA, Voorhees JJ, Watkins PB. Cyclosporin Metabolism by P450IIIa in Rat Enterocytes-Another Determinant of Oral Bioavailability? *Transplantation* 53: 596-602 (1992).
61. Fisher JF, Harrison AW, Bundy GL, Wilkinson KF, Rush BD, and Ruwart MJ. Peptide to Glycopeptide: Glycosylated Oligopeptide Renin Inhibitors with Attenuated in vivo Clearance Properties. *J. Med. Chem.* 34: 3140-3143 (1991).
62. Hoover JL, Rush BD, Wilkinson KF, Day JS, Burton PS, Vidmar TJ, and Ruwart MJ. Peptides Are Better Absorbed from the Lung than the Gut. *Pharmaceutical Research* 9:1103-1106 (1992).
63. Redgrave NG, Francis DM, Dumble LJ, Plenter R, Ruwart MJ, Birchall I, and Clunie GJ. Prevention of acute cyclosporine nephrotoxicity in rabbits with a prostacyclin analogue. *Transplant. Proc.* 24, 227-228 (1992).
64. Redgrave NG, Francis DM, Dumble LJ, Plenter R, Ruwart MJ, Birchall I, and Clunie GJ. Synergistic prolongation of rabbit renal allograft survival by cyclosporine and a prostacyclin analogue. *Transplant. Proc.* 24: 222-223 (1992).
65. Wilkinson KF, Rush BD, Sharma SK, Evans DB, Ruwart MJ, Friis JM, Bohanon MJ, and Tomich PK. Development of Activity Assays for High-Volume Evaluation of Human Immunodeficiency Virus (HIV) Protease Inhibitors in Rat Serum: Results with Ditekiren. *Pharmaceutical Research* 10(4):562-566 (1993).
66. Sheehy AM, Hoover JL, Rush BD, Wilkinson KF, Vidmar TJ, and Ruwart MJ. Intrapulmonary Delivery of Renin Inhibitory Peptides Results in Sustained Release Because of Saturable Transport. *Pharmaceutical Research* 10(10):1548-1551 (1993).
67. Chong KT, Ruwart MJ, Hinshaw RR, Wilkinson KF, Rush BD, Yancey MF, Strohbach JW, and Thaisrivongs S. Peptidomimetic HIV Protease Inhibitors: Phosphate Prodrugs with Improved Biological Activities. *J. Med. Chem.* 136(17):2575-2577 (1993)
68. Kim DC, Harrision AW, Ruwart MJ, Wilkinson KF, Fisher JF, Hidalgo IJ, and Borchardt, RT. Evaluation of the Bile Acid Transporter in Enhancing Intestinal Permeability to Renin-Inhibitory Peptides. *J. Drug Targeting* 1:347-359, 1993.
69. Islam I, Ng K, Chong KT, McQuade TJ, Hui JO, Wilkinson KF, Rush BD, Ruwart MJ, Borchardt RT, and Fisher JF. Evaluation of

a Vitamin-Cloaking Strategy for Oligopeptide Therapeutics: Biotinylated HIV-1 Protease Inhibitors. *J. Med. Chem.* 37(2):293-304, 1994.

70. Martin LN, Soike KF, Murphey-Corb M, Bohm RP, Roberts D, Kakuk TJ, Thaisrivongs S, Vidmar TJ, Ruwart MJ, Davio SR, Tarpley WG. Effects of a Peptidomimetic Inhibitor of Retroviral Proteases (U-75875) on Simian Immunodeficiency Virus Infection in Rhesus Monkeys. *Antimicrobial Agents and Chemotherapy* 38(6):1277-1283, 1994.

