

DIAMOND

Maurice H. Kornberg School of Dentistry Magazine | Fall 2018



smart dental biomaterials
REGENERATION



Kornberg School of Dentistry

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MISSION

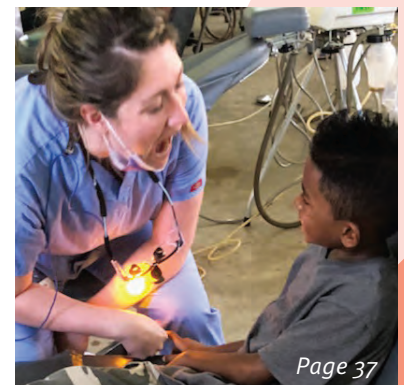
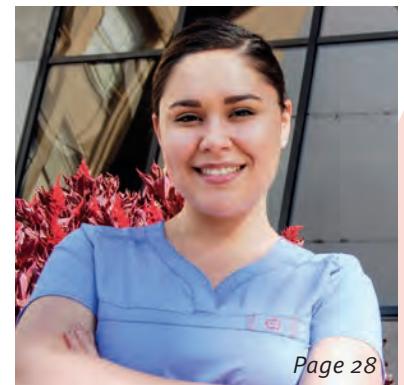
The Kornberg School of Dentistry promotes health and wellness through the comprehensive education of diverse general and specialty dentists utilizing inter-professional collaboration; providing compassionate, comprehensive, patient-centered, evidence-based and outcome-driven oral healthcare; engaging in research and scholarly activities; and serving the community.

VISION

The Kornberg School of Dentistry endeavors to distinguish itself as a dynamic teaching and learning community in which dental students and residents are inspired to become progressive healthcare practitioners, proactive public health advocates, inquisitive life-long learners and innovative leaders in addressing present and future healthcare challenges.

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THE NEW ERA OF SMART BIOMATERIALS AND PRAGMATIC RESEARCH



Dean Amid I. Ismail
Laura H. Carnell Professor

This year is my 10th anniversary as Dean of Temple University Maurice H. Kornberg School of Dentistry. If one word can describe these years, it's "smart." We've been smart in generating revenues, building networks, connecting with alumni and investing in students, staff and faculty. We've been smart in creating innovative programs to support our school. As a result, our new students surpass the national average in GPA and DAT scores. And we have a budget surplus that is renovating the infamous fourth-floor café in the old dental school.

Being smart has meant being new or innovative and making wise decisions. Today, visitors and alumni to the dental school feel a different "buzz" than what they experienced decades ago. Today, students look and feel happy, the clinics are full with patients and faculty are engaged with the students. Today, students, who are our future alumni, are treated with respect. There are no "saints" anymore at the dental school.

Being smart also has meant investing in research that will help the dental profession provide better care and promote health. When the Department of Oral Biology merged with the medical school in the 1980s, Temple Dental lost its research faculty and staff. Now, we have made progress in building novel and pragmatic research programs in the oral microbiome, dental and pulp regeneration, behavioral sciences and smart biomaterials. Also, just this fall, tenured Associate Professor Dr. Tellez-Merchán received a \$2.59M grant to support research in relieving dental anxiety.

In addition, Dr. Santiago Orrego, a mechanical engineer, has just completed building a laboratory with a new chewing machine. It will enable him to test dental materials in an environment of oral bacteria and saliva and in an artificial mouth where semi real-life testing of materials will be conducted. This new generation of materials will be able to repulse bacteria on the inner surfaces of dentures and at the surfaces and margins of restorations. Another potential research project is the development of new root canal sealers that can generate dentin and chemically bond to tooth structure.

In short, Temple Dental is on the verge of a major change in how education is delivered and in how research is conducted. While honoring the traditional models of care, we are creating new ones—ones that are better suited for a new generation of patients and populations.

Come visit your alma mater and experience the new dynamic of Temple Dental!

To arrange a visit and tour, please contact me at 215-707-2799 or at ismailai@templ.edu.



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Being smart also has meant investing in research that will help the dental profession provide better care and promote health.

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SMART DENTAL BIOMATERIALS FOR ORAL HEALTH



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The addition of
bioactive fillers in
dental composites has
greatly benefited the
success and longevity
of dental materials.
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By Santiago Orrego, PhD



Dental materials are the driving force in all disciplines of dentistry. They play a critical role in improving and restoring oral health. A wide variety of materials are utilized in dental practice, including composites, polymers, elastomers, metals, alloys and ceramics.

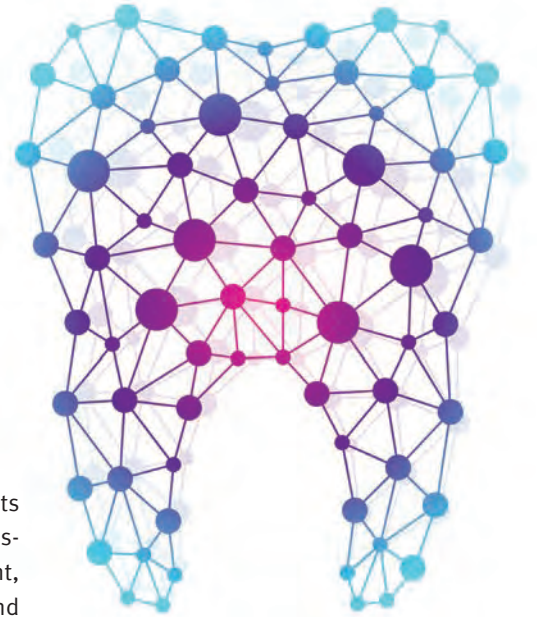
In the United States, about 50% of adults from 20 to 64 years of age have reported losing one permanent tooth due to an accident, a failed root canal or tooth decay. The demand for restorative dental care is tremendous. The replacement of a tooth structure damaged by disease or injury continues to be a large part of general dental practice. Unfortunately, dental hard tissues are unable to self-regenerate; therefore, restorative dental biomaterials remain a necessary instrument to reconstruct the form and function of dental tissues and re-establish proper oral function.

Implantable dental biomaterials are continuously exposed to the harsh environmental conditions found in the oral cavity. High mechanical forces, ever-changing pH, bacterial attacks, temperature fluctuations and wet conditions are just some of the challenges. Scientific research and understanding of how biomaterials interact with the body and surrounding environment has led to their successful evolution.

From bioinert to bioactive

The field of dentistry has shifted from reactive treatments to a preventive and conservative model. Historically, dental biomaterials were primarily selected by the type of bulk properties required for a specific process. These bioinert materials were passive and never designed to fully interact with complex living tissues and harsh environments. Today, this is no longer the case, as we have advanced tools to rationally design and process advanced biomaterials with specific properties in mind. In fact, the last few decades of research have led to the emergence of numerous advanced biomaterials with the capacity to tune and manipulate complex physical and biological properties at the interface of the tissue and the implanted biomaterial. This tailored interaction between the biomaterial and tissue is referred to as bioactivity.

The addition of bioactive fillers in dental composites has greatly benefited the success and longevity of dental materials. Traditionally, fillers were used to modulate mechanical properties, decrease thermal expansion, minimize polymerization shrinkage, delay abrasion and reduce swelling. The current generation of dental materials uses bioactive fillers to stimulate specific biological effects at the interface of the material and surrounding tissues. The desired effect will depend on the purpose of the bioactive filler. For example, restorative composites implanted with bioactive fillers release specific ions to promote remineralization at the resin-tooth margins. The potential gap formation at the tooth margin will



be prevented by the new minerals and the longevity of the restoration extended. Other fields within dentistry are benefiting from bioactive functionalities, including bioactive liners, cements, endodontics sealers and root end fillers.

Multifunctional bioactivity: more than just remineralization

While bioactive dental biomaterials are often utilized for remineralization, they are also responsible for producing combined antimicrobial and anti-enzymatic effects. A prime example of the multifunctional role is its application to the treatment of caries. Dental caries, a biofilm-dependent disease, remains a challenge in the improvement of oral health. Antibacterial fillers and monomers are adding new functionalities to bonding materials that prevent oral biofilm formation, infiltration and proliferation. These multi-functional therapeutic dental biomaterials have the potential to make cavity preparations even less invasive and to prevent early restoration replacement due to bond degradation and caries recurrence. These biomaterials, which inhibit disease and repair or replace lost tissue, are essential for the field of dentistry.

A new generation of bioactive dental biomaterials and formulations for restorative composites, glass ionomer cements, luting materials and preventive biomaterials is available to dentists. Most of them have evidence-based outcomes offering clinical advantages in restorative procedures and improving a dentist's ability to treat oral health conditions.

Embedding smart materials into dentistry

In the immensely diverse world of materials, there is an advanced class called "smart materials," oftentimes referred to as intelligent or responsive materials. What is unique about these materials is

their ability to change properties via external stimuli, which could include: mechanical stress, temperature, moisture, pH levels, light and other variables. Smart materials are capable of sensing and responding to environmental changes.

The field of dentistry is beginning to benefit from smart or bioresponsive biomaterials. For example, the effects of orthodontic wires fabricated with nickel-titanium (NiTi) alloys are surpassing the limitations of common stainless-steel wires (i.e., limited flexibility, high forces applied to teeth, constant re-tensioning). Smart biocompatible NiTi (commonly called Nitinol) wires are considered "superflexible," acting like a super spring that applies continuous, gentle forces over a long period of time. Once these wires are placed in the mouth, the individual's body temperature causes the wires to contract, applying a constant force to move the teeth. As a result, the patient's discomfort is reduced and visits to the orthodontist are minimized.

Another example of the benefit of bioresponsive materials is smart sutures used in oral surgery, which are fabricated with shape memory polymers. After the ends are loosely stitched and fixed, the temperature of the suture is raised above a threshold (i.e. thermal transition temperature), causing suture shrinking and tightening the suture with optimal force.

According to the report *Smart Dental Biomaterials For Oral Health*, the global market for smart biomaterials reached \$47 billion in 2009 and will rise to \$113 billion by 2025. Smart dental biomaterials are a transformative tool for the development of novel strategies in the creation and expansion of more effective and less invasive treatment options. The areas of prosthodontics, orthodontics, pediatric and preventive

dentistry, endodontics, oral surgery, restorative biomaterials and periodontics could highly benefit from smart tools and environmental-bioresponsive biomaterials.

The smart "biofuture"...

There is national interest in developing technologies to accelerate the development of oral biodevices. NIH-NIDCR's strategic plan 2030 is encouraging research in transformative solutions that significantly improve the evaluation, monitoring and management of oral and

overall health using multi-functional oral biodevices.

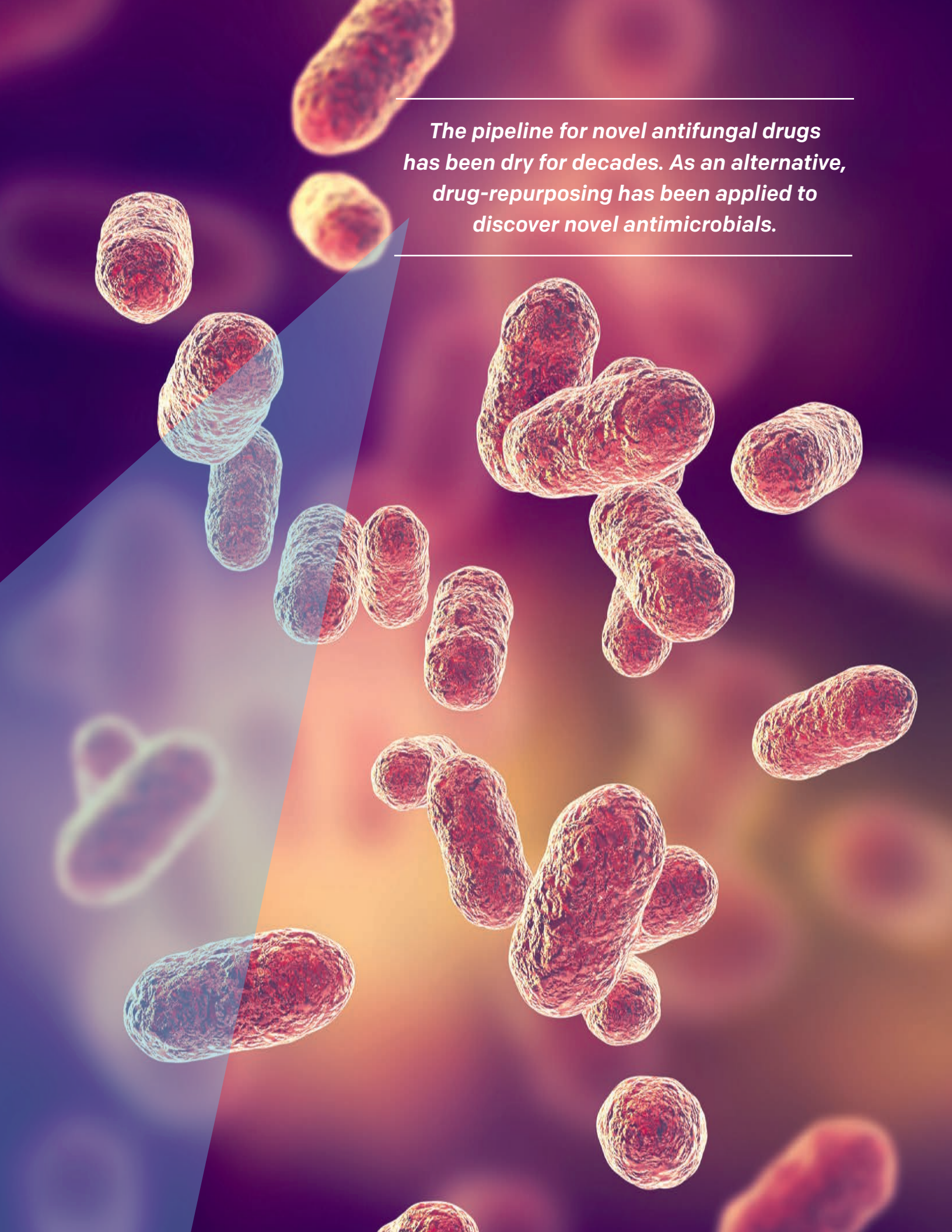
Smart dental biomaterials will enable the design of oral devices to diagnose disease and deliver local and systemic treatments. Imagine a biofeedback device embedded inside an implant or restorative biomaterial, such as an orthodontic appliance, that

would sense changes in temperature, pH, salivary flow rates, biofilm or sleep cycles. Another possibility for the future is a patch that senses dysregulated oral microbiota, alerting patients on health risks and, at the same time, delivering drugs and signals to promote a balance in the microbiome to restore oral health.

