BIOGRAPHICAL SKETCH

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NAME: Jill A. Macoska

eRA COMMONS USER NAME (credential, e.g., agency login): jcoska

POSITION TITLE: Distinguished University Professor of Science and Mathematics

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
Kent State University, Kent, OH	B.A.	05/78	Physical Anthropology
City University of New York, New York, NY	M. Phil.	05/86	Chemistry/Biochemistry
City University of New York, New York, NY	Ph.D.	05/88	Chemistry/Biochemistry
Harvard University, Cambridge, MA	Postdoctoral	05/88-10/89	Molecular Genetics
Michigan Cancer Foundation, Detroit, MI	Postdoctoral	10/89-06/91	Molecular Genetics

A. Personal Statement

Qualifications as Project 2 Principal Investigator

I have led peer-reviewed and funded research for the past 25 years focused on elucidating the molecular genetic alterations and dysfunctional inter- and intra-cellular signaling mechanisms that promote urinary tract (kidney, bladder, prostate) pathobiology. In particular, the Macoska laboratory established the concept of peri-urethral fibrosis as a previously unrecognized pathobiology promoting male lower urinary dysfunction (LUTD). Research in the Macoska laboratory is currently focused on: 1) Defining the mechanisms through which dysfunctional interactions between cell types within the tissue microenvironment develop, and how these dysfunctional interactions contribute to pathobiology; 2) Elucidating the intracellular mechanisms through which inflammatory cytokines secreted by aging stromal fibroblasts and inflammatory cells stimulate cellular proliferation and myofibroblast phenoconversion; and mechanistically delineating how these pathobiologies, particularly tissue fibrosis, promote lower urinary tract dysfunction and malignancy; 3) Understanding how the intersection of lifestyle and genetic predisposition contributes to health disparities in diverse populations, and 4) Translating laboratory-based knowledge to the development of clinically efficacious biomarkers and therapeutics.

I have held several leadership positions throughout my career. During my previous tenure at the University of Michigan, I co-directed an NIH/NIDDK T32 Training Program; was Associate Director of the NIH/NCI-supported University of Michigan Comprehensive Cancer Center Prostate Oncology Program; served as Associate Graduate Program Director of the Cellular and Molecular Biology graduate program; directed an NIH/NIDDK-supported Planning Center for Interdisciplinary Research in Benign Urology (P20 DK090870), and served as Associate Chair for Research in the Department of Urology. I am currently the Alton J. Brann Endowed Chair and Distinguished University Professor of Science and Mathematics at the University of Massachusetts Boston. I am the Co-PI of the University of Massachusetts, Boston - Dana-Farber/Harvard Cancer Center U54 Comprehensive Partnership for Cancer Disparities Research, and am the Director of the newly established Center for Personalized Cancer Therapy, At the national level I have served as the Secretary, Vice-President, and President of the Society for Basic Urologic Research (SBUR), and continue to be active in SBUR and the American Urological Association (AUA). I actively participate in peer review through service on NIH review panels and through manuscript reviews for several journals.

Relevant to this F32 application, my work is focused on defining how the functions of inflammation-associated proteins, particularly chemokines and interleukins, are coupled to pathological collagen accumulation, fibrosis, and urinary voiding dysfunction in the male lower urinary tract. This work is highly interdisciplinary and collaborative, and has led to multiple avenues of innovative research that have identified the molecular and cellular biological mechanisms driving prostatic fibrosis, and investigated the relationship of hormonal, developmental, metabolic, and inflammatory processes in the development of fibrosis associated with lower urinary tract dysfunction using functional urological testing.

