University of Mississippi Medical Center
School of Dentistry
Research Day 2018
February 20, 2018

David A. Felton, DDS, MS
Dean

Jason A. Griggs, PhD, FADM
Associate Dean for Research

School of Dentistry | Office of Research
University of Mississippi Medical Center
2500 North State Street, Room D528-6A
Jackson, MS 39216-4505
Dear Colleagues,

It is indeed a pleasure to welcome you to the 2018 UMMC School of Dentistry Research Day, an annual tradition at the School since 1994! Today our faculty, students, and postgraduate students come together to present their research findings to the members of the School of Dentistry and our Medical Center colleagues. Consider the advances that we’ve seen in dentistry over the past few decades—new dental materials, dental implant therapies, the development of systematic reviews, digital and CAD/CAM dentistry, advances in adhesive dentistry, advances in pulpal and periodontal research, dental caries assessment and management, and the movement toward minimally invasive dentistry—the list is impressive! Few, if any, of these advances would have occurred without dental research efforts. Research is critical to advancing dentistry and the dental specialties.

Having our students participate in research is an excellent way to advance the science of dentistry beyond the classroom and clinical environment. In addition, according to the Commission on Dental Accreditation (CODA, Standard 6-3), “Dental education programs must provide opportunities, encourage, and support student participation in research and other scholarly activities mentored by faculty.” Our faculty, and others within the UMMC system, continue to serve as excellent mentors and role models for our students in the research arena. As you will witness, the quality of the research presented today strongly supports our goal to not only achieve the CODA accreditation standard, but to surpass it.

I am confident that you will enjoy these outstanding research presentations, and that you will witness, first hand, as our students, residents, and faculty demonstrate excellence in their research efforts. I extend my heartiest welcome to our Dental Research Day, and encourage you to enjoy the presentations, and celebrate our student’s accomplishments with us!

David A. Felton, DDS, MS, Dean
Dean, School of Dentistry
Professor, Department of Care Planning and Restorative Sciences

This has been an exciting year for research in the School of Dentistry. Our aggregate H-index increased by 4%, showing that our discoveries have an increasing impact on the field. We also celebrated the 10th Anniversary of our summer research program, the UPSTART Program. UPSTART has mentored 113 students, garnered 15 awards for student research presentations, and has grown under the direction of Dr. Amol Janorkar – setting a new record this year with 20 participants!

It is a pleasure to have Dr. Jack Lemons with us as our keynote speaker this year. He is a leader in the field of dental materials – especially the failure analysis of dental implants, on which he has conducted five decades of retrievals and provided invaluable advice to improve manufacturing and ISO test standards. In addition, Dr. Lemons advised the Department of Biomedical Materials Science at our school – helping us when we were creating the MS and PhD programs in 2005-2007 – and he served on the dissertation advisory committees for our first class of graduate students, so it is great to have him with us again.

As usual, the abstracts that we received this year are excellent, and I look forward to hearing our students and faculty present their results and discuss the scientific impact with all of you. Thank you for joining us.

Jason A. Griggs, PhD, FADM
Associate Dean for Research, School of Dentistry
Professor and Chair, Department of Biomedical Materials Science
Program

Lower Amphitheater R153
8:00 – 9:00 am   Keynote Lecture: Dr. Jack E. Lemons, PhD
“50 Years of Dental and Bio-Materials and Mechanics:
Role(s) of Dentists in Biocompatibility Research”

Nelson Student Union Conference Rooms A and B
9:15 – 10:00 am   Break
Poster preparation

10:00 – 11:30 am  Poster presentations
Judging of student posters
Biomedical Materials Science lab demonstrations

Nelson Student Union Conference Rooms C and D
11:30 am   Lunch will be served
12:15 pm   Certificates and awards presentation
12:45 pm   Poster removal

Acknowledgements

Faculty Research Mentors
Ahmad Abdelkarim, DDS, MS, PhD, DMD, EdD
Associate Professor & Chair, Orthodontics
John J. Correia, PhD
Professor, Cell & Molecular Biology
Yuanyuan Duan, BDS, MS, PhD
Assistant Professor, Biomedical Materials Science
Lubna Fawad, DDS
Associate Professor, Pediatric & Community Oral Health
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Charles Ramsey, DMD
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Michael Roach, PhD
Associate Professor, Biomedical Materials Science
Susana Salazar Marocho, BDS, MS, PhD
Assistant Professor, Biomedical Materials Science
Scott Williamson, PhD
Assistant Professor, Biomedical Materials Science
Director, Shared Equipment Facility

Poster Judges
Jennifer Bain, DMD, MSPH, PhD
Associate Professor & Chair, Periodontics and Preventive Sciences
Beckie Barry, PhD, RDH
Professor & Chair, Dental Hygiene
Kenneth St. John, PhD
Professor Emeritus, Biomedical Materials Science

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Dr. Jennifer Bain
Dr. Ron Caloss
Dr. Pier Paolo Claudio
Dr. Angelia Garner
Dr. Amol Janorkar
Dr. Jack Lemons received his PhD from the University of Florida in 1968 where he earned his bachelor's, master's and doctorate in metallurgy and materials science. Dr. Lemons completed his National Institute of Health-sponsored Fellowship in Medicine and Dentistry at the University of Alabama at Birmingham (UAB) in 1973 and joined the faculty there that same year, becoming a full professor and chair of the Department of Biomaterials in the School of Dentistry in 1978 and serving as department chair until 1990. He has served as a university professor in the Department of Prosthodontics and Biomaterials at UAB's School of Dentistry, where his academic responsibilities included dental prosthodontics, medical orthopaedic surgery and biomedical engineering. He has also served as Professor of the Joint Materials Science Program at the University of Alabama in Tuscaloosa, and was an adjunct professor of prosthodontics at the University of Pittsburgh School of Dental Medicine.

Dr. Lemons is a member of numerous organizations including the American Academy of Orthopaedic Surgery, the International Association for Dental Research, the American Board of Forensic Examiners, and the American Association for the Advancement of Science, to name just a few. He presides over lectures for local study clubs and continuing education classes and has contributed over 50 years of education, research, and service focused on the biocompatibility of synthetic origin bio- and dental-materials. He sat on the editorial board of the Journal of Biomedical Materials Research and was a section editor at the Journal of Clinical Implantology. His publications and abstracts exceed 600 titles in various peer-reviewed journals.

