

WALLACE L. MCKEEHAN
FACULTY RECORD

A. NAME: Wallace L. McKeehan

B. RANK: Professor

C. EDUCATION:

B.S. University of Florida, Gainesville, FL, 1966 Chemistry

Ph.D. University of Texas, Austin, TX, 1970 Biochemistry

D. EMPLOYMENT:

1970 - 1971 Research Associate III, Chemistry & Biochemistry, University of Texas, Austin, TX

1971 - 1974 Research Scientist, Basel Institute of Immunology, Basel, Switzerland

1974 - 1978 Research Associate, Molecular, Cellular and Developmental Biology, University of Colorado, Boulder, CO

1979 - 1993 Senior Scientist, W. Alton Jones Cell Science Center, Lake Placid, NY

1986 Co-founder (with Gordon Sato), First President, Board Member, Upstate Biotechnology, Inc. (UBI), Lake Placid, NY

1985 – 1993 Adjunct Professor, Biochemistry, University of Vermont, Burlington, VT

1987 – 1994 Adjunct Professor, Biology, Clarkson University, Potsdam, NY

1988 - 1993 Deputy Director (Gordon Sato Program), W. Alton Jones Cell Science Center, Lake Placid, NY

1993 – 1996 Adjunct Professor, Zoology, Chinese Academy of Sciences, Kunming, PRC

1993 – 2016 Adjunct Professor, Cell Biology, Xiamen University, Xiamen, PRC

1993 - 2016 Professor, Biochemistry & Biophysics, Texas A&M University (TAMU), Houston, TX

1993 - 2014 John S. Dunn Chair, Institute of Biosciences and Technology (IBT), TAMU & Texas A&M Health Science Center (TAMHSC), Houston

2014 – present John S. Dunn Chair Emeritus, IBT-TAMHSC, Houston

1993 - 2006 Director, Center for Cancer Biology and Nutrition, IBT, TAMU & TAMHSC, Houston

1994 - 2001 Associate Director, IBT-TAMU & TAMHSC, Houston

1995 – 2016 Adjunct Professor, Molecular & Cell Biology, Baylor College of Medicine, Houston

1998 - 2016	Professor, IBT-TAMHSC, Houston
2003 - 2016	Texas A&M Regents Professor
2007 – 2012	Director, Center for Cancer and Stem Cell Biology, IBT-TAMHSC, Houston
2008 – 2016	Texas A&M Distinguished Professor
2009 – 2012	Executive Associate Director, IBT-TAMHSC, Houston
2012	Recipient Society for In Vitro Biology Lifetime Achievement Award
2012–2016	Visiting Professor, School of Pharmaceutical Sciences, Wenzhou Medical College, Wenzhou, China
2015-present	Member, Center for Translational Cancer Research, IBT-TAMHSC, Houston
2016-present	Texas A&M Regents & Distinguished Professor Emeritus

E. TEACHING PERFORMANCE

1. Courses

Undergraduate

1995. Lecture/discussion session on Cancer Research (TTVN), Special Topics for Advanced Undergraduates, Dept. of Biochemistry and Biophysics, Texas A&M University, College Station, TX

1999. Lecture/discussion session on Signal Transduction and Cancer, Honors Undergraduate Biochemistry, Dept. of Biochemistry and Biophysics, Texas A&M University, College Station, TX

Graduate

1982 - 1993. Lecturer in team-taught courses on the topics of Intermediary Metabolism, Metabolic Regulation, Cell Membranes and Function and Cell Signaling for Advanced Biochemistry and Cell and Molecular Biology in the joint W. Alton Jones Cell Science Center (Lake Placid, NY) and Clarkson University graduate program (Potsdam, NY) in Chemical Biology.

1999, October 14. Lecture in Advanced Reproductive Biology Course, M.D. Anderson Cancer Center. "Malignancies of the Male Reproductive Tract".

2000, January 26. Lecture and discussion sessions to students of Dept. of Biochemistry and Biophysics, Texas A&M University, College Station, TX, "The Heparan Sulfate-Fibroblast Growth Factor Signaling System: Intimate Partnership Between Matrix Sugar and Membrane Protein".

2000 - 2005, April. Lectures on “Diet and Prostate Cancer,” in special topic distal education course via TTVN entitled “Phytochemicals in Fruits and Vegetables to Improve Human Health”, funded by the USDA.

Professional

1977 - 1982. Lecturer on serum free, defined medium for cell culture, prostate and liver epithelial cell culture for advanced hands-on education courses in culture of tissues and cells outside the body, a primary mission of the W. Alton Jones Cell Science Center, Lake Placid, NY, in cooperation with the Tissue Culture Association. Participated in an average of five 1-2 week courses per year.

2. Course Coordination

1979 - 1982. Organizer advanced hands-on education courses in culture of tissues and cells outside the body, a primary mission of the W. Alton Jones Cell Science Center, Lake Placid, NY, in cooperation with the Tissue Culture Association. Organized and coordinated average of 1 course per year.

3. Curriculum & Teaching Materials Development

1979 - 1982. Developed lecture topics, identified internationally recognized lecturers, developed hands-on laboratory exercises for advanced education courses in culture of tissues and cells outside the body, a primary mission of the W. Alton Jones Cell Science Center, Lake Placid, NY, in cooperation with the Tissue Culture Association. Average of 1 course per year.

1982 - 1993. Developed curricula taught at the Lake Placid site in the joint W. Alton Jones Cell Science Center (Lake Placid, NY) and Clarkson University graduate program (Potsdam, NY) in Chemical Biology.

1999 - 2003. Collaboration with Dr. Bhimanagouda Patil, Project Director (TAMU-Kingsville, Weslaco), on a special topic distal education course via TTVN entitled “Phytochemicals in Fruits and Vegetables to Improve Human Health”, funded by the USDA, from January 1999 – 2003.

4. Student/Trainee Supervision

Graduate

Years, research topic and last known position.

Dongdong (DeeDee) Cao, 2003 - 2007, Ectopic FGFR1 and p53 in Prostate Tumor Development, ASCP Pathologists' Assistant, St. Alexius Medical Center, Bismarck, ND

Wai-Kin Chan, 1999 - 2002, Androgen and FGF Signaling in Prostate (1 Pub), FGFR Dimerization, Senior Research Scientist, Bioinformatics & Computational Biology, M.D. Anderson Cancer Center, Houston, TX

Shuju Feng, 1994 – 1998, Role of FGFR1 and FGFR2 in Prostate (2 Pubs), Assistant Professor, Pulmonary Medicine, MD Anderson Cancer Center, Houston, TX

Patricia Fritz, 1979 - 1980, Isolation and Characterization of Human Liver Cells in Culture, SUNY-Plattsburgh

Qiang He, 2000 - 2002, Gene Structure of LRP130 and SNT, Research Data Scientist, IBT, Texas A&M, Houston, TX

Jinzhao Hou, 1989 - 1992, Cloning of FGF Receptors (9 Pubs), Senior Research Scientist, Skyline Therapeutics, Shanghai, PRC

Xinqiang Huang, 2001 – 2007, FGFR4 in Metabolic Homeostasis and Hepatomas (6 Pubs), 2007-2011, Associate Director, Morphic Therapeutics, Waltham, MA

Jun-Hyeog Jang, 1994 - 1997, Mechanism of FGFR Assembly (5 Pubs), Professor, Dept. of Biochemistry, Inha University, Incheon, Korea

Richard Jones, 1994 - 2000, Alternative Splicing and Nonsense mediated Decay in FGFR2 (7 Pubs), Assistant Professor, University of Chicago, Chicago, IL

Adrian Lacy, 1997 - 1999, Function of Paired-related Homeobox Genes During Skeletogenesis, Pediatric Neurology Group, Cook Children's Hospital, Fort Worth, TX

Chunsik Lee, 1999 - 1999, Crystal Structure of FGFR, Unknown

Junchen Liu, Aberrant FGFR Tyrosine Kinase Signaling and the Warburg Effect (3 Pubs), (Co-mentor with Fen Wang), Assistant Professor, Department of Integrative Biology and Pharmacology, McGovern Medical School, University of Texas, Houston, TX

Yan Liu, 1999 - 2000, Phytochemicals from Citrus (2 Pubs), Research Assistant, Dept. of Medicine Thrombosis, Baylor College of Medicine, Houston, TX

Weiqin Lu (MS), 1995 - 1999, Role of FGF10 in the Prostate (3 Pubs), Associate Professor, Dept. Medicine, Stony Brook University School of Medicine, Stony Brook, NY

Yongde Luo, Ph.D., 2003 - 2005, Role of Heparan Sulfate in FGFR Signaling (12 Pubs), School of Pharmaceutical Science, Wenzhou Medical University, Wenzhou, Zhejiang, PRC

Tijuana Moss, 2003 – 2006, Role of UXT in Tumor Suppression (1 Pub), Research Associate, MesoScale Discovery, Gaithersburg, MD