ABSTRACTS/ORAL PRESENTATIONS

1. Ruwart MJ, Holland JR and Haug A: Fluorescence studies of cryoprotectants. *Cryobiology* 9:257, 1972.
2. Ruwart MJ, Jaquet D, Hoy D and Haug A: Membrane properties of *Thermoplasma acidophila*. *Am Chem Soc*, August 26, 1973, Biol-223.
3. Kaminski DL, Ruwart MJ and Jellinek M: The effect of the H₂ receptor antagonist, metiamide, on histamine stimulated bile flow. *Clin Res* 23:604A, 1974.
4. Kaminski DL, Ruwart MJ and Willman VL: The effect of glucagon on secretin stimulated bile flow. *Fed Proc* 34:394, 1975.
5. Ruwart MJ, Kaminski DL and Willman VL: Evaluation of perfused liver viability. *Fed Proc* 34:395, 1975.
6. Ruwart MJ, Holland JR and Haug A: Fluorescence studies of cryoprotectants. *Cryobiology* 9:257, 1972.
7. Ruwart MJ: Cryoprotectant interactions as detected by fluoroscopy. 12th Annual Cryobiology Conference, Washington, D.C., August 10-13, 1975.
8. Kaminski DL, Ruwart MJ and Jellinek M: Receptor mechanisms involved in histamine stimulated bile flow. *Gastroenterology* 68:A-64, 1975.
9. Ruwart MJ, Kaminski DL and Willman VL: Effect of insulin and glucagon on hepatic bile flow in ex-vivo perfused porcine and canine liver. *Gastroenterology* 68:A-120, 1975.
10. Kaminski DL, Ruwart MJ and Willman VL: The effect of prostaglandin A₁ on canine hepatic bile flow. *Adv PG Thromboxane Res* 2:940, 1976.
11. Hahn JW, Ruwart MJ and Kaminski DL: Excision of the canine liver for perfusion. Presented 26th Annual Session American Association for Laboratory Animal Science, 1975.
12. Ruwart MJ, Kaminski DL and Hahn J: Effect of papaverine on isolated perfused canine liver. *Fed Proc* 35:381, 1976.
13. Kaminski DL and Ruwart MJ: Receptor mechanisms of the active peptide fragments of gastrin and cholecystokinin (CCK). *Physiologist* 19:247, 1976.
14. Kaminski DL and Ruwart MJ: The effect of PGF_{2a} on canine and porcine hepatic bile flow. Presented at Meeting for Hormonal Receptors in Digestive Tract Physiology, Paris, 1976.
15. Kaminski DL, Ruwart MJ and Despande YG: The role of cyclic AMP in canine bile salt stimulated bile flow. *Gastroenterology* 72:1077, 1977.
16. Kaminski DL, Jellinek M, Ruwart MJ, Mueller E and Menz L: Etiology of hepatic steatosis in obese rats undergoing small bowel bypass. *Gastroenterology* 72:1077, 1977.
17. Kaminski DL, Ruwart MJ and Despande YG: Role of Cyclic AMP in canine bile salt stimulated choleresis. *Clin Res* 25:312A, 1977.
18. Ruwart MJ, Klepper MS and Rush BD: The beneficial effects of prostaglandins in post-operative ileus. *Gastroenterology* 74:1088, 1978.
19. Ruwart MJ, Klepper MS and Rush BD: Evidence for noncholinergic mediation of small intestinal transit in the rat. *The Pharmacologist* 20:209, 1978.
20. Ruwart MJ, Klepper MS and Rush BD: The role of adrenergic and non- cholinergic transmission in the rat small intestinal transit. *The Physiologist* 21:103, 1979.
21. Ruwart MJ, Klepper MS and Rush BD: Stimulation of gastrointestinal propulsion in laparotomized rats by various neurological

agents. *Gastroenterology* 76:1232, 1979.

22. Rush BD and Ruwart MJ: Chronic bile duct cannulation in the domestic and mini-pig. *Gastroenterology* 76:1231, 1979.

23. Ruwart MJ, Klepper MS and Rush BD: Regulation of gastric emptying, small intestinal transit and colonic transit in the rat. *Gastroenterology* 76:1232, 1979.

24. Ruwart MJ, Klepper MS and Rush BD: Accelerated colonic transit and its inhibition by loperamide and atropine: another factor in prostaglandin-induced diarrhea. *Fed Proc* 39:715, 1980.

25. Ruwart MJ, Klepper MS and Rush BD: PGI₂ inhibits gastric emptying and small intestinal transit. *Gastroenterology* 78:1248, 1980.

26. Ruwart MJ: Prostaglandins and the gut. Keynote Address: Pittsburgh Gut Club, Pittsburgh, PA., March 4, 1980.

27. Ruwart MJ and Rush BD: Prostaglandin effects on the lithogenic index of mini-pig bile. Midwest Gut Club, Milwaukee, WI., March 8, 1980.