Positions and Honors

Professional Experience

1991-00	Research Associate, Lecturer, Assistant Professor, The University of Michigan, Department of Surgery, Section of Urology
1996-01	Associate Editor, Basic Science Section, Urology
2000-10	Director, University of Michigan Comprehensive Cancer Center Affymetrix and cDNA Microarray Facility
2000-02	Member, Executive Committee, Society for Basic Urologic Research
2000-02	Member, NIH Small Business Innovation Research (SBIR) in Genetic Sciences Study Section
2001-12	Faculty Member, Program in Bioinformatics (now the Center for Computational Medicine and Bioinformatics).
2001-10	Associate Professor w/tenure, The University of Michigan, Department of Urology
2002-06	Associate Director, Prostate/Urologic Oncology Program, University of Michigan Comprehensive Cancer Center
2003-08	Associate Chair for Laboratory Research, Department of Urology, University of Michigan
2004-08	Charter Member, NIH Cancer Genetics Study Section
2004-12	Faculty Member and Associate Graduate Program Director, Cell and Molecular Biology Graduate Program, The University of Michigan
2007	Participant, NIDDK Prostate Basic and Clinical Research Strategic Planning Meeting
2007-10	Director, University of Michigan Urology Research Training Program
2008-10	Chief, Division of Laboratory Research, Department of Urology, University of Michigan
2010-12	Charter Faculty Member, Cancer Biology Graduate Program, The University of Michigan
2010-12	Professor w/tenure, The University of Michigan, Department of Urology
2010-13	Secretary, the Society for Basic Urologic Research
2012-Present	Associate Editor, *The Prostate*
2013-Present	Alton J. Brann Endowed Chair and Distinguished University Professor of Science and Mathematics, University of Massachusetts Boston
2013-Present	Director, Center for Personalized Cancer Therapy, University of Massachusetts Boston
2013-Present	Presidential Scholar, the Dana-Farber/Harvard Cancer Center
2013-14	Vice-President, the Society for Basic Urologic Research
2014-15	President, the Society for Basic Urologic Research
2016-Present	Chair, University of Massachusetts Boston Institutional Animal Care and Use Committee

Honors

1974	Salutatorian, St. Joseph Academy High School
1978	Magna Cum Laude
1979	Phi Beta Kappa
1985	Beatrice Goldstein Konheim Graduate Scholarship in the Life Sciences, City University of New York
1991-93	Ph.D. Scholar, American Foundation for Urologic Disease (AFUD)
1995-96	New Investigator Research Award American Foundation for Urologic Disease/Searle
1996-97	Society for Basic Urologic Research/Merck Young Investigator Award
2012	Society for Women In Urology/ Society for Basic Urologic Research Award for Excellence in Urologic Research
2015	2015 "Woman to Watch", Boston Business Journal

Recent Experience in Conference Planning and Organization

2011	Chair, Organizing Committee, American Association for Urologic Research (AUA) Summer Research Conference, July 16-17, Linthicum, MD (NB: proceedings from this conference were published in Griebling, T. Geriatric Urology. Springer, New York 2013).
2012, 2013	Member, Organizing Committee, AUA New Investigator's Workshop, Nov. 1-3, Linthicum, MD.
2012	Chair, Organizing Committee, Society for Basic Urologic Research (SBUR) Fall Symposium, Nov. 15-18, Sunny Isles Beach, FL (NB: Dr. Macoska was the PI of an R13 award for this Conference, NIH/NIDDK R13 DK097916).
2013	Chair, Organizing Committee, AUA Basic Science Symposium, May 4, San Diego, CA.
2014	Co-Chair, Organizing Committee, Joint Society of Urologic Oncology/SBUR Spring Meeting,

May 17, Orlando, FL.

2014 Chair, Organizing Committee, SBUR Spring Meeting, May 17, Orlando, FL.

2016 Chair, Organizing Committee, Basic Science Symposium, AUA Annual Meeting, May 6, San Diego, CA (NB: Proceedings from this meeting were published as a special issue of the Annals of Translational Medicine, January 2017).