Ergang Shi, 1988 - 1992, Structure/Function of FGF Receptors (4 Pubs), Associate Director, Regeneron Pharmaceuticals, Tarrytown, NY (deceased 2022)

Xiaochong Wu (MS), 1996 - 2002, Stromal-Epithelial Interactions in the Prostate (7 Pubs), Associate Professor, Texas Childrens Hospital, Baylor College of Medicine, Houston, TX

Yaqing Wu, 1990 - 1993, Splice Variants of FGFR2, MD Anesthesiologist, New York, NY

Jianming Xu, 1988 - 1994, FGFR, Activin & TGF β Receptors (15 Pubs), Professor, Dept. of Molecular & Cell Biology, Baylor College of Medicine, Houston, TX

Guochen Yan, 1989 - 1992, Alternate Splicing in FGFR2 (7 Pubs), Cofounder & CEO, Biovision, Inc., Mountainview, CA; Now AbVision Therapeutics

Chundong Yu, 1997 - 2002, Role of FGFR4 in Liver (13 Pubs), Professor, State Key Laboratory of Cellular Stress Biology, Xiamen University, Xiamen, PR China

Rui Xie, 2003 - 2010, Role of Microtubule- and Mitochondria-associated C19ORF5 In Autophagy and Tumor Suppression (8 Pubs). Postdoctoral - Johns Hopkins Univ. School of Medicine, Department of Molecular Biology and Genetics, Howard Hughes Medical Institute, Baltimore, MD.

Chaofeng Yang, 2003–2010, Role of Endocrine Fibroblast Growth Factor in Metabolism (6 Pubs), Postdoctoral Research Associate. Touchstone Diabetes Center, Division of Endocrinology UT-Southwestern Medical Center, Dallas, TX

Postdoctoral

Years, research topic and current position.

Hiroyoshi Hoshi, 1982 - 1987, Growth Factors in the Cardiovascular System (15 Pubs), Executive Director, Institute for Functional Peptides, Yamagata, Japan

Donna Chaproniere, 1984 - 1985, Culture of Human Prostate Cells (1 Pub), Unknown

Dennis DiSorbo, 1987 - 1988, FGF Receptors (2 Pubs), CEO, Quality Controlled Biochemicals (QCB), Hopkinton, MA.

Mikio Kan, 1987 - 1994, Mechanism of FGF and the FGFR-Heparan Sulfate Complex (32 Pubs), Director, Central Research Laboratories, Zeria Pharmaceuticals, Ltd., Saitama, Japan

Stathis Nikolaropoulos, 1991 - 1992, FGF7 and Prostate (5 Pubs), Staff IVF Expert, IVF and Genetics Clinic, Athens, Greece

Koichi Matsuzaki, 1993 - 1996, Assembly TGF β Receptors (7 Pubs), Clinical Research Scientist, Kansai Medical University, Osaka, Japan

Fen Wang, 1994 -1996, Structure/Function of FGF Receptors (14 Pubs), Professor, IBT, Texas A&M Health Science Center, Director-Center for Cancer & Stem Cell Biology, Houston, TX

Yongde Luo, 1995 - 2005 - Differential Signaling of FGFR Isoforms in Cellular and Metabolic Homeostasis (1 Pub), Assistant Professor, Director Proteomics and Nanotech Laboratory, IBT, Texas A&M Health Science Center, Houston, TX

Khalid Mohamedali, 1996 - 2000, Recombinant Production of FGFR and Role of Glycosylation (2 Pubs), Instructor, Dept. Experimental Therapeutics, M.D. Anderson Cancer Center, Houston, TX

Rex Dyer, 1997, Genomic Structure of FGF10, Research Scientist, Metabolix, Inc., Cambridge, MA

Fumiya Uematsu, 1997 - 2002, Role of Structural Modules in FGFR (2 Pubs), Research Scientist, Department of Pathology, Sasaki Institute, Tokyo, Japan

Chengliu Jin, 1997 - 2003, Role of FGF9 and FGFR3 Axis Prostate Stromal-Epithelial Homeostasis (11 Pubs). Director, Transgenic and Gene Targeting Core, University Research Services & Administration, Georgia State University, Atlanta, GA.

Richard Gunasekera, 1998 - 2000, Bioactive Plant Products and FGFR Signaling (3 Pubs), Associate Professor, Coordinator of Biological Sciences, Univ. of Houston-Victoria & Sugarland, Victoria/Sugarland, TX

Leyuan Liu, 1999 - 2002, Role of the LRPPRC Complex in Tumor Suppression and Neuronal Homeostasis (5 Pubs), Assistant Professor, IBT, Texas A&M Health Science Center, Houston, TX

Xinqiang Huang, 2006 - 2007, FGF Signaling in Metabolic Homeostasis (7 Pubs), IBT, Texas A&M Health Science Center, Houston, TX; Staff Scientist, Regulus Therapeutics, Inc., San Diego, CA.

Chaofeng Yang, 2011 – 2012 (6 Pubs), Role of Endocrine Fibroblast Growth Factor in Metabolism. Instructor, Division of Endocrinology, Department of Internal Medicine UT Southwestern Medical Center, Dallas, TX.

Professional/Visiting Scientists for specialized training

Yoshitatsu Fukabori, MD, 1991 - 1992, FGF7 as an Andromedin (7 Pubs), Clinical Research Professor, Dept. of Urology, Gunma University Medical School, Gunma, Japan

Atsuko Furukawa, M.D., 1987, Role of FGF in Prostate Cancer, Staff Physician, Dept. of Urology, Tokushima University, Tokushima City, Japan

Masafumi Katayama, 1988 - 1990, FGF Action in Cardiovascular Cells, Professor, Tohoku Seikatsu Bunka College, Sendai, Japan

Masashi Kobayashi, MD, 2003 - 2005, Androgen and FGF Signaling in Prostate, Clinical Scientist, Hiroshima School of Dentistry, Hiroshima University, Hiroshima, Japan.

Guoqin Liu, Ph.D., 2002, Interaction of C19ORF5 and LRPPRC (2 Pubs), Professor and Deputy Director of the Department of Biochemistry and Molecular Biology, China Agricultural University, Beijing, PR China

Akio Matsubara, M.D., 1997 - 1998, Tumor Suppressor Role of FGFR2 in Prostate (3 Pubs), Professor & Chair, Dept. of Urology, Hiroshima University, Hiroshima, Japan

Yushi Matuo, 1990, Probasin in Prostate (6 Pubs), Director, Nagahama Institute for Biochemical Science, Nagahama, Japan

Koji Mita, M.D., 2001 - 2002, Role of FGFR2 in Transgenic Mouse Prostate, Research Associate, Department of Urology, Hiroshima University School of Medicine, Hiroshima City, Japan

Mitsuri Nakahara, M.D., 1985, Hiroshima University, 1991 – 1992, Monoclonal Antibodies against FGFR1 (3 Pubs), Staff Surgeon & Scientist, Dept. of Urology, Hiroshima Univ., Hiroshima, Japan

Katsuya Nakano, M.D., 1989, FGF7 and FGF10 in Human Prostate (3 Pubs), Medical Staff, Dept. of Urology, Gunma University, Gunma, Japan

Akihiko Sakamoto, 1995, Antibodies against FGFR2, Research Scientist, Hiroshima Dental School, Hiroshima, Japan

Hidekazu Sawada, Ph.D. 1989 - 1990, Monokines in Vascular Cells (2 Pubs), Research Group Leader, Takeda Chemical Industries, LTD, Osaka, Japan

Tohru Suzuki, Ph.D., 1995 – 1996, Genomic Structure of FGFR2 (1 Pub), Professor, Dept. of Applied Science for Biological Resources, Gifu University, Gifu City, Japan

Akiyoshi Taniguchi, 1985, Structure/Function of TGF β RIII (2 Pubs), Senior Researcher, Bionic Materials Technology Group Biomaterials Center, National Institute for Materials Science, Tsukuba, Japan

Keiichi Tanno, 1993, Expression of FGF Ligands in Liver, Staff Research Scientist, Kobe City College for Nursing, Kobe, Japan

Hidetaro Yasumitsu, Ph.D., 1989, 1999, FGF Antigens in Liver (2 Pubs), Associate Professor, Yokohama City University International Graduate School of Arts and Sciences, Yokohama City University, Yokohama, Japan

Pre-Med/Graduate Tech Training (chronological order)

Bao To, 1995 - 1997, Texas A&M Health Science Center, College of Medicine, M.D. 2001

Trinh Nguyen, 2000 - 2001, Texas College of Osteopathic Medicine, Ft. Worth, TX, D.O.M May 2005

Courtney Bowles, 2003-2005, Ph.D. Program, Signaling Mechanisms in Progesterone-induced Neuroprotection, Dept. of Pharmacology and Neuroscience, University of North Texas Health Science Center at Fort Worth

