

# DIAMOND

Maurice H. Kornberg School of Dentistry Magazine | Fall 2017

## ORAL MICROBIOME

A NEW FRONTIER IN RESEARCH



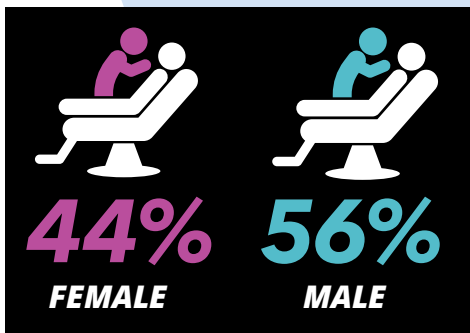
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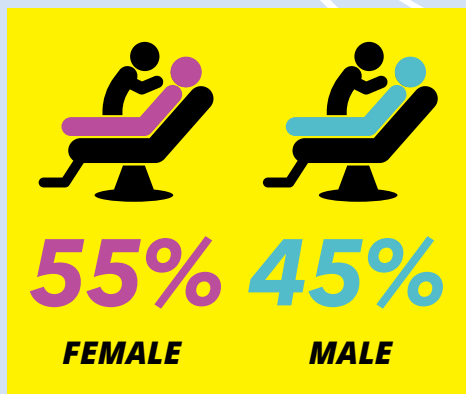
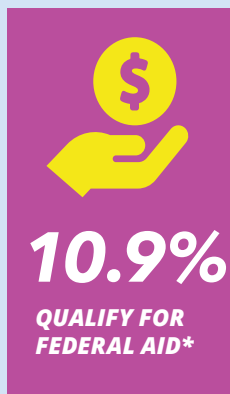
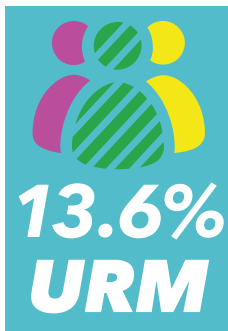
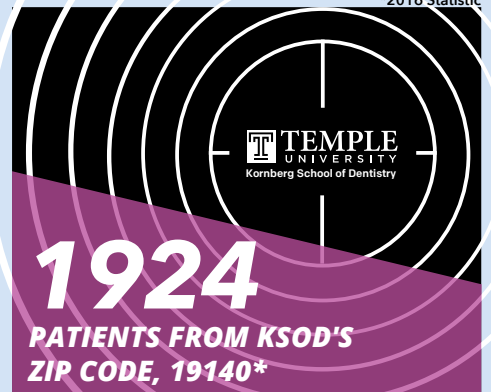
# DIAMOND

Maurice H. Kornberg School of Dentistry Magazine | Fall 2017

## 2017 ENTERING CLASS BY THE NUMBERS



## TEMPLE DENTAL PATIENTS BY THE NUMBERS



Cover Image: Jessica Mark Welch, Marine Biological Laboratory, and Gary G. Borisy, The Forsyth Institute.

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## THE VISION AND THE ART OF CONQUERING OBSTACLES



Dean Amid I. Ismail  
Laura H. Carnell Professor

**I**t is really amazing to feel the pride and energy at Temple Dental. We are moving up and up. We are transforming ourselves, the dental profession and oral healthcare.

Temple Dental has been inching to the cutting edge of science through novel, powerful collaborations that have been studying dental anxiety and now are working with the oral microbiome, dentin and pulp generations. We plan to develop a repository of oral microbiome analytical data that will help us test new therapies. That can only be achieved by hiring faculty determined to forge this line of research and by developing a network with a major center.

This direction gained momentum in 2016 when I attended a symposium on the microbiome that did not include any presentation on oral health. My goal is to explore this domain. I identified a new emerging company, CosmosID, that has created a large metagenomics database on the human microbiome. I approached the CosmosID vice president after his presentation and introduced myself. At that time, I had not yet hired researchers to work on the oral microbiome, and there was no space to build a lab. We connected and started to talk as Temple Dental began to hire faculty and go through the process of creating lab space and building a lab. Our collaboration with Dr. Rita Colwell, Distinguished University Professor at the University of Maryland and founder of CosmosID, and her team grew stronger. This last summer, we started research on the oral microbiome. It is widely known that Temple Dental is not a research school, but we will build research and transform oral healthcare and oral health. From the meeting in 2016 to today, we have made significant progress. The construction of a lab took over a year, the certification and tests took months, the obstacles were and are many, but the will to conquer them is unlimited.

I know as dean that the pride of our alumni and the reason students come to Temple is our strength in clinical education and patient care. Do not worry! The statistics on our progress are impressive. The Class of 2017 treated 27,950 patients, which represents a 32.5% increase over the number of patients that the Class of 2014 treated. Our board examinations are also at a high, and we are receiving more competitive applicants than ever before. In fact, acceptance at Temple Dental is not easy, and many alumni want to know more about our objective, thorough admission process. For instance, administrators and deans no longer make decisions on admission. Instead, a faculty committee reviews exhaustive data on applicants, and we videotape live interviews that the alumni conduct. This way, we ensure that all committee members can review the interview and that there are no biases. To share our process, we held a Legacy Day for alumni and their children or close relatives who plan to apply to Temple Dental.

Space here is limited to share all of our exciting plans and news. But please read about InsightDenti® in this issue. The HIPAA-compliant, secure application allows us to share images and develop a new learning environment within Temple Dental. By the time this issue is distributed, faculty and students will have access to cases and our standard images for any examination on their smartphones.

To discuss our great school, please call me, email me or invite me. I will be happy to visit you.

Amid I. Ismail  
Dean, Laura H. Carnell Professor  
215-707-2799 or ismailai@temple.edu

## WHAT 'S NEXT?

A major renovation project will directly impact our dental students' environment as we create:

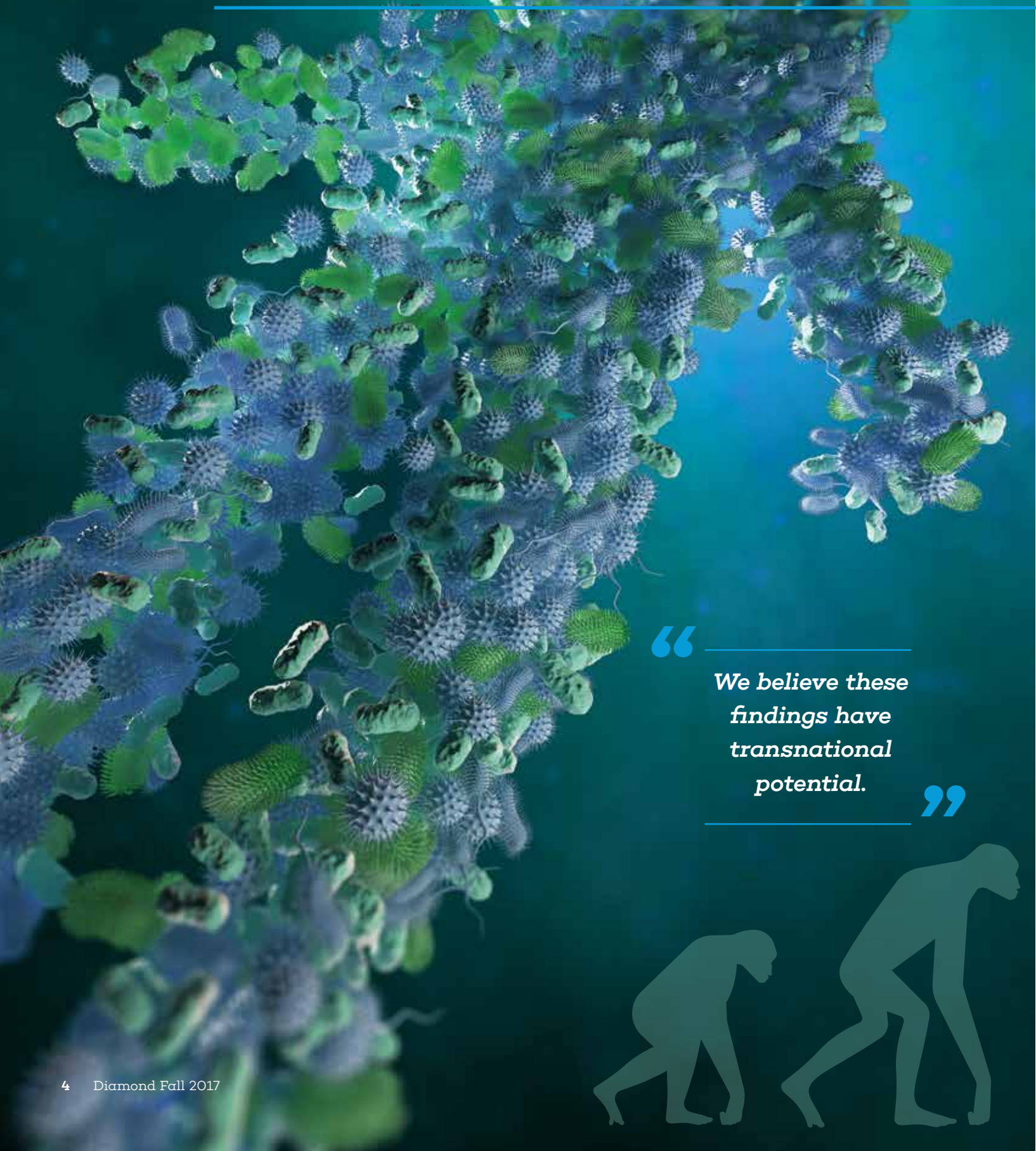
- A modern, technologically advanced Students' Life Center, where students can eat, study and rest—by converting a large section of the old dental school building's fourth floor.
- A histology lab in the old dental school will be renovated to provide a 100-seat lecture hall for post-baccalaureate courses. The new lecture hall will allow the dental school to schedule courses of the post-baccalaureate program to allow these students to allocate more time to work as dental assistant trainees with our dental students and postgraduate residents.

“*Temple Dental has been inching to the cutting edge of science through novel, powerful collaborations.*”



# EVOLUTION OF THE ORAL MICROBIOME

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*We believe these findings have transnational potential.*

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## AND OUR EVOLVING STUDY OF IT

By Nezar Al-hebshi, BDS, PhD

**W**here does the term *microbiome* come from and what does it mean? Joshua Lederberg, Nobel Prize laureate, was the first to coin the term *microbiome*, which refers to all microorganisms living in a particular habitat with their collective genomes. The habitat provides further description, such as soil, marine and human. All microbial components are included: bacteria (bacteriome), fungi (mycobiome), viruses (virome) and protozoa.

Throughout millions of years, we've seen coevolution of the human microbiome—our microorganisms serving important functions that complement us as hosts. That's led to thinking of humans as “holobionts” or “superorganisms,” where microorganisms outnumber human cells by at least tenfold in a healthy adult. And the gene content of these microbes is at least 100 times that of our own genome.

### Many distinct microbiomes

Due to variations in ecological factors, such as anaerobiosis, nutrients, pH and attachment ligands, each body site has its distinct microbiome. Even the oral microbiome, the second most diverse after that of the gut, is not homogenous. Saliva, mucosa, supragingival and subgingival plaques each possess a unique microbiome.

Although predominantly bacteria, the oral microbiome also has small numbers of fungi, viruses, archaea and even protozoa. We've identified at least 700 bacterial species in samples from the oral cavity. But the average number is around 250 species.

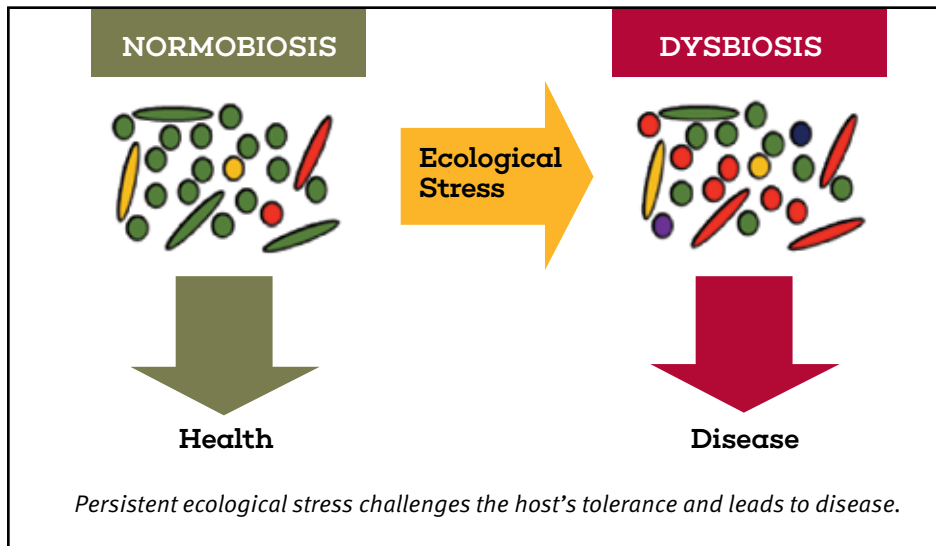
### Early research

Until the early 1990s, our understanding of what composed oral microbial communities came from studies using culture techniques. For example, we grew bacteria in samples in the laboratory.

Then, for a decade or so, most of the research used closed-ended molecular techniques. They were mainly checkboard DNA-DNA hybridization, although scientists used polymerase chain reaction (PCR) to a lesser extent. As we detected and quantified specific species in a large number of samples, we unveiled a wealth of information: the diversity and organization of the oral microbiota, how species tend to form complexes, and how these complexes relate to health and disease. So the focus was on the cultivable component of the oral microbiome.



*Dr. Al-hebshi's research and collaboration with renowned scientists in the microbiome field are important assets for the new Oral Microbiome Research Laboratory. He is its co-director as well as associate research professor and a member of Fox Chase Cancer Center.*



However, by 2000, scientists started to use open-ended molecular techniques that rely on sequencing of DNA—usually a marker gene like 16S rRNA—recovered directly from samples to identify all microbes present. This approach initially involved gene cloning and sequencing a limited number of clones using the well-known Sanger method.

#### NGS revolutionizes study

More recently, next-generation sequencing (NGS) has revolutionized our concept of the microbiome and study of microbial communities.

That's because NGS allows us to analyze a large number of samples at unprecedented depth—up to 250 samples at 100,000 sequences per sample in one run—at an affordable cost. Today, NGS truly is the gold standard for study.

Open-ended techniques have led to our discovery of twice as many uncultivable species as cultivable ones. Yet, even though scientists have used advanced techniques to cultivate many of the uncultivables, around 30% of the oral bacterial species today remain uncultivable.

#### Normobiosis vs. dysbiosis

The characterizations of mature oral microbial communities are high levels of compositional stability that resist transient ecological disturbances. Referred to as microbial homeostasis, it results from an array of synergistic and antagonistic interactions among members of these communities.

Basically, the oral microbiomes are in a mutual relationship with the host. The host provides shelter and food to its microbial residents. In turn, the microbiomes serve important functions for the host, such as conferring resistance to pathogens' colonization, regulating blood pressure and stimulating the immune response. A balanced microbiome composition that is in harmony with host health is called normobiosis.

However, persistent ecological stress, such as frequent sugar intake or gingival inflammation due to lack of proper oral hygiene, can disrupt microbial homeostasis and result in microbial shifts (dysbiosis). What characterizes these shifts are changes in microbial diversity, relative abundance of microbes and, most

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important, overgrowth of pathogenic bacteria that otherwise would be neutrally present in very low numbers.

That's when the host is challenged. Once its tolerance is exceeded, disease results. The most common oral diseases associated with oral microbial dysbiosis are dental caries and periodontitis.

Our research group currently is using whole metagenome rather than 16S rRNS sequencing to study the "full" microbiome. For example, we're looking at microorganisms from all three domains of life, as well as viruses associated with dental caries.

#### Dysbiosis and oral cancer

The major risk factors of oral cancer are tobacco use, alcohol consumption and human papillomavirus infection. Yet, for a subset of oral cancer cases, other risk factors seem to be involved.

