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Friday Faculty: William DePaolo

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His videos exploring the bacterial science behind everyday objects have amassed millions of hits on BuzzFeed and led to appearances on the Today Show, but the associate professor of medicine at the University of Washington Medical Center and director of the UW Center for Microbiome Sciences and Therapeutics (CMiST) says he sees his sliver of cyber celebrity as a means to an end.

"Doing stuff like that is a great way to educate the public," DePaolo says of his efforts to package bacterial science for a wider audience on the web. "The key is doing good science, while not letting it be influenced by the popular culture." It's a paradoxical push-pull that lies at the heart of DePaolo's work on what's known as the microbiome—the enormous microbial ecosystem comprised of more than 100 trillion bacteria that flourishes within every person's intestines or guts. How does one push science into the public eye while simultaneously defending it from distortions wrought by prominence in the public imagination? Over the past decade, the idea of the microbiome and an accompanying notion that people can re-engineer the bacterial composition of their digestive system for better health have exploded in the public consciousness, leading to a proliferation of probiotic shakes, products, and therapies that, according to DePaolo, are often backed by incomplete science and promise more than they can deliver.

"Everyone's microbiome is like a fingerprint," DePaolo says. "Everyone's microbiome is going to be different. So to try to identify single organisms that either predict disease or tell you how to treat disease? I don't know if we'll ever be able to do that."

It's not that we can't or shouldn't be reprogramming the bacteria in our gut, DePaolo says, rather, it's that we need to go about it in the right way. He cautions a more conservative approach, stressing that standardization and scientific consensus are necessary to preserve the promise of the field and propel it forward.

"It has been known that diet is one of the biggest factors that can influence the microbiome," DePaolo says, adding that while it's "amazing to see how one thing can change the architecture of the gut," the nutritional education of one's microbiome takes time. "Your diet has to slowly change your microbiome. If you just take a new microbiome and try to stick it in with a Western diet biome, the consequences can be quite severe."

DePaolo says conducting dietary analysis alongside microbiome studies is essential to his work at CMiST—identifying environmental factors that impact the distinct composition of the microbiome and developing therapies to maintain or restore ecological harmony, especially for those with colon cancer, inflammatory bowel disease, and enteric pathogens. It would seem the old adage is as true as ever: you are what you eat. What people consume really does impact how their bodies react and respond to change, illness, or disease.

It's something DePaolo first experienced during a residency in Memorial Sloane Kettering Cancer Center's Solid Tumor Immunology Department as an undergraduate at Bates College. He recalls a patient whose wife began feeding him a diet high in estrogen she'd read about on the Internet. It caused his cancer to spread rapidly—proving fatal far sooner than it otherwise might have been.

"The substance of those foods was feeding those cancer cells," DePaolo says. "I was young and that was devastating to see. It really made an impact on me, but it wasn't until later that I realized what it meant."

From tidepools to test tubes Will DePaolo was always a talker. He relates how, when he was younger, he was often sent

home from school with a note saying he didn't eat his lunch because he was too busy talking up a storm.

"I was always a very inquisitive child," DePaolo says. "I was taught to always ask questions and if nobody knew the answer go find it yourself."

Growing up in Portland, Maine, DePaolo conducted his first scientific "experiments" in coastal tide pools in the shadow of a lighthouse.

"Each one seemed like its own little world," he says. "That contributed to my interest in biology and how things grow together."

When DePaolo wasn't poking around at water's edge, he might be found helping his grandparents at their pizza restaurant—they'd emigrated from Italy and lived next door to him and his parents.

"It was very close-knit," he says of the family dynamic. "We knocked the fence down to have a double backyard."
The first in his family to attend college, DePaolo chose to attend Bates College, where he debated between majoring in English and Science, before ultimately choosing neuroscience after taking a class called Drug Actions on the Nervous System. "It seemed better than trying to write a novel," he says.

After the aforementioned residency at Memorial Sloan Kettering Cancer Center, he decided to get his Ph.D. in Immunology at Northwestern University's Feinberg School of Medicine, driven in part by a desire to "figure out why these factors are making immune systems act the way they do."

He went on to complete his postdoctoral training at the University of Chicago, where he developed projects investigating the immune-modulation within the intestine and studied molecular pathogenesis of Yersinia pestis (bubonic plague)—even briefly contracting the infamous bacterial infection after a lab partner accidentally dropped an needle and it pierced the sleeve of his protective suit. The next several hours were a nerve-wracking waiting game before he could get a dose of doxycycline, an antibiotic used to treat the infection.

"The reason plague wiped out one third of the population in medieval times is that they didn't have antibiotics," DePaolo says. "It is one of the most incredibly intelligent bacteria that has developed a way to suppress the immune system at the same time it's expanding. That's what we were trying to figure out—how does it shut you down?"

His work at the University of Chicago led him to an assistant professorship at USC, where, after several years, he was approached by Wesley Van Voorhis, professor and head of the UWMC's Division of Allergy and Infectious Diseases, who asked him to present a talk in Seattle.

"It ended up being a job interview," DePaolo says. "I didn't know that until breakfast the day of when an old colleague from Chicago who happens to work here said, 'Oh, so you're up for a faculty position."

DePaolo says the opportunity to lead the Center for Microbiome Sciences and Therapeutics as the Lynn M. and Michael D. Garcey endowed chair in Gastroenterology came as one to shape research in a way that he believes in: coupling strong science with interdisciplinary connection and sound communication. After that first weekend on campus in Seattle, he says he returned to USC feeling so invigorated he realized he really wanted the job.

"Every time I'd come up here I was blown away by the level of curiosity and level of interest of the faculty here," he says, adding that the chance to "get to put together a program using all that expertise" was second to none.

"The purpose of this center is to work with clinicians and existing technologies and resources," DePaolo says, citing the foresight of UW researchers to store so many samples as another factor that immediately impressed him about the University. "There's a wealth of information saved away. [CMiST] is a place where we want all scientists to bring their research. I'm here to interface with the clinicians who don't always have time to do research to start some projects focused on the gut and see if we can't put together some interesting stories from that."

DePaolo says he doesn't just want to make an impact on the scientific level, but on the UW as a whole—a desire evidenced by the fact the Center works with an artist in residence to help visualize the complex constructions of gut science and plans to host a series of art shows and monthly educational seminars to facilitate connections in the wider community.

"I wanted to be where the medicine happens and where the patients are and where the doctors are," DePaolo says. "There's an academic energy here you just don't find anywhere else."

It would seem the communicative kid from Maine finally found a place where he can talk science to his heart's content—and not have to worry about the teacher sending him home with a note for doing so. Anyway, these days, he's the teacher.

"I love training and teaching students and M.D.'s," he says. "To see their growth and that fire ignite is one of the most rewarding things ever."