It's the perfect time for a profitable collaboration between industry, academia and government to develop a new generation of smart dental biomaterials. These three sectors must align to generate translational research that leads to dental innovation boosting the growth of the national economy and creation of additional jobs. ◆



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It's the perfect time for a profitable collaboration between industry, academia and government to develop a new generation of smart dental biomaterials.
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The image features a collection of 3D-rendered fungal cells. Some are rod-shaped with textured surfaces, while others are more spherical or elongated. They are scattered across a background that transitions from a dark purple/blue on the left to a bright orange/red on the right, separated by a diagonal line. The cells are rendered with a semi-transparent effect, showing internal structures. The text is positioned in the upper right quadrant, enclosed in a white-bordered box.

The pipeline for novel antifungal drugs has been dry for decades. As an alternative, drug-repurposing has been applied to discover novel antimicrobials.

NOVEL STRATEGIES FOR ORAL HEALTH TO SYSTEMIC WELL-BEING

CHARACTERIZING THE MICROBIOME OF DENTAL CARIES AT THE STRAIN LEVEL

By Nezar Al-hebshi, BDS, PhD & Sumant Puri, MSC, PhD



Dr. Al-hebshi (left) and Dr. Puri lead the research team that's assessing, replicating and modulating the oral microbiome.

It's the first study of its kind. Significantly, it opens new avenues for prevention strategies, such as replacement therapy, that can boost health-related microbial activities while offering a way to interfere with disease-related activities.

Typically, oral microbiome studies use targeted DNA sequencing, in which a marker gene like 16S rRNA is used to identify the types of bacteria in samples. However, this approach results in microbial profiles with low resolution, hardly to the species level. So assessing the role of the microbiome in health and disease is compromised.

Nonetheless, Temple researchers overcame those limitations in this study, which characterizes the supragingival microbiome associated with dental caries at the strain level. Collaborating with Cosmos ID, the research team used whole metagenome shotgun sequencing, coupled with a proprietary analysis platform, to analyze the samples. The platform exploits one of the world's largest databases of reference genomes to classify sequences from samples to the strain level. In addition, the research team looked at the functional traits of microbial communities to identify proteins, enzymes and metabolic pathways that may be involved in dental caries.

What they found was a number of species in the genera *Prevotella*, *Veillonella* and *Actinomyces* that have a stronger association with dental caries than *Streptococcus mutans*, the prime suspect in dental caries. They also found that particular strains of some of these species were associated with the disease. Yet, sister strains

of some species showed differential associations. For example, one strain from a particular species showed association with health and another strain from the same species showed association with dental caries.

Importantly, the study found that functional features such as bacterial deiminases and lactate dehydrogenase may play a protective role against dental caries, while attributes like urate, vitamin K2 and polyamine biosynthesis may contribute to development of the disease, potentially through boosting biofilm formation.

Iron chelation as a treatment strategy against *Candida albicans*

Candida albicans is the oral yeast that is the major component of the oral fungal community or the mycobiome. This yeast causes oropharyngeal candidiasis (OPC), denture stomatitis and life-threatening systemic infections among the immunocompromised. As a keystone pathogen, it plays a role in aggressive childhood caries by interacting with *Streptococcus mutans*. But *C. albicans* is seemingly becoming resistant to existing antifungal drugs.

The pipeline for novel antifungal drugs has been dry for decades. As an alternative, drug-repurposing—using existing drugs to treat off-label diseases—has been applied to discover novel antimicrobials. A promising direction is chelator-treated *C. albicans*. While *C. albicans* requires environmental iron for survival and virulence, host nutritional immunity deploys iron-binding proteins to sequester iron and reduce infection.

In this NIH-funded, collaborative study between Temple University and the University at Buffalo, iron chelation therapy was tested in a murine model of OPC to assess treatment efficacy. Also, chelator-treated *C. albicans* cells were tested for their ability to adhere and invade human oral epithelial (OE).

- Treatment of mice, starting two days prior to infection, resulted in significant reduction of *C. albicans* in the tongue tissue of infected mice. A significant reduction in salivary iron levels and inflammation of the tongue tissue was also noted.
- *C. albicans*, harvested from tongues of animals undergoing preventive treatment, had differential expression of 106 genes. Included were those involved in iron metabolism, adhesion to host tissue and response to host innate immunity.
- Chelator-treated *C. albicans* cells had reduced adhesion and invasion of OE cells in vitro.

Thus, the study showed the potential for manipulating the oral microbiome by using drugs aimed at specific components of the oral salivary environment—an environment that can be a potential source of nutrients required for growth of the oral microbial population.

Fine-tuning *in vitro* subgingival microbiome model

In their first attempt, the team was successful in growing in the lab a diverse microbiome on a Calgary Biofilm Device from clinical subgingival plaque samples. So far, the developed microbiome has captured more than 50% of the original diversity. To further improve the process, the team is optimizing media formulations and fine-tuning growth conditions to maximize similarity of the grown microbiomes to the *in vivo* ones.

For optimized testing of microbiome modulation, the subgingival microbiome model is indented. Then the team is looking at how prebiotics, probiotics or combinations of them can change the microbiome composition in favor of health, by inducing or maintaining what is called microbial “normobiosis.”

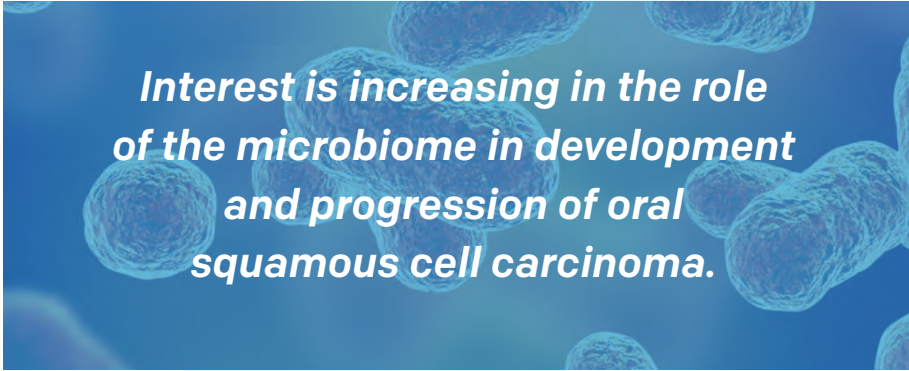
Role of commensal oral bacteria with anti-cancer properties

Oral squamous cell carcinoma (OSCC) continues to be a challenging malignancy with poor prognosis. Yet, interest is

effect of a panel of health-associated species—either individually or in cocktails—on proliferation, invasiveness and gene expression of OSCC cells.

Manipulating fungal cell wall to decrease disease-causing potential of *C. albicans*

C. albicans' cell wall is crucial for its interaction with oral tissue in the mouth, as well as for its interaction with oral bacteria. Also, cell wall composition affects the sensitivity of fungal cells toward some of the commonly used antifungals.



Interest is increasing in the role of the microbiome in development and progression of oral squamous cell carcinoma.

increasing in the role of the microbiome in development and progression of OSCC. Our own work and other microbiome studies have consistently identified a number of bacterial species that are differentially abundant between the tumor and healthy samples. However, researchers have exclusively focused on and further explored species that are enriched in the tumors or the pathobionts. Those associated with healthy tissues have been largely ignored and their potential use in the treatment of OSCC has not been explored.

In an ongoing project, the team will attempt to identify commensal oral bacteria with anti-cancer properties that potentially can be used in the treatment/prevention of OSCC. The study will explore the

In this ongoing, NIH-funded study, we are using novel approaches that can manipulate *C. albicans*' cell wall. We are hoping to increase its sensitivity toward antifungals, while decreasing its overall ability to interact with human tissue and disease that cause bacteria in the oral cavity.

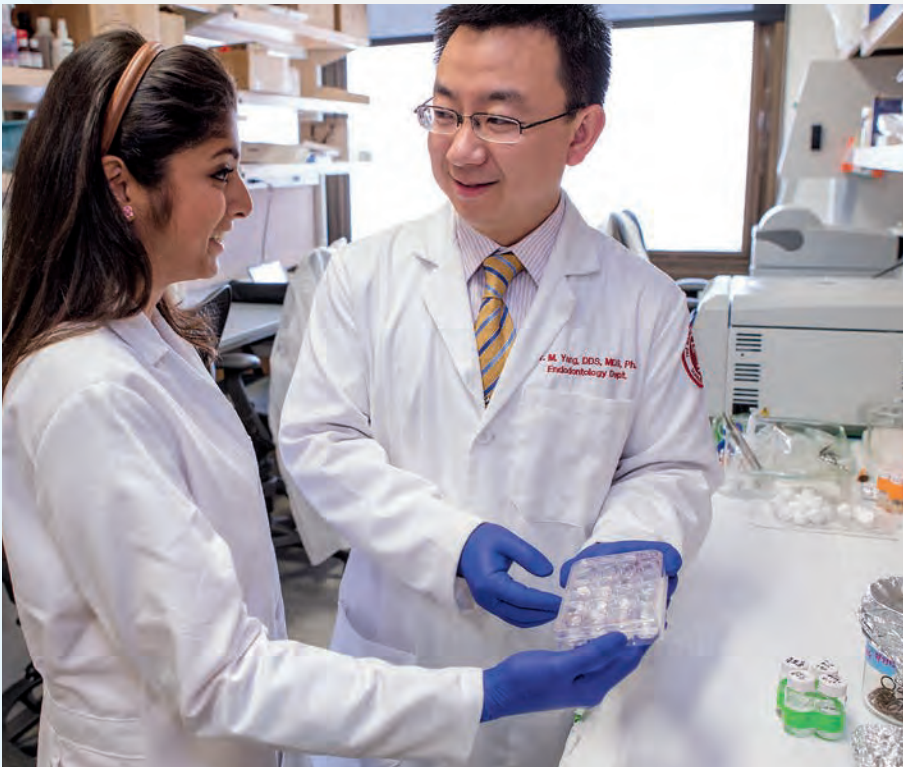
Exploring novel immunodeficient murine models for oral diseases

Macrophages and neutrophils are immune cells that play an important role in protecting the oral cavity against infection. In collaboration with the medical school, our team will explore novel murine models with specific defects in immune responses. The study will further our knowledge about the host immunity's role in keeping our mouth healthy. ♦



In their first attempt, the team was successful in growing in the lab a diverse microbiome on a Calgary Biofilm Device from clinical subgingival plaque samples. So far, the developed microbiome has captured more than 50% of the original diversity.

EXPLORING THE TISSUE ENGINEERING TRIAD: STEM CELLS, SCAFFOLDS AND GROWTH FACTORS



A leader in endodontic research, Dr. Maobin Yang is in his sixth year at Kornberg and recently achieved tenure. To develop integrative therapies in regenerative endodontics, he is collaborating with Temple's College of Engineering and the dental school's new research teams in the oral microbiome and smart biomaterials.

The scenario is all too common. An older child is climbing or running and falls or trips. A tooth fractures. Or perhaps the child's tooth is infected with decay and it looks fine but an X-ray shows no root. So the tooth stops developing, affecting self esteem and function.

"We see lots of teeth like this," says Dr. Maobin Yang, "and restoring them through regenerative treatment is a new treatment modality in the endodontic world." In fact, his study of this successful treatment won a best article award when published last year in the *Journal of Endodontics*.

Now he's adding to the research with a two-pronged approach: studying stem cell behavior and a smart dental scaffold. "I'm looking for a way that can help," he says. That's because Yang is both a clinician and a research scientist. As such, his goal is research that can translate to the clinical application to provide the most benefit to patients. For example, he has shown that a smart material can help immature permanent teeth develop after trauma.

Two projects

Yang's first project involves the behavior of stem cells in a nutrition-deficient environment. "If you take out the pulp tissue, you have no blood vessel or nutrition," he explains. "In most current published studies, cells are cultured in the ideal environment, but we are studying low oxygen level and nutrition deficiency in a culture medium that simulates the actual environment."

In a related second project, Yang is studying how to make a dental scaffold "smart." A conventional scaffold provides only the function of support, but the advanced scaffold can now be more bioactive and biomimetic to support the regeneration of the dentin-pulp complex. In short, the scaffold can be smart. From day one, since coming to Kornberg, Yang has been collaborating with Dr. Peter Lelkes, department chair of the Bioengineering Department at the College of Engineering, on scaffold research.

What they've created is a bilayered scaffold with different porosities on each side. The membrane material, PLGA, is an FDA-approved material that is already used in the medical field. PLGA is very cost effective and Yang's focus is to regenerate the dentin-pulp complex using this scaffold.

The two-layered structure of the membrane is very important because one layer is placed next to existing dentin to support the new dentin formation, while the other layer supports the pulp regeneration. "The membrane can be rolled up and then inserted into the root canal," he explains. "The membrane is smart because it does not require a specific culture medium to guide the stem cell differentiation. The membrane itself can promote cell differentiation and regener-

ation.” In July, Yang published this his report “Tissue Engineering Part A” in the *Journal of Endodontics*.

Other uses

Although Yang originally started using the smart membrane on the pulp regeneration, by doing this research more and more, he’s found that the membrane can be used in other ways. Now he’s studying periodontal cells’ behavior on the membrane.

For instance, he’s looking at the challenges of regenerating bone in periodontal disease when the gum has receded and a periodontal pocket has formed by periodontitis. His studies show that the smart membrane could be used in the guided-bone regeneration from the periodontal treatment. One layer of the membrane could guide bone regeneration, while the other layer could prevent the soft tissue growth into the space protected for bone regeneration.

Citing another project, Yang re-emphasizes that he is interested in the translation of research to what can be used in the clinic sooner. “I’m interested in improving and making small modifications that are supported with strong scientific evidence and that can benefit the clinical treatment.” For example, two years ago he looked at the protocol for the rinses during the regenerative endodontic treatment. Working with freshly extracted teeth from the clinic, he measured the release of growth factors from dentin when changing the sequence and concentrations of irrigations. The result showed significant differences on growth factor release by doing these changes. Based on the results, Yang raised the modification of the clinical protocol.

