BIOGRAPHICAL SKETCH

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NAME: Vezina, Chad

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

POSITION TITLE: Tenured Associate Professor

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)	END DATE MM/YYYY	FIELD OF STUDY
St. Olaf College, Northfield, MN	BA	06/1998	Chemistry, Biology
University at Buffalo, Buffalo, NY	PHD	08/2003	Pharmacology and Toxicology
University of Wisconsin-Madison, Madison, WI	Postdoctoral Fellow	01/2009	Developmental Toxicology

A. Personal Statement

I am an Associate Professor of Comparative Biosciences at the University of Wisconsin-Madison School of Veterinary Medicine and Associate Director of the University of Wisconsin-Madison George M. O'Brien Center for Benign Urology Research. I received a B.A. degree in Chemistry & Biology from St. Olaf College and a Ph.D. in Pharmacology & Toxicology from the University at Buffalo. I completed post-doctoral studies at the University of Wisconsin-Madison where I investigated how environmental chemicals impact prostate development and function. My current research examines how the urinary tract develops and the mechanisms responsible for prostate-related urinary dysfunction in men. I am actively involved in building new research model systems and tools for microscopic image analysis and urodynamic testing in rodent models. I have dedicated substantial effort to resolving the landscape of the prostate through molecular mapping studies as part of the NIH-sponsored GenitoUrinary Development Molecular Anatomy Project (GUDMAP). I am also embedded in the urologic and toxicologic research fields, with roles as president of the Midwest Regional chapter of the Society of Toxicology and planning committee member for meetings of the Society of Toxicology, American Urological Society, and Society of Basic Urologic research.

B. Positions and Honors

Positions and Employment

1998 - 1998	Intern, Veterinary Diagnostic Lab, University of Minnesota, St. Paul, MN
1998 - 1998	Intern, Ecolab Department Of Research and Development, Mendota Heights, MN
1998 - 2003	Research Assistant, University at Buffalo, Buffalo, NY
2003 - 2005	Research Associate, University of Wisconsin-Madison, Madison, WI
2006 - 2009	Postdoctoral Research Fellow, University of Wisconsin-Madison, Madison, WI
2009 - 2015	Assistant Professor, University of Wisconsin-Madison, Madison, WI
2015 -	Tenured Associate Professor, University of Wisconsin Madison, Madison, WI
2015 -	Affiliate Associate Professor of Pharmaceutical Sciences, University of Wisconsin-Madison, Madison, WI
2015 -	Adjunct Associate Professor of Urology, University of Wisconsin-Madison, Madison, WI
2017 - 2019	Associate Director, Molecular and Environmental Toxicology Graduate Program, Madison , WI
2019 -	Director, Molecular and Environmental Toxicology Program, Madison, WI

Other Experience and Professional Memberships

1999 -	Member, Society of Toxicology
2011 -	Member, Society for Basic Urologic Research
2012 - 2012	Grant Reviewer, Medical Research Council (MRC) Molecular & Cellular Medicine Board, Swindon UK

2013 -	Editorial Board Member, American Journal of Clinical and Experimental Urology
2014 -	Grant Reviewer, NIH/NIDDK Special Emphasis Review Panel ZDK1 GRB-S (M1)
2014 -	Editorial Board Member, American Journal of Physiology – Renal Physiology
2014 - 2014	Grant Reviewer, NIH/NIDDK Special Emphasis Review Panel ZRG1 DKUS-P (80) S
2014 - 2014	Grant Reviewer (ad hoc), NIH/NIDDK Review Panel UGPP
2015 -	Grant Reviewer (ad hoc), Veterans Administration SURG1 Review Panel
2015 -	Grant Reviewer, NIH/NIDDK Special Emphasis Review Panel ZDK1 GRB-S (O4)
2016 -	Member, American Physiological Society
2016 - 2016	Program Committee Member, American Urological Association (AUA) Summer Research Conference "Targeting Epigenetics and Genome Regulation to Improve Urologic Health
2017 - 2017	Invited Subject Matter Expert, Creation of an online training module for NIH K-series career development awards for the American Urological Association (AUA)
2019	President, Midwest Regional Chapter of the Society of Toxicology
2019 - 2022	Chair, NIH/NIDDK DDK-D Study Section (Standing Member since 2016)

Honors

2002	Society of Toxicology Colgate Palmolive Award for In Vitro Toxicology, Society of Toxicology
2008	Manuscript “Dioxin causes ventral prostate agenesis by disrupting dorsoventral patterning in developing mouse prostate” selected as finalist Best Reproductive/Developmental Toxicology Paper in Toxicological Sciences, Society of Toxicology
2012	Young Investigator (of the year) Award, Young Investigator Award, Society for Basic Urologic Research (SBUR)
2019	Vilas Mid-Career Award, University of Wisconsin-Madison

