Bridging the Gap
PARTNERS IN INTERDISCIPLINARY CARE
2011 AAE ANNUAL SESSION

# Abstracts of Research

**To be presented at the 2011 Annual Session of the American Association of Endodontists**
**April 13 – 16, at the San Antonio Convention Center, San Antonio, Texas**

Abstracts appear as they were submitted by the presenters. The letters in the upper left corner represent the type of presentation: OR for Oral Research Presentation and PR for Poster Research Presentation.

Please refer to the schedule below to determine when the abstracts will be presented. For example, OR 31 will be presented during the Resident Session on Pain and Trauma, Wednesday, April 13, 3:30 – 5 p.m., in Room 206B.

# Schedule of Presentations

## Oral Research Presentations

### Resident Sessions

**Wednesday, April 13, 2011**
*Regenerative Endodontics*
Room 206A
10 – 11:30 a.m.
Abstracts 1-6

*Instrumentation I*
Room 206A
1:30 – 3 p.m.
Abstracts 12-16

*Canal Disinfection and Debridement I*
Room 206B
1:30 – 3 p.m.
Abstracts 17-21

*Pain and Trauma*
Room 206B
3:30 – 5 p.m.
Abstracts 28-32

**Thursday, April 14, 2011**
*Endodontic Technology and Materials I*
Room 206B
10 – 11:30 a.m.
Abstracts 39-43

*Endodontic Biology II*
Room 206A
1:30 – 3 p.m.
Abstracts 44-49

*Clinical Aspects in Endodontics II*
Room 206A
3:30 – 5 p.m.
Abstracts 56-60

## Oral Research Presentations, continued

*Canal Disinfection and Debridement II*
Room 206B
3:30 – 5 p.m.
Abstracts 61-66

### Predoctoral Student, General Practitioner and Endodontist Sessions

**Wednesday, April 13, 2011**
*Endodontic Biology I*
Room 206B
10 – 11:30 a.m.
Abstracts 7-11, 67

*Instrumentation II*
Room 206A
3:30 – 5 p.m.
Abstracts 22-27

**Thursday, April 14, 2011**
*Clinical Aspects in Endodontics I*
Room 206A
10 – 11:30 a.m.
Abstracts 33-38

*Endodontic Technology and Materials II*
Room 206B
1:30 – 3 p.m.
Abstracts 50-54

## Poster Research Presentations

**Thursday, April 14, 2011**
*Resident Session*
Exhibit Hall C
2 – 5 p.m.
Abstracts 1-53

**Saturday, April 16, 2011**
*Predoctoral Student, General Practitioner and Endodontist Session*
Exhibit Hall C
8:15 – 11:15 a.m.
Abstracts 54-82

## Table Clinics (no abstracts)

**Thursday, April 14, 2011**
*Resident Session*
Exhibit Hall C
2 – 5 p.m.

**Saturday, April 16, 2011**
*Predoctoral Student, General Practitioner and Endodontist Session*
Exhibit Hall C
8:15 – 11:15 a.m.

## OR 01

### Preclinical Trials of Three Regenerative Endodontic Procedures

*M.A. Limosani*, K.N. Namerow, P.E. Murray*
Nova Southeastern University, Fort Lauderdale, FL

The purpose of this preclinical trial was to compare the regeneration effectiveness of four types of endodontic procedures. Following Institutional Animal Care & Use Committee's approval, the root canals of 36 maxillary and mandibular teeth in two nonhuman primates (*M. fasicularis*) were cleaned and shaped to a size 40.04 using ProTaper™ and ProFile™ files (DENTSPLY Tulsa Dental Specialties, Oklahoma City, OK) using standard endodontic techniques. Three types of regenerative procedures were used: Group 1—Stimulate a blood clot; Group 2—Stimulate a blood clot and implant a rigid Collagen scaffold (BD Biosciences, Franklin Lakes, NY); Group 3—Stimulate a blood clot and inject a Pepgen P-15 scaffold (DENTSPLY, York, PA); Group 4—Gutta-percha (negative control). An MTA liner was placed above the blood clot and the access cavity was restored with glass ionomer (Fuji II, GC, Tokyo, Japan). After a postoperative time of 30 or 60 days, teeth were processed for histology and analyzed at x200 magnification according to ISO criteria. Data was analyzed by ANOVA statistical tests (P-values) at a significance of 95%. No regeneration was observed in teeth obturated with gutta-percha. Some cells were observed in the canals of teeth following revascularization. Greater numbers of cells were observed in teeth where a rigid collagen scaffold or an injectable Pepgen P15 scaffold had been implanted ($P<0.05$). No adverse events were observed. The use of injectable and rigid scaffolds was more successful than using the traditional revascularization procedure to accomplish regenerative endodontic therapy. This study was supported by NSU Health Professions Division.