“Most researchers focus on how the irrigations kill or inhibit bacteria and protect stem cells,” he says, “but few focus on how the irrigation affects the release of growth factors.” His work produced what he calls an optimized protocol. “It’s an example,” he notes, “of how even the small things can help a clinician immediately.” His article in the *Journal of Endodontics* received an honorable mention award in 2016.

Yang appreciates Dean Ismail’s vision for the four major directions of research: microbiome, regeneration, smart materials and public health. And he adds that he’s very lucky that the school provides support for his lab, including space, design, renovation, equipment and staff.

Work with students

To help the students and residents with their research, Yang has been a mentor for many dental residents and honor students. “I

like to encourage them to address a small but interesting question from the clinical perspective,” he explains. They can think scientifically about why we are doing a clinical procedure and how it can be improved.”

So far, Yang has worked with 35 students. Some stay a short time, he notes. Some stay for a year. Almost every year, his student researchers have won first or second prize at Temple University Science in Dental Practice Day. Some residents even have won awards at the National Endodontics Association meeting.

“Not many clinicians are doing research,” he says. “How to manage my time is very challenging. Teamwork is very important. Currently, I have Dr. Yu Du, a visiting research scholar from China, collaborating on research work in my lab. Dr. Yu is from China’s Sun Yat-sen University, which has had a collaborative agreement with Temple Dental since 2013.” ♦

MEET MAOBIN YANG, DDS, MDS, PHD

*Director, Regenerative Health Research Laboratory
Director, Postdoctoral Endodontic Program
Associate Professor, Department of Endodontology*

Originally from Chengdu, China, Dr. Maobin Yang has served on the Research and Scientific Affairs Committee of the American Association of Endodontists. Notably, in 2013, he received the AAE Endodontic Educator Fellowship Award and the AAE John and Joyce Ingle Fellow Award. He also is on the editorial board of the *Austin Journal of Dentistry* and on the scientific advisory board of the *Journal of Endodontics*. He has published more than 50 papers and abstracts and several book chapters, has lectured internationally and is a reviewer for more than 10 clinical and scientific research journals.

He received his DMD from Temple University in 2015 and his DDS and MS degrees from the West China School of Stomatology at Sichuan University, China. Additionally, he received his PhD in biomedical sciences at the University of Connecticut in 2009 and then in 2012, completed his postgraduate residency training in endodontics there, receiving an MDS and certificate. In addition to his work at Kornberg, he practices endodontics in Philadelphia.

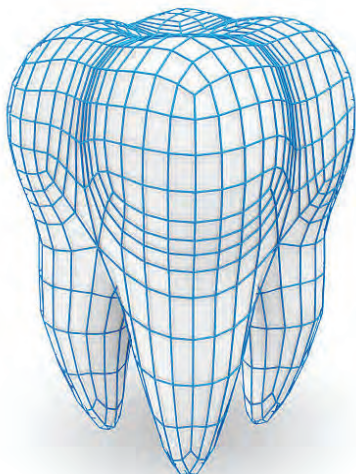
SMART BIOMATERIALS AND SMART SCAFFOLDS IN TISSUE ENGINEERING AND REGENERATIVE MEDICINE

By Peter I. Lelkes, PhD



Tissue Engineering (TE) and regenerative Medicine (RM) are two related terms often used interchangeably. Both terms were coined, nearly co-simultaneously, around 1990. To define the difference between these two concepts, tissue engineering envisions engineering a three-dimensional (3D) tissue-like construct from its constituents (cells, scaffolds, growth/differentiation factors) outside the body, whereas in regenerative medicine the focus is on using stem/progenitor cells and harnessing specific growth and differentiation factors to repair/regenerate diseased tissues and organs in situ, i.e., in the patient. The close relationship and interdependence of these two concepts is evident from the fact that the most important professional organization calls itself TERMIS (Tissue Engineering and Regenerative Medicine International Society).

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Tissue engineering requires a supporting 3-D scaffold and an appropriate bioreactor, whereas in regenerative medicine the host’s body serves as autologous bioreactor.
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Tissue engineering requires a supporting 3D scaffold and an appropriate bioreactor, whereas in regenerative medicine the host’s body serves as the autologous bioreactor. Regenerative medicine focuses on (stem/progenitor) cells and their secreted instructive products, such as soluble (humoral) growth factors and cytokines, that sequentially and in a co-ordinate fashion initiate and advance individual steps of the regenerative process by re-kindling some of the embryonic developmental steps leading to tissue formation.


From a synthetic point of view, the newest concept, developed in ca. 2010, is the idea of regenerative engineering (RE). As a converging approach, RE applies lessons learned from a number of seemingly distinct disciplines, as diverse as developmental biology and advanced biomaterial sciences, and utilizes “engineering principles” of designing, testing and optimization to rationally engineer regenerative “smart” biomaterials that will directly activate the complex cascades of tissue repair and regeneration. In this short overview, we will focus on two aspects of such smart, regenerative biomaterials: the biochemical/physicochemical materials, properties of the materials themselves and the physical properties of 3D assem-

blies of such smart biomaterials in the form of “smart scaffolds”.

Once translated into clinical reality, the goal of either approach is to engineer effective means for inducing and maintaining an organ/tissue-specific reparative and regenerative sequel in situ. Much of our current understanding of tissue healing/regeneration suggests that such a sequel requires the directed activation of the regenerative phenotype of certain immune cells, such as neutrophils and, especially, macrophages, while suppressing their inflammatory traits. While inflammation is correlated with the presence of the M1 macrophage phenotype, regeneration requires participation of macrophages of the M2 phenotypes. This phenotypic switch between M1 and M2 macrophages (a.k.a. macrophage polarization) seems to be critical for initiating and sustaining tissue regeneration.

Smart biomaterials:

Regeneration of damaged or diseased tissues and organs is a natural process in many animals, but (for the most part) cannot be recapitulated in a human adult. For example, amphibians, such as geckos or salamanders, can fully regenerate lost limbs or repair damaged internal organs.

A hand holding surgical forceps, with a blue-tinted background and a glowing blue sphere at the bottom. The forceps are positioned diagonally across the frame, pointing towards the bottom right. The background is a gradient of blue and purple. The glowing sphere is at the bottom center, with two thin lines extending from it towards the forceps. The overall image has a scientific and medical theme.

This ability is lost in humans beyond the fetal stage. (For an exception to this rule, visit the Philadelphia Art Museum and look for Peter Paul Rubens's masterwork "Prometheus Bound"). A major emphasis of ongoing studies in regenerative medicine and engineering, here at Temple University and worldwide, is to identify and employ "smart" regenerative materials that can jump-start a patient's own regenerative processes. Our most recent understanding of the tissue healing and regeneration acknowledges the crucial role played by cells of our immune systems, specifically of macrophages and neutrophils. The times have passed when these immune cells were recognized primarily for their ability to initiate and sustain the inflammatory process. Recent advances in our understanding of the interplay between immunology and regeneration have led to the recognition of the key role that specific immune cells, in particular some macrophage subtypes of the M2 family play in promoting wound healing and tissue repair. Hence, a key task of regenerative engineering is to identify/design smart biomaterials and engineer smart scaffolds that can initiate the process of macrophage polarization. Smart biomaterials are natural or synthetic or composite materials, which either through their physicochemical composition or by virtue of forming regenerative scaffolds can initiate the cascade of processes that lead to tissue repair and regeneration.

Natural biomaterials, such as extracellular matrix molecules, entail innate biological cues that govern their interaction with the cells (via integrin receptors) by promoting cell adhesion, cell proliferation, and tissue-specific differentiation. Such cues may reside "overtly" in the peptide sequences or

sugar moieties of glycosylated structural ECM proteins, such as collagen and fibronectin. The smartness of many natural biomaterials is primarily found in the presence of their (cryptic) oligopeptide sequences, which are revealed during the dynamic degradation of these materials and serve as functional cues to initiate a regenerative process. For example, the extracellular matrix molecule laminin has more than 200 such cryptic sequences, each of which can serve to stimulate (or inhibit) diverse functions, such as angiogenesis, neurogenesis, or cell proliferation.

By contrast, synthetic biomaterials offer the great advantage that some of their biomimetic properties can easily be tailored according to the requirements of a specific tissue. Key properties amenable to tissue- or application-specific modulation by chemical modifications include the time of degradation of these materials, or variations in their mechanical properties (stiffness, elasticity). For example, a material can be soft and elastic (e.g., for engineering blood vessels), or stiff (for engineering bone). Biopolyesters and other biotextiles can be custom-tailored to serve as anisotropic elastic patches to promote cardiac regeneration. The bio-functionality of synthetic biomaterials, such as polyglycolides or polyurethanes, can be enhanced by incorporating peptides or other bioactive molecules and then engineering these composites to release their "payload" in a controlled fashion. There are limited, if any, known interactions sites of cells with

synthetic materials, such as polyurethanes, although developing phage display libraries can reveal unique peptide sequences that may promote the adhesion of cells to such materials, especially if these modifications enhance calcification the biomaterials and thus accelerate/improve bone tissue regeneration.

Among the newer types of smart biomaterials are amphiphilic (nano) peptides that can self-assemble to form extracellular matrix analogs and/or modulate the expression of specific extracellular matrices at the interfaces of the regenerating tissues. Synthetic or natural hydrogels can serve as a unique porous matrices for the regeneration of soft tissues, such as musculoskeletal or cardiac tissues, or the dental pulp. Recent studies emphasize the regenerative nature of polysaccharides (such as dextrans) and proteins (or their bioactive degradation fragments) derived from plant-based alimentary products, such as pineapple, corn, and soy, all of which are being explored for enhanced repair and regeneration of cutaneous wounds, either in the form of hydrogels, 2D sheets, or fibrous scaffolds.

“

In the early stages of tissue engineering, scaffolds were mostly viewed as auxiliary tools and passive participants that enable the generation of functional 3-D tissues from tissue-specific cells and that would (degrade) once the job was done and the engineered tissues (e.g., bone) were stable enough to function on their own. ”

Smart scaffolds:

Smart biomaterials can be engineered into smart biomimetic scaffolds for promoting the functional repair and regeneration of diseased tissues. In everyday life, a scaffold is used during the construction phase as a (temporary) external support platform, which facilitates erecting a building according to a predetermined architectural plan. Once the building phase is completed, the scaffold is disassembled and the new building can stand on its own. Similarly, a tissue scaffold is required for the assembly of a given engineered tissue from its main biological constituents, i.e., cells, extracellular matrix molecules and growth factors/cytokines. In the construction business, people use the scaffolds to transport and assemble a variety of building materials into the new edifice, such as bricks, mortar, window-frames, windows,

etc. In tissue engineering, scaffolds *prima facie* serve a similar purpose. Actually, tissue scaffolds are a necessary “auxiliary cane” to provide the 3D spatial guidance and topological constraints for a nascent engineered tissue.

This is where the analogy ends. In the construction business, help in the form of a sturdy, external robust exoskeleton (external sturdy scaffold) is required to move the construction materials, to assemble them in the appropriate fashion, to fasten them together (mortar), etc. In all these operations, the scaffold is the passive support system that is dismantled once the construction is finished. By contrast, in the current concept of tissue engineering, a tissue scaffold is an active participant in the creation of functional tissue constructs. Thus, a smart tissue scaffold is not only the necessary physical support around or in which cells will thrive and form an organ-specific, tissue-like assembly. In many instances, a smart scaffold, by virtue of their physicochemical properties, will actively participate in the process of tissue regeneration by promoting key biologic process, such as macrophage polarization, angiogenesis, or the mobilization and differentiation of resident stem/progenitor cells.

In the early stages of tissue engineering, scaffolds were mostly viewed as auxiliary tools and passive participants that enable the generation of functional 3D tissues from tissue-specific cells. It was assumed that these scaffolds would go away (degrade) once the job was done and the engineered tissues (e.g., bone) were stable enough to function on their own. The next generation of scaffolds attempted to translate our emerging understanding of the role of individual extracellular matrix (ECM) proteins, and their

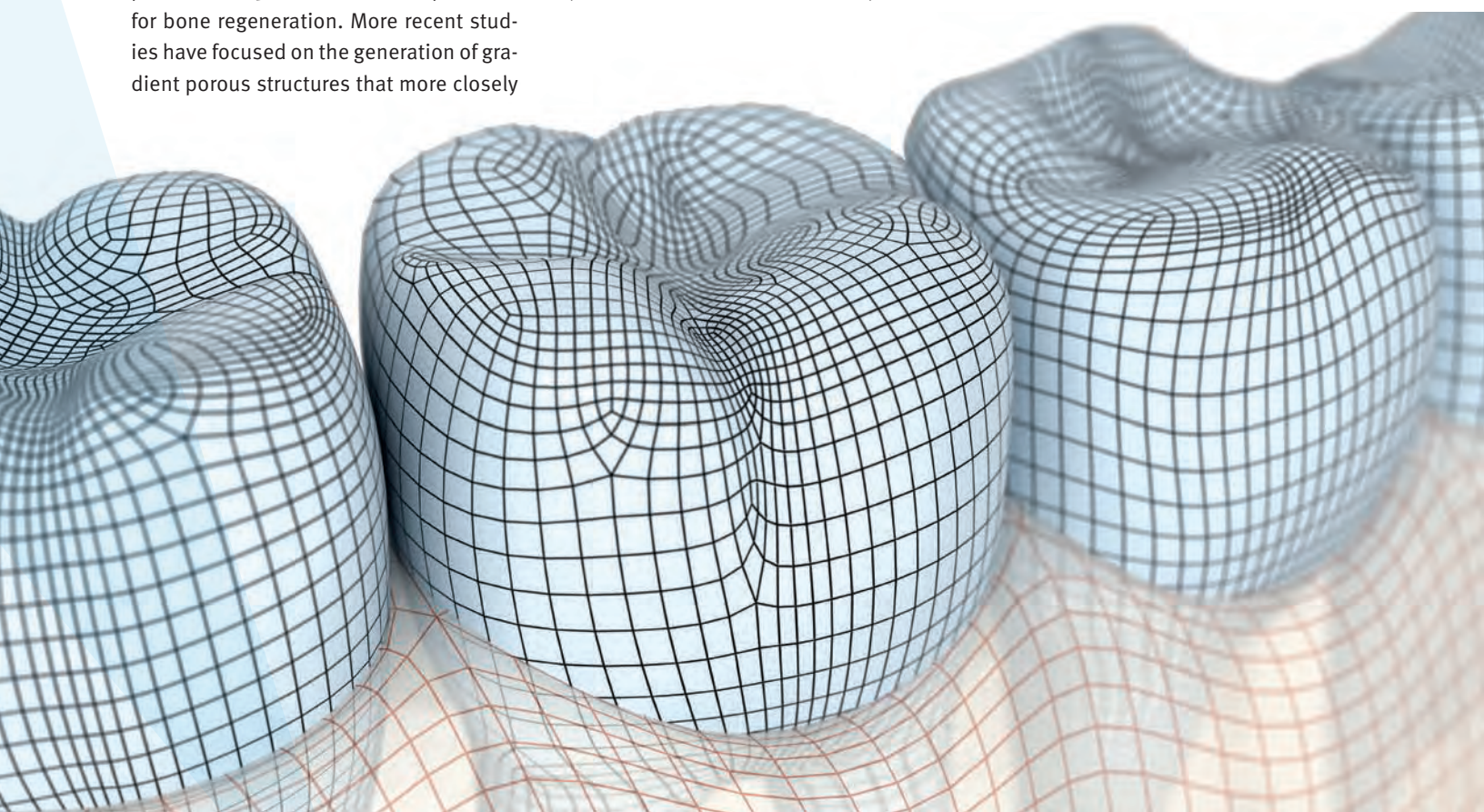
(cryptic) bioactive peptide and oligo/polysaccharide fragments in providing the necessary biological cues that are able to modulate tissue assembly, maintenance, repair and regeneration. These natural proteins/saccharides (holoproteins or specific fragments) can be covalently coupled to synthetic biomaterials and then released in a controlled fashion by specific, endogenous (naturally occurring) enzymatic reactions in the body, to liberate the stimuli that, directly or indirectly, activate their target cells. Neovascularization and angiogenesis are critical prerequisites for most tissues to function. For example, angiogenic biomaterials can release angiogenic factors to either directly or indirectly stimulate the formation of new blood vessels (angiogenesis) or attract blood vessels for the surrounding tissues (neovascularization), a critical component for the regeneration and stabilization of most engineered tissues once they are implanted into a host.