C. Contribution to Science

1. In an effort to understand and potentially identify therapeutic targets for prostatic enlargement consequent to aging, our group examined whether aging-associated changes in the stromal cellular components of the prostate gland might disrupt tissue homeostasis and promote proliferation of prostatic epithelium. Work from my group showed that primary stromal fibroblasts from the prostates of older men exhibited transcriptional up-regulation and secretion of inflammatory proteins, including several interleukins and CXC-type chemokines, compared to those from younger men. Interleukins and CXC-type chemokines serve as cytokines to promote the proliferation of prostatic epithelium. This novel finding, that the aging prostate gland microenvironment was highly inflammatory, formed the basis for subsequent work by my group and others aimed at understanding the etiology of human benign prostatic hyperplasia (BPH).

   a) Begley L, Monteleon C, Shah RB, Macdonald JW, **Macoska JA**. CXCL12 overexpression and secretion by aging fibroblasts enhance human prostate epithelial proliferation in vitro. Aging Cell. 2005 Dec;4(6):291-8. PubMed PMID: 1630048
   b) Begley LA, MacDonald JW, Day ML, **Macoska JA**. CXCL12 activates a robust transcriptional response in human prostate epithelial cells. J Biol Chem. 2007 Sep 14;282(37):26767-74. Epub 2007 Jul 12. PubMed PMID: 17631494.
   c) Begley LA, Kasina S, MacDonald J, **Macoska JA**. The inflammatory microenvironment of the aging prostate facilitates cellular proliferation and hypertrophy. Cytokine. 2008 Aug;43(2):194-9. doi: 10.1016/j.cyto.2008.05.012. Epub 2008 Jun 24. PubMed PMID: 18572414; PubMed Central PMCID: PMC2538565.
   d) McDowell KL, Begley LA, Mor-Vaknin N, Markovitz DM, **Macoska JA**. Leukocytic promotion of prostate cellular proliferation. Prostate. 2010 Mar 1;70(4):377-89. doi: 10.1002/pros.21071. PubMed PMID: 19866464; PubMed Central PMCID: PMC3167472.

2. The finding that the prostates of aging men exhibited an inflammatory phenotype led my group to hypothesize that fibrosis, which occurs consequent to inflammation, might comprise a previously unrecognized pathobiology contributing to lower urinary dysfunction (LUTD). We first showed that peri-urethral tissues from men with LUTD, as measured by elevated American Urological Association Symptom Index (AUASI) scores, demonstrated significantly higher levels of collagen content and tissue stiffness indicative of fibrosis than tissues from men with low AUASI scores. Peri-urethral fibrosis associated with urinary voiding dysfunction was also observed following exposure to a high fat diet and concomitant development of type 2 diabetes. Subsequent studies revealed that the same CXC-type chemokines secreted by the aging prostate microenvironment promoted collagen secretion, fibroblast to myofibroblast Phenoconversion, and acquisition of a fibrotic phenotype in the prostate. Further work is focused on the molecular mechanisms utilized the CXCL12/CXCR4 axis to accomplish myofibroblast phenoconversion and the development of diagnostic biomarkers for fibrosis and anti-fibrotic therapeutics.

   a) Ma J, Gharaee-Kermani M, Kunju L, Hollingsworth JM, Adler J, Arruda EM, **Macoska JA**. Prostatic fibrosis is associated with lower urinary tract symptoms. J Urol. 2012 Oct;188(4):1375-81. doi: 10.1016/j.juro.2012.06.007. Epub 2012 Aug 17. PubMed PMID: 22906651; PubMed Central PMCID: PMC3485634.
   b) Gharaee-Kermani M, Kasina S, Moore BB, Thomas D, Mehra R, **Macoska JA**. CXC-type chemokines promote myofibroblast phenoconversion and prostatic fibrosis. PLoS One. 2012;7(11):e49278. doi: 10.1371/journal.pone.0049278. Epub 2012 Nov 16. PubMed PMID: 23173053; PubMed Central PMCID: PMC3500280.
   c) Rodríguez-Nieves JA, Patalano SC, Almanza D, Gharaee-Kermani M, **Macoska JA**. CXCL12/CXCR4 Axis Activation Mediates Prostate Myofibroblast Phenoconversion through Non-Canonical EGFR/MEK/ERK Signaling. PLoS One. 2016 Jul 19;11(7):e0159490. doi: 10.1371 /

journal.pone.0159490. eCollection 2016. PubMed PMID: 27434301; PubMed Central PMCID: PMC4951124.

d) Patalano-Salsman S, Rodriguez-Nieves J, Colaneri C, Cotellessa J, Almanza D, Zhilin-Roth A, Riley T, **Macoska J**. CXCL12/CXCR4-Mediated Procollagen Secretion Is Coupled To Cullin-RING Ubiquitin Ligase Activation. Sci Rep. 2018 Feb 22;8(1):3499. doi: 10.1038/s41598-018-21506-7 PMID: 29472636.

