ENGINEERING PLANT CELLS WITH HUMAN GENES, RECENT RECRUIT TURNING LETTUCE LEAVES INTO DRUG-DELIVERY SYSTEMS
ADVANCING THE SCHOOL’S TRIPARTITE MISSION of education, research, and patient care informs all we do, and I am pleased to report that with the help of the entire Penn Dental Medicine community, we are continuing to build on our strengths in all three areas.

In research, fiscal year 2013 was an especially strong year. Our scholarly activity was up with 28% more faculty research publications than in fiscal year 2012 and total research funds awarded topping $13.36 million. We are also continuing to add to the depth of our research enterprise through faculty recruitment—welcoming two accomplished researchers since June—Dr. Henry Daniell, Professor in the Departments of Biochemistry and Pathology, (see story, page 8), and Dr. Hyun (Michel) Koo, Professor, Department of Orthodontics (see story, page 2). In addition, the School brought together highly respected researchers from throughout the country and around the world this June, hosting the 5th International Congress on Adhesive Dentistry and the Penn Periodontal Conference. Highlights from both events as well as from our Student Research Day and Faculty Research Retreat are presented in a special supplement in this issue of the *Penn Dental Medicine Journal* (see page 47).

In patient care and community service, 2013 marks a milestone—the 10th anniversary of the PennSmiles mobile van (see story, page 22). Over the past 10 years, PennSmiles has grown to be a vital source of dental care for children in West and Southwest Philadelphia and an integral part of our students’ clinical experiences.

And in education, we continue to attract the top students from across the country and around the world. This year’s 120-member freshman class is again among the best and the brightest, representing 24 states and six foreign countries. We also welcomed 34 accomplished foreign-trained dentists from 18 different countries to the Class of 2015 through our Program for Advanced Standing Students. Our tremendous students continue to be the School’s greatest asset.

In other areas, we are pleased to welcome a new member to the School’s Board of Overseers—Alfred L. Spencer, Jr., who brings extensive experience with DuPont in engineering management and integrated operations. Al’s strength as a program facilitator will be invaluable in helping to move new goals for the School forward, particularly, our next key facilities project—the transformation of the Evans Lower Concourse, which will involve an infrastructure renovation, a new state-of-the-art Preclinical Lab and Continuing Education Training Center, and a new general restorative clinic. A project that is vital to the School’s continued strength and growth.

Advancing our mission in education, research, and patient care truly does require the active support and involvement of the entire Penn Dental Medicine community.

Denis F. Kinane, BDS, PhD
Morton Amsterdam Dean
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ON THE COVER: One of the lettuce plants growing in the lab of recent recruit Dr. Henry Daniell, Professor, Departments of Biochemistry and Pathology, who has developed a novel platform for producing and delivering drugs through plants. Therapeutic proteins are introduced into the plants and the plant material is encapsulated and delivered orally. See story, page 8.
New Recruit Taking Aim at Biofilms, Dental Caries

Adding to the strength of Penn Dental Medicine’s research enterprise, is a recent faculty recruit to the Department of Orthodontics – Dr. Hyun (Michel) Koo, who joined the School in September as Professor in the Department of Orthodontics. Dr. Koo comes to Penn Dental Medicine from the University of Rochester School of Medicine and Dentistry where he had been part of the faculty since 2001, most recently serving as Associate Professor in the Department of Dentistry, the Department of Microbiology & Immunology, and the Center for Oral Biology.

Dr. Koo holds a PhD in Oral Biology (Microbiology, 1999) and an MS in Food Science (Biochemistry, 1996) from State University of Campinas, Brazil, and earned his DDS at State University Sao Paulo, Brazil (1993). In addition, he completed a postdoctoral fellowship in oral biology at the University of Rochester Medical Center, 1999-2001, and served as a visiting scientist with the National Institute of Dental and Craniofacial Research, 2011-2012.

An accomplished researcher, his lab focuses on one of the most prevalent biofilm-dependent oral infectious diseases – dental caries. His research is aimed at building our understanding of pathogenic biofilms and developing effective therapeutics against them. His lab is particularly interested in finding new anti-biofilm agents from plant-derived foods and organic waste products as well as developing novel drug-delivery approaches.

“As with the high prevalence of caries among the most vulnerable populations, Michel’s work stands to improve the lives of many, particularly underserved children,” says Morton Amsterdam Dean Denis Kinane. “We are excited to have him here at Penn.”

Student Elected to National Post

Third-year Penn Dental Medicine student Matthew Oishi (D’15) has been elected vice president of the American Association for Dental Research’s National Student Research Group (AADR NSRG), a platform from which he hopes to inspire other students to also become advocates for research.

“The importance of research cannot be understated. It not only pushes the frontiers of knowledge and improves healthcare, but also is a key driver of economic growth and global competitiveness,” says Oishi.

Oishi, who is presently pursuing a Master of Public Health along with his DMD, served as a government affairs fellow with the AADR during the summer after his first year at Penn Dental Medicine. “While at the AADR, I witnessed the importance of research as an investment for our future and for our health,” says Oishi. “I hope to raise awareness about the crisis in research funding and engage students in advocacy through the AADR and NSRG.”

The election of the 2014-2015 AADR NSRG officers took place in May 2013, with Oishi beginning his term as vice president-elect at that time. He will officially take office after the 2014 AADR/CADR Annual Meeting & Exhibition, to be held March 19-22, 2014 in Charlotte, N.C., and will serve through the 2015 IADR/AADR/CADR General Session.

The AADR NSRG is a student-run organization whose main purpose is to foster an environment in every dental school whereby students interested in enriching their dental education through research are encouraged to do so. It is composed of a network of self-governing local student research group (SRG) chapters at each dental school and is led nationally by officers elected through a majority of votes from all members. Penn Dental Medicine’s Vernon Brightman Research Society is the School’s chapter of the NSRG.
School Signs China, Thailand MOU’s

This summer, Penn Dental Medicine continued build on its global engagement, signing a new memorandum of understanding (MOU) agreement with dental schools in Thailand and China to facilitate faculty and student exchange and foster collaborative research. Faculty from the School guest lectured as part of both visits as well.

In June, Morton Amsterdam Dean Denis Kinane signed an MOU with the Faculty of Dentistry Mahidol University, Bangkok, Thailand, and in August, he signed one with the Shanghai Dental School (College of Stomatology, Ninth People’s Hospital, Shanghai Jiao Tong University School of Medicine). This Shanghai MOU marks the fifth dental school in China with which Penn Dental Medicine has an exchange agreement.

As part of the Thailand visit, Dr. Syngcuk Kim, Associate Dean for Global Affairs and Continuing Education, also gave an endodontic microsurgery course to faculty at Mahidol, while Dean Kinane gave a research seminar to faculty and students in Chulalongkorn University Faculty of Dentistry, also in Bangkok.

On the China trip, Dean Kinane and Dr. Kim were joined by Dr. Anh Le, Chair and Norman Vine Endowed Professor of Oral Rehabilitation, Department of Oral & Maxillofacial Surgery/Pharmacology; and Dr. William Cheung, Chair of the School’s Board of Overseers. All four spoke at the Hong Kong International Dental Expo and Symposium as well as the annual Chinese Stomatology Association (CSA) meeting in Shanghai. “The CSA meeting is the biggest dental meeting in China,” says Dr. Kim. “This was the first time in its history that four foreign-country professors of the same institution lectured. We were pleased to be involved at this level as Penn Dental continues to build its presence in China.”

IN JUNE, Penn Dental Medicine turned the spotlight on the latest research in adhesive dentistry and periodontics, hosting two conferences that drew highly respected speakers and attendees from across the country and around the world. Penn Dental Medicine hosted the 5th International Congress on Adhesive Dentistry June 14-15, 2013 and presented the first Penn Periodontal Conference June 23-28, 2013.

In addition to a program of speakers, both events included poster presentations of current research in the respective fields. See the special supplement to this issue of PDMJ, Research Review, page 47, for highlights of both conferences as well as a selection of the research presented at the School’s Student Research Day, held May 9, 2013, and the School’s annual Faculty Research Retreat, held May 31, 2013.

The program at both the adhesive dentistry and periodontics conferences featured speakers from across the country and around the world.
Exploring a Passion for Problem Solving in Clinical Dentistry

While there may only be 24 hours in every day, fourth-year Penn Dental Medicine student Mehreen Merchant (D ’14) makes the most of every minute. As a dual-degree candidate pursuing her DMD here, and a Master of Science in Bioengineering from Penn’s School of Engineering and Applied Science, she artfully balances coursework and clinical requirements, all while also making time to pursue her passion for research.

“I strongly believe that the best clinical practices are those founded on sound evidence-based dentistry, and am determined to be a clinician who not only provides care in consciousness of the latest research and expertise in her field, but also one who contributes to such advancements,” she says.

Her introduction to research began after her sophomore year of her undergraduate studies, when she spent a few weeks working in the Colgate-Palmolive Company’s Oral Care Product Development Department. It was then that Mehreen initiated research that later launched a desensitizing mouthwash as part of the company’s Sensitive Pro-Relief™ product line. She returned to Colgate this past summer and collaborated with a team of the company’s scientists, faculty from New York University’s College of Dentistry, and private-practice clinicians on the development of an electric toothbrush which employs novel and innovative technology.

“This coming March, I plan to travel with the company to present my work at the 2014 American Association for Dental Research (AADR) meeting in Charlotte, NC,” she says.

Mehreen is also involved in research at Penn Dental Medicine, where she is working with a resident on a research study to examine the effects of palatal expansion on patients afflicted with pediatric obstructive sleep apnea.

Mehreen, who earned her bachelor’s degree in Chemical and Biomolecular Engineering from Johns Hopkins University, credits her undergraduate engineering courses with inspiring her love of research and motivating her decision to become a dentist.

“I knew that a career in dentistry would allow me to best intertwine my penchant for problem solving with my passion for healthcare and for working with others,” she says. “I decided to pursue a dual degree at Penn to build upon my knowledge of engineering fundamentals in order to use these tools to solve problems in clinical dentistry.”

To fully incorporate her desire to be a problem solver and a healthcare advocate, Mehreen also finds time to apply her skills in giving back to the community. She is part of the Penn Dental Medicine competitive honors program in both community health and clinical dentistry.

“The honors program is challenging, but it gives me a chance to put my efforts to work to help others. As part of my community honors, I help to provide free dental services to uninsured children through our partnership with Puentes de Salud, a health clinic in South Philadelphia, and as part of the clinical honors program, I am able to enhance my clinical skills by managing advanced cases in restorative and esthetic dentistry by working in the William W.M. Cheung Advanced Dental Care Clinic,” she adds.

While Mehreen’s immediate plans after graduation are to pursue further training before entering private practice, she plans to continue to be involved in research during residency and throughout her career.

“Research has allowed me the opportunity to envision, to discover, to problem-solve, and to engineer,” says Mehreen. “I anticipate that continuing to be involved in such pursuits will allow for a career of fulfillment and purpose.”

“I strongly believe that the best clinical practices are those founded on sound evidence-based dentistry.”

— MEHREEN MERCHANT, D’14
Next Steps for Class of 2013

Congratulations Class of 2013! Commencement for the 143-member Class of 2013 took place May 13, and with that, these new alumni were off to begin the next stage of their dental careers. Where are they now? Following is a breakdown of their self-reported plans:

- 88 graduates are pursuing postdoctoral study;
- 50 entered private practice;
- 3 are in the military (general practice);
- 1 graduate is practicing abroad; and
- 1 is in the National Health Service Corps, practicing in an underserved area.

POSTDOCTORAL RESIDENCIES & LOCATIONS

61.5% of the Class of 2013 went on to postdoctoral study at the schools and centers noted below.

**General Practice Residency (34 students)**
- Abington Memorial, Jenkintown, PA
- Albert Einstein Medical Center, Philadelphia, PA
- Brookdale Hospital, Brooklyn, NY
- Brooklyn Hospital Center, Brooklyn, NY
- Coler-Goldwater Specialty Hospital, New York, NY
- Howard University Hospital, Washington DC
- Jamaica Hospital, Jamaica, NY
- Jacobi Medical Center, Bronx, NY
- Lutheran Hospital- Brooklyn, Brooklyn, NY
- New York Hospital Queens, Flushing, NY
- New York Metropolitan Hospital, New York, NY
- New York Columbia Presbyterian Hospital, New York, NY
- North Shore University Hospital, Manhasset, NY
- Montefiore Hospital, New York, NY
- Mount Sinai Medical Center, New York, NY
- New York Methodist Hospital, Brooklyn, NY
- Newark Beth Israel Medical Center, Newark, NJ

**Oral and Maxillofacial Surgery Internship (4 students)**
- Louisiana State University Health Science Center, New Orleans, LA
- University of Pennsylvania, Philadelphia, PA
- University of Maryland Medical Center, Baltimore, MD

**Oral & Maxillofacial Surgery Residency (13 students)**
- Beth Israel/Jacobi/Einstein Hospitals, New York, NY
- Brookdale Hospital, Brooklyn, NY
- New York Columbia Presbyterian Medical Center, New York, NY
- UCONN, Hartford, CT
- MGH, Boston, NY
- Emory University, Atlanta, GA
- University of Pittsburgh, Pittsburgh, PA
- Oregon Health Sciences University, Portland, OR
- LSU, New Orleans, LA
- Weill Cornell Medical Center, New York, NY

**Orthodontics Residency (12 students)**
- Columbia University, New York, NY
- Detroit Mercy- University of Detroit, Detroit, MI
- Oregon Health Sciences Center, Portland, OR
- Loma Linda University, Loma Linda, CA
- Roseman University of Health Sciences, Henderson, NV
- University of Washington, Seattle, WA
- University of Louisville, Louisville, KY

**Endodontics Residency (4 students)**
- UNC, Chapel Hill, NC
- University of British Columbia, Vancouver, BC, Canada
- Tufts University, Boston, MA
- University of Pennsylvania, Philadelphia, PA

**Pediatric Dentistry Residency (7 students)**
- St. Christopher’s Hospital, Philadelphia, PA
- Children’s Hospital of Philadelphia, Philadelphia, PA
- Columbia Presbyterian Hospital, New York, NY
- Children’s Hospital of Pittsburgh, Pittsburgh, PA

**Periodontics Residency (2 students)**
- University of Illinois- Chicago, Chicago, IL
- Columbia University, New York, NY

**Prosthodontics Residency (3 students)**
- Columbia University, New York, NY
- University of Illinois- Chicago, Chicago, IL
- University of Maryland, Baltimore, MD

**Periodontic/Prosthesis Residency (1 student)**
- University of Pennsylvania, Philadelphia, PA

**Orthodontics Residency (12 students)**
- University of Buffalo, Buffalo, NY
- University of Colorado, Aurora, CO
- University of Maryland, Baltimore, MD
- University of Pennsylvania, Philadelphia, PA

**Admissions & Postgraduate Education**

- University of Texas Health Science Center, Houston, TX
- VA Medical Center- Memphis, Memphis, TN
- VA Medical Center- Malcolm Randall, Gainesville, FL
- VA Medical Center- San Francisco, San Francisco, CA
- Virtua Health, Camden, NJ

**61.5% of 2013 graduates are pursuing postdoctoral study**
On Board: Alfred L. Spencer, Jr.

Penn Dental Medicine welcomes a new addition to its Board of Overseers—Alfred L. Spencer, Jr., of Wilmington, Del. Spencer, who has worked in engineering management and integrated operations for the DuPont Company, was officially approved to the three-year renewable term as an Overseer at the November 2013 meeting of the University of Pennsylvania’s Board of Trustees.

Spencer, who holds a BS in Civil Engineering from the Massachusetts Institute of Technology and an Executive MBA from the University of Delaware, is currently a Continuous Improvement–Global Program Manager for DuPont, working on efforts to implement productivity processes across the North American manufacturing and the global Safety, Health, and Environmental organization. He has served as site engineering manager in the design and construction divisions with direct responsibility for multi-million-dollar manufacturing installations. Spencer is a certified Six Sigma Black Belt, with expertise in applying the Six Sigma business methodologies across platforms to control costs and reduce waste while maintaining quality. In recent years, he has held several positions in DuPont operations, including Master Production Scheduler, Demand Manager, and Global Supply Chain Manager for the Chemicals Solutions Unit.

Recognized for outstanding leadership in the area of diversity, he was appointed DuPont Executive on Loan to N.A.C.M.E., (National Action Council for Minority Engineers), from 1993 to 1995. In this role, he worked to leverage corporate resources to assist in the development and marketing of an academic diversity workshop series aimed at increasing the retention rate of minorities in engineering.

“Al’s strength as a facilitator of programs and new initiatives will be invaluable as we call on the Board to help move new goals and plans for the School forward,” says Morton Amsterdam Dean Denis Kinane.

The Penn Dental Medicine Board of Overseers provides volunteer leadership to the School and acts as a sounding board and advisory resource for the Dean and other administrative leaders, stewarding the missions of both Penn Dental Medicine and the University of Pennsylvania.

Rite of Passage

Penn Dental Medicine welcomed the Class of 2017 DMD students into the study of dental medicine with its White Coat Ceremony, held Monday, August 26, at the Zellerbach Theatre in the University of Pennsylvania’s Annenberg Center. This annual tradition holds symbolic significance for the incoming class as they declare their commitment to assume the responsibilities and obligations of the dental profession.

This year’s freshman class includes 120 students—55 men and 65 women, representing six foreign countries (Canada, Jamaica, People’s Republic of China, South Korea, Taiwan, and Vietnam) and 24 states. Widely accomplished (with an overall average GPA of 3.67), the class includes six students who have Master’s degrees and one with a JD, who was a practicing attorney before applying to Penn Dental Medicine. Nine members of this first-year class are legacy students with family members who are also Penn Dental Medicine alumni. There is also a brother/sister pair in the class (but no, not twins).