Addie Embry, 2004-2005, Ph.D. Program, UT San Antonio

Patricio de Hayos, Summer 2005, Tecnologico De Monterrey, Monterrey, Mexico

Brenda Rodriguez, Summer 2003, Tecnologico De Monterrey, Monterrey, Mexico

Martha Parra Cardenas, Summer 2006, Tecnological De Monterrey, Monterrey, Mexico

Carlos A. Sanchez, Summer 2007, Tecnological De Monterrey, Monterrey, Mexico

Jesus Hector Canter, Summer 2007, Tecnological De Monterrey, Monterrey, Mexico

Undergraduate & High School (chronological order)

Stephen Janak, summer 1995, Biomedical Science, Texas A&M University, College Station, TX

Sohail Aslam, summer 1996, Biochemistry & Biophysics, Texas A&M University, College Station, TX

Samir Savjani, summer 1997, Biochemistry, Texas A&M University, College Station, TX

Mohammad Mohammad, summer 1997, Genetics, Texas A&M University, College Station, TX (2005 Ph.D. Texas A&M Medical Biochemistry & Genetics)

Stephen Decovic, summer 1997, Biochemistry, Texas A&M University, College Station, TX

Jennifer Puccio, summer 1998, Genetics, Texas A&M University, College Station, TX

Maria McKeehan, summer 1998, Bellaire High School, Houston, TX (2004 Rice University Graduate)

Jeffrey Lane, summer 1998, Biology, Abilene Christian University, Abilene, TX

Daniel (Jamie) Catanese, Jr., summer 1998, Biochemistry & Genetics, Texas A&M University, College Station, TX (Ph.D., 2005 Rice University, Mentor: Kathy Mathews)

Travis Young, summer 1998, Genetics, Texas A&M University, College Station, TX, (Ph.D., 2003 UTMB, 2005 postdoctoral UTMB)

Nicole Dierschke, summer 1999, Biomedical Science, Texas A&M University, College Station, TX

Sonia Abraham, summer 1999, Biochemistry, Baylor University, Waco, TX

Magalie LeDuc, summer 2000, Effects of Two Heparin Mimics on the FGF Receptor Complex, University of Paris, Creteil, France. (2005 Cameron Foundation Fellow, UTGSBS)

Kevin Parsons, summer 2015, Department of Biochemistry and Biophysics, Agri-Life, Texas A&M University.

Xinchen Wang, summer 2003, Bellaire High School, Houston, TX (2005 Presidential Scholar Award, entered Yale University)

Allison Chin, summer 2005, St. John's High School, Houston, TX

Thesis/Dissertation Committees

Lei An, (Ph.D., IBT-TAMHSC, Houston, Co-mentor with Fen Wang).

Julia Yu Fong Chang., (MD/Ph.D., Baylor College of Dentistry, IBT- TAMHSC, Houston)

Xian Chen, (Ph.D., IBT-TAMHSC, Houston, Co-Chair with Jianming Xu, Baylor College of Medicine TMC, Houston, TX)

Yoonsang Cho (Ph. D, Dept. Biochemistry & Biophysics, Texas A&M University, College Station, TX)

Paola Guerrero (Ph.D., Dept. Biochemistry & Biophysics, Texas A&M University, College Station, TX)

Ana Maria Hernandez (Ph.D., Dept. Biochemistry & Biophysics, Texas A&M University, College Station, TX)

Zheng Huang (Ph.D., IBT-TAMHSC, Houston)

Yanqing Huang, (Ph.D., IBT-TAMHSC, Houston, Co-mentor with Fen Wang)

Hak-Hyun Ka (Ph.D., Animal Science, Dept. of Animal Science, Texas A&M University, College Station, TX)

Melinda Larsen (Ph.D., Cell Biology, Cell Mol. Biology Program, Baylor College of Medicine, Houston, TX)

Tao Lin, (Ph.D., IBT-TAMHSC, Houston)

Yongshun Lin (Ph.D., IBT-TAMHSC, Houston)

Qing Liu (Ph.D., IBT-TAMHSC, Houston)

Wei Liu (Ph.D., IBT-TAMHSC, Houston)

Yan Liu (M.S., Plant Sciences, Texas A&M University, Kingsville, TX)

Lijiang Ma (Ph.D., IBT-TAMHSC, Houston)

Lingjun Meng (Ph.D., IBT-TAMHSC, Houston)

Dianne Mitchell (Ph.D., IBT-TAMHSC, Houston)

Tuan M. Nguyen (Ph.D., Translation and Molecular Medicine Program, Baylor College of Medicine, Houston, TX)

Alan Parrish (Ph.D., School of Veterinary Medicine, Texas A&M University, College Station, TX)

Brandy Sanchez (Ph.D., IBT-TAMHSC, Houston)

Jennifer Palie Selever (Ph.D., IBT-TAMHSC, Houston)

Xuenong Shi (Ph.D., Biochemistry & Biophysics, Texas A&M University, College Station, TX)

Jean Ching Yi Tien (Ph.D., IBT-TAMHSC, Houston, Co-Chair, with Jianming Xu Baylor College of Medicine TMC, Houston, TX)

Bryan Welm (Ph.D., Cell. Biology, Cell Mol. Biology Program, Baylor College of Medicine, Houston, TX)

Shoubin Wen (Ph.D., IBT-TAMHSC, Houston)

Yixiang Xu, (Ph.D., IBT-TAMHSC, Houston, Mentor Jianming Xu, Baylor College of Medicine TMC, Houston, TX)

Fan Yang, (Ph.D., IBT-TAMHSC, Houston)

Jue Zhang, (Ph.D., IBT-TAMHSC, Houston)

Yongyou Zhang (Ph.D., IBT-TAMHSC, Houston)

Qubo Zhu (Ph.D., IBT-TAMHSC, Houston)

5. Graduate Faculty Membership

1985 - 1993, Faculty of Biochemistry, University of Vermont, Burlington, VT

1987 - 1994, Faculty of Chemistry & Biology, Clarkson University, Potsdam, NY

1993 - 1996, Faculty of Zoology, Chinese Academy of Sciences, Kunming, PRC

1993 - Present, Faculty of Cell Biology, Xiamen University, Xiamen, PRC

1993 - Present, Faculty of Biochemistry and Biophysics, Texas A&M University, College Station, TX

1995 - Present, Graduate School of Biomedical Sciences, University of Texas Houston Health Science Center (UT-GSBS)

1995 - Present, Faculty of Molecular and Cell Biology, Baylor College of Medicine, Houston, TX

1996 - 1998, Faculty of Tea Sciences, Zhejiang Agricultural University, Zhejiang, PRC

1996 - Present, Intercollegiate Faculty of Nutrition, Texas A&M University, College Station, TX

1996 – Present, Interdisciplinary Faculty of Reproductive Biology, Texas A&M University, College Station, TX

1998 – Present, Cardiovascular Research Institute, Texas A&M Health Science Center

1998 - 2012, Reproductive Biology Program, UT-GSBS

1999 - Present, Graduate School of Biomedical Sciences, Texas A&M Health Science Center

6. Teaching Awards

1999, Dean's Excellence Award, UT-GSBS

2007, Stanley R. Glasser Award in Recognition of Excellence in Mentoring

2012, SGS Outstanding Mentor Award, TX A&M Health Science Center

F. RESEARCH & SCHOLARLY ACTIVITIES

1. Areas of Research/Scholarship

Dr. McKeehan has made major conceptual contributions in three general areas. First, he contributed to understanding the mechanistic basis of cell to cell communication in health and disease through tyrosine kinase cell surface signal reception apparatuses that are intimately controlled by tissue matrix heparan sulfate. Although mechanistically applicable to most tissues, these contributions have been made at the molecular, cellular and physiological levels with a focus on cardiovascular, liver and prostate biology. His basic contributions represent significant advances in understanding health and disease, particularly those of prostate and liver.

He showed that an important element of prostate cancer is basically a failure of cells in the microenvironment to communicate properly using the FGF tyrosine kinase signaling mechanisms and revealed multiple faulty steps in tumor progression that may be potentially reversed by treatment or prevention. In this area he pioneered and helped document two novel concepts: one, that FGF signaling both mediates steroid hormone and metabolite transcription factor receptor action as well as modifies their activity in addition to their direct actions; and two, that pericellular matrix heparan sulfate plays an intimate and sometimes oligosaccharide motif-specific role in FGF signaling as a part of the transmembrane receptor complex.

Using genetically modified mice, his second contribution was the first to implicate members of the fibroblast growth factor (FGF) in control of metabolic homeostasis that includes cholesterol, general lipid and glucose metabolism. This implicated FGF signaling in endocrine functions whose dysfunction include diabetes, metabolic syndrome and obesity-related diseases. Previously FGF signaling was limited to short range events within tissues. This opened up the field of the circulating endocrine FGFs.