In addition to their regenerative biochemical composition, recent studies have shown that the regenerative properties of the assembled scaffolds are largely determined by their physical “appearance” (fibrous vs. porous vs. smooth), geometry (2D sheets vs. 3D tissue-like matrices), mechanical properties (stiffness, elasticity), electrical conductivity (innate vs. inducible electroactivity), porosity (micropores vs. macropores vs. impermeable), and surface topography (nano vs. micro vs. macro). Each of these physical features differentially contributes to the potential of a particular scaffold for initiating specific regenerative processes, e.g., by selectively promoting cell proliferation, migration and differentiation of somatic cells, or by activating regenerative immune cell phenotypes. For examples, some of the smart materials discussed above can form hydrogels, which then can be manufactured into porous scaffolds, with a wide control over their mechanical properties (stiffness), pore sizes, and pore interconnectivity. Thus, smaller pores < 50 microns preferentially stimulate angiogenesis (blood vessel ingrowth) and innervation, while large pores (200–300 microns) are preferred for bone regeneration. More recent studies have focused on the generation of gradient porous structures that more closely

mimic the complex architecture of bone, with smaller pores on the outside providing for enhanced stability. Furthermore, electrospinning, a process invented 80 years ago in the textile industry, has been adapted and refined for creating fibrous biological scaffolds that mimic some of the intrinsic features of the natural, tissue-specific extracellular matrix (ECM), such as diameters of the ECM fibers (from nanometers to microns) and their alignment (random vs. oriented). Electrospun scaffolds have shown enhanced regenerative properties, e.g., for soft tissues, nerves and skin, but also for bone and cartilage.

One of the most exciting recent developments in the realm of regenerative engineering is the application of 3D printing technologies for tissue engineering and regenerative medicine. Originally an extension of the industrial concept of additive manufacturing, synthetic and later natural biomaterials were used to print 3D tissue scaffolds of precise shapes and porosities. For tissue engineering purposes, these 3D printed scaffolds were then seeded with the appropriate cells, just like other scaffolds. The major break-

through toward 3D printing of tissues and organs was achieved when the printing process was modified to include simultaneous printing of ECM proteins, diverse cells and growth factors. An exciting new development in this field includes the concept of 4-D printing of functional tissue constructs, where, upon implantation of the 3D printed constructs into the host, some of the printed components will change their shapes over time, or are sequentially releasing diverse growth and differentiating factors to better mimic the natural processes of tissue development and maturation. Finally, an innovative development is the ability to 3D print directly into the body. This sounds futuristic, but with recent advancements in smart scaffold engineering, this visionary, Star Wars-like dream is currently being tested, initially for the regeneration of “simple,” easily accessible tissues, such as the skin. We can imagine that in the not-too distant future, smart biomaterials can be 3D printed inside the patient to regenerate, repair and replace bones, teeth or entire limbs. ♦



TEMPLE DENTAL AWARDED \$2.59 MILLION GRANT FROM NIH, LARGEST IN SCHOOL HISTORY

A COLLABORATION BETWEEN TEMPLE UNIVERSITY'S DENTISTRY AND PSYCHOLOGY RESEARCHERS IS SHOWING PROMISING RESULTS IN THE BATTLE AGAINST DENTAL ANXIETY

Dental anxiety is a significant public health concern associated with increased risk of oral health problems, as well as problems related to sleeping, social and occupational functioning. Approximately 10–20% of individuals in the United States report significant dental anxiety and 10–50% cancel preventative dental care, delay treatment for painful dental conditions or avoid dental treatment altogether due to fears of dental procedures. A collaboration between Marisol Tellez-Merchán, PhD, associate professor in our Department of Pediatric Dentistry and Community Oral Health Sciences, and Richard G. Heimberg, PhD, the Thaddeus L. Bolton Professor of Psychology in Temple University's College of Liberal Arts, is showing promising results in the battle against dental anxiety, as evidenced by a \$2.59 million award from the National Institute of Dental and Craniofacial Research, a branch of the National Institutes of Health (NIH). This is the largest NIH grant ever received by the Kornberg School of Dentistry and the latest in a series of multimillion-dollar grants awarded to the Psychology Department of Temple's College of Liberal Arts. It will fund a five-year clinical trial for 450 patients at Temple's Faculty Dental Practice in North Philadelphia.

The grant, for the study entitled "Efficacy of an Internet-based intervention for dental anxiety," will seek to examine an internet-based cognitive-behavioral treatment (I-CBT) for patients of the dental school who suffer from significant dental anxiety. The intervention will be administered



Collaborators Dr. Marisol Tellez-Merchán, right, and Dr. Richard G. Heimberg discuss their Internet-based intervention for dental anxiety.

under the supervision of psychology clinicians highly trained in CBT versus dental assistants with minimal training designed specifically to prepare them to supervise the delivery of the CBT protocol to anxious patients. The intervention involves a single one-hour internet-based session that is delivered with the aid of a staff person trained in assisting patients navigate the program and complete more challenging aspects of the program related to CBT (e.g., cognitive restructuring tasks). This intervention utilizes the CBT techniques that have received the strongest support in the empirical literature on the treatment of dental anxiety (e.g., psychoeducation, motivational interviewing, graduated exposure, cognitive restructuring). A randomized controlled trial examining the efficacy of an earlier computer-based version of the program, as delivered by individuals with training in CBT, suggested that it significantly reduced dental anxiety as compared to a waitlist control group. A prior case series suggested that patients take to it well. A pilot open tri-

al conducted as part of a previous grant project supported the feasibility and acceptability of the internet-based version of the intervention as delivered by dental staff with brief training in CBT as well as personnel with more specialized CBT training.

With their funding secured for the next five years, Heimberg and Tellez-Merchán are currently building up their staff and will soon enter the recruiting phase of their clinical trial. The impact of their approach could be significant because of its potential to be used by dental practitioners and patients anywhere. In the future, they hope the intervention might include translation into additional languages for even greater reach. ♦

Research reported in this publication was supported by the National Institute Of Dental & Craniofacial Research of the National Institutes of Health under Award Number U01DE027328. The content is solely the responsibility of the author and does not necessarily represent the official views of the National Institutes of Health.

POTENTIAL IMPACT OF VALUE-BASED HEALTHCARE ON DENTAL PRACTICE

BY DEAN AMID I. ISMAIL

For the past several decades, Americans' oral and general health have significantly improved, due to better healthcare, preventive care and increases in U.S. income. However, we still have health problems that are impacting now and will impact in the future, our general health and financial well-being.

Just consider the cost of U.S. healthcare, now approaching 20% of the Gross Domestic Product. That means for every five dollars we generate in our economy, one dollar is allocated to cover the cost of healthcare. This percentage is by far one of the highest healthcare expenditures in the world. Yet, our high investment has not produced the best health status among developed countries, many of which spend less and achieve relatively more.

Numerous attempts to improve this imbalance have been tried and failed. The current focus in healthcare financing and the healthcare field is to link payments to outcomes and not to procedures. In fact, payers are now rewarding hospitals and providers who meet quality standards and control or prevent diseases.

The dilemma

But the dilemma is that patients' behaviors, socioeconomic status and educational attainment play major roles in outcomes. And these factors are not under the control of the healthcare system or healthcare providers. Also, medical evidence for the effectiveness of this approach is lacking, even though the model is being widely adopted and soon will be introduced in dental insurance as bonus payments for achieving outcomes.

We know that the major challenge facing the dental community is providing access to quality dental care for low-income Americans, the frail elderly and those with limited income and no insurance coverage. I contend that we should welcome models that compensate our care based on oral health outcomes, provided dentists are free to manage the targeted patient population and are compensated well for their time and service.

For the majority of our populations, U.S. dentistry has succeeded in achieving improved outcomes. It is time we get paid for providing oral healthcare rather than just dental care. And such a model may work well to address the disparities in dental access for dentally vulnerable populations.

At Temple University Dental School, we have started preparing our graduates for their long path into the future. One of our new programs is rewarding student-doctors for going beyond oral healthcare and providing value to patients by promoting and improving their general health as well.


One pathway to desired outcomes

Dental care, preventive care, education, coordination of care, and motivational approaches to change patient behaviors are all part of this value-based healthcare. To achieve these desired outcomes, one pathway is "comprehensive patient care," which Temple University Dental School has fully endorsed in all of its clinics.

Traditional treatment plans list dental therapies to be provided in an appropriate sequence and in order of urgency. While this approach has been used successfully in dental practices all over the world, outcomes such as preventing caries and periodontal diseases, controlling early disease through nonsurgical care, effective and intensive education and clinical preventive care have not been well rewarded. Often, dental outcomes are confused with quality of care. But to achieve successful health outcomes, a comprehensive and sequenced management plan must be implemented. And it must be focused on modifying risk factors, risk-adjusted prevention and education, staging of disease severity to control early stages and treat extensive stages.

Every year at Temple Dental, we have been transitioning to a comprehensive care model where outcomes are assessed and rewarded. Our students have just started this year to use a fully integrated electronic health record that directs the steps in comprehensive care. Moreover, we now emphasize formulating a customized preventive plan for each patient and assessing the Patient Wellness Report. These innovations, are new in dentistry.

Temple Dental has a long history of innovations with the first dental chair, nitrous oxide, curriculum, implants, smart bur and fissurotomy bur, among others. This latest focus on comprehensive care and a value-driven reward system will position our students to lead new healthcare models emerging in the 21st century. ♦



GOING PAPERLESS: KORNBERG IMPLEMENTS ELECTRONIC HEALTH RECORDS

Healthcare information collected on daily basis is rapidly being transformed into digital data. At each step of the healthcare cycle, the data are entered by patients, providers such as assistants and financial managers and all those who are involved in provision of care to patients. The Electronic Health Record (EHR) has become a living document in all healthcare settings.

In 2008, Kornberg transferred to a digital I record, focusing on entering treatment plans and financial management data. The dental school converted to digital radiographs in 2012. “We were behind in moving to a fully paperless dental chart mainly because of the lack of programming expertise,” explained Amid Ismail, dean of the Kornberg School of Dentistry. “Over the last two years, a large group of faculty and administrators had engaged in discussion on what our EHR should look like.”

In 2017, the school hired a senior programmer who had the expertise to program all functions, including questionnaires, clinical examinations, problem lists, treatment plans, approval forms for all procedures, fee reduction or waiver forms and prosthetic care forms. Quality assurance functions and the assessment of health (diabetes, smoking and height/weight for children) were added. Outcomes of care are assessed using an inno-

vative Patient Wellness Report (PWR) and both a Preventive Care Plan and Review Plan were also added to emphasize the importance of prevention. On July 5 of this year, the school officially implemented its new EHR. Over the next months and years, data is being collected to evaluate patient care processes and outcomes.

“While the EHR allows limited care for patients in need of emergency care, any patient seen for comprehensive care must go through steps to generate treatment plans and follow the sequence that is appropriate for the patients,” Dean Ismail explained. “The pick-and-choose model of care can easily be flagged for review by faculty. When preapprovals are not available in the digital chart, the faculty knows immediately that a violation has taken place. The EHR is a useful tool for quality assurance and can assist providers to review the totality of a patient record.”

Mark Meraner, associate professor, Department of Restorative Dentistry, said the PWR is a key component of the comprehensive care model in the dental school and the primary outcomes assessment tool. “It summarizes concisely, in language the patient needs to understand, many of the important subjective and objective findings of the examination and it does so automatically by locating data already entered in axiUm forms and charts used routinely to record patient information,” said Dr. Meraner. “A PWR is printed for every new comprehensive

care patient at the initial examination stage and serves as a framework for helping each patient identify personal goals of dental care.”

The 14 “dimensions” of wellness included in the PWR, are rated on a scale (Good/green; Fair/orange; Poor/red) based on published standards, practice guidelines and best available scientific evidence. Given the proper interventions and behavior changes, each wellness factor is amenable to improvement over time (red changes to orange, orange changes to green). As new data are entered into the EHR after a course of therapy, the PWR serves to illustrate graphically the actual outcomes that have been achieved. To the right of each wellness factor, the PWR provides a brief explanation of the rating and in some cases, a general recommendation for care based on that rating. This information helps the patient understand the rationale for the present assessment and the type of care that may be appropriate. At the bottom of the PWR the patient can access online resources.