What has been gaining increasing attention in this area recently, and is the focus of our research at the Oral Microbiome Research Laboratory, is the possible role of bacteria in oral carcinogenesis. There is ample evidence from *in vitro* and animal studies on the carcinogenicity of some oral bacteria, particularly *Porphyromonas gingivalis* and *Fusobacterium nucleatum*. These and other species are believed to play a role in oral cancer by inhibiting apoptosis, activating cell proliferation, promoting cellular invasiveness, inducing inflammation and producing carcinogens.

In fact, epidemiological studies using samples from oral cancer cases and healthy controls have clearly shown the presence of a unique, living microbiome within the tissues of oral cancer. However, results about the microbiome's composition have been inconsistent.

Recently, my work with collaborators from the U.S., Australia, Sri Lanka, Saudi Arabia and Yemen used NGS coupled with a bioinformatic algorithm that classifies 16S rRNA sequences to the species level. We studied the bacteriome and mycobiome within tissues of oral squamous cell carcinoma, the most common type of oral cancer, in cohorts from Yemen and Sri Lanka, where this neoplasm is highly prevalent.

In these studies, we provided the first epidemiological evidence associating certain microbes—including *F. nucleatum*, *Pseudomonas aeruginosa*, *Prevotella* spp and *Campylobacter* spp, as well as *Candida albicans*—with oral cancer. More important, using functional analysis, we showed that the microbiome in tumors is enriched in genes that encode for pro-inflammatory microbial attributes, such as lipopolysaccharides and flagella.

In other words, we identified a dysbiotic microbiome with inflammatory properties within the tumors. This finding is very important, given the established role of inflammation in cancer.

We believe these findings have transnational potential. So we plan to explore them further in larger scale epidemiological and mechanistic *in vitro* and animal studies. Then we'll assess usefulness of the findings as diagnostic, prognostic or therapeutic markers. ♦

“ ***In these studies, we provided the first epidemiological evidence associating certain microbes—including *F. nucleatum*, *Pseudomonas aeruginosa*, *Prevotella* spp and *Campylobacter* spp, as well as *Candida albicans*—with oral cancer.*** ”



# Oral Yeast:

Indicator of Disease

By Sumant Puri, PhD



**Dr. Sumant Puri** came to Kornberg “to be a part of building up an entire research program in my field of choice.” He is co-director of the new Oral Microbiome Research Laboratory and assistant professor of microbiology, Pediatric Dentistry and Community Oral Health Sciences.

**T**he oral cavity is a complex ecosystem with a wide variety of microorganisms and salivary proteins. What defines oral health and even modulates the overall healthy state is a balance of the good and bad microorganisms, both resident and transient.

Oral yeast such as *Candida albicans* is a very small component of the microbial population in our oral cavity. Yet while most bacteria can colonize both hard and soft surfaces in there, *C. albicans* can only colonize soft tissues—the buccal mucosa, upper palate and the tongue.

Although a large percentage of individuals have *C. albicans* colonization at low levels, the increase in numbers is what signals trouble. That’s because the enhanced oral colonization of *C. albicans*, especially in the form of oropharyngeal candidiasis (OPC), signifies a weakening of the immune system. Therefore, such lesions during a basic dental exam are for many the first indicators of AIDS, or acquired immune deficiency syndrome. However, that is one of the extreme possibilities.

Other less drastic changes in health also can lead to OPC. People who suffer from asthma and use oral steroid inhalers, as well as people who are diabetic, are prone to a higher incidence of oral *Candida* carriage, leading to potential oral candidiasis. For the former, steroids lower mucosal immunity in the mouth, while for the latter, diabetes enhances overall infection susceptibilities. In addition, an extended course of antibiotics taken for infection anywhere in the body can kill the good oral bacteria that keep *C. albicans* overgrowth under control, again potentially leading to oral candidiasis in some individuals.

### One bad microbe spoils the whole bunch

In recent years, the term *keystone pathogens* has emerged to stress the key roles some microbial species play in the delicate landscape of oral microbial diversity. These microorganisms are usually present at very low numbers. But even a subtle increase in population can have significant negative effects.

A keystone pathogen can do that by promoting growth of potentially harmful microorganisms. That’s how a keystone contributes to diseases it does not directly cause. In other words, keystones are like the bad apples that even when present in low numbers can ruin the overall microbial landscape in the oral cavity.

*C. albicans* fits the role of a keystone almost perfectly. Although its direct role in dental caries has not been established, *C. albicans* is present in much higher numbers in children with aggressive childhood caries, as compared with caries-free children. Similarly, numbers are higher in individuals with oral cancers.

All of this suggests that whether *C. albicans* has any direct role in these etiologies or not, it definitely either modulates the oral microbiome or represents a microbiome that has shifted away from health.

### What happens in the mouth does not stay in the mouth

Researchers have established to a great extent that oral microbes can get into the bloodstream or cause gut colonization, eventually affecting overall health. For example, now we know that oral bacteria can also lead to cardiovascular, gastrointestinal (GI) and chronic diseases, ranging from atherosclerosis to GI infections to hypertension, respectively.

Additionally, *C. albicans* is one of the leading causes of drug resistance

and, occasionally, of fatal blood infections in hospitals. That's especially true among patients in intensive care units and patients undergoing gastric surgeries. Interestingly, the latest research shows that, in most cases, *C. albicans* already in our GI tract causes such infections. So *C. albicans* in the oral cavity is the reservoir for *Candida* in the gut, and then once in the gut, *C. albicans* can become blood borne.

In short, as long as its numbers are maintained at low levels, *C. albicans* is not a problem. However, when there is an increase in colonization and a decrease in host immunity, this low-abundance oral microbe can end up in the blood to cause fatal sepsis.

### Take their metal away: nutritional starvation strategy

All living organisms require iron, an essential transition element, for survival. That's because iron plays an important role in various cellular processes, including catalysis, oxygen metabolism and respiration. During a harmful microorganism's excessive proliferation, the demand for this element is even higher to meet the higher growth rates.

For example, research has recently shown that bacterial iron uptake gene expression collectively goes up during periodontitis. But selective nutritional starvation with an iron chelator, which limits the concentration of free iron, may help curtail harmful microorganisms' excessive proliferation.

In fact, as part of ongoing research in my laboratory, we have used an iron chelator to successfully treat the oral candidiasis that *C. albicans* caused in a mice model of the disease. Since *C. albicans* is a keystone pathogen, this targeted nutritional starvation strategy has the potential to positively modulate the oral microbiome by eliminating specific keystones.

### We are what microbiome we carry

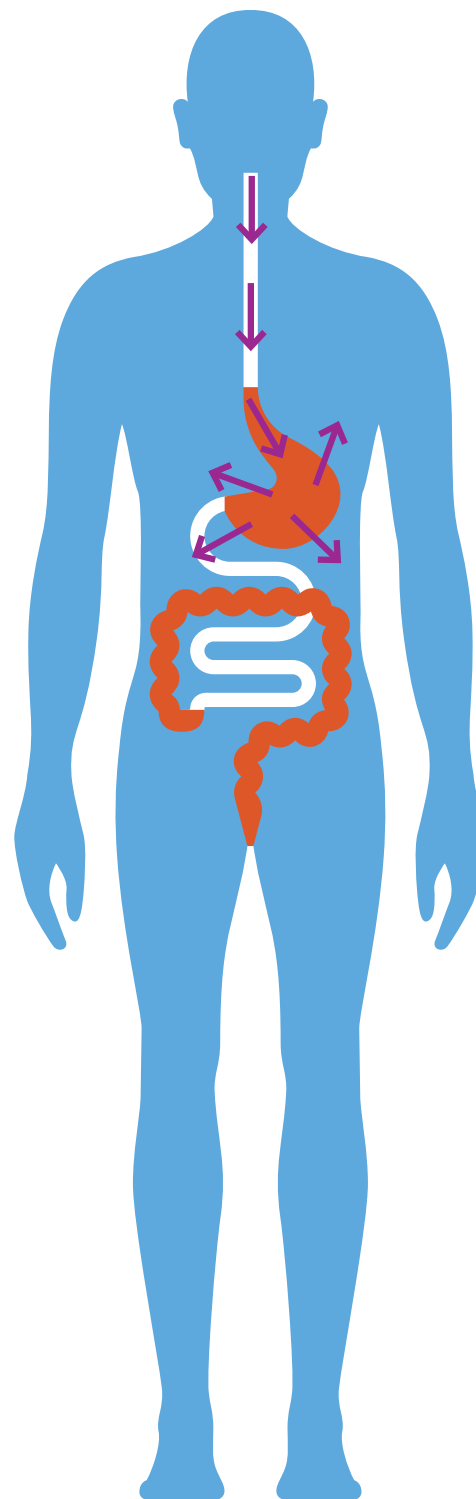
Two factors control maintenance of a healthy oral microbiome: endogenous (host immunity, genetics and overall health) and exogenous (diet, oral hygiene, recreational drug and antibiotic abuse). Researchers have identified a newer means to aid this process: introducing "healthy" microorganisms as probiotics to tilt the diseased microbiome toward a healthy one.



Keystone oral pathogen *C. albicans*: the bad apple of the oral cavity

Yet, I've presented here an alternative approach: targeted elimination of certain keystone pathogens by selective nutritional starvation. We need further research to take this approach from bench to clinic. The ultimate goal will be to use nutritional modulators like iron chelators in oral hygiene products or in drugs that dentists administer at clinics.

However, to restore and maintain a healthy oral microbiome, we may need multiple strategies at the same time, with repeated applications. Ultimately, we can play an important role in maintaining overall health and disease prevention—by eliminating certain oral pathogens that have the potential to colonize their human host beyond the oral cavity. ♦



“ **Researchers have established to a great extent that oral microbes can get into the bloodstream or cause gut colonization, eventually affecting overall health. For example, now we know that oral bacteria can also lead to cardiovascular, gastrointestinal (GI) and chronic diseases, ranging from atherosclerosis to GI infections to hypertension, respectively.** ”

*Gut seeding of *C. albicans* can potentially lead to blood infections or fatal sepsis.*

# A NEW LAB, A NEW FOCUS AND NEW OPPORTUNITIES



*Drs. Nezar Al-hebshi and Sumant Puri were intrigued when they first heard about Dean Ismail's decision to open a new lab in their field. With a background in oral microbiome research, each of them welcomed the opportunity to accept positions at Kornberg, working in the lab and teaching. Together, they describe what we can expect from the new Oral Microbiome Research Laboratory.*

## **How do you think the lab will benefit Kornberg?**

In many ways. The lab will

- strengthen Kornberg's research program, helping to establish the school as a competitor in the field of oral microbiome research.
- provide additional access to federal and non-federal funding.
- result in high-impact publications using data that the funded research projects generate. That will boost the school's scientific reputation and ranking. The data can also lead to patents, development of commercializable products, and new knowledge with implications for patient care (particularly since both dental caries and periodontitis, the most common oral disease, are microbiome associated).
- give Temple dental graduates an opportunity to perform state-of-art research in one of the most up-and-coming areas of research in the field of dentistry.

## DIFFERENT PATHS LED TO KORNBERG

### What first prompted your focus on the oral microbiome?

**Dr. Al-hebshi:** I obtained my PhD in oral microbiology from the University of Bergen, Norway. Since then, I've been studying the composition of oral microbiota in different contexts. For some time, I've used closed-ended molecular techniques, initially DNA-DNA hybridization and then quantitative PCR. As next-generation sequencing technologies were introduced, I developed high interest in them and their use for studying microbial communities. So a transition to oral microbiome research was natural and actually inevitable.

**Dr. Puri:** After getting my PhD in iron metabolism in bacteria from the University at Buffalo in New York, I became interested in the role of iron in microbial pathogenesis. When I joined the University at Buffalo dental school for my second postdoctoral fellowship, I began to apply my knowledge of iron to an oral yeast, *Candida albicans*. Very quickly, I discovered that by modulating host iron levels, I can affect the levels of this oral fungal pathogen—as well as potentially modulate the oral microbiome from disease to health. I am currently using and developing newer mice models to test this hypothesis, and that has led me into oral microbiome research.

### What brought you to Kornberg?

**Dr. Al-hebshi:** Just when I was looking to pursue further oral microbiome research in a developed and supportive institution, I saw that Dean Ismail was looking for faculty. He had decided to add an oral microbiome component to the school's research program. Since I already had a background of research in oral microbiome and of collaboration with renowned scientists in the field, I was accepted for the position.

**Dr. Puri:** At the International Association of Dental Research conference in 2016, I found out that Dean Ismail envisioned starting an Oral Microbiome Research Laboratory at Kornberg. I knew I wanted to apply my knowledge of microbiology in a dental school setting as an academic. Also, I realized that starting here at Temple would not only give me big university exposure, but also allow me to be a part of building up an entire research program in my field of choice.

### Which specific areas within the oral microbiome field will be your focus?

The lab will study

- characterization of a high-resolution core oral bacteriome in health in different populations—as well as exploring the possible existence of universal and ethnicity-specific core species.
- identification of the compositional and functional microbial shifts associated with transition from health to disease (periodontitis, dental caries and oral cancer).
- establishing an *in vitro* model of dysbiotic subgingival microbiome—and using it for high throughput screening of prebiotics, probiotics and antimicrobials.
- studying the role of host iron in oropharyngeal candidiasis.
- testing iron chelators as potential therapeutics against oral microorganisms in mixed biofilms and murine models of co-infection.
- using mice models of diabetes and iron overload to understand the mechanisms leading to changes in the oral microbiome resulting from chronic diseases.

### When do you think the lab will be up and running?

Renovations are over, and the equipment has been moved in. Currently, we're working on getting the lab certified by the University's Environmental Health and Radiation Safety. At the same time, we are in the process of hiring postdoctoral fellows to work in the lab. We expect it to be functional soon. ♦

## The Critical Perspective of Microbiology FOR HEALTH AND DISEASE



**Dr. Rita Colwell** is a Distinguished University Professor at the University of Maryland College Park and at the John Hopkins University Bloomberg School of Public Health. She also is chairman emeritus at Canon U.S. Life Sciences, Inc., and founder and chairman of CosmosID, Inc. Additionally, she served as the 11th director of the National Science Foundation; has authored or co-authored 17 books and 800 scientific publications; received the 2017 Vannevar Bush Award from the National Science Board, the 2010 Stockholm Water Prize and the 2006 National Medal of Science of the United States. She is a member of the National Academy of Sciences.

**F**or Dr. Rita Colwell, the U.S. outbreak of anthrax in 2001 was the final catalyst—her inspiration to develop rapid and accurate microbial diagnostics. During the event, correct diagnosis was taking weeks. The country was becoming fearful. Fortunately, molecular techniques were tracking the source. She knew medical diagnostics had to change because she had an inside view of it all. She was director of the National Science Foundation and of the government interagency committee dealing with the cases.

Adding even more impetus to her decision was the subsequent MRSA infection of her brother-in-law's leg. With an initial misdiagnosis of the causative bacterium, he lost his leg and then succumbed to the infection. "That was no way for medical diagnostics to be done in the 21st century," she says.

As an environmental microbiologist with a background in both technology and public health, Colwell has been perfectly suited for the task. "I'm evangelical about new technology to improve human health and well-being," she emphasizes. So, in 2008, she launched her company, CosmosID, which uses next-generation sequencing and bioinformatics to identify microorganisms in a given sample accurately and in minutes.


The CosmosID system uses cell extracts and sequences the DNA, then employs bioinformatics, software and an expert-curated database to detect and identify microbes from one another. The process can even identify antibiotic resistance, so the most effective antibiotic can be used if many different bacteria-resistant microorganisms are present.

"It's an elegant tool," she notes. "In the future, with a handheld device it will be possible to obtain a sample of sputum, saliva or periodontal disease tissue; extract DNA in minutes; and identify the species of bacteria, virus or fungi. It's far more accurate than 16S rRNA-based identification, which gave too many false positives and let us analyze only a portion of the genome rather than all of the DNA. Now we can see the subtle and critical indicative measures of disease and health."