Thirdly, his group discovered a new molecular complex and pathway that integrates microtubular and mitochondrial dynamics, chromosome remodeling and cell division involved in tumor suppression. This pathway may prevent the onset of genetic instability at its earliest origin through prevention of aneuploidy, the only common property of all cancers.

These contributions are documented in 206 original peer-reviewed papers and 54 review articles.

Milestones in Dr. McKeehan's contributions are:

1. Demonstration of importance of nutrient balance and trace nutrients and their interaction with hormones and growth factors in serum-free culture of new cell types; establishment of the MCDB series of defined culture media; isolation of growth factors through cell culture detection methods; isolation of normal prostate cells in culture;

- culture of fastidious prostate tumor cells.
2. Discovery that the heparan sulfate chains from peri-cellular matrix proteoglycan are an integral part of the FGF tyrosine kinase signal transduction complex. Demonstration of the relative contributions of the heparan sulfate and FGF receptor kinase subunits on specificity. Demonstrated that charged groups are specifically distributed in heparan sulfate oligosaccharides that control FGF signaling. Directly isolated the first specific oligosaccharide for FGF signaling.
 3. Demonstration that androgen is not a direct growth factor for prostate cells, but is mediated by local tissue polypeptides that mediate communication between stromal and epithelial cell compartments; demonstration of the stepwise changes within cell compartments in the FGF family that subverts stromal to epithelial communication and homeostatic balance during progression to malignancy.
 4. Demonstration that a specific FGF tyrosine kinase receptor (FGFR4) controls cholesterol to bile acid synthesis, lipid and glucose metabolism affecting obesity-related fatty liver and diabetes.
 5. Discovery of the LRPPRC complex, how its dual function microtubule- and mitochondria-associated subunits interact to recognize defective chromosomal alignment, promote mitochondrial-promoted mitotic cell death and prevent aneuploidy.
 6. Discovery that the normal physiological role of anti-obesigenic and anti-diabetic hormone FGF21 is a general tissue stress signal that triggers stress relieving effects from adipocytes back to tissues.

2. Invited Presentations (since 1993 at Texas A&M)

The Ohio State University, Columbus, OH, "Program in Molecular, Cellular and Developmental Biology", November 29, 1993, "*Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships*".

University of Minnesota, Veterans Administration/Dept. of Urologic Surgery, Minneapolis, MN, November 30, 1993, "*The Fibroblast Growth Factor Family in Stromal-Epithelial Interactions*".

Society for Basic Urologic Research Fall Symposium, Wyndham Warwick Hotel, Houston, TX, December 4, 1993, "*The Fibroblast Growth Factor Family, Stromal-Epithelial Interactions and Prostate Cancer*".

Daiichi Pharmaceutical Co., Ltd., Tokyo, Japan, December 14, 1993. "*Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships*".

Takeda Chemical Industries, Ltd., Osaka, Japan, December 21, 1993, "*Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships*".

University of Rochester, Dept. of Biology, Rochester, NY, January 26, 1994, "*Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships*".

Keystone Symposia on Breast and Prostate Cancer II, Lake Tahoe, CA, March 14-20, 1994, "*The Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Glycosaminoglycan and Ligand Binding Domains*".

American Paralysis Association Conference, "Activity-Dependent Plasticity: Enhancing Recovery After Spinal Cord Injury", Irvine, CA, April 14-15, 1994, "*Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships*".

The University of North Carolina at Chapel Hill, Dept. of Cell Biology & Anatomy, Chapel Hill, NC, April 20, 1994, *"Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships"*.

EMBO Workshop, "Molecular and Cellular Aspects of FGFs and their Receptors", Capri, Italy, May 29 - June 2, 1994, *"Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships"*.

Gordon Research Conference, "Vascular Cell Biology", Colby-Sawyer College, New London, NH, June 12-17, 1994, *"Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships"*.

Gordon Research Conference, "Reproductive Tract Biology", Plymouth State University, Plymouth, NH, July 10-15, 1994, *"Heparin Sulfate-EGF and TGF-beta Receptor Complexes in the Prostate"*.

American Urological Association Summer Research Conference, "Growth Factors and Urogenital Tract Physiology and Disorders", Omni Hotel, Houston, TX, August 5, 1994, *"Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships"*.

The University of Texas Health Science Center at Houston, Dept. of Internal Medicine, Houston, TX, August 25, 1994, *"The FGF Receptor Complex"*.

Burgher Foundation Center for Molecular Biology in the Cardiovascular System, Baylor College of Medicine, Houston, TX, September 23, 1994, *"Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships"*.

The University of Texas Health Science Center at San Antonio, Dept. of Cellular and Structural Biology, San Antonio, TX, September 28, 1994. *"Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships"*.

British Association for Cancer Research, Joint Winter Meeting Symposium, "Growth Factors & Receptors", London, England, November 28, 1994. *"Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships"*.

American Association for Cancer Research, Basic and Clinical Aspects of Prostate Cancer, Palm Springs, CA, December 8-12, 1994. *"Androgen and Growth Factors in Prostate Stromal and Epithelial Cell Cross-Talk"*.

The University of Texas Medical School at Houston, Dept. of Biochemistry and Molecular Biology, Houston, TX, January 17, 1995. *"Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships"*.

Baylor College of Medicine, Dept. of Cell Biology, Houston, TX, January 25, 1995, *"Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Structure/Function Relationships"*.

Endocrinology Research Program Advisory Committee, National Institute of Diabetes and Digestive and Kidney Diseases, NIH, Bethesda, MD, March 13, 1995, *"New Frontiers in Endocrinology"*.

NeuroScience Network Tissue Culture Course, University of Saskatchewan, Dept. of Anatomy, Saskatoon, Canada, May 14-16, 1995. *"Nutrition and Micro-environment in Tissue Culture. Growth and Differentiation of Cells"*.

3rd International Consultation on Benign Prostatic Hyperplasia, Monte Carlo, Monaco, June 25-29, 1995, Subcommittee on The Regulation of Prostatic Growth, *"Stromal-Epithelial Communication in Prostate Cell Growth"*.

1995 Mary Lasker Symposium on Frontiers of Cancer Research, Modern Concepts in Tumor Biology and Their Relevance to Prostate Cancer, San Diego, CA, July 26-29, 1995. *"Nonandrogen Paracrine-Autocrine Regulation"*.

MD Anderson Cancer Center, Department of Neuro-oncology, Houston, TX, August 17, 1995. *"The Heparan Sulfate-Fibroblast Growth Factor Receptor: Diversity and Structure-Function Relationships"*.

Fifth International Congress on Hormones and Cancer, Symposium on Cell-Cell Interactions, Quebec City, Canada, September 16-20, 1995. *"The FGF Family and Stromal-Epithelial Cell Interactions in Prostate Cancer"*.

Endocrine Society of Australia, Satellite Symposium on Androgen Action and Cell Growth, Melbourne, Australia, September 25-28, 1995. *"Role of Androgens and Growth Factors in Epithelial/Mesenchymal Cell Interactions"*.

Flinders Medical Centre, Research Centre for Genetics and Molecular Medicine, Adelaide, Australia, September 29-30, 1995, *"The Heparan Sulfate-Fibroblast Growth Factor Receptor: Diversity and Structure-Function Relationships"*.

University of Texas Medical School-Houston, Dept. of Pathology & Laboratory Medicine, Houston, TX, October 11, 1995, *"The Heparan Sulfate-Fibroblast Growth Factor Receptor: Diversity & Structure-Function Relationships"*.

Argentine Bank of Cells (ABAC) annual meeting, Buenos Aires, Argentina, October 17-18, 1995. Two plenary lectures: *"The Cell Culture Environment--Nutrients, Polypeptide Regulators and Extracellular Matrix"* and *"Application and Discovery in Cell Culture"*.

INTA, Castelar, Buenos Aires Province, October 19, 1995. Two lectures: *"Texas A&M, The Texas Medical Center and Common Frontiers in Agriculture and Medicine,"* and *"The Heparan Sulfate-Fibroblast Growth Factor Receptor in Cancer"*.

Texas A&M University, Nutrition Faculty, College Station, TX, October 24, 1995, *"The Heparan Sulfate-Fibroblast Growth Factor Signal Transduction Complex--Potential Target for Nutraceutical Prevention and Therapy?"*.

1996 International Symposium on Biology of Prostate Growth, Washington, DC, March 28-31, 1996, *"Paracrine and Autocrine Mechanisms in Prostate Growth: Role of the Heparan Sulfate-FGF Receptor Complex"*.

TAMU Agricultural and Extension Center, Weslaco, TX, May 8, 1996, *"Cancer Research in Relationship to Human Nutrition and Phytochemicals"*.

Department of Biochemistry, State University of New York at Buffalo, May 20, 1996. *"The Fibroblast Growth-Factor-Heparan Sulfate-Tyrosine Kinase Signal Transduction Complex"*.