Along with welcoming remarks by Penn Dental Medicine’s Morton Amsterdam Dean, Dr. Denis Kinane, and Dr. Uri Hangorsky, Associate Dean for Academic Affairs, the ceremony included a keynote address by Michael A. Fitts, Dean and Bernard G. Segal Professor of Law at Penn Law, a talk by Dr. D. Walter Cohen (C’47, D’50), Dean Emeritus of Penn Dental Medicine, on the history of Penn Dental Medicine, and the presentation of each student in their white coats.
Dean’s Scholars

Each year, Penn Dental Medicine awards Dean’s Scholarships to accomplished students at the time of admission; this year, awarding 20 scholarships to members of the freshman class. These scholarships recognize outstanding students based on both their academic and nonacademic achievements. Among the selection factors are academic record, DAT scores, extracurricular activities, predental and research experience, community service, and leadership qualities.

The newest class of Dean’s Scholars includes Aliana Caridad, Heather Chiarello, Ivana Derby, Yanyao Fu, Corina Guzman, Tranchau Hoang, Maria Hodapp, Aaron Ivanhoe, Sukyong Jung, Alexander Krisko, Tiffany Lin, Peter Mailhot, Joanna Mangar, Matthew Martinez, Michael Moshenayov, Daniel Shimansky, Woojung Sul, Van-Anh Tran, Jonathan Wyble, and Heliya Ziai. They join a group of 71 other Dean’s Scholars from the second-, third-, and fourth-year classes; a group now coming together to support each other in new ways with the formation of the Dean’s Scholars Society.

The newly formed Dean’s Scholars Society will foster career development through networking, mentoring, and community service.

Jonathan Vo (D’15), Vice President; Emily Ding (D’16), Secretary; Jacqueline Calcagno (D’15), Treasurer; and Tiffany Lin (D’17), Class of 2017 Representative.

“Dean’s Scholars are highly accomplished students not only in academics but also in non-academic activities, such as community service, research, leadership,” says Kim. “Yet, one year of scholars didn’t know the next. With the scholarships in existence for more than 20 years, my goal is to bring the group together to support each other’s career development.” The mission of the Society is to foster career development of the Dean’s Scholars through networking, mentoring, and community service. The group’s future plans include a mentoring program among current Scholars, postdoctoral residents, and alumni, as well as social events and a community service day to bring current and alumni Scholars together.

A World Class

Penn Dental Medicine’s Program for Advanced Standing Students (PASS) continues to attract top, foreign-trained dentists from around the world, entering the two-year program in order to pursue clinical practice here in the United States. This year’s newest class, who joined the Class of 2015 with the start of this academic year, includes 34 students from 18 different countries, including:

- Albania: 1
- Armenia: 1
- Belarus: 1
- China: 1
- Colombia: 1
- Dominican Republic: 1
- Egypt: 2
- Ghana: 1
- India: 8
- Iran: 2
- Iraq: 5
- Kazakhstan: 1
- Nigeria: 1
- Pakistan: 3
- Russia: 2
- Saudi Arabia: 1
- Ukraine: 1
- Venezuela: 1

18 countries are represented in the PASS class of 2015

ABOVE: The Class of 2017 Dean’s Scholars with Dean Denis Kinane; 20 scholarships were awarded to members of the freshman class.
“If you have something that saves lives, you have an obligation to make it available to everyone. We won’t solve the high cost of pharmaceuticals unless we solve the cost of production.”

— DR. HENRY DANIELL
YOU MIGHT SAY that Dr. Henry Daniell, who recently joined the faculty of Penn Dental Medicine, has a green thumb. The plants he grows, however, are far from your garden variety greens. Packed with human genes, his specially engineered plants offer a novel platform for producing and delivering pharmaceuticals.

Dr. Daniell, a plant molecular biologist, pursued basic science research after earning a biochemistry PhD from Madurai Kamaraj University in his native India. Yet he began to think more expansively about his work upon recognizing what he perceived as a human-rights injustice: the sky-high costs of medications taken for chronic or lengthy illnesses. Drugs costs soar in part due to complex production and delivery systems, which may involve fermentation, purification, sterilization, injection, and cold storage and transportation.

“Interferon, a common cancer drug, for example, costs $30,000 to $40,000 for a four-month treatment, and a third of the global population earns $2 or less a day,” says Dr. Daniell. “To me, there is something morally not right about that. If you have something that saves lives, you have an obligation to make it available to everyone. We won’t solve the high cost of pharmaceuticals unless we solve the cost of production.”

That’s why, when Dr. Daniell got his first faculty position two decades ago, he formulated an idea for new ways of making proteins for human therapeutics: producing them in plant cells. His outside-the-box thinking has since turned lettuce leaves into drug-delivery systems, with results that have the potential to make disease treatment and prevention affordable and accessible to a global population—and, possibly, even more effective.

Now, as Professor, Departments of Biochemistry and Pathology, and Director of Translational Research, Daniell is forging new pathways towards making human therapeutics more accessible to all.

OPPOSITE: Henry Daniell, PhD, joined Penn Dental Medicine this June as Professor, Departments of Biochemistry and Pathology, and Director of Translational Research. Pictured in his lab where therapeutic proteins are introduced into plant cells and the specially engineered plants are grown, harvested, and encapsulated. This plant-based system has been shown to be effective in producing and delivering vaccines, insulin, and in the treatment of autoimmune disorders.

GREEN VACCINES

DELIVERING DRUGS WITH PLANTS, DR. HENRY DANIELL AIMS TO SAVE LIVES
Biochemistry and Pathology, and Director of Translational Research at Penn Dental Medicine, Dr. Daniell is working to take his plant-based medicine platform from the lab to the clinic, and to begin saving lives.

A NEW MODEL FOR MEDICINE
Dr. Daniell arrived at Penn Dental Medicine this past June from a position at the University of Central Florida (UCF). There, he established a reputation as a path-breaker and attained the title of Pegasus Professor, the institution’s most prestigious honor given to faculty members, for “outstanding accomplishments in teaching, research, and service.” He was also the only Board of Trustees Chair in UCF’s medical school and is a foreign member of Italy’s National Academy of Sciences, only the 14th American to be inducted. (The first was Penn founder Benjamin Franklin, inducted in 1786.)

These honors stem from a simple, if innovative, idea. “Our concept is to grow a plant containing a therapeutic protein, put the plant material in a capsule, and deliver it orally,” explains Dr. Daniell.

Over the last decade, Dr. Daniell and colleagues have produced several hundred proteins of pharmaceutical interest—candidates for insertion into plants that could then be encapsulated and easily administered. In experiments in model organisms, they’ve had great success at tackling some of medicine’s most daunting conditions. In 2012, Dr. Daniell and colleagues published a paper in the Journal of Plant Biotechnology describing the creation of lettuce plants engineered to express a protein that stimulates the pancreas to produce insulin. Mice fed capsules of the freeze-dried plant material produced insulin and had normal sugar levels in their blood and urine—the appearance of a functional cure for diabetes. What’s more, the capsules could be stored at room temperature for up to 15 months and retain their potency. Similarly, a 2010 publication in the National Academy of Sciences’ journal, PNAS, demonstrated the ability to block severe immune reaction and death in hemophilic mice. Dr. Daniell’s lab has also developed oral vaccines against polio, cholera, malaria, tuberculosis, anthrax, and plague.

“We’ve shown that we can deliver vaccines, we can deliver insulin for diabetes, and we can even use this to treat autoimmune disorders by teaching the immune system to tolerate certain drugs that can cause severe immune reactions,” he says.

Dr. Daniell’s technique also has the potential to navigate the blood-retina barrier as well as the blood-brain barrier—a critical step in treating neurological diseases like Alzheimer’s. In fact, Dr. Daniell’s lab has had promising findings related to the plaque formed in Alzheimer’s brains. And his approach to manufacturing insulin boasts an advance over currently available insulin as it provides the complete, three chain protein; current formulations are missing the C chain.

The path from idea to application, however, was not simple or quick. Dr. Daniell and colleagues have methodically developed and tested each step of the system of plant-based therapeutics: from developing proteins of interest, to designing molecular tags that direct the proteins across epithelial barriers to reach the bloodstream or immune system, to introducing those proteins into a plant cell (via a “gene gun” specially designed by DuPont to operate using helium gas), and finally to growing, harvesting, freeze-drying, powdering, and packaging the engineered plants in capsules that can be easily administered and easily stored.

“Our concept is to grow a plant containing a therapeutic protein, put the plant material in a capsule, and deliver it orally.”

—DR. HENRY DANIELL

ABOVE: The encapsulated form makes drugs produced in this way easy to administer and shelf-stable, easing distribution to remote areas of the world. Capsules can be stored for up to 15 months.

OPPOSITE: Proteins are introduced into plant cells via a “gene gun,” which operates using helium gas. Dr. Jin Su of the Daniell’s lab prepares to place a lettuce leaf into the device.
In addition to offering an injection-free alternative to taking medicines—a bonus for diabetics who might otherwise face 60,000 injections of insulin in their lifetime—this shelf-stable system also addresses a shortcoming in current vaccine production. Because vaccines contain pathogens—even if they are killed or inactivated—they must be refrigerated to ensure the organisms don’t reproduce and pose threats to individuals receiving the vaccine.

“Many vaccines are based on ‘killed’ or inactivated viruses, but there’s no such thing as one hundred percent killed,” says Dr. Daniell.

Dr. Daniell’s system, in contrast, uses only proteins from pathogens, rather than the entire organism, to “teach” the immune system to recognize them as dangerous. Thus the required “cold chain” of refrigeration is eliminated, saving a step that increases the cost of vaccines and makes them difficult to transport to remote areas in developing nations where electrical connections are scarce.

**PLANT ADVANTAGES**

Plants have several properties that lend themselves well to producing biomedical molecules and carrying them into the body. First, plant cells are totipotent; in other words, all the different tissues of a plant can be grown starting from a single cell in a culture dish. This characteristic enables scientists to make modifications to one plant cell and, from that, grow a plant in which every cell has those modifications.

Plant cells also have fibrous walls made of cellulose, which cannot be broken down by human enzymes, but can be degraded by the microbes that reside in the gut. This feature enables therapeutic proteins produced inside plant cells to survive the trip through the digestive system until reaching the intestines, where they can be released to disseminate into the bloodstream.

In addition, because plants are commonly consumed foods, most people are not allergic to them as they might be to some synthetically produced drugs, or those based on egg proteins, to which a substantial number of individuals are sensitive.

And finally, plants can be easily grown. Dr. Daniell has reported that just an acre of genetically modified tobacco plants, for example, could produce enough anthrax vaccine to immunize every person in the United States.
THINKING BIG
Dr. Daniell’s work has attracted attention from multiple funding bodies, including the National Institutes of Health, the Juvenile Diabetes Research Foundation, and the Bill and Melinda Gates Foundation. The Gates Foundation grant, awarded in 2011, has the specific aim of eradicating polio, once and for all. Though the disease was mostly wiped out thanks to an effective vaccination campaign in the latter half of the 20th century, localized outbreaks have prevented it from disappearing completely. The vaccine that Daniell is working on is aimed at offering protection against multiple strains of polio, and would be free of the refrigeration cold chain, easing the process of delivery to those areas of the world where the disease is still present.

“Gates wants me to develop a booster vaccine that will offer protection against multiple serotypes of the polio virus,” says Dr. Daniell. “We have all the key players in place to move this to the clinic.”

Pharmaceutical companies are similarly interested in the great potential of Dr. Daniell’s work, which has generated more than 150 patents.

Collaborative work with Novo Nordisk and Bayer are among the tally of his lab’s projects, which will be supported by a greenhouse erected in Penn’s South Bank campus in Gray’s Ferry, where plants harboring vaccine or drug proteins can grow and be harvested.

The applications of his platform are nearly limitless, but several could push forward dental medicine and practice. Dr. Daniell’s lab has already made monoclonal antibodies against streptococcus mutants that cause dental caries. He and colleagues have also worked on designing antimicrobial peptides to insert in plant cells that could destroy bacteria, including oral pathogens. Such an approach could destroy oral infections without raising the risk of developing antibiotic resistance because the peptide’s attack strategy—physically poking holes in a bacterial membrane—cannot be avoided by mutation.

Penn Dental Medicine is well positioned for Dr. Daniell to take advantage of interdisciplinary collaborations. Within the School, he is exploring collaborations with Dr. Anh Le, Norman Vine Endowed Professor of Oral Rehabilitation and Chair of the Department of Oral Surgery/Pharmacology, to work on vaccines to suppress oral tumors. A partnership is also in the works with Dr. Elisabeth Barton, Associate Professor in the Department of Anatomy and Cell Biology, on a project tied to multiple sclerosis therapies.

Cross-school partnerships are likewise developing. One project, for instance, will involve Penn’s Perelman School of Medicine with an aim of developing a vaccine to protect hemophilia patients from developing immune reactions to injected blood clotting factors. In addition, Dr. Daniell has been invited to join Penn’s graduate programs in immunology and in gene therapy and vaccines. And he is in talks with the Penn Medicine’s Global Health Programs to get involved with work related to tuberculosis.

“I’m quite excited because the rationale for me to move here is that hospitals and clinics are in place for the technology to be validated by moving to clinical trials,” he said. “President Amy Gutmann’s mantra about integrating knowledge was also very attractive to me. Many universities have these brick walls around their disciplines. But if I were to work in isolation, I’d never get to the finish line.”

At its core, Dr. Daniell’s work aims to improve the human condition with the same energized sense of innovation that led to the tech boom.

“Unlike the fantastic inventions that we see in things like cell phones and IT and so on, medicine hasn’t had the same types of leaps and bounds of progress,” says Dr. Daniell. “I see a lot of room for improvement.”

—By Katherine Unger Baillie
WHILE RESEARCH and scholarship have always been integral to the mission of Penn Dental Medicine, this summer, a new role was created to help advance goals in these areas with the naming of a Vice Dean for Research and Scholarship. Appointed to this new administrative post in August was Dr. Dana Graves, Professor, Department of Periodontics. Soon after his appointment, we had a chance to ask him about this new position and get some of his views on the School’s research efforts now and going forward.

Q: How would you describe this new position of Vice Dean for Research and Scholarship?
A: Scholarship involves students, staff, and faculty and is critical to the integration of the School within the fabric of a research-intensive university such as the University of Pennsylvania. This position will provide a unique opportunity for me to help shape and promote activities that enhance scholarship. It provides an opportunity to develop programs that better integrate basic and clinical research. In this position, I will also participate in some of the financial processes and decisions faced by the School, which is both interesting and challenging.

Q: What are the key goals for the School in terms of its research/scholarship?
A: One of the key areas is the recruitment of strong researchers to the School. Penn Dental Medicine has been successful in recruiting outstanding basic and translational scientists over the last few years despite the difficult economic environment (see related stories on the appointments of Dr. Henry Daniell, page 8, and Dr. Michel Koo, page 2). It is important to maintain this trajectory, to build upon the current strengths in basic research, and to include growth in clinical research.

Q: What aspects of the School’s research enterprise are growing and changing the most?
A: Penn Dental Medicine has one of the most successful groups of researchers of any dental school. Areas of strength are microbiology, including virology; the study of pathologic processes, including inflammation and the host response; and cellular aspects of tissue regeneration, which provide a strong core to build upon. At the University level, there has been a re-emphasis on corporate-sponsored research, including the development of a Corporate Relations Office. This provides opportunities for our School to leverage many of its clinical strengths to enhance scholarship and research.

The recruitment of scientists into clinical departments is ongoing and will help develop research infrastructure that enhances interactions between basic scientists and clinicians. And, lastly, there has been a conscious effort to bring investigators to Penn Dental Medicine who interact with other schools and centers at Penn. This builds upon the current research strength and enhances the School’s visibility internationally and within the University.

Q: What role do you see student research playing within the School?
A: The School has had a strong predoctoral student research program through the Summer Research Program for many years. More recently, an Honors Degree Program was developed for predoctoral students that also has a strong research component. At the Master’s level, a scholarship program supported by the Dean’s Office was initiated that encourages students in clinical specialties to work in basic science laboratories and strengthen interactions between clinical and basic science departments. Lastly, a DScD program was established to provide formal research training for residents in Periodontics, Endodontics, Orthodontics, Oral Medicine, and Pediatric Dentistry that will prepare students to enter academics. This program also has a Dean’s Scholarship to reduce financial barriers for students interested in research. All these programs highlight the School’s strong commitment to student research and to building scholarship at Penn Dental Medicine.

Q: What else about research/scholarship do you see as important to the School’s mission?
A: Research and scholarship are central to Penn Dental Medicine and represent one of its core missions. Virtually all of the new full-time faculty members hired by the School, including those in clinical departments, have formal research training with research degrees. The University of Pennsylvania is one of the foremost international research centers and is committed to scholarship. Penn Dental Medicine is part of that culture and has the highest commitment to fostering knowledge at both the basic science and clinical levels. I hope to contribute to this effort.
Cancer Therapies, Jaw Bone Necrosis

Cancer treatments can save lives, but the devastating effects of some therapies pose new and often significant health hazards for patients undergoing treatment.

Some of these are particularly harmful to the jaw bone, prompting Dr. Sunday O. Akintoye, DDS, MS, Associate Professor in the Department of Oral Medicine at Penn Dental Medicine, to build on his existing research with two new federally funded studies that investigate the use of two common cancer-related therapies—radiation and the antiresorptive drug bisphosphonate—and their impact on necrosis of the jaw bone.

Underpinning both studies is the growing understanding, based on research first reported by Dr. Akintoye, that the bones and mesenchymal stem cells of the jaw are different from those in other parts of the body, in terms of their growth, lifespan, and regenerative properties. As a result, Dr. Akintoye says, “they respond to external insults from radiation, drugs, trauma, and other things differently.”