“The EHR offers the opportunity to collect and analyze enormous amounts of data, which are a core necessity in ensuring the delivery of high-quality, patient-centered care, preventing medical errors and limiting/minimizing risk,” said Leona Sperrazza, DDS, associate dean for Patient Care, who also served on the EHR committee. “The ability to use the EHR for

this purpose relies heavily on all providers and users of the system entering data in a consistent, timely and accurate manner. Standard queries, which can provide a snapshot in time as well as generate historical perspectives, can be developed for each identified quality measure. These measures include, but are not limited to, the timeliness of care, maintaining preventive schedules, monitoring record completeness, efficiency in claim submission and safety measures.

Dr. Sperrazza believes EHR has a significant positive effect on patient care, as it goes well beyond simply being a repository for a patient’s health and treatment histories. It gives the dental healthcare provider information in ways that just aren’t possible with a paper record. Built-in decision-making support tools help prevent adverse events, such as those associated with negative drug interactions and drug allergies, through the linking of a patient’s medical history and pharmaceutical information. “Providers can easily view and track a patient’s status over time. The EHR can provide alerts to remind providers when specific preventions or screenings are due. With consistency in data entry, the EHR can provide valuable data on the practice, which could improve systems for more efficient and quality-based care.” ♦



The Maurice H. Kornberg School of Dentistry

A RESOUNDING SUCCESS!

Full CODA accreditation with no recommendations and no reporting requirements—that’s the very successful outcome of a two-year self-study leading up to the CODA site visit last April. Congratulating faculty, staff and students, Dean Amid Ismail noted that during every month of the self-study, “we have discovered our strengths and bond.”

According to Dr. Maria Fornatora, associate dean of academic affairs, who helped lead the effort for the DMD program with the dean and John Moore, assistant professor and director of outcomes assessment: “The findings from the self-study and site visit were overwhelmingly positive, including revised areas for outcomes assessment, curriculum management, the Progression Towards Competency assessment system and orthodontic-pediatric curriculum integration. Graduate programs also received positive feedback.”

Three-day visit

On April 3–5, the school hosted a team of 11 dental professionals, three CODA staff members and two silent observers from dental schools with upcoming accreditations. The team toured the building, met with more than 100 faculty, staff and students and reviewed the school’s clinical, didactic, administrative, research and financial operations.

“A primary purpose of all site visits is to confirm the findings reported in the self-study,” says Fornatora. “The self-study was no mean feat, as there were over 6,000 written pages submitted to the commission!”

She adds: “After spending more than two years involved in the in-depth self-study, faculty and staff are not finished thinking about ways to improve. Since the site visit, the school has held a series of



The first shipment of boxes submitted to the Commission on Dental Accreditation was just the beginning. In total, 6,000 pages in stacks of reports were mailed last February.

retreats to examine the mission, vision and goals of the institution in light of what we learned about ourselves. This new mission, which was recently ap-

proved by the Collegial Assembly, will drive the institution forward over the next seven years, when we will have our next site visit.” ♦

Congratulating faculty, staff and students, Dean Amid Ismail noted that during every month of the self-study, “we have discovered our strengths and bond.”

Team Leaders for the Self-Study

Leading the teams who conducted the self-study, wrote the reports and coordinated the visits were:

DMD Program, Academic Affairs

Dr. Maria Fornatora
Jeremy Hull
John Moore

Program Directors

Dr. Nina Ghobadi, AEGD
Dr. Jeff Godel, Orthodontics
Dr. Keisuke Wada, Periodontics
Dr. Maobin Yang, Endodontics

Self-Study Steering Committee

Dean Amid Ismail
Dr. Susan Chialastri
Dr. Jon K. Deriel
Dr. Laurie MacPhail
Dr. Mark Meraner
Jo Ann Nyquist
Cynthia Russell
Dr. Leona Sperrazza
Dr. Marisol Tellez-Merchán
Dr. Jie Yang

CODA Standards in Detail

What exactly are the Commission on Dental Accreditation standards that must be met or exceeded? The list is long: institutional effectiveness, mission, outcomes assessment and planning, collegiality, diversity, financial resources and support from the university.

Within that list, the most extensive focus is on the educational program. In the didactic, preclinical and clinical areas, CODA looks at curriculum scope, depth, content and scientific basis; teaching methods; students' learning assessment and competency achievement; curriculum management effectiveness; interprofessional education; community service and high-quality biomedical science instruction.

Also examined are faculty and staff credentials, continuing education, faculty development and calibration programs, faculty research programs and scholarly activities that include student research support.

In addition, what happens outside the classroom is assessed. In educational support services, that includes student admissions, services, facilities, tutoring, advising, financial aid and debt management. In patient services, that includes access to high-quality, evidence-based care that focuses on the whole patient. Clinics must be modern, well-maintained and safe, with extensive quality assurance and improvement programs in place.

Established in 1975, CODA is the sole agency that accredits post-secondary dental and dental-related education programs. Through independent evaluation, CODA promotes and monitors the continuous quality and improvement of dental education programs. Its standards have evolved to be extensive and complex, requiring considerable evidence and data analysis.

NEWEST FACULTY LEADERS

**Michele J. Dimaira, DMD**

***Associate Professor, Department of Periodontology
Program Director, Graduate Program in Periodontology***

Dr. Michele J. Dimaira joined the faculty in fall 2017 as an adjunct instructor in the Department of Periodontology. Effective July 1, 2018, she joined the full-time faculty as an associate professor in the Department of Periodontology and program director of the Graduate Program in Periodontology.

Dr. Dimaira attended Rutgers University, graduating with honors with a bachelor of science degree in biochemistry and then earned her DMD at the University of Medicine and Dentistry of New Jersey. Following a general practice residency at the Lyons Veterans Administration Medical Center in Los Angeles, she trained at the West Los Angeles Veterans Administration Medical Center and obtained her certificate in periodontics while simultaneously receiving her masters of science in oral biology from the University of California. Dr. Dimaira is board certified by the American Board of Periodontology. She owned and operated her private practice in northern New Jersey limited to periodontology and oral implantology for over 20 years prior to pursuing a full-time academic career. She has taught at UCLA, NYU and Rutgers School of Dental Medicine.

**Louis DiPede, DMD, FACP**

***Associate Professor, Department of Restorative Dentistry
Assistant Dean for Advanced Clinical Education***

Dr. Louis DiPede joined the faculty as an associate professor in the Department of Restorative Dentistry and assistant dean for advanced clinical education, where he oversees the operation and integration of the Advanced Education in General Dentistry Program and the Faculty Dental Practice.

Dr. DiPede received his bachelor of arts in zoology from Rutgers University and both his DMD and certificate in advanced education in general dentistry from Rutgers School of Dental Medicine. After several years in private general dentistry practice, he earned a certificate in prosthodontics at the University of California, Los Angeles, and then completed a subspecialty fellowship in maxillofacial prosthetics and dental oncology at Memorial Sloan-Kettering Cancer Center in New York. After private practice specializing in prosthodontics, he joined the faculty at Rutgers School of Dental Medicine, serving as vice chair of the Department of Restorative Dentistry and director of Postgraduate Prosthodontics. Dr. DiPede is a board-certified prosthodontist and diplomate of the American Board of Prosthodontics.



Paul C. Jones, MSc, PhD

Assistant Professor, Tenure Track

Department of Pediatric Dentistry and Community Oral Health Sciences

Dr. Paul C. Jones joined the faculty as an assistant professor, tenure track, in the Department of Pediatric Dentistry and Community Oral Health Sciences. His appointment will support the school's goal of building its research contributions to the field of behavioral science.

Dr. Jones received his bachelor of arts in psychology from Villanova University, his master of science (with commendation) in psychology from Nottingham Trent University (United Kingdom) and a postgraduate certificate in school psychology from Eastern University. Prior to earning his doctor of philosophy in school psychology from Temple University, he completed a one-year pediatric psychology residency at the Cleveland Clinic Children's Hospital Pediatric Pain Rehabilitation Program, a one-year practicum in clinical neuropsychology/health psychology at St. Christopher's Hospital for Children and a postdoctoral fellowship in pediatric psychology at Nemours/A. I. duPont Hospital for Children, with an emphasis in pediatric pain management and consultation/liaison. He also served as a research assistant on an NIH/Gates Foundation study of cognitive development across eight international sites.



Santiago Orrego, PhD

Assistant Professor, Tenure Track, Department of Restorative Dentistry

Dr. Santiago Orrego joined the faculty as an assistant professor, tenure track, in the Department of Restorative Dentistry. His appointment provides a significant opportunity for the school in contributing to the field of smart biomaterials.

Dr. Orrego received his bachelor of science and master of science degrees in mechanical engineering from EAFIT University (Colombia), his PhD in mechanical engineering from the University of Maryland Baltimore County and a postdoctoral fellowship in the Department of Mechanical Engineering and the Hopkins Extreme Materials Institute at Johns Hopkins University.

His work focuses on developing advanced multifunctional dental biomaterials that integrate, adapt and communicate within oral environments, as well as other functional materials for dental and biomedical applications.



Craig Williams, DMD

Associate Professor, Department of Restorative Dentistry

Dr. Williams received his undergraduate degree from Dartmouth College, graduating cum laude with honors in mathematics. He received his DMD from the University of Pennsylvania School of Dental Medicine and also completed a general practice residency program in advanced restorative dentistry in both periodontics and in periodontal prosthesis-fixed prosthodontics. He has been in private practice for more than 30 years and previously held an appointment as an assistant professor of restorative dentistry at the University of Pennsylvania School of Dental Medicine.



Kelly Holst, DMD

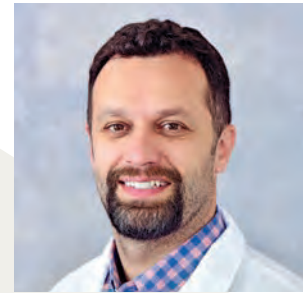
Clinical Instructor, Department of Restorative Dentistry

Dr. Holst earned her bachelor of science degree in dental hygiene from the University of Pittsburgh and completed a post-baccalaureate program at Drexel University. She earned her DMD from Temple University Kornberg School of Dentistry, where she received the Dr. Benjamin Homer Award and the Dr. Martin N. Kravitt D.D.S, Class of 1944 Award.

Ivan Miloradovic, DMD

Clinical Instructor, Department of Restorative Dentistry

Dr. Miloradovic earned his bachelor of science degree in chemistry from Temple University, as well as his DMD, summa cum laude, from Temple University Kornberg School of Dentistry, where he received several awards, including the American Academy of Oral Medicine Award; the Edward B. and Arnold R. Cook Prize in Children's Dentistry; and the International College of Dentists Leadership Award.



Joshua Munch, DMD

Clinical Instructor, Department of Restorative Dentistry

Dr. Munch earned his bachelor of science degree in biological sciences from Florida State University, where he was a member of the university's honors program. He received his DMD from Temple University Kornberg School of Dentistry, where he received the ADA/Dentsply Sirona Student Clinician Research Award.



Aabhar Patel, DMD

Clinical Instructor, Department of Restorative Dentistry

Dr. Patel received his bachelor in dental surgery degree from the Dr. D. Y. Patil Dental School and Hospital, Pune, India. He earned his DMD from Temple University Kornberg School of Dentistry, where he received honors in endodontics and advanced implantology and the AAE Award for Achievements in Endodontics.





Sheila Fanning, RDH

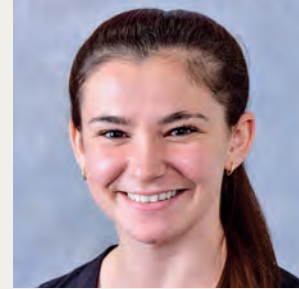
Clinical Instructor, Department of Restorative Dentistry

Ms. Fanning received her associate degree in dental hygiene from the Community College of Philadelphia and her bachelor's degree in health science administration from Drexel University. She has several years of experience in private practice, where she was responsible for patient education, nutrition counseling and office management.

Marlaina Gagliardi, RDH

Clinical Instructor, Department of Restorative Dentistry

Ms. Gagliardi completed the dental hygiene program at Harcum College and received her certificate in dental assisting from Camden County College. She joins Temple after providing full dental hygiene services in fast-paced private dental practices.



Lisa Marie McGlinchey, RDH

Clinical Instructor, Department of Restorative Dentistry

Ms. McGlinchey earned her associate degree in applied science in dental hygiene from the Community College of Philadelphia. In private practice, she became proficient in motivational interviewing (MI) and in training others in MI techniques.



Donna Rounsaville, RDH

Clinical Instructor, Department of Restorative Dentistry

Ms. Rounsaville received her associate degree in dental hygiene from Union County College and her bachelor's degree in dental hygiene from the University of Bridgeport Fones School of Dental Hygiene. In private practice settings, she was responsible for front desk operations, establishing and maintaining active recall and soft tissue management programs, compliance, staff training and dental education programs.



Emily Rudick, RDH

Clinical Instructor, Department of Restorative Dentistry

Ms. Rudick received her associate degree in dental hygiene from the Community College of Philadelphia and her bachelor of science degree in biology from Temple University. In addition to providing dental hygiene services in private practice, she served as a cardiac safety specialist and validation analyst for a clinical trial management firm.



LEADING BY EXAMPLE: STUDENT BODY PRESIDENT, LARISA FLORES

Larisa Flores decided she wanted to be a dentist at the age of five. “All my classmates said they wanted to be teachers and police officers, and I said dentist,” Larisa recalled.

After an accident that caused her to have her two front teeth removed, five-year-old Larisa found comfort in her orthodontist (coincidentally, a family member from Mexico), who cared for her and inspired her to one day become a dentist.

That pivotal experience as a child, paired with a love of science, math and learning, led Larisa to Temple Dental four years ago. After completing her undergraduate studies at the University of Texas at El Paso, Larisa learned about Temple through her now-fiancé, who attended the School of Podiatric Medicine. Impressed by Temple Dental’s reputation, Larisa quickly decided that it was her No. 1 choice. She was delighted to be accepted.

“Temple is a second home to me,” Larisa explained. She wasted no time when she arrived, immediately getting involved on campus. In her first year, she served as vice president of her class. The following year, she was elected president. In her third year, Larisa was elected vice president of the student body, and finally, she culminates her fourth and final year in dental school as president. Larisa even

had the opportunity to address her classmates at the White Coat Ceremony in 2017.