ASTM International Committee F04 on Medical and Surgical Materials and Devices recognized the outstanding contributions of Dr. Lemons with the Patrick G. Laing Award in 2014. The Laing Award is Committee F04's highest-level award. A decorated ASTM member since 1974, Lemons has received several ASTM awards for his work over the years, including the Award of Merit and title of Fellow, the Robert J. Painter Memorial Award and the William T. Cavanaugh Award, some of ASTM’s highest organizational honors. In addition, Dr. Lemons has worked on multiple F04 subcommittees and chaired F04.93, the U.S. Technical Advisory Group for International Organization for Standardization (ISO) Technical Committee 150 – Implants for Surgery. He also served as chair of the main F04 committee, a group of 300 technical experts who oversee more than 900 international standards.

Dr. Lemons has been affiliated with many other groups in addition to ASTM. This includes the American Society for Metals, where he is a Fellow, as well as the American Academy of Orthopaedic Surgery, American Board of Forensic Examiners and the International Association for Dental Research, among others. He also serves on the editorial boards of several medical journals and holds two U.S. patents.

During his career, Dr. Lemons has mentored more than 300 students leading to more than 1,000 presentations and publications, including editing four textbooks. He continues as a part-time co-investigator on collaborative research on assessments of the biocompatibility of dental and medical treatments that include devices. We are truly fortunate to have a speaker of Dr. Lemons knowledge and experience join us for SOD Research Day 2018.
Finite Element Analysis of Two Reduced-Diameter Zirconia Dental Implants  

**J Boles**, **J Griggs**, **S Scherrer**, **Y Duan**

1Department of Biomedical Materials Science, University of Mississippi Medical Center; 2Division of Fixed Prosthodontics-Biomaterials, University of Geneva

**Objectives:** To investigate the biomechanical behavior of two one-piece reduced-diameter zirconia dental implant systems using finite element method and provide information for design optimization of ceramic dental implants.

**Methods:** Two commercially available reduced-diameter one-piece zirconia implants, Straumann PURE Ceramic (SP, Ø=3.3 mm) and Z-Systems Z5m (ZZ, Ø=3.6 mm) were scanned using a micro-CT scanner (Skyscan1172, Microphotonics). Matching crowns for a mandibular central incisor were designed and fabricated using a dental CAD/CAM unit (InLab MC XL, Dentsply Sirona) according to manufacturers’ instructions and scanned in the same micro-CT scanner. 3D composite computational models of dental implants, crowns, cementation layer, and simulated surrounding bone were created in a medical image processing software (ScanIP, Synopsis) using the reconstructed micro-CT images. Stress analysis was performed on the 3D models using ABAQUS (Simulia). A 100 N load was applied to the incisal edge oriented at a 30-degree angle to the long axis of the tooth to simulate occlusal loading according to ISO 41801 testing standard. Convergence tests were performed to select the appropriate level of mesh refinement for the 3D models.

**Results:** Maximum 1st principal stress in the implant body was located on the buccal surface of implant between the 2nd and 3rd screw threads for both models. The ZZ implant model had a higher peak stress value than the SP model. Maximum von Mises stresses in the surrounding bone were located in the crestal bone on the lingual side for both models. The ZZ model had a higher peak von Mises stress value in the surrounding bone than the SP model.

**Conclusions:** The predicted peak stresses in the surrounding bone were below the bone resorption thresholding value for both implant models. Both implant systems are predicted to be resistant to fracture when restoring mandibular central incisors under the given loading amplitude.

The Behavior of Elastin-Like Polypeptide Copolymers  

**A Engel**, **J Cobb**, **A Janorkar**

1Department of Biomedical Materials Science, University of Mississippi Medical Center

**Objectives:** Elastin-like polypeptides (ELPs) are thermally sensitive biopolymers that undergo an inverse phase transition. Understanding ELP behavior is important for its use in advanced applications when in contact with cells.

**Methods:** ELP (MW = 17,000 g/mol) was produced from genetically engineered *E. coli*. A Dynapro Nanostar DLS instrument was used to determine the phase separation of ELP over a temperature range of 20-60 °C with a ramp rate of 1 °C/min in solution.

**Results:** Decreased solvation of the polypeptides occurred when the ELP solution was heated, leading to phase separation and a change in solution appearance from transparent to translucent. The polymers yielded a change in transition temperature (T) due to a difference in hydrophobic interactions that occur between the ELP structure and the solution.

**Conclusions:** This study demonstrates the thermosensitive behavior of ELPs in solution, and how it changes based on the structural properties of the ELP molecule.

Acknowledgments: Supported by NIH/NIBIB R01 EB020006.

Some abstract details have been withheld due to confidentiality.

Effect of High-Speed Handpiece Vibration on the Fractal Dimension of Y-TZP Ceramic  

**F Jones**, **K Jodha**, **S Salazar Marocho**, **GV Joshi**, **J Griggs**

1Department of Biomedical Materials Science, University of Mississippi Medical Center; 2GC America

**Objectives:** Fracture surfaces of ceramic restorations can be characterized using fractal geometry to determine conditions that were present at the time of failure. Failed zirconia-based restorations can be clinically retrieved from the tooth preparation using a coarse diamond bur with a high-speed handpiece. This process could induce vibration and changes in the fracture surface because of phase transformation. The aim was to test the hypothesis that there is no effect of the handpiece vibration on fractal dimension (D) values of yttria-tetragonal polycrystalline zirconia (Y-TZP) dental ceramic.

**Methods:** Fracture surfaces of Y-TZP specimens (IPS e.max Zir-CAD, Ivoclar Vivadent) (n=19) that had been tested in four-point bending were analyzed. An impression was taken of each fracture surface using light body polyvinylsiloxane (Extrude, Kerr), and
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Utilization of Procedural Sedation by Pediatric Dentists in Mississippi: A Survey Study of Current Practices

M Malingkas¹, L Fawad², A Khatri¹

¹Department of Pediatric and Community Oral Health, University of Mississippi Medical Center

Objectives: The purpose of this study was to survey pediatric dentists within the state of Mississippi on their training and current practices regarding pharmacological behavior management of pediatric patients.

Methods: Pediatric Dentists who are registered members of the American Academy of Pediatric Dentistry (AAPD) and are practicing in the state of Mississippi, were emailed an 18-item survey. The survey includes questions related to basic demographic information as well as the training current practices including drugs used/level of sedation employed/monitoring and personnel used for monitoring/assisting with procedural sedation in their practices.

Results: Twenty surveys were collected and analyzed during the study timeline. Initially questions were asked to assess the respondent’s demographic information such as age and sex. The majority of those who responded were in the age range of 31-40 (n=9), and there was an almost equal number of males to females (10 males to 9 females); one person did not answer the question. When it came to the training that those who responded received during residency, it was found that there was a trend towards a hospital training program versus a university program. The preferred route of drug administration was asked, and the majority of those surveyed responded that the oral route was the preferred route of administration, while IV route was the least preferred route. The drugs that are most commonly used are midazolam and hydroxyzine. In terms of physiological monitoring of the patient, the equipment used also varies.