The first study is designed to determine the mechanisms that promote the susceptibility of the jaw bone to osteoradionecrosis (ORN), a major complication of radiation therapy that is standard for head and neck cancers and which can cause facial disfigurement, tooth loss, significant morbidity, and a diminished quality of life. Oropharyngeal cancer is the ninth most common cancer, according to epidemiological studies.

“We know radiation damages cells and believe this is accentuated in the jaw bone,” Dr. Akintoye says. Knowing the jaw bone behaves differently from others in the body, he is now seeking to find out how the jaw mesenchymal stem cells are different, what are the underlying radiation-induced cellular events that disrupt jaw bone healing and why these bones are relatively more susceptible to ORN.

The researchers are irradiating healthy human stem cells isolated from the jaw and hip bones to evaluate skeletal site-specific mechanistic differences. The overarching goals, Dr. Akintoye says, is to determine “what we can do differently so we don’t impact the jaw bone” and thus improve the quality of life of cancer survivors.

The study, which has been underway since last year, is funded for three years by the National Cancer Institute at the National Institutes for Health (NIH), of the U.S. Department of Health and Human Services.

Dr. Akintoye, who did two postdoctoral fellowships at the National Institute of Dental and Craniofacial Research (NIDCR/NIH) from 1999-2003, has focused his research studies on alleviating the orofacial complications of cancer, in particular by studying the unique properties of the orofacial bone mesenchymal stem cells.

“We know from our animal studies that a high amount of the drug stays in the jaw bone compared with other bones in the body.”

— DR. SUNDAY O. AKINTOYE

ABOVE: Dr. Sunday Akintoye is studying the use of two common cancer therapies and their impact on necrosis of the jaw bone.

As an oral medicine specialist, I have seen a lot of patients who develop jaw complications when undergoing cancer therapy,” Dr. Akintoye says. “I’m interested in how we can prevent this and avoid the added co-morbidity they have to go through in addition to the cancer.”

In a similar vein, the second research project underway is studying jaw necrosis that results from exposure to bisphosphonate, an antiresorptive drug used to treat osteoporosis and bone cancer spreading throughout the body.

“Even though the patients have bone cancer or osteoporosis all over, only the jaw bone seems susceptible to antiresorptive necrosis,” Dr. Akintoye explains.

Previous studies by Dr. Akintoye have shown that mesenchymal stem cells in the jaw die quickly in the presence of bisphosphonate, and this new study will look at why this happens, in particular how the drug is taken up by the cells and the mechanism by which the cell tries to eliminate the bisphosphonate so it does not rise to toxic levels.

“We know from our animal studies that a high amount of the drug stays in the jaw bone compared with other bones in the body,” Dr. Akintoye explains. Using live cell microscopic imaging studies, “we want to track the drug that is taken up in the cell, and see how the lysosomes within the cell picks up the drugs and tries to break it down and eliminate it.”

This study has been funded for two years by the NIDCR/NIH, although Dr. Akintoye, principal investigator, expects both to be long-term studies that continue beyond their funding dates.
ANATOMY & CELL BIOLOGY

AWARDS & ACHIEVEMENTS
Dr. Carolyn Gibson, Professor, Dept. of Anatomy & Cell Biology, was recognized with the first annual Faculty Mentor Award, presented by Penn Dental Medicine for her significant contributions in facilitating research in the basic and clinical sciences. The award was presented by Dean Denis Kinane at the School’s Faculty Awards & Recognition Reception, held May 8, 2013.

RECENT GRANT AWARDS
Astra Zeneca grant to test a new treatment to slow age-related macular degeneration.
Principal Investigator: Dr. Claire Mitchell, Associate Professor, Dept. of Anatomy & Cell Biology

SELECTED PUBLICATIONS
Recently published work by department researchers (indicated in bold).

RECENT GRANT AWARDS
Texas A&M Agrilife Research (DOE) grant to study the development of a synthetic crop for direct-drop-in biofuel production.
Principal Investigator: Dr. Henry Daniell, Professor, Depts. of Biochemistry and Pathology

SELECTED PUBLICATIONS
Recently published work by department researchers (indicated in bold).

BIOCHEMISTRY

AWARDS & ACHIEVEMENTS
Dr. Sherrill Adams, Professor and Interim Chair, Dept. of Biochemistry, and Director of Faculty Advancement and Diversity, was honored with the Distinguished Faculty Award on behalf of Penn Dental Medicine’s Office of Diversity Affairs, recognizing her leadership in promoting and nurturing a diverse community. The award was presented by Dean Denis Kinane at the School’s Faculty Awards & Recognition Reception, held May 8, 2013.

RECENT GRANT AWARDS
Bill & Melinda Gates Foundation grant to develop and license a low-cost booster vaccine for immunity against all serotypes of poliovirus.
Principal Investigator: Dr. Henry Daniell, Professor, Depts. of Biochemistry and Pathology

NIH grant to develop oral tolerance for hemophilia B using transgenic edible crop plants.
Principal Investigator: Dr. Henry Daniell, Professor, Depts. of Biochemistry and Pathology

Juvenile Diabetes Research Foundation grant to investigate the mechanism of oral tolerance upon delivery of chloroplast-derived autoantigens to delay the onset of type 1 diabetes.
Principal Investigator: Dr. Henry Daniell, Professor, Depts. of Biochemistry and Pathology

Bayer Healthcare, LLC grant to engineer chloroplast transgenic tobacco plants for testing the hypothesis that plant-derived factor VIII can induce oral tolerance in hemophilia A mice.
Principal Investigator: Dr. Henry Daniell, Professor, Depts. of Biochemistry and Pathology

SELECTED PUBLICATIONS
Recently published work by department researchers (indicated in bold).


ENDODONTICS

APPOINTMENTS
Dr. Frank Setzer was appointed to the School’s standing faculty as Assistant Professor of Endodontics.

SELECTED PUBLICATIONS
Recently published work by department researchers (indicated in bold).


MICROSCOPE TRAINING
Dates are set for the Department’s Microscope Training Center’s 2014 microsurgery courses (March 24-25, April 28-29, June 16-17, Sept. 22-23, Oct. 20-21, and Nov. 17-18) as well as the 2014 microendodontics courses (Feb. 14-15, June 13-14, and Sept. 19-20); for more information, contact, pennenod@dentals.upenn.edu.

MICROBIOLOGY

RECENT GRANT AWARDS
National Cancer Institute/NIH/DHHS grant to investigate early events in KSHV de novo infection with an emphasis on initial viral replication and establishment of latency. Principal Investigator: Dr. Yan Yuan, Professor, Dept. of Microbiology

SELECTED PUBLICATIONS
Recently published work by department researchers (indicated in bold).


NEW ANTIVIRAL TARGET

There is a constant challenge to produce new and better drugs against diseases. The lab of Dr. Robert Ricciardi has discovered a new antiviral target and assay to identify compounds that block infection by a vast range of viruses. The targets, called processivity factors, are unique to each virus. Thus far, antiviral therapeutics have been identified for Smallpox (a bioterror threat); Kaposi Sarcoma (seen in AIDS patients); Ocular Herpes (cats/humans); Molluscum (a skin disease seen largely in children). See:


ORAL SURGERY/PHARMACOLOGY

AWARDS & ACHIEVEMENTS

Dr. Helen Giannakopoulos, Associate Professor of Oral & Maxillofacial Surgery/Pharmacology, has been elected Chair of Penn Dental Medicine’s Faculty Senate for a two-year term.

VOLUNTHER SERVICE

Earlier this year, Dr. Joli Chou, Assistant Professor of Oral & Maxillofacial Surgery/Pharmacology, volunteered aboard the Africa Mercy Hospital Ship in Conakry, Guinea, West Africa, working with other healthcare professionals to give life-saving medical care to the poor in the region. Africa Mercy is the world’s largest charity hospital ship.

RECENT GRANT AWARDS

Biomet grant for OMFS chief residents to attend the ACOMS 34th Annual Scientific conference. Principal Investigator: Dr. Anh Le, Chair and Norman Vine Endowed Professor of Oral Rehabilitation, Dept. of Oral & Maxillofacial Surgery/Pharmacology

Biomet grant to collect long-term follow-up data on subjects who have received the Biomet TMJ Replacement System to determine survivorship, revision rate, and reasons for revisions. Principal Investigator: Dr. Eric Granquist, Instructor, Dept. of Oral & Maxillofacial Surgery/Pharmacology

SELECTED PUBLICATIONS

Recently published work by department researchers (indicated in bold).


MANAGING MAST CELLS

Human β-defensins (hBDs) are antimicrobial peptides that play an important role in host defense, but can also promote inflammatory diseases and tumor formation. Dr. Hydar Ali’s group provided the first demonstration that hBDs activate human mast cells via a novel cell surface G-protein-coupled receptor, MrgX2, which is expressed only in human but not murine mast cells. Thus, while hBD3 caused mediator release in human mast cells, they had no effect on murine mast cells in vitro or in vivo. This work is potentially important for human mast cell-mediated diseases, such as asthma. See:


SELECTED PUBLICATIONS

Recently published work by department researchers (indicated in bold).


PATHOLOGY

PROMOTIONS

Dr. Kelly Jordan-Sciutto has been promoted to Professor, Dept. of Pathology. Dr. Jordan-Sciutto has been a member of the School’s faculty since 2001 and was named Chair of the Department in 2012.

RECENT GRANT AWARDS

See grants awarded under Biochemistry of Dr. Henry Daniell, who has a joint appointment in the Dept. of Pathology.

SELECTED PUBLICATIONS

Recently published work by department researchers (indicated in bold).


Also see H Daniell under Biochemistry and D Kinane under Periodontics, both of whom have joint appointments in the Dept. of Pathology.

ORTHODONTICS

APPOINTMENTS

Dr. Hyun (Michel) Koo has joined the standing faculty as Professor, Dept. of Orthodontics. He comes to Penn Dental Medicine from the University of Rochester School of Medicine and Dentistry (see story, page 2).

Dr. Dr. Guy Coby (GD’87, GD’90), Clinical Associate Professor of Orthodontics, has been appointed Co-Director of the Orthodontic Clinic along with Dr. Peter M. Greco (D’79, GD’84), Clinical Professor of Orthodontics.

SELECTED PUBLICATIONS

Recently published work by department researchers (indicated in bold).


PATHOLOGY

PROMOTIONS

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SELECTED PUBLICATIONS

Recently published work by department researchers (indicated in bold).


Also see H Daniell under Biochemistry and D Kinane under Periodontics, both of whom have joint appointments in the Dept. of Pathology.

PERIODONTICS

AWARDS & ACHIEVEMENTS

The Dept. of Periodontics honored leaders in the field of periodontics and prosthetics at a special reception held during the AAP 2013 meeting in Philadelphia. The honorees included: Drs. D. Walter Cohen (C’47, D’50), Morton Amsterdam (C’43, D’45), Jan Lindhe, Leonard Abrams, Jay Selbert (D’53), Robert Genco (GR’67), Max Listgarten, Jorgen Slots (D’86, WG’89), Herman Corn (GD’58), George Coslet (GD’67), Arnold Weisgold (GD’65), and David Garber (GD’78, D’81).

Dr. Arnold Weisgold (GD’65), Adjunct Professor, Dept. of Periodontics, received the Leadership Award, presented by the Kornberg School of Dental Medicine, and the Distinguished Clinician’s Award, presented by Quintessence Publishing Co. and the International Journal of Periodontics and Restorative Dentistry at the 11th International Symposium of Periodontics and Restorative Dentistry.

SELECTED PUBLICATIONS

Recently published work by department researchers (indicated in bold).


SELECTED PUBLICATIONS
Recently published work by department researchers (indicated in bold).


POSTOP SENSITIVITY
A randomized clinical trial by the Dept. of Preventive & Restorative Sciences was the first that can be found in the literature to assess the influence of a new self-adhesive resin cement on the postoperative sensitivity of teeth. In testing tooth sensitivity of 88 participants 1 day, 1 week, and 3 weeks after crown cementation, the findings showed significantly lower sensitivity levels with this new cement compared to a popular resin-modified glass-ionomer cement. See:


Accelerated Osteogenic Orthodontics

For the last three decades, more and more adults have been seeking orthodontic treatment to correct their malocclusions for functional needs and to improve their smiles, demanding short treatment time without compromising the quality of treatment. Among the different options, accelerated osteogenic orthodontics (AOO), also known as corticotomy-facilitated orthodontics, has gained popularity during the last several years. This requires a periodontist and an orthodontist and involves periodontal procedures, including alveolar bone perforation around the teeth, followed by applying orthodontic forces, and is often combined with bone grafts. Studies have shown that this technique significantly induces an acceleration of tooth movement.1

The idea of AOO has been around for many years. In 1959, Köle2 illustrated a faster orthodontic tooth movement when the cortical layer of the alveolar bone was osteotomized both buccally and lingually after a mucoperiosteal flap was reflected. He believed that the main resistance to tooth movement was encountered in the cortical layer, hence the corticotomy between the teeth would allow the teeth with the sectioned blocks of bone to move more rapidly under orthodontic forces.3 Köle’s hypothesis was widely accepted by clinicians for many years until 2001, when Wilcko et al.4 reported that AOO was not simply due to the result of movement of the tooth with sectioned bony blocks, but rather due to a transient localized bone demineralization-remineralization phenomenon in the bony alveolar housing around the tooth consistent with the regional acceleratory phenomenon. They suggested that the increased rate of bone turnover and demineralization of bone resulting from corticotomy were conducive to accelerated tooth movement.

More recently, Iino et al.5 examined the effects of corticotomy on orthodontic tooth movement and alveolar bone reaction histologically. They found that the corticotomy procedure significantly elevated cellular activities in the periodontal ligament. As a result, the sterile necrotic tissue (hyalinization) on the pressure side of the periodontal ligament induced by orthodontic force was removed more quickly and tooth movement was accelerated considerably. It should be noted that the length of the regional acceleratory phenomenon induced by corticotomy is about 4 months; therefore any accelerated tooth movement would need to be executed within this period. After that, the rate of tooth movement would return to normal.2

In addition to corticotomy, another important aspect of the AOO in adults is alveolar augmentation (bone graft). Since the cellular activity of adult bones is not as active as that of children’s bones, after corticotomy, the bone demineralization occurs, but the remineralization process may be incomplete, resulting in a reduction in bone volume. Thus, the bone graft added to the facial and lingual cortical bones during the corticotomy procedure can help increase the alveolar bone volume. The augmented alveolar bone would allow for a greater scope of tooth movement.

One disadvantage of AOO is its high cost. The fees for the corticotomy surgery vary greatly, but generally they are similar to the fees for orthodontic treatment. Another disadvantage is that corticotomy surgery could be invasive. For this reason, several modified alveolar corticotomy techniques to minimize surgical intervention have been developed recently.7,8 For example, without the need of reflecting the flap, the Piezocision technique combines small incisions from gingival to periosteum with selective tunneling that allows for hard- or soft-tissue grafting and piezoelectric incisions into cortical bone.8 However, more studies are needed to evaluate and compare the efficiency and efficacy of different corticotomy techniques on accelerated tooth movement.

REFERENCES:
“We know that by working in partnership with community members to solve health problems, we strengthen both Penn and its surrounding neighborhoods.”

— DR. JOAN GLUCH
IN 2000, the Surgeon General’s Report on Oral Health brought national attention to a critical issue: many American children lacked access to primary dental care. In fact, the Surgeon General reported that tooth decay was the nation’s leading pediatric health problem, more prevalent than asthma and allergies.

Lack of access to oral health care in disadvantaged communities had long been on Penn Dental Medicine’s radar. Since 1994, the School had been sending faculty and students into West Philadelphia’s schools to provide educational programs and dental examinations, and referring children for follow-up care in Penn Dental Medicine’s pediatric dental clinic. However, the Surgeon General’s report, combined with the University’s ongoing desire to expand its partnership with the surrounding West Philadelphia community and school district budget cuts that greatly reduced its existing oral hygiene programs, led to a School-wide call to action.

“The future of West Philadelphia and the future of Penn have always been intertwined,” says Dr. Joan Gluch, Interim Chief of the Division of Community Oral Health and Director of Community Oral Health, describing the University-wide commitment to community engagement that is part of President Amy Gutmann’s vision for Penn through the ‘Penn Compact.’ “We know that by working in partnership with community members to solve health problems, we strengthen both Penn and its surrounding neighborhoods.”

GOING MOBILE

Problems specific to low-income communities often make obtaining dental care difficult, says Dr. Gluch. These barriers include lack of transportation to the dental office, conflicting parental work schedules, and lack of dental insurance or income to pay for care. To truly help solve these problems, it became obvious that Penn Dental Medicine needed to go mobile.

“The public schools were asking, ‘Can you bring dental treatment here?’ We asked ourselves, ‘How can we do this? How can we bring essential services to the schools?’” remembers Dr. Gluch. Under the leadership of Dean Raymond Fonseca (Dean 1989–2003) and the Assistant Dean of Community Service at the time, Dr. Herman Segal, a plan began to take shape.
The result of their collaboration was PennSmiles, a mobile dentistry program designed to deliver dental services directly to local schools so that children without transportation would receive proper oral care. In turn, the program would provide valuable training and experience in pediatric dentistry for Penn Dental Medicine students. In 2001, Penn Dental Medicine received funding from the Health Resources and Services Administration, and later, the Pennsylvania Health Department for the program. In 2003, the colorful PennSmiles mobile clinic, a 40-foot custom coach fully equipped with two dental chairs and equipment for comprehensive dental care, was ready for action.

PennSmiles has spent the past decade strengthening the University-community connection. With its bright red cab and vibrant photographs, the mobile clinic is a warm and welcome presence on the streets, and school yards of West and Southwest Philadelphia. “It’s a great reflection on Penn Dental Medicine,” says Dr. Gluch. “When residents see the PennSmiles bus, they see a tangible commitment from Penn Dental Medicine to improve the oral health of children in our community.”

