BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
Pennathur, Subramaniam	Director, Molecular Phenotyping and Metabolomics
eRA COMMONS USER NAME spennath	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
St. John's Higher Secondary School, India	HSC	1984	Biology
Tirunelveli Medical College, India	M.B.B.S	1984-1992	Medicine
Mass General Hospital, Harvard Medical School	Res. Assistant	1992-1993	Endocrine Research
Washington University, Saint Louis, MO	Resident	1993-1996	Internal Medicine
Washington University, Saint Louis, MO	Fellow	1997-1999	Endocrinology
Washington University, Saint Louis, MO	Fellow	1999-2001	Nephrology
Washington University, Saint Louis, MO	Chief Resident	2001-2002	Internal Medicine

A. Personal Statement

My laboratory has made extensive use of mass spectrometric methods to study oxidant injury mechanisms, metabolomics and proteomics in animal models and humans with diabetic complications. The major focus of our work has centered on developing a biomarker discovery platform which encompass a wide range of metabolomic/proteomic approaches, including multidimensional protein identification technology (MUDPIT), and liquid chromatography electrospray ionization (LC/ESI) tandem MS and matrix assisted Laser desorption ionization time flight (MALDI-TOF) MS analyses of biological samples. We are examining the tissue specific protein changes that occur as a consequence of diabetes in target organs of diabetic damage which include kidney, nerve, retina and the artery wall. We propose to perform targeted proteomic and metabolomic analysis of oxidatively modified proteins/metabolites (funded by NIH grant R24DK082841), tissue-specific protein glycosylation, acetylation and phosphorylation (funded by NIH DP3DK094292) in both animal models of diabetic complications and in human diabetic tissue before and after disease-modifying interventions. Additionally, my laboratory performs shotgun proteomic and glycoproteomic profiling in biofluids (plasma and urine) in patients with complications to discover novel biomarkers (funded by NIH grants R21DK077368, R01HL094230, R24DK082841 and DP3DK094292).

B. Positions and Honors

Faculty and Staff Appointments:

7/2002-3/2003 Clinical Instructor in Medicine, Washington University School of Medicine, St. Louis, MO

4/2003-3/2006 Acting Instructor/Acting Assistant Professor in Medicine, University of Washington, Seattle, WA

3/2006- Assistant Professor in Medicine, University of Michigan, Ann Arbor, MI

2006- Faculty, Bioinformatics Graduate Program and the Center for Computational Medicine and Biology, University of Michigan

2006- Associate Director, Biomedical Mass Spectrometry Facility, Department of Pharmacology, University of Michigan

2010- Director, Molecular Phenotyping Core, Michigan Metabolomics and Obesity Center, University of Michigan

2011- Director, Physician Scientist Program, Associate Director, Internal Medicine Residency Program, University of Michigan, Ann Arbor MI

9/2011- Associate Professor of Medicine with tenure, University of Michigan, Ann Arbor MI

Awards and Honors

1994 National Institutes of Health Medical Resident Research Award

1997 Young Investigator Award, Oxygen Society

1998 Endocrine Society Research Award, San Diego CA

1999	Young Investigator Award, Oxygen Society
2000	Merck Atherosclerosis Young Investigator Award
2003	Physician Scientist Award, National Institutes of Health
2007	Clinical Scientist Development Award, Doris Duke Foundation