“Absolutely get involved!” Larisa urges fellow students. “There are so many benefits to being involved. I get so much joy out of it.”

In addition to campus leadership, Larisa stays busy as a member of the American Student Dental Association, Student National Dental Association and Hispanic Student Dental Association. Through her involvement, Larisa has taken half a dozen trips to cities across the country for conferences and leadership retreats. This fall Larisa traveled to the Dominican Republic for her first mission trip.

“Each experience has been special in its own way. I’m forever grateful for the friendships I’ve built and the mentors I’ve gained. I can’t put a price on that,” she said.

After graduation, Larisa plans to return to Texas to go into private practice. She hopes to give back, and become a part-time faculty member at a dental school opening in El Paso in 2021.

“I’m looking forward to finally being a dentist, something I’ve wanted for 20 years now,” Larisa said. “It’s nice to realize my dreams are finally coming true.” ♦

ENDOWED AWARDS RECOGNIZE OUTSTANDING SENIORS AT GRADUATION



Faculty nominate students according to specifications outlined by the donors. Photographed clockwise from top: Dr. Christina Amato, '18, with Dr. Jason Bresler, '06 (R. Ralph Bresler, M.D. Endowed Memorial Award); Dr. Ivan Miloradovic, '18, with Mrs. Martha Eshleman (Dr. Jay H. Eshleman Endowed Scholarship Fund Award); Dr. Kelly Holst '18, with Mr. David Kravitt (Martin N. Kravitt, D.D.S. Endowed Award); and Dr. Sasha Sherry, '18, with Dr. Cary Klimen (Cary Klimen, D.D.S. Excellence in Ethics Award).





SPRING GRADUATION FOCUSES ON NEW VISION OF DENTAL CARE

*Front row, from left: Syeda Jaffery, Aisha Javed, Emily Andrade, Nailah Khalfan, Khalid AlNajdi
Back row, from left: Odai Abashanab, Tai Nguyen, Christopher Glecos*

Held at the Academy of Music, May 18, the graduation ceremony featured Dean Amid Ismail’s call to the graduates to “expand access to oral healthcare in local communities and states, as well as nationally and globally to integrate oral health as a primary component of overall health.” Dr. Kathryn Kell, DDS, MHCA, president of the World Dental Federation, supported that idea in her keynote address, as she described what the new dentists can do to change the world of dental care.

Sharing their thoughts, too, were Dr. Jason Bresler, DMD, delivering a message from the alumni; Dr. Susan Chialastri, DMD, MS, speaking for the faculty; and Valedictorian Ivan Miloradovic, originally from the former Yugoslavia, describing his love for dentistry.

After presentation of degrees and specialty certificates, friends, family and faculty enthusiastically welcomed the graduates into the dental profession. Notably, they already have made outstanding contributions to dental care. At Kornberg, they treated 26,350 patients and provided 115,000 procedures during their last two years. ♦



Endodontics, Advanced Education in General Dentistry, and Public Health residents who received specialty certificates and Orthodontics and Periodontics residents who received specialty certificates and master’s degrees

WHITE COAT CEREMONY BEGINS STUDENTS' CLINICAL EDUCATION

One of the most important milestones in a dental student's life, the White Coat Ceremony, was held May 5 at the Temple University Performing Arts Center. The event began with a welcome from Dean Amid Ismail and then remarks from Dr. Manuel A. Cordera, DDS, CPH, MAGD, president of the American Academy of General Dentistry.

"Ethical Responsibility in the Future of Dental Care" was the focus of the keynote address. And the words of Steve Kess, vice president, global professional relations, Office of the CEO, Henry Schein, Inc., provided important insights for students, faculty, administrators, friends and family. Also striking a chord with attendees was Class President Courtney Kozlowski's student commentary.

A highlight, as always, was when a family or faculty member coated each student, recognizing the beginning of his or her clinical education while moving into the third year of dental school. Underscoring the importance of the ceremony, each of the 139 students in the Class of 2020 signed the Dentist's Pledge and also recited in unison the Professional Oath with Bruce Terry DMD, immediate past president of the Pennsylvania Dental Association. Notably, his daughter, Caroline Terry, is a member of the Class of 2020.

The dean's remarks concluded the ceremony, and a reception followed in Mitten Hall. ♦



Class of 2020 recited in unison the Professional Oath.



Keynote speaker, Dr. Manuel A. Cordera, DDS, CPH, MAGD, president of the American Academy of General Dentistry.



MAKING CONNECTIONS AT SHALVA AND ACROSS BORDERS



Yossi leans back, concentrating on the hand he holds. His heightened sense of touch tells him more about this student he's just meeting than most of us can imagine. Signing into his brother's hand, Yossi, blind and deaf, waits for the response. Surrounding him are Kornberg students on a Bridge to Peace mission in Jerusalem, Israel. Recalling the experience, Anita Gotz says, "He always hit the nail on the head."

The son of Malki and Rabbi Kalman Samuels, founders of Shalva National Center for care and inclusion of those with disabilities, Yossi inspired the creation of Shalva, which in turn inspired Dean Amid Ismail to initiate the trip. The dean wanted students to learn more about special-needs patients and their families in a comprehensive and inclusive healthcare facility. And he envisioned more. He wanted to create peaceful connections among Kornberg, the Al-Quds University Palestinian dental school, and the Hebrew University Hadassah School of Dental Medicine.

"It brought together two sides of a conflict zone with shared academic goals," says Dean Ismail. It also expanded the worldview of our students by introducing them to different people and organizations relating to dentistry and the overall health of individuals, including those with disabilities."

Adds Jo Ann Nyquist, associate dean of student affairs and diversity, who led the trip with the dean: "To better understand how another country addresses and provides care to special-needs children and their families in such a comprehensive, warm and inclusive 24/7 environment was an important educational opportunity for our students. Learning from each other on common ground was a turning point."

Bridge to Peace funding

For Gotz, the trip was special for several reasons. "First, it was funded with alumni donations to Bridge to Peace."

Much like its name, the program forges bridges that connect students and faculty from Israel, the Palestinian Authority and Temple University. Launched in 1996 through the D. Walter Cohen Middle East Center for Dental Education at Jerusalem's Hebrew University, Bridge to Peace brings professionals together to collaborate, work and receive training for the benefit of all people in the region. Since 2012, Kornberg has supported and raised money for the work. This year, the school went further and created an alliance with the Shalva Center.

Temple Dental has been soliciting funds from donors to support this program and has raised close to \$10,000. The school is working to raise another \$5,000 to \$10,000 to cover the cost of air fare, hotels and meals for the dental students. Gotz wrote, "The connection with children with disabilities opens a new chapter to build bridges among us. These children do not discriminate by citizenship, origin, religion, race, or political affiliations. We need to follow their souls that live in peace."

Reflecting now on the trip, Gotz says, "The experience was eye opening about what being in dental school is all about. It was learning about commonalities, showing us the bigger picture. It gave us an opportunity to learn what we can't learn in a classroom. It was the most memorable experience I've had in dental school."

Student Elizabeth Cohen agrees. "It was an incredible experience and made a large impact on everybody in different ways. I would like to maintain a connection with Shalva, and I found that I really like working with special-needs populations. I hope I can incorporate that into my career one day." ♦



HEAR MORE, SEE MORE

- ◆ Dean of Al-Quds welcomes Kornberg visitors with inspiring message about turning conflict into cooperation:
<https://www.youtube.com/watch?v=4SYjoOyVU3k&feature=youtu.be>
- ◆ Rabbi Kalman Samuels describes the beginning, recent expansion and work of Shalva:
<https://www.youtube.com/watch?v=7rOtLI53Exo&feature=youtu.be>
- ◆ The Shalva Band performs “One Day”:
<https://www.youtube.com/watch?v=f3rfEzd6zzM&feature=youtu.be>
- ◆ Al-Quds student stresses importance of working together across borders:
<https://www.youtube.com/watch?v=ZHMrbVrZGE&feature=youtu.be>
- ◆ Hadassah student reflects about connecting people through the dental field:
<https://www.youtube.com/watch?v=AYRtwOvIYec&feature=youtu.be>

TRIP HIGHLIGHTS

- ◆ Three days visiting Shalva
- ◆ Meeting the Chief Dental Officer and his staff at the Israeli Ministry of Health in Jerusalem
- ◆ Conference with students and faculty from Hebrew University’s Hadassah School of Dental Medicine, the Palestinian Al-Quds University Dental School and Kornberg



"It's amazing the things Yossi picked up about people," remembers Elizabeth Cohen, '19. "He could really read people," agrees Anita Gotz, '19. "And when he met Dean Ismail, he felt it was special since his father and the dean know each other well."

The Shalva Story

It started with an accident. Yossi Samuels was given a childhood vaccination, leaving him unexpectedly blind, deaf and acutely hyperactive. The family became so exhausted and felt so isolated that professionals and friends urged institutionalizing him. But his mother, Malki, refused, and as the Shalva website states, "vowed to God that if He helped Yossi, she would dedicate herself to helping other children with disabilities and their families."

When Yossi was eight, a deaf special education teacher made a remarkable breakthrough. She penetrated Yossi's wall of silence with the Hebrew word for "table." Remembering her promise, Malki founded Shalva in 1990 with her husband, Rabbi Kalman Samuels.

At first, Shalva was only able to help eight children thrive in an afternoon program. Since then, Shalva has become a national center serving thousands of people with disabilities, from infancy to adulthood. The transformative programs, which promote social inclusion and empowerment, fill previously neglected needs and are an international model for disability services. Partners are governmental bodies, universities, corporate entities and friends from around the world. ♦

A Day at Shalva

Kornberg's Elizabeth Cohen was one of 10 Kornberg students who traveled to Jerusalem last February on a Bridge to Peace mission. Engaging with a special-needs population at the Shalva Center was a major focus of the trip. Asked about a particularly memorable experience there, Cohen points to classroom time with the children on the celebratory day of Purim.

"We were divided into groups," she recalls. "Others were placed in rooms with older children. I was with two- and three-year-olds with Down Syndrome. At first, it was really overwhelming because I don't speak Hebrew very well, and the kids don't speak a lot of English. It was noisy with a lot of preschoolers, and I wasn't sure if they understood me or not, but I felt like I made a connection.

"It was fun watching them make funny faces, steal each other's snacks, do just the things that normal toddlers do. We crossed the obstacle of language, and I'll never forget a couple of the kids. They were just so sweet and so happy.

"I've never spent a lot of time with a special-needs population, and I don't think that's the way they want to be described because they are able to do so many things. They don't want to be looked at as special. They want to be looked at for what they can do, not what their limitations might be according to a diagnosis. Shalva is really a happy, hopeful place.

"Borders aren't really important. Just treating people with dignity and respect is what matters. Seeing all of the hope and positivity and good things they do there was probably the most significant part of the trip for me." ♦



Kornberg students were multiethnic—Christians, Muslims and Jews—meeting new friends with equally diverse backgrounds from Al-Quds and Hadassah Dental schools.

What They Learned

More of the Kornberg students who visited Shalva share their insights:

Where a life of meaning stems from. Numerous volunteers unreservedly disregarded their egos or own self-interests to generate happiness and laughter among the children.

– Jason Ginsburg, '20

Personal stories and talking about differences open-mindedly, which shine a light on the importance of a support system and the principle of inclusion.

– Yi-Hsuan Lee (Judy), '19

Importance of treating every type of patient with love and respect, no matter the challenges that it might bring.

– Mark Mast, '19

That human potential is infinite, and it begins with forming relationships with one other.

– Stephanie Tran, '19

The sense of fulfillment one gets from participating in charity comes not from the gratitude one receives, but from the charitable act itself.

– Tzicha Jessica Wang, '20

That each person who works or volunteers in Shalva bears a sincere serving heart and has a compassionate attitude. That's truly what we need most as a healthcare professional.

– Ping Wang, '19

The incredible work that is being done to help children with disabilities, empower their families and promote a more inclusive world.

– Harrison Wong, '19

The focus was hands-on experience with Shalva children, getting to know their potential and talents.



INTERNATIONAL EXPERIENCES ENRICH STUDENTS' DENTAL EDUCATION

MISSION: HAITI

Haiti, April '18

It's a Bresler family tradition of service that each year exposes students to what happens when technology disappears and thinking on your feet takes over. "We have very limited equipment—no X-rays, no suction, no drills, no imaging—so it's fundamental surgical skills," explains Dr. Josh Bresler. "We go where no dentist would ever go." To that point, Kate Miller, '19, recalls that in a remote area, "a group of about 50 people, extended families and neighbors from the same village, walked two hours to get treatment and then walked two hours home." Leading the team of eight seniors and two juniors were Josh and his brother, Dr. Jason Bresler, and sister, Dr. Rachel Bresler.



Dental care as a gateway to helping even more

"On our last day, a gentleman came in for extractions, and I noticed his ring finger wrapped in what looked like a shopping bag and twine. So while we were waiting for more anesthesia to kick in, I asked him what happened. He said he cut it with a machete about two weeks before. As soon as we were finished with the extractions, I helped him take off the bandage. His finger looked wet, infected, almost gangrenous. We cleaned it up, gave him a bunch of antibiotics and probably saved his life."
 — Josh Holt, '19, student doctor (above)

It's the collaboration, teamwork and cooperation that develop when working with an undertreated population. It's the broadening of perspective when seeing such limited access to dental care in countries of great need. And it's understanding the impact of care through the lens of patient gratitude. Through a variety of mission trips, Kornberg students have the opportunity to make a positive impact on the oral health of our global community, while honing their skills under conditions quite different from those at home.



MISSION: JAMAICA

Jamaica, August/September '18

Even though temperatures usually soar past 100 degrees and makeshift clinics have no electricity or running water, Xi Psi Phi dental fraternity students continue to organize and raise funds for what they say is one of the best experiences in dental school. In fact, the trip is so powerful that Faculty Advisor Dr. Susan Chialastri believes they will be inspired to continue treating the underserved through volunteerism. Helping this year to create the accomplishment, confidence and pride that she feels the 21 students experienced were: Dr. Robert Miller and his wife, Pat, Dr. Hsiao, Dr. Ivan Miloradovic and Temple Dental alumni Dr. Bart Santos, Dr. Kali George, Dr. Aida Paselic and Dr. Robert Bentz.