C. Contribution to Science

1. An incomplete map of the developing prostate made it impossible to determine critical cell-cell signaling events involved in its development. My laboratory used mRNA expression as a means to improve the map’s resolution. We developed a high-throughput method for visualizing and characterizing prostate cell- and developmental stage-specific expression patterns for over 100 unique mRNAs. We defined new prostate cell populations based on mRNA expression signatures and built a single-cell resolution atlas of mouse prostate and adjacent tissues. We also developed an immunohistochemical identification key for in situ detection of seven nerve, seven stromal, three epithelial, and three fibrovascular cell types in adult mouse prostatic and urethral tissue sections and established a new method to map prostatic collagens. Most recently, we contributed to a single cell map of human prostate and adapted a new publication strategy that avails all raw data in a public forum through a digital object identifier–based data library in the GUDMAP database.

    a. Henry GH, Malewska A, Joseph DB, Malladi VS, Lee J, Torrealba J, Mauck RJ, Gahan JC, Raj GV, Roehrborn CG, Hon GC, MacConmara MP, Reese JC, Hutchinson RC, Vezina CM, Strand DW. A Cellular Anatomy of the Normal Adult Human Prostate and Prostatic Urethra. Cell Rep. 2018 Dec 18;25(12):3530-3542.e5. PubMed PMID: 30566875; PubMed Central PMCID: PMC6411034.

    b. Wegner KA, Cadena MT, Trevena R, Turco AE, Gottschalk A, Halberg RB, Guo J, McMahon JA, McMahon AP, Vezina CM. An immunohistochemical identification key for cell types in adult mouse prostatic and urethral tissue sections. PLoS One. 2017;12(11):e0188413. PubMed PMID: 29145476; PubMed Central PMCID: PMC5690684.

    c. Georgas KM, Armstrong J, Keast JR, Larkins CE, McHugh KM, Southard-Smith EM, Cohn MJ, Batourina E, Dan H, Schneider K, Buehler DP, Wiese CB, Brennan J, Davies JA, Harding SD, Baldock RA, Little MH, Vezina CM, Mendelsohn C. An illustrated anatomical ontology of the developing mouse lower urogenital tract. Development. 2015 May 15;142(10):1893-908. PubMed PMID: 25968320; PubMed Central PMCID: PMC4440924.

    d. Abler LL, Keil KP, Mehta V, Joshi PS, Schmitz CT, Vezina CM. A high-resolution molecular atlas of the fetal mouse lower urogenital tract. Dev Dyn. 2011 Oct;240(10):2364-77. PubMed PMID: 21905163; PubMed Central PMCID: PMC3583531.

2. My group identified beta-catenin as a mediator of androgen action. We showed that androgens activate beta-catenin in developing prostate, that beta-catenin dependent transcripts are among the first to mark nascent prostatic ducts, and that the beta-catenin responsive gene, Wnt Inhibitory factor 1, is induced by androgens. We demonstrated that beta-catenin functions by an activation-inhibition model to pattern prostate development. In other words, beta-catenin is activated in a small population of cells to initiate prostatic duct formation, while producing diffusible factors that inhibit duct formation nearby, yielding periodically spaced ducts. These results shed new light on orchestration of positive and negative paracrine signals in developing prostate. We also determined that beta-catenin is upregulated in human BPH specimens, indicating a potential reawakening of this prostate developmental signaling pathway.

    a. Bauman TM, Vezina CM, Huang W, Marker PC, Peterson RE, Ricke WA. Beta-catenin is elevated in human benign prostatic hyperplasia specimens compared to histologically normal prostate tissue. Am J Clin Exp Urol. 2014;2(4):313-22. PubMed PMID: 25606577; PubMed Central PMCID: PMC4297327.
    b. Mehta V, Schmitz CT, Keil KP, Joshi PS, Abler LL, Lin TM, Taketo MM, Sun X, Vezina CM. Beta-catenin (CTNNB1) induces Bmp expression in urogenital sinus epithelium and participates in prostatic bud initiation and patterning. Dev Biol. 2013 Apr 15;376(2):125-35. PubMed PMID: 23396188; PubMed Central PMCID: PMC3602957.
    c. Keil KP, Mehta V, Branam AM, Abler LL, Buresh-Stiemke RA, Joshi PS, Schmitz CT, Marker PC, Vezina CM. Wnt inhibitory factor 1 (Wif1) is regulated by androgens and enhances androgen-dependent prostate development. Endocrinology. 2012 Dec;153(12):6091-103. PubMed PMID: 23087175; PubMed Central PMCID: PMC3512059.

3. My laboratory was the first to establish key regulatory mechanisms of DNA methylation in prostate proliferative growth. We mapped expression of DNA methylation modifying genes during mouse prostatic development and found they change in pattern as development proceeds. We found that the function of DNA methylation also changes as prostate development proceeds. In early development, DNA methylation of the androgen receptor protects against precocious development by restricting male hormone action. Later in development, DNA methylation of e-cadherin represses cell adhesion to permit ductal elongation into surrounding tissue. We also demonstrated that folic acid, a dietary methyl donor, improves urinary function in a mouse model of bladder outlet obstruction.