Department of Urology, M.D. Anderson Cancer Center, Houston, TX, June 5, 1996. *"The Heparan Sulfate Fibroblast Growth Factor Signal Transduction Complex in Health and Disease"*.

29th Annual Meeting of Society for the Study of Reproduction, London, Ontario, Canada, July 27-30, 1996. Mini-Symposia: Paracrine Mediators in the Reproductive System. *"KGF and KGF Receptor Expression in the Prostate"*.

American Urological Association Summer Research Conference, Houston, TX, August 9-11, 1996, *"Cell Membrane Proteins & Receptors"*.

Sixth International Congress of the Metastasis Research Society - Satellite Meeting, Gent, Belgium, September 5-9, 1996, *"Role of Heparan Sulfate and Divalent Cations in the Assembly of the Oligomeric Fibroblast Growth Factor Receptor Complex"*.

National Prostate Cancer Coalition, U.T. M.D. Anderson Cancer Center, Department of Urology, Houston, TX, October 12-13, 1996, *"Establishing an Agenda for Prostate Cancer Research: A Formula for Funding"*.

49th Annual Symposium on Fundamental Cancer Research (sponsored by MD Anderson; Regulatory Mechanisms in Growth and Differentiation) Houston, TX, October 22-25, 1996, *"Regulatory Mechanisms in Growth and Differentiation"*.

Pharmaceutical Peptides, Cambridge, MA, October 27-28, 1996, *"The Heparan Sulfate-Fibroblast Growth Factor Family: Diversity of Structure and Function"*.

First Donald Coffey Urology Research Conference, Palm Beach, FL, November 2-3, 1996, *"Paracrine and Autocrine Mechanisms and Genetic Expression"*.

The Fifth Annual Genitourinary Oncology Conference, Advances in the Biology and Therapy of Prostate Cancer, Houston, TX, February 20-21, 1997, *"Signal Transduction of Prostate Cancer Progression"*.

1997 Cambridge Symposia Conference, Lake Tahoe, CA, March 22-28, 1997, *"The Heparan Sulfate-Fibroblast Growth Factor Receptor Complex in Prostate Tumor Progression"*.

SBUR Spring Meeting/AUA, New Orleans, LA, April 12, 1997, *"Heparin-binding Growth Factors"*.

4th International Consultation on Benign Prostatic Hyperplasia, Paris, France, July 2-5, 1997, Committee member: *"Regulation of Prostatic Growth"*.

International Symposium on Cellular Endocrinology, Lake Placid, NY, September 11-14, 1997, Session Chairman: *"The Heparan Sulfate-Fibroblast Growth Factor Receptor Complex: Diversity and Structure-Function Relationships"*.

ReproForum, TAMU, College Station, TX, December 5, 1997, *"The Ubiquitous and Multifunctional Heparin Sulfate-Fibroblast Growth Factor Receptor Family: Structure-Function Relationships"*.

The University of Texas at Austin, Department of Chemistry and Biochemistry, Austin, TX, December 17, 1997, *"The Heparan Sulfate-Fibroblast Growth Factor Signaling System: Diversity of Structure and Function"*.

Northwestern University, Department of Urology, Chicago, IL, Jan. 14-15, 1998, *"The Heparan Sulfate-Fibroblast Growth Factor Signaling System: Diversity of Structure and Function"*.

NIDDK International Symposium on the Biology of Prostate Growth, Bethesda, MD, March 16-18, 1998, "*The Heparan Sulfate-Fibroblast Growth Factor Receptor Complex*".

17th Joint Meeting of the British Endocrine Societies, Edinburgh, U.K., March 23-25, 1998, "*Fibroblast growth factor receptors in health and disease*".

MD Anderson Cancer Center, Dept. of Tumor Biology, April 8, 1998, "*Structure-Function Relationships in the Heparan Sulfate-Fibroblast Growth Factor Complex*".

Houston A&M Club, Houston, TX, April 27, 1998, "*Progress in Prostate Cancer*".

Mayo Clinic – Rochester, MN, October 2, 1998, "*The Heparan Sulfate-Fibroblast Growth Factor Receptor Complex in Prostate Tumor Progression*".

University of California-Irvine, November 16, 1998. "*The Heparan Sulfate-FGF Receptor Complex: Assembly and Structure-Function Relationships*".

American Association for Cancer Research Special Conference: "New Research Approaches in the Prevention and Cure of Prostate Cancer", Indian Wells, CA, December 2-6, 1998. "*FGF Genes and FGF Receptor Alterations in Prostate Tumorigenesis*".

American Urological Association Summer Research Conference entitled "Advances in BPH Research, Omni Hotel, Houston, TX July 30-August 1, 1999. "*KGF Pathways in the Prostate*".

EMBO Workshop on FGF and their receptors: Structure to Function. Ein Gedi, Dead Sea, Israel, December 5-9, 1999. "*Models of assembly of the FGF receptor heparan sulfate-kinase complex*".

Department of Biochemistry and Biophysics, Texas A&M University, College Station, TX, January 26, 2000. "*The Heparan Sulfate-Fibroblast Growth Factor Signaling System: Intimate Partnership Between Matrix Sugar and Membrane Protein*".

The University of Texas-Houston Health Science Center, Institute of Molecular Medicine, Houston, TX, January 28, 2000. "*The Heparan Sulfate-Fibroblast Growth Factor Signaling System: Ubiquitous Mediator of Development and Adult Homeostasis*".

Texas A&M University-Kingsville, Citrus Center at Weslaco, TX, March 31, 2000. "*Cell Communication in Cancer: Potential Target for Plant Products*".

Mouse Models of Human Cancers Consortium – Steering Committee Meeting, Chantilly, Virginia, July 7-10, 2000.

UT-GSBS Reproductive Program Seminar Series, Houston, TX, September 12, 2000. "*Structure-function Relationships in the Heparan Sulfate-Fibroblast Growth Factor Complex*".

Research Institute for the Functional Peptides, Yamagata, Japan, November 17, 2000. "*The Heparan Sulfate-Fibroblast Growth Factor Signaling System in Health and Disease*".

The 13th Annual Meeting of the Japanese Association for Animal Cell Technology (JAACT 2000), Fukuoka, Japan, November 20, 2000. "*The Ubiquitous Heparan Sulfate-Fibroblast Growth Factor Signaling Complex: Determinants of Specificity and Function*".

Zeria Pharmaceutical Co. Ltd., Saitama, Japan, November 21, 2000. "*The Heparan Sulfate-Fibroblast Growth Factor Signaling System in Health and Disease*".

MD Anderson Cancer Center, Dept. of Molecular & Cellular Oncology, April 18, 2001. "*The Heparan Sulfate-Fibroblast Growth Factor Signaling Complex*".

Annual Meeting of the Endocrine Society, Denver, CO, June 20-23, 2001. "*The Heparan Sulfate-Fibroblast Growth Factor Signaling System: Structure-Function Relationships and Role in Prostate Disease*".

Mouse Models of Human Cancers Consortium – Steering Committee Meeting, San Francisco, CA, July 9-12, 2001.

Modeling Human Prostate Cancer in Mice meeting, Bar Harbor, ME, October 18-21, 2001. "*Cell-specific FGF Ligands, Tyrosine Kinase Receptor Isoforms and Heparan Sulfates: Mediators of Prostate Epithelial-Stromal Crosstalk*".

Mouse Models of Human Cancers Consortium – Steering Committee Meeting, Washington, DC, January 14-17, 2002, "*Cell-specific FGF Ligands, Tyrosine Kinase Receptor Isoforms and Heparan Sulfates: Mediators of Prostate Epithelial-Stromal Crosstalk---Moving into the Mouse*".

International Symposium on Nutritional Sciences, Shanghai, PR China, April 1-4, 2002. "*Molecular Targets in Cell-to-Cell Communication for Cancer Prevention*".

Institute of Life Science, School of Biological & Environmental Engineering, Jiangsu University, Zhenjiang, Jiangsu Province, PR China, April 6, 2002. "*Heparan Sulfate-Fibroblast Growth Factor Complex*".

State Key Laboratory of Reproductive Biology, Institute of Zoology, Beijing, PR China, April 8, 2002. "*Heparan Sulfate-Fibroblast Growth Factor Complex*".

First Joint Meeting of the Mouse Models of Human Cancers Consortium and the Prostate SPOREs, Bethesda, MD, November 20-21, 2002. "*Age-Dependent Prostatic Intraepithelial Neoplasia (PIN) in Mice Expressing Ectopic and Constitutively Active FGFR1 in the Prostate Epithelium*".

Mouse Models of Human Cancers Consortium meeting, Houston Intercontinental Hotel, Houston, TX, January 13-15, 2003. Emphasis on hemopoietic cancers.

Facts of Life 2003 Conference, Institute of Biosciences and Technology, Texas A&M Health Science Center, Houston, TX, January 29-30, 2003. "*Lessons from Molecular Biology*".