### A recent approach

Working with metagenomic genome sequencing to analyze the oral microbiome is a recent approach, and she describes it as an exciting development. "Oral microbiology offers a critical perspective and a very early warning for infectious diseases. Dentists in the past didn't have the tools. They knew better

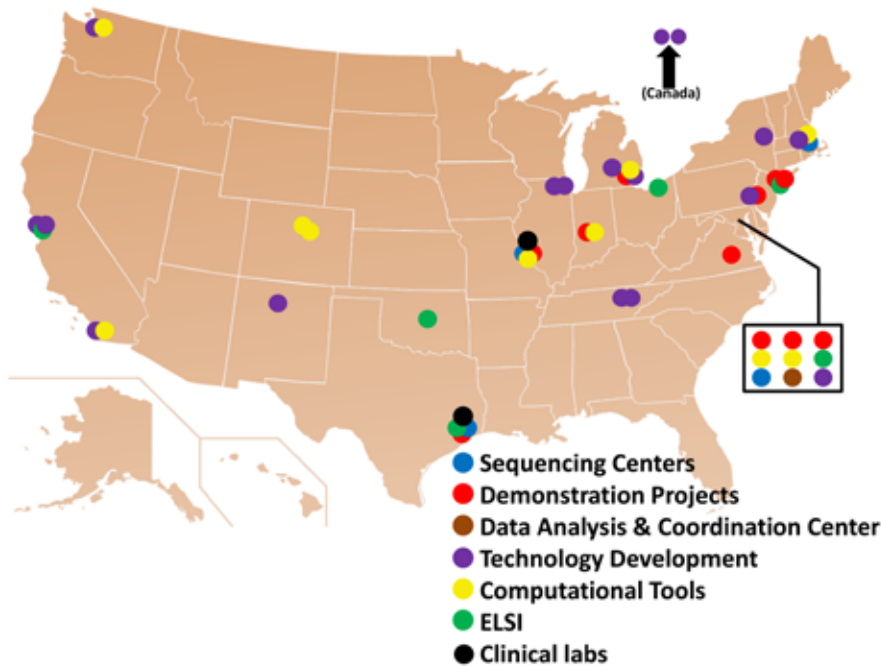




*“ I’m evangelical about  
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and well-being. ”*

## The NIH Human Microbiome Project (HMP)

(HMPI: 2008–2012)



*The ability to test samples for diseases linked to the oral microbiome is increasing. Due to a dramatic drop in cost, sequencing centers now are not only in the U.S. but on every continent.*

analysis was needed because culture methods were time-consuming and limited.”

She continues: “With the capacity to test saliva, we can analyze the microbial community genome of the host individual.” In fact, Colwell contributed to an important study, “Microbial Community Profiling of Human Saliva Using Shotgun Metagenomic Sequencing,” published in May 2014 in the journal, *PLOS ONE*. The conclusion: The most practical approach

to answering questions about the salivary microbiome is through whole genome shotgun metagenomic sequencing (WGS).

Because the cost of genomic sequencing has dropped rapidly, the number of sequencing machines has increased, explains Colwell. So labs and machines on every continent can now test samples for diseases linked to the oral microbiome: alveolar osteitis and tonsillitis, bacteremia, endocarditis, brain and liver diseases,

stroke, diabetes, pneumonia, and premature birth.

What’s in the future? “We need a better understanding of infectious disease and exactly what pathogens are involved,” says Colwell. “Now we test for bacteria. We need to test for all pathogens. If there are no known bacterial pathogens, then there may be a viral or fungal agent.”

Always concerned with disease and health, Colwell is currently publishing results from a major study carried out in Calcutta, India. Looking at patients suffering from severe diarrhea, a symptom of cholera, “We discovered that a mixture of several to as many as 10 pathogens was involved,” she says. “Today, it’s abundantly clear that the environment is a major factor in human health.”

A childhood fascination with the ocean was the genesis of her passion for environmental and public health microbiology. In the 1970s, her study of cholera began when she discovered the causative agent of *Vibrio cholerae* in the waters of the Chesapeake. Then, in the 1990s, during the cholera epidemic in Central and South America, she used her knowledge of the organism, genetics, ecology and public health to combat the disease.

### Work on a Kornberg project

Closer to home, Colwell is currently working with Kornberg scientists to study a large number of patient volunteers with and without dental problems. The goal is to build a specific library for dental medicine. “It

will be valuable for patients and professionals to identify and treat disease,” she says, adding: “It’s an ideal collaboration. The dental school is forward thinking and the dean understands the value of technology.”

Last April, Colwell received the National Science Board’s prestigious Vannevar Bush Award. Cited was her work that bridges many areas, including life-saving research focused on global infectious diseases, especially in regions where cholera and other waterborne diseases are endemic.

“I’ve been an interdisciplinary scientist from the beginning of my career,” she says. “I’ve always crossed fields of medical and atmospheric sciences. Then, science was highly deductive, not how genes work in a global sense.”

Her decision to pursue a career in genetics was somewhat accidental. After earning a degree in bacteriology from Purdue University, she was accepted at the medical school. However, when her husband was accepted for graduate study in physics at the University of Washington, she was denied acceptance as a medical student there because she wasn’t a legal resident of the state. So she studied marine microbiology instead, receiving a PhD with a focus on the *Vibrio* species of marine bacteria.

While at the University of Washington, she started using a just-installed, high-speed computer. “I laugh now,” she says, “it probably had less power than a microwave and the computation power of today’s wristwatch.”

### Early similarity index

Operating the IBM 650 herself from midnight till 6 a.m., she was following up on the work of Peter Sneath in England. He suggested that a mathematical similarity index could be used to match bacteria to determine quantitatively how strains of bacteria were related. The idea was in turn based on Robert Sokal’s work in Kansas with Dr. Charles Michener, who developed an approach to quantitate relationships among bees, other insects, plants and animals. Writing her own numerical code, Colwell decided that was the way to begin the modernization of microbial systematics and taxonomy.

To run the similarity indices for 40 strains of bacteria and 78 characteristics based on phenotypic traits took an hour or two. But in a foreshadowing of CosmosID today, she was a pioneer in writing the first program to identify bacteria from the environment and one of the pioneer microbial ecologists.

Looking back, she says, “I’ve been driven by the necessity to modernize microbiology and make it more quantitative.” ♦

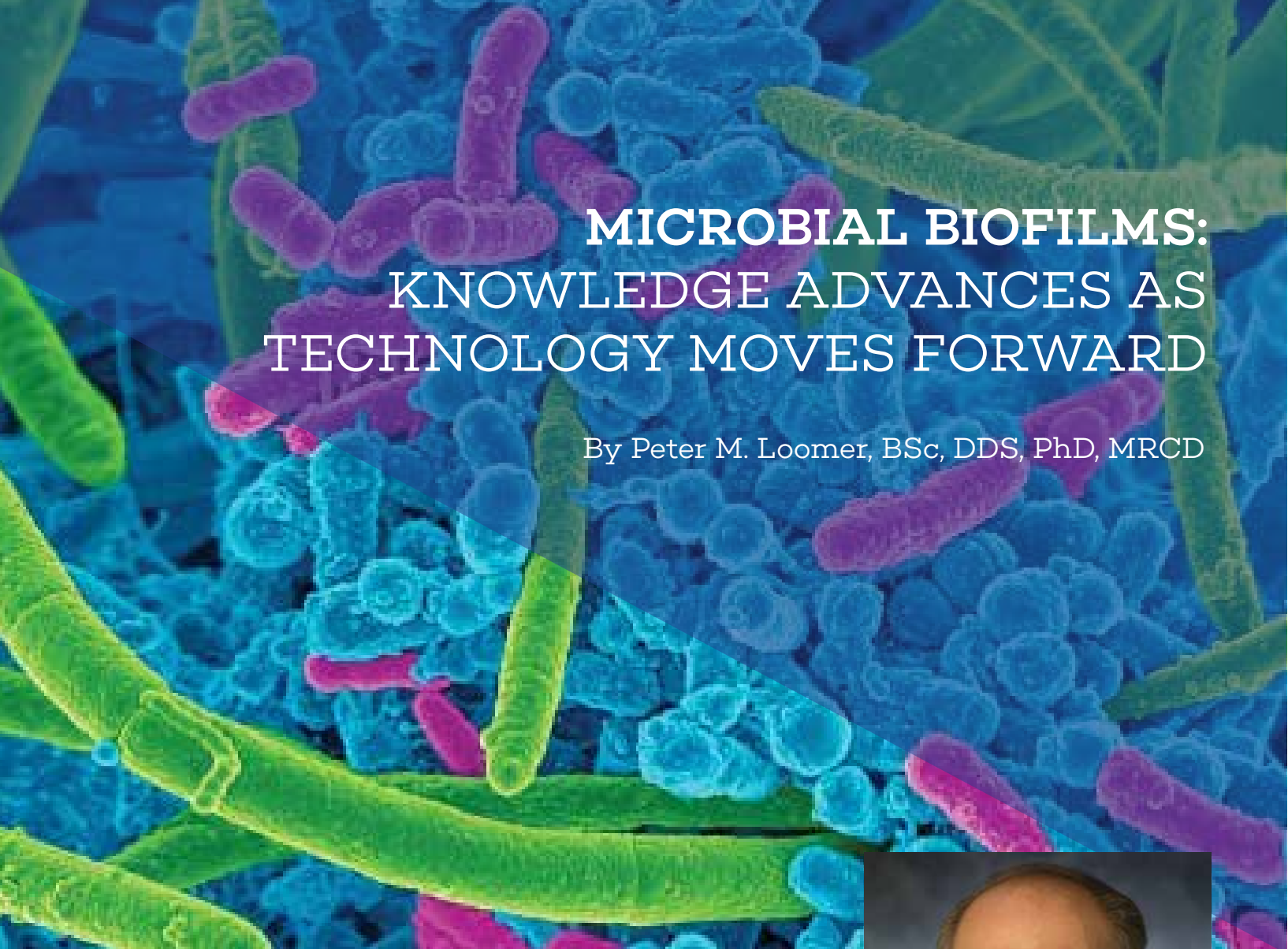


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***Colwell is currently working with Kornberg scientists to study a large number of patient volunteers with and without dental problems. The goal is to build a specific library for dental medicine. ‘It will be valuable for patients and professionals to identify and treat disease,’ she says, adding: ‘It’s an ideal collaboration. The dental school is forward thinking and the dean understands the value of technology.’***

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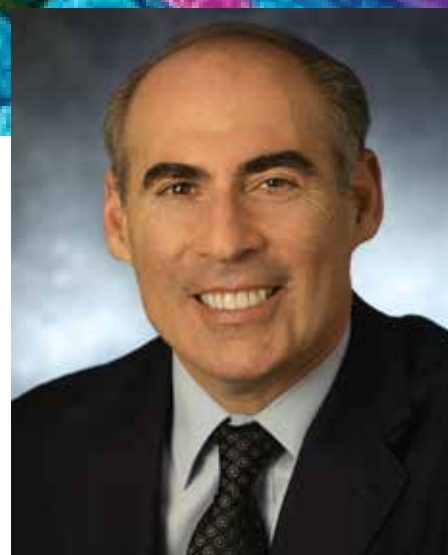


# MICROBIAL BIOFILMS: KNOWLEDGE ADVANCES AS TECHNOLOGY MOVES FORWARD

By Peter M. Loomer, BSc, DDS, PhD, MRCD

## UNIQUE ECOLOGICAL NICHES OF THE ORAL CAVITY

- **Tooth:** supragingival, subgingival
- **Saliva:** includes microbes shed from hard and soft surfaces
- **Mucosa**
  - **Masticatory:** keratinized gingiva, hard palate, tongue dorsum
  - **Lining mucosa:** inner cheeks, inner lips, alveolar mucosa, soft palate, floor, ventral tongue
  - **Specialized mucosa:** tongue dorsum, floor of mouth



*For the past 20 years, Dr. Loomer has studied the microbiology of periodontal diseases, most recently the oral microbiome of smokers of alternative tobacco products and in lung disease of HIV-positive populations. At New York University, he is a clinical professor and chairman of the Ashman Department of Periodontology and Implant Dentistry. He also serves as the founding director of the NYU Dentistry Center for Global Health Sciences and is affiliated faculty in the New York University College of Global Public Health.*

Scientists have long been fascinated with microbiota in the oral cavity. In fact, they've been studying it for nearly 400 years. In 1683, Antonie van Leeuwenhoek, whom most scientists think of as the father of microbiology, used a primitive microscope to first record a description of oral microbiota as “animalcules,” the microorganisms from the “white white matter coating his teeth.”

Ease of accessibility into the oral cavity and microbiota's diversity of habitats are two reasons why scientists continue their quest to discover what the microorganisms are, which ones inhabit the oral cavity (and indeed the entire human body), and what roles they play in both health and disease. While today we may take for granted the microbial etiology of many oral diseases, including dental caries and periodontal disease, our understanding of the microbiome has slowly progressed. However, the most rapid expansion has been in the last 25 years.

A greater in-depth understanding of the oral microbiota will satisfy our curiosity about this microscopic world. But, importantly, more study will lead to better strategies for microbial biofilm control and promotion of biofilms associated with health, ultimately reducing human disease and improving patient outcomes.

### *L'union fait la force*

Of particular interest to oral health clinicians are the oral and nasopharyngeal environments, which have a multitude of habitats, each with its own unique microbial community. Differences in the ecological landscapes between these sites,—for ex-

ample, the tongue as compared to the subgingival crevice—are dramatic for their patterns that are both spatial (hard versus soft surface, aerobic versus anaerobic, etc.) and temporal (when microbes colonize).

However, common to most of these communities is their organization into microbial biofilms (or microbiomes). The late Joshua Lederberg, a Nobel-Prize-winning molecular biologist, first used the term and defined it as ecological communities of commensal, symbiotic and pathogenic microorganisms that share our body.

Mature biofilms contain microbial cells and a self-produced, extracellular polymeric substance. It's the “glue” that holds everything together. This structural arrangement supports the exchange of genetic material and nutrients between cells and facilitates evasion of host defense mechanisms.

Previously, research has emphasized identifying and studying the behavior of individual microorganisms associated with disease. Through traditional laboratory methods, such as culturing microbial organisms found in dental plaque biofilm, well over 200 species have been identified as key pathogens involved in such oral diseases as dental caries, gingivitis and periodontitis. Simply stated, the microbes found in high levels in disease states, low numbers in health, and capable of inducing host-exaggerated immune responses or producing toxic byproducts were identified as possible microbial pathogens.

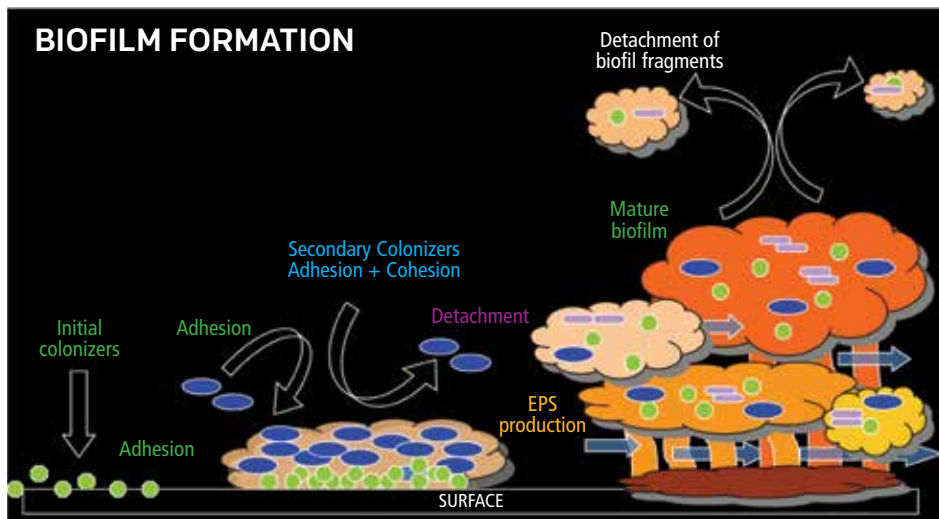
However, the complex polymicrobial nature of biofilms actually supports

the theory that oral microbes do not act alone. Rather, they act as consortia to induce disease—hence, *l'union fait la force*, or “in unity there is strength.” Following this theory, current research has focused on studying diversity within microbial populations and how communities of microbes, as opposed to single species, influence health and disease. That's a challenging task, to say the least. This direction significantly contrasts with the late Robert Koch's published postulates, which centered on infectious diseases caused by single pathogenic microorganisms.

