



# ZACH BUSH MD

Architect for a Healthy Future

- ▶ In his academic leadership and teaching he is often introduced as a triple board-certified physician and biomedical researcher. While this is accurate, his life purpose has a much broader mission.
- ▶ Zach describes himself as an Architect for a Healthy Future.
- ▶ His passion is to co-create a healthy future with each of his patients, colleagues, musicians, fellow lifelong learners, global citizens, and mission-minded humanitarians.
- ▶ Zach believes that for humanity to survive the next 50 years, we are going to have to collectively raise our consciousness.
- ▶ With his companies, research, and relationships, Zach is creating ways for humanity to come together with nature to solve the biggest threats to human kind and our planet.

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## Curriculum Vitae

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# Curriculum Vitae

## ZACH BUSH MD

### Education

INSTITUTION	DEGREE <i>(if applicable)</i>	YEAR(S)	FIELD OF STUDY
University of Colorado	Baccalaureate	May, 1997	Spanish
University of Colorado Health Sciences Center	M.D.	May, 20012	Medicine
University of Virginia Health System	Residency	2002-2005	Internal Medicine
University of Virginia Health System	Fellowship	2006-2009	Endocrinology and Metabolism
Hospice of the Piedmont	Internship	2010-2014	Hospice / Palliative Care

## Professional Positions

ACTIVITY / OCCUPATION	BEGINNING DATE	ENDING DATE	FIELD	INSTITUTION / COMPANY	SUPERVISOR / EMPLOYER
Resident Physician	June 2002	May 2005	Internal Medicine	University of Virginia	Department of Medicine
Chief Resident	May 2005	June 2006	Internal Medicine	University of Virginia	Department of Medicine
Clinical Instructor	January 2006	June 2006	Internal Medicine	University of Virginia	Department of Medicine
Endocrinology & Metabolism Fellowship	July 2006	June 2009	Internal Medicine	University of Virginia	Department of Medicine
Clinical Instructor	July 2009	July 2010	Medicine - Endocrinology	University of Virginia	Department of Medicine
Director of Clinical Affairs	July 2010	Present	Medicine - Endocrinology	Revolution Health Center	Owner
Associate Medical Director	December 2010	December 2014	Hospice Palliative Care	Hospice of the Piedmont	Hospice of the Piedmont
Co-Founder, CEO	October 2013	Present	Medicine - Endocrinology	Biomic Sciences, LLC 844.432.5488	Owner
Founder, CEO	July 2010	Present	Medicine - Endocrinology	Seraphic Group, Corp.	Owner

## Honors/Awards

### **Career**

Physician leader, US Navy Ship Comfort, Haiti Relief Operation.  
Director of pre- and post-surgical care, Adult Wards.  
February, 2010. Port-au-Prince, Haiti

### **Fellowship**

UVA novel translational research award: CTSA Pilot Study award for my proof-of-concept clinical trial: Preoperative Bexarotene treatment for Cushing's disease. One faculty awardee each year. \$25,000. March, 2009

Endocrine Society: Winner ENDO 08 Trainee Poster Competition; Pituitary Diagnostics and Disease Management Section  
Immunohistochemistry of COUP-TFI: an Adjuvant Diagnostic Tool for the Identification of Corticotroph Microadenomas. San Francisco, CA. June, 2008

Invited lecturer, Medicine Grand Rounds, UVA. November 4, 2008. "Glycemic Control in DM2, How Low Should You Go? DISCORD over ADVANCE and ACCORD." An invitation typically reserved for UVA and visiting faculty

ACP Leadership: Associate Physician Delegate, 5th Congressional District, Virginia. Represented 5th district on Capitol Hill, May, 2008 and May, 2009

House staff appointee, GME Certificate Program steering committee

### **Chief Residency**

House Staff Resident/Fellow teaching award 2005-2006

Nominee: Inpatient Teaching Attending of the Year 2005-06

### **Residency**

Virginia American College of Physicians (ACP), first place award, Associates research poster competition. April, 2002.  
The prevalence and associated etiologies of acute pancreatitis in the HIV-infected population before and after the introduction of protease

inhibitors

Awardee, Virginia ACP Associates Abstract contest January, 2004 for Warfarin skin necrosis in a patient with antiphospholipid syndrome, a case report. Presented at Regional and National ACP meetings spring of 2004.