Eleventh Annual Radiation Workshop entitled "New Directions in Prostate Cancer Therapy", Round Top, TX. April 10-12, 2003. "*Cytokines in Prostate Cancer Development*".

Mouse Models of Human Cancers Consortium – Steering Committee Meeting, New York, City, NY, July 9-11, 2003.

AUA/SBUR Summer Research Conference entitled “Prostate Growth in Benign and Malignant Diseases”, Houston, TX, August 1-3, 2003. *“The FGF Family and Prostate Cancer”*.

Mouse Models of Human Cancers Consortium – Steering Committee Meeting, Los Angeles, CA, January 7-9, 2004.

Mouse Models of Human Cancers Consortium – Steering Committee Meeting, Washington, DC, July 14-16, 2004.

57th Annual Symposium on Fundamental Cancer Research, Signal Transduction: From Pathways to Networks. Co-Chair of Session entitled *“Signaling from Pathways to Networks”*. Houston, TX, October 12-15, 2004.

Mouse Models of Human Cancers Consortium – Steering Committee Meeting, Nashville, TN, January 19-21, 2005.

Baylor College of Dentistry, Texas A&M Health Science Center, Dallas, TX, June 13, 2005. *“The Role of the Heparan Sulfate-regulated FGF Signaling Complex in Prostate and Liver”*.

Mouse Models of Human Cancers Consortium – Steering Committee Meeting, New Brunswick, NJ, June 28-30, 2005.

The Methodist Hospital, Houston, TX, October 18, 2005. *“Role of the Heparan Sulfate-Fibroblast Growth Factor Signaling System Between Stroma and Epithelium in Prostate”*.

Mouse Models of Human Cancers Consortium – Steering Committee Meeting, Washington D.C., January 16-18, 2006. *“Mouse Model of Hepatocarcinogenesis Using Forced Ectopic Expression of FGFR1 in Hepatocytes”*.

Department of Biochemistry and Molecular Biology, University of Texas Medical School-Houston, February 13, 2006. *“The Role of Heparan Sulfate in FGF Signaling: Is There Motif Specificity Beyond Random Variation in Charge Density?”*

Gordon Research Conference, Fibroblast Growth Factors in Development & Disease, Ventura, CA, March 12-17, 2006. *“FGF Signaling in Liver Development”*.

National Youth Leadership Program, Institute of Biosciences and Technology, Houston, TX, July 26, 2006. *“Liver, Metabolic Syndrome and Obesity”*.

Institute of Biosciences and Technology, Texas A&M Health Science Center, Information Exchange Seminar, Houston, TX, September 28, 2006. *“Heparan Sulfate-FGF Tyrosine Kinase Signaling In Obesity-Related Metabolic Syndrome, Fatty Liver Disease and Cholesterol Metabolism”*.

Cardiovascular Research Institute, Texas A&M Health Science Center, 2nd Annual CVRI Retreat, College Station, TX, October 19-20, 2006. *“FGF Signaling, Metabolic Syndrome and Obesity”*.

Amgen, Inc., San Francisco, CA, April 3, 2007. *FGF Signaling in Obesity-related Metabolic Syndrome, Fatty Liver Disease & Cholesterol Metabolism*

New York University School of Medicine, Pharmacology Dept., Frontiers in Pharmacology Program, New York, NY, October 16, 2007. *The Role of FGF Receptor Type 4 in Metabolic Homeostasis and Hepatoma.*

Baylor College of Medicine, Texas Medical Center Digestive Diseases Center, GI Research Forum, Houston, TX, December 6, 2007. *The Role of FGF Receptor Type 4 in Metabolic Homeostasis and Hepatoma.*

University of Texas Southwestern Medical Center at Dallas, Department of Molecular Biology, Dallas, TX, April 23, 2008. *The Role of FGF Receptor Type 4 in Metabolic Homeostasis and Hepatoma.*

Hiroshima University Graduate School of Biomedical Sciences, workshop for Bio-dental Education & Research, Hiroshima, Japan, February 7-8, 2009. The Ubiquitous FGF Signaling Family: Control of Cellular and Metabolic Homeostasis in Health and Disease.

Zeria Pharmaceutical Co., Ltd., Tokyo, Japan, February 10, 2009. The Ubiquitous FGF Signaling Family: Control of Cellular and Metabolic Homeostasis in Health and Disease.

FGF Gordon Research Conference, Fibroblast Growth Factors in Development & Disease, Ventura, CA, March 14-19, 2010. "Beta-Klotho directs FGFR4 and FGFR1 signaling to metabolism and tumor suppression".

TX A&M HSC Translational Research Symposium, College Station, TX, November 11-12, 2010. "Co-factor turns oncogenic FGF tyrosine kinase transmembrane signal into metabolic regulator and tumor suppressor".

Komen Foundation SAB/SAC Meeting, Baltimore, MD March 1-2, 2011. "The impact of obesity and obesity treatments on breast cancer".

3rd International Conference on Fibroblast Growth Factors, Wenzhou, China, December 7-10, 2012 "The FGF receptor signaling complex: Diversity of function and target cell specificity".

Gordon Research Conference: Fibroblast Growth Factors in Development & Disease, Ventura Beach, CA, March 2-7, 2014. Keynote Lecture: "Celebrating 40 years of FGF research: Past, present, future: FGF—Ubiquitous regulator of cellular and metabolic homeostasis. [Two poster presentations: McKeehan, Luo, Yang, Jin, Lee, Yeung. "Deficiency of metabolic regulator FGFR4 elevates endocrine FGF19 and FGF21 and suppresses TGF- α driven breast tumor progression"; McKeehan, Luo, Yang. FGF21 is a tissue stress hormone that targets adipocytes."

Gordon Sato Conference (satellite of 2015 ASBMB meeting): "Forty years of FGF: Regulator of cellular and metabolic homeostasis," Boston, MA, March 29-31, 2015.

4. Grants

a. Past Funding Summary

1979-1993. *Individual.* Continuous competitive individual project grant funding from National Cancer Institute; National Heart, Blood, Lung Institute; National Institute of Digestive & Kidney Diseases; American Society, Council for Tobacco Research.

1979-1993. *Program Projects.* Subprojects in program project grants from National Institute of Aging, National Cancer Institute, National Institute Digestive and Kidney Diseases and R.J. Reynolds/Nabisco. Program Project Principal Investigator National Cancer Institute (4 years) and National Institute Digestive and Kidney Diseases (7 years) (4 years overlap as PI of two PPGs).

Past Funding at Texas A&M

(Moved \$450,000 annual direct cost grant support with staff of 11 to IBT-Texas A&M in 1993)

1993-1995 National Institute of Digestive and Kidney Diseases 2P01 DK38639 (Program Project PI), "Tissue Culture/Growth Factor Study – Metabolic Disorders"
Subproject: "Novel Substrates & Antagonists of the Heparin-Binding (Fibroblast) Growth Factor Receptor"

2/28/94 – 2/28/96 (supported since 1988 at prior institution)

Direct: \$52,167 Indirect: \$23,475 Total: \$75,642

1993-2003 National Institute of Digestive and Kidney Diseases R01DK40739, "Human Heparin-binding Growth Factor Receptors"

Direct: \$1,333,645 Indirect: \$593,323 Total: \$1,926,968

1994-2007 National Institute of Digestive and Kidney Diseases R01DK35310, "Human Hepatocyte Growth Factors."

Continuously funded through NIH R01 and Program Projects since 1980, NIDDK R01DK35310 was renewed competitively for 5 cycles from 1986.