C. Selected Publications (Selected from 57 publications)

1) **Pennathur S**, Ido Y, Heller J, Williamson J, Heinecke JW 'A Species Resembling Hydroxyl Radical Damages the Retina in Diabetes: Potential Role of a Carbonyl/Polyunsaturated Fatty Acid Pathway' **J Biol Chem**, 280(24):22706-14, 2005 PMID: 15855169.
2) Vaisar T***, Pennathur S****, Green P, et al "Shotgun Proteomics Implicates Protease Inhibition and Complement Activation in the Anti-inflammatory Properties of HDL" **Journal of Clinical Investigation** 117(3):746-756, 2007 PMCID: PMC1804352. * *Both authors contributed equally*
3) **Pennathur S**, Bergt C, Shao B, Byun J, Kassim SY Singh P, McDonald T, Brunzell J, Chait A, Oram J , O'Brien K, Geary RL, Heinecke JW 'Human Atherosclerotic Intima and Blood of Patients with Established Coronary Artery Disease Contain High Density Lipoprotein Damaged by Reactive Nitrogen Species " **Journal of Biological Chemistry** 279(41):42977-83, 2004
4) Bergt C*, **Pennathur S***, Fu X, Byun J, O'Brien K, McDonald TO, Singh P, Anantharamaiah GM, Chait A, Brunzell J, Geary RL, Oram JF, Heinecke JW. The myeloperoxidase product hypochlorous acid oxidizes HDL in the human artery wall and impairs ABCA1-dependent cholesterol transport. **Proc Natl Acad Sci U S A**. 2004 Aug 31;101(35):13032-7. PMCID: PMC516512. * *Both authors contributed equally*
5) Malhotra J, Miao H, Zhang K, Wolfson A, **Pennathur S**, Pipe S and Kaufman RJ "Antioxidants reduce endoplasmic reticulum stress and improve protein secretion" **Proc Natl Acad Sci U S A** 2008 105(47):18525-30 PMCID: PMC2587584
6) Feng S, Yang N, **Pennathur S**, Goodison S, **Lubman DM**. Enrichment of glycoproteins using nanoscale chelating concanavalin A monolithic capillary chromatography. **Anal Chem**. 2009 May 15;81(10):3776-83. PubMed PMID: 19366252; PubMed Central PMCID: PMC2759973.
7) Patwa TH, Wang Y, Miller FR, Goodison S, **Pennathur S**, Barder TJ, **Lubman DM**. A novel phosphoprotein analysis scheme for assessing changes in premalignant and malignant breast cell lines using 2D liquid separations, protein microarrays and tandem mass spectrometry. **Proteomics Clin Appl**. 2008;3(1):51-66. PubMed PMID:19194518; PubMed Central PMCID: PMC2633720.
8) Hecker L, Vittal R, Jones T, Jagirdar R, Luckhardt T, Horowitz J, **Pennathur S**, et al "NADPH Oxidase-4 Mediates Myofibroblast Activation and Fibrogenic Responses to Lung Injury**"** **Nature Medicine** 15(9):1077-81 2009 PMCID: PMC2743335
9) **Pennathur S**, Maitra D, Byun J, Sliskovic I, Abdulhamid I, Saed GM, Diamond MP, Abu-Soud HM. Potent antioxidative activity of lycopene: A potential role in scavenging hypochlorous acid. **Free Radic Biol Med**. 2010 Jul 15;49(2):205-13. Epub 2010 Apr 11. PubMed PMID: 20388538.
10) Sreekumar A, Poisson LM, Rajendiran T, Khan AP, Cao Q, Yu J, Laxman B, Mehra R, Lonigro RJ, Li Y, Nyati MK, Ahsan A, Kalyanasundaram S, Han B, Cao X, Byun J, Omenn G, Ghosh D, **Pennathur S**, et al "Metabolomic Profiles Delineate Potential Role for Sarcosine in Prostate Cancer Progression" **Nature** 457(7231):910-4, 2009 PMCID: PMC2724746
11)Wang JH, Byun J, **Pennathur S**. Analytical approaches to metabolomics and applications to systems biology. **Semin Nephrol**. 2010 Sep;30(5):500-11.PubMed PMID: 21044761; PubMed Central PMCID: PMC2989741.
12)Vivekanandan-Giri A, Byun J, **Pennathur S**. Quantitative analysis of amino Acid oxidation markers by tandem mass spectrometry. **Methods Enzymol**. 2011;491:73-89.PubMed PMID: 21329795.
13) Dai L, He J, Liu Y, Byun J, Vivekanandan A, **Pennathur S**, Fan X, Lubman DM."Dose-dependent proteomic analysis of glioblastoma cancer stem cells upon treatment with γ-secretase inhibitor. **Proteomics.** 2011 Dec;11(23):4529-40. doi0.1002/pmic.201000730. Epub 2011 Oct 24. PubMed PMID: 21932445.
14) Vivekanandan-Giri A, Slocum JL, Buller CL, Basrur V, Ju W, Pop-Busui R, Lubman DM, Kretzler M, **Pennathur S**. Urine glycoprotein profile reveals novel markers for chronic kidney disease. **Int J Proteomics**. 2011;2011:214715. Epub 2011 Oct 10.PubMed PMID: 22091387; PubMed Central PMCID: PMC3196258.
15) Abu-Soud HM, Maitra D, Byun J, Souza CE, Banerjee J, Saed GM, Diamond MP,Andreana PR, **Pennathur S**. The reaction of HOCl and cyanocobalamin: Corrin destruction and the liberation of cyanogen chloride. **Free Radic Biol Med**. 2011Nov 10. [Epub ahead of print] PubMed PMID: 22138102.