Resident/Fellow Teaching Award, nominee 2004-2005

### **Medical School**

President, Medical Student Council, 2001-02  
Class Co-President, 1999-2001  
Chair, Faculty Curriculum Content Review Committee, 2001-2002

James Waring Award, 2001 "Awarded to the third-year medical student who has demonstrated diligent scholarship and devotion to the field of Internal Medicine"

Clinical Honors: Internal Medicine, Internal Medicine Sub-Internship, Family Medicine, Pediatrics, General Surgery, Obstetrics/ Gynecology, Neurology, Psychiatry, Emergency Medicine, Endocrinology, Rheumatology, Hospice, Cardiac Diagnostics

Basic Science Honors: Anatomy, Cell Biology, Neurobiology, Embryology, Biochemistry of Nutrition, Immunology, Epidemiology/ Statistics

### **Undergraduate**

Dean's List (every semester)  
The Levitt Prize 1997-- 1st place recipient, University of Colorado; a University-wide competition among all literature courses – winning entry argumentative essay

### Completed support

NIH LRP grant: PI: Bush ZM. July, 2008 - June 2010.  
\$55,508 direct cost

CTSA Novel Pilot Study Award. Retinoid-Mediated Apoptosis: a novel therapeutic approach to the management of Cushing's disease. Author and lead investigator: Bush ZM. Faculty Sponsor: Mary Lee Vance. Funding cycle 3/09-03/10, potential for renewal.  
\$25,000 direct cost

Umfrid Neuroendocrinology Research Fund. PI: Mary Lee Vance and John Jane, Jr.  
\$107,000

Individual Ruth L. Kirschstein National Research Service Award (NRSA) 1-F32-DK082159-01. Retinoic Acid Receptors: A Novel Therapeutic Target for Cushing's Disease. PI: Bush ZM. Funding period: August, 2008 – July, 2010.  
\$115,560 direct cost

Institutional Ruth L. Kirschstein National Research Service Award (NRSA) 1-T32-DK07646. PI: Robert Carey. Funding period: September, 2007- July, 2008.  
\$47,000 direct cost support

NIH LRP Grant. Neuroimaging, Inflammation, and Endocrine Profiles in Human Subjects with Major Depressive Disorder. PI: Bush ZM.  
July, 2007

### Completed projects

Retinoic Acid Receptors: A Novel Therapeutic Target for Cushing's Disease. Author and lead investigator: Bush ZM. Mentors and Collaborators: Mary Lee Vance M.D., Beatriz Lopez, M.D., Ph.D., Isa Hussaini Ph.D. John Jane, Jr, M.D., Edward Oldfield, Salary Support from NIH F32 NRSA grant. PI: Zachary Bush. Direct Costs: Umfrid neuroendocrinology Research Grant. PI: Mary Lee Vance; John Jane, Jr.

IRB#13369; GCRC #2335. Preoperative Bexarotene Treatment for Cushing's Disease. Author and lead scientific investigator: Bush ZM. PI: Vance ML (faculty PI required for GCRC study).

IRB#13313 Human Corticotroph Adenomas: Expression of RAR, RXR, COUP-TF, PPAR-gamma and Caspase 3 activity in corticotroph cells. PI: Bush ZM

IRB-HSR # 3943 Prevalence of Vitamin D deficiency among patients with pituitary tumors. Co-author and Co-investigator: Bush ZM. PI: Michael Thorner, MD, DSc

COUP-TFI and COUP-TFII expression in breast cancer cell lines, opportunities for apoptotic synergy. I have demonstrated decreased expression of COUP-TFI and COUP-TFII in two post-menopausal cell lines (MCF-7 and a Tamoxifen-resistant line), with complete absence noted in pre-menopausal ICI-resistant cells. This finding not only identifies tumor populations that may be vulnerable to retinoic acid therapy, it also opens an avenue to explore pharmaceutical regulation of COUP-TF expression, which would have the potential to open up a broad array of solid tumors for adjuvant therapy with retinoic acid. PI: Bush ZM. Current collaborators: Richard Santen, MD. Ping Fan, PhD. Sarah Aiyar, PhD.

Department of Endocrinology, University of Colorado Health Science Center, 2001-2002. Topic: Hyperlipidemic pancreatitis in HIV patients; the effects of protease inhibitor related hypertriglyceridemia. Mentors: Lisa Kosmiski, MD and Robert Eckel, MD



## ▶ Publications

### Peer-Reviewed Publications

Gildea J, Roberts D, **Bush ZM** (as Senior/corresponding author). Protective Effects of Lignite Extract Supplement on Intestinal Barrier Function in Glyphosate-mediated Tight Junction Injury. [Self-Funded Original Research] (Under Review - *BioMed Central – Public Health*).