## OR 02

### The Use of Biosensors to Detect Toll-Like Four Receptor Activators in Root Canal Systems

*C. Cosby*, F. Teixeira, K. Hargreaves, A. Diogenes*
University of Texas at San Antonio, TX

The innate immune response represents the first line of defense. It is responsible for the recognition of patterns of microbial infection and tissue injury to trigger the initiation and maintenance of inflammation. Lipopolysaccharides (aka, endotoxin) are integral constituents of the bacteria cell wall of Gram-bacteria and a known initiator of apical periodontitis. LPS mediates its pro-inflammatory effects by activating its putative receptors (TLR4, CD14 and MD2) in immune cells. However, it has been demonstrated that LPS is not the only activator of TLR4, and that endogenous TLR4 activators (agonists) may be released during inflammation. Therefore, we hypothesized that measurement of TLR4 activators in the human dental pulp will be correlated with clinical diagnosis. To test this hypothesis, we characterized a new methodology (biosensor) based on the expression of a TLR4/CD14/MD2 receptor complex and a reporter gene downstream the promoter for the pro-inflammatory factor NFk-b in HEK cells. Intracanal samples were collected with S1 and S2 ProTaper™ instruments from teeth diagnosed with irreversible pulpitis (IP), necrotic pulp and normal pulp. The biosensor cells were exposed to the debris and to a LPS standard curve. Activators of TLR4-mediated inflammatory signals were detected in all samples, except normal pulp samples. Importantly, samples from teeth with irreversible pulpits had high levels of TLR4 activators. Collectively, these results suggest that this new assay is a sensitive method of detecting physiologically relevant concentrations of TLR4 activators, and that teeth diagnosed with IP express significant levels of endogenous activators of TLR4 that appear distinct from endotoxins. This study was supported by the AAE Foundation.

## OR 03

### Emdogain Inhibits Proliferation and Stimulates Differentiation of Human Dental Pulp Stem Cells

*M. Yang*[1], Q. Zhu[1], J. Jiang[1], K. Safavi[1], S. Shi[2], M. Mina[1]*
[1]University of Connecticut, Farmington, CT, [2]University of Southern California, Los Angeles, CA

The goal of this study was to investigate the effects of the purified enamel matrix protein product Emdogain (EMD) on the growth and osteogenic differentiation of human dental pulp stem cells (hDPSCs). The gene expression of collagen $\alpha 1$ (Col1$\alpha$1), bone sialoprotein (BSP) and osteocalcin (OC) were also analyzed during the differentiation. Cultures of hDPSCs were treated with or without 100 ug/ml EMD for 1, 3, 5 and 7 days. At each time point, cell proliferation was measured by cell counting, crystal violet staining and colorimetric MTS assay. To study the effect of EMD on hDPSCs differentiation, confluent cells were cultured with ascorbic acid and ß-glycerophosphate to induce osteogenesis for up to 3 weeks. At the end of each week, cell differentiation was analyzed by alkaline phosphatase and von-Kossa staining, as well as expressions of Col1$\alpha$1, BSP and OC mRNAs. The result showed a significant decrease in cell growth in EMD-treated groups at all time points as compared to the controls (t-test, $p<0.05$). Under osteogenic differentiation conditions, EMD treatment significantly enhanced mineralization as evidenced by extended von-Kossa staining and increased the expression of BSP and OC (one-way ANOVA, $p<0.05$). This study indicates that EMD inhibits proliferation but promotes differentiation of hDPSCs. This study was supported by the AAE Foundation.

## OR 04

### *De Novo* Creation of Tooth Constructs Using Stem Cells From Human Exfoliated Deciduous Teeth

*R. Raymond*, P. Murray, K. Namerow*
Nova Southeastern University, Fort Lauderdale, FL

The purpose of this study was to conduct a histological analysis of tooth constructs created from human dental stem cells. Stem cells from human exfoliated deciduous teeth (SHED) were grown to confluence and seeded on three-dimensional tissue engineering scaffolds. Tooth constructs (n=90) were created by seeding SHED on hydroxyapatite-calcium phosphate tissue engineering scaffolds or Collacote™-based scaffolds (collagen, Zimmer Dental, Carlsbad, CA). The negative control was an absence of stem cells. Growth factors utilized included: 100 ng/ml of Stromal-derived factor-1 (SDF-1), Bone morphogenetic protein-7 (BMP-7), and ß-Glycerophosphate (ß-GP) in a solution of 2 mg/ml neutralized rat tail type-1 collagen (R&D, Minneapolis, MN). Tooth constructs were submerged in Dulbecco's Minimal Essential Media containing 10% fetal calf serum and antibiotics, maintained at 37°C in a 5% CO2 atmosphere for 30 and 60 days. Neutral red dye (0.0016%) was added to the culture media to stain metabolically active cells. Specimens were fixed in formalin, dehydrated and processed for light microscope histology at x200 magnification according to ISO criteria. Data was analyzed by ANOVA statistical tests (P values) at a significance of 95%. SHED survival was observed in all tooth constructs, with and without growth factors SDF-1, BMP-7 and ß-GP, versus the negative control ($P<0.05$). These *in vitro* results suggest that scaffolds, growth factors and cell cultures can be used to create tissue-engineered teeth. This technique may allow future endodontists to deliver tooth constructs as an alternative to conventional dental implants. This study was supported by the AAE Foundation and NSU Health Professions Division.