Conclusions: The pediatric dentists of Mississippi who were surveyed reported that the majority do use pharmacological behavior management to minimally or moderately sedate their patients with a variety of different drugs.

Maximum Temperature Through Y-TZP Ceramic After ER,CR:YSGG Laser Irradiation

S Malley¹, L Stringer¹, D Hutto¹, J Griggs¹, S Salazar Marocho¹

¹Department of Biomedical Materials Science, University of Mississippi Medical Center; ²Department of Care Planning & Restorative Sciences, University of Mississippi Medical Center

Objectives: Removing Y-TZP restorations with diamond burs is time-consuming and destructive. Using a laser could be a fast and non-destructive alternative method. However, the heat produced might damage the tooth pulp (>42 °C). The aim of this research was to determine the maximum temperature (T) reached during the use of different settings of an Er,Cr;YSGG laser through a Y-TZP ceramic.

Methods: Y-TZP slices (1 mm thick) were prepared and divided into 7 experimental groups (n=5). For the control group, a coarse diamond bur was operated with a high-speed dental handpiece on the Y-TZP slices. For the 6 experimental groups, the Er,Cr:YSGG laser (Waterlase MD) was operated at a constant combination of 33% water and 66% air during 30 s with two different power settings (W) at three frequencies (PPS), as follows (W/PPS): 2.5/20, 2.5/30, 2.5/45, 4.5/20, 4.5/30, and 4.5/45. The T through Y-TZP was recorded in degrees Celsius by using a digital thermometer (OMEGA HH506R) with a type K thermocouple.

Results: The data were not normally distributed. The median T of the control group was 26.5 °C. The use of 4.5 W resulted in the median T (in °C) of 44.2 at 20 PPS, 53.3 at 30 PPS, and 58.9 at 45 PPS, while 2.5 W showed 34.6, 31.6, and 25.0 at 20, 30, and 45 PPS, respectively. Kruskal-Wallis one-way ANOVA showed that within each power setting, the T was similar regardless of the frequency. The high power and lowest frequency (4.5/20) showed no significant difference from the 2.5 W settings and the control group.

Conclusions: The lower power setting (2.5 W) could be the method of choice for the use of the Er, Cr; YSGG laser with thin Y-TZP structures. The higher power (4.5 W) with high frequencies (30 and 45 PPS) would be recommended if a higher temperature is necessary.
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45 PPS is not suitable due to the potential damage to the pulp.

**Bioactive Release of Doxycycline from Extracellular Matrix Protein Based Composites**

*Q Nguyen*, A Benton*, M Marquart*, A Janorkar*

*1Department of Biomedical Materials Science, University of Mississippi Medical Center; 2Department of Microbiology and Immunology, University of Mississippi Medical Center*

**Objectives:** Controlled drug delivery application is a key factor to reduce the amount of drug necessary to elicit the same therapeutic efficacy as systemic drug delivery. Recently, we prepared elastin-like polypeptide (ELP)–collagen composites with significantly better mechanical properties and equivalent biocompatibility compared to collagen scaffolds. ELP exhibits an inverse phase transition behavior in response to changes in its environment. Previously we have shown that ELP-collagen hydrogels exhibit a tunable release of bioactive agents compared to collagen-only hydrogels. We have also shown that increasing collagen concentration and addition of ELP created hydrogels that allowed gradual release of a higher molecular weight growth factor (rhBMP-2) without affecting the release of a lower molecular weight antibiotic (doxycycline). Here, we evaluate bioactivity of doxycycline released from ELP-collagen hydrogels against three clinically important bacteria (*Escherichia coli*, *Pseudomonas aeruginosa*, and *Streptococcus sanguinis*).

**Methods: Hydrogel preparation.** Four different compositions were prepared by varying concentration of collagen, ELP addition, and chemical crosslinking of collagen (EDC/NHS=1:1). ELP (MW=17 kDa) was produced from genetically engineered *E. coli*. ELP-collagen hydrogels were formed by incubating ELP and collagen (rat tail tendon) in 1M NaOH, DI H2O, and 10X DMEM at 37 °C overnight. The procedures are detailed elsewhere.

**Determination of Bioactivity of doxycycline release.** *E. coli* (ATCC 53506), *P. aeruginosa* (D2123), and *S. sanguinis* (1736) were struck for isolation from stock onto agar plates containing Luria-Bertani (LB) broth, tryptic soy, and 5% sheep blood plus blood agar base, respectively. A single colony for each bacterium was used to grow the bacteria in their respective agar plate overnight at 37 °C. After overnight growth, the bacteria were subcultured into fresh media and allowed to grow until an optimal OD600 was reached. The logarithmic-phase cultures were then swabbed onto agar plates as above. Hydrogels were placed onto swabbed petri dishes for evaluation of inhibition of bacteria growth. *E. coli* and *P. aeruginosa* plates were incubated overnight at 37 °C and *S. sanguinis* plates were incubated overnight at 37 °C with 5% CO₂. The bioactivity of doxycycline released from the hydrogels was determined by observing and comparing the zones of inhibition created around the hydrogels.

Results: All studied hydrogels released doxycycline against *E. coli* (zone of inhibition diameter, Ø=3.8-7.1 mm) in similar manner as no significant difference was seen between all zones of inhibition. We found that doxycycline yields a smaller zone of inhibition against *E. coli* compared to the other two bacterial strains in this study. Significantly higher (p<0.05) inhibition against *S. sanguinis* (Ø=9-13 mm) and *P. aeruginosa* (Ø=8-13 mm) was observed. Such lower effect of the released doxycycline on *E. coli*, while being more effective against *P. aeruginosa* and *S. sanguinis*, is similar to observations by other researchers. Thus, the extracellular-matrix protein (collagen and elastin) based composites tested in this study were able to release doxycycline and were shown to be effective against all three bacterial strains tested. Similar sizes of zone of inhibition also support our previous findings that the compositional factors of collagen concentration, ELP addition, and chemical cross-linking did not affect doxycycline release.

Conclusions: Overall, the released doxycycline from all ELP-collagen hydrogels was effective against three commonly encountered bacteria in clinical settings, which can be helpful in creating tissue engineering scaffolds that can also achieve effective drug delivery. In the future, we will evaluate if released rhBMP-2 from selective extracellular matrix based composites in the presence of adipose stem cells can promote bone generation.