Culture, microscopy and other traditional laboratory techniques of microbial analysis have provided essential insight into the major plaque-induced oral diseases. Yet, these methods also have presented significant limitations to our knowledge, since only microorganisms that could be detected or grown by these methods were identified.

As culture-independent molecular biological techniques have been introduced, some of these limitations have been overcome. Now, we are able to identify in oral biofilms the microorganisms that cannot be grown in culture.

One of the frequently used molecular approaches is microbial profiling of the 16S ribosomal RNA genes. They are present in prokaryotes and contain highly variable regions, such as with species-specific sequences. The variable regions enable us to identify bacterial species by comparing sequences found in databases, including the Human Oral Microbiome Database, so we can match profiles of known microorganisms. Using 16S



rRNA methods, around 700 microbial species have been identified in the oral cavity.

Most recently, next-generation sequencing techniques have been used to evaluate DNA profiles of microorganisms in biofilms. That has allowed researchers to identify species previously not known to exist in oral biofilms. Thus, we anticipate that the list of pathogens associated with oral diseases may be longer in the future, or certainly different from what is known today.

### Role in health

Parents transmit oral microbiome constituents to infants through close contact. Birth delivery and infant-feeding methods also affect the transmission and diversity of the oral microbiome. In addition, studies have suggested that transmission is possible from household pets, such as dogs to humans and vice versa.

Environmental factors continually modify the oral microbiome. Among the profound influences are diet, medications, systemic health and oral hygiene practices. Furthermore,

the aging process itself modifies the microbial composition of biofilms, possibly through changes in the immune system.

Essentially, humans and microorganisms have evolved together. Indeed, scientists estimate that microbes outnumber human cells by 10 times. Some estimates even suggest that humans are visitors in a body of microbes.

For the most part, the human-microbe relationship promotes health and protects us from disease. However, this homeostasis depends on balancing the host's immune defenses with microbial community activity. Beneficial activities of the microbial community include those that sup-

port the host defense mechanisms and possess anti-inflammatory properties as well as anti-oxidation functions. Saliva, a microbial environmental niche in itself, also helps us maintain a healthy relationship with the oral microbiome through secretion of various anti-microbial products.

### Influence on dental caries and periodontal disease

Dental caries is a major global public health concern. It affects individuals in patterns of disease that are highly site specific within the oral cavity. While many factors influence the development of dental caries, including diet and exposure to fluoride, susceptibility to tooth decay also depends on the presence of pathogenic microorganisms.

Previously, cultural methods showed that caries-associated microbiota contained an extensive assortment of microbes. But the focus was on major caries-associated pathogens of acid-producing streptococci (*S. mutans*) and *Lactobacillus* species. More recently, 16S rRNA gene methodology has revealed a much wider array of caries-associated pathogens. That has helped further identify known and previously unknown ones associated with different types and stages of caries disease.

## SIX METHODS FOR ASSESSING THE MICROBIOME

- Taxonomic composition (phylogenetically informative genes)
- Metagenomics (gene, genome) composition (genome assembly)
- Community-wide transcription profiles
- Community-wide protein profiles
- Community-wide metabolite profiles (assess function)
- Host measurements (clinical outcomes, genetics, gene expression, protein, etc.)



***A greater in-depth understanding of the oral microbiota will satisfy our curiosity about this microscopic world. But, importantly, more study will lead to better strategies for microbial biofilm control and promotion of biofilms associated with health, ultimately reducing human disease and improving patient outcomes.***



The caries microbiome is not stagnant. It shifts in profile in response to pH and other environmental elements. Thus, our current understanding of the dental caries-associated microbiome has changed from one that centered around a mere few bacterial species to one that involves a complex array of microbes, both pathogens and commensals, and their interactions with the host and environmental factors.

Periodontal diseases are largely considered the most common inflammatory diseases in mankind. While their prevalence and severity vary dramatically throughout the world, clinical presentation is typically similar in the most common varieties: plaque-associated gingivitis and chronic periodontitis.

As with caries research, cultural methodologies have helped identify a handful of pathogens associated with periodontal diseases. These pathogens, such as *Porphyromonas gingivalis*, have been extensively studied as mono-cultures. Now, research using 16S rRNA methodologies has enabled scientists to evaluate the polymicrobial nature of the disease. For instance, studies

are looking at how the subgingival microbiome shifts and increases in diversity from health to gingivitis through periodontitis. Research has also revealed that while periodontal disease activity may be localized in nature, associated microbiome shifts are not. They may elicit subgingival microbiome shifts on adjacent sites or possibly throughout the mouth.

#### **Effects on systemic health**

Patients with certain systemic illnesses often exhibit more severe oral disease than their healthy counterparts. This observation has spurred interest in evaluating whether oral diseases contribute to systemic disease.

Because oral microbes are “mobile,” they can travel via the bloodstream or through aspiration to sites in the body distant from the oral cavity. This characteristic has led to investigating the relationship of the oral microbiome to systemic disease in many diseases, including cardiovascular, liver, colorectal cancer, neurodegenerative diseases and many others.

The oral microbiome may indirectly effect systemic disease by eliciting inflammation both locally, in the oral

cavity, and at distant sites, through elevation of inflammatory cytokines such as C-reactive protein. In either case, the multifactorial nature of most systemic illnesses has made it challenging to determine whether or not the oral microbiome plays a significant role in their etiology or pathogenesis. Current and future research will help unravel these complex relationships.

Our understanding of the oral microbiome and its role in health and disease has dramatically changed from its humble beginnings. Advances in technology have exposed us to the “new” world of the microbiome. Thus, what we know about the influence of oral microorganisms on diseases in the oral cavity and at distant sites is in its infancy and will continue to advance as technology evolves. ♦

# \$1.5M GRANT TO EXPAND TRAINING IN PEDIATRIC DENTAL CARE

The five-year grant awarded to Temple's Maurice H. Kornberg School of Dentistry by the Health Resources and Services Administration will create new and enhanced pediatric and dental public health curricula and in-school and community-based clinical rotations.



A \$1.5 million, five-year grant recently awarded to Temple's Maurice H. Kornberg School of Dentistry will support training of students in pediatric dental care and expand access to care for children in need.

Through the Pediatric Patient Care, Population Health and Community Based Training (PPCT) Project for Dental Students, Kornberg will receive roughly \$300,000 per year to use for development and implementation of new and enhanced curricula, new community-based clinical rotations for dental students, and other activities to improve proficiency in providing dental services to children younger than 5 and their families, and in advocating for improved oral health. The grant aims to equip students with an understanding of social determinants of health and teach them to apply population health principles while providing care to underserved children.

“When a child is aged from 0 to 5, it is a very crucial time in their growth to receive dental care,” said Assistant Professor Vinodh Bhoopathi, who specializes in public health dentistry and will lead the grant. “If they don't get access to care or treatment services at this early age, their quality of life could be affected, and it may have long-term negative health consequences. With this grant, we estimate around 1,000 more children per year will have access to improved oral healthcare.”

The grant will also enhance collaboration between Temple's Pediatric Dental Clinic and various community partners—including Greater Philadelphia Health Action, Doc Bresler's Cavity Busters, Brightside Academy Pre-K/Head Start programs and the Norris Square Community Alliance Early Head Start/Head Start programs—to develop new clinical rotations in which dental students will have ample opportunity to treat children. Dental students will also rotate with medical students in primary care training at the Philadelphia College of Osteopathic Medicine.

The award will also provide five dental students with scholarships for the Advanced Public Health Certificate Training offered by Temple's College of Public Health. One minority student with financial need will also benefit from a dental school tuition scholarship.

“There is a shortage of pediatric dentists in Pennsylvania,” Bhoopathi explained, adding that the project will equip general dentists graduating from Kornberg to treat young children, helping to alleviate that shortage. “This grant has immediate and long-term local and statewide impact in improving access to care for underserved and vulnerable children.” ♦

—Ben Palestino





# THE SEDATION CENTER

Opened in 2017, Temple Dental's state-of-the-art Sedation Center offers new treatment options for patients with a fear of undergoing dental procedures, as well as those who need surgical procedures or interventions that require special pain management. Faculty clinicians provide consultation to referring dentists and comprehensive case management for their patients—from general dental care to the most complex procedures in restorative dentistry, prosthetics, endodontics, periodontics and oral surgery.

The Sedation Center is also well-suited to care for patients who are medically compromised, for pediatric patients and for individuals with special needs.

Under the direction of a board-certified dentist anesthesiologist who is supported by qualified clinical staff, patients receive care while under sedation levels that are tailored to their specific needs for the management of discomfort, anxiety, and medical, developmental and/or behavioral health conditions. Patients receive follow-up care and direct access to a provider who will answer any questions they (or their guardians) may have after treatment.

The Sedation Center provides another valuable resource for dentists and patients from the tri-state area and underlines Temple Dental's commitment to the quality of its clinical operations and comprehensive care in a patient-centered environment. ♦

## InsightDenti®

### A NOVEL CASE SHARING AND DISCUSSION APPLICATION

Temple University Kornberg School of Dentistry and InsightMedi™ (Madrid, Spain) have developed a novel case sharing and discussion application called InsightDenti®, which provides for the first time a security-compliant software that allows the dental community to share experiences and calibrate dentists, students or other dental professionals toward the standard of care adopted by a community. InsightDenti®, in addition to its systemwide features enforcing today's security standards, represents a state-of-the-art archive of shared cases, allowing users to read and analyze information on an ongoing as well as historical basis. InsightDenti® and InsightMedi™ (the parent platform in medicine) are expected to become powerful tools in education, professional development, calibration, and creation of a learning organization where in-depth

analysis of patient cases is conducted and shared among dental professionals. Another major advantage of InsightDenti® is in teaching preclinical and clinical courses where students and faculty can review and evaluate each other's work. It has its own trending algorithm, providing faculty, students or dentists easy access to top cases being heavily discussed in the platform, with real-time updates. A secure and versatile online and smartphone application will be available in early fall to enable easier access to secure and HIPAA-compliant social media.

Licenses for customized schools or organizations online and APP links will be available in the fall of 2017. For information, contact Dr. Amid I. Ismail at ismailai@temple.edu. ♦

**“InsightDenti® is unique in that it empowers users to share, easily and securely, patient cases for learning, calibration, and clinical advice.”**

—Dean Ismail

# CONNECTING WITH TEMPLE NEIGHBORHOODS FOR RESEARCH



**Dr. Marisol Tellez Merchan, BDS, MPH, PhD,** associate professor and deputy chair of Pediatric Dentistry and Community Oral Health Sciences, has been surprised with the higher-than-average prevalence of dental anxiety in North Philadelphia and with a greater-than-expected need for oral health education with seniors.

The national average for dental patient anxiety: about 10–20%. The average for Kornberg’s patient pool: much higher at 49.2%, and 20% of those have actual dental phobia.

Such a discrepancy has been a surprise to Dr. Marisol Tellez Merchan, who has been researching alternative ways to handle dental anxiety since coming to Kornberg in 2011. “We’re dealing with residents of North Philadelphia who are experiencing poverty, violence and mental disorders. That has helped me appreciate the array of psychological and social factors that in addition to dental anxiety are part of why this population is avoiding dental care.”

Now recognized as a major health concern, anxiety is leading to underutilization of dental services, she says, and to poor medical and physical health. So seeking ways to manage this barrier to care, Tellez is beginning a new aspect of an intervention project underway for six years.

### CBT research moving forward

Working with Dr. Richard Heimberg of Temple’s Psychology Department, Tellez has been using a computer program that’s unique in several ways: It’s structured around cognitive-behavior therapy, is online and targets each patient’s most feared dental procedures. In about 60 minutes, a patient can sit down, go

through guided exercises and interact with videos that teach how to turn an anxious thought into a coping one.

Several predoctoral dental students, as well as psychology students from undergraduate to doctoral levels, have been developing projects related to dental anxiety, and some of them have even been involved in running the initial study with 151 patients. Since its initial work, the group has presented 10 posters in scientific meetings. And Tellez has published the results of this trial and other studies in five top dental and psychology journals. All have cited significant success of the new computer-based tool. “It’s been a great collaboration,” she notes.

So far in the research, highly trained psychology personnel have interacted with patients during the online intervention. But Tellez hopes that can change. In fact, she has applied for a new grant from the National Institute of Dental and Craniofacial Research to test the efficacy of using trained dental hygienists and dental assistants instead. She’ll know the funding decision in the fall.

### Motivational interviewing with seniors

In another line of research, Tellez is studying ways to better deliver oral health education to elderly populations. KleinLife, a Jewish Community

Center in Northeast Philadelphia with a large number of Holocaust survivors, is a natural connection to this population. Thanks to a grant from Colgate Palmolive, Temple Dental already is providing low-cost or free dental services through collaboration with the center.

Tellez is known for her innovative approaches and this research is no different. She is studying whether individually based oral health education with motivational interviewing (MI) has better outcomes with seniors than traditionally based education. Factors she's considering are knowledge, oral-health-related quality of life and behavior change.

She explains: "Few studies have documented the efficacy of MI in dental settings, and almost none involve oral health education of seniors." So two years ago she conducted a needs assessment with this population. What she found was that they have a lot of non-communicable diseases such as cancer, diabetes and coronary heart disease. As a result, she is incorporating education about these diseases into the program. The hope is that knowledge about common risk factors for chronic and oral diseases can be better managed and reduced.

Until the end of December 2018, Tellez will be testing the efficacy of this approach with 180 seniors. Dental students won't be collecting the data, but they will be shadowing those doing the motivational interviewing.

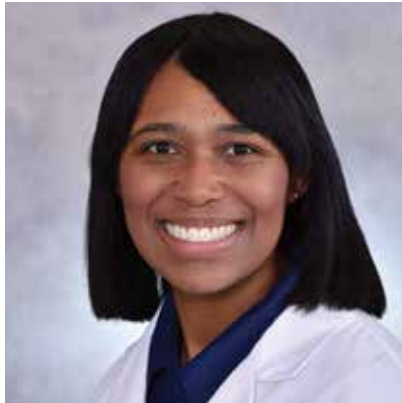
### DR. TELLEZ MERCHAN ACHIEVES TENURE

Recognized for what Dean Ismail has enthusiastically described as "outstanding teaching, especially in the graduate program mentoring predoctoral students, and for her network building," Dr. Marisol Tellez Merchan has achieved tenure. The dean made the announcement in August. Notably, she is the first Latin American tenured at Temple Dental.

"That experience will be extremely valuable," she says, "because dental students are taught about MI at the school, but have so few opportunities to observe how this technique is applied in a real setting to manage patient behavior, particularly among seniors." ♦



# Newest Faculty Leaders



**ANDREA BELL, DMD**, dentist anesthesiologist and clinical assistant professor, oral maxillofacial pathology, medicine and surgery. Dr. Bell received her bachelor's degree from Temple University and is a graduate of Southern Illinois University School of Dental Medicine. She completed residencies in general practice of dentistry and dental anesthesiology at Stony Brook. Prior to coming to Temple Dental, Dr. Bell served as assistant professor, Department of Growth, Development and Structure, Pediatric Dentistry Section, of Southern Illinois University School of Dental Medicine. Dr. Bell will work in the Sedation Center.

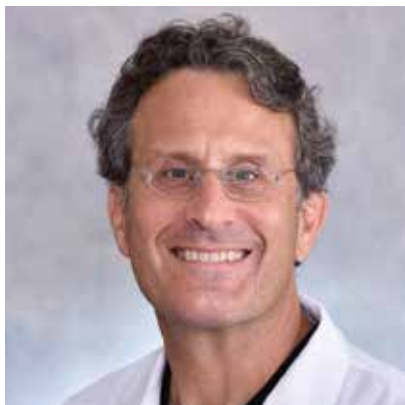


**STANTON BRAID, DMD**, clinical associate professor, oral maxillofacial pathology, medicine and surgery. Dr. Braid graduated from Temple University and the University's School of Dentistry, and earned a specialty certificate in oral and maxillofacial surgery from Thomas Jefferson University Hospital College. He has had an active clinical teaching career, teaching at Thomas Jefferson, the University of Pennsylvania and Temple, where he has been an adjunct clinical assistant professor for the last 20 years. He currently holds attending appointments at Thomas Jefferson University Hospital and Albert Einstein Medical Center. His clinical teaching duties will be in the Elective Oral Surgery Clinic.