3. As a Project PI in the University of Wisconsin Madison/University of Massachusetts George M. O'Brien Center for Benign Urology Research I have published several studies in collaboration with Center project and Core PIs (denoted by **) to elucidate pathobiologies contributing to male lower urinary tract dysfunction.

a) **Macoska JA**, Wang Z-Y, Virta J, Zacharias N, **Bjorling DE. Inhibition of the CXCL12/CXCR4 Axis Prevents Urethral Collagen Accumulation and Lower Urinary Tract Dysfunction In Vivo. Prostate. 2019 Feb 27. doi: 10.1002/pros.23781. [Epub ahead of print] PubMed PMID: 30811623.

b) Wegner KA, Abler LL, Oakes SR, Mehta GS, Ritter KE, Hill WG, Zwaans BM, Lamb LE, Wang Z, **Bjorling DE, **Ricke WA, ***Macoska J**, **Marker PC, Southard-Smith EM, Eliceiri KW, **Vezina CM. Void spot assay procedural optimization and software for rapid and objective quantification of rodent voiding function, including overlapping urine spots. Am J Physiol Renal Physiol. 2018 Oct 1;315(4):F1067-F1080. doi: 10.1152/ajprenal.00245.2018. Epub 2018 Jul 4. PubMed PMID: 29972322; PubMed Central PMCID: PMC6230749.

c) Hao L, Greer T, Page D, Shi Y, **Vezina CM, ****Macoska JA**, **Marker PC, **Bjorling DE, Bushman W, **Ricke WA, Li L. In-Depth Characterization and Validation of Human Urine Metabolomes Reveal Novel Metabolic Signatures of Lower Urinary Tract Symptoms. Sci Rep. 2016 Aug 9;6:30869. doi: 10.1038/srep30869. PubMed PMID: 27502322; PubMed Central PMCID: PMC4977550.

d) Gharaee-Kermani M, Rodriguez-Nieves JA, Mehra R, **Vezina CA, Sarma AV, ****Macoska JA**. Obesity-induced diabetes and lower urinary tract fibrosis promote urinary voiding dysfunction in a mouse model. Prostate. 2013 Jul;73(10):1123-33. doi: 10.1002/pros.22662. Epub 2013 Mar 26. PubMed PMID: 23532836; PubMed Central PMCID: PMC5512573.

4. My group has pursued several studies to identify and validate biomarkers diagnostic for cancer and prognostic for tumor recurrence and metastasis, including the identification of AR variants associated with castration resistance in prostate cancer; serum cytokine and chemokine markers for prostate cancer diagnosis and prognosis, and protein biomarkers diagnostic for prostate and renal cancers.

a) Han D, Gao S, Valencia K, Owiredu J, Han W, de Waal E, **Macoska JA**, Cai C. A novel nonsense mutation in androgen receptor confers resistance to CYP17 inhibitor treatment in prostate cancer. Oncotarget. 2017 Jan 24;8(4):6796-6808. doi: 10.18632/oncotarget.14296. PubMed PMID: 28036278; PubMed Central PMCID: PMC5351670.

b) Agarwal M, He C, Siddiqui J, Wei JT, **Macoska JA**. CCL11 (eotaxin-1): a new diagnostic serum marker for prostate cancer. Prostate. 2013 May;73(6):573-81. doi: 10.1002/pros.22597. Epub 2012 Oct 11. PubMed PMID: 23059958; PubMed Central PMCID: PMC3594486.

c) **Macoska JA**, Begley LA, Dunn RL, Siddiqui J, Wei JT, Sarma AV. Pilot and feasibility study of serum chemokines as markers to distinguish prostatic disease in men with low total serum PSA. Prostate. 2008 Mar 1;68(4):442-52. doi: 10.1002/pros.20717. PubMed PMID: 18196514.

d) Donald CD, Sun CQ, Lim SD, **Macoska J**, Cohen C, Amin MB, Young AN, Ganz TA, Marshall FF, Petros JA. Cancer-specific loss of beta-defensin 1 in renal and prostatic carcinomas. Lab Invest. 2003 Apr;83(4):501-5. PubMed PMID: 12695553.