Acknowledgments: Supported by the National Institutes of Health/National Institute of Dental and Craniofacial Research (R03 DE024257)


**Bonding of Yttria-Tetragonal Zirconia Polycrystal (Y-TZP) Ceramic to a Resin Cement as a Function of Surface Roughness and Fractal Dimension**

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*1Department of Biomedical Materials Science, University of Mississippi Medical Center; 2Department of Biomaterials and Oral Biology, University of São Paulo*

**Objectives:** To determine if either surface roughness (Rₜₐₜ) or fractal dimensional increment (D*) created by different silica-coating protocols on the Y-TZP ceramic is correlated to the bonding to the resin cement.

**Methods:** In a previous study, Y-TZP cylinders (Ø=3.5 mm) were divided according to the SC protocol, bonded to resin composite blocks, and subjected to the shear bond strength test. The control group (a) did not receive any surface treatment. Groups (b) to (e) received SC with silica-modified alumina particles with dif-
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Effect of the Er,Cr:YSGG Laser on Debonding a Y-TZP Ceramic

D Remley1, L Stringer1, J Griggs1, S Salazar Marocho1, D Hutto2, S Magee2

1Department of Biomedical Materials Science, University of Mississippi Medical Center; 2Department of Care Planning & Restorative Sciences, University of Mississippi Medical Center

Objectives: To determine the effect of different powers of the Er,Cr:YSGG laser on the debonding strength between a Y-TZP ceramic and a resin cement.

Methods: Slices (1 mm thick) of a Y-TZP ceramic were subjected to tribochemical silica-coating and bonded to a resin composite cylinder (Ø~3.8 mm) with a dual-cured resin cement (Variolink, Ivoclar). The sets were randomized and divided into three groups according to the power of the Er,Cr:YSGG laser (Waterlase MD, Biolase) application. The laser irradiation was performed with a sapphire tip (Ø=1 mm, MG6; Biolase) in contact mode. The tip was brushed across the simulated occlusal surface over the bonding area in one direction and was kept perpendicular to the Y-TZP surface. After the laser application, the sets were subjected to the shear bond strength test using a wire loop at a loading rate of 1 mm/min until failure.

Results: The data passed the normality test (S-W, p=0.199). The Tukey’s test (α=0.05) showed that the control group (9.5±2.7 MPa) had a similar bond strength value to the 2.5 W (10.8±2.7 MPa) and 4.5 W (7.5±1.9 MPa) groups. The 2.5 W group was significantly different from the 4.5 W group that exhibited the lowest bond strength (p≤0.05). Both the control and 2.5 W group exhibited predominantly mixed mode failure, while the 4.5 W group showed mainly adhesive failure at the resin cement-resin composite interface.

Conclusions: The high power setting (4.5 W at 20 PPS) decreased the strength necessary to debond the Y-TZP ceramic from the resin cement by ~21% when applied for 30 s.

Attitudes and Perceptions of Dental Students and Faculty Regarding the Buffalo Model of Clinical Licensure Exam in Dentistry

M Remley1, A Abdelkarim1, A Janorkar2, D Felton3

1Department of Orthodontics, University of Mississippi Medical Center; 2Department of Biomedical Materials Science, University of Mississippi Medical Center; 3Department of Care Planning & Restorative Sciences, University of Mississippi Medical Center

Objectives: The Buffalo Model of the clinical licensure exam was developed at the University at Buffalo School of Dental Medicine to address ethical concerns regarding patient care. It has the potential to resolve concerns raised about patient involvement in dental licensure exams and to address logistical issues associated with the traditional exam format. To date, no study has yet assessed the attitudes of dental students and faculty regarding this new model. Therefore, the purpose of this study was to assess and compare dental students’ and faculty members’ attitudes towards this model after our recent administration of this model.

Methods: After IRB approval, a survey instrument designed with 15 questions, including one demographic question to self-identify as student or faculty, 10 statements rated on a Likert scale (i.e., from Bold print signifies student researcher *signifies presenter if not first author

Acknowledgments: Supported by FAPESP 2012/13727-3, CNPq 150296/2013-4, NIH grant 1R01 DE024333.


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Poster Abstracts

“strongly agree” to “strongly disagree”) regarding the Buffalo model’s advantages, and four open comment sections was delivered with participation by 20 students and 19 faculty (n=39) from the University of Mississippi School of Dentistry. Mann-Whitney U test was used to test the null hypotheses regarding response equality between the two groups, with a statistical significance set at 0.05.

**Results:** In the study, both students and faculty members largely agreed with all survey statements that the Buffalo model focuses on patient care, was applicable and well done at our school, and ameliorates ethical and logistical concerns associated with clinical exams. There was no statistically significant difference between the two groups (p>0.05). Qualitative data suggest some minor modifications, but both groups generally believed that the examination was successful.

**Conclusions:** Both dental students and faculty members were largely supportive of the new model of the clinical licensure exam. There were no differences in responses between the two groups, and it is thus valuable to continue administration of this model at our institution and consider its adoption at other institutions. This assessment will be ongoing forward to continue to evaluate the Buffalo model.

**The Efficacy of a Simply Fabricated Mandibular Repositioning Splint for the Treatment of Temporomandibular Disorders**

_A Srivastava*, A Garner, C Ramsey*

1Department of Care Planning and Restorative Sciences, University of Mississippi Medical Center; 2Department of Dental Hygiene, University of Mississippi Medical Center

**Objectives:** Over the past four decades, there have been numerous publications describing temporomandibular disorders (TMD) etiologies, comorbidities, and treatment modalities. At present, in the field of dentistry and sleep medicine, there is a significant renewed interest in TMDs relative to chronic pain and sleep disorders. The purpose of this research is to provide supportive evidence that dental professionals can use splint therapy to offer a conservative, predictable course of treatment to reduce headaches and jaw pain, improve range of motion of the neck, and improve quality of sleep.

**Methods:** The patients will be referrals from the University of Mississippi Medical Center Dental Students Program, Advanced General Dentistry Program, and Oral and Maxillofacial Surgery Program. After a thorough evaluation of signs and symptoms, impressions and casts will be created to fabricate the splint, which is made with urethane acrylic material. The mandibular repositioning splint provides an ideal bite for the patient, assuring canine guidance as the mandible moves right and left and immediate posterior discclusion that encourages muscle relaxation even when the patient clenches and bruxes while he or she sleeps. The patient is reappointed for insertion of the splint. Patients will be evaluated relative to their history of symptoms and examined to evaluate muscle, fascia, tendon, and joint involvement. The examination is performed by manual palpation as well as utilization of a stethoscope to listen for sound in the joints. Surveys will provide a baseline with which to compare a follow-up survey relative to reductions of headaches/migraines and jaw/joint pain as well as improvements in neck range of motion, disturbances of masticatory function and range of motion, and quality of sleep.