**MARIA CORDERO-RICARDO, DMD, MS**, Clinical Associate Professor, Pediatric Dentistry and Community Oral Health Sciences. Dr. Cordero-Ricardo is a Diplomate of the American Board of Pediatric Dentistry and is the new Director of the Pediatric Dental Clinic. A graduate of the University of Medicine and Dentistry of New Jersey, she completed a graduate residency in General Practice at Christiana Care Health Services (Wilmington, Del.) and earned a clinical certificate in Pediatric Dentistry from Nationwide Children's Hospital (Columbus, Ohio). She completed a master of science degree in Pediatric Dentistry at Ohio State University, and is a candidate for a master in public health from Stony Brook University School of Dental Medicine. Previously a Clinical Assistant Professor in the Department of Orthodontics and Pediatric Dentistry at Stony Brook, Dr. Cordero-Ricardo has an impressive record of clinical and didactic teaching in Pediatrics, school leadership, and school and professional service.

## DEAN ISMAIL RECOGNIZED WITH COVETED AWARD



**DR. JEFFREY RODNEY, DMD**, associate professor, restorative dentistry. Dr. Rodney earned his DMD from the University of Pennsylvania. He holds a certificate in prosthodontics from the University of Medicine and Dentistry of New Jersey and a certificate in maxillofacial prosthodontics from the University of California, Los Angeles, School of Dentistry. He is a fellow of the American College of Prosthodontists, associate fellow of the American Academy of Maxillofacial Prosthetics, and a member of the American Dental Association, American Cleft Palate Association and Dysphagia Research Society. He was previously associate program director for the General Practice Dentistry Residency Program and section chief for prosthodontics, implantology and maxillofacial prosthetics in the Christiana Care Health System.

“There’s no question,” says Dr. D. Walter Cohen, chancellor emeritus of Drexel University College of Medicine and former dean of the University of Pennsylvania School of Dental Medicine, “that Amid Ismail is deserving of this 2017 award.” Referring to the coveted Achievement Award that the Alpha Omega International Dental Fraternity has given over 77 years to such luminaries as Albert Einstein, Jonas Salk and Selman Waksman, Cohen, a previous Achievement Award recipient, continues. “Dr. Ismail is an innovative thinker, has done a wonderful job at the Temple Dental School, is an outstanding public health dentist and deserving because of his work with the Alliance for Oral Health Across Borders.”



*Dr. Mervyn Druian, middle, current president of the AO international organization, presents the Achievement Award along with Dr. D. Walter Cohen, left.*

Chairing that Alliance, which brings together dental students from the Hebrew University of Jerusalem and the Palestinian Al-Quds University, was what “cemented the decision,” comments Dr. Marc Rothman, who organized the evening. “Dean Ismail has fostered peaceful relations. He’s been important for the lives of others.”

In his summary of the evening for the AO May newsletter, Rothman added: “We honor Dr. Ismail’s many feats of accomplishment and extraordinary work, his rise to become dean of a prominent Philadelphia institution, which he has made stronger, and the management of his position and influence to make our community, and the world, healthier and more humane.”

After accepting the award, the dean noted that he “does not (just) pass through a community; I am absorbed and influenced by my experiences. Walking the streets of North Philadelphia energizes me every day. I feel for the plight of patients whom we see on a daily basis at the dental school. I made their experiences better, but I am not yet satisfied. We can continue to grow and build to better our community. I look at the horizon and say, ‘Why not?’ Status quo may not be an option, and change is never easy, especially change that must occur at a fast pace.”

Says Cohen, “I didn’t know Amid until he came to Philadelphia. But I’ve gotten to know him. How fortunate we are that he’s here in Philadelphia. He’s very international working worldwide and even now trying to address India and Pakistan through the Alliance.”

Thanking the AO organization for honoring him, the dean emphasized that he will continue to be global, diverse, embracing and humbly thankful for their generous recognition.

## IN A GROOVE: RESIDENT DR. ADNAN KAZIM SHINES AT TEMPLE DENTAL AND BEYOND



**D**r. Adnan Kazim, an endodontology resident at Temple Dental, is in a groove. He recently returned from a round-the-world adventure funded by prize money won as a finalist in a research competition. He got engaged in Paris, and when he returned to Philadelphia, he welcomed a golden retriever into his home. Then, in August, Adnan got married. Life is good for Adnan, and the future looks to be bright, too.

Growing up in Wayne, Pa., Adnan was interested in chemistry and environmental science. During his undergraduate studies at the University of Pittsburgh, Adnan spent a summer completing research at the Academy of Natural Sciences. He realized he didn't want to spend that much time

in a lab, and instead wanted to also pursue the human connection part of science. He then completed a program for pre-med and pre-dental students, where he was first exposed to dentistry. "I realized dentistry had a lot of the qualities I wanted in a career: the opportunity to help people and make lasting change," Adnan said. He enrolled at Temple Dental.

"Temple was always my number one choice in the city I love. I wanted to be at the best school possible for what I was looking for," explained Adnan.

After a lecture on regenerative endodontics in his third year, Adnan found himself fascinated by the specialty area, which uses the concept of tissue engineering to restore root canals to a healthy state, allowing for continued development of the root and surrounding tissue. "I'm in tune with applying science to advanced medicine. Regenerative endodontics is just that," he said. "That lecture was a pivotal turning point in my education."

Adnan spoke to the lecturing professor to seek out research opportunities. A month later, an opportunity presented itself, and Adnan applied and received funding for a two-year research project around dental pulp stem cells. "I thought to myself that maybe I could do this as a specialty," Adnan said.

After completing dental school in 2016, Adnan began a 24-month endodontology residency, also at Temple. "When I started working, I felt prepared to do many procedures, and I attribute that to my clinical experience and the foundation that I got at Temple," said Adnan. When Adnan completes his residency, he has accepted a one-year faculty position as the director of the emergency endodontics department at Temple. He dreams of eventually opening his own practice in the Philadelphia region. ♦

### Taking Initiative: Temple Dental Takes Part in the HITECH Act

Dr. Adnan Kazim has also played an important role in bringing the Health Information Technology for Economic and Clinical Health (HITECH) Act to Temple Dental. Enacted as part of the American Recovery and Reinvestment Act of 2009, the initiative promotes the adoption and meaningful use of health information technology.

Participating institutions can receive a large amount of funding when they sign up and make the efforts to become paperless.

Adnan was the sole Temple Dental resident to step up to the challenge when Dean Amid I. Ismail sent out an email about the initiative a few months ago.

"I saw this as a chance to help my school and make an impact," said Adnan.

Temple Dental's application to be part of the HITECH Act was recently processed and accepted.



Linda Green with the HITECH Act funding.

# COMMUNITY LEADER: STUDENT BODY PRESIDENT JAY PATEL

Jay Patel didn't always know he wanted to be a dentist.

In fact, during his undergraduate education at Temple University, the Bucks County, Pa. native studied both biology and business. "I actually enjoyed my business classes more than my science classes," Jay admitted.

But now, Jay is in the midst of his fourth year at Temple Dental.

Growing up with the doctors in his family, Jay knew he liked the sciences, but a dental experience with his brother during college led him to choose a future in dentistry.

"My brother needed to have teeth extracted and get braces. I went with him to the appointment and saw a bunch of the equipment. I was intrigued," Jay explained. He asked the oral surgeon if he could work with him, and began to gain exposure to the dentistry world.

Still, the decision to become a dentist wasn't surprising. "I always liked going to the dentist," Jay said. "I never really understood why people were scared."

Jay applied to Temple Dental, and was rejected. "I had a backup plan," he said. Jay went on to receive a master's in biomedical sciences from the Philadelphia College of Osteopathic Medicine. As the two-year master's program drew to a close, Jay refocused his sights on dental school.

"I applied to 26 different schools, but Temple was always my number one choice. I said to myself, 'I'm going to get in,'" said Jay. He was accepted and started at Temple Dental in the fall of 2015.



"Dental school has been challenging, but humbling," Jay said. "A lot of people think dental school won't be that hard. It's not only memorizing facts, but also working with your hands. It takes a lot of time to make our hands listen to our brain."

From the start of dental school, Jay knew he wanted to be involved. In his first year, he was elected vice president of his class and went on to be president in his third year. As a fourth-year student, Jay serves as president of the student body, advocating for his fellow classmates and helping to

find solutions to challenges they face. He's also the president of Temple Dental's a cappella group, and recently returned from a mission trip to Peru with the Growing Smiles Foundation.

"I love it here," Jay said. "I wouldn't change anything about my experience."

Looking toward the future, Jay plans to go into private practice in the Philadelphia region. ♦

**Jay serves as president of the student body, advocating for his fellow classmates and helping to find solutions to challenges they face. He's also the president of Temple Dental's a cappella group, and recently returned from a mission trip to Peru with the Growing Smiles Foundation.**

# DENTISTRY AS A WAY TO SOCIAL JUSTICE

## LAUREN YAP

**G**rowing up, she was afraid of going to the dentist, and even as she got older, she always got nervous before every appointment. So Lauren Yap will tell you that she “never imagined she would end up in the profession of dentistry.” Instead, because she was surrounded with parents and family members all in healthcare, she was sure early on that she wanted to be involved in healthcare.

Not till her junior year as a biology major at Villanova University did dentistry enter the equation. “Everything happened all at once for it to fall into place,” she remembers. “The school’s pre-professional health club would often email different opportunities to students in various disciplines.” The one that intrigued Yap was shadowing a Villanova alumna practicing dentistry in the area. Watching the strong doctor-patient relationships so evident in that practice, Yap realized, “Dentistry was a way to be able to practice all that I was passionate about.” That was social justice, always a major interest, and healthcare ethics, her academic concentration.

As her drive to pursue both public health and dentistry developed, she decided to create the organization, Students Against Human Trafficking, at Villanova. She began researching the kinds of trauma that these victims experience and the kinds of care provided during victims’ rehabilitation. What she found was a need for extensive dental care as well as awareness of the trauma itself.

### HEALTH-NEEDS RESEARCH

After earning her biology degree, Yap became a research assistant at the Center for Asian Health. With funding from the National Institutes of Health/National Cancer Institute, she worked on a health-needs assessment specifically for the Filipino community of Pennsylvania and New Jersey, including oral hygiene and oral healthcare. In 2015, Yap presented her year of research at the American Public Health Association’s national conference and published her work, “Addressing the Health Needs of High-Risk Filipino Americans in the Greater Philadelphia Region,” in the *Journal of Community Health*.

Next came decisions about dental school. When applying to Kornberg, Yap says, “I had a really great time at my interview. Everyone was so nice and spoke so highly of the clinical experience. I was crossing my fingers that this is where I would end up.”

Despite studying for dual degrees, Yap is very involved in student life. She is the advocacy chair, legislative liaison and vice president-elect for Temple’s chapter of the American Student Dental Association, as well as advocacy consultant for ASDA’s District 3, helping to organize interest for a joint effort of ASDA and ADA, National Lobby Day in April. She is also vice president of Temple’s Student Professionalism and Ethics Association and treasurer of the Dental Public Health Club. “My goal,” she says, “is to do the best I can because I want to be the best clinician. I can’t imagine being anywhere else.” ♦



*Very active in ASDA advocacy, **Lauren Yap, '19**, is looking forward again to National Lobby Day in April when she will join 1,000 dentists and dental students in Washington, D.C. There, they'll learn about issues affecting the dental profession and give voice to those issues while lobbying lawmakers and staff on Capitol Hill.*

**Lauren Yap is the only student in her class also pursuing a master's degree in public health.**



# TRENT GABRIEL

## DEDICATED TO MAKING A DIFFERENCE

Throughout dental school, Trent Gabriel focused on curriculum development by conducting research into new teaching methods and subsequently, by being a teaching assistant. “I started getting involved with ADEA (American Dental Education Association) when I presented my research poster on ‘The Flipped Classroom Approach to Teaching Pre-doctoral Oral Histology’ at the 2016 ADEA Annual Session. I attended the ADEA Council of Students, Residents and Fellows (CoSRF) meetings at the conference and was selected as regional representative for District 3 and am also developing an ADEA chapter at Kornberg.”

Gabriel, who received a bachelor of science degree in biochemistry and molecular biology, said the ADEA has given him many opportunities to work on initiatives in both diversity and curriculum development. He presented at the 2017 ADEA Annual Session as part of a panel on “Student Perspectives for Cultivating Humanistic Dental School Environments,” in which participants were given different case scenarios where the identities of students, faculty or patients were not respected.

“I will be presenting with faculty and administrators from around the country on a panel focusing on “Blended Learning and the Flipped Classroom: Engaging Students,” in which we will be discussing innovative approaches to teaching and how these techniques were implemented at our respective institutions,” Gabriel added.

As one of the student liaisons for the ADEA Section on Gay-Straight Alliance, he also presented at the Building the Next Generation of Academic Physicians (BNGAP) LGBTQ Healthcare Workforce Conference as a part of a panel on “Innovations in Graduate Health Education,” in which a colleague from another dental school and he discussed how dental schools nationally are falling behind their medical school counterparts in addressing how to respectfully treat the LGBTQ population. He also is a part of several committees at Kornberg, including the Humanistic Culture Committee, Admission Committee for the 2017–2018 cycle, Curriculum Management Committee, the CODA Committee for the Standard 6 - Research Program and the Trainee Committee for BNGAP 2018.

Gabriel is proud of the third-place award at Kornberg’s Science in Dental Practice Research Day for his research on the flipped classroom approach. He was selected to represent Temple KSoD for the 2016 ADA/Dentsply Sirona Student Clinician Research Program, which is a national research competition.

Gabriel grew up in Westfield, N.J. His parents are both art teachers, so growing up, Gabriel went to many art exhibits. “I enjoy painting and going to the art museums in Philadelphia.” With his love of art, Gabriel decided to go into dentistry because it combines art and science. “I enjoy the hands-on aspect of making dentures and sculpting fillings. Dentistry also offers diverse career options in



owning your own business in private practice, specializing and/or teaching.”

Gabriel added that the long history of clinical excellence makes Kornberg unique and this is most visible in the great faculty the school attracts and the large number of alumni that return to the school to teach. “Kornberg also has leading specialists that train its students and that is rare for many dental schools.”

After completing a general practice residency at Kornberg School of Dentistry in 2018, Gabriel plans to develop a career in academia by pursuing a degree in higher education at a university that also has a dental school. ♦

# JO ANN ALLEN NYQUIST: PROVIDING THREE PIVOTAL POINTS OF STUDENT SUPPORT

EXPANDED ORIENTATION TO START STUDENTS' JOURNEY TO SUCCESS



*As associate dean for student affairs and diversity and as director of the Post-Baccalaureate Program, Jo Ann Allen Nyquist brings a passionate commitment to the dental school community. Before coming to Kornberg, her professional and leadership background included positions as an allied health dean, dental hygiene program director, educator, consultant for the Commission on Dental Accreditation and the Commission on Dental Competency Assessments and president of Executive Women International, Detroit Windsor Chapter.*

When Jo Ann Allen Nyquist talks about the look and feel of orientation, you can hear her enthusiasm and clarity, you can sense her broad and comprehensive view. “Orientation gives new students the opportunity to think differently, to embark on developing themselves personally, to know how to balance their lives while going through school,” she says. Newly expanded over the last two years, orientation has become, she explains, “an opportunity to spend time with non-dental professionals and prepare for work in a global healthcare society.” It all takes four days of interactive education, and Nyquist believes it makes a huge difference in student development.

This year, team building, so important to later collaboration, was the first in-depth session of the August 22–25 program. Facilitators from the Fox School of Business led students through a series of activities. The goal was to explore the impact

of leadership and high-performing teams on not only dental students’ ability to graduate, but also on their ability to build successful careers and practices and to effectively navigate the difficult and rapidly changing healthcare environment.