Humbling experience to see how others live

"One boy was six or seven years old and needed fillings in his back teeth, but never had an experience like that or even dental anesthesia. I had to be careful to use the right lingo: 'cocaine' for 'lidocaine,' 'joke' for 'poke with a needle,' 'shaky' for 'loose tooth.' Before we even started, Great Shape! Inc. organizers explained the language differences. Fortunately, we could do more than esthetics on the front teeth because we had the time and resources to do full-care procedures."

— Dena Feinberg, '19, Xi Psi Phi fraternity president

PUTTING TO USE THE SKILLS LEARNED AT SCHOOL

MISSION: DOMINICAN REPUBLIC

Dominican Republic, November '18

When Faculty Advisor Dr. Stanton Braid returns from the November trip with another group of eight students, he expects he'll see what he noted last year: "a tremendous amount of group cohesiveness and bonding as the students treated well over 400 patients." Harrisburg Rotary Club's dentists, physicians and support volunteers once again will put together the logistics and supplies for the trip.

“

We're helping a lot of people from similar communities every day right here in North Philadelphia. Now I want to expand on that experience, putting to use what I've learned here at school to really benefit adults and children. I'm excited to help people who will be really grateful for our care.

— Morgan Dorsey, '19, student leader (on left)

”



TEMPLE MISSION TRIPS AT A GLANCE

MISSION	STUDENTS	WHAT	WHERE
DOMINICAN REPUBLIC	4th year	extractions/restorations	cafeteria, clinic/2 towns
HAITI	4th year	extractions	in the field/different villages
JAMAICA	4th year	extractions/restorations	open-air clinics/2 towns
PERU	1st–4th year	education/prevention/ dental care for children	Lima school

IMPROVING DENTAL HEALTH THROUGH EDUCATION



“You see children from the age of six with all four of their first molars unrestorable or younger children with all of their primary teeth decayed. Besides access to health resources that we take for granted, it really just takes a little bit of education with parents and their children to bring a lot of positive change in the dental health of these children. That was really eye opening for me.”

— Stephanie Tran, '19, Peru Dental Mission president (far right)

MISSION: PERU

Peru, February '19

Children are the focus of this program—saving their teeth for the rest of their lives through education and prevention. “Students see a variety of pediatric procedures and gain incredible experience,” says Faculty Advisor Dr. David Lampl. Dr. Bari Levine, '16, who was instrumental in starting the program as a student, and whose Growing Smiles Foundation provides funding toward the trip each year, adds, “Students are passionate about giving back and helping others. And because students from all four years participate, they form close friendships in other classes.”

ARTWORK DISPLAYS ENHANCE THE WALLS OF KORNBERG



In 2016, Kornberg executed an art and environmental design program by partnering with Sentry Arts, LLC, a design firm that creates custom graphics and signage to advance an organization’s mission and create visual consistency within a work environment.

Through a collaboration between Kornberg School of Dentistry Dean Amid Ismail and Sentry’s Principal and Creator Heather Gibson, a plan was developed to display artwork and custom-designed pieces throughout the dental school.

“My goal for the project was to make the displays informative and to speak to Kornberg’s values and accomplishments,” said Dean Ismail. “I wanted to focus on the history of Philadelphia, history of the school, and healthcare through photographs from all over the city, and our school. For our patients, I chose to place colorful flowing images that reflect calmness and serenity.”

“**For our patients,
I chose to place colorful
flowing images that
reflect calmness
and serenity.**”



The following displays were implemented throughout the building:

- ◆ First Floor: Historical display of Temple Dental School, Philadelphia and around the globe
- ◆ Second Floor: Dental Care with a Smile, including the following words/values that were represented by Kornberg faculty and staff: Listen, Kind, Respect, Welcome, Collaborate, Quality, Efficiency, Patients are First, Caring Community of Professionals, Recognizing and receiving people with warmth of encouragement, and If you do not know where to go, just ask. These words were translated into Arabic, Chinese, English, Hindi, Korean, Portuguese and Spanish. Photos of faculty, students, administrators and patients were included. A timeline of dental chair development was also included.

- ◆ Third Floor: Kornberg’s involvement in the wars and advances in wartime dentistry and service to the community such as International Missions, Project Engage, Give Kids a Smile and KleinLife
- ◆ End of Corridors—All floors: Summary statements related to Kornberg’s values as a reminder to students, faculty and as an assurance to patients and included:
 - ▶ We Believe....each Patient is the most important.
 - ▶ We Believe....in serving our community.
 - ▶ We Believe....in celebrating diversity.
 - ▶ We Believe....in treating everyone with kindness and respect.
- ◆ Abbreviated Dental Pledge—installed throughout school



ALUMNI PROFILE: RON SILVERMAN

He's in a war zone, commanding all healthcare operations in Iraq. The patient trauma is horrendous. His surgeons are stressed and fearful, especially the ones new to this theater. They've seen the results of a gunshot at home but not someone with that injury as well as crushing and burning wounds. How to get them to work through it, to be able to perform at their job?

As he recalls it, Major General Ron Silverman was immediately reminded of the stress and fear he needed to deal with in his dental patients back home. The circumstances were very different, but the manifestations were the same. "People often act differently when feeling in danger," he says. "Some rise to the occasion. Others are paralyzed by it. I learned a lot about how to recognize and deal with stressed and fearful people at the Temple Dental clinic."

Silverman entered Temple's dental program knowing he would later spend at least four years in the military. He was commissioned as a second lieutenant through ROTC when he graduated from college and understood the military needed dentists. "It was the height of the Vietnam War," he remembers, "and there was a program that would defer you from active duty and help financially if you went to dental school." He had to serve full time for four years after graduation, but he liked knowing that he could have a career in the military or in a civilian setting. In fact, he did both.

Leaving Temple Dental and then serving four years as required, he worked as a general dentist at Fort Belvoir in Virginia, becoming captain, then major. In 1976, he left active duty to build a private practice but didn't make a complete break from the military. He joined the U.S. Army Reserves, combining dentistry five days a week with work that was intentionally quite different on weekends. "I was lucky enough to be offered a position in the Office of the Assistant Chief of Staff for Logistics at the Pentagon," he says. "It was an entry-level position, but I got a whole new view of the Army. I saw the big picture of how everything fits together and works. Dentistry is focused on a very small area. You look at a tooth and sometimes inside a tooth. This gave me the macro view."

That was important as Silverman moved through the ranks, continually broadening his areas of expertise. He left the logistics field when he became colonel and then brigadier general, a big achievement. "When going from lieutenant colonel to colonel," he notes, "about 25% make it. But only about one in 1,000 get promoted from colonel to general." Notably, he was the first dentist to be a one-star general in a non-dentist position.

Back on active duty while his partner took care of things at the office, he commanded all the New England medical assets—hospitals and clinics. "But," he explains, "when you're a general, you're given more than one job to do. So in addition to running medical operations in New England, I ran the New Horizons program in Central and South America. It began when Hurricane Mitch destroyed much of Honduras and El Salvador. We sent medical help for the injured and engineering help to rebuild roads, bridges and some towns. I learned the engineering aspects, even the science of concrete. We had to move everything down there, set up places to live, arrange for food and other supplies. My logistics background paid off."

Just when he was considering retiring from the Army, he was promoted to two-star general. As head of the 3rd Medical Command in Fort Gillem, Georgia, and then in Iraq, he and his task force achieved a 95% battlefield survival rate for wounded soldiers who reached their facilities. That still remains a record. "We told them if they could see the flag on the triage tent ceiling, they would be okay," he remembers.

Several factors contributed to that record. "I could make decisions on the ground, without approval, due to my rank," he explains. "Also, as in a civilian hospital, we had weekly trauma board meetings to evaluate outcomes. Temple Dental did a good job of giving us knowledge of general medicine, which allowed me to fully understand and facilitate the discussions at those meetings."



Achievements Recognized in Gallery of Success

Vision. Execution. Perseverance. Flexibility. These are the components of leadership that Major General Ron Silverman says helped him achieve “all of my pipe dreams.” And all were recognized October 18 when Temple University President Richard Englert named Silverman the dental school’s 2018 honoree for Temple

University’s Gallery of Success. Recalling the moment, Silverman says he was thinking, “What was a nice suburban Philadelphia kid like me doing, traveling the world, commanding 7,000 military personnel and doing the job with success?” But then he adds, “Hopefully, I made an impact.” Although retired from his mili-

tary career and only working occasionally in dentistry now, Silverman is still using what he learned about leadership. He and his wife are involved with the Peres Leadership Program in West Palm Beach, Florida, working with high-achieving teenage students. ♦

Two Temple Dental grads: Major General Ron Silverman, '72, with his dad, Colonel Max Silverman, '35, who was Patton's senior medical officer



Temple Dental also gave him the opportunity to work in a clinic with people from all walks of life. “That started me,” he says, “on developing teams who could live together and work together. One of my goals in combat was to take care of my soldiers, to make them feel good about themselves, even when combat made

them feel bad. I would tell them, “War is horrific, but when you go home you can tell people you not only saved lives, you also showed the world how people of diverse backgrounds, ages and religions can work together for a common goal and common good.” ♦

“Leadership gives you the ability to show positive results,” says Major General Ron Silverman, '72. When deployed in support of Operation Iraqi Freedom, he became the first major general in U.S. history to command medical forces in a combat zone.



RISKING IT ALL TO START ANEW Q & A WITH DR. JORGE BLANCO

Dr. Jorge Blanco, previously a dentist in Cuba, earned a faculty DMD from Kornberg in 2002, then watched his two sons, Kemel and Farid, complete their DMDs here in 2003 and 2006. The Blancos, including Jorge's wife, Rauda, also a dentist, have successfully built a new life in the Miami, Florida, area after narrowly escaping from Cuba. They now have a thriving family practice with 11 offices.

“

Success is the achievement of any goal, big or small, that you set out to do despite all the obstacles and challenges you've faced along the way.

”

Recently, we asked Dr. Blanco about his path to success.

DIAMOND: The Dean calls your story one of courage. In fact, he presented you with the Dean's Distinguished Courage Award in May. How has courage played a role in your life in the U.S.?

DR. BLANCO: Courage has played a central role in my life because, without it, I would never have risked my life and that of my family to escape the evils of communism. I would never have started my life over in a new country. And I would never have enrolled in Temple and revalidated my dental credentials.

Q: Can you tell me about a particular compelling moment when you needed courage here?

A: In 2000, I had a very clear choice. I could work to join my son, Kemel, by applying to Temple, starting from zero and indebting myself. Or I could keep working hard, maybe earn more over time and keep my family “comfortable.” Without the courage to risk it all, I don't know where I would be. But I know I would not be a dentist.



Back row, from left: Ana Hernandez, Kemel J. Blanco DEN'03, Jorge L. Blanco DEN'02, Rauda B. Jamis, Farid Blanco DEN'06, Mayorly Abreu, Belinda Blanco. Front row, from left: David, Jorge, Alejandro, Alvaro, and Adriano Blanco

Photo at left: Dr. Jorge Blanco, '02, center, receives the Dean's Distinguished Courage Award from Dean Ismail, left. Dr. Jason Bresler, alumni association president, joins them.

Q: What led you and your sons to Temple Dental?

A: My son, Kemel, did a lot of research and found that Temple had an exceptional dental program. I trusted his judgment and soon found myself following in his footsteps.

Q: Can you describe your feelings when you and your son, Kemel, were at Kornberg at the same time—and also when Farid followed you both here?

A: The feeling was indescribable. I was not just revalidating my dental credentials. I was able to see them learning the profession for the very first time. It was like going back in time and reliving my own learning experience.

Q: Did you always think that you and your sons would be in a dental group together?

A: I never thought we would be a dental group together. But I always hoped and prayed that we would do “something” together. I still look at my life in disbelief. I am (and my family is) very fortunate to be so united—both at home and in our profession.

Q: Why did you choose Florida to set up a practice?

A: We are Cuban exiles, and South Florida is a hub of the exiles. I

never considered setting up a practice anywhere else. It just felt necessary to do so here, in Florida.

Q: What do you think led to your success—for example, expanding your practice to many locations? In fact, how would you describe success?

A: Success has nothing to do with money, offices or assets. It has nothing to do with “anything” you can hold in your hands. Success is the achievement of any goal, big or small, that you set out to do despite all the obstacles and challenges you’ve faced along the way.

Q: What do you think is in your life experience that would encourage today's dental students?

A: The courage to succeed because success takes sacrifice, risk and determination. And in order to have courage, you need faith, too—faith in your abilities to get to wherever you want to be.

Q: What is the main message that you would tell dental students today?

A: With enough faith in yourself, nothing can stop you—not age, not communism, not even English.

FROM HUMBLE ROOTS, KORNBERG ALUMNUS GIVES BACK

Robert Bagramian, DEN '60, credits Temple for paving the way for his illustrious career in dentistry. Now, he's giving \$700,000 to support dentistry students so they can pursue their own dreams.



Dr. Robert A. Bagramian and his wife, Ms. Linda Bennett

By Morgan Zalot

“
***We think education
is the key to success,
and everyone deserves
a chance to fulfill
their dreams.***”

Robert Bagramian, a 1960 graduate of the Kornberg School of Dentistry, says giving back is important to him because Temple provided him the opportunity to build a successful career.

Growing up as the son of a shoe repairman in working-class West Philadelphia, Robert Bagramian knew there was only one feasible way he could achieve his dream of becoming a dentist: by attending Temple's Kornberg School of Dentistry.

“I couldn't afford to go to any other schools,” Bagramian, DEN '60, said. “The only school I could actually afford was Temple, and Temple gave me that opportunity.”

Since graduating from Kornberg, Bagramian has built an illustrious career in dentistry. Shortly after leaving Temple, he

spent nearly three years in Taiwan, where he shared his dental expertise for what is now a comprehensive dental program in one of Taiwan's largest medical centers. He's traveled elsewhere around the world, from Armenia to Singapore to South America, consulting and providing dental education, and, for the past 50 years, served as a professor at the University of Michigan, where his wife, Linda Bennett, now retired, worked as a senior development officer.

To recognize and honor Temple's contribution to his life, Bagramian will bequeath \$700,000 to Kornberg to fund scholarships for future Temple dentistry students. For the school that Bagramian credits with setting him on the course of his career, he said he felt it was the least he could do.