**Results and Conclusions:** This study is pending IRB approval.

**Size Scale of Leveling Affects Fractal Failure Analysis of Y-TZP**

_T Wilkerson*, K Jodha†, S Salazar Marocho†, GV Joshi‡, J Griggs§

1Department of Biomedical Materials Science, University of Mississippi Medical Center; 2GC America

**Objectives:** Fractal geometry is useful in analysis of ceramic fracture surfaces. The fractal dimension (D) can be used to estimate the fracture toughness of a material, which may help in identifying failure modes of prostheses. However, accurately measuring D values of fracture surfaces requires leveling the surfaces to be analyzed. Otherwise, smaller D values (negative bias) will result. Previous literature suggested that the surface can be leveled on a macroscopic scale – even when measuring D at the microscopic scale. We sought to discover if there was a difference between leveling on the scale of measurement and leveling on a larger scale when analyzing dental zirconia.

**Methods:** Impressions were taken of fractured four-point flexure bars (n=18) made of yttria-tetragonal polycrystalline zirconia (Y-TZP, ZirCAD, Ivoclar Vivadent) using light bodied impression material (Extrude, Kerr). Epoxy replicas (EpoxySet, AlliedHighTech) were made of two areas on each fracture surface, and 5 µm x 5 µm areas were scanned using an atomic force microscope (AFM, Bioscope Catalyst, Bruker) and were leveled using a first-order flattening operation. Each scanned area was divided into 2.5 µm x 2.5 µm quadrants. Image file format was converted using a custom script in MathCAD (PTC) and analyzed using FRACTALS software (Russ) with the Minkowski Cover algorithm.

**Results:** D values were not normally distributed (Shapiro-Wilk p≤0.05). Friedman repeated measures ANOVA on ranks showed that the images that were leveled and measured on the 5 µm scale had significantly higher D (associated with greater accuracy) than images leveled on the 5 µm scale but measured on the 2.5 µm scale (p≤0.001). The median D values (inter-quartile range) for the 5
The Use of Flow Cytometry to Identify the Presence and Differences in Human Adipose Derived Stem Cells from Bariatric Patient Tissue Samples

S Woods1, S Fitzgerald2, A Janorkar1

1Department of Biomedical Materials Science, University of Mississippi Medical Center
2Department of Biomedical Materials Science, University of Mississippi Medical Center

Objectives: Human Adipose-Derived Stem Cells (hASCs) are multipotent, mesenchymal cells that have the capability to undergo differentiation into several cell types including, but not limited to, osteogenic, adipogenic, and chondrogenic differentiation. However, the presence of hASCs within a patient-donated adipose tissue must be identified and quantified before such differentiation can be achieved. The goal of this project is to isolate and expand hASCs from three donors and confirm the presence of hASCs, while also ruling out the presence of any other differentiated cells using a set of known positive and negative hASC biological markers. The hASCs were tagged with specific cluster of differentiation (CD) markers and quantified using flow cytometry.

Methods: hASCs were isolated from procured adipose tissue donated by three patients undergoing bariatric surgery according to our IRB-approved protocol. The cells were cultured in Dulbecco’s Modified Eagle Medium (DMEM) at 37 °C and a CO2 concentration of 5%. Once confluent, cells were trypsinized and marked with fluorescent antibodies manufactured by BD Bioscience. Antibody markers included CD13, CD29, CD31, CD73, CD105, CD90, CD44, CD117, isotype control IgG1 and isotype control IgG2. Ten vials with cell culture samples were then run through the flow cytometer of two donors to help confirm the presence of the hASCs biological markers.

Results: Flow cytometry results for the cells isolated from one donor (Patient B095) showed that endothelial-specific CD31 marker was negatively expressed in 99% of cells, while stem cell specific markers such as CD13 was positively expressed in 36.6% of cells, CD73 was positively expressed in 83% of cells, CD105 was positively expressed in 76.6% of cells, and CD90 and CD44 were expressed in 99% of cells. Unfortunately, the other two patient samples never reached confluence and were unable to be tagged for analysis.

Conclusions: Cells isolated from Patient B095 were successfully identified as hASCs. We observed that there were marked differences in how efficiently cells isolated from different donors proliferated in vitro. It remains to be determined whether these differences depend on donor’s age, BMI, gender, or ethnicity in terms of marker fluorescence.

Acknowledgments: Supported by NIH/NIBIB R01 EB020006.

Observations on SynB1-Elastin-Like Polypeptide

J Cobb1, V Zai-Rose2, J Correia2, A Janorkar1

1Department of Biomedical Materials Science, University of Mississippi Medical Center; 2Department of Cell and Molecular Biology, University of Mississippi Medical Center

Objectives: Elastin-like polypeptide (ELP) belongs to a class of recombinant proteins that exhibit a reversible phase transition where below its transition temperature (Tc) the ELP remains soluble in the continuous phase and above Tc the ELP phase separates and stabilizes into coalesced particles. Understanding this behavior is important for ELP’s use in applications as a biomaterial.

Methods: The SynB1-ELP was prepared at three concentrations 0.8, 1.5, and 3 mg/mL. A Dynapro Nanostar DLS instrument (Wyatt Tech) was used to show aggregation behavior of SynB1 ELP in solution over a temperature range of 20–50 °C. Samples were analyzed using a Zeiss Supra 40 SEM with an accelerating voltage of 3 keV.

Results: From 0.5 to 2.5 hours, the ELP stabilizes into particles, which increase in size. At 3.5 hours, a large increase in particle diameter can be seen. Dynamic changes in particles sizes were observed beyond 5 hours.

Conclusions: The phase transition behavior of ELP led to formation of ELP particles, whose size was shown to be time dependent.

Acknowledgments: Supported by the National Institutes of Health (R01 EB020006).

Some abstract details have been withheld due to confidentiality.

Three Dimensional Model of Adipocyte Spheroid Maturation and Retention

S Fitzgerald1, A Janorkar1

1Department of Biomedical Materials Science, University of Mississippi Medical Center

Objectives: Elastin-like polypeptide conjugated to polyethylenimine (ELP-PEI) coatings have been used in the past for several different cell types, in which positively-charged PEI encourages cells to form three-dimensional spheroids while tethering themselves to the biocompatible ELP containing surface. However, mature adipocytes grown in such a manner may eventually become too buoyant to
Poster Abstracts

Optimization of Collagen-Elastin-Like Polypeptide-Bioglass Composite Scaffolds for Bone Tissue Engineering
B Gurumurthy1, J Griggs1, A Janorkar1

1Department of Biomedical Materials Science, University of Mississippi Medical Center

Objectives: The ability of a tissue-engineered scaffold to regenerate bone depends on its mechanical, physical, and biochemical properties. The currently used collagen scaffolds fail due to lack of rigidity though they have good biochemical properties. To overcome this limitation, we have developed a multicomponent composite scaffold that can mimic native bone by incorporating a natural polymer collagen, a smart-polymer elastin-like polypeptide (ELP), and a biodegradable ceramic Bioglass. Using the novel statistical method of response surface methodology (RSM), we optimized the composite compositions to have the maximized mechanical properties.