Notes Dr. Tony Petrucci, academic director of leadership development at Fox, “Temple Dental is visionary in this respect. So many business professionals come through our program, and now we are giving dental students the leadership skills to complement their technical, dental skills—to produce better dentists.”

## IMPORTANCE OF LEADERSHIP TRAINING

Although the daylong session also addressed how to assess and leverage personal strengths, the real priority was to build cooperation and strengthen relationships. And the results, according to the Fox Business School professionals? “I appreciate that we’re thinking about what new



students need, that the Fox Business School and Temple Dental are partnering with each other,” says Dr. Michael Rivera, associate professor of strategy and entrepreneurship, as well as academic director of Executive MBA (Philadelphia and Global Programs) and managing director of the Center for Executive Education. Adds Petrucci, “You could see the intellectual horsepower, the critical thinking skills and the excitement about the end vision in our robust discussion.” Allyce Barron, deputy managing director of the Center for Executive Education, concurs. “It set a foundation for success. At the end of the day they came out more solidified as a cohort, ready to function as a team.”

Unconscious and implicit bias was the focus of another important session. And for three hours, the students “shared a lot and learned from each other’s stories,” says Dr. Tiffenia Archie, who led the training. As assistant vice president, institutional diversity, equity, advocacy and leadership, she addressed how students see the world and how the world sees them, how to interact with diversity, and how to speak up when seeing things that are problematic.

Also spurring a lot of discussion was the debt management session. “We were especially pleased with not only the number of questions about actual repayment strategies, but how in depth some of the questions were,” says Paul Garrard, who

spoke to the students and is founder and president of PGPresents, which provides independent student loan counseling.

Because the research about dental student stress is so alarming, the mindfulness session was not only popular but important to include. It recognized a 2014 study of the McGill University Faculty of Dentistry in which dental students reported higher levels of stress than their medical school counterparts. Putting that fact in perspective, the *Journal of the American Medical Association* has said that 11% of medical students consider suicide. Although not a panacea, guided meditation as experienced in the session and other mindfulness practices can help with anxiety and depression. Rebecca Baelen, a doctoral student in educational policy at the University of Pennsylvania, who led the session, says, “We planted a seed, which Nyquist will continue for the rest of their dental experience.”

To prepare for the sessions and for a baseline of information, students completed three online surveys, prior to their orientation, about cultural competency, personal strengths and un-

conscious/implicit bias. Our intent, says Nyquist, was to help students begin to think about their path to being successful, ethical, professional, global practitioners—themes they’ll encounter throughout all four of their years at Kornberg.

*What does a high-performing team look like? Providing the answer during orientation were two group challenges: stacking red cups with loops of string and building a spaghetti tower topped with a marshmallow.*



## POST-BACCALAUREATE PROGRAM TO PROVIDE AN ENHANCED CHANCE

“It fills a need in the dental education market,” says Jo Ann Allen Nyquist, director of the Post-Baccalaureate Program, now in its third year. “Around 7,000 dental applicants each year don’t get in anywhere because of academic qualifications. Yet 1,400 of those have GPAs and DATs close to being competitive. So providing schools with many more qualified applicants is important and why we’ve recognized the need.”

The focus of Kornberg’s one-year program is translational basic science courses as well as formal training in dental assisting, which includes work with dental students in clinical clusters and in dental specialty departments. Making the program unique is an important advantage: Once students complete the courses and meet Kornberg’s admission requirements, their applications are reviewed by the Admissions Committee.

### STUDENTS LOVE THE PROGRAM

Reactions range from “The mistakes I made in undergraduate didn’t define me,” to “I don’t know how students enter dental school without this program.” What Nyquist understands is that students in the Post-Baccalaureate Program “accept the opportunity and demonstrate amazing diligence. They know it may be their only hope, and they internalize it.”

### RESULTS AT A GLANCE

Upon completion of the program during its first year:

- 85% were admitted to Kornberg or other dental schools

Upon completion of the program this year:

- 91% were admitted to Kornberg or other dental schools



*The Post-Baccalaureate Program...helped me not only become more confident in my decision to become a dentist, but also in my abilities to succeed in dental school...allowed me to mature both as a student and a person, becoming more focused and determined on achieving my career goals.*

Christina Peters, Penn State University

*This program has provided two distinct advantages: knowledge of biological sciences in relation to the oral cavity, and valuable experiences interacting with patients and developing my interpersonal skills.... I now feel infinitely more prepared to face the struggles of dental school compared to only a year ago.*

Chenyu Wang, Carnegie Mellon University



*The curriculum afforded me the confidence that I now possess to be a competitive dental student both academically and clinically, an invaluable feeling as I approach my first year of dental school.*

John Nuveen, Colgate University



*As Dr. Casimir Gieniec, ‘63, white coated his nephew John Luciani, the retired dentist was struck with how the room “was filled with an electricity you can’t describe. You could sense the respect between faculty and students, how they enjoyed each other.” He also appreciated how much change the dean has brought to the school and knew his nephew will “get a really good professional education.”*

## WHITE COAT CEREMONY TO REFLECT EARLY EMPHASIS ON CLASS COHESIVENESS

For Jo Ann Allen Nyquist, taking over leadership of this year's White Coat Ceremony was especially meaningful. Those transitioning into the clinical part of their training were in her first orientation class, the same year she came to Kornberg.

She remembers students on May 5 shaking hands, thanking faculty, reciting and signing the Dentist's Pledge, clearly excited for themselves but, perhaps most importantly, for each other. "The efforts of the school's commitment to teamwork shone through," she says.

### WHAT THE CEREMONY MEANT TO LEGACY FAMILIES

Alumni and their legacy family members felt another layer of meaning during the White Coat Ceremony. For many years, students didn't have this formal ceremony. So this recognition of a significant beginning to a professional career struck a chord. Also, alumni fully understood how much their family members, once graduated, would value a Temple Dental education.



*"Kornberg was the only dental school Hannah wanted because it's truly the best in the country," says Dr. Jonathan Burke, '89, remembering the moment she signed the Dentist's Pledge. In fact, as an oral surgeon working with area general dentists, he says he sees students from other schools and knows that Kornberg is the best. Many in his extended family obviously agree because at last count 11 of them graduated from Temple Dental.*



*Kornberg's Assistant Professor of Restorative Dentistry Dr. David Donatelli, '82, has often participated in this definitive moment for students. But this year he watched as his wife, Barbara, white coated their son, Jeffrey. "In general, legacy kids know what the time demands are in dental school and how to schedule themselves," he says. "They've heard about it from parents or family members who are dentists and know what to expect."*



*When the keynote speaker emphasized "sticking to the basics," Rachel Schloth looked into the crowd to find her father, Dr. Paul Schloth, '92, and gave him a big smile. "I knew she was in the right place at that moment," he says, "because that was what I had always told her." Schloth preferred her to attend his alma mater due to its advantages of more patients, more clinical experience and more instruction from different points of view.*



*Part of a legacy tradition that includes many Zielinskis, Henry Dudek white coated his son, Matt, feeling the ceremony "means you're doing great, keep going and get to the finish line." Henry's brother, Dr. Stan Dudek, '83, there too, recalls that "when you go into the clinic, the reality of dentistry really strikes you."*

# Kornberg's Reach in the Community

ENSURING THAT LOW-INCOME RESIDENTS GET DENTAL CARE

**K**ornberg has been on the cutting edge of dentistry for more than 150 years, with a constant mission to provide the highest quality of care to all those in need. As part of this mission, the school developed a partnership in March 2016 with HealthLink, a free dental clinic serving uninsured, low-wage earning adults in Bucks and Montgomery counties. The clinic, a 501(c)3 nonprofit organization, is supported entirely by charitable contributions from the community.

In 1999, Eugene Jackson created HealthLink—modeled after the Volunteers in Medicine clinic in Chester County. His goal was to “bridge the gap” between qualifying for Medicaid coverage and having the ability to afford health-care coverage. The medical clinic opened its doors in April 2001, and the dental clinic opened soon after, in August.

Bernard Dishler, DDS, a 1962 graduate of Temple School of Dentistry; founder, Yorktowne Dental Group; and president of the board of HealthLink, explained that the founder of the clinic, Eugene Jackson, was concerned about low-wage earners who had no dental or medical insurance. So 16 years ago, he paid for the opening of a medical and dental clinic. “When the Affordable Healthcare Act was passed, most of our medical patients were eligible for insurance and the board decided to cease medical operations and expand the dental clinic. The clinic is staffed with mostly volunteer dentists. To be eligible for treatment, at least one member of a family must have a job and the family income cannot exceed 250% of the poverty level.

During a meeting of Kornberg's Board of Visitors, Dr. Dishler learned that the dental students were having difficulty getting their endodontic (root canal) requirements due to

the cost of the procedure for the clinic patients. “We invited Dean Ismail to visit the clinic. Since we had expanded the clinic we had some unused capacity. The Dean liked the idea of the students' working in a community clinic.”

So Kornberg decided to send a faculty member with four or six students weekly. They treat HealthLink patients who need endodontic work, and the treatment is free because it is a clinic. In fact, the board decided to provide crowns for these patients after the endodontic treatment is completed. “We had not been providing crowns for patients previously,” said Dr. Dishler, “but once a tooth is treated endodontically, a crown is necessary for the long-term health of the tooth.”

This initiative benefits Kornberg students in that they are able to fulfill one of their requirements for graduation. “But, I think there is a secondary benefit,” added Dr. Dishler. “The students see firsthand how important it is for dentists to volunteer to help the underserved. And, our patients are benefiting. They are receiving treatment that they otherwise would not have received.”

Dean Ismail concurs with Dr. Dishler. “We are proud to be associated with HealthLink. This partnership furthers our school's commitment to provide care to underserved populations, while also giving our students the opportunity to perform more treatments. Patients will gain access to advanced endodontic treatments and restorative dentistry.”

Dr. Dishler is now at the end of his fundraising responsibilities with the clinic. Jackson and his wife were very generous with the clinic, but they are both deceased. So the clinic depends on the community to support its efforts. ♦



# Meeting Diverse and Complex Needs of the Elderly

THE CONCERN IS REAL, THE SOLUTION EVOLVING.



**S**eniors in the U.S. make up a population that's dramatically on the rise. Although many have the resources for oral care, many others do not. That is one issue: affordability. Another is access. How do you care for the underserved who typically don't live in a group situation, such as a nursing home, where services can be efficiently provided? Yet another issue is the high morbidity and mortality of this population. How do you address their widely varying physical limitations; their chronic disorders; their complex set of medical, social and psychological issues?

For instance, notes Dean Ismail, the elderly can't sit in a chair for an hour. "So we can't serve Medicaid seniors the same way we serve Medicaid

children. The children's model just doesn't apply."

To seek some answers, Temple Dental is working on the first stages of a pilot program. Its initial step was purchasing a clinic two years ago from KleinLife, a Jewish community center in Northeast Philadelphia serving about 6,000 area residents with a variety of health, cultural, educational, athletic and social programs.

Twice a week, faculty members from Temple Dental provide education, outreach and low-cost services that include cleanings and preventive care, full examinations and X-rays, as well as restorative dentistry, such as crowns, implants and dentures. While the clinic is open to all the

underserved elderly, the target population is those who use KleinLife services. Notably, the clinic is designated provider for the country's largest number of Holocaust survivors. And they receive free dental care if they're without private insurance or other coverage.

Yet, due to their relationship with established providers, most of the KleinLife members are not using Temple Dental Clinic services. That reluctance to switch from a primary care provider to a clinic is also true for seniors generally.

## Cutting edge but financially challenging

"We're in the first stages of a difficult model that's also financially challenging," emphasizes the dean, "but it's unique, cutting edge." He adds, "Now that we're in the same building with the school's medical arm, we're working closely with them. And in their KleinLife clinic, they're finding the same problems."

To determine best ways to care for the elderly, Kornberg has hired the Fox School of Business to gather opinions from patients and stakeholders. "We are providing preventive services and follow-up and avoiding complications," says the dean, "but we need much more study. We need one to two years, maybe more."

He continues: "As we build capacity for care and work to sustain this model for seniors, we're going to rely on donations. And that's a call for alumni to help us." ♦

# “It changed my life.”

*Although each of Kornberg’s four mission trips is a bit different, the response of students and faculty who go to underserved countries is the same. Transformation not only happens for the children and adults with such great need of dental care. Transformation also happens for those delivering the care.*

## WHAT THEY ACCOMPLISHED

Even before the student/faculty team goes to the Dominican Republic in November, Kornberg’s mission trips to Haiti, Jamaica and Peru changed lives this year with much-needed dental services for more than 1,200 patients:

- 1,000s of extractions
- 100s of cleanings
- 100s of fillings
- Life-saving treatment
- Preventive care, especially for children
- Nutritional counseling
- Oral health education

## Dominican Republic

Planned for early November, anticipation is the most apt description for this trip. Dr. Stanton Braid and student leader Jessica Lam, '18, are working with the Harrisburg Rotary Club to organize the trip. The Rotary is a key participant because they started the project in 1995, initially to purify village spring water and later to provide medical and dental care. Kornberg students and faculty joined the effort in 2005. Now they depend on the club to handle logistics, raise money for supplies and send people to help. This year, four principals plus other dentists and physicians from the club will join Braid, Lam and seven other students.



“I’ll be getting down to basic dentistry, helping those in need despite cultural and environmental barriers. It’s everyone’s first time there, and I just want to be a better dentist, to get patients out of pain.”

— Jessica Lam, '18, student leader





**“I particularly remember one 15-year-old girl. She has Down Syndrome, and this was the first time she had seen a dentist. She had a cleaning and was so appreciative, so sweet and tranquil. Our ability to work on people who are so appreciative is very gratifying.”**

—Amanda Clemente, '18, student leader



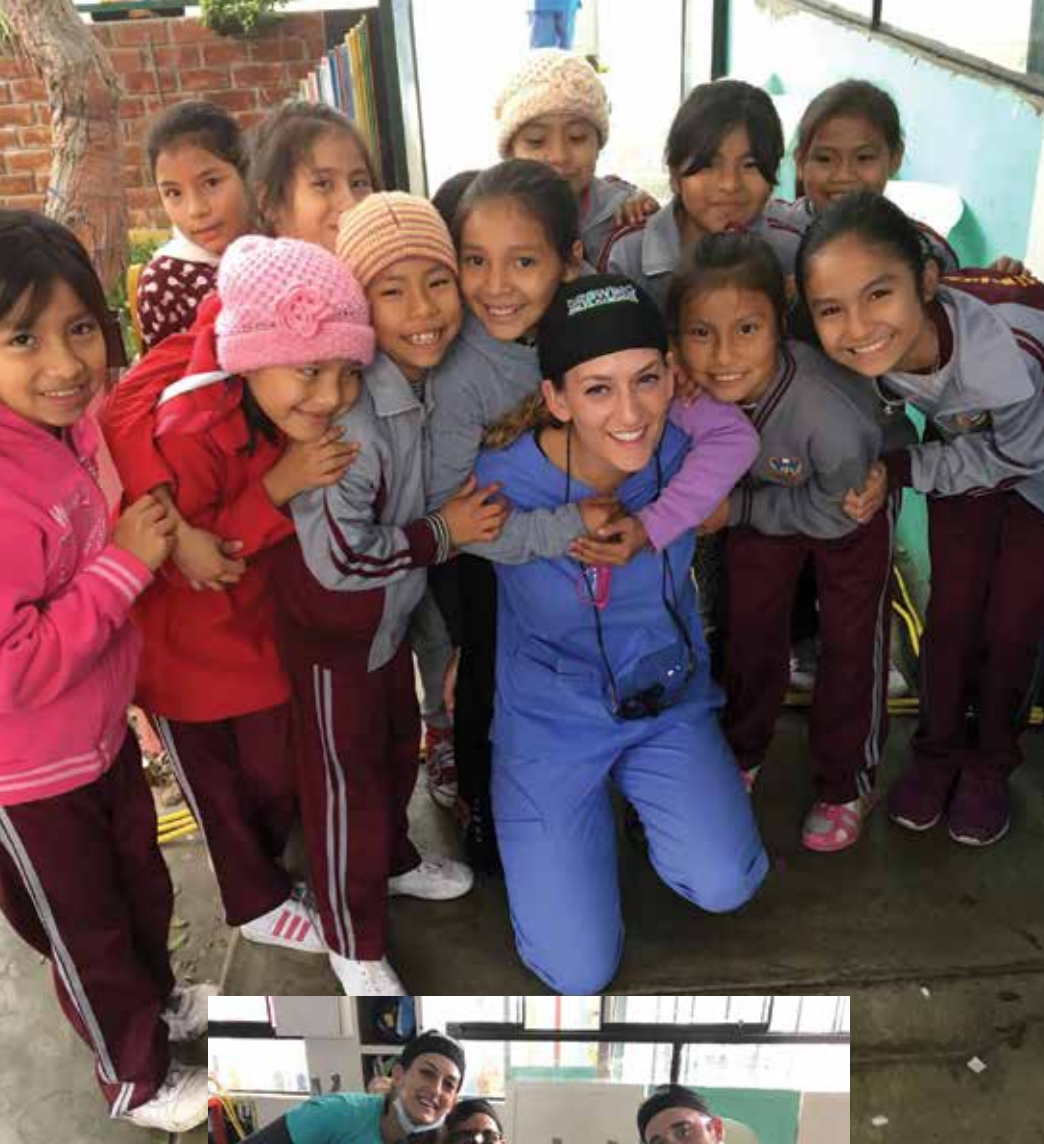
### Jamaica

In a country where hospitality is the main industry, a good smile is everything. To be employed, Jamaicans need good-looking teeth, despite the havoc that chewing sugar cane and drinking lots of juices creates. Kornberg’s student fraternity Xi Psi Phi, known as ZIP, organizes each trip and fundraises for instruments, supplies and travel expenses. Appropriately, 1000 Smiles, the dental arm of Great Shape! Inc., is one of the outside sponsoring organizations. It partners with the Sandals Foundation and Sandals Resorts International for first-class accommodations that include mission-trip luxuries: a clean bed, good food and even a hot tub. Working with 17 students were faculty advisor Dr. Robert Miller; Dr. Chinhua Hsiao, assistant professor, periodontology and oral implantology; plus Temple Dental alumni Dr. Aida Pasalic, Dr. Robert Bentz, Dr. Richard Gesker and Dr. Bart Santos.