Gildea J, Roberts D, **Bush ZM** (as Senior/corresponding author). Gliadin and glyphosate independently, and in combination, induce tight junction injury, and epithelial membrane leak in small bowel and colon epithelial membrane. [Self-Funded Original Research] (Under Review *J Gastroenterology*).

Gildea J, Roberts D, **Bush ZM** (as Senior/corresponding author). Protection against Gluten-mediated Tight Junction Injury with a Novel Lignite Extract Supplement. [Self-Funded Original Research] *J Nutr Food Sci* 2016, 6:5

**Bush ZM**, Longtine JA, Cunningham T, Schiff D, Jane, Jr. JA, Vance ML, Thorner MO, Laws, Jr. ER, Lopes MB. Temozolomide Treatment for Aggressive Pituitary Tumors: Correlation of Clinical Outcomes with DNA Methylation and MGMT Expression. [Original Research] *J Clin Endocrinol Metab*. 2010 Nov;95(11):E280-90

**Bush ZM**, Lopes MBS, Hussaini IM, Jane, Jr JA, Laws ER, Vance ML. Immunohistochemistry of COUP-TFI: An adjuvant diagnostic tool for the identification of corticotroph microadenomas. [Original Research] *Pituitary*. 2010;13:1-7.

**Bush ZM**, Vance ML. Management of acromegaly: Is there a role for primary medical therapy? [Review] *Rev Endocr Metab Disord*. 2008 Mar;9(1):83-94.

**Bush ZM**, Kosmiski L. Acute pancreatitis in HIV-infected patients: are etiologies changing since the introduction of protease inhibitor therapy? [Original Research] *Pancreas*. 27(1):E1-5, 2003 Jul.

### Book Publication

**Bush ZM**, Vance ML, Jane, Jr. JA. Endocrine Complications After Skull Based Endoscopic Surgery. Chapter 47. *ENDOSCOPIC SKULL BASE AND BRAIN SURGERY: TIPS AND PEARLS* by Aldo Stamm. Thieme Medical Publishers Inc. New York, New York. In press.

## ▶ Peer Review

### Invited Reviewer for peer-reviewed journals:

Expert Review of Pharmacoeconomics & Outcomes Research  
Case Reports in Medicine  
Virchows Archiv

## ▶ Research Presentations

### National and International Meetings

Temozolomide Treatment for Aggressive Pituitary Tumors: Correlation of Clinical Outcomes with DNA Methylation and MGMT Expression. Poster Presentation. Endocrine Society. June, 2010

Immunopathology of the retinoic acid signaling environment in corticotroph adenomas guides potential tumor-directed therapies. Oral presentation. International Pituitary Pathology Society, Awaji Island, Japan October 2009

Silent Subtype III Pituitary Adenoma: Clinicopathologic features and prognosis. Oral presentation. International Pituitary Pathology Society, Awaji Island, Japan October 2009

MGMT immunoeexpression in aggressive pituitary adenoma and carcinoma tumors. Oral presentation. International Pituitary Pathology Society, Awaji Island, Japan October 2009

A Unique Retinoic Acid Signaling Environment in Corticotroph Cells: Prospect for a Tumor Directed Medical Treatment for Cushing's Disease. Poster presentation, Endocrine Society 2009. Washington, D.C. June, 2009

Immunohistochemistry of COUP-TFI: an Adjuvant Diagnostic Tool for the Identification of Corticotroph Microadenomas. Poster presentation, ENDO 2008. Winner Trainee Poster Competition. San Francisco, CA. June, 2008

Warfarin skin necrosis in a patient with antiphospholipid syndrome, a case report. Finalist, Virginia ACP Associates Oral Abstract

Presentation. Presented as a poster by invitation, National ACP meeting, New Orleans, 2004.

Acute pancreatitis in HIV-infected patients: are etiologies changing since the introduction of protease inhibitor therapy? Oral presentation Virginia ACP associates meeting Richmond, VA, January, 2002. First Place Recipient. Virginia State ACP meeting, April 2003.