28. Ruwart MJ and Reece SB: A new technique for simultaneous measurement of gastric emptying and small intestinal transit in man: effects of atropine, bethanechol, and 16,16-dimethyl PGE₂. *Dig Dis Sci* 25:723, 1980.

29. Ruwart MJ: Prostaglandins and gastrointestinal motility. *Fed Am Soc Expt Biol Symposium*, April 14, 1981.

30. Ruwart MJ, Kolaja GJ, Friedle NM, Rush BD, Tarnawski A, Stachura J, Mach T, and Ivey KJ: Protection against CCl₄-induced liver damage by 16,16-dimethyl PGE₂. *Gastroenterology* 80:1266, 1981.

31. Bonnema KJ, Kolaja GJ, Piper RC, Ruwart MJ, Lancaster C, and Nezamis JE: Morphologic evaluation of gastric cytoprotection by 16,16-dimethyl PGE₂. *Micron* 12:309-310, 1981.

32. Stachura J, Tarnawski A, Ivey KJ, Dabros W, Ruwart MJ, Rush BD, and Friedle NM. Ultrastructural alterations in rat liver after 16,16-dimethyl prostaglandin E₂. Evidence against a cholestatic effect. *Gastroenterology* 80:1291, 1981.

33. Stachura J, Tarnawski A., Ivey KJ, Ruwart MJ, Rush BD, Friedle NM, Szczudrawa J, and Mach T. 16,16-Dimethyl prostaglandin E₂ protection of rat liver against acute injury by galactosamine, acetaminophen, ethanol and ANIT. *Gastroenterology* 80:1349, 1981.

34. Ruwart MJ, Rush BD, Friedle NM, Piper RC, and Kolaja GJ. Protective effects of 16,16-dimethyl PGE₂ on the liver and kidneys. Conference on Protective Effects of Prostaglandins on the Gastrointestinal Mucosa. Santa Monica, CA, January 23 and 24, 1981.

35. Ruwart MJ, Rush BD, Friedle NM, Piper RC, and Kolaja GJ. Protective effects of 16,16-dimethyl PGE₂ on the liver. MSU Regional Toxicology Meeting, May 8, 1981, East Lansing, MI.

36. Gilbertson TJ, Ruwart MJ, Stryd RP, Brunden MN, Friedle NM, Rush BD and Christianson CA. 16,16-Dimethyl PGE₂ increases dry organ weights of the stomach, small intestine, and colon in rats. *Gastroenterology* 82:1066, 1982.

37. Nezamis JE, Lancaster C, Robert A and Ruwart MJ. Indomethacin-induced gastric and duodenal ulcers and intestinal lesions in hamsters. *Gastroenterology* 82:1138, 1982.

38. Ruwart MJ, Friedle NM and Rush BD. 16,16-Dimethyl PGE₂ protects in vitro hepatocytes from carbon tetrachloride-induced damage. *Gastroenterology* 82:1166, 1982.

39. Ruwart MJ, Lancaster C, Nezamis JE, Davis JP, Rush BD, Friedle NM and Pugh C. Timoprazole: A unique antisecretory and cytoprotective agent. *Gastroenterology* 82:1167, 1982.

40. Ruwart MJ, Rush BD and Friedle NM. 16,16-Dimethyl PGE₂ partially prevents necrosis due to aflatoxin in rats. *Gastroenterology* 82:1167, 1982.

41. Ruwart MJ, Friedle NM, Rush BD, Smith CW, Gay S and Henley KS. 15(S)-15-Methyl-prostaglandin E₁ (methyl PGE₁) reverses the ethanol-induced increase of neutral extractable hydroxyproline containing peptide (NEHYP) in rat liver. *Hepatology* 2:690, 1982.

42. Friedle NM, Rush BD and Ruwart MJ. Prostaglandin and fatty acid protection on in vitro hepatocytes against CCl₄-induced damage. *Fed Proc* 42:512, 1983.