Complete List of Published Work in NCBI MyBibliography:
https://www.ncbi.nlm.nih.gov/sites/myncbi/jill.macoska.1/bibliography/40442183/public/?sort=date&direction=ascending

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

U54DK104310 (PI: Ricke) 09/24/14-07/31/19
NIH/NIDDK
George M. O'Brien Urology Cooperative Research Centers Program: Mediators of fibrosis in the development of lower urinary tract dysfunction. The goal of this is to determine the role of hormones and other mediators of fibrosis in the development of BPH/LUTS.
Project 3: CXCL12/CXCR4 Axis Activation in Lower Urinary Tract Fibrosis and Dysfunction
This project will test the hypothesis that activation of the CXCL12/CXCR4 axis in the prostate promotes myofibroblast phenoconversion and tissue fibrosis through non-canonical mechanisms coupled to EGFR transactivation and MEK/ERK signaling.
Role: Project Principal Investigator

U54CA156734 (PIs: Colon-Carmona/Macoska) 09/01/16-08/31/21
NIH/NCI
Administrative Core; Planning and Evaluation Core; Shared Resources Core
(1/2) The University of Massachusetts, Boston - Dana-Farber/Harvard Cancer Center U54 Comprehensive Partnership for Cancer Disparities Research
The University of Massachusetts, Boston (UMass Boston) and Dana-Farber/Harvard Cancer Center (DF/HCC) Partnership is committed to further developing a shared rigorous and collaborative transdisciplinary cancer and disparities-related research program that spans the spectrum of “Cells to Society.” Sophisticated research projects are proposed across several areas of basic biomedical, behavioral and social sciences that will employ evidence and methods to converge upon and impact cancer health disparities at multiple levels of analysis. These projects, together with state-of-the-art Outreach and Research Education Cores and creative Research Design and Analysis and Genomics Shared Resource Cores, will serve to build research capacity and infrastructure at UMass Boston
Role: Principal Investigator

U54CA156734 (PI: Macoska) 05/01/18-08/31/19
NIH/NCI
Pilot Project: Validation of Urinary RNA Biomarkers Predictive for RCC Diagnosis
The objective of the proposed studies is to test the predictive power of a unique 15-Transcript Urinary Signature in urine collected pre-nephrectomy to diagnose RCC. The overall goal of this study is to determine whether this urinary RNA molecular signature is sufficiently specific and sensitive to be further developed as a test with clinical utility for RCC diagnosis and early detection, especially among potentially high risk populations (e.g., African Americans). The significance of this study is that it will develop test is to identify patients harboring renal malignancies that could benefit from closer surveillance, surgery, and/or adjuvant therapy to improve cancer-specific survival.
Role: Pilot Project Principal Investigator

R01DK077195-06 (PI: Adam) 08/07/15-04/30/19
NIH/NIDDK
Mechanotransduction in Bladder Smooth Muscle
The major goals of this project are to determine how the Akt serine-theonine kinase and the transcriptional complex AP-1 interact to regulate bladder smooth muscle growth in response to mechanical signals.
Role: Co-Investigator

Completed Research Support

Massachusetts Life Sciences Center (PI: Grosovsky) 07/01/13-06/30/18
Center for Personalized Cancer Therapy
The Mission of the Center is to: Build capacity and research infrastructure for use by students and faculty as well as small/startup biotechs; function as an academic/industry hybrid to develop oncology-related therapeutics and biomarkers with significant clinical utility, and Contribute to workforce development in the Commonwealth to increase diversity in the local Life Sciences Cluster and increase the competitiveness of University of Massachusetts Boston students so they will become the future leaders of life sciences research in academia and industry.
Role: Project Principal Investigator