“The first time I saw the van, my jaw dropped open,” she remembers. “I was flabbergasted. I had never seen a dental office on wheels before.” Students and their parents quickly embraced the preventive care and dental treatment offered by PennSmiles (“The students love it!”), and today it plays an invaluable role in school health. Wetzel estimates that approximately 20 percent of her students will rely on PennSmiles this year for primary preventive care, cleanings, and/or treatment.

“It has had a huge impact on our children’s dental health,” she says, adding that it’s now rare for a child to come to her with a serious dental problem. “If a child comes to me about a tooth, it’s usually a loose tooth. We really don’t have to worry about severe dental problems anymore.” As for the Penn Dental Medicine students who have worked at the school over the years, they couldn’t be kinder, Wetzel says: “They are caring and nurturing and very concerned about our students.”

In 2008, demand from local schools for the PennSmiles mobile clinic was high, and it was operating at maximum capacity when Penn Dental Medicine acquired two portable dental units, which are used to provide preventive dental care (sealants). The addition of a mini-van in 2010 allowed the storage and transport of the portable equipment for expansion of the preventive dental care program, which has greatly increased the number of children who are treated.

“A COMMITMENT TO SERVICE
Through its extensive community outreach program, Penn Dental Medicine requires each student to participate in community oral health activities as part of a four-year sequence of academically based service learning courses for a minimum of 82 hours of service activities before graduation. The service requirement can be met in many ways – by completing dental services at community-based clinics, through interdisciplinary health care programs throughout the city, and a variety of other outreach programs. With the advent of PennSmiles, visits to local schools became a critical piece of the community service requirement, with every third- and fourth-year student scheduled to work on the PennSmiles bus.

“We’re proud that our program now offers each of our students substantial experience in community oral health education, preventive dental services, and comprehensive dental care provided on both mobile and portable dental equipment,” says Dr. Gluch. “It’s an invaluable asset to a well-rounded dental education.”

1,500

I,500 dental students have worked on the bus
A DAY ON THE ROAD

Weeks before PennSmiles ever reaches a school destination, careful behind-the-scenes coordination between Debra Linkstrom, Penn Dental Medicine’s public health dental hygienist, and the school’s nurse or principal has already occurred. Each child who will be seen in the bus or participate in preventive programs provided in-school has submitted a signed parental permission slip and has been scheduled for dental care. Depending on the size of the school, it may take days or even weeks at the same location before all of the scheduled children can be seen.

At 8 a.m. on the morning of a scheduled school visit, the PennSmiles bus, driven by a contracted driver from Philadelphia Trolley Works, which houses and maintains the bus, arrives at Penn Dental Medicine and is met by the hygienist and the dental students scheduled to work that day. Together, they prepare the mobile clinic for the day, sterilizing dental instruments and stocking supplies. With dental students safely seated inside—the vehicle is equipped with seat belts, says Dr. Gluch—it proceeds to the scheduled elementary school, one of 26 that PennSmiles will service this year. At the school, the PennSmiles bus is met by a Penn Dental Medicine faculty dentist, who provides clinical supervision for primary dental care provided to the children. “The Penn faculty dentists are committed, experienced clinical teachers who enjoy their work providing dental care in the community,” says Dr. Gluch.

During the course of the day, the students and faculty provide care to up to 12 patients on the PennSmiles bus, while inside the school, in an auditorium, cafeteria, or empty classroom, students and public health dental hygienists provide preventive dental care and classroom education. Together, the team covers all aspects of basic diagnostic, preventive, and restorative dentistry. Children with complex needs, including those requiring surgical or orthodontic care, are scheduled for appointments at Penn Dental Medicine or other community clinics.

A FUTURE OF BRIGHT SMILES

Over the past 10 years, as more and more children have received preventive education and treatment from PennSmiles the impact has been evident. “While we continue to find a great need among Philadelphia school children for both preventive and restorative dental care, especially as new school children join our program and seek dental care on the PennSmiles bus, over time, we have seen the need for restorative care in many children decrease,” says Dr. Gluch. “However, since we added the portable dental units for preventive care, we are able to accommodate more children and provide a greater number of restorative dental services on the PennSmiles bus.”

Looking back proudly on the history of PennSmiles, Dr. Gluch also reflects on its future. “For the first five years, we were concerned with establishing contacts with principals, school nurses, and families in order to develop a strong program,” she says. “The second five were spent strengthening and expanding the program, especially in the preventive services we provide. In the next five years, we will be documenting and analyzing the performance of our program in order to find ways to be more effective and treat more children. We look forward to continuing to work with our neighbors in West and Southwest Philadelphia to increase access to dental care for school children and reduce dental decay.”

—By Juliana Delany
"THE MOMENT I came back to Penn Dental I felt the energy again of learning and sharing with colleagues," says Dr. Lee Durst, D’83, the recently elected President of the Alumni Society Executive Committee, and she is eager to use this new role to encourage fellow alumni to do the same. The serendipitous timing of meeting the School’s Morton Amsterdam Dean Denis Kinane at the Greater New York Dental Meeting in the fall of 2009 brought Dr. Durst back to Penn Dental Medicine and she has been actively engaged at the School ever since.

“I was in the midst of trying to sell my practice, yet felt I wasn’t ready to leave dentistry, and asked the Dean about getting involved at the School,” recalls Dr. Durst. “He suggested the possibility of joining the School’s Faculty Practice, which was adding clinicians at the time.” By February 2010, she had sold her East Falls, Philadelphia, general practice (finding the interested parties through a posting on Penn Dental Medicine’s career opportunities web page) and was part of the Penn Dental Faculty Practices. Originally working in the Practice three days a week, she is now there two days a week and works a third day as Director of Dental Services at Penn Nursing’s LIFE Center for seniors, where Penn Dental Medicine provides dental services. She supervises fourth-year dental students who rotate through LIFE, helping her provide care.

Dr. Durst was quickly recruited to join the Alumni Executive Committee soon after starting in the Faculty Practices, and while she didn’t anticipate taking on the leadership role as President this soon, she is eagerly taking up the task of energizing the Committee to help reconnect fellow alumni to the School, each other, and current students. We sat down with Dr. Durst to ask her about this new role shortly after starting her two-year term in July 2013.

Q: What are your key goals for the Alumni Executive Committee?
A: A primary goal is to simply get more alumni back and involved with each other and the current students. In the last three years that I have been on the Committee, I went to every alumni event, and thought, why aren’t there more alumni doing this? They are great fun, and it is very special to meet today’s students. I really hope I can encourage people who haven’t been involved in years to just give it a try.

Q: How do you hope to do that?
A: First, we are working closely with the Alumni Relations Office on alumni communications to help ensure that alumni are aware of the various programs and ways to get involved in the School. One of the biggest challenges is having current contact information for alumni. So I encourage alumni to go online and update their contact information through QuakerNet (www.alumniconnections.com/olc/pub/UPN/) or contact the Alumni Office (alumnifeedback@dental.upenn.edu or 215-898-8951) with it.

In addition, in partnership with the other officers, we are focusing on tapping into the unique skills and interests of our Executive Committee members by identifying sub-committees that will focus on specific projects related to alumni communications, events, continuing education, alumni-student connections, annual fund, reunion committees, and nominations of other alumni for the Executive Committee.

Q&A with
Dr. Lee Durst, D’83
President, Alumni Society Executive Committee

One project already underway is a mentoring program to pair upper classmen with local alumni practices to learn about the business of running a dental practice.

Q: Why do you feel it is important for alumni to engage with the School?
A: We all need to continue learning, and we can learn as much from the students as the students can learn from us. Plus, it is so gratifying to meet these growing professionals, hear where they are headed, and pay it forward.

ABOVE: Dr. Lee Durst (D’83) with classmate Dr. Cornelius Sullivan (D’83) at Alumni Weekend 2013.
Call for Nominations

Dear Fellow Alumni,

We want to hear from you! The Penn Dental Medicine Alumni Society invites nominations for candidates to serve on its Executive Board and candidates for the following distinguished awards—“Alumni Award of Merit” and “Thomas Evans Achievement Award.”

To nominate someone, please download and print the appropriate nomination form. All forms, additional information, and past award recipients can be found on the Alumni Society website at www.dental.upenn.edu/alumnisociety.

Sincerely,

Keith Libou D’84
Immediate Past-President & Nominations Committee Chair
Penn Dental Medicine Alumni Society Executive Committee
Penn Dental Medicine welcomed back alumni May 10-12 for Alumni Weekend 2013 — the reunion year for classes ending in “3” and “8.” We hope to see you at Alumni Weekend 2014, May 16-18!

1 Abe Finton (D’58) together with Mitzi Stewart and fellow Penn Dental alumni march in the Alumni Parade.

2 Patricia O’Neill Cohen (DH’71), Linda Berman Mand (DH’63), and Marvis Kaiser Gersten (DH’63) reminisce at the Alumni Weekend Welcome Reception.

3 Tara Sexton (D’88) and Bernard W. Kurek (D’73) receive the 2013 Alumni Award of Merit.

4 The Class of 2003 celebrated their 10th Reunion with Corky Cacas at the Reunion Dinner (Corky Cacas was awarded honorary membership in the Alumni Society at this year’s Senior Farewell). The Class of 2003 had record-breaking attendance at this year’s Alumni Weekend!
5 The Class of 1963 celebrated their 50th Reunion at the Reunion Dinner with Dean Denis Kinane.

6 Members of the Class of 1983 gathered before the Alumni Parade down Locust Walk.

7 Classmates Michael Kay (D’63) and Jacob Salzmann (D’63) celebrate their 50th Reunion at the Welcome Reception.

8 The Class of 1983 had a record turnout at Alumni Weekend with over 40 classmates returning to celebrate their 30th Reunion.

9 Penn Dental Medicine’s Dental Hygiene alumni at Alumni Weekend 2013.

10 Members of the Class of 2003 celebrate their 10th reunion with classmates and families at the Alumni Picnic.
OKU Inductees

Penn Dental Medicine’s ETA Chapter of the Omicron Kappa Upsilon National Dental Honor Society (OKU) inducted new members from the Class of 2013 during the Senior Farewell Dinner held in May. New inductees are selected based on scholarship, exemplary traits of character, and potential qualities of future professional growth.

The new OKU members from the Class of 2013 include: James Barra, Julie Bharucha, Alexandra DeGeorge, Nicolas Garcia, Noam M. Green, Scott Kim, John Kwon, Jason Lee, Sara Malenbaum, Jeffrey Pace, Matthew Ryskalczyk, John Schier, Jeremy Wano, Neha Ajmera, Nandita Nanda, and Simy Paluvelil Matthew.

In addition, Dr. Eric Stoopler, Associate Professor of Oral Medicine, was inducted as a dental honorary member, and Regina Russell, Department Coordinator for Preventive & Restorative Sciences, was inducted as a non-dental honorary member. OKU also presented the Dr. William S. Kramer Award of Excellence, given to a rising junior student at the time who has demonstrated scholarship, character, and the potential promise for advancement of dentistry and service to humanity; this year’s recipient was Katharine Woehling (D’14).

Making History Campaign Celebration

Penn Dental Medicine alumni and friends celebrated the School’s contributions to the University-wide Making History Campaign with a special celebration in the Fonseca Gardens on April 18.
Thank You

OUR HONOR ROLL celebrates all alumni, parents, and friends who made gifts, pledges, or pledge payments in fiscal year 2013 (July 1, 2012–June 30, 2013). On behalf of Penn Dental Medicine, I would like to convey our gratitude for your continued support of our mission. Many of the donors listed are Annual Fund contributors. I cannot overstate how critical the Annual Fund is to the School and how every contribution makes a difference. The Annual Fund supports priorities of the School unmet by tuition: new equipment purchases to create a diversity of training opportunities; updates to student spaces; support for student clubs; scholarship funding; seed research funding, and so much more.

Penn Dental Medicine is tasked with seeing to the superior education of our students, keeping in the forefront of research, and serving the community—priorities that could not be accomplished without our dedicated faculty, administration, and, yes, you our donors. The graphs within this Honor Roll section give a clear indication of how your funds are utilized.

Charitable giving to the School fits into several well-defined categories. As you can clearly see, much of the funding is focused on facility renovations and scholarship, but just as important, as noted above, are the Unrestricted or Annual Fund dollars. They fund smaller initiatives that are not huge changes but have huge impact. I also find it interesting and important to note that it is alumni who overwhelmingly support the School. We have many great corporate and foundation partners, but they do not do half of what our individual alumni donors do for the School.

Looking forward, we need you to help Shape the Future of Care and add your name to the donor pool for exciting new projects, like the Preclinical Lab and Training Center, the Lower Concourse Clinic, and the Library Study Rooms. Thank you for your continued support and engagement.

Maren Gaughan
Associate Dean for Development and Alumni Relations

ANNUAL GIVING DONORS

This list includes all donors who made unrestricted gifts or pledge payments totaling $250 or more to one of Penn Dental Medicine’s annual giving funds in fiscal year 2013. By providing essential support to help Penn Dental Medicine meet its annual needs, the generosity of our donors is critical to the School’s success in adapting programs to stay at the forefront of dental medicine. Their commitment sustains Penn’s preeminence in dental medicine, and advances the School’s mission of preparing its graduates to become dentistry’s leading clinicians, educators, and researchers.

BENJAMIN FRANKLIN SOCIETY

The Benjamin Franklin Society is the University of Pennsylvania’s leadership unrestricted annual giving group. Members of the Benjamin Franklin Society form the most critical base of support for the University and serve as a powerful motivator for garnering greater participation. Through their vision and generosity, members of the Benjamin Franklin Society are an inspiration and example to others.

Ambassador ($25,000+)
Robert I. Schattner, D’48

Founder ($10,000 - $24,999)
Rose Xiaohong Wang, D’96

Fellow ($5,000 - $9,999)
Ann Kearney Astolfi, D’92
Robert A. Brody, C’80, D’84
D. Walter Cohen, C’47, D’50
Richard Copell, D’80
Matthew J. Doyle
Lawrence A. Friedman, D’62, GD’65, GD’67
Anita Nayar Joy, D’81
Christopher H. Joy, D’80
Gail E. Schupak, D’83
Jay Kevin Selznick, D’90
David Tai-Man Shen, D’79, GD’81
David S. Tarica, D’83
Robert E. Weiner, C’72, D’79
Umit Yigit, C’81, D’86

Associate ($2,500 - $4,999)
Nina V. Aks, D’01
Clement C. Alpert, C’32, D’34
J. M. Bayless, D’81
Laurence G. Chacker, D’85
Christina Young Chao, CW’74
Jireh I. Chao, ME’74, D’79
James E. Clayton, Jr., D’82
Silvana Cumani, D’04
Gregory S. DiRenzo, D’87
Helen Haynes Direnzo, NU’85, GNU’88
Michael J. Feldman, D’89
Swapan S. Ghosh, D’93
Linda J. Gilliam, D’89
W. Darby Glenn III, M’56
Frances B. Glenn, D’56
Edward P. Johnson, D’72
Fred B. Kastenbaum, D’77
Hope Rothenberg Kessler, CW’67, ASC’69
Lawrence Kessler, C’66, D’70
Seung W. Kim, D’04
Denis F. Kinane
Allan D. Klenetsky, D’74
Judith C. Koss, C’81
Gerald H. Kreinces, D’68
Bernard W. Kurek, D’73, WMP’03, WEV’04
Lawrence Kessler, C’66, D’70
Seung W. Kim, D’04
Denis F. Kinane
Allan D. Klenetsky, D’74
Judith C. Koss, C’81
Gerald H. Kreinces, D’68
Bernard W. Kurek, D’73, WMP’03, WEV’04
Martin D. Levin, D’72, GD’74
Matthew A. Mandel, D’68
Bruce D. Manson, WG’87
Jayne L. Marcazzolo, D’94
Randolph L. Mitchell, D’81
Tara Sexton, D’88
Thomas L. Snyder, D’71 WG’74
Susan L. Stern, C’77, D’81
Margaret S. Williams, CW’62, GED’85
Robert H. Williams, CHE’59, D’63

Thank You
THOMAS EVANS SOCIETY

Named after Thomas Evans, who left his estate to Penn Dental Medicine, the Thomas Evans Society honors those donors who, like Evans, want to support a dental school that is “second to none.”

Fellow ($1,000 - $2,499)

Laura Roiff Adelman, D’91
Morton Amsterdam, C’43, D’45
Hope S. Berman, C’77, D’83
Robert Litowitz, D’43
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Robert J. Anderson, C’52, D’55
Mark A. Resnik, D’84
Margo B. Faier, G’72
Bruce W. Corbin, D’92
Jeffrey B. Sameroff, D’71
M. Ross Segal, D’98
Women’s Century of Service, 1933–1983

Foundations 5%

Individuals 2%

Corporations 12%

Alumni 81%

WHERE OUR GIFTS COME FROM

*Annual giving funds raised in FY2013 total $470,008

Myron S. Graff, D’72
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Sidney Gutsin, D’68
Aaron M. Hader, D’58
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Cheryl Lang Ullman, D’78
Jack Weil, D’75
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John D. Andrews, D’63
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Richard Allen D’Innocenzo,
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GD’99
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D’94
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Robert M. Sorin, D’74
Theodore A. Soulisof, D’65
Amy Schild Spiegel, D’80
Louis Spiegel, D’79
Caryn L. Stark, GED’76
Cornelius J. Sullivan, D’83,
D’84
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D’65, GD’67
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D’83, GD’84, GD’86
Valerie Eisenberg Yassner,
C’79, GD’83, GD’86
Jonathan Zamzak, D’80

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Jean-Pierre M. Arnoux, GD’90
Murry A. Awrach, D’88
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GED’77, GR’71
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Donald G. Bell, Jr., D’68
Robert M. Beneton, D’81,
GD’84, Vinamra Bhaskar, D’02
Joseph S. Bienstock, C’52,
GD’54
Paul Luft Boger, D’93
Thomas J. Boland, D’81
David N. Bordonaro, D’83
James V. Bordoni, D’80
Alvin T. Boyd, D’71
Charles T. Branch, D’74
Charles M. Brenner, D’73
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Dennis M. Byrne, D’76
John Michael Capogna, GD’88
Colleen L. Catea, D’96
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**CAPITAL AND ENDOWMENT GIVING DONORS**

This list includes all donors who made restricted gifts to Penn Dental Medicine’s capital and endowment funds in fiscal year 2013. Their gifts in support of enhancing and developing new programs, providing scholarship aid, renovating facilities, and upgrading equipment and technology are an enduring legacy that provide for the future of Penn Dental Medicine.