43. Rush BD, Nichols NF, Merritt MV, Kaluzny MA and Ruwart MJ. Mechanistic studies on the protection of rat liver from carbon tetrachloride by 16,16- dimethyl-PGE2. *Fed Proc* 42:509, 1983.
44. Ruwart MJ and Rush BD. Effects of PGE2, PGF2a, PGI2, and 16,16-dimethyl- PGE2 on gastric emptying and small intestinal transit in rats. *Gastroenterology* 84:1291, 1983.
45. Ruwart MJ, Sammons DW, Kolaja GJ, Rush BD, Nichols NM and Adams LD. Alloxan-induced hyperglycemia in rats is reduced by 16,16-dimethyl-PGE2. *Gastroenterology* 84:1292, 1983.
46. Ruwart MJ, Rush BD, Nichols NM, Brunden MN, Appelman HD and Henley KS. 16,16-Dimethyl-prostaglandin E2 (DMPG) lowers the collagen content of rat liver in nutritional injury. *Hepatology* 5:833, 1983.
47. Ruwart MJ, Rush BD, Peters K, Snyder KF, Appelman HD, and Henley KS. 16,16 Dimethyl Prostaglandin E2 (DMPG) Modified the Progression of Collagen Formation in Nutritional Rat Liver Injury. *Gastroenterology* 86:1338, 1984.
48. Ruwart MJ, Rush BD, Snyder KF, Peters KM, Appelman HD, and Henley KS. 16,16-Dimethyl PGE2 (DMPG) Partially Reverses Collagen Deposition in Nutritional Rat Liver Injury. *The Pharmacologist* 26:155, 1984.
49. Ruwart MJ, Rush BD, Snyder KF, Peters KM, Appelman HD and Henley KS. 16,16 Dimethyl Prostaglandin E2 (DMPG) Reverses Dietary Fibrosis in Rat Liver, In Spite of Continued Nutritional Injury. *Hepatology* 4:1018, 1984.
50. Meren H, Varin F, Ruwart M and Thurman RG. Effect of 16,16-Dimethyl PGE2 (DMPG) on O2 Uptake and the O2 Gradient in Perfused Livers from Nutritionally-Deficient Rats. *Fed Proc* 44:1168, 1985.
51. Ruwart MJ, Rush BD, Snyder KF, Peters KM, Appelman HD, Henley KS, Schuppan D, and Hahn EG. Analogs of Prostaglandin E Protect Rat Liver from Fibrosis Induced by Nutritional Injury. *Gastroenterology* 88:1690, 1985.
52. Schreur PJKD, Sawyer TK, Ruwart MJ, Collins RJ, Staples DJ, Rush BD, Nichols NF, and Russell RR. Satiety Effects of CCK-8 in Rats: Studies on Peptide Delivery, Structure/Activity, and Subchronic Treatment. *Neuroscience, Abstract Volume*, 124, 1985.
53. Peters KM, Henley KS, Rush BD, Snyder KF, and Ruwart MJ. The Distribution of Type Specific Collagens in Dietary Cirrhosis in the Rat. Effect of 16,16-Dimethyl Prostaglandin E2 (DMPG). *Hepatology* 5:208, 1985.