Community Service Programs: A Vital Part of Medical Student Education. Presented at the AAMC Regional Organization of Student Representatives Conference. Monterey, CA. April, 2001

## Invited Lectures

### CME Accredited Lectures

Thy Food is No Longer Thy Medicine: Chemical Farming, the Loss of Nutrients, and the Chronic Disease Epidemics  
ACIM Orlando, FL November, 2017

Keynote Talk: The Microbiome's Regulation of Human Genetics, Immunity, and Life Expectancy  
Rome, Italy July, 2017

Disruption of the Gut Microbiome and Gut Permeability as Ground Zero for the Nutrition-Related Epidemics of the Developed World  
Rome, Italy July, 2017

The Gut-Cancer Connection: New Insights Into the Bacterial Regulation of Human Health  
SOPMed Colorado Springs, CO June, 2017

Airway Mechanics, the Microbiome, and the Acceleration of Inflammation and Aging  
ACIM Fellowship Dallas, TX May, 2017

The Microbiome's Regulation of Human Genetics, Immunity, and Life Expectancy  
ACIM Fellowship Dallas, TX May, 2017

Airway Mechanics, the Microbiome, and the Acceleration of Inflammation and Aging  
ACIM Fellowship Dallas, TX May, 2017

1) The Bacterial Biome and Gut Physiology: critical foundations for health;  
2) Tight Junctions – The critical role of membrane barriers in the body; Clinical Application of Cell-Cell Communication Therapies;  
3) Cell-Cell Communication: Three Elements of Health and Human Healing.  
SOPMed Conference Snowbird, UT, Zach Bush, MD – June 16, 2016  
Delivered 6 hours of CME level 1 Original content for Physicians

Gut-Brain Regeneration: The microbiome as a new avenue for therapeutic management. 1 hour CME level 1 Original Content  
ACIM, Orlando, FL October 17, 2015

Type 2 diabetes - drugs, sugar, and other half-truths in diabetes management. Keynote speaker, Updates in Primary Care CME Seminar. Tappahannock, VA. April 21, 2010.

Incretins in Clinical Practice, a case-based discussion.  
Williamsburg, VA. November 6, 2009

Drugs for Type 2 Diabetes, Are We Hurting the Patient?  
Updates in Clinical Medicine Retreat, Omni Hotel  
Charlottesville, VA. October 30, 2009

The Pursuit of a Novel Medical Therapy for Cushing's Disease: The Basic Science Perspective. Invited Instructor, Basic Science for Careers course. March 2 and 13, 2009

Insulin Management in Diabetes Mellitus: What the Pharmaceutical Companies Will Never Tell You. Lecture Series: What Every Primary Care Doctor Should Know. University of Virginia. December 16, 2008

Oral Drugs in Type 2 Diabetes: Your patient deserves the truth. Lecture Series: What Every Primary Care Doctor Should Know. University of Virginia. November 14, 2008

Glycemic Control in DM2, How Low Should You Go? DISCORD over ADVANCE and ACCORD. Internal Medicine Grand Rounds. University of Virginia, November 4, 2008

Oral Medication Management in Type 2 Diabetes: Does Your Practice Align with the Literature? Lecture Series: What Every Primary Care Doctor Should Know. University of Virginia. April, 2008

Insulin Management in Diabetes Mellitus: What the Pharmaceutical Companies Will Never Tell You. Lecture Series: What Every Primary Care



Doctor Should Know. University of Virginia. April, 2008

Vitamin D Deficiency: Beyond Bone. Immunologic, cardiovascular, and cancer implications. Grand Rounds, Division of Endocrinology and Metabolism. University of Virginia. March, 2008

## NON-CME Lectures

Bacterial Communication, Nature's Solution to our Health and Ecological Crisis  
Hoshindo Institute Lecture Series, Santa Fe, NM April 2017

Loss of the Microbiome, a Central Component in the Decay of the Extracellular Matrix, and the Acceleration of Aging and the Modern Disease Epidemics  
Life Vision Seminar, Atlanta, GA, April, 2017

Airway mechanics, the Microbiome and the Acceleration of Aging and the Modern Disease Epidemics  
ALF Educational Institute, LLC, Arlington, VA, March, 2017

The Food Production System, Your Microbiome, and Our Modern Disease Epidemics  
West Palm Beach, FL, January, 2017

The Extracellular Matrix, Tight Junctions, and Chronic Inflammation and Carcinogenesis  
West Palm Beach, FL, January 2017

The Individual's Bacterial History as a Critical Element of Patient Assessment, and a New Model for Mitochondrial Nutrition and Human Health  
West Palm Beach, FL, January, 2017

Gut Microbiome and Gut Permeability, the Zero-Point for the Disease Epidemics of the Developed World  
HCF Seminars, Las Vegas, NV, November 2016

Communication is Community – Bacterial Metabolites are the Foundation for Human Health and Healthy Societies.  
Fermentation Festival, Santa Barbara, CA September, 2016

The Gut-Brain Matrix, Reprogramming Health for Kids, Moms, and Other Superheroes  
Autism One, Chicago, IL. June 2016

Gut Brain Injury: How, Why and What You Can Do About It  
Autism One Chicago, IL. May 2015.

