Revascularization and Regenerative Endodontics Curriculum
Syllabus for ADVANCED PROGRAMS IN ENDODONTICS

As of 4/13/15

The AAE Educational Affairs Committee has developed a syllabus on revascularization and regenerative endodontics and is based on the CODA Accreditation Standards for Advanced Education Programs in Endodontics (January 1, 2014 implementation) and on the AAE's activities and positions on regenerative endodontics.

I. General Information
   a. Course Director
   b. Course Credits
   c. Semester

II. Course Description

This course consists of lectures designed to provide postdoctoral students with advanced information on revascularization and regenerative endodontics. The subjects include didactic and clinical simulation materials to fully engage the residents in seminars, laboratory, clinic and literature reviews.

III. Course Goals & Objectives
   a. The goal of this course is to provide the students with the fundamental understanding and in-depth knowledge of revascularization and regenerative endodontics both at the didactic and clinical levels.
   b. Upon completion of this course, the student should be able to:
      i. Describe the indications and contra-indications for revascularization.
      ii. Define the principles of regenerative endodontics and revascularization.
      iii. Describe the options of different techniques of regenerative endodontics.
      iv. Describe the differences between revascularization and regenerative endodontics.
      v. Explain the biological principles of regenerative endodontics and revascularization.
      vi. Support clinical practice with evidence based knowledge of regenerative endodontics
      vii. Integrate fundamentals of regenerative endodontics into the practice of dentistry.
      viii. Demonstrate competency in all clinical steps involved in a revascularization procedure.
      ix. Have in-depth knowledge of the didactic and clinical aspects of revascularization and regenerative endodontics.

IV. Course Material
   a. Textbook: **Pathways of the Pulp** (10th Edition) – Chapter 16 – Regenerative Endodontics
   b. Additional reading

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Thibodeau B, Teixeira F, Yamauchi M, Caplan DJ, Trope M. Pulp revascularization of immature dog teeth with apical periodontitis. Journal of Endodontics 2007;33:680-9.

Murray PE, Garcia-Godoy F, Hargreaves KM. Regenerative endodontics: a review of current status and a call for action. J Endod 2007: **33**: 377-390.

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Hargreaves KM, Geisler T, Henry M, Wang Y. Regeneration Potential of the Young Permanent Tooth: What Does the Future Hold? Journal of Endodontics 2008; 34:S51-S6.

Huang GT, Sonoyama W, Liu Y, Liu H, Wang S, Shi S. The hidden treasure in apical papilla: the potential role in pulp/dentin regeneration and bioroot engineering. J Endod 2008;34(6):645-651.

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V. Evaluation
   a. Summative Assessment: Students will be graded in their clinical performance and didactic examinations.
   b. Formative Assessment: Each student will be assigned to a regenerative endodontic case. Cases will be assessed using multiple defined criteria, and feedback will be provided immediately.

VI. Policies (***Individual policy links/text should be inserted by each program***)
   a. Professional Behavior
   b. Attendance
   c. Make-up exams or other work
   d. Accommodations for students with disabilities

COMPONENTS

1. Didactic Component (***Individual lectures should be inserted by each program***)
2. Laboratory Component ***(Individual lab component should be inserted by each program)***
3. Clinical Component
   a. **AAE "Clinical Considerations for a Regenerative Procedure"** http://www.aae.org/uploadedfiles/publications_and_research/research/currentregenerativeendodonticconsiderations.pdf
   b. The current recommendation/protocol from San Antonio (reference: Diogenes et al., 2013 – Endodontic Topics) Table 2: Treatment procedures for regenerative endodontics

      First treatment visit for regenerative endodontics:
      i. Informed consent, including explanation of risks and alternative treatments or no treatment.
      ii. After ascertaining adequate local anesthesia, dental dam isolation is obtained.
      iii. The root canal systems are accessed and working length is determined (radiograph of a file loosely positioned at 1 mm from root end).
      iv. The root canal systems are slowly irrigated first with 1.5% NaOCl (20 mL/canal, 5 min) and then irrigated with saline (20 mL/canal, 5 min), with irrigating needle positioned about 1 mm from root end.
      v. Canals are dried with paper points.
      vi. Calcium hydroxide is delivered to canal system.
      vii. Access is temporarily restored.

      Final (second) treatment visit for regenerative endodontics (the second visit is scheduled 2–4 weeks after the first visit):
      i. A clinical exam is first performed to ensure that there is no moderate to severe sensitivity to palpation and percussion. If such sensitivity is observed, or a sinus tract or swelling is noted, then the treatment provided at the first visit is repeated. At this point the clinician may elect to use double antibiotic paste or triple antibiotic paste (at no more than 100 **m**g of each drug/mL).

ii. After ascertaining adequate local anesthesia with 3% mepivacaine (no epinephrine), dental dam isolation is obtained.
iii. The root canal systems are accessed; the antibiotic paste is removed by irrigating with 17% ethylenediaminetetraacetic acid (EDTA) (30 mL/canal, 10 min).
iv. The canals are dried with paper points.
v. Bleeding is induced by rotating a pre-curved K-file size #25 at 2 mm past the apical foramen with the goal of having the entire canal filled with blood to the level of the cemento–enamel junction.
vi. Once a blood clot has formed, a premeasured piece of Collaplug™ (Zimmer Dental Inc., Warsaw, IN) is carefully placed on top of the blood clot to serve as an internal matrix for the placement of approximately 3 mm of white MTA (Dentsply, Tulsa, OK).
vii. A 3–4 mm layer of glass ionomer (e.g. Fuji IILC™, GC America, Alsip, IL) is flowed gently over the MTA and light-cured for 40 s.
viii. A bonded reinforced composite resin restoration (e.g. Z-100™, 3M, St. Paul, MN) is placed over the glass ionomer.
ix. The case needs to be followed-up at 3 months, 6 months, and yearly after that for a total of 4 years.

ADDITIONAL RESOURCES

- **Accreditation Standards for Advanced Specialty Education Programs in Endodontics**
  http://www.ada.org/~/media/CODA/Files/endo.ashx
- **AAE Position Statement**
  http://www.aae.org/uploadedfiles/clinical_resources/guidelines_and_position_statements/scopeofendo_regendo.pdf
- **AAE Glossary**
  http://www.nxtbook.com/nxtbooks/aae/endodonticglossary/index.php
- **AAE Teaching Materials**
  http://www.aae.org/education/educator-center/teaching-resources/teaching-materials.aspx
- **Writing Objectives for Critical Thinking**
  http://www.aae.org/uploadedfiles/education/educator_center/writingobjectivesforcriticalthinking.pdf