COMMUNITY

Peru

It's the children who are the focus in Lima, Peru. And they receive comprehensive dental education and care that's the same as in the U.S. That's because extensive fundraising allows the team to use quality equipment, and borrowed X-ray units allow proper diagnosing. Emphasizing oral education and preventive services, Dr. Bari Levine, '16, has designed the program to provide services to schoolchildren. Kornberg and the organization Dr. Levine started, the Growing Smiles Foundation, now work closely with the local dental school at Peruvian University of Applied Sciences to help ensure sustainability and follow-up care. Working with her this year were 17 students; Dr. David Lampl, clinical adjunct professor, restorative dentistry; Dr. Jennifer Dobzanski; two pediatric dental residents, one at St. Christopher's Hospital for Children and one at Stonybrook Hospital; and, as always, Dr. Levine's family members and Temple Dental graduates: Clinical Professor in Post-Graduate Periodontics and Dental Implantology Dr. Robert Levine, Clinical Adjunct Instructor in Pediatric Dentistry Dr. Sheryl Radin and pediatric dentist Dr. Ross Levine.



“Every trip I learn more about public health, dentistry and myself. It's a highlight, doing actual dentistry. When I came to Kornberg, I wanted to go into pediatrics. After these trips, I'm 100% set on pediatrics.”

—Stephanie Calora, '18, student leader





## Haiti

Haiti is a mostly rural and impoverished country; 45% of its population is undernourished. Dentists and even hospital beds are in short supply. Conditions are challenging: no electricity, running water or suction; usually a shade tree but sometimes a thatched-roof hut or small building for cover. It's all very makeshift, but interest is so high that only a few students are chosen each year to participate. And would-be patients are eager for treatment. Several weeks before the Kornberg team arrives to visit 10 remote villages outside Jeremie, the Haitian Health Foundation alerts the community. Then the walking starts, with many Haitians traveling almost a week, sleeping alongside the road at night. Joining faculty advisor Dr. Josh Bresler, '03, were 10 students; Dr. Rachel Bresler; Dr. Cory Johnston; Dr. Tyler Twiss; and Dr. Miriam Ting.



**“It’s the best experience I ever had. They’re the strongest and most grateful people. The team became family, all huddled together in cars and then bunking together. On Monday and Tuesday, we were a little slow as we were getting comfortable in oral surgery. By Thursday, we could see how far we’d grown in just a few days.”**

—Jacob Kuruvilla, '17, student leader



# FIRST LEGACY DAY

## Included One-on-One Consultation

**IT'S A NEW EVENT**—one that responds to alumni interest. And attendee feedback indicates that the first Legacy Day, July 28, was a huge success.

Says Brooke Walker, associate dean of development and admissions, who organized the event, “We want to welcome legacy students to Temple Dental school. We want them to keep applying.”

About 10% of each Kornberg class are legacy students. Yet, with stiffer competition than many of their alumni parents experienced, the admission process can be disappointing to some prospective students. So in an effort to advise them about what they can do to be strong candidates, Kornberg designed a one-day program for alumni and their children.

The day began with Dean Ismail welcoming 25 students and their parents or grandparents. For an attentive audience of 75, he spoke about recent renovations and changes to the dental program.

Next came the ABCs of a successful application and how to be best prepared for Kornberg and other dental schools. Doing well in the sciences, taking advantage of mentorship opportunities, participating in community service were all noted, in addition to the Dental Admissions Test and an excellent GPA. Brian Hahn, director of admissions, led the two-hour morning presentation with help from Ariel Edwards, assistant director of admissions,



Corey Dickson; Neal Bozentka, DEN'86; Maianh Nguyen; Anh N. Ly, DEN'96



Dean Ismail; Mike Will; Samantha Roman; Mark Roman, DEN '88

## UPCOMING LEGACY DAY

If you missed the July event, **save January 12, 2018**, as your next opportunity to hear from the Office of Admissions about how to be successful in applying to dental school. To register, visit [dentistry.temple.edu](http://dentistry.temple.edu).



Michael Bydalek, DEN '89; Austin Bydalek; Ryan Bydalek

**“*‘My private meeting with Ariel was outstanding,’ noted one participant. ‘She was so helpful and emailed me within a few days of Legacy Day, answering all the questions I had that required research. The whole day was outstanding. I can’t stop telling my friends and family about Temple Dental.’***”

and Mustafa Badi, chair of admissions. On hand to answer additional questions were Kendra English and Terry Griffin from Student Services.

As the group toured the campus, including the dental clinics, talked with current students about their experience at Kornberg and ate lunch, individual prospective students had an opportunity to talk one on one with an admissions counselor. “My private meeting with Ariel was outstanding,” noted one participant. “She was so helpful and emailed me within a few days of Legacy Day, answering all the questions I had that required research. The whole day was outstanding. I can’t stop telling my friends and family about Temple Dental.”

Commenting about goals for the event, Walker says, “We geared the presentation to high school students and college freshmen and sophomores who are thinking about dentistry as a career. The younger they are when participating in the day, the better, so they have time to prepare.”

## NUMBERS TO KNOW: 2017 Temple Dental enrollment profile

<b>Total Applicants:</b>	<b>3007</b>
<b>Enrolled:</b>	<b>140</b>
<b>Average Age:</b>	<b>24</b>
<b>Average DAT Score:</b>	<b>20.6</b>
<b>Average BCP GPA:</b>	<b>3.41</b>
<b>Average Cumulative GPA:</b>	<b>3.53</b>
<b>Total applications nationally:</b>	<b>approximately 11,000</b>
<b>Total applications to Temple:</b>	<b>3,007</b>

# Taiwan: A Pivotal Experience



*Returning to Taiwan, Dr. Bagramian learned that the dental clinic he established opened a new page of dental service.*

**F**or a recent Temple Dental graduate wanting to travel, the offer was too good to turn down. Go to Taiwan for a year; earn a small stipend while costs of transportation, room and board are covered; and treat the people there. Dr. Robert Bagramian, '60, was 27 and admittedly “a naive young dentist,” but ready for his “most important experience.”

Sent under the sponsorship of the Presbyterian Church to Changhua Christian Hospital (CCH), Bagramian found medical services but no dental care. A bit surprised, he asked, “What should I do?” and was told, “Do what you think is important.”

So in the tiny hospital with two English doctors, one American surgeon and missionaries who were ministers and nurses, Bagramian set up two dental chairs, trained residents, taught at the local dental school, learned the language, ate the street food, connected with the local population and generally loved the experience. The year turned into almost three, and he left only because he knew he wanted more training.

Describing that time, he wrote in the *Journal of Public Health Dentistry*, “As I returned home I realized that the Chinese had given me much more than I ever could give them, because I experienced a feeling of sharing dental knowledge and skill with a people so eager to accept what I had to offer.”

Looking back, he says, “It was an unbelievable thing; we were doing great stuff. It changed me, gave me tools and skills, and laid out my objective. It

made me the person and professor I am today and started my career.”

In 2013, CCH celebrated the 50th anniversary of the dental clinic, now with 41 chairs, an international accreditation and a comprehensive array of services in one of Taiwan’s largest modern medical centers. A film produced especially for the occasion recognizes Bagramian as “the pioneer of modern dental service in central Taiwan.” He is remembered as the deeply committed dentist who spent time before every procedure explaining oral hygiene to a patient, who was concerned about the education of dentists and started teaching them, who saw the needs and set a strong foundation for the future. How far the clinic has come still amazes him, even as he notes, “The important thing is that we worked together to improve the health of Taiwan.”

That concern for public health became a recurring focus back home. He worked in the Health Department of Philadelphia; was visiting staff in the Oakland, California, Health Department and with WHO in Geneva, Switzerland; and was director of the Community Dental Center in Ann Arbor, Michigan, among other positions. Meanwhile, he earned an MPH in epidemiology at the University of North Carolina and a DrPH in epidemiology at the University of Michigan, becoming a professor and chair of the Department of Community Dentistry there and later chairing the Department of Preventive Health Care.

### Global public health

“From the beginning, I’ve had an international interest,” he says. “I see how other countries deal with oral health and share my experience and expertise with dental schools. I’ve

been a visiting professor in Singapore, Malaysia, India, Switzerland and Armenia.”

Working with students and their patients, he has researched healthcare behavior, epidemiology, delivery of care, etiology and health disparities. All the clinical studies have been collaborative, he says, looking at preventive measures that can impact better health and improve quality of life. “Quality of life is related to oral health, especially if you’re in pain, can’t drink water, can’t eat ice cream and don’t want to smile,” he emphasizes. “It’s an important field, gaining momentum. It’s evidence-based dentistry—whatever we do has to have some scientific research support.” His most recent research is in Armenia, studying the wide range of health issues and why dental conditions are worse. “It’s challenging, interesting and satisfying,” he says.

Considering his early years, he says his parents were immigrants who valued education highly and insisted he go to college. Working with his father in his shoe repair business, Bagramian went to Temple as an undergraduate. Asked why he then chose Temple Dental School, he says, “My parents encouraged me to go beyond my environment and seek education to have a better future, perhaps through a professional career. I found that I enjoyed the

classes and clinical experiences at Temple and that I could indeed make a contribution by improving the oral health of others. I can honestly say that I made the right decision and have enjoyed all aspects of my profession.”

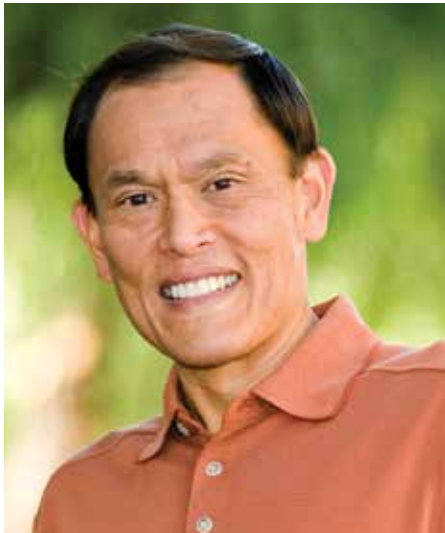
He adds: “I’ve had a career and life that’s unbelievable. I never predicted that I would end up a professor at the University of Michigan. I come from very humble beginnings with not many financial resources, and many of my neighborhood friends weren’t necessarily college bound. I feel a deep gratitude to Temple. It started me on my path and gave me the tools. It was a tremendous opportunity.”



*Then and now: During the 40th anniversary of establishing Changhua Christian Hospital’s Dental Department, Dr. Bagramian and his previous dental assistant, Dr. Samuel Chwang, reflect on their years together in Taiwan.*



## Appreciating Our Educational “Backyard”



**Dr. Randy Ligh** urges alumni to “give back to the place where we earned, and were given, the opportunity to flourish in a great profession.”

By Randy Q. Ligh, DDS, MA, '76

**A**s I sit back and reflect on where I am today as a dental practitioner, where I was as a young adult and my journey to the present, certain destinations have had quite an impact.

Prominent among them are the University of California (Berkeley), University of California (Los Angeles), University of the Pacific (Stockton) and certainly Temple University School of Dentistry. It's where my dental journey started. It's my “backyard” that Russell H. Conwell, Baptist pastor and Temple University founder and first president, described in his famous “Acres of Diamonds” speech in 1889.

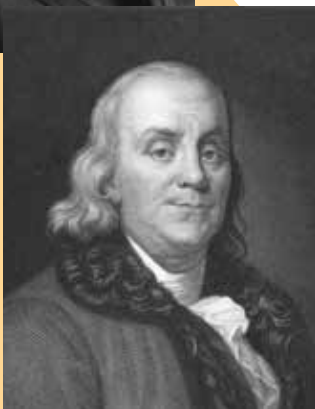
That moving plea urged us to recognize opportunities right in our own backyard. For Dr. Conwell, Hattie May Wiatt provided the example. A member of his congregation, Hattie died young, leaving a modest contribution to the church of just 57 cents. But that small sum had a profound effect. The money helped purchase property that would become an evening school and later Temple University. Conwell literally was able to dig in his own backyard and bring education to North Philadelphia.

Today, Dr. Conwell's speech still resounds with us. We have the Temple University football team with diamond decals on their helmets and diamond trim on their collars. We even have this magazine named *Diamond*.

In addition to Russell Conwell, I think of the ubiquitous legacy of Benjamin Franklin. Noted author, inventor, diplomat, philanthropist, statesman and scholar, he famously said, “The only thing more expensive than education is ignorance.” Also: “If a man empties his purse into his head, no man can take it away from him. An investment in knowledge always pays the best interest.”

I see the overriding theme here as: We don't need to look far to invest in knowledge. We can plant in our own backyard. We can give back to the place where we earned, and were given, the opportunity to flourish in a great profession.

Let's continue Hattie May Wiatt's tradition of giving with your personal best gift today or by putting Temple Dental in your estate plans. I encourage all of you to recognize this acre of diamonds.



*Two notable Philadelphians, Temple University Founder Russell Conwell and Benjamin Franklin, recognized the value of providing educational opportunities.*



## Naming Opportunities

**It's Time!** Join us as we transform the Old Dental School 4th floor upward and onward. The Kornberg School of Dentistry invites you to help revitalize the outdated space to create a vibrant new student and faculty collaborative and research space. Yes, Temple Dental has first-rate students and faculty, but the 4th floor is behind the times. Converting the nearly 16,000 square-foot space will take our student learning experience and faculty research enterprise to the next level.

**Student Life Center:** The epicenter for our students, the nearly 16,000 square-foot space will house the Student Café, the Digital Learning Lab, and Collaborative Meeting Rooms. The Student Life Center will be utilized by the entire dental student body and will be their home away from home.

Naming Opportunity: \$1,000,000

**Café:** The Student Life Center will house a Café (4,716 sq. ft) for dining convenience and socialization. Without leaving the building, the students and faculty will be able to dine in comfort year round.