Direct: \$2,262,313 Indirect: \$987,812 Total: \$3,250,125

1994-1995 Lamar Fleming Fund, "Exon Switching in the Heparan Sulfate-Fibroblast Growth Factor Receptor Kinase as a Marker of Prostate Tumor Progression to Malignancy"

Total: \$15,000

1995-1999 Lucille Markey Foundation, "Structural Biology of Cell Signaling Molecules

Direct: \$450,379 Indirect: \$45,039 Total: \$495,418

1996-1998 COALS-TAMU, Joint Weslaco-IBT Program (research of joint MS student Yan Liu), "Program for Prevention and Therapy of Prostate Cancer with Nutraceuticals and Phytochemicals" (Co-PI with Dr. Bhimanagouda Patil)

Total: \$38,500

1997 John S. Dunn Research Foundation, "Growth Factors in Prostate Cancer Program"

Total: \$50,000

2000-2004 GS PlatZ (bioventure subsidiary of Zeria Pharmaceuticals, Inc.), "Structural Proteo-glycomics and Transmembrane Signaling, Goals are basic research that will

lead to agonists and antagonists of proteoglycan-mediated signaling with emphasis on the FGF signal transduction system”
Direct: \$509,092 Indirect: \$50,908 Total: \$560,000

2006, John S. Research Dunn Foundation, “Confocal microscope for imaging mouse models of disease”
Total: \$250,000

2007, Ray Fish Foundation, “Robots for 2D gel analysis for the IBT Proteomics and Nanotechnology Laboratory (Co-PI with Dr. R. Schwartz)
Total: \$50,000

1995-2009, Allen Foundation “IBT Nutrition and Cancer”
Direct: \$100,000

1995-2009, Texas Biotechnology Corporation, “Mechanisms of FGF/FGF Receptor Action in Cardiovascular Disease”:
Direct: \$100,000 Indirect: \$25,000 Total: \$125,000

1999-2009 National Cancer Institute U01 CA084296, “Transgenic Mouse Models of Prostate Cancer, Mouse Models of Human Cancers Consortium (MMHCC), Norman Greenberg, PI. Subproject: “FGF Signaling in Prostate Homeostasis and Tumor Progression” Wallace L. McKeehan, P.I.
2005-2009
Direct: \$442,534 Indirect: \$198,894 Total: \$641,428

1993-2009, National Cancer Institute, R01 CA59971-16, “Growth Factors in Prostate Cancer.” Continuously funded through R01 and Program Projects since 1980.
2003-2009
Direct: \$1,041,571 Indirect: \$473,916 Total: \$1,515,487

2008-2009, ANH TATRC, Department of Army, “The Medical NanoVector Research and Development Center of the Alliance for NanoHealth.” Equipment Grant
Total: \$135,219

2007-2009, Upgrades for 2D DIGE robots and support of a Director for the IBT Proteomics and Nanotechnology Laboratory, John S. Dunn Foundation
Total: \$135,000

2009-2011, Amgen, “Metabolic Studies in Adipocyte-specific FGFR1 Knockout Mice”
Direct: \$66,071 Indirect: \$17,179 Total: \$83,250

2011-2013, Eli Lilly-McKeehan: “Metabolic Studies of FGF19 and FGF21 in FGFR1-deficient Adipocytes”
Direct: \$71,429 Indirect: \$18,571 Total: \$90,000

2000-2013, John S. Dunn Research Foundation Grant, “Mouse Models of Human Disease Program”
Total direct: \$500,000

2008-2013, KG081048-05 Dr. Sai-Ching Jim Yeung, PI, UT/MD Anderson Cancer Center; 00988839 Subcontract Dr. Wallace L. McKeehan, Subcontract PI; Title: Impact of Obesity and Obesity Treatments on Breast Cancer
Direct: \$627,376 Indirect: \$159,844 Total: \$787,220

2009-2014, 5P50CA140388 Dr. Christopher Logothetis, PI, UT/MD Anderson Cancer Center "SPORE" Project#462022 (McKeehan, Subproject Co-PI, with Drs. Fen Wang and Nora Navone; TAMHSC subcontract PI with Fen Wang, Co-PI); Title: Targeting FGF Signaling in Prostate Cancer Progression
Direct: \$300,377 Indirect: \$139,366 Total: \$439,743

2011-2014 Cancer Prevention Research Institute of Texas (CPRIT) RP110555, "Activation of Prostate Cancer Stem Cells through Aberrant FGF Signaling," Co-Principal Investigator, Principle Investigator Fen Wang.
Annual Direct: \$133,000. Indirect: \$6,650 Total: \$138,650

1993-2014 John S. Dunn Research Foundation Endowed Chair Funds
Annual Direct \$100,000 Total: \$2,000,000

1993-2014

Total Direct: \$10,663,673 Indirect: \$2,739,997 Total: \$13,403,650

b. Active

2014-
John S. Dunn Distinguished Professor Fund
\$125,000 Direct

Proposals pending (available on request)

Manuscript Review (Since 1993)

Journal Articles Refereed

1993-2005

Average of 16 per year for 8 different journals as a primary reviewer
Average of 26 per year requiring an additional editorial review (In Vitro)

2006-present

Average of 8 per year for 6 different journals

Editorial Boards

1984 – 1992; 2005-present, Associate Editor, In Vitro Cell. Dev. Biol.
1990 - 2012, Consulting Editor, CYTOTECNOLOGY

Editorship

1992 – 2005, Editor-in-Chief, In Vitro Cell. Dev. Biol.-Animal
2005 - Present, Editor-in-Chief Emeritus

6. Grant Reviews

1979 - 1993. Average ca. 10 proposals per year as reviewer for NCI, NIDDK, NHBLI special study sections, Ad Hoc Cell Biology II Study Section.

1995. ca. 15 proposals, Member, Special Review Committee, SPORE in Prostate Cancer, NIH

1996 - 1998. ca. 10 proposals per year, Ad Hoc NIH Metabolic Experimental Pathology Study Section

1998 - 2001. ca. 60 proposals per year, member, NIH Metabolic Experimental Pathology Study Section

2001 - 2012. External Program Review Committee, Program in Prostate Cancer (Leland Chung, PI), Dept. of Urology, Emory University, Atlanta, GA.

7. Scholarly Societies

American Association for Advancement of Science

American Association Cancer Research

American Chemical Society

American Society for Cell Biology

American Society for Biochemistry and Molecular Biology

American Society for Microbiology

Society for In Vitro Biology (formerly Tissue Culture Association)

Executive Board 1984-1988 (Lifetime Member)

8. Other Indices of Scholarly Performance

1985-1993, Organizer, Co-organizer or organizing committee of the Annual W. Alton Jones Cell Center Symposium on Cellular Endocrinology (annual symposium in Lake Placid, NY on a timely topic in the field in honor of a major contributor to the field)

1995-1996, Developed international exchange program for graduate students in CCBN

1995, Key role in development of the agreement with UT-GSBS for IBT Faculty to become members of the UT-GSBS faculty and mentor students in the program at the IBT

1995, Key role in partnership with UT Institute of Preventive Molecular Medicine and development of facilities in the IBT building

1997, Organizer Southwestern Basic Prostate Research Group, consortium of IBT and Baylor Cell and Molecular Biologists doing basic research on prostate in a clinical setting

1998 - Present, Member Research Cores, Nutrition and Reproductive and Developmental Biology, Center for Environmental Rural Health, TAMUS-HSC

2003 - 2004, Member, Organizing Committee of the 57th Annual Symposium on Fundamental Cancer Research sponsored by The University of Texas M.D. Anderson Cancer Center, entitled "Signaling and Cancer"

9. Research and Service Awards

2003, Regents Professor, Texas A&M University System

2004, Society for In Vitro Biology Fellow Award, Vertebrate Division
2004, Distinguished Service Award, Society for In Vitro Biology
2008, Distinguished Professor, Texas A&M Health Science Center
2012, SGS Outstanding Mentor Award, Texas A&M Health Science Center
2012, SVIB Lifetime Achievement Award

G. OUTREACH & PUBLIC SERVICE

1. Dissemination of research information to the appropriate public sectors

1984 - 1993, Assistant to Dr. Gordon Sato in organization, fundraising and office management of The Manzanar Project (project to transfer low-tech, biotech solutions to hunger and global warming)

1998 - Present, Maintenance of The Manzanar Project website
(<http://www.tamu.edu/ccbn/dewitt/manzanar/default.htm>)

1998 – 2002, Coordinator of the IBT Website. Initiated and designed first IBT website. Trained Ms. Kay Kendall (IBT and Deputy Director HSC Communications) in web programming and maintenance.

1998 – Present, Coordinator and maintenance of the Center for Cancer and Stem Cell Biology (formerly Cancer Biology and Nutrition) website. Initiated and designed first Center website, (<http://www.tamu.edu/ccbn/ccbnweb/ccbn.htm>)

2. Grant reviewer on study sections

1979 - 1993. Ad Hoc for numerous special study sections NCI, NIDDK, NHBLI. Ad Hoc Cell Biology II NIH Study Section (Average 2 per year).

1995, Member, Special Review Committee, SPORE in Prostate Cancer, NIH, Bethesda, MD

1996 - 1998, Ad Hoc, NIH Metabolic Experimental Pathology Study Section

1998, Member, Special Review Committee, NIH Prostate Program Projects

1998 - 2001, Member, NIH Metabolic Experimental Pathology Study Section

3. Consultant to industry or academic departments related to research, health care, or product development

1979-1993, Consulted for Flow Laboratories, Collaborative Research, Corning, GIBCO, Eli Lilly, Organogenesis, New England Nuclear, Johnson & Johnson (Ortho Division), Upstate Biotechnology (UBI)

1986-1992, Co-founder/First President, Member Board of Directors, Upstate Biotechnology (UBI), Lake Placid, NY

1994-1995, Consultant to Texas Biotechnology Inc., Houston, TX, *“Mechanisms of FGF/FGF Receptor Action in Cardiovascular Disease”*

1994–2003, Consultant to QED Bioscience Inc., San Diego, CA, *“Marketing Signal Transduction Reagents”*

1995-1996, Consultant to BioWhittaker, Inc., Walkersville, MD, To communicate and evaluate technology and business opportunities in the areas of serum-free media, in vitro toxicology and biomedical fluids.