54. Ruwart MJ, Schuppan D, Kim KY, Snyder KF, Rush BD, Vidmar TJ, and Hahn EG. N-III Serum Procollagen Reflects Hepatic Fibrosis in Growing Rats Fed a Lipotrope Deficient Diet. *Gastroenterology* 90:1763, 1986.
55. Peters DM, Ruwart MJ, and Henley KS. The Measurement of Hydroxyproline (OHPRO) in Rat Liver. *Hepatology* 6:782, 1986.
56. Snyder KF, Ruwart MJ, Rush BD, Henley KS, Peters KM, and Appelman HD. 16,16-Dimethyl PGE2 (DMPG) Inhibits Hepatic Fibrosis in Rabbits Fed Chenodeoxycholic Acid (CDC). *Hepatology* 6:1208, 1986.
57. Ruwart MJ, Schuppan D, Hahn EG, Kin, KY, Teike T, Risteli J, Risteli T, Rush BD, Snyder KF, Vidmar TJ, Peters KM, Appelman HD, and Henley KS. 16,16-Dimethyl PGE2 (DMPG) and its Substituted Phenyl Ester (DMPG-C) Inhibit Hepatic Fibrosis Induced by Dietary Deficiency in the Rat; Association with Two Serological Markers of Collagen Turnover. *Hepatology* 6:1208, 1986.
58. Ruwart MJ, Snyder KF, Rush, BD, Vidmar TJ, Henley KS, Peters KM, Appelman HD, Kin KY, Hahn EG and Schuppan D. 16,16-Dimethyl PGE2 (DMPG) Inhibits Diet-Induced Hepatic Fibrosis as Monitored by Serum N-Terminal Procollagen III Peptide (PIIIP), Stainable Collagen, and Hydroxyproline (OHPRO) Without Modifying These Parameters in Normal Rat. *Hepatology* 6:1208, 1986.
59. Ruwart MJ, Snyder KF, Rush, BD, Vidmar TJ, Henley KS, Peters KM, Appelman HD, Kim, KY, Hahn EG and Schuppan D. Integrated Value of Serum Procollagen III Peptide Over Time is Predictive of Hepatic Hydroxyproline Content and Stainable Collagen in a Model of Dietary Cirrhosis in the Rat. *Gastroenterology* 92:1769, 1987.
60. Peters KM, Snyder KF, Rush BD, Ruwart MJ, and Henley KS. In Vitro Evidence for Inhibition of Fibrogenesis by 16, 16, Dimethyl Prostaglandin E2, (DMPG) in Cirrhotic Rat Liver. *Hepatology* 7:1091 1987.
61. Ruwart MJ, Im WB, Snyder KF and Blakeman DP. H+/K+ ATPase Inhibitor is Effective in Rat and Rabbit When Given Transdermally. *Gastroenterology* 90: A432, 1989.
62. Ruwart MJ, Lakings DB, Bundy GL, Rush BD, Wilkinson KF, Friis JM. Absolute Bioavailability of U-77436, A Renin Inhibitory Peptide, in Conscious Rats With Chronic bile Duct Cannula. *Gastroenterology* 100, A429, 1990.