**Arnold & Marci Weisgold Periodontal Prosthesis Scholarship Fund**
Frank Celenza, GD’85
Minn A. Cho, GD’01, GD’02
Jonathan J. Costlet, W’87
Robert N. Eskow, D’67
Edward Gerson
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Harmon Katz
Joseph T. Kelly, D’69
Ernest A. Lee, GD’87
Lynn Ann Mastaj, D’88
Hideo Masuki
Haruo Matsukawa
Yasuhide Minami
Akihiro Taguma
Robert L. Vanarsdall, Jr., GD’72
Anthony C. Vigglioti, GD’71
Frank A. Viggliotti, D’94, GD’98
Harold C. Wanner, D’90
Myron Z. Weitzman, D’89
Joel J. Wernick
Markowitz Dellheim & Block, D.M.D., LLC

**Endodontic Clinic Renovations Fund**
Seung-Ho Baek, GD’95
B AND L BIOTECH. INC
Stacy Bea
George E. Biron, D’68
Wenk Boesemeyer
Brasseler USA Dental, LLC
Craig C. Broome, GD’94
Dr. Mario Castro
Jeffrey P. Chen, D’98, GD’00
Dr. Thomas Clauer
Contemporary Endodontics PC
Francine Trzeciak Cwyk, D’82, GD’84

**Dean’s Discretionary Fund**
Est of Sadie J. Cahn
David Tai-Man Shen, D’79, GD’81

**Dental Periodontic Clinic**
Nobel Biocare

**Dental School General Fund**
3M ESPE Dental Products
Craig Bruns
Maureen Cramer
Beverly Crawford
Richard P. Dakin, D’59
Susanne Effenberger
GlassSpan Inc

Johnson & Johnson Corporate Contributions
Alisa G. Kaufmann, D’85
Robert S. Kravitz
Joan S. Malcolm
New Era Dental Society
Premier Dental Products Company
Lewis E. Proffitt
Provisor Financial LLC
Septodont, Inc.
Albert Serreno
Shofu Dental Corporation
Thomas P. Sollecito
Carolyn Suh
Sun Medical Co Ltd
Ultradent
Serap O. Yigit
Umit Yigit, C’81, D’86

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Allendale Dental Corporation
Kunaal Goyal, C’87, D’91, CGS’02

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David B. Block
Corinne L. Cacas
Ernest J. Dellehim
William N. Hanafee, Jr.
Dr. & Mrs. Gerald A. Markowitz
Markowitz Dellehim & Block, D.M.D., LLC

**Research**
GlasSpan Inc
Susanne Effenberger
Richard P. Dakin
3M ESPE Dental Products
Nobel Biocare
Dental Periodontic Clinic
David Tai-Man Shen, D’79, Est of Sadie J. Cahn

**Support**
Johnson & Johnson Corporate Contributions
Alisa G. Kaufmann, D’85
Robert S. Kravitz
Joan S. Malcolm
New Era Dental Society
Premier Dental Products Company
Lewis E. Proffitt
Provisor Financial LLC
Septodont, Inc.
Albert Serreno
Shofu Dental Corporation
Thomas P. Sollecito
Carolyn Suh
Sun Medical Co Ltd
Ultradent
Serap O. Yigit
Umit Yigit, C’81, D’86

**Endodontic Clinic Renovations Fund**
Seung-Ho Baek, GD’95
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George E. Biron, D’68
Wenk Boesemeyer
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Craig C. Broome, GD’94
Dr. Mario Castro
Jeffrey P. Chen, D’98, GD’00
Dr. Thomas Clauer
Contemporary Endodontics PC
Francine Trzeciak Cwyk, D’82, GD’84
Justo S. Doreste
Exton Endodontics
Denny Y. Fang, GD’01
Fifth Avenue Endodontics
Fred B. Fromhold
Nancy K. Fromhold
Adam J. Gatan Alumni, GD’09
Maren Gaughan, C’88
Saju J. George, D’95, GD’00
Dr. Mario Castro
Jeffrey P. Chen, D’98, GD’00
Dr. Thomas Clauer
Contemporary Endodontics PC
Francine Trzeciak Cwyk, D’82, GD’84
Justo S. Doreste
Exton Endodontics
Denny Y. Fang, GD’01
Fifth Avenue Endodontics
Fred B. Fromhold
Nancy K. Fromhold
Adam J. Gatan Alumni, GD’09
Maren Gaughan, C’88
Saju J. George, D’95, GD’00
Dr. Eudes Gondim, Jr.
Jin Hahn, D’86
Terry G. Han, GD’05
Anthony R. Harlacher, D’91, GD’04
Spencer Hinckley, GD’08
Yong T. Hwang
Dr. Aleksander Iofin
This issue of the Honor Roll represents activity in Fiscal Year 2013 (July 1, 2012 – June 30, 2013).
Class of 1958 – 55th Reunion
Richard J. Castor
James L. Cusato
Francis A. Defrino
John S. Eppolito
Norman F. Faulkner
Abe M. Finton
Aaron M. Hader
Walter W. Hashimoto
Rowland A. Hutchinson
Leonard Graham Jewson
Arnold Katz
Arthur Marshall
Barry D. Meiselman
Mary Lewis Berry Orsatti
David Rapkin
Charles E. Reich
Myron I. Schaffer
Albert J. Simkins
Marvin H. Sitrin
Charles W. Tager
Robert J. Valient

Class of 1959
Chris T. Armen
Gerald Barrack
Walter S. Bogad
Theodore M. Bolotin
Joseph R. Bonacci
Donald G. Cheek
Richard P. Dakin
Norman F. Davis
Harold A. Dehaven, Jr.
Gerald L. Fine
Arthur M.Gitlin
Jay I. Glat
Harry M. Hoffman
Charles W. Jensen, Jr.
Philip W. Kitchin
Richard C. Knoll
Donald G. Lovejoy
Lawrence D. Moses
Omer E. Paquette
Frederick W. Richardz
James N. Sarantos
James D. Sheen
Robert B. Spilker
John T. Stevens
Peter H. Strife II
Alfred C. Thompson

Class of 1960
James L.Ackerman
Barry Benn
Philip S. Caplan
Arthur S. Cobin
Richard C. Durbeck
James H. Dyen
Gabriel C. Garber
Stephen F. Goodman
Daniel B. Green
Arnold G. Greene
Melyn Greenstein
Hugh C. Howarth
Carol Balla Hutzel
Rein Maavere
Harvey Wenick
Denison W. Young
Malcolm B. Zola

Class of 1961
Franklin M. Barber
Richard L. Brihart
Lawrence G. Coulter
Richard M. Dannenbaum
Harry E. Dolph
Bonnie Wilson Hartscock
Rusi A. Hilloowala
Louis Sandor
Thomas E. Holbrook
Farouk A. Moursoud
Albert S. Mowery, Jr.
Jeanne Swallow Mowery
Richard L. Nyce
I. David Popkin
Cerlene M. Rose
Lawrence N. Rouff
Betty Brussel Shamas
Louis A. Tobia, Jr.

Class of 1962
Ross P. Cafaro
Lawrence A. Friedman
Gordon B. Groff
Florence Connelly Kollmar
Donald B. Munger
The late Howard H. Pomeranz
Paul L. Segal
Norman Shapiro
Edward W. Sharkey
Robert J. Silverman
John E. Weise
El Wilks
Dennis E. Winn

Class of 1963 – 50th Reunion
John D. Andrews
D. Bryan Braman
Francis A. Castano
Richard L. Chodosh
Daniel P. Decesare
Richard W. D’Eustachio
Martha De Haven Frey
Roger D. Goldberg
Ronald L. Good
Charles P. Hadtke, Jr.
Henry S. Hammer
Emanuel R. Tress
Jeffrey A. Watson
Robert H. Williams

Class of 1964
Myron Allukian, Jr.
Jerry Baldwin
John Calvin Bauman
Edward J. Beatty
Neal L. Freedman
Marshall J. Goldin
Robert S. Hall
William E. Jacoby, Jr.
Morton A. Langfeld III
Robert A. Lawton
Warner E. Lund, Jr.
Henry A. Miller
Michael M. Perl
James D. Smallwood
Sanford A. Stein
Paul F. Zizza, Jr.

Class of 1965
Peter J. Abell
Joseph C. Au
Gail Downs Baer
Robert W. Beideman
Charles Bromberg
John W. Canzano
Lawrence G. Caruth
Kenneth Allan Chernow
Shu Cheung Cheuk
William K. Deal

Class of 1966
Joel E. Abraham
Malvin F. Braverman
Charles R. Dagati
Bruce M. Elliott
Gertrude Stahl Epstein
Neil B. Epstein
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Anthony C. Harlacher
Jeffrey H. Harnett
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Myron E. Katz
Franklin D. Niver
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Elaine Mantzouris Stevenson
Robert B. Summers
Vija Tamuzs
Morris L. Weinman
Arnold S. Weisgold
Joseph R. Zaintz

Class of 1967
Henry S. Hammer
Charles P. Hadtke, Jr.
Ronald L. Good
Roger D. Goldberg
Martha De Haven Frey
Daniel P. Decesare
Richard L. Chodosh
Francis A. Castano
Richard L. Brihart
Lawrence G. Coulter
Richard M. Dannenbaum
Harry E. Dolph
Bonnie Wilson Hartscock
Rusi A. Hilloowala
Louis Sandor
Thomas E. Holbrook
Farouk A. Moursoud
Albert S. Mowery, Jr.
Jeanne Swallow Mowery
Richard L. Nyce
I. David Popkin
Cerlene M. Rose
Lawrence N. Rouff
Betty Brussel Shamas
Louis A. Tobia, Jr.

Class of 1968
Paul L. Segal
Edward E. Thomas
This issue of the Honor Roll represents activity in Fiscal Year 2013 (July 1, 2012 – June 30, 2013).

### FY2013 Fundraising Overview

**HOW CHARITABLE GIFTS BENEFIT THE SCHOOL**

- **Graduate Programs**: 32%
- **Scholarship Support**: 5%
- **Unrestricted (Annual Giving)**: 5%
- **Clinical Research**: 3%
- **Clinic/Facility Renovations**: 54%

*Funds raised in FY2013 total $6,783,104
This list includes all donors who made tribute gifts of any amount to any Penn Dental Medicine fund in fiscal year 2013. For many, a gift to the School is more than just a financial contribution—it is a meaningful way to honor or remember someone special in their lives.

David L. Bellet
Laura G. Bellet
Eric Berg
Carolyn Izu Bergmann, D’83
Rainer H. Bergmann, GD’85
Hope S. Berman, C’77, D’83
Nina Craig
Lee B. Durst-Roisman, D’83
Richard L. Gaines, D’70
Arthur B. Hattler, D’55, GD’57
Harriet Juli
Marin Z. Kutler, CW’71, L’74
Ernesto A. Lee, GD’87
Jeffrey M. Leitner, D’74
Lynn Ann Mastaj, D’88
John McCarthy, GD’50
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Lisa McNamara
David M. Mendelson, D’73
I. David Popkin, C’59, D’66
Ruth Kosterlitz Rider, D’57
Ira S. Rosen, D’83
Karen Knopf Rosen, C’82, D’85
Mark A. Ruggerio, D’82,
GD’83, GD’85
Ronald V. Runyon
Robert Sage
Larry B. Sandor, D’90
Louis Sandor, C’57, D’61
Jeffrey A. Siber, D’83, GD’84
Ira I. Silverman
Jerry S. Silverman
Brian Smith
Colin B. Smith
Lillian C. Smith
Andrea Klingenman Solomon,
C’78, GED’82, GR’88
Daniel Harry Solomon, L’97
Linda Spellman
Caryn L. Stark, GED’76
Arthur I. Steinberg
Shirley R. Steinberg
Mirele Steing
Debra Kamerling Stern, W’87,
WG’92
Illy Stern
Robert Fraser Stokes, M’88
Carol W. Summers
Jodi Sussman
Melody Troeger Sweet, GR’85
Akihiro Taguma
Michele Tarica
Page M. Tomlinson
Susan Greenberg Toubman,
C’79
Alison Slap Tress
Idit Trope, GR’85
Toshirio Ushikubo
Rafael A. Vargas, W’98
Betty Smith Vodzak
Marilin Watzler
Myra Chernoff Weisgold, CW’61
Dominik R. Wesolowski
Susan B. West
Richard Wexler
Bernadine Whitehouse
Margaret S. Williams, CW’62,
GED’85
Gary Wiser
Deirdre Woods
Margaret Tung-Yeh Wu-Saito,
W’94
Jean P. Wynn
Serap O. Yigit
Hayashi Yoshii
Sebastian Zorn
Robert Zou Qi Fang, WG’94

This issue of the Honor Roll represents activity in Fiscal Year 2013 (July 1, 2012 – June 30, 2013). We have made every attempt to ensure the accuracy of this report. If your name has been omitted or misprinted, please accept our sincere apologies and notify the Penn Dental Medicine Office of Development and Alumni Relations at 215-898-8951.
“My overarching role is to work with faculty, students, and staff to help provide excellent patient and student clinical experiences.”
WHEN DR. YOTA STATHOPOULOU, DDS, MS, PhD, left her native Greece to join Penn Dental Medicine in July 2012, it was to take the position of Director of Predoctoral Periodontics and Assistant Professor, Department of Periodontics.

As if getting acclimated to Penn Dental Medicine and meeting the demands of that position weren’t enough, Dr. Stathopoulou this summer was tapped to fill another role—as Assistant Dean for Clinical Affairs.

Although the two positions have distinct responsibilities, they also have some things in common. As Director of Predoctoral Periodontics, Dr. Stathopoulou has been responsible for predoctoral teaching and patient care in periodontics, and now as Assistant Dean for Clinical Affairs she is responsible for overseeing operations of and establishing general policies for all the School’s clinics.

“The clinical and communicational roles of these two positions are similar in concept, however, they differ vastly in extent and complexity,” Dr. Stathopoulou says. “By doing one job, however, I can be prepared for the other and have a good view of what needs to be done.”

While both positions are challenging, she says, “At the moment, I’m spending more time as assistant dean, because it’s a new position for me and didactic periodontal courses are not as busy this time of year.” She will continue in both roles for now, though with the level of responsibility of this newest appointment, she will be transitioning out of the predoctoral periodontics position.

In this new role since August 1, she has responsibility for overseeing operations of both predoctoral and postdoctoral clinics, including the review and revision of policies affecting such things as scheduling, infection control, emergency response, and quality assurance procedures. Her overarching role is to “work with faculty, students, and staff to help provide excellent patient and student clinical experiences,” she says.

“These things are under continuous review at all times, however, with the upcoming accreditation next year, it is a good opportunity to more intently revisit policies and make sure they are up to date and things are running smoothly and efficiently.”

In her role as Director of Predoctoral Periodontics, Dr. Stathopoulou oversees all didactic courses in periodontics throughout the predoctoral curriculum, as well as the predoctoral instruction in the periodontal clinic. In addition, as Assistant Professor in the Department of Periodontics, she teaches both predoctoral and postdoctoral students in the classroom and the clinic and works closely with other clinic and course directors, participating in interdisciplinary educational offerings.

Dr. Stathopoulou “is very good at what she does,” said Dr. Joseph Fiorellini, DMD, DMSc, Chair and Professor, Department of Periodontics, and Director, Postdoctoral Periodontic Program. “She’s well trained in research, and clinically, she’s board certified and she has experience in private practice. She fully understands both the educational and clinical training aspects of her position.”

In her first year at Penn Dental Medicine, she helped revise the curriculum and clinical teaching in periodontics and ensure the smooth operation of the periodontics clinic. In her new role, she will focus on improving patient flow, operational efficiency, renovation of facilities, and marketing strategies for all dental clinics.
One significant curricular change she helped implement this past year gives predoctoral students more hands-on experience earlier in their training by providing the opportunity to work in the periodontal clinic during their sophomore year. Previously, the students started their clinical training in their junior year.

“This change was made to better prepare students for the clinical experience,” Dr. Stathopoulou says. “Now they get into the clinic earlier working with simple periodontal cases, such as regular exams, prophylaxis and scaling, under very close—almost one-to-one—supervision.”

Based on evaluations and feedback so far, Dr. Stathopoulou says the change has been successful. “The students enjoyed the course, they thought it was meaningful,” she says. “When they get in the clinic now in their junior year, they are much more comfortable treating patients.”

Fadi Raffoul (D’15), a junior and Class of 2015 President, was pleased to have his first clinical periodontal experience last year as part of Dr. Stathopoulou’s sophomore-level course.

“Many students are eager to start treating patients, as this is the ultimate goal for most of us,” he said. “Applying our learning in the clinic as early as possible enriches the educational experience. It helps us better understand the material presented in lectures, so we can expand on that knowledge during future years.”

In addition, he notes, “This early interaction helped alleviate the nervousness associated with treating my first patient.”

**DRAWN BY STRONG RESEARCH, CLINIC ENVIRONMENT**

While her plate is pretty full serving in two major roles at Penn Dental Medicine, Dr. Stathopoulou is doing exactly what she had hoped when she left private practice in Athens last year to join Penn.