Tight Junctions and Redox Signaling.  
SOPMED Snowbird, UT. June, 2015.

Roots of Health. TEDx Lecture Series.  
Charlottesville, VA. November, 2014.

Loss of Human Health, A Microcosm of Soil Health and the Planet's Microbiome.  
Santa Barbara Fermentation Festival.  
Santa Barbara, CA. September, 2015.

Gut Brain Regeneration: The Microbiome Has a New Avenue for Therapeutic Management.  
The World Residences at Sea. South Hampton, England. September 2015. Dublin, Ireland September 2015.

Gut Brain health Tight Junctions and a New Paradigm for Membrane Integrity and Cell-Cell Communication.  
Academy of Comprehensive Integrative Medicine. Orlando, FL. October, 2015.

Target Nutrition to Insulin Resistance, Not Hyperglycemia: Challenging 80 years of diabetes practice.  
Endocrinology Grand Rounds, University of Virginia. March 3, 2009

Vitamin D Deficiency: Beyond Bone  
Clinical Grand Rounds, Student Health Department, University of Virginia, September 29, 2009

## Media

Hypoglycemia and Autonomic Dysfunction.  
Invited speaker for the Regional Diabetes Symposium, Williamsburg, VA. November, 2007

Major Depressive Disorder: Changing perceptions of an old disease, and the role of the endocrinologist  
Grand Rounds, Division of Endocrinology and Metabolism. University of Virginia. May, 2007

The Foundational Biome. Bacterial Communication and the Frontline of Optimal Health.  
Winter of Wellness International Symposium. February, 2016.

#### The Balancing Act. Lifetime Television for Women

Aired nationally August 2015, syndicated on 200+ networks February–June, 2015.

#### Zach's Revolution. Virginia Insight, National Public Radio.

Harrisonburg, VA. October, 2014.

### ▶ Board Exams

American Academy Hospice and Palliative Care  
Board Certification December, 2012

ABIM Board Certification Endocrinology and Metabolism  
October, 2009

ABIM Board Certification Internal Medicine  
August, 2005

USMLE Step 1, Step 2, Step 3, 2001-2005

### ▶ Licensure

Virginia Medical License, 2002-present

Virginia General Contractor, Class A – 2009-2014

### ▶ Extracurricular/Volunteer Activities

#### Career

Physician leader, US Navy Ship Comfort, Haiti Relief Operation.  
Director of pre- and post-surgical care.  
February, 2010. Port-au-Prince, Haiti

#### Fellowship

Founder, Youth for Quality Sustainable Health, a multi-disciplinary think tank for healthy community development  
ACP leadership, Associate delegate, 2008-2009  
Steering committee, Graduate Certificate Program, 2007-present  
Charlottesville Free Clinic, Physician Volunteer, 2003-present

#### Residency

Elected representative to the CORE Committee, 2003-2006  
Information Technology Committee, 2003  
Curriculum committee, Millennium Plan Subcommittee, 2002-03  
Charlottesville Free Clinic, Physician Volunteer, 2003-2009  
Nelson county migrant farm clinic volunteer, 2002-03

#### Medical School

President, Medical Student Council, 2001-02  
Class Co-President, 1999-2001  
Chair, Faculty Curriculum Content Review Committee, 2001-02  
Student Representative 3rd year Curriculum Committee, 2001-02  
Student Representative 4th year Curriculum Committee, 2001-02  
Medicine Ball Gala exhibit committee, 1999-2001  
Student Keynote Speaker, Medicine Ball Gala fund-raiser, 2000  
Student Presenter, School of Medicine Curriculum Retreat, 2000  
New Initiatives Curriculum Committee, 1999-2000  
Stout Street Clinic for the Homeless, 1998-2000  
Stout Street Steering Committee, 1999-2000  
Student Representative, Chancellor Society, 1999-2000  
Injury prevention lecture series for area high schools, 1999-2000  
Coordinator: Mini-Med School, community education 1999  
Steck Elementary Reading tutor, 1998-99  
Camp Wapiyapi, companion for a child with cancer, 1999

### ▶ Certifications

ACLS/BLS, 2002-present  
Emergency Medical Technician (EMT), 1995-1998

### ▶ Foreign Language

Spanish, written and conversational. Bachelor's in Spanish Literature.  
University of Colorado, Boulder 1993-1997

### ▶ Interests/Hobbies

Field trips and activities with my children, Ethan (18 years old), Alissa (16 years old). Also: carpentry, triathlons, hiking, camping, and playing music (guitar, bass, drums), ballet and theater performance.