Naming Opportunity: \$300,000

**Digital Learning Lab:** Cutting-edge technology is one of the hallmarks of today's learners. The Digital Learning Lab (2,400 sq. ft) will keep our students in the forefront of our ever-changing profession.

Naming Opportunity: \$150,000

**Collaborative Meeting Rooms:** Collaboration is key to success. Four meeting rooms (400 sq. ft) will allow our students to share and create together.

Naming Opportunity: \$20,000 x 4 = \$80,000

**Oral Microbiome Lab:** Support Temple Dental's growing research enterprise in oral microbiome. The 2,618 sq. ft. research lab will be state of the art.

Naming Opportunity: \$400,000

For more information, please contact Brooke Walker, associate dean of development and admissions, at 215-707-7887 or email at [brooke.walker@temple.edu](mailto:brooke.walker@temple.edu).

## DENTAL REUNION 2017

A lovely reunion evening of cocktails, dinner and alumni awards was attended by almost 100 people on May 5, 2017, at the Loews Philadelphia Hotel. Special recognition was given to the 50th Reunion Class of 1967; keynote speaker was Dr. Robert Wartell, DEN '67. The 2017 Alumni Awards recipients honored were: Dr. Ernest Dellheim, Distinguished Education Award; Dr. Mark Meraner, Distinguished Service Award; Dr. Bhaskar Savani, Distinguished Business Award. Heartfelt thanks to all of our Reunion Ambassadors for your contributions to this very special evening.



S. Rand Werrin, DEN '67; Aaron Shatzer, DEN '67; Richard Sulkes, DEN '67; Jay Melvin, DEN '67; Kenneth Stout, DEN '67. Student: Jay Patel, Class of 2019



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Seated: Alan Trachtenberg, DEN '67; Lawrence Tractenberg, DEN '67; Gordan Kalmanson, DEN '67; Marvin Levine, DEN '67  
 Standing: Kenneth Stout, DEN '67; Robert Wartell, DEN '67; Aaron Shatzer, DEN '67; Richard Cavanaugh, DEN '67; S. Rand Werrin, DEN '67



Seated: Doreen Venneri, DEN '87; Dina Wasileski, DEN '87; Marsha Kirschner, DEN '87; Pamela Brennen-Clarke, DEN '87  
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Plan now to attend the  
**TEMPLE DENTAL ALUMNI WEEKEND**  
 May 4 - 5, 2018

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Named for Russell H. Conwell, Temple University's founder and first president, the Conwell Society celebrates those who sustain Temple's educational enterprise through annual leadership gifts of \$1,000 or more (or \$500 or more for graduates of the last decade). The following donors gave at the Conwell Society level for fiscal year 2017:

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## Message from the Dental Alumni Association President

**Y**ou're in! Yes, if you're a dental alumnus/a, you're a member of the Dental Alumni Association. Whether you live within a few miles of Temple or thousands of miles away, you belong to more than 7,500 living dental alumni around the world.

As a proud graduate, I invite you to get involved by making a gift to help our students get the most out of their dental school experience.

Direct your gift to benefit the *Temple Dental Alumni Association*. With no administrative overhead, all funds raised will directly benefit our students.

- New student orientation socials, such as the annual BBQ by ASAD, Wine and Cheese meet and greet with alumni, Ice Cream Social with faculty, student-led pre-orientation socials, and more
- Partial support to celebrate the White Coat Ceremony for rising juniors
- Overseas service trips to Haiti, Peru, Jamaica, Dominican Republic

Our students are strong collaborators and model, global citizens. Please join me and fellow alumni by investing in our students today. One gift of \$100, \$250, \$500 or \$1,000+ to the *Temple Dental Alumni Association* will cover your dues (\$85) and your gift to benefit our student programming. Your generosity will be recognized in the *Diamond* magazine, unless specified otherwise.

In closing, mark your calendars for **May 4–5, 2018**—our next Alumni Reunion celebration. Come visit the school and reconnect with friends. All alumni are invited, and a special welcome celebration is in store for the Reunion Classes ending in 3 and 8.

Thank you for making a difference in the Temple Dental community!

Sincerely,

Jason Bresler, DMD '06  
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\*The Wachman Society

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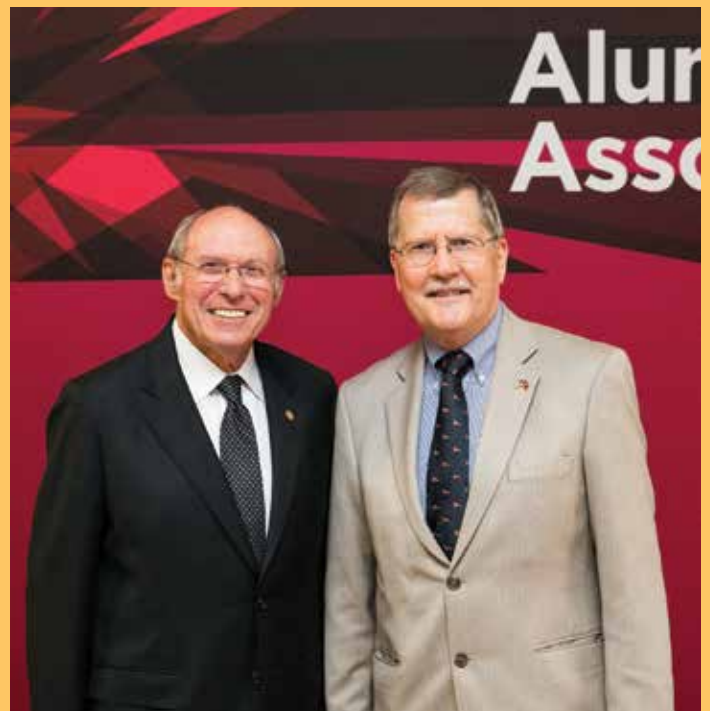
## Honoring Work with the Underserved

DR. BERNIE DISHLER, DDS, '62, IS INDUCTED INTO TEMPLE'S GALLERY OF SUCCESS

**T**hey're children, adults and seniors. They're the disabled and medically fragile. They're Pennsylvania's underserved who need preventive and restorative dental care. And Dr. Bernie Dishler continues to meet the need through three nonprofit organizations, MOM-n-PA, Health-Link and Dental Lifeline Network. For this inspiring work and more, on October 12 he was inducted into Temple University's 2017 Gallery of Success.

Each fall during Homecoming Weekend, the Temple University president and the Temple University Alumni Association recognize an alumnus from each Temple school or college for using the skills and knowledge learned here to chart a path in his or her studied field. As a member of this select group, Dr. Dishler will be featured throughout the year in the Gallery of Success exhibit in Mitten Hall.

Dishler founded MOM-n-PA in 2013, using an acronym for "Mission of Mercy." A large-scale, annual, free 120-chair, all-volunteer dental clinic, it's been in five communities in Pennsylvania, from Philadelphia to Erie. Over five years,



Temple University President Richard Englert (right) recognizes the important community outreach of Dr. Dishler.



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a total of 4,005 volunteers have provided more than \$4 million in dental care to more than 7,000 patients through approximately 26,000 procedures.

Additionally, Dishler is board chair of HealthLink Dental Clinic, now in a partnering arrangement with the Dental School, thanks to his efforts. He also is chair of Pennsylvania's Dental Lifeline Network, which donates care to the state's disabled, elderly and medically fragile.

Beyond this work, he has served as president of the Pennsylvania Dental Association, the Montgomery Bucks Dental Society and the Valley Forge Dental Association. For the American Dental Association, he has served in its House of Delegates, Membership Council and on the board of the Political Action Committee. At Kornberg, he volunteers as a member of the Board of Visitors and mentors current dentistry students.

For five decades he has practiced at the Yorktowne Dental Group and is currently at its Jenkintown, Pa., office.

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Vickie S Greenberg A Professional Dental Corp.

Robert Vignola, ENG '52

Donna Wallinger, DMD DEN '87

Steven R. Walls, DMD, DEN '89

Marie Rosso Waltz, CHPSW '79 and Michael P. Waltz, DMD, DEN '74

Ellen Warntz, CHPSW '63 and Jack Warntz

Joel E. Wasley, III, DDS, DEN '72 and Phyllis M. Wasley

John J. Wasniewski, III, DMD, DEN '08

Richard M. Waxler, DDS, DEN '65 and Deborah Waxler

Britton L. Weber

Nicholas L. Wengrin, DMD, DEN '82 and Janne Wengrin

S. Rand Werrin, DDS, DEN '67 and Karen Werrin

Irwin H. Wesler, DMD, DEN '60 and Dr. Marcia T. Wesler, EDU '60

Scott T. Whitener, DMD, DEN '03 and Venessa Whitener

Niteace C. Whittington, CST '08

Jeffrey J. Wiesner, DDS, DEN '76 and Laurell Wiesner

William P. Smith Trust

Gregory Paul Williams, DDS, DEN '81 and Lynne Williams

Howard A. Wimmer, DDS, DEN '79 and Nancy T. Wimmer, Esq. EDU' 73, LAW '94

Alfred J. Wolanin, Jr., DDS, DEN '77 and Mary Beth Wolanin

Lauren S. Wolf, DMD, DEN '10

Rolf B. Wolfrom, DDS, DEN '79

Michael K. Wong, DDS, DEN '83

Robert Emmett Wright, M.D., MED '65 and Carole Wright

Bernard John Wujcik, Jr., DDS, DEN '84 and Beth Grenewalt Wujcik, CHPSW '85

Harold B. Yaffe, DDS, DEN '70 and Linda Yaffe

Solomon Y. Yakubov, DMD, DEN '16

Cemil Yesilsoy, DMD, DEN '87

Yohan Kim Dental Corporation

Mary Yohe, CHPSW '62, EDU '68 and Thomas Yohe

Ya-Li Emily Yu, M.S., DEN '87

Robert R. Zimmerman, DDS, DEN '77

Walter H. Zuber, Jr. DDS, DEN '53 and Lillian Zuber

## CE SCHEDULE

**Friday, December 8, 2017**

**Full Crown Preparation** (Hands On)  
LIMITED ATTENDANCE!!!

Dr. Joseph Breitman  
9:00am – 12:00pm / 3 CE / TUKSoD  
Dentist \$225; DT \$125

### THE TEMPLE DENTAL COMPREHENSIVE SURGICAL IMPLANT COURSE

**Session #1:**  
**November 30-  
December 2, 2017**  
**Introduction of Oral  
Implantology**

**Session #2:**  
**January 25-27, 2018**  
**Diagnosis and Treatment  
Planning of Oral  
Implantology**

**Session #3:**  
**February 22-24, 2018**  
**Regeneration and Site Prepa-  
ration for Oral Implantology**

**Session #4:**  
**March 22-24, 2018**  
**Maxillary Sinus**

**Session #5:**  
**May 10-12, 2018**  
**Esthetics, Lasers and  
Mucogingival Surgeries**

## CALENDAR OF EVENTS

**Wednesday, November 29,  
2017**

**6:00 pm–8:00pm**  
**Greater New York Dental  
Meeting**  
New York Marriott Marquis  
Hotel  
Wilder Room, 4th Floor  
New York, NY

**Wednesday, March 7, 2018**  
**Science in Dental Practice Day**  
Temple Performing Arts Center  
Philadelphia, PA

**Wednesday, March 7, 2018**  
**5:00pm–7:00pm**  
**Greater Philadelphia Valley  
Forge Dental Conference  
Alumni Reception**  
Room to be announced

**Friday, April 27, 2018**  
**7:00–8:00 pm**  
**Pennsylvania Dental Associ-  
ation (PDA) Annual Meeting**  
Dessert Reception  
Hershey, PA

**Friday, May 4–5, 2018**

**Temple Dental  
Alumni Weekend**  
Events throughout the day  
at the Kornberg School of  
Dentistry  
Evening of cocktails, dinner  
and awards at Hyatt at The  
Bellevue in Philadelphia

**Friday, May 4, 2018**  
**3:00pm**  
**White Coat Ceremony**  
Temple Performing Arts Center

**Friday, May 18, 2018**  
**4:00pm**  
**Commencement**  
Academy of Music \*Tentative\*  
Philadelphia, PA

For more information contact Nicole Carreno at  
ncarreno@temple.edu or 215-707-7541.

Or visit our website at  
<https://dentistry.temple.edu/continuing-ed>

## IN MEMORIAM

**Dr. David “Doc” Donati**, ’84, of Brigantine, N.J., passed away on February 27, 2017. Born in Hazelton, Pa., he was the son of David B. and Carolyn (D’Amico) Donati. He was the loving husband of the late Dr. Christine (Reimer) Donati, who passed on November 16, 2002. David was co-owner and operator of Bayside Medical and Dental in Brigantine, N.J. with his son, serving the public of the island faithfully for over 30 years.

**Dr. Shelly Martin Greene**, ’51, passed away on July 5, 2017. Husband of Joanne E.; father of Joel (Nancy) Greene, Dana Greene and Dr. Aime (Craig) Berman; brother of Evelyn Ginsburg and Alvin (Sondra) Greenberg; grandfather of Clark, Leo, and India; also survived by many nieces, nephews, and his dog, Otis. He was a graduate of Central H.S. Class 181; Temple University Dental School, practicing in Hatboro, Pa., for 60 years; and a member of Lulu Country Club for 30 years.

**Dr. Norman Mitnick**, ’61, a longtime resident of Riverdale, N.J., passed away on Sunday, March 12, 2017, at Chilton Memorial Hospital in Pompton Plains. Norman was born and raised in Philadelphia. He attended Temple University, where he earned his dental degree. After graduating, Norman entered the Air Force, was stationed in Texas, and served as Captain Norman Mitnick, DDS. Following service, Norman moved to

Wayne, N.J., where he started his first dental practice. A second office was located in Newfoundland.

**Dr. Salvatore “Sal” Musco**, ’62, of Lake St. Louis, Mo., formerly of Windsor, passed away on Wednesday, June 28, 2017, after a long battle with Alzheimer’s disease. Son of the late Carmelo and Lucia (Giucastro) Musco, he was born in Providence, R.I., in 1929. Sal previously resided in Windsor, where his family was raised and he practiced dentistry for 39 years. He attended the University of Connecticut, Temple University School of Dentistry and was an Army veteran. He enjoyed golf, tennis and bocce; family, humor and Candi’s cream puffs.

**Dr. Philip S. Wasserman**, ’72, of Upper Saddle River, N.J. and Westport, Conn., passed away after a brief illness, on August 15, 2017. He was born in Brooklyn and graduated from Brooklyn College and Temple University Dental School. He was a pediatric dentist for over 40 years in Bloomfield, N.J., where he owned Dentistry for Children. He was a captain in medical service corp in the Army. Philip loved, skiing, sailing, and gardening. He is predeceased by Rona Wasserman. Philip is survived by his son, Scott Wasserman (Stacy); his daughter, Nicole Troisi (Jon); and four grandchildren. He is also survived by his dear friend, Ann Ali and her family, and his brother, Herbert Wasserman.

Arthur Petrella, DDS	DEN ’44
Paul M. Sherman, DDS	DEN ’48
Gerald Harold Rosnick, DDS	DEN ’49
Gerald J. Steinberg, DDS	DEN ’50
Shelly M. Greene, DDS	DEN ’51
Herbert Katz, DDS	DEN ’52
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Franklin H. Ewald, DMD	DEN ’72
Philip S. Wasserman, DDS	DEN ’72
Thomas Elbert Jenkins, DMD	DEN ’73
Donald O. Daurora, DDS	DEN ’84
David P. Donati, DMD	DEN ’84
Matthew J. Soranno, DMD	DEN ’88



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**ALUMNI WEEKEND**  
CELEBRATING OUR REUNION  
CLASSES ENDING IN 3 & 8 **MAY 4 - 5**  
**REUNION 2018**

Registration is now open! Visit [dentistry.temple.edu/reunion2018](http://dentistry.temple.edu/reunion2018)  
for a full schedule of events and registration information

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## DIAMOND

Maurice H. Kornberg School of Dentistry  
Magazine | Fall 2017

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