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Advancement of A Vision of Integrated Health

Since February 2021, I have had the honor of serving as director of the **Rush Center for Integrated Microbiome and Chronobiology Research**. This one-of-a-kind academic hub bridges the critical gap between basic science and patient care. By integrating high-level research, education and community partnerships, we are not just studying disease; we are redefining how the medical community understands the vital relationships between the gut, circadian rhythms and the brain. Your support provides the essential protected time for our associate director, **Robin Voigt-Zuwala, PhD**, and me to balance transformative scientific discovery with the mentorship of the next generation of clinician-scientists and researchers. This generosity fuels our trajectory toward publication in prestigious journals and enables the pilot studies required to secure highly competitive federal grants.

Pioneering Scientific Discovery

Our research center employs a “bedside-to-bench/bench-to-bedside” approach, asking clinically relevant questions in the laboratory and then moving laboratory discoveries directly to the clinic. Rather than viewing diseases in isolation, our work illustrates how the common threads of intestinal integrity, microbiota communities, and circadian rhythms dictate the development and progression of diverse chronic conditions. We have established Rush as a world leader in several critical domains:

- **Neurodegenerative and neuropsychiatric breakthroughs:** We were the first to demonstrate that patients with Parkinson’s disease have a “leaky gut” and significant disruption of the intestinal microbiome (dysbiosis). We pioneered the discovery that modifying the gut



microbiota through prebiotic interventions can improve disease markers in patients with Parkinson’s disease. Our research has revealed an abnormal intestinal milieu in veterans with post-traumatic stress disorder, or PTSD, identifying the gut as a viable therapeutic target. We have provided a scientific basis for precision interventions by showing the MIND diet induces “brain-beneficial” effects in older adults at risk of Alzheimer’s disease.

- **Oral health and systemic disease:** We recently demonstrated that patients with inflammatory bowel disease (ulcerative colitis and Crohn’s disease) and Parkinson’s disease exhibit abnormal oral microbiota and increased gingival inflammation, which directly correlates with a more severe disease course. We have also shown that oral microbiota differ based on cognitive function, a finding with relevance to Alzheimer’s disease.
- **The gut-liver-brain axis in alcohol and HIV:** Our research has been instrumental in identifying how alcohol consumption and HIV act as synergistic “hits,” disrupting the intestinal microbiota to drive organ damage and disease progression.
- **National leadership in circadian medicine:** We are national leaders in illustrating how the body’s circadian rhythm impacts inflammatory bowel disease, or IBD. By showing that circadian disruption triggers gut-derived inflammation, we have made circadian and sleep hygiene a standard part of patient management at Rush — a model being emulated by other top medical centers.
- **Environmental impact on brain health:** Our groundbreaking research linking outdoor night pollution to Alzheimer’s disease has reached a global audience, appearing in over 100 articles in more than 10 countries, including *Forbes* and *U.S. News and World Report*.

Scholarship, Influence and Financial Growth

The center’s productivity is a reflection of this endowment, which propels our scientific reach.

Academic Productivity

- **Cumulative impact:** Since the inception of the center, we have published 115 peer-reviewed manuscripts. In 2025 alone, our research resulted in 24 publications. Our most cited publications from 2025 include:



- The Bidirectional Effects of Periodontal Disease and Oral Dysbiosis on Gut Inflammation in Inflammatory Bowel Disease. *J Crohns Colitis* (2025) PMID: 39447062.
- Parkinson Disease and the Gut: A Primer for Gastroenterologists. *Am J Gastroenterol* (2025). PMID: 40298214.
- Oral Microbiome Brain Axis and Cognitive Performance in Older Adults. *npj Dementia* (2025) <https://doi.org/10.1038/s44400-025-00004-4>
- **Global citations:** My work has been cited over 48,000 times with an h-index of 109. Dr. Voigt-Zuwala's work has been cited over 9,200 times with an h-index of 37. Our core staff scientists, **Maliah Shaikh, MS**, and **Phillip Engen, MS**, maintain exemplary h-indices of 42.
- **Global and national scientific leadership:** In 2025, our team delivered 28 presentations at the world's most prestigious forums, underscoring our international influence.
 - I served as the keynote speaker at the annual Dutch Neuroscience Meeting in June 2025 and as a visiting professor at the Universities of Amsterdam and Botswana.
 - Our work was featured in invited presentations at the European IBD Meeting and the Movement Disorders Society Meeting. Dr. Voigt-Zuwala also served as organizer, chair and presenter for multiple sessions at the Research Society on Alcoholism in 2024 and 2025 and presented leading-edge findings at the Gordon Research Conference on Multi-Organ Alcohol Injury in Ventura, California.
 - My selection as a member of the Council for the National Institute on Alcohol Abuse and Alcoholism and Dr. Voigt-Zuwala's service as a standing member of Aging Systems and Geriatrics for the National Institute of Aging ensure Rush remains at the forefront of shaping national research priorities.