63. Karls MS, Rush BD, Wilkinson KF, Burton PS, and Ruwart MJ. Influence of Peptide Structure on Absorption of Peptides from Rat Intestine and Extraction by the Liver. *Pharm Res* 7(10):S119 (1990).
64. Day JS, Burton PS, Vidmar TJ, Ruwart MJ, Hoover JL, Rush BD, Wilkinson KF, Conradi RA, Hilgers AR, Burton PS. *Pharm Res* 8(10):S217 (1991).
65. Ruwart MJ, Rush BD, Wilkinson KF, Conradi RA, Hilgers AR, Burton PS. Caco-2 Permeability Coefficients Predict In vivo Intestinal Absorption of Renin Inhibitory Peptides. *Pharm Res* 8(10):S165 (1991).
66. Ruwart MJ, Cho MJ, Raub TJ, Rush BD, Wilkinson KF, Sawada GA, Vidmar TJ. Potential Mechanisms for Enhancement of Intestinal Absorption by Citric Acid. *Pharm Res* 8(10):S221 (1991).
67. Sheehy AM, Hoover JL, Rush BD, Wilkinson KF, Vidmar TJ, Ruwart MJ. Intrapulmonary Delivery of Renin Inhibitory Peptides, Results in Sustained Release Due to Saturable Transport. *Pharm Res* 8(10):S165 (1991).
68. Ruwart MJ, Fisher JF, Harrison AW, Bundy GL, Wilkinson KF, Rush BD. Peptide to Glycopeptide: Glycosylated Oligopeptide Renin Inhibitors with Attenuated In Vivo Clearance Properties. *Pharm Res* 8(10):S201 (1991).
69. Hoover JL, Rush BD, Wilkinson KF, Day JS, Burton PS, Vidmar TJ, and Ruwart MJ. Peptides are Better Absorbed from the Lungs than the Gut. *Pharm Res* 8(10):S165 (1991).
70. Kruske C, Ho NF, Rush BD, Wilkinson KF, and Ruwart MJ. Sustained Release of Renin Inhibitory Peptides After Subcutaneous Delivery. *Pharm Res* 9(10):S205 (1992).
71. Rush BD, Wilkinson KF, Lakings DB, and Ruwart MJ. Relationship between Peptide Structure and Systemic Clearance: Studies with Selected Renin Inhibitory Peptides in the Unanesthetized Rat. *Pharm Res* 9(10):S282 (1992).
72. Ruwart MJ, Wilkinson KF, Rush BD, Thaisrivongs S, Bundy GL, and Vidmar TJ. Structure-Activity Relationships in the Liver Clearance of Renin Inhibitory Peptides. *Pharm Res* 9(10):S205 (1992).
73. Ruwart MJ, Rush BD, Wilkinson KF, Rieden C, Vidmar TJ, Fisher JF, Sawyer TK, Hester JB, and Thaisrivongs S. The Role of Hydrophobicity in the Clearance of HIV Protease Inhibitors. *Pharm Res* 10(10):S219 (1993).
74. Ruwart MJ, Rush BD, Roof RD, Jaglan PS, and Gilbertson TJ. Intrapulmonary Bioavailability of 3H-Spectinomycin Sulfate in the Rat. *Phar Res* 10:S198 (1993).
75. PKTomich, MJBohanon, JCLynn, JEMcGee, SThaisrivongs, JWStrohbach, SRTurner, CPYang, LLSkaletzky, FJSchwende, GMHoward, GEPadbury, LNToth, MJRuwart, KFWilkinson, BDRush, AMMulichak, and KDWatenpaugh, "Discovery and Properties of Small Organic Molecule Inhibiting HIV-1 Protease," Protease Function and Inhibition Symposium, March 5-12, 1994, Sant Fe, NM.
76. SThaisrivongs, PKTomich, KDWatenpaugh, KTChong, FJSchwende, GEPadbury, MJRuwart, and GLZipp. "Non-peptidic HIV Protease Inhibitors," American Chemical Society, 1994 Joint Central-Great Lakes Regional Meeting, June 1-3, 1994, Ann Arbor, MI.
77. SThaisrivongs, PKTomich, KDWatenpaugh, KTChong, FJSchwende, GEPadbury, MJRuwart, and GLZipp. "Structure-based Disign of Non-peptidic HIV-Protease Inhibitors," Tenth International Conference on AIDS, August 7-12, 1994, Yokohama, Japan.
78. KRRomines, JKMorris, KDLovasz, SJRay, SThaisrivongs, PAAristoff, SRTurner, JWStrohbach, CPYang, PDJohnson, HISkulnick, PKTomich, KDWatenpaugh, WJHowe, KTChong, LADolak, FJSchwende, GEPadbury, MJRuwart, GLZipp, and ZZhao. "Effectvie Small-molecule Inhibitors of HIV-Protease Derived from 4-Hydroxycoumarin," XIIIth International Symposium on Medicinal Chemistry, September 19-23, 1994. Paris, France.
79. SThaisrivongs, PAAristoff, KRRomines, PKTomich, KDWatenpaugh, WJHowe, KTChong, GLZipp, MJRuwart, FJSchwende, and GEPadbury. "Analogues of 4-Hydroxypyron: Potent, Non-peptidic HIV Protease Inhibitors," 34th Interscience Conference on Antimicrobial Agents and Chemotherapy, October 4-7, 1994. Orlando, Florida.
80. JWStrohbach, SRTurner, CPYang, PKTomich, KDWatenpaugh, KTChong, GLZipp, MJRuwart, GEPadbury, FJSchwende, WJHowe, and SThaisrivongs. "Design, Synthesis and Activity of Non-Peptidic HIV Protease Inhibitors," 24th National Medicinal Chemistry Symposium, June 21-25, 1994. Salt Lake City, Utah.
81. SThaisrivongs, PKTomich, KDWatenpaugh, WJHowe, KTChong, FJSchwende, GEPadbury, MJRuwart, and GLZipp. "Structure-based Design of Non peptide HIV Protease Inhibitors," 35th Annual Buffalo Medicinal Chemistry Symposium, May 22-

