

Welcome to

Conversations with Scientists



Online Webcast

Email questions for our speakers throughout the program at ahw@mcw.edu

BIOMEDICAL ENGINEERING

Designing Tools for a Healthy Future

Presented in partnership with the Marquette University and Medical College of Wisconsin Department of Biomedical Engineering

Tuesday, April 23, 2019

6:30 - 8:30 p.m.

Medical College of Wisconsin

Milwaukee | Central Wisconsin | Green Bay

Speakers BRIDGING THE GAP



Opening Remarks

B. Tucker Woodson, MD



The Physics of Obstructive Sleep Apnea

Guilherme Garcia, PhD
B. Tucker Woodson, MD



Virtual and Augmented Reality Tools to Demystify Clinical Complexity

John LaDisa, Jr., PhD

ABOUT THE SPEAKERS



Guilherme Garcia, PhD

Assistant Professor of Biomedical Engineering
Marquette University and Medical College of Wisconsin

Guilherme Garcia, PhD, is Assistant Professor of Biomedical Engineering at Marquette University and the Medical College of Wisconsin. Dr. Garcia received his PhD in Physics from Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, in 2005.

Area of Interest: My goal is to make meaningful contributions to improving the diagnosis and treatment of respiratory diseases, such as obstructive sleep apnea, chronic rhinosinusitis, nasal airway obstruction, and cystic fibrosis.

Highlight of My Career: It is very exciting when our papers are cited by other researchers because it demonstrates that we made a meaningful contribution to science.

Fun Fact: I am married and have two children. I love hiking and travelling. I highly recommend visiting Yosemite National Park in California and the Iguazu Falls at the border of Brazil and Argentina.

Take Away Message: During sleep, the human upper airway behaves like a collapsible tube. Biomedical engineering research helps clinicians better understand what factors determine mechanical stability of the upper airway, which may lead to more effective treatments for obstructive sleep apnea.



B. Tucker Woodson, MD

Professor and Chief
Division of Sleep Medicine and Surgery
Department of Otolaryngology and Communication Sciences
Medical College of Wisconsin
Director, Froedtert Hospital Center for Sleep Medicine

B. Tucker Woodson, MD, is Professor and Chief in the Division of Sleep Medicine and Surgery, Department of Otolaryngology and Communication Sciences at the Medical College of Wisconsin. Dr. Cross received his MD from the University of Missouri, Columbia School of Medicine, Columbia, MO, in 1983.

Area of Interest: When I started medicine, our understanding of how the airway collapsed during sleep was a mystery, a “black box.” My career goals have been to develop and advance more effective and less invasive surgical therapies for sleep apnea by better understanding these mechanisms. Most of my research has involved developing and improving soft tissue surgeries but has also included novel treatments such as implantable cranial nerve stimulation.

Highlight of My Career: As an undergraduate student at Washington University in St. Louis, I had a chance to meet and listen to Dr. Levi Montechelli who described the work that went into winning the Nobel Prize for discovering neural growth factor (NGF). Big discoveries can come from simple observations.

Fun Fact: Gardening is great fun. As a physician and surgeon, I keep my hands clean all day but get to go home to my garden and get dirty.

Take Away Message: The airway in sleep apnea is complex and involves both anatomy and the physiology of sleep.

ABOUT THE SPEAKERS



John LaDisa, Jr., PhD

Associate Professor of Biomedical Engineering
Marquette University and Medical College of Wisconsin

Dr. LaDisa is Associate Professor of Biomedical Engineering at Marquette University and Medical College of Wisconsin. He received his PhD in biomedical engineering from Marquette University in 2004 and completed postdoctoral training at Stanford University in 2007. He now directs the MARquette Visualization Lab (MARVL).

Area of Interest: My research interests in MARVL include the area of extended reality (XR), which includes augmented and virtual reality, as well as immersive visualization. It applies XR technology rooted in computers, software, projectors or screens, sound, and statistics to create three-dimensional, immersive virtual environments for, among other things, better understanding of research applications related to cardiovascular disease and cancer.

Highlight of My Career: I've been fortunate to experience many exciting career moments. One that stands out is a custom cycling event we created for the Marquette Visualization Lab.

Fun Fact: Science requires creativity when researching a topic, designing an experiment, and deciding how to look at data. For me, this creativity developed during my childhood through art and music. I continue to foster creative outlets through projects with my children and playing guitar in a band.

Take Away Message: Immersive visualization, augmented reality and virtual reality are not just for video games or hobbies. Technological advances and content created in these areas can allow us to break down complex situations and show them in ways that are natural and realistic thereby improving understanding by clinicians and patients.

DO MORE ... THINK BIG

● Watch

- **Mayo Clinic video on how treatment of obstructive sleep apnea can improve a patient's quality of life:**
<https://www.youtube.com/watch?v=z12MEPiG4cg>
- **3D printing human tissue - where engineering meets biology:**
www.youtu.be/nbtz8fhhMhE
- **Marquette University's custom cycling event:**
www.youtu.be/gxl68HXDn_Q
- **Can virtual reality change your mind?**
www.youtube.com/watch?v=eFHj8OVC1_s

● Read

- **Mayo Clinic website on obstructive sleep apnea:**
<https://www.mayoclinic.org/diseases-conditions/obstructive-sleep-apnea/symptoms-causes/syc-20352090>
- **Five ways 3D printing is changing medicine:**
www.asme.org/engineering-topics/articles/manufacturing-design/top-5-ways-3d-printing-changing-medical-field
- **Enhancing Our Lives with Immersive Virtual Reality:**
www.frontiersin.org/articles/10.3389/frobt.2016.00074/full
- **Virtual Reality Isn't Just For Gamers Anymore; It Will Change Your Health:** www.forbes.com/sites/billfrist/2018/07/10/virtual-reality-isnt-just-for-gamers-anymore-it-will-change-your-health/#292e9d34c0ad
- **Five ways virtual reality is improving health care:**
<http://theconversation.com/five-ways-virtual-reality-is-improving-healthcare-79523>

● Do

- **Visit the MARquette Visualization Lab (MARVL) website to learn how technology is creating immersive experiences:**
www.eng.mu.edu/vizlab
- **Download the Discovery VR app in your app store for 360-degree experiences in science, nature, travel, and more on your mobile device**

Join us next series!

Thank you for attending our Spring 2019 Conversations with Scientists learning series! Please join us in the fall when Conversations with Scientists will be back with an exciting new series.

Do you have ideas for topics you'd like to explore? Visit www.AHWendowment.org/Learning-Series to submit your suggestions today!



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WISCONSIN ENDOWMENT

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Conversations with Scientists is a free, public learning series presented by AHW to bring the research of MCW experts to the public, translating new discoveries into community knowledge and taking discussions out of the classroom or health clinic and into public conversation.

www.AHWendowment.org



Conversations with Scientists

The text is centered over a network diagram. The diagram features a central dark blue circle with five lines radiating outwards to smaller circles of various colors: red, yellow, grey, and two white. The background is a complex network of light blue and yellow lines connecting various white and grey circular nodes of different sizes.