    a. Joseph DB, Chandrashekar AS, Abler LL, Chu LF, Thomson JA, Mendelsohn C, Vezina CM. In vivo replacement of damaged bladder urothelium by Wolffian duct epithelial cells. Proc Natl Acad Sci U S A. 2018 Aug 14;115(33):8394-8399. PubMed PMID: 30061411; PubMed Central PMCID: PMC6099915.
    b. Keil KP, Abler LL, Altmann HM, Wang Z, Wang P, Ricke WA, Bjorling DE, Vezina CM. Impact of a folic acid-enriched diet on urinary tract function in mice treated with testosterone and estradiol. Am J Physiol Renal Physiol. 2015 Jun 15;308(12):F1431-43. PubMed PMID: 25855514; PubMed Central PMCID: PMC4469891.
    c. Keil KP, Abler LL, Laporta J, Altmann HM, Yang B, Jarrard DF, Hernandez LL, Vezina CM. Androgen receptor DNA methylation regulates the timing and androgen sensitivity of mouse prostate ductal development. Dev Biol. 2014 Dec 15;396(2):237-45. PubMed PMID: 25446526; PubMed Central PMCID: PMC4261055.
    d. Keil KP, Abler LL, Mehta V, Altmann HM, Laporta J, Plisch EH, Suresh M, Hernandez LL, Vezina CM. DNA methylation of E-cadherin is a priming mechanism for prostate development. Dev Biol. 2014 Mar 15;387(2):142-53. PubMed PMID: 24503032; PubMed Central PMCID: PMC3976955.

4. My group with collaborators to standardize methods for non-invasive testing of mouse urinary function, with an ultimate goal of removing barriers for entry into urologic research space. We focused on the void spot assay because it is non-invasive and does not require expensive laboratory equipment, making it widely accessible. We optimized assay parameters and examined influence of over ten different confounding variables to enhance rigor and reproducibility. We also created software and distributed it in a public website where it can be downloaded free of charge.

    a. Hill WG, Zeidel ML, Bjorling DE, Vezina CM. Void spot assay: recommendations on the use of a simple micturition assay for mice. Am J Physiol Renal Physiol. 2018 Nov 1;315(5):F1422-F1429. PubMed PMID: 30156116; PubMed Central PMCID: PMC6293303.

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. PubMed PMID: 29972322; PubMed Central PMCID: PMC6230749.

c. Keil KP, Abler LL, Altmann HM, Bushman W, Marker PC, Li L, Ricke WA, Bjorling DE, Vezina CM. Influence of animal husbandry practices on void spot assay outcomes in C57BL/6J male mice. Neurourol Urodyn. 2016 Feb;35(2):192-8. PubMed PMID: 25394276; PubMed Central PMCID: PMC4428995.

d. Bjorling DE, Wang Z, Vezina CM, Ricke WA, Keil KP, Yu W, Guo L, Zeidel ML, Hill WG. Evaluation of voiding assays in mice: impact of genetic strains and sex. Am J Physiol Renal Physiol. 2015 Jun 15;308(12):F1369-78. PubMed PMID: 25904700; PubMed Central PMCID: PMC4469884.

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

Ongoing Research Support

R01ES001332, National Institute of Environmental Health Sciences
Chad Vezina and Richard Peterson (MPI)
06/01/78-07/31/22
Reproductive and Developmental Toxicity of Dioxin
Role: MPI

U01DK110807, National Institute of Diabetes and Digestive and Kidney Diseases
Chad Vezina (PI)
09/15/16-05/31/21
Molecular and fate maps of prostatic stroma
Role: PI

U54DK104310, National Institute of Diabetes and Digestive and Kidney Diseases
Ricke, William (PI)
09/24/14-7/31/2024
CTGF drives voiding dysfunction through expression of collagen in periurethral SRD5A2+ fibroblasts.
Role: Associate Director and Project Director

R01CA204320, National Cancer Institute
James Shull (PI)
03/01/17-02/28/22
Characterization of Emca4, the Rat Ortholog of the 8q24 Breast Cancer Risk Locus
Role: Co-I

T32ES007015, National Institute of Environmental Health Sciences
Christopher Bradfield (PI)
07/01/75-06/30/23
Molecular & Environmental Toxicology Pre-& Postdoctoral Training Program
Role: Co-I (Associate Director)

F30DK122686, National Institute of Diabetes and Digestive and Kidney Diseases
Hannah Ruetten (PI)
09/01/19-06/01/23
Prostate inflammation increases collagen and voiding dysfunction

Role: Pre-doctoral Mentor

R01HD094759, National Institute of Child Health and Human Development
Laura Hernandez (PI)
07/20/18-04/30/23
Influence of SSRI Use During Pregnancy and Lactation on Maternal Bone Health
Role: Co-I

R01DK118145, National Institute of Diabetes and Digestive and Kidney Diseases
Dale Bjorling (PI)
08/05/19-04/30/23
Regulation of Bladder Structure and Function by Micro-RNA29
Role: Co-I

F31ES028594, National Institute of Environmental Health Sciences
Kyle Wegner (PI)
05/01/18-04/30/20
TCDD Reprograms Prostate Stroma and Causes Fibrosis to Induce Urinary Dysfunction
Role: Co-I

Completed Research Support

R01 DK099328-01A1, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)
VEZINA, CHAD M. (PI)
07/15/14-06/30/19
Role of DNA methylation in prostate glandular development and urinary function
Role: PI