Methods: Rat tail collagen I was purchased from Corning, and ELP was produced from genetically-modified E. coli. Bioglass (Mo-Sci Corp.) amount and particle size were varied from 0-10 mg and 0-364 µm, respectively, and added in 12 different proportions to previously determined collagen and ELP amounts of 6 mg/mL and 18 mg/mL, respectively, to form the scaffolds. Bioglass particles were size sorted using sieves and were characterized using scanning electron microscopy (SUPRA-40, Zeiss) followed by ImageJ analysis. Mechanical properties were determined by uniaxial compressive testing (Sintech 2/G, MTS) of the composites aged for 8 days in PBS at 37 °C, and scaffold composition was optimized with RSM (DOE++, Reliasoft).

Results: Compressive testing revealed that the addition of Bioglass based on the amount and size improved the strength and Young’s modulus compared to collagen-ELP scaffold. Adding Bioglass improved the strength (0.5-1.9 kPa) and modulus (12-57 kPa) over a wide range based on the amount and size. RSM performed a two-factor optimization and helped in distinguishing the interaction effect of particle amount and size on compressive properties. RSM directed us to 5 mg and 142±6 µm as the optimal values of Bioglass amount and size that can be mixed with 6 mg/mL collagen and 18 mg/mL ELP to achieve maximized strength (1.6 kPa) and Young’s modulus (45 kPa).

Conclusions: Overall, mechanical properties vary with Bioglass amount and size. Bioglass addition improved the mechanical properties, and RSM efficiently optimized the collagen-ELP-Bioglass composition to obtain a combination of maximized mechanical properties. RSM identified a new composition that is currently being tested for knowing the physical, in vitro, and in vivo

Research Day 2018
School of Dentistry
Fractal Analysis at Varying Locations on Clinically Failed Zirconia Implants

K Jodha¹, S Salazar Maracho¹, Y Duan¹, S Scherrer², J Griggs¹

¹Department of Biomedical Materials Science, University of Mississippi Medical Center; ²University Clinic of Dental Medicine, Division of Fixed Prosthodontics-Biomaterials, University of Geneva

Objectives: Previous studies have shown that the fracture toughness of ceramics can be determined from the fractal dimensions (D) of their fracture surfaces and that the surface should be leveled to obtain an accurate D measurement. This study was to determine the effects of leveling operations and distance from the failure origin on the D values.

Methods: Twelve clinically failed zirconia implants from four different brands: Axis Biodental (n=7), Z-Systems (n=3), Straumann (n=1), and SDS (n=1) were retrieved and thoroughly cleaned. Epoxy replicas were made of three locations along the crack path in the center region of each fracture surface (near origin (O), hackle (H), and near compression curl (CC)) using a light body polyvinyl siloxane material (Extrude, Kerr). Surfaces were scanned in ScanAsyst mode with a scan size of 5 μm x 5 μm and a scan rate of 0.592 Hz using the atomic force microscope (AFM, Bioscope Catalyst, Veeco). The scan surfaces were then leveled using 1st order flattening operations in the AFM analysis software. The height data before and after the operation were imported into a custom MathCAD script, and FRACtALS software (Fractal Surfaces, Russ) was used to determine the D value by Minkowski cover algorithm, which was shown previously to be the algorithm with highest precision. A Wilcoxon signed-rank test, two-way repeated measures ANOVA, and one-way repeated measures ANOVA were performed as detailed below.

Results: The data were not normally distributed (S-W p≤0.05), so a non-parametric repeated measures test (Wilcoxon signed-rank test) was selected. The median D values before and after leveling were 2.161 and 2.174, respectively. There was a significant difference before and after leveling (p=0.001). The two-way repeated measures ANOVA showed no significant difference among the D values for different implant brands (p=0.66) and fracture surface locations (p=0.83). After eliminating implant brand as a factor, the data passed normality and equal variance tests (S-W p=0.88, BF p=0.15). The mean D values and standard deviations from the three locations (O, H, CC) were 2.183±0.031, 2.179±0.024, and 2.175±0.018, respectively. One-way repeated measures ANOVA showed no significant effect of location (p=0.74).

Conclusions: The leveling operation successfully removed the tilt without decreasing surface tortuosity, as it increased the D values significantly. The fractal dimension was the same at the three locations on the fracture surfaces. This means that hackle and compression curl regions can be used to determine fracture toughness when the failure origin has been lost.

Acknowledgments: Supported by the National Institutes of Health (1R01 DE024333) and the UMMC Intramural Research Support Program.

Photocatalytic Activity and Osteoblast Viability of UV-Treated Titanium Oxides

H Johnson¹, P Pal¹, A Janorkar¹, M Roach¹, R Williamson¹

¹Department of Biomedical Materials Science, University of Mississippi Medical Center

Objectives: Titanium naturally forms an amorphous oxide layer that can be converted to anatase and/or rutile crystalline phases through electrochemical surface modification techniques such as anodization. Recent studies have shown UV light pre-irradiation of crystalline titanium oxide layers may lead to photocatalytic activation causing a bactericidal effect. Photocatalytic activation has also been shown to accelerate the degradation of methylene blue solutions. The primary purpose of the present study was to assess UV generated photocatalytic activation in a variety of titanium oxide layers consisting of primarily anatase, primarily rutile, and combinations of anatase and rutile phases. A second purpose was to assess the effect of short term UV pre-irradiation on osteoblast attachment and early proliferation was also assessed.

Methods: Commercially pure titanium samples were anodized in three different electrolytes (A, B, and C) with a DC rectifier using 12 V, 10 s steps to a final forming voltage of 180 V. Thin-film X-ray diffraction was used to determine the oxide phases present, and electron backscattered diffraction was utilized to determine spatial distribution of these phases within the anodized layer cross-sections. The photocatalytic activity of the resulting anodized surfaces was assessed by analyzing the UV-generated degradation of a 0.001% methylene blue solution. Samples (n=3) from each of the anodized and titanium control groups were exposed to a 15 W UVA light in a custom box enclosure for 2 hours. The optical density (660 nm) of the methylene blue solution was measured at 10, 30, 60, and 120 minutes. Anodized and control samples (n=6) were seeded with approximately 20,000 MC3T3-E1 pre-osteoblasts/sample and cultured in alpha-modified Eagle’s minimum essential medium. Prior to cell seeding, 3 samples from each group were exposed to
UVA irradiation for 10 minutes. Rhodamine/DAPI assays were performed after 7 days to evaluate cell attachment and proliferation.