After earning her DDS at the National and Capodistrian University of Athens, Dr. Stathopoulou headed to the University of Louisville to bolster her dental training, earning an MS and PhD in Microbiology and Immunology and Certificate in Periodontics. In 2008, she returned to Greece to work in a private practice, while also working part-time at her alma mater, the University of Athens School of Dentistry.

She was concerned, however, that she wouldn’t have as much opportunity as she would like to both practice dentistry and do clinical research in an academic environment in her home country. So when the position of Director of Predoctoral Periodontics became available at Penn Dental Medicine, she knew it would be a welcome fit for her career goals and talents.

“Penn Dental Medicine is a school with a great history and tradition in the field of periodontology,” Dr. Stathopoulou says. “Furthermore, under the current leadership, there are unique opportunities for research, academic excellence, and clinical education.

It was a great honor for me to be offered a position from which I can contribute to the success of this great school.”

In addition to her administrative, teaching, and clinical roles, Dr. Stathopoulou is working on several research projects that reflect her interests in the interaction of periodontal pathogens with the innate immune system regeneration and treatment of peri-implantitis.

In collaboration with colleagues Dr. Denis F. Kinane, Morton Amsterdam Dean and Professor in the Departments of Pathology and Periodontics, and Dr. George Hajishengallis, Professor, Department of Microbiology, she is investigating and refining protocols for the non-surgical treatment of periodontal disease and utilizing different instruments, pharmacological agents, and antibiotics to see if there are advantages to one protocol over another regarding both the clinical outcome and the immune response to pathogens. The researchers are in the process of seeking funding and close to getting a trial underway.

“It is within my mid-term goals as Assistant Dean for Clinical Affairs to encourage the active involvement of predoctoral students in clinical research.”

— DR. YOTA STATHOPOULOU

She is also working with Dr. Fiorellini on a multi-center clinical trial that is investigating the use of local antibiotics for the non-surgical treatment of peri-implantitis, which is inflammation and infection around the site of an implant. This is a relatively new condition, she notes, since implants have only been used for about 30 years in dentistry.

“At the moment, the treatment of peri-implantitis is more empirical rather than evidence based, and we are in need of high-level evidence-based clinical studies,” she says.

Currently, it is primarily postdoctoral students who are involved in these research projects, but, putting on her administrative hat, Dr. Stathopoulou says it is “within my mid-term goals as Assistant Dean for Clinical Affairs to encourage the active involvement of predoctoral students in clinical research.”

Thus, while having taken on two distinct roles at Penn Dental Medicine, Dr. Stathopoulou is focusing on how she can leverage one role to further the other.

“Ultimately,” she says, “both positions share a common goal—to provide our students with an excellent education and our students and patients with an excellent clinical experience.”
1940’s
Herbert Taubman (D’47) is retired and living on Long Island and in Florida. He would love to hear from classmates!

1950’s
Irving R. Spector (D’56) proudly has three generations of Penn Alumni in his family, including his sons Lawrence (W’80, WG’81, L’84) and Bruce (C’87) and grandson Jacob (ENG’13)

1960’s
Rusi A. Hilloowala (GD’61) is Professor Emeritus in the Department of Neurobiology and Anatomy at the West Virginia University, Health Sciences Center.

Congratulations to the Penn Dental Class of 1963, who celebrated their 50th Reunion at Alumni Weekend 2013!

Stephen M. Fisher (D’66, D’68) was recently a Citizen Ambassador Delegate to China as part of the International People to People Citizen Ambassador Program. Dr. Fisher also participated in the 14th International Joint Symposium on craniofacial growth and development in conjunction with the 11th Chinese National Orthodontic Meeting.

1970’s
Joseph E. Gian-Grasso (C’67, D’71) was appointed President-Elect of the New Academy of Osseointegration.

After serving on the dental faculty in the University of California San Francisco Department of Preventive Dental Sciences since 1984, Susan M. Lee (D’72) is now retired and on “recall” teaching third- and fourth-year dental students.

Arnold J. Malerman (GD’72) is a Clinical Professor of Orthodontics at Penn Dental Medicine. Dr. Malerman was also named “Top Orthodontist in Pennsylvania” by Healthtap.com, and featured in Orthodontic Products “Best of 2013”, and listed in the 2013 edition of “Leading Physicians of the World.”

William J. Wentz (D’72) is living the good life in Santa Rosa Beach, Fla. Dr. Wentz recently moved into a newly constructed, custom designed home “with a hot new wife to keep me motivated!”

Bernard W. Kurek (D’73, WMP’03, WEV’04) received the 2013 Alumni Award of Merit at the Reunion Dinner during Alumni Weekend 2013 (See photo, page 28).

Arthur F. Eddy (D’77) has a son, Luke, on the Columbia University football team. Luke kicked two field goals when Columbia took on Penn at Franklin Field last fall and has kicked six field goals versus Penn over the last three years!

1980’s
Frank G. Serio (D’80) was named Inaugural Dean at the Bluefield College School of Dental Medicine. Dr. Serio recently served as Professor of Dentistry, Interim Vice Dean, and Associate Dean for Clinical Affairs at the East Carolina University School of Dental Medicine.

Glenn A. Burgner (D’82) moved to Westport, Mass., and is now practicing in both Fall River and Roslindale.

The Penn Dental Class of 1983 celebrated their 30th Reunion at Alumni Weekend with over 40 classmates returning to Philadelphia. Congratulations Class of 1983!
Pamela Gayle Doray (GD’76, D’84) has achieved Accredited Member status with the American Academy of Cosmetic Dentistry becoming one of five Aacd-accredited dentists in the state of Pennsylvania and less than 350 worldwide. Since graduating, Dr. Doray has been on the faculty in the Department of Restorative Dentistry at Penn Dental Medicine as well as at the University of Texas Health Science Center at Houston since 1994. Dr. Doray maintains a private practice in Philadelphia offering adult cosmetic, implant, and restorative dentistry.

Wayne W. Maibaum (D’84) has been awarded Fellowship in the Academy of General Dentistry. Dr. Maibaum also has a number of articles published in the organization’s journal General Dentistry and serves as a manuscript reviewer for the publication.

Ernesto Lee (GD’87) and LynAnn Mastaj (D’88) with their children Mackenzie and Michael waved the flag of Penn Dental Medicine on a recent family trip to Mt. Fuji.

Tara Sexton (D’88) received the 2013 Alumni Award of Merit at the Reunion Dinner during Alumni Weekend 2013 (See photo, page 28).

Robert A. Levine (GD’84) was one of only 104 international specialists from the field of implant dentistry invited to share his knowledge and expertise at the International Team for Implantology’s (ITI) 5th Consensus Conference in Bern, Switzerland. Dr. Levine, a Fellow of the ITI, also participated in the 4th Consensus Conference in Stuttgart, Germany in 2008. Dr. Levine’s wife, Dr. Sheryl Radin, is a Philadelphia Magazine “Best Pediatric Dentist.” Their son, Ross, is a recent Philadelphia dental school graduate and their daughter, Bari, is in her second year of dental school.

2000’s

The Penn Dental Class of 2003 celebrated their 10th Reunion at Alumni Weekend with over 30 classmates returning to Philadelphia. Congratulations Class of 2013!

Melissa B. Anderson-Lin (D’06) recently joined the faculty of the University of California San Francisco Department of Preventive Dental Sciences as Assistant Clinical Professor. She started teaching second-, third-, and fourth-year students in September 2012.

Jessica Di Cerbo (D’07, GD’09) celebrated the opening of Coastal Kids Pediatric Dentistry along with the Rehoboth Beach-Dewey Beach Chamber of Commerce at a special ribbon-cutting ceremony August 2013.

Gurpeet S. Khurana (D’07) published “Student Doctor Network Dental School Admissions Guide.”

Gary K. Lines (GD’90) and his partner, Dr. Donald Hoaglin, recently published an article in the International Journal of Dentistry titled “Prevention of Localized Osteitis in Mandibular Third-Molar Sites Using Platelet-Rich Fibrin.” They have seen a tremendous decrease in patient complaints of pain after surgical removal of teeth, which has had a significant impact on their practice of OMFS.

WILL POWER.
A little planning today can make a big difference for tomorrow.

Donations from alumni and friends have supported the mission of Penn Dental Medicine since it was founded. You can continue that tradition by considering a gift to the School through your estate. In particular, a bequest can be an easy yet powerful way to provide resources for Penn Dental’s highest priorities: faculty and student support, research, and service.

JUST A FEW SENTENCES ARE ALL THAT IS NEEDED. You can make a bequest by including Penn Dental Medicine as the beneficiary of your estate. It’s that easy. A bequest can be made in the form of a specific gift of cash or property, or a percentage of the remainder of your estate. Contact us for suggested language.

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fbarr@dev.upenn.edu

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Penn Dental Medicine alumni and current students met at a recent meeting of the New Dentist Committee of the American Dental Association in Denver.

From left to right, Front row: Stefanie Walker (D’06); Christine Lama (D’14); Susan Kasper (D’08); Charles Weber (D’69). Back row: Brian Schwab (D’06); Adam Schaefer (D’14); Jonathan Ford (D’07).

The Naval Postgraduate Dental School in Bethesda, Maryland held its annual graduation ceremony on June 21, 2013. The school is the only centralized dental specialty training facility across the Department of Defense, and hosts specialty residencies and fellowships in Maxillofacial Prosthetics, Orofacial Pain, Comprehensive Dentistry, Endodontics, Oral and Maxillofacial Pathology, Periodontics, and Prosthodontics, as well as an AEGD-1 program. Penn Dental Medicine is well represented among the faculty and residents, pictured:

Bottom Row (left to right): Natalie Powell (D’10), 2nd-year Prosthodontics Resident; Lieutenant Jennifer McGuire (D’07), 3rd-year Periodontics Resident; Lieutenant Commander Marjorie Barndt (D’02), Dental Laboratory Director.

Middle Row (left to right): Lieutenant James Linkous (D’12), 1st-year Prosthodontics Resident; Lieutenant Commander Sennay Stefanos (GD’08), Orthodontics Department Chairman; Lieutenant Jacqueline Hogan (D’08), 2nd-year Prosthodontics Resident; Captain Sean Meehan (D’92), Associate Dean.

Top Row (left to right): Commander Michael Rudmann (D’01), AEGD Program Director; Lieutenant Gregory Gittleman (D’11), 2nd-year Comprehensive Dentistry Resident; Lieutenant David Rusthoven (D’09), Maxillofacial Prosthetics Fellow; Captain Marc Arena (D’92), Comprehensive Dentistry Department Chairman.

Soo Y. Park (D’13) married Se J. Kim (D’13) last year and just had their first child, a baby girl. Dr. Park will work in Maryland as a general dentist, while Dr. Kim will continue his dental education in Prosthodontics at the University of Maryland.

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Share Your News

We want to hear from you. Share your news on personal and professional accomplishments with your fellow Penn Dental Medicine alumni through the Class Notes section of the Penn Dental Medicine Journal. We have made it easy for you to make a submission — simply go to www.dental.upenn.edu/classnotes where you can quickly send us your information — we welcome photos as well.

Or, you can send your submissions to:

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University of Pennsylvania School of Dental Medicine
Office of Development and Alumni Relations
240 South 40th Street
Philadelphia, PA 19104-6030

215-898-8951 (p)
alumnifeedback@dental.upenn.edu
Dr. Jeffrey Blum (D’80) is warmly remembered by the Penn Dental Medicine community for his many years of devoted service to the School’s students and youngest patients as part of the Division of Pediatric Dentistry. Dr. Blum first joined the School’s faculty in 1990 and served as Clinical Associate Professor of Pediatric Dentistry up until his death from pancreatic cancer in November 2012. During his years with the School, Dr. Blum’s professional perspective was highly valued by the Office of Admissions, which tapped him to be among the faculty frequently asked to interview prospective students. He was also a member of the Alumni Society Executive Committee. Dr. Blum led a successful pediatric dentistry practice on the Main Line and devoted time to Dental Volunteers for Israel, where he helped deliver needed dental services to poor children in Jerusalem.
WE ARE PLEASED to present this special supplement to the Penn Dental Medicine Journal with highlights from four research conferences held by Penn Dental Medicine in 2013. In June, Penn Dental Medicine hosted two conferences that brought together leading researchers and clinicians from across the country and around the world—the 5th International Congress on Adhesive Dentistry and the Penn Periodontal Conference 2013. And in May, our faculty and students gathered to share their recent research through the School’s annual Faculty Research Retreat and Student Research Day—programs that demonstrated the great depth of research activities by our faculty and students. The level of information shared through all four gatherings was tremendous, which will be shared with you through a selection of abstracts from each on the pages that follow.

Creating such forums facilitate the exchange of ideas among investigators and help build new collaborations, which is a vital part of the School’s mission and important to our ongoing research growth and leadership. Multidisciplinary research that reaches across schools, across fields of study, and across the globe is the hallmark of Penn as a world-class research institution and of Penn Dental Medicine’s research enterprise. Whether building collaborations between our own basic and clinical science departments, among colleagues from the other Penn schools, or with other universities throughout the country and around the world, this integration of knowledge advances the science and practice of oral biology and dental medicine.

The impact of the School’s research and scholarship is far reaching. This is evidenced not only by the number of publications from the School’s faculty, but also by the number and frequency of faculty publications cited in the scholarship of other researchers. The charts on page 60 offer a snapshot of that impact over a five-year period, showing the average h index of faculty in each of the School’s academic departments as well as the top 20 h index levels and number of publications achieved by individual faculty members during that time. The impact of research from both the clinical and basic science departments spotlights the breadth of the School’s research activities and Penn Dental Medicine’s continuing strength as an international leader in the generation of new knowledge and treatment modalities in oral health.

Dana Graves, DDS, DMSc
Vice Dean for Research and Scholarship
MORE THAN 550 attendees representing 20 countries attended the 5th International Congress on Adhesive Dentistry (IAD), hosted by Penn Dental Medicine June 14–15, 2013. This marked the first time that the Congress was held in the United States, and Dr. Markus Blatz, Chair and Professor of Preventive and Restorative Sciences at Penn Dental Medicine, served as President of the historic gathering and head of the organizing committee.

“As an internationally renowned academic institution, it is our responsibility to be at the forefront of modern dentistry and participate in the research and education of novel and proven treatment protocols, such as dental adhesion,” says Dr. Blatz. “We were, therefore, very proud when the Japanese Adhesive Society asked us a few years ago to host the IAD in Philadelphia.”

The intensive two-day program, held in the Annenberg Center for the Performing Arts, brought together clinicians, researchers, and the dental industry to discuss the state-of-the-art in adhesive technologies and resin bonding. The opening day of the scientific program addressed the history, current state, and future of dental adhesion, while the second day focused on adhesive restorative materials and treatment options, including updates on composite resin materials for direct restorations and on adhesion to indirect materials, such as dental ceramics. The program also included a scientific corporate forum where industry leaders discussed their latest innovations and developments.

“While research and science were the main focal points of the IAD, the program featured several more clinically oriented presentations to emphasize the importance of clinical relevance in scientific efforts,” adds Dr. Blatz.

In addition, a pre-Congress hands-on course, held June 13 and presented in limited-attendance format, featured two internationally acclaimed clinicians who demonstrated their techniques for ultimate esthetic and functional success with anterior and posterior adhesive restorations.

“Adhesive dentistry has become the center of research and development in restorative dentistry, fundamentally altering and literally transforming our field with significantly less invasive, more esthetic, and longer-lasting dental restorations,” says Dr. Blatz. “In addition, adhesive technologies and resin bonding have vastly expanded clinical treatment options and become key elements of almost every specialty area in modern dentistry.”

A total of 107 peer-reviewed scientific and clinical poster presentations on all aspects of adhesive dentistry were also part of the Congress, with scientific awards presented for the winning posters selected by members of the IAD Scientific Advisory Board (see abstracts of the three winning poster presentations, page 49–50).

“Complementing information shared on the main podium, these presentations were invaluable for clinicians and researchers to get the latest scientific information and to gauge current clinical and research trends,” notes Dr. Blatz.

The complete proceedings of the Congress and the abstracts accepted for presentation at the IAD are scheduled for publication in a special supplement with the November 2013 issue of The Compendium of Continuing Education in Dentistry.

The gathering also offered a forum for the founding meeting of The International Academy for Adhesive Dentistry, a new international organization and information platform to foster the benefits of adhesive and minimally invasive dentistry among researchers, dentist, dental students, the dental industry, and patients.

“Following a strong tradition of previous IAD meetings held in Japan, China, and Korea, the 5th IAD was an incredible success, and the wealth of knowledge and ideas shared during the meeting was tremendous,” says Dr. Blatz. “The fast-paced clinical improvements, scientific discoveries, and industry developments in adhesive dentistry, as impressively displayed during the Congress, are simply fascinating. We are just beginning to understand the impact they will have on the future of our profession.”

The program sponsors included Kuraray; Shofu; 3M ESPE; Dentsply-Caulk; GC Corporation; Sun Medical Co.; BISCO Dental Products, Inc.; Ivoclar Vivadent, Inc.; Tokuyama Dental Corporation; DMG Dental Material Gesellschaft mbH; Ultradent; Danville Materials; and GlasSpan; with publishing partners Aegis Publications LLC and Quintessence Publishing Co. Inc.
IAD SELECTED ABSTRACTS
Following are the abstracts of the three winning poster presentations from the 5th International Congress on Adhesive Dentistry (IAD), selected by members of the IAD Scientific Advisory Board.