“I came from a very modest background. My parents were immigrants and struggled to support me through school,” Bagramian said. “Temple gave me, a kid from a working-class neighborhood in Philadelphia, an opportunity to become a successful professional through education, so I really feel strongly about giving back.”

Bagramian and Bennett are no strangers to philanthropy: For several years, they've been supporting students at Kornberg through the Armen and Isabel Bagramian Scholarship Fund, named in honor of Bagramian's parents. The \$700,000 gift will be added to that fund.

“It's part of our DNA,” Bagramian said. “I understand the cost and the pressures of going through dental school, and we both want to be able to recognize my alma mater and provide support for students—primarily students who are in need, and who might not otherwise be able to go to school—because we think education is the key to success, and everyone deserves a chance to fulfill their dreams.” ♦

Dr. Sally Gray, '82 and Dr. Matthew Palermo, '05 were posthumously recognized for their outstanding service to the school at the annual Alumni Reunion and Achievement Awards event. The School is grateful to them for their outstanding contributions as faculty, mentors and colleagues.

DISTINGUISHED ALUMNI SERVICE AWARD

Dr. Sally Gray, '82 (1956 – 2018)

Dr. Sally Gray served as a tenured faculty member and administrator at Kornberg School of Dentistry for 35 years and devoted herself to our dental students. In 1990, Dr. Gray developed the first Admissions and Student Affairs database for applicants to the school. She authored the first student handbook and worked to develop a recruitment video for incoming students. Also, she co-authored the Northeast Regional Board Exam student instruction booklet for removable prosthodontics in 1987.

While at Temple University, she held the positions of assistant and associate dean for admissions and student affairs, acting chair of the Department of Prosthodontics, associate dean for clinical affairs, associate dean for academic affairs, and many more. Additionally, Dr. Gray was president of the Temple Dental Alumni Association in 2008.

Dr. Gray received her DDS degree from Temple University in 1982 and then went on to specialize in prosthodontics. She received a postgraduate degree in prosthodontics in 1985 and a master of science in oral biology in 2004. She was a member of many organizations, such as the Pennsylvania Prosthodontic Association, and she was an International College of Dentists Elected Fellow. Dr. Gray's husband, Glenn, and two of her three children are all alumni of the Kornberg School of Dentistry.

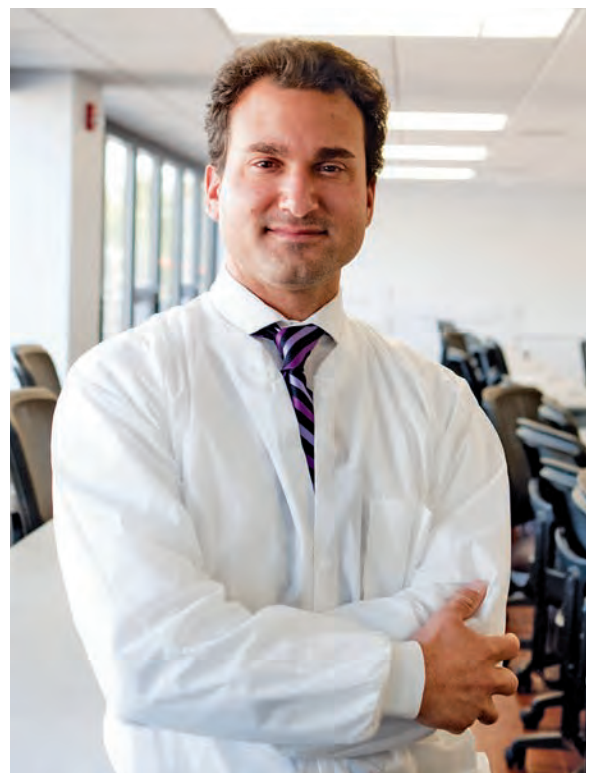


Dr. Matthew Palermo, '05 (1978 – 2018)

Dr. Matthew Palermo received his DMD from Temple University in 2005 after being named to the Dean's List each year of his education. He received the Auerbach Memorial Award as a senior dental student who best combined clinical excellence and moral character, traits that he continued to demonstrate throughout his career. He remained at the school to complete the advanced education in general dentistry program in 2005 and soon discovered his love of prosthodontics, going on to receive his specialty certificate at Eastman Institute for Oral Health at the University of Rochester Medical Center.

Dr. Palermo returned to Temple University as a faculty member and served in many capacities, rising to associate professor and eventually serving as chair of the Department of Restorative Dentistry. His teaching, from the pre-clinical to the graduate level, earned him the respect and admiration of his students and colleagues, and his leadership contributed significantly to the school's prosthodontics, implantology and restorative curriculum.

As a passionate and dedicated educator, Dr. Palermo spent many hours tutoring students and providing professional guidance to help them achieve success. Additionally, he was actively involved in professional organizations, such as the American College of Prosthodontics (ACP) and International Team for Implantology (ITI). He also managed multiple grants that supported interdisciplinary clinical patient care.



ALUMNI GALA 2018: REUNION AND ALUMNI ACHIEVEMENT AWARDS

May is a special time. A few weeks before the seniors walk the stage to receive their diplomas, alumni return to the school to reminisce the good (and some interesting) times. Whether it's a class of the 60s, 80s or the 2000s, the common theme is one of gratitude—"Temple prepared me well for a great career and for that I am thankful." On May 4, 2018, alumni toured the school led by current students and were wowed. In the evening, everyone slipped into something more glamorous for cocktails and dinner at the Hyatt at the Bellevue. More than 170 alumni and guests recognized the following distinguished alumni: Dr. William Dragan, Jr., '58, Entrepreneurship Award; Dr. Sally Gray, '82, Service Award (posthumous); Dr. Ronald Gross, '58, Leadership Award; Dr. Charles Mandell, '64, Education Award; Dr. Matthew Palermo, '05, Service Award (posthumous); Dr. Jorge Blanco, '02, Courage Award; Dr. Ronald Silverman, '72, Courage Award. Next Alumni Gala: Reunion and Alumni Achievement Awards—May 3, 2019, at The Logan Philadelphia. ♦



Class of 1964 Scholarship Presentation: Jason Bresler; Samuel Cimino; Gilbert Falcone; Vincent Ferragamo; Pasquale Damico; Alan Simkins; Daniel Schneider; Morris Kauffman; Donald Coppola; Charles Mandell; Dean Amid Ismail



Alex Mitchell giving a tour of Temple Dental to alumni



Above: Glen Cole; John Rokita; John DeFinnis; Roger Friedlander; Philip Tighe; Richard Albright



Left: Austin Maxwell; Kathryn Maxwell; Kathy Udell-Martin; Joel Martin

Below: Amid Ismail (left) and Jason Bresler (far right) with 2018 Alumni Achievement Awardees: Jorge Blanco; Glenn Gray; Ronald Gross; Ronald Silverman; William Basil Dragan; Mario Palermo and Charles Mandell



Seated: Elliot M. Brooks; William Basil Dragan, Jr.; Stanley J. Czerwinski. Standing: Richard D. Mumma, Jr.; Ronald B. Gross; Jordon Bichefsky; Howard Zucker; Haig Garjian



David Slobodinsky; Joseph Roberts; Jeffrey Koche; Debra Rosen; Paul Ravin; Janine Reed; Harris Mulnick; Jay Goldberg; Loren Grossman



Seated: Michael Strickler; Soheil Soleimani; Jill Zaleski; Scott Fong; Kenneth Boyle. Standing: Steven Zicchinolfi; Timothy Regan; Patricia Rose; John Staivecki; Bridget McLaughlin; Paulette Yaswinski; Adam Weiss; Karen Smith; Theresa Benyo; Richard Panagrossi



Seated: Mack Abdul Lateer (guest); Renee Fennell; Randa Lisa Padner; William Padner. Standing: Melissa Burke-Minnig; Ronald Morales; Angela Stout; Shari Sklar; Steven Grater; Peter Hernandez; James Marmo



Seated: Joshua Bresler, William Basil Dragan, Jr., Angel Stout, Edward Vesely, Bridget McLaughlin. Standing: Jason Bresler, Phillip Tighe, Joseph Roberts, Howard Zucker, Jay Goldberg, Mario Palermo, Richard Albright, John Definnis, Shari Sklar, Renee Fenell



Amy Amaro;
Lara Kartleben;
Belinda Brown-Joseph

OFFICE OF THE PROVOST RECOGNIZES FACULTY

On Sunday, February 18, Maurice H. Kornberg School of Dentistry faculty members Dr. Mustafa Badi and Marisol Tellez-Merchán were recognized by the Office of the Provost at the men's basketball game against the University of Houston. Drs. Badi and Tellez-Merchán celebrated with their families, additional faculty, alumni and Dean Ismail.



2019 CE COURSES

Wednesday, January 16, 2019

Jewels You Can Use: 4 Hour PA Mandated Opioid Training Including Game Changers You Never Learned in Dental School

Dr. Marc Gottlieb - D \$295 DT \$125 / 6 CE

Wednesday, January 30, 2019

Silver Diamine Fluoride and Other New Materials for Caries Prevention and Arrest

Dr. Peter Milgrom - D \$195 DT \$95 / 3 CE

Wednesday, February 13, 2019

***Nitrous Oxide Sedation**

Dr. Stanton Braid, Dr. Allen Fielding

D \$800 / 7 CE

Wednesday, March 6, 2019

Medical Emergencies in the Dental Office

Dr. Andrea Bell, Dr. Stanley Heleniak

D \$350 DT \$150 / 7 CE

Friday, March 8, 2019

Oral Mucosal Disorders: Clinical Evaluation and Management

Dr. Chizobam Idahosa - D \$195 DT \$95 / 3 CE

Saturday, March 16, 2019

***Current Trends in Posterior Esthetic Restorative Dentistry**

Dr. Steven Weinberg - D \$325 DT \$175 / 6 CE

Friday, March 22, 2019

How to Read 3D Cone-Beam CT-Anatomy and Pathology

Dr. Jie Yang - D \$295 DT \$125 / 6 CE

Saturday, March 30, 2019

Dr. Leonard Abrams Lecture Lasers in Every Day Dentistry

Dr. Raymond Yukna

Temple Affiliates: FREE; All Others: \$75 / 3 CE

Friday, October 11, 2019

Multidisciplinary and Interceptive Orthodontic Tx for the General Dentist and Pediatric Dentist

Dr. Harold Slutsky - D \$295 DT \$125 / 6 CE

Saturday, October 19, 2019

***Pulp Therapy and Restorative Dentistry in Pediatric Dentistry**

Dr. Lance Kisby - D \$295 DT \$125 / 6 CE

Temple Comprehensive Surgical Implant

Training Program | Session #1 **Jan 10–12**;
Session #2 **Feb 7–9**; Session #3 **Feb 28–Mar 2**;
Session #4 **Apr 18–20**; Session #5 **May 9–11**

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>

*Indicates hands-on course

IN MEMORIAM

Dr. Elwood C. Johnson	DEN '43	Dr. James E. Pennington, Sr.	DEN '59
Dr. Arthur Petrella	DEN '44	Dr. James H. Craig, Jr.	DEN '60
Dr. Gerald Lowenthal	DEN '45	Dr. Joel Hittleman	DEN '60
Dr. Leonard Bellis	DEN '50	Dr. Edward C. Shore	DEN '60
Dr. F. Carl Cerine	DEN '52	Dr. Edward J. Chermol, Sr.	DEN '61
Dr. Ray N. Leidich	DEN '53	Dr. Ronald H. Lebbly	DEN '61
Dr. Milton Palat	DEN '53	Dr. Robert F. Moritz, Jr.	DEN '61
Dr. Robert E. Pedersen	DEN '53	Dr. R. Barry Angstadt	DEN '62
Dr. Albert J. Schreder	DEN '53	Dr. John F. Centonze	DEN '62
Dr. Richard T. Sweet	DEN '54	Dr. Lonnie Zaslow	DEN '62
Dr. William V. Bell	DEN '55	Dr. Edwyn M. Smith	DEN '63
Dr. William R. Frost	DEN '55	Dr. Maurice William Donnelly	DEN '64
Dr. Philip F. Greenstine	DEN '55	Dr. Alan Silverman	DEN '64
Dr. Edmund J. McGurk	DEN '55	Dr. Henry F. Neumann	DEN '70
Dr. Robert J. Stegner	DEN '55	Dr. Philip S. Wasserman	DEN '72
Dr. Michael M. Krop	DEN '56	Dr. Karl D. Geiger	DEN '74
Dr. Samuel D. Moore	DEN '56	Dr. Brian C. White	DEN '75
Dr. Joseph G. Morris, Jr.	DEN '56	Dr. Raymond E. Stover	DEN '77
Dr. Dale W. Gaul	DEN '57	Dr. John V. DiGirolamo	DEN '77, DEN '79
Dr. George Kanamori	CST '53, DEN '57	Dr. Sarah A. Gray	DEN '82, DEN '04
Dr. Joseph M. Belovich, Jr.	DEN '58	Dr. Richard Keith Yeager	DEN '83
Dr. Edward Blender	DEN '58	Dr. Gregory B. McClure	DEN '87
Dr. Joseph E. Cerino	DEN '58	Dr. Lorraine Hamel	DEN '88
Dr. John E. Salem	DEN '58	Dr. Matthew J. Soranno	DEN '88
Dr. Robert J. Champaine	DEN '59	Dr. Michael V. Brogna	DEN '89
Dr. Robert Kardon	DEN '59	Dr. Virginia E. Lee	DEN '90
Dr. Herbert S. Levinson	DEN '59	Dr. Matthew Palermo	DEN '05
Dr. Thomas Papoutsis	DEN '59	Dr. Gary J. Mencl	DEN '12

DIAMOND

Maurice H. Kornberg School of Dentistry
Magazine | Fall 2018

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TEMPLE DENTAL

IS ON THE VERGE OF A MAJOR CHANGE
IN HOW EDUCATION IS DELIVERED AND
IN HOW RESEARCH IS CONDUCTED.

WHILE HONORING THE TRADITIONAL MODELS OF
CARE, WE ARE CREATING NEW ONES—ONES THAT
ARE BETTER SUITED FOR A NEW GENERATION
OF PATIENTS AND POPULATIONS.

—Dean Amid Ismail

EXPERIENCE THE NEW TEMPLE DENTAL!

Save the date for the

Temple Dental Alumni Gala 2019 Reunion and Alumni Achievement Awards

May 3, 2019

The Logan Philadelphia