Substantial Grant Funding

Your endowment enables us to generate the pilot data needed to secure federal grant funding. We have been awarded \$14.5 million in research funding since the center launched. The center currently manages 17 active grants, including major awards from the National Institutes of Health, or NIH, for Parkinson's disease (U01 DK140923) and aging (U01 AG086145), with five pending grants. In 2025, two new projects received funding: "Microbial-based Platform for Assessing Organ Damage in Alcohol Use Disorders (AUD)" (NIH-NAAA: 07/01/2025-6/30/2030) and "The Bidirectional Gut



Microbiota Axis in Parkinson's Disease: integrating mechanistic biomarkers of disease severity and progression" (Administrative supplement, NIH-NIDDK: 07/01/2025-6/30/2026)

Mentorship: Cultivating the Next Generation

We are deeply committed to training an inclusive group of future scientific leaders. In the 2024-2025 academic year, we mentored two PhD students, one postdoctoral fellow, two master's students and two GI fellows. We also provide summer research rotations for medical, PhD and master's students. Medical students can also shadow me in the clinic and in endoscopy to determine if GI is a field they would like to pursue. If it is, they can apply for summer research opportunities in our center's lab. This educational pathway ensures that the expertise developed at Rush continues to influence the field for decades to come.

The Road Ahead: 2026 and Beyond

We will continue to complete studies outlined for our NIH-funded projects. As noted, we currently have 17 funded grants and five grant applications pending. We will carry out a series of human studies to leverage our basic science knowledge for Parkinson's disease, colon/pancreatic cancer, HIV and COVID to determine whether gut-directed intervention can positively modify the clinical course of these diseases.

We will continue mentoring young faculty, GI fellows, and PhD, medical and master's-level students rotating in our program.

We will advance and expand our Parkinson's/GI clinic, which manages Parkinson's patients with GI problems via a multidisciplinary team composed of Parkinson's disease neurologists, a dietitian, a physiotherapist and me.

Finally, we will advance and expand our collaboration with other research groups at Rush (e.g., neurology, urology, orthopedics, immunology, anatomy/cell biology, the Rush Alzheimer's Disease Center, the Institute for Healthy Aging, the Road Home Program), locally (Northwestern, University of Chicago, University of Illinois Chicago, Veterans Affairs Hines Health Care), nationally (Mayo Clinic, Stanford Medicine, Harvard Health, UTHealth Houston, the Medical University of South Carolina, Duke Health, Louisiana State University Health), and internationally (University of Amsterdam, Newcastle University, University of Plymouth).



With Gratitude

The stability of your endowment supports the national and international leadership roles we play. Your support is the bedrock upon which we have built a world-class research program. Your generosity has far-reaching consequences for the future of medicine.

By protecting our time, you ensure that we can remain at the forefront of high-level scientific discovery while providing mentorship to the next generation of clinician-scientists and researchers. Your support has allowed our group to advance understandings of the pathogenesis of multiple chronic diseases, including Parkinson's disease, PTSD, HIV and IBD. Through the generation of critical pilot data fueled by this endowment, we have successfully secured \$14.5 million in grant funding to bring our novel hypotheses to fruition.

Most importantly, this funding has enabled us to save lives through earlier diagnosis and improve people's quality of life through novel therapeutic strategies. You help position the Rush Center for Integrated Microbiome and Chronobiology Research as a national leader and enable my team to make innovative discoveries.

We are deeply grateful for your partnership in enhancing the scientific understanding of gastroenterology and your commitment to the advancement of medicine at Rush.