Non-destructive Non-staining 3D Analysis of Marginal and Internal Microgaps
Sadr A., Shimada Y., Bista B., Bakhsh T.A., Sumi Y., Tagami J.
1Tokyo Medical and Dental University, Japan; 2National Center for Geriatrics and Gerontology, Japan

The objective of this work was to (3D) visualize marginal and internal gaps with different bonding agents using optical coherence tomography (OCT). Tapered cylindrical cavities (3 mm in diameter and 2 mm in depth) were prepared on flattened occlusal surfaces of molars and treated with either the two-step self-etch adhesive Clearfil SE Bond (CSE, Kuraray) or one of the all-in-one adhesives Clearfil S3 Bond Plus (S3P, Kuraray), G-aenial Bond (GCB, GC), or Xeno V (XNV, Dentsply).

After bonding agent application, the preparations were bulk-filled with a low-viscosity composite (Estelite Flow Quick, Tokuyama). After 24 h, the specimens were scanned using swept-source dental OCT (Prototype-II, Panasonic Health Care). 3D image segmentation was performed in Avizo software (VSG). Depth-dependent interfacial binary thresholds were defined to overcome OCT signal attenuation while detecting the defects.

Quantitative 3D comparisons were performed by calculating the proportion of sealed interface. Enamel interfacial microgaps were observed in the form of detached areas extending from external margins towards internal walls that only occasionally continued into dentin walls.

The majority of dentin microgaps were detected as interconnected areas of debonding at the pulpal floor extending towards the bottom third of the walls. These areas were rarely a continuation of the external marginal gaps. Smaller isolated patches of interfacial defects were observed less frequently throughout the dentin interface.

Based on the sealed area, the results suggest the following ranking of bonding agents: CSE=S3P>GCB>XNV. Cross-sectional microscopy showed adhesive-composite detachment at the bottom with all-in-one adhesives. 3D analysis of microgaps without dye penetration suggests that debonding of external margins and gaps at the pulpal floor under high-C factor occurred independently.

Some all-in-one adhesives showed short-term results comparable to the gold-standard two-step self-etch system. OCT allows for non-destructive evaluation of marginal and internal microgaps with a potential application in clinical trials.

Commentary and clinical relevance: Optical coherence tomography (OCT) has exhibited a unique capability for time-resolved analysis of defect formation in dental restorative composites during and after placement and polymerization. The non-destructive testing methodology is based on the optical contrast between the media filling the defects and the surrounding biomaterial or tissue which results in a detectable reflectivity signal peak. The technical evolution of this methodology has now enabled 3D visualization of voids and microgaps without the need for a staining agent or dye penetration that are required in conventional microleakage studies.

With OCT, marginal integrity can even be assessed clinically for existing restorations. Therefore, the results are not only important for research in adhesive dentistry to answer questions about polymerization shrinkage stress and adhesion, but the goal is to allow dentists to have access to this revolutionary technology chair-side for an objective and quick evaluation of marginal integrity and internal adaptation of existing resin-based restorations in clinics.
IAD SELECTED ABSTRACTS

QCM-D Analysis of Chemical Adsorption of Functional-monomer with HAp Sensor
Takagaki T., Nikaido T., Matsui N., Sato T., Tagami J. Tokyo Medical and Dental University, Japan

Previous reports suggest that the functional monomer 10-methacryloxydecyl dihydrogen phosphate (MDP) has the ability to chemically bind to hydroxyapatite (HAp). This study investigated the chemical adsorption of four different functional monomers on HAp. Quartz crystal microbalance with dissipation (QCM-D, Q-Sense) was used to measure the amount of functional monomer adsorbed on the HAp sensor in real time.

Four different functional monomer solutions containing 0.1% functional monomer (MDP, 4-META, GPDM or Phenyl-P), 2% ethanol and 8 mM HEPES were prepared (pH adjusted to 7.0 with NaOH). Frequency change and the shift of energy dissipation were recorded at a flow rate of 1 ml/min. The QCM-D chamber and liquid samples were temperature-stabilized to 37.0±0.1 °C.

Each of the four functional monomer solutions was injected after frequency and dissipation became stable with the control solution without functional monomer. After the reaction was completed, the control solution was again injected to wash the unreacted functional monomer on the HAp surface. Immediately after injection of the functional monomer solutions, the HAp-sensor frequency dropped significantly in all the groups. In the MDP group, along with the frequency drop, energy dissipation shifted sharply and even after the wash with the control solution. The frequency shift was leveled at a fixed position.

Frequency change and the shift of energy dissipation were material-dependent and depended on the design of the monomer structures. The adsorption behaviors of the functional monomers on HAp varied depending on the molecular structure. The chemical adsorption of chemical monomers on HAp, particularly MDP, may potentially improve the bonding interface and reduce the risk of secondary caries.

Monomers Interaction to Collagen Studied by Saturation Transfer Difference NMR
Hiraishi N., Otsuki M., Tagami J. Tokyo Medical and Dental University Graduate School, Japan

The interaction of adhesive monomers with collagen is not well understood at a molecular/atomic level. The saturation transfer difference NMR spectroscopy is a powerful method in drug delivery studies for screening ligands for their binding to proteins and to determine the ligand binding epitopes. The objective of this study was to examine the molecular/atomic level interactions of dental resin monomers with collagen model.

Saturation transfer difference NMR experiments were performed to investigate the binding interaction of three adhesive monomers: 2-Hydroxyethyl methacrylate (HEMA), 4-methacryloyloxyethyl trimellitate anhydride (4-META) and 10-methacryloyloxydecyl dihydrogenphosphate (MDP), with atelocollagen as a triple-helical peptide model. The ligands HEMA, 4-META and MDP were dissolved in deuterated dimethyl sulfoxide (d6-DMSO) to 20 mM and each one was added to the atelocollagen solution. Final concentration for saturation transfer difference NMR measurement was 4 mM. NMR experiments were performed at 298 K on 600 MHz and 800 MHz spectrometers equipped with a cryogenic probe (Bruker BioSpin Corporation). When the saturation transfer difference effect was detected, its epitope mapping of ligands binding to atelocollagen was obtained by normalizing the largest value to 100%. High saturation transfer difference intensities were detected on the protons in MDP, whereas they were not detected for HEMA and 4-META. The STD epitope mapping revealed that the intense saturation transfer difference signals were primarily associated with the aliphatic region in MDP.

The results imply that MDP has a relatively stable interaction with the collagen, because of the hydrophobic interactions between the hydrophobic MDP moieties and the collagen surface. HEMA and 4-META have not such hydrophobic regions and no intense saturation transfer difference signals were observed. Hydrophobic moiety allows the MDP monomer to form the monomer-collagen aggregate and may control collagen degradation, which accounts for the stable property of hybrid layers.
First Penn Periodontal Conference Exceeds Expectations

ON JUNE 23-28, 2013, Penn Dental Medicine presented its inaugural Penn Periodontal Conference, which drew more than 200 attendees from across the country and around the world. Interest was so great that the conference, originally scheduled to be held at the dental school, was moved to the Annenberg Center for the Performing Arts on Penn’s campus to accommodate more participants. The scientific gathering was a success on multiple levels, says Morton Amsterdam Dean Denis Kinane, who organized and hosted the event with Dr. Dana Graves, Professor, Department of Periodontics, and Vice Dean for Research and Scholarship.

“This was a conference that was timely and much needed, and had an impact that greatly exceeded expectations,” says Dean Kinane. “Our aim of encouraging a large body of both young and experienced dental and basic science researchers was admirably achieved. In addition, the impact on the discipline is already being felt in terms of new projects and publications.”

The conference featured presentations by leading researchers on the latest findings in periodontology, concentrating on four main topics: inflammation, microbiology, periodontal regeneration and repair, and the oral-systemic health connection. Other areas of discussion included innate and adaptive immunity, bone remodeling, oral medicine, disease specificity, epigenetics, stem cells, and clinical microbiology. Highlights included a keynote address by Dr. E. John Wherry, Director of Immunology and Associate Professor, Department of Microbiology, at Penn’s Perelman School of Medicine, titled “Altered Immunity when Pathogens Persist.” Invited speakers came from the United States, Europe, Asia, and South America. See selected abstracts on pages 52-53 for a flavor of the topics and research projects that were presented.

FILLING A VOID IN PERIODONTAL RESEARCH

In the past, explains Dr. Graves, those at the forefront of periodontal research attended the Gordon Conference on Periodontal Diseases, which is no longer held. “There was a need for a new, broad-based conference that explored the basic sciences related to periodontal disease, etiology, and treatment,” he says, and Penn Dental Medicine was eager to take the lead in filling that void.

“Our goal was to create a forum for investigators to meet, hear presentations by leading researchers in different fields of periodontology and to discuss research projects,” he says. The scientific program was structured to encourage interaction among participants. Presentations were scheduled in the morning and evenings so that the afternoons were free for attendees to talk about their research projects and attend the poster sessions. A total of 69 posters were presented.

Dr. Graves believes the success of the conference is due in large part to the internationally known, highly respected presenters, who drew a large audience throughout the weeklong meeting. “The response was overwhelmingly positive because of the quality of the speakers,” he says, “and also because the University provided such a rich environment for an international conference of this caliber.”

Adds Dean Kinane, “In less than two years, we plan to rekindle this wonderfully exciting conference. We hope it will continue to stoke the fires of high quality periodontal research and serve this discipline well into the future.”
Periodontal disease is associated with changes in the oral microbiome. However, it is still uncertain how periodontal pathogens cause periodontal disease. We have previously shown in a mouse model that introduction of a human periodontal pathogen causes periodontal bone loss. Interestingly, the periodontal pathogen virtually disappears from microbiome of the mice as they develop periodontal disease.

In our experiments, we transferred bacteria from the oral cavity of mice that had periodontal disease induced but had virtually eliminated the human periodontal pathogen. Surprisingly, the transfer of these bacteria still caused periodontal disease. This changes the concept of a “pathogen” and suggests that the periodontal pathogen may alter the other bacteria present, which in turn contribute to periodontitis. These experiments begin to address one of the key issues in the pathogenesis of periodontal disease and emphasize the importance of the commensal bacteria. Thus, one of the major events that may occur is the alternation of the commensal bacteria by a key periodontal pathogen. We have termed this concept the keystone concept of infectious disease.
Molecular Inhibition of Bone Formation by NF-κB
By Cun-Yu Wang, DDS, PhD, Associate Dean of Graduate Studies, Dr. No-Hee Park Endowed Chair in Dentistry, Chair of the Division of Oral Biology and Medicine, UCLA School of Dentistry

The purpose of this work is to investigate whether oral inflammation may inhibit bone formation and mesenchymal stem cell function by activating nuclear factor-kappa B (NF-κB), a master regulator of inflammation and infection. Although it has been long known that pro-inflammatory cytokines from periodontal or periapical diseases inhibit bone formation and repair, the underlying mechanism is not clear. Using a mouse model, our group at UCLA found that inflammatory mediators inhibited bone-forming cell function and bone formation in vivo. In contrast, the inhibition of NF-κB significantly enhanced bone formation.

Mechanistically, we found that NF-κB activation led to the degradation of the key molecules that promoted bone formation. By inhibiting NF-κB with a small molecule inhibitor, we enhanced the function of mesenchymal stem cells, bone regeneration, and bone repair in vivo. Our results suggest that targeting NF-κB may have dual benefits in enhancing bone regeneration and repair and inhibiting oral inflammation and bone loss. This may be important in a number of oral treatments including endodontics, periodontics, and oral surgery.

The Influence of Vitamin D and Parathyroid Hormone on Periodontal Regeneration
By Jill Bashutski, DDS MS, Clinical Assistant Professor, Division of Periodontics, Department of Periodontics and Oral Medicine, University of Michigan School of Dentistry

Teriparatide is a commercially available form of the first 34 amino acids of parathyroid hormone and is FDA approved for the treatment of osteoporosis. It is unique because it promotes bone growth as opposed to most other bone regeneration therapies, which typically prevent bone loss. Regenerating bone around teeth that is lost due to periodontal disease is unpredictable and thus, there is a critical need for the development of new therapies to encourage periodontal regeneration.

Teriparatide is a promising therapeutic candidate since numerous studies have validated its ability to successfully improve bone quality in osteoporotic patients and there are numerous similarities between osteoporosis and periodontitis. A double-masked, placebo-controlled study was conducted in order to evaluate the effects of teriparatide in conjunction with periodontal surgery on craniofacial osseous regeneration in patients with advanced periodontal disease. In this study, 40 adult patients with a severe vertical infrabony defect received an open flap debridement surgical procedure along with daily self-administered injections of teriparatide (20 μg) or placebo control, 1000 mg calcium and 800 IU of Vitamin D for six weeks. Patients were then followed for one year post-operatively.

Teriparatide administration resulted in significantly greater probing depth reduction, clinical attachment gain, and radiographic alveolar bone defect resolution than patients who received placebo, and these results were sustained for one year. The use of a systemic anabolic agent like teriparatide provides an exciting new avenue of therapeutic potential for periodontitis patients.

These findings are significant since this may support the development of a more predictable and less invasive treatment for bone lost due to periodontal disease. Furthermore, the results of this study support the idea that a systemic medication can have positive effects in the oral cavity and so there may be the potential for expanded applications, such as promoting dental implant success or treating other craniofacial defects.
PENN DENTAL MEDICINE’S Student Research Day, held May 9, 2013, was a celebration of the broad range of research projects conducted by Penn Dental Medicine DMD students during the past year. This inaugural event brought together for the first time the work of students who benefit from three of the School’s dynamic curricular opportunities: the Summer Research Program; the School’s honors degree programs in research, community health, and clinical care; and the Bridging the Gaps community externship.

“Each year there is a significant increase in the level of sophistication and attention to detail in the research projects and poster presentations. I believe this is a testament to the quality of the students we are attracting to our programs,” says Dr. Joseph DiRienzo, Assistant Dean for Student Research and Director of the Summer Research Program.

The event, held in the Fonseca Gardens courtyard behind the School’s Robert Schattner Center, centered on a poster session. Students from all three programs presented poster displays on projects conducted throughout the past year and also submitted abstracts of their work, which were included in an abstract booklet (view online at www.dental.upenn.edu/StudentResearchDay2013). A total of 86 posters were presented, including 15 from Summer Research Program participants, 13 from Bridging the Gaps, and 58 from the three honors degree programs combined. Students shared highlights of their projects with fellow students, faculty, and staff.

“Making a poster presentation offers students an experience similar to a professional meeting, which is an important part of all of these programs, so we were pleased to offer all of our student researchers this opportunity,” says Dr. Kathleen Boesze-Battaglia, Director of the research honors program.

Previously, students in the honors degree programs presented their projects at a separate event from the Summer Research Program and Bridging the Gaps participants. Having work from all three programs presented at one event added depth and breadth to the proceedings, noted Dr. Francis Mante, advisor to the School’s Vernon Brightman Research Society. Board members of the Vernon Brightman Research Society (Penn Dental Medicine’s chapter of the National Student Research Group, a subset of the American Association for Dental Research) helped to organize the day’s program.

The participating students represented programs that enrich and expand the academic opportunities available at Penn Dental Medicine. The Summer Research Program allows students to engage in a basic laboratory or clinical research project full-time during July and August with a faculty preceptor. Bridging the Gaps, also held over the summer, is an interdisciplinary externship program that teams healthcare and social service students from throughout Penn as well as other Philadelphia-area universities to provide services for underserved and economically disadvantaged residents at sites throughout the region. The honors degree program—the newest of the initiatives (entering its fourth year with the 2013-2014 academic year)—enables exceptional students to earn a DMD degree with honors in one of three areas—research, clinical dentistry, and community health.

The posters from the School’s Summer Research Program and Bridging the Gaps were judged by a team of independent faculty members. This year’s winners in clinical and basic science research include the following (read abstracts of their work on page 55):

SUMMER RESEARCH PROGRAM
First place: Kang I. Ko (D’15), as the first-place winner, Ko represented Penn Dental Medicine in the ADA/DENTSPLY Student Clinician Research Program at the ADA Annual Session in New Orleans, October 31 – November 3, 2013; Second place: William S. Konicki (D’15), as the second-place winner, Konicki presented his poster at the Hinman Student Research Symposium in Memphis, Tenn., October 25-27, 2013; and Third place: Snow Feng (C’14).

BRIDGING THE GAPS
First place: Wenting Guo (D’15); Second place: Eunice Chay (D’15); and Third place: Laurel Lee (D’15).

“The School of Dental Medicine research community is proud to have such accomplished students representing our research enterprise on Student Research Day and at national meetings,” adds Dr. DiRienzo.
Inheritance of Amelogenesis Imperfecta and Modifier Genes in Transgenic Murine Models
William Konicki (D’15) was awarded second place for this study, conducted with faculty preceptor, Dr. Carolyn W. Gibson, Professor, Department of Anatomy & Cell Biology

Transgenic mice of varying backgrounds were used to simulate genetic diversity in human families affected by X-linked amelogenesis imperfecta (AI). It was hypothesized that much of the noted variation in clinical phenotype between members of the same sibling group is due to individuals’ unique complements of modifier genes rather than variations in the mutated alleles themselves. We predicted that crossing mouse backgrounds could generate something akin to what is seen in families’ clinical presentation.

This work has the possibility of contributing to the growing body of knowledge of how X-linked amelogenesis imperfecta is clinically manifested once inherited. Furthermore, it would investigate the appropriateness of mouse models for this disease and explore various methods of describing the severity of AI in the models. Various methods including visual inspection, immunohistochemistry, image analysis, and microCT were used to show that mouse strains with induced knockout mutations to Amelx (gene coding for amelogenin) had the smallest volumes and qualities of enamel. Mice with a mixed background displayed phenotypes somewhere between our positive and negative controls. In addition, the C57BL/6 strain of mice containing knockout mutations appeared to have diminished densities of both enamel and dentin. The wild-type mouse strain FVB, often chosen for transformation experiments, displayed a short, richly pigmented and inconsistently dense dentition.