Results: Electrolyte A samples showed an oxide consisting of mostly anatase, while electrolyte B samples showed an oxide layer containing mostly rutile phase. Electrolyte C samples showed an oxide mixture of approximately 70% anatase and 30% rutile phases, and both phases were present on the outermost surface. Electrolyte C samples showed accelerated methylene blue degradation compared to other anodized and control samples. Electrolyte A and B samples showed similar results to the titanium control. Rhodamine/DAPI images indicated positive cell attachment and similar proliferation was shown for all conditions regardless of 10 minute UVA exposure.

Conclusions: For UVA exposure times as short as 10 minutes, the anatase and rutile combination oxide formed in electrolyte C showed accelerated methylene blue degradation compared to the other conditions. No detrimental effects on cell attachment or proliferation were shown for any of the anodized or control sample conditions after a 10-minute UVA exposure.

Osteoblast Viability and Differentiation on Calcium Soaked Titanium Oxides

P Pali1, H Johnson1, J Nelson1, A Janorkar1, M Roach1, R Williamson1

1Department of Biomedical Materials Science, University of Mississippi Medical Center

Objectives: Anodization in phosphoric acid electrolyte was recently shown to form phosphorous-containing anatase oxide surface coatings on commercially pure titanium. Furthermore, calcium soak treatment of the anodized samples at 80 °C increased bioactivity. The calcium soak treatment was done to obtain a surface Ca/P ratio similar to that of apatite. The aims of this study were to characterize the osteoblast responses to anodized samples with and without calcium soak and to ensure that the native biocompatibility of the non-anodized titanium is not negatively affected due to anodization and calcium soak treatment.

Methods: Sample Preparation and Characterization: Commercially pure titanium samples (Ø=12.5 mm; n=6) were anodized in an electrolyte containing phosphoric acid using a DC rectifier with 12 V, 10 s steps to a final voltage of 108 V. Non-anodized samples were used as comparative controls. Thin film X-ray diffraction (XRD) was used to determine the titanium oxide phases present in each group. Samples (n=3) from each group were soaked for 72 hours at 80 °C in a 1.2 M calcium nitrate tetrahydrate solution. Energy dispersive spectroscopy (EDS) was used to analyze the surface chemistry for each group.

Results: XRD analysis revealed the non-anodized samples to show an amorphous oxide layer and the anodized samples to contain partial anatase phase oxide. EDS results showed the anodized samples to contain phosphorus in the oxide layer and show a favorable Ca/P ratio of 2 after Ca soak treatment, which was similar to the Ca/P ration of natural apatite (~1.7). Non-anodized samples did not show presence of calcium or phosphorus, while non-soaked samples did not show presence of calcium.

All samples promoted efficient cell attachment by day 7 with distinct cytoplasmic filamentous spreading as shown by the rhodamine/DAPI staining, which increased by day 21. Increase in cell density was observed by presence of numerous glowing purple cell nuclei stained with DAPI. Live/dead assay revealed that both soaked and non-soaked samples were biocompatible with more than 95% cells alive on both 7 days and 21 days. Cells had covered all sample surfaces by day 21 forming a cell sheath. Increase in cell proliferation in a time dependent manner is seen on all the samples as measured by the DNA assay. All samples also supported ALP activity, an early marker for osteoblastic differentiation, with maximum expression on day 14.

Conclusions: The anodized samples showed a Ca/P ratio after calcium soak treatment that was closer to that of the apatite. All samples supported osteoblast attachment, proliferation, and differentiation.
Three Dimensional Finite Element Analysis of Zirconia Implant-Supported Dental Crowns

*H Sherrill*, Y *Duan*, J *Griggs*

1Department of Biomedical Materials Science, University of Mississippi Medical Center

**Objectives:** To construct finite element analysis (FEA) models of two posterior dental crowns supported by regular-diameter zirconia dental implants and to evaluate the stress distribution throughout the system.

**Methods:** A high-resolution micro-CT scanner (Skyscan1172, Microphotonics) was used to scan two commercially available one-piece zirconia implants, Straumann PURE Ceramic (S, Ø=4.1 mm) and Z-Systems Z5m (Z, Ø=4.0 mm). Two full-coverage crowns on first maxillary molars were designed for implants and fabricated using a computer-aided design/computer-aided manufacturing (CAD/CAM) dental system (InLab MC XL, Dentsply Sirona). A commercial medical image processing software (ScanIP, Synopsys) was used to create the individual models of implants, crowns, cementation layers and surrounding bone tissue. These models were later assembled and analyzed in ABAQUS (Simulia). A 100 N axial load was applied to the central fossa of the molars to simulate the physiological occlusal load. Convergence tests were executed to select the appropriate level of tetrahedron volume mesh refinement for the 3D models.

**Results:** Maximum 1st principal stress in the Z implant was located on the surface of 7th screw thread with 20.82 MPa of stress. While the maximum 1st principal stress in the S implant was located on the surface of 4th screw thread with 14.50 MPa of stress. Maximum von Mises stress in the surrounding bone for S model and Z model were 11.54 and 4.37 MPa, respectively.

**Conclusions:** The predicted peak stresses in the surrounding bone were below the bone resorption thresholding value for both implant models with the S implant having higher stress than the Z implant. Both implant systems are predicted to be resistant to fracture under the given physiological loading amplitude.

**Acknowledgments:** University of Mississippi Medical Center School of Dentistry UPSTART program and School of Dentistry Intramural Research Support Program.

Bitter Taste Receptor Genes and Risk of Proximal Versus Occlusal Caries in Primary Molars

*C Hughes*, M *Moran*, S *Diehl*

1Department of Biomedical Materials Science, University of Mississippi Medical Center

**Objectives:** Polymorphisms in a bitter taste receptor gene, TASR38, appear to influence food choices and susceptibility to dental caries. In this study, we examined polymorphisms in nine other taste receptor genes encoding proteins that function as bitter taste receptors for association with dental caries in primary molars.

**Methods:** Diet, hygiene, and demographic information was obtained for children ages 6-11. Decay of proximal and occlusal surfaces of primary molars was evaluated using WHO+IL caries detection criteria. Where available, radiographs supplemented the clinical examination. DNA were extracted from saliva and assayed for single nucleotide polymorphisms (SNPs) in TAS2R3, TAS2R4, TAS2R5, TAS2R9, TAS2R14, TAS2R16, TAS2R19, TAS2R31 and TAS2R43 that influence bitter taste perception. Tests of association assuming an additive genetic model were performed using linear regression analysis of the number of primary molars with proximal and/or occlusal caries. Effects of race and ethnicity were adjusted using Principal Components Analysis (PCA).