2001–2003, Consultant to Human Genome Sciences Inc (HGS), Rockville, MD

2001–2003, Consultant to IDEC Pharmaceuticals, San Diego, CA

2009-2012, Advisory Board, David H. Koch Center for Applied Research of Genitourinary Cancers, MD Anderson Cancer Center.

2010-present, External Advisory Board – Dr. Leland WK Chung Cedars-Sinai Medical Center (CSMC) Program Project-Prostate Cancer Bone Metastasis: Biology and Targeting

2014, Consultant to Navigant Consulting, Inc., *“Treatments targeting FGFR4”*.

2013-present, Consultant to Guidepoint Global, Inc, *“FGFR inhibition in cancer,” “Inhibition of FGF in cancer metabolism.”*

4. Outreach programs for college students (mentoring)

1995, summer intern, Biomedical Sciences Program, College of Veterinary Medicine

5. Outreach programs for high and middle school (mentoring)

1995, Texas A&M-HISD Outreach for Middle/High School under-represented minorities who show special interests in science

H. INSTITUTIONAL SERVICE TO THE HSC

1. College/component committees

- 1993 - 2003, IBT Chair, Faculty Search Committee, Center for Cancer Biology and Nutrition
- 1993 - 1995, IBT Chair, Search Committee, Allen Chair & Director, Center for Cellular & Molecular Nutrition
- 1994 - 2003, IBT Director Search Committee (Ad Hoc & Appointed)
- 1995 - 2014, IBT Chair, Faculty Evaluation Committee (now IBT Promotions & Tenure Committee)
- 2001 – 2004, IBT Southern Association of Colleges and School (SACS) Accreditation, Administration Issues Committee
- 2004 – 2006, Chair, Search Committees for Director & Faculty for Center for Molecular Development & Disease
- 2006 – 2014, Chair, IBT Standing By-Laws Committee

- 2008-2011, Chair Welch Chair and IBT Director Search Committee
- IBT Executive Committee 1998-2006
- IBT Director's Advisory Committee 2006 – present
- IBT Committee on Internal and External Signage for IBT Building
- IBT Committee for Structural Biology
- IBT Computer Advisory Committee
- IBT Strategic Planning Committee
- IBT Institutional Animal Care and Use Committee
- IBT Member, Alliance for Nanohealth Steering Committee

2. A&M System HSC Committees

- TAMUS-HSC Task Force on Academic Affairs
- TAMUS-HSC Task Force on Tenure and Promotion Policy and Procedures
- TAMUS-HSC Task Force--Planning Committee, Comprehensive Oral Health Research Center
- TAMUS-HSC Committee on Research Space
- TAMUS-HSC HRSA Coordination Committee member
- TAMUS-HSC Tenure Track Review Committee--Faculty Governance
- TAMUS-HSC Review Panel for Investigator-initiated Tobacco Research Grants
- TAMUS-HSC Advisory committee for selection of Interim Vice President for Research for the HSC.
- TAMUS-HSC SACS Accreditation, Subcommittee on Institutional Effectiveness
- TAMUS-HSC GSBS--The Committee on Special Programs and Centers of Excellence of the Graduate School
- TAMUS-HSC Committee on Academic Freedom, Ethics, Responsibility, Rights and Tenure (CAFERRT)
- TAMUS-HSC 2015 Strategic Planning Committee, Institutes & Centers Planning Task Force
- TAMUS-HSC Finance and Administration Review Committee
- TAMUS-HSC Research Advisory Council (RAC)
- TAMUS-HSC Appointment, Promotion and Tenure Committee (APT Committee)
- TAMUS-HSC Texas A&M CPRIT Task Force

3. Texas A&M University Committees

- TAMU, IBT Program Council
- COALS, Dept. of Biochemistry and Biophysics, Promotion and Tenure Committee
- COALS, Search Committee for Head of Dept. of Biochemistry and Biophysics
- TAMU Council of Center Directors
- TAMU Council of Principal Investigators
- TAMU Research Foundation Principal Investigator Advisory Committee

4. Other A&M System HSC Service

Texas Medical Center Committees

- TMC, Board of Directors of the Friends of the Texas Medical Center Library, 1996-2002
- TMC Library Board of Directors Nominating Committee
- TMC Library Board of Directors, 1994-1999
- TMC Library Executive Committee, 1994-1997
- TMC Library Finance Committee, 1994-1997
- TMC Policy Council, 1997-1998
- TMC Alliance for NanoHealth Steering Committee, 2007-2012
- TMC Digestive Diseases Center (DDC), Associate Member-2009

Statewide

- Texas Women's Reproductive Health Center Forum organizing committee

I. PATENTS OR COMMERCIALIZATION OF RESEARCH

1. Invention disclosures (since 1993 Texas A&M)

Disclosure of Invention TAMUS 1072, "Novel Process for Production, Purification, and Activation of Recombinant Fibroblast Growth Factors and Analogues in Bacteria". Mikio Kan, Jun-Hyeog Jang, and Wallace L. McKeehan. June 18, 1996.

Disclosure of Invention TAMUS 1127, "Chimeric Fibroblast Growth Factor (FGF)-7 (Keratinocyte Growth Factor) with Combined Activities of FGF-7, FGF-1, and FGF-2". Mikio Kan, Yongde Luo, and Wallace L. McKeehan. November 15, 1996.

Disclosure of Invention TAMUS 1477, "FGFR receptor-specific Anti-coagulant Heparin and Heparan Sulfate". Mikio Kan and Wallace L. McKeehan. May 25, 1999.

Disclosure of Invention TAMUS 1669, "Simple and Cost-effective Preparation of Anticoagulant and Antithrombotic Low Molecular Weight Heparin by GST-FGF Affinity Matrix". Yongde Luo and Wallace L. McKeehan. November 21, 2000

Disclosure of Invention TAMUS 1769, "A Simple Improvement for Large-scale Production of Recombination FGF7 (Keratinocyte Growth Factor)". Yongde Luo and Wallace L. McKeehan. July 23, 2001.

Disclosure of Invention TAMUS 1770, "Signal-inactive FGF as an Extrinsic Neutralizer of Heparin-related Anticoagulant Activity". Yongde Luo and Wallace L. McKeehan. July 23, 2001.

Disclosure of Invention TAMUS 1829, "Production of Native Non-anticoagulant Heparin/Heparan Sulfate (NNAH)". Yongde Luo and Wallace L. McKeehan. December 4, 2003.

Disclosure of Invention TAMUS 2078, "Control of Biological Activity of FGF and the FGF Receptor with FGF-Affinity Purified Heparin/Heparan Sulfate Oligosaccharides of Defined Structure". Yongde Luo and Wallace L. McKeehan. February 17, 2005.

Disclosure of Invention TAMUS 3006-(pending), "Prostate epithelial specific PB-Cre transgenic mouse". Fen Wang and Wallace L. McKeehan, August, 2009.

2. Patents

Patent based on TAMUS 1669, "FGF-Affinity Chromatography". Yongde Luo and Wallace L. McKeehan. Filed November 21, 2001; Approved September 2004.

Patent pending based on TAMUS 2078, "Affinity purified heparin/heparan sulfate for controlling the biological activity of the FGF receptor". Yongde Luo and Wallace L. McKeehan. Filed February 27, 2005.

Amendment filed 1/30/09

Serial No. 11/060,125

TAMUS 2078

Title: "Affinity Purified Heparin/Heparan Sulfate for Controlling the Biological Activity of the FGF Receptor"

Inventors: Wallace L. McKeehan & Yongde Luo

3. Licensing of Technology

Agreement through TAMU Licensing and Technology Office with QED Bioscience Inc. (Advanced Research Technologies) for the firm to produce and market FGF receptor and ligand monoclonal antibodies, plus to market two FGF ligands (FGF1 and FGF7) produced by the laboratory, 1994.

Agreement through TAMU Licensing and Technology Office with Zymed Inc. to produce and market FGF receptor 1 monoclonal antibodies, 2004.

Agreement through TAMU Licensing and Technology Office with Santa Cruz Biotechnology, Inc. to produce and market FGFR Antibodies (L-845). 2008

Agreement through TAMU Licensing and Technology Office with Amgen for Metabolic Studies in Adipocyte-specific FGFR! Knockout Mice. 2009

Agreement through TAMU Licensing and Technology Office with Pfizer, Inc. "Prostate Epithelial Specific Cre Transgenic Mouse". 2010

J. PUBLICATIONS

1. Original peer-reviewed papers

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- 4) McKeehan, W. and B. Hardesty (1969) The mechanisms of cycloheximide inhibition of protein synthesis in rabbit reticulocytes. *Biochem. Biophys. Res. Commun.* 36:625-630.
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