D. Research Support

Active:

R01HL094230 (Pennathur, PI) 08/07/2009-07/31/2013
NIH/NHLBI
Mass spectrometry based Biomarker Discovery
The major goals of this project are to identify oxidative biomarkers in IPF by a mass spectrometry based approach
Role: PI

R24DK082841
(Pennathur/Brosius/Kretzler/Feldman/Jagadish, MPI) NIH/NIDDK 04/01/2010-03/31/2015
Integrated Systems Biology Approach to Diabetic Microvascular Complications
The major goals of this proposal are utilize systems biology approaches to define critical pathogenic determinants of diabetic nephropathy and neuropathy.
Role: PI

DP3DK094292 (Pennathur/Brosius/Burant/Feldman/Gardner, MPI)
09/30/2011-08/31/2016
NIH/NIDDK
Tissue-Specific Metabolic Reprogramming in Diabetic Complications
The major goal of this project is to determine utilizing metabolomics and flux analysis to identify tissue specific responses in diabetic microvascular disease
Role: PI

American College of Rheumatology (Pennathur, PI) 07/01/2009-06/30/2012
Dysfunctional HDL, Rheumatoid arthritis and Cardiovascular Disease
The major goals of this project are to determine the role of dysfunctional HDL in CVD
Role: PI

R01DK079912 (Kretzler) 07/15/2008-06/30/2013
NIH/NIDDK
Molecular Predictors of Progressive Renal Failure in the Chronic Renal Insufficiency
The major goal of this project is to identify novel protein biomarkers in subjects with chronic renal insufficiency
Role: Co-I

R01DK055823 (Shayman, PI) 07/01/2009-04/30/2014
The Pharmacological Treatment of Fabry Disease
The major goals of this project are to understand the mechanisms of endothelial dysfunction in a mouse model of Fabry's disease
Role: Co-I

R01CA133458 (Sreekumar, PI) 04/04/2008-1/31/2013
Integrative Metabolomics of Prostate Cancer Progression
The major goals of this project are to perform mass spectrometry based metabolomics of prostate cancer and utilizing systems biology tools to integrate the data sets.
Role: Co-I

R01 HL102334 (Pop-Busui, PI) 05/01/2010-04/30/2015
Cardiac Autonomic Neuropathy and Myocardial Dysfunction in Type 1 Diabetes
The major goal of this project is to determine mechanisms of myocardial dysfunction in Type 1 diabetes utilizing myocardial imaging and plasma oxidation markers.
Role: Co-I

P30 DK089503 Nutrition and Obesity Research Center 07/01/2010-06/30/2015

NIDDK (Burant, PI; Pennathur, Core Director)
The Michigan Nutrition Obesity Research Center (MNORC) is an entity created to support, integrate and enhance research related to obesity and nutrition among the faculty at the University of Michigan.
Role: Core Director, Molecular Phenotyping and Metabolomics

Completed:
2-2003-149 (Pennathur, PI) 05/01/2003-04/30/2008
Juvenile Diabetes Research Foundation (JDRF) Career Development Award
Mechanisms of oxidative stress and vascular inflammation in Diabetes
The major goal of the project is to define the biochemical mechanisms of oxidative stress in animal models and humans with Type 1diabetes and cardiovascular disease.
Role: PI

5P60DK020572 12/1/2006-11/30/2007
NIH/NIDDK
Michigan Diabetes Research and Training Center Pilot and Feasibility Award (Pennathur, PI)
Molecular mechanisms of pancreatic β-cell failure in vivo
The major goal of this project is to determine mechanisms of oxidative stress in a rodent model of diabetes.
Role: PI

R21HL092237 and R21HL092237-02S109 (Pennathur, PI) NIH/NHLBI 8/15/2007-7/31/2010
Mass Spectrometry Based Platform for Oxidative Biomarker Discovery in Type 1 Diabetic Complications
The major goal of this project is to identify novel oxidative biomarkers in human diabetic neuropathy
Role: PI