**Results:** Associations were found between number of teeth with only proximal decay and SNPs in TAS2R5 (Tyr167Cys; p=0.01); number of teeth with only occlusal decay and SNPs in TAS2R4 (Tyr6Ser; p=0.03), TAS2R14 (Thr86Ala; p=0.03), and TAS2R19 (Lys258Asn; p=0.03); number of teeth with both occlusal and proximal caries and SNPs in TAS2R9 (Ala574Thr; p=0.02), TAS2R14 (Thr86Ala; p=0.002), TAS2R31 (Gln217Glu; p=0.0008), and TAS2R43 (Pro276Arg; p=0.002).

**Conclusions:** This study of modest sample size requires replication but suggests that polymorphisms in genes associated with bitter taste perception influence caries susceptibility. Interestingly, our data point to different genetic polymorphisms affecting risk of decay at proximal versus occlusal tooth surfaces.
Research Opportunities and Awards at the University of Mississippi School of Dentistry

Honors in Research Program
The Honors in Research Program (HRP) provides an opportunity for eligible dental students to choose advanced study in dental research or basic health science and receive recognition for their accomplishments on their transcripts and at graduation.

Honors work consists of hypothesis driven research in some aspect of dental or basic health science. Students conduct laboratory research, clinical research, or population research (e.g., improving current clinical practices, exploring controversies in dentistry, engaging in basic and biomedical materials research) with the guidance and supervision of a UMMC faculty member.

Honors in Research Graduates - 2009-2017
Jennifer Bain, Jason Brown, Reid Lester, Kristin Balius, Curtis Caskey, Lacey Harris, Stacey Ritter, Camille Sandifer, Corey Shook, Phebe Winters

School of Dentistry Intramural Research Support Program (IRSP)
The goal of the Intramural Research Support Program is to provide seed funding for research activities in the School of Dentistry. In addition to faculty, pre-doctoral students and residents who develop a faculty-mentored research project are eligible to apply for small grants to cover materials and supplies. Priority will be given to those research projects which involve School of Dentistry students.

Student Research Group (SRG)
The School of Dentistry Student Research Group is a branch of the American Association for Dental Research (AADR) National Student Research Group (NSRG) and is composed of dental and graduate students committed to research and the advancement of further education. Goals of the organization are to expose dental students to various student research projects, aid in the application process for residencies to dental specialties, and to encourage student participation in dental research. Meetings allow students to share and evaluate on-going research projects within the School of Dentistry.

Student Research Group Officers for 2017-2018
President – Caleb Hardman
Vice-President – Jolie Nguyen
Treasurer – Justina Boles
Secretary – Bhuvaneswari Gurumurthy
Student Advocacy Representative - Ambika Srivastava
Faculty Advisor – Dr. Jennifer Bain

Awards and Honors

2017 ADA/Dentsply Student Clinician Award – Jiman Nelson was the ADA/Dentsply Student Clinician Award winner and was presented the award at Student Awards Day 2017.

2017 Hinman Student Research Award – Kendra Clark received this award and represented UMMC at the Hinman Student Research Symposium, in Memphis, TN, November 3 - 5, 2017 at the historic Peabody Hotel.

53rd Annual Colgate Dental Students’ Conference on Research
Jiman Nelson was selected as UMMC’s representative to attend this conference, which introduces outstanding dental students to scientists from the ADA Foundation’s Dr. Anthony Volpe Research Center on the NIST campus in Gaithersburg, MD. The conference was held on October 1-3, 2017.

2017 Quintessence Award for Research Achievement – William Fontaine received the School of Dentistry Quintessence Award for Research at the SOD Awards Day on April 18, 2017. Fontaine received this honor for his many combined achievements during his time in the DMD program. Fontaine was the Thomas P. Hinman Student Research Award winner in 2015 and presented research at the ADA/Dentsply Annual Meeting in 2014 in Washington, DC. Fontaine also was the recipient of the Quintessence Award in Restorative Dentistry in 2017.

Graduate Student Receives Biomed Engineering Award - Bhuvaneswari Gurumurthy, a fourth-year Ph.D. student and research assistant in the School of Dentistry, received First Prize for her Oral Presentation at the 33rd Southern Biomedical Engineering Conference (SBEC) on March 17-18 in Gulfport. Gurumurthy’s presentation, “Characterization and Optimization of Collagen-Elastin-Like Polypeptide Composite Scaffolds for Bone Tissue Engineering,” was coauthored by Dr. Amol Janorkar, associate professor of biomedical materials science, and Dr. Jason Griggs, associate dean for research and professor and chair of biomedical materials science. The SBEC is composed of bioengineering professionals from academia and industry in the southern United States. Submitted papers are peer-reviewed and those accepted for presentation and publication appear in the yearly issue of SBEC proceedings. The SBEC emphasizes participation from young professionals and advanced students.

2017 American Association of Women Dentists (AAWD) Colgate Research Award - Quynh (Jolie) Nguyen was selected to receive this award. This program, funded by Colgate, is designed to promote early career research, facilitate research related to dentistry, and help the improvement of oral health. Applicants are selected based on research vision, innovation, academic performance, potential for leadership, and overall strength of their research. The recipient also receives a $500 award to support current research in oral health.
Student Research Opportunities at the University of Mississippi School of Dentistry

Undergraduate and Professional Student Training in Advanced Research Techniques (UPSTART) Program

The UPSTART Program provides an opportunity for eligible dental, pre-dental, pre-graduate, and high school students to be involved and trained in research at the University of Mississippi School of Dentistry. The program is designed to initiate students in research by pairing with research mentors, teaching general laboratory safety, and instilling essential research skills through hands-on learning. The research experience is provided under the mentorship of a dental faculty member who is actively engaged in research throughout the summer. The program promotes learning of the dental students as well as the undergraduate students from national colleges and universities in design and successful implementation of research projects through a didactic seminar series, hands-on laboratory research, and peer-judged research presentations. The students have the opportunity to present their research findings as an oral seminar in the “UPSTART Symposium” organized at the end of the UPSTART program. Additionally, the students are expected to present the research performed during the UPSTART program and progress since then on the following School of Dentistry Research Day. Since its inception, 113 students (56 dental, 57 other) have benefited from this program.

For information contact:
Dr. Amol V. Janorkar (Email: ajanorkar@umc.edu / Phone: 601-984-6170)

UPSTART 2017 Students and Mentors with Dr. Felton

10 YEARS

School of Dentistry
Research Day 2018
# Faculty Excellence in Research (as of December 31, 2017)

## Cumulative Publications

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Research Day 2017...