The results of these experiments indicated that the experimental model of AI was legitimate. The expected trend of mixed-background mice displaying less severe phenotypes, compared to those of a single background, correlates clinically to family members’ varying penetrance of modifier gene complements resulting in different phenotypes even when the X-linked mutation to amelogenin is shared by all. The unexpected hypodensity seen in the dentin of the KO C57BL/6 mouse strain may hint at an unexplored link between amelogenesis and dentinogenesis. Amelogenin is expressed in dentin, though at one thousandth of the level found in enamel. The data obtained with the FVB mice identifies what might be a challenge for workers using this mouse in transgenic experiments. The strain appears to have several inherent idiosyncrasies that previous studies may have taken for granted.

This work generated a successful mouse model of x-linked amelogenesis imperfecta, provided inroads in identifying modifier genes affecting expression of the disease, raised questions about the interplay between amelogenesis and dentinogenesis in a certain commercial strain of mouse, and highlighted a few developmental quirks of one strain that may confound the outcomes of other studies.

The Effect of Musashi Expression on the Self-Renewal and Differentiation of Mesenchymal Stem Cells
Snow Feng (D’15) was awarded third place for this study, conducted with faculty preceptor, Dr. Christopher Lengner, Assistant Professor, Department of Animal Biology, School of Veterinary Medicine

The effect of Musashi (Msi) gene expression on stem cell differentiation and proliferation had never been studied in mesenchymal stem cells (MSC). The purpose of the research was to identify whether Msi induces differentiation or maintenance of MSCs. Msi is a translational regulator of cell fate and has been demonstrated in recent studies to regulate CNS, mammary, and hematopoietic stem cells. In addition, Msi2 is a prognostic marker in acute myeloid leukemia. The role of Msi had been demonstrated in many stem cell compartments and aggressive tumors but it has never been studied in MSC.

MSC have the ability to differentiate into osteoblasts, chondrocytes and adipocytes. Therefore, they serve as an important reservoir for self repair of bone tissue. Understanding the mechanism Msi plays in MSC differentiation will provide greater insight into connective tissue regeneration. Manipulation of Msi activity may enable strategies for expansion of undifferentiated MSC in vitro.
There were no obvious differences between the number of colonies formed by Msi-deleted cells compared to that of a wild-type control. Reduced colony formation was observed by Msi+/doxycycline resistant cells compared to that of the control. These results were completely opposite those obtained with intestinal stem cells. There were no obvious differences in colony number between Msi+/tamoxifen resistant and control cells. Reduced colony formation was observed with Msi-induced cells compared to that of the control cells. This observation is completely opposite of what was observed with intestinal stem cells. There were no obvious differences in colony number of Msi-deleted cells compared to that of control cells.

At the histological level, both Msi-induced and -deleted cells were able to differentiate into the tri-lineage when cultured in specific differentiation media and no differences were observed compared to the control cells. Understanding the roles that Msi plays in MSC differentiation will increase understanding of connective tissue regeneration and improve methods for expansion of undifferentiated MSC in vitro.

### BRIDGING THE GAPS PROJECT WINNERS

The following abstracts summarize the experiences of three Student Research Day prizewinners in their community externships through the Bridging the Gaps program.

#### Working for Change

*Wenting Guo (D’15) was awarded first prize for her project at The College of Physicians of Philadelphia, with Caroline Fortin, Penn’s School of Social Policy and Practice*

Guo and Fortin worked with the College of Physicians of Philadelphia staff and 13 high school students in the Teva Summer Internship Program, which focused on sexually transmitted disease and violence education and prevention in Philadelphia communities. The program’s activities included workshops; writing and filming public service announcements about HPV; field trips to Children’s Hospital of Philadelphia, local gardens and community building projects; and resource gathering. Guo and Fortin assisted in the various program activities, compiled lessons on STIs, developed pre- and post-evaluations of the program, chaperoned trips, and hosted lunchtime discussions.

#### Sudanese Women’s Group

*Eunice Chay (D’15) was awarded second place for her project at HIAS and Council Migration Service of Philadelphia, with Ijeoma Chinwuba, Penn’s Perelman School of Medicine*

Chay and Chinwuba facilitated a biweekly women’s group for recently resettled Sudanese refugee women living in Northeast Philadelphia. Each meeting focused on a particular health topic or life skill, such as family planning, nutrition, oral health, and financial literacy. Learning activities took place in clients’ homes as well as at various sites in the community, such as health clinics and grocery stores. Guest speakers were invited to present on pregnancy, personal safety and women’s health. Individually, Chay assessed the need for improved access to pediatric dental care by identifying community resources and patterns of utilization. In addition, both Chay and Chinwuba served as liaisons between patients and medical and dental clinics, as well as between the clinics and HIAS, by acting as patient escorts, scheduling appointments, securing interpretation services, and communicating messages and health information between patients and their caseworkers at HIAS.

#### Laying Down Roots in West Philadelphia

*Laurel Lee (D’15) was awarded third place for her project with Earth’s Keepers, Inc. (EK), an urban farm in Southwest Philadelphia, with Nicole Oakman, Penn’s Perelman School of Medicine*

Lee and Oakman worked with high school students at Earth’s Keepers (EK) to grow, harvest, and sell fresh organic produce. They also led discussions and hands-on exercises related to nutrition, food sovereignty, health, cooking, and guidance counseling. The interns’ work culminated in the production of a colorful mural on the side of the garden’s greenhouse. Lee noted, “Seeing the interest people in the community have to come to the farm to volunteer, ask questions, or purchase fresh produce reinforces my belief that food can bind a community, and reaffirms the importance of having local farms within otherwise food-poor neighborhoods.”
Faculty Retreat Spotlights Research Across Basic, Clinical Sciences

ON MAY 31, 2013, Penn Dental Medicine held its annual faculty research retreat, bringing together the School’s basic science and clinical faculty, as well as postdoctoral fellows and students, for a day of exchange with colleagues across disciplines. The meeting, held this year at the Hill Pavilion within Penn’s School of Veterinary Medicine, reflects the quality and diversity of research carried out at the School, and provides opportunities for information sharing, networking, and discussions on future collaborations.

“The goal of our annual retreat is to create a forum in which our basic and clinical science faculty can take time out together to share their latest research activities with one another,” says Dr. Ellis Golub, Professor, Department of Biochemistry, and Chair of the Research Retreat Organizing Committee.

In preparation for the retreat, faculty, postdoctoral fellows, and students are asked to submit abstracts of their research from the past year for consideration by the School’s Faculty Senate Research Committee. This year, from more than 60 abstract submissions, seven faculty projects were selected for the day’s program of presentations and five abstracts from postdoctoral fellows were chosen for oral poster presentations. Poster presentations of many of the faculty research project submissions were also on display for discussion.

Those faculty projects presented included the following (see abstract briefs on several of the research presentations, page 58):

**Mechanical Signal Transduction Pathways Associated with the Sarcoglycan Complex**, Dr. Elisabeth Barton, Associate Professor, Department of Anatomy & Cell Biology

**The Role of Genipin, a Phytochemical from the Terpenoid Family, in Osteoblast, Matrix and Mineral Characteristics**, Dr. Patricia Miguez, Assistant Professor, Department of Periodontics

**A Virally Encoded Small Peptide Regulates the Switch of Kaposi’s Sarcoma-associated Herpesvirus from Latent to Lytic Life Cycle**, Dr. Yan Yuan, Professor, Department of Microbiology

**Sensory Feedback for Dental Caries Detection and Removal**, Dr. Margrit P. Maggio, Assistant Professor of Clinical Restorative Dentistry

**Antimicrobial peptides activate human mast cells via MAS-Related gene (MrgX2 and MrgX3): Cross-regulation by LPS**, Dr. Hydar Ali, Professor, Department of Pathology

**Classification of TMJ Dislocations and Treatment of Longstanding Type with Total Alloplastic TMJ Reconstruction**, Dr. Helen Giannakopoulos, Associate Professor of Oral & Maxillofacial Surgery/Pharmacology

**Characterization and Treatment of Dental Implant Postsurgical Pain Employing Intranasal Ketorolac**, Elliot V. Hersh, Professor, Department of Oral & Maxillofacial Surgery/Pharmacology

In addition to these and the oral presentations by postdoctoral students (see the winning student abstracts, page 59), the retreat featured an annual tradition, The Joseph L. Rabinowitz Memorial Lecture, presented this year by Dr. Ali Naji, M.D., PhD, J. William White Professor of Surgery and Director, Kidney/Pancreas Transplant Programs, Hospital of the University of Pennsylvania. Dr. Naji’s lecture focused on his work in developing procedures for pancreas transplants in the treatment of Type I diabetes. A key part of this work involves developing protocols for immune suppression which will protect the transplanted tissue from the host’s immune system without depriving the recipient of the ability to fight off infections.

“The retreat was inspiring and edifying for all attendees,” says Dr. Golub. “Each year, the research shared at our retreat grows in depth and diversity.”
SELECTED FACULTY RETREAT ABSTRACTS

Following are highlights of several of the research projects presented at the School’s annual faculty research retreat, held May 31, 2013.

Characterization and Treatment of Dental Implant Postsurgical Pain Employing Intranasal Ketorolac

Elliot V. Hersh, Professor, Department of Oral & Maxillofacial Surgery/Pharmacology

The purpose of this project was to characterize the nature of postsurgical pain following the placement of one to three implants. A secondary goal was to explore the analgesic efficacy and tolerability of intranasal ketorolac in this patient population. Twenty-eight patients 18-64 years of age who required the surgical placement of one to three dental implants and signed an IRB-approved informed consent participated in this open-label study.

Following surgery, patients self-administered 31.5 mg ketorolac nasal spray upon experiencing pain of at least a moderate intensity (≥40 mm on a 100 mm VAS). Pain intensity and pain relief were assessed for six hours, as were the onsets of first perceptible and meaningful relief. Patients were transitioned to a multi-dose take-home phase, administered the drug every six hours as needed and recorded dose frequency and adverse events over five days.

The results were as follows: Ninety-two percent (23/25) of subjects rated intranasal ketorolac as very good or excellent. Eighty percent (20/25) of subjects required additional doses of intranasal ketorolac and/or rescue medication at home and 54% (13/25) required dosing on an as-needed basis for three days.

In conclusion, NSAIDS such as ketorolac should represent the first line of drugs for post-surgical dental implant pain. Future studies of intranasal ketorolac should be double-blind with a placebo control and active comparator drugs.

Mechanical Signal Transduction Pathways Associated with the Sarcoglycan Complex

Dr. Elisabeth Barton, Associate Professor, Department of Anatomy & Cell Biology

Muscles respond to changes in mechanical load, and can respond by altering expression of genes to adapt properties to use needs. The sarcoglycan complex, which is lost from the muscle membrane in several Limb Girdle muscular dystrophies and Duchenne muscular dystrophy, is important for sensing muscle load.

The goal of this study was to identify the key steps in the signaling process associated with mechanical loading and to determine how signal transduction is altered in the absence of the sarcoglycan complex. Isolated extensor digitorum longus (EDL) muscles were subjected to 30 minutes of passive stretch (10% increase in resting length) or no stretch at all, and then rapidly frozen for biochemical analysis. Without stretch, the muscles from gamma-sarcoglycan null mice had elevated two important signaling proteins compared to unstretched wildtype muscles.

Passive stretch invoked increases in these two proteins in wildtype muscles, but in muscles from gamma-sarcoglycan null mice had a blunted response to passive stretch. Thus, the sarcoglycan complex appears to be important for appropriate mechanical signal transduction, and that impaired mechanical signal transduction underlies a significant part of the pathology associated with loss of sarcoglycans in the muscular dystrophies.

A Virally Encoded Small Peptide Regulates the Switch of Kaposi’s Sarcoma-associated Herpesvirus from Latent to Lytic Life Cycle

Dr. Yan Yuan, Professor, Department of Microbiology

One key feature of Herpes viruses is they can remain dormant in a human host for many years, and then can become activated to the pathologic, lytic phase. How this transition is controlled is not well understood. Dr. Yuan presented evidence of a novel control mechanism which appears to function in Kaposi’s Sarcoma-Associated Herpesvirus (KSHV).

It was previously known that one gene in the KSHV genome encoded the replication and transcription activator (RTA) that controls the switch of the virus between latent and lytic life cycle.

The present study found that a small RNA transcribed from the opposite DNA strand from that which encodes RTA encodes a small polypeptide which appears to bind to and stabilize RTA. As a consequence, expression of this small peptide facilitates KSHV gene expression and lytic replication. This finding revealed a novel mechanism of gene regulation in viral life cycle and provided a new paradigm for the biology of (apparently) noncoding RNAs.
RESEARCH RETREAT POSTDOC WINNING ABSTRACTS
Following are abstracts of the winning poster presentations by postdoctoral students at the School’s faculty research retreat, May 31, 2013.

The Role of MMP-13 in Skeletal Muscle Regeneration
Lucas R. Smith was awarded first place for this project, conducted in the lab of Dr. Elisabeth R. Barton, Associate Professor, Department of Anatomy & Cell Biology

Skeletal muscle requires timely expression of genes for satellite cell-based regeneration in coordination with extracellular matrix (ECM) remodeling. The ECM of skeletal muscle becomes pathologic in many muscle conditions, including muscular dystrophies and severe injury. Matrix Metalloproteinases (MMPs) are a family of enzymes responsible for breakdown of ECM components. We have identified one member of the MMP gene family, MMP13, which degrades fibrillar collagen during the resolution of muscle damage. To determine the timecourse of MMP expression and activity in regenerating muscle, cardiotoxin (CTX) injections were used to create reproducible muscle regeneration in adult mice.

Our results showed MMP13 expression is significantly increased in regenerating muscle. In unchallenged muscle, MMP13 null mice have no significant difference in histology or in active and passive mechanical properties compared to muscles of wild type mice. To determine the necessity of MMP13 expression in regeneration we injected CTX into MMP13 null mice and compared the resolution of damage to wild-type mice. Our results show trends for reduced muscle fiber size and vascularity of MMP13 null mice during regeneration following CTX injection. We compared fibrosis formation using sirius red staining and found that muscles from MMP13 null mice have similar collagen area, but that collagen is in a looser state compared to those from wildtype mice. Because satellite cells are an important component of muscle repair, we cultured primary myoblast (satellite cells) from MMP13 null and wild-type mice and found no change in proliferation, but reduced migration rates in the MMP13 null cultures. These data show that mice lacking MMP13 have decreased regenerative capacity within the muscle.

Understanding the role of MMP13 in muscle regeneration and fibrosis resolution may serve as a new therapy for muscle impairments that occur in nearly all muscle disorders.

FOXO1 Orchestrates the Wound Healing Response through Regulation of TGF-1 and Prevention of Oxidative Stress
Bhaskar Ponugoti was awarded second place for this project, conducted in the lab of Dr. Dana Graves, Professor, Department of Periodontics

Keratinocyte mobilization is a critical aspect of wound re-epithelialization, but the mechanisms that control its precise regulation remain poorly understood. We set out to test the hypothesis that FOXO1 has a negative effect on healing because of its capacity to inhibit proliferation and promote apoptosis. We investigated our hypothesis by generating keratinocyte-specific FOXO1-deficient mice in vivo and by RNAi in primary cultures of dermal keratinocytes in vitro. Contrary to expectations FOXO1 deletion in keratinocytes delayed wound closure in vivo (P<0.05). Further analyses revealed that FOXO1 deletion reduced expression of the keratinocyte migration marker uPAR and increased cell death (P<0.05). Moreover, we show that decreased keratinocyte migration was due to a large decrease in TGF-1 expression while increased apoptosis was due a substantial increase oxidative stress when FOXO1 was deleted in vivo (P<0.05). To test whether the control of TGF-1 was functionally important, wounds in FOXO1 deleted mice were treated with recombinant TGF-1 and rescued the delayed wound healing phenotype. Lastly, we determined that FOXO1 directly regulated TGF-1 levels in vitro (P<0.05).

Our studies identify a novel function for FOXO1 in coordinating the response of keratinocytes to wounding through upregulation of TGF-1 and other factors needed for keratinocyte migration and protection against oxidative stress that inhibits migration. Treatment with FOXO1 agonists may represent a potential therapeutic target for the treatment of tissue repair by mobilizing keratinocytes for rapid wound epithelialization.
The Impact of Scholarly Activity

**AVERAGE H INDEX FOR DEPARTMENT FACULTY**

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*The h index indicates the quantity and quality of the researcher’s publications during their career and was developed to measure the impact of an individual’s scientific research output. The higher the number the better. Older researchers with longer careers will always have more than new or younger researchers.*

These lists were generated using the Scopus database, and the Author IDs found within that system. Articles published in journals that are not indexed in Scopus, are not included in the calculation. The articles that were included were published between January 2008 and December 2012 and the h index calculations were done in early 2013.

“The Penn Dental Medicine research enterprise continues to have a far-reaching impact across disciplines as evidenced by the number and frequency of faculty publications cited in the scholarship of other researchers. The impact of the research in the clinical departments demonstrates the breadth of research activities and is an important part of the School’s scholarship.”

—DR. DANA GRAVES, VICE DEAN FOR RESEARCH & SCHOLARSHIP

**TOP 20 FACULTY SCHOLARLY OUTPUT BY H INDEX & NUMBER OF PUBLICATIONS**

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<td>Sunday Akintoye, BDS, DDS, MS, Dept. of Oral Medicine</td>
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<td>Marjorie Jeffcoat, DMD, Dept. of Periodontics</td>
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<td>Hydar Ali, PhD, Dept. of Pathology</td>
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<td>Syngcuk Kim, DDS, PhD, MD (hon), Dept. of Endodontics</td>
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<td>Elliot Hersh, DMD, MS, PhD, Dept. of Oral &amp; Maxillofacial Surgery/Pharmacology</td>
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<td>Yan Yuan, PhD, Dept. of Microbiology</td>
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<td>Bekir Karabucak, DMD, MS, Dept. of Endodontics</td>
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<td>Robert Ricciardi, MA, PhD, Dept. of Microbiology</td>
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