25, 1994. Buffalo, New York.

82. SRTurner, JWStrohbach, PKTomich, KDWatenpaugh, WJHowe, LADolak, KTChong, MJRuwart, GLZipp, FLSchwende, GEPadbury, SThaisrivongs. "4-Hydroxycoumarin-derived, Potent HIV Protease Inhibitors," National ACS meeting, Division of Medicinal Chemistry, August 21-25, 1994, Washington D.C.

83. GADeBrincat, SLDouglas, MTBorin, WMorozowich, AHBates, PRNixon, EJLee, JEPrice, MJRuwart, BDRush, KFWilkinson, GLZipp, RJDalga, and PLPossert, "Development of a Microsuspension Formulation of the Protease Inhibitor U-96988 for Improved Bioavailability in Humans," PAC Associates Symposium, September 22, 1994.

84. SThaisrivongs, SRTurner, JWStrohbach, PKTomich, KDWatenpaugh, KTChong, WJHowe, MJRuwart, GLZipp, FJSchwende, and GEPadbury, "Structure-Based Design of Carboxamide-Containing 4-Hydroxycoumarin-Derived Non-Peptidic HIV Protease Inhibitors," 2nd National Conference on Human Retroviruses and Related Infections, January 29-February 2, 1995, Washington D.C.

85. KRRomines, JKMorris, KDLovasz, RBGammil, QZhang, TMJudge, GPhillips, PDJohnson, PKTomich, JCLynn, MMHorng, KDWatenpaugh, AMMulichak, BDFinzel, WJHowe, FJSchwende, LNToth, GMHoward, MJRuwart, BDRush, KFWilkinson, GLZipp, PLPossert, RJDalga, KTChong, RRHinshaw, "Novel, Effective Small-molecule Inhibitors of HIV Protease Derived from 4-Hydroxycoumarin Screening Leads," XIIIth International Symposium on Medicinal Chemistry, Paris France.

86. KRRomines, JKMorris, KDLovasz, PKTomich, JCLynn, MMHorng, KDWatenpaugh, AMMulichak, BCFinzel, WJHowe, FJSchwende, MJRuwart, GLZipp, and KTChong, "Cycloalkylpyranones: A New Template for the Design of Potent, Non-Peptidic HIV Protease Inhibitors," The First Winter Conference on Medicinal and Bioorganic Chemistry, Steamboat Springs, CO, January 29-February 2, 1995.

87. SThaisrivongs, SRTurner, JWStrohbach, PKTomich, KDWatenpaugh, KTChong, WJHowe, MJRuwart, GLZipp, FJSchwende, GEPadbury, "Structure-based Design of Carboxamide-Containing 4-Hydroxycoumarin-Derived Non-Peptidic HIV Protease Inhibitors," Chemotherapy of AIDS, 1995 Winter Gordon Conference, Ventura, CA, February 19-24, 1995.

88. RACHrusciel, LLMaggiora, JMTustin, JHKinner, WJHowe, KDWatenpaugh, BCFinzel, MNJanakiraman, PKTomich, MMHorng, JCLynn, MJRuwart, BDRush, KFWilkinson, GLZipp, PLPossert, KTChong, RRHinshaw, FJSchwende, GMHoward, and CWSmith, "A New Template for Structure Based Design of Non-Peptide HIV Protease Inhibitors," Winter Conference on Medicinal and Bioorganic Chemistry, Steamboat Springs, CO, January 29 - February 2, 1995.

REVIEWS AND MONOGRAPHS

1. Robert A and Ruwart MJ: Effects of prostaglandins on the digestive system. In Prostaglandins (Current Endocrinology Ser), JB Lee ed. Elsevier/North Holland Inc., New York, N.Y. 1982, pp. 113-176.

2. Ruwart MJ: The role of prostaglandins in the gastrointestinal tract. In CRC Handbook of The Eicosanoids. Prostaglandins and Related Lipids, Vol II, ALWillis, BH Vichery and C Pace Asciak eds. CRC Press, Boca Raton, Fa. 1987.

3. Ruwart MJ: Prostaglandin protection of the liver from various damaging agents. In Biological Protection with Prostaglandins, M Cohen ed. CRC Press, Inc., Boca Raton, FL, 1986, pp. 229-243.

4. Ruwart MJ and Henley KS: Prostaglandin Effects on the Extracellular Matrix. In The Extracellular Matrix and Liver Disease. M Zern, ed. Marcel Dekker, Inc., New York, NY, 1993, pp. 369-381.

5. Ruwart MJ: Approaches to Modulating Liver Transport of Peptide Drugs in Peptide-Based Drug Design: Controlling Transport and Metabolism. MD Taylor and Gamidon, eds. Oxford University Press, New York, NY, 1995, pp.249-262.

PATENTS

1. U.S.P. #4,359,465. November 16, 1982: Methods for treating gastrointestinal inflammation.

2. U.S.P. #4,374,856. February 22, 1983: Liver protection using PGE's.

3. U.S.P. #4,496,587, January 29, 1985: Inhibition of Bacterial Toxin Released by PG's.

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