

Immunologic Reactions and Endodontics: An Online Study Guide

Abstract

The Editorial Board of the *Journal of Endodontics* has developed a literature-based study guide of topical areas related to endodontics. This study guide is intended to give the reader a focused review of the essential endodontic literature and does not cite all possible articles related to each topic. Although citing all articles would be comprehensive, it would defeat the idea of a study guide. This section will cover potential immunological reactions, endotoxin, and cysts versus granulomas. (*J Endod* 2008;34:e181–e186)

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Introduction

The delivery of high-quality clinical care requires a thorough understanding of the endodontic literature. The Editorial Board of the *Journal of Endodontics* (JOE) has developed this online study guide for endodontists and fellow clinicians interested in endodontics.

There are several potential applications for an online study guide. First, an online study guide permits clinicians to focus in on particular areas of endodontics where they can quickly review key papers devoted to one particular topic. For example, this particular study guide provides a summary of key papers in the area of potential immunologic reactions, endotoxin, and cysts versus granulomas.

Second, a study guide permits speakers to efficiently review background material in preparation for future courses, lectures, or continuing educational events. Third, an online study guide permits students to review key papers in preparation for future examinations or for development of residency seminars. And, fourth, an online study guide permits readers to quickly and efficiently access either the abstract or the entire paper cited in the tables (see Discussion for details).

Methods

One potential problem in developing an online study guide was to provide a summary of major papers that contributed to a given topic area. The inclusion of all possible papers on a given topic would lead to an unwieldy collection that failed to clearly identify key papers in the area. Of course, the exclusion of key papers is also problematic. To address this issue, the JOE Editorial Board developed the overall list of topics to be covered and then for each topic generated an initial tabulation of key historical and contemporary papers on that topic. This list was then sent to two outside reviewers who were both experienced educators and Diplomates of the American Board of Endodontics. These reviewers then recommended additions and deletions of papers to the proposed topic list.

In order to maintain currency, the JOE Editorial Board proposes to periodically update each topical study guide using the same peer-reviewed process as described above.

Results

The results of the study guide (1–56) provide an overview of selected literature on potential immunologic reactions, endotoxin, and cysts versus granulomas. This information is organized into Tables 1–3.

Discussion

The journey to clinical excellence requires not only outstanding clinical skills but also that special knowledge that accrues from a study of the endodontic literature. The purpose of the JOE online study guide is to serve as one source for efficiently reviewing key papers that are organized by topic area and presented with the advantages of online Internet technology.

Although JOE readers are undoubtedly familiar with many aspects of the Internet, there are special features available at JOE online that provide particular advantages in their application for a study guide. For example, if this particular study guide is downloaded as a pdf, it provides a useful but static listing of the cited articles. On the other hand, if the reader navigates to the table of contents page for the online study guide and then clicks on “Full Text” (Fig. 1), they will be taken to an HTML version of the study guide. This online version of the study guide has special capabilities including the fact that the references are hyperlinked. Thus, the

reader can quickly obtain abstracts of nearly all cited papers and can review the entire paper of many of the cited papers with only a few clicks of their mouse (Fig. 2). Thus, combining a study guide with online capabilities provides particular benefits for efficiently reviewing key papers in the endodontic literature.

We hope that this study guide will prove useful to you as one source for developing a focused and special base of endodontic knowledge. As always, we are interested in your thoughts on this initiative and how JOE can better serve you, our readers. Feel free to e-mail us at: JEndodontics@UTHSCSA.edu.

TABLE 1. Potential Immunological Reactions

Ref #	Title
1.	Naidorf IJ. Immunoglobulins in periapical granulomas: a preliminary report. <i>J Endod</i> 1975;1:15–8.
2.	Kuntz DD, Genco RJ, Guttuso J, Natiella JR. Localization of immunoglobulins and the third component of complement in dental periapical lesions. <i>J Endod</i> 1977;3:68–73.
3.	Pulver WH, Taubman MA, Smith DJ. Immune components in human dental periapical lesions. <i>Arch Oral Biol</i> 1978;23:435–43.
4.	Torabinejad M, Bakland LK. Immunopathogenesis of chronic periapical lesions. A review. <i>Oral Surg Oral Med Oral Pathol</i> 1978;46:685–99.
5.	Torabinejad M, Kettering JD. Detection of immune complexes in human dental periapical lesions by anticomplement immunofluorescence technique. <i>Oral Surg Oral Med Oral Pathol</i> 1979;48:256–61.
6.	Jones OJ, Lally ET. Biosynthesis of immunoglobulin isotypes in human periapical lesions. <i>J Endod</i> 1980;6:672–7.
7.	Greening AB, Schonfeld SE. Apical lesions contain elevated immunoglobulin G levels. <i>J Endod</i> 1980;6:867–9.
8.	Stern MH, Dreizen S, Mackler BF, Selbst AG, Levy BM. Quantitative analysis of cellular composition of human periapical granuloma. <i>J Endod</i> 1981;7:117–22.
9.	Stern MH, Dreizen S, Mackler BF, Levy BM. Antibody-producing cells in human periapical granulomas and cysts. <i>J Endod</i> 1981;7:447–52.
10.	Stern MH, Dreizen S, Mackler BF, Levy BM. Isolation and characterization of inflammatory cells from the human periapical granuloma. <i>J Dent Res</i> 1982;61:1408–12.
11.	Weiner S, McKinney RV Jr, Walton RE. Characterization of the periapical surgical specimen. A morphologic and histochemical study of the inflammatory patterns. <i>Oral Surg Oral Med Oral Pathol</i> 1982;53:293–302.
12.	Svetcov SD, DeAngelo JE, McNamara T, Nevins AJ. Serum immunoglobulin levels and bacterial flora in subjects with acute oro-facial swellings. <i>J Endod</i> 1983;9:233–5.
13.	Bergenholtz G, Lekholm U, Liljenberg B, Lindhe J. Morphometric analysis of chronic inflammatory periapical lesions in root-filled teeth. <i>Oral Surg Oral Med Oral Pathol</i> 1983;55:295–301.
14.	Torabinejad M. The role of immunological reactions in apical cyst formation and the fate of epithelial cells after root canal therapy: a theory. <i>Int J Oral Surg</i> 1983;12:14–22.
15.	Cymerman JJ, Cymerman DH, Walters J, Nevins AJ. Human T lymphocyte subpopulations in chronic periapical lesions. <i>J Endod</i> 1984;10:9–11.
16.	Kettering JD, Torabinejad M. Concentrations of immune complexes, IgG, IgM, IgE, and C3 in patients with acute apical abscesses. <i>J Endod</i> 1984;10:417–21.
17.	Torabinejad M, Kettering JD. Identification and relative concentration of B and T lymphocytes in human chronic periapical lesions. <i>J Endod</i> 1985;11:122–5.
18.	Kettering JD, Torabinejad M. Concentrations of immunoglobulin E in patients with chronic periapical lesions. <i>J Endod</i> 1986;12:306–8.
19.	Baumgartner JC, Falkler WA Jr. Detection of immunoglobulins from explant cultures of periapical lesions. <i>J Endod</i> 1991;17:105–10.
20.	Safavi KE, Rossomando EF. Tumor necrosis factor identified in periapical tissue exudates of teeth with apical periodontitis. <i>J Endod</i> 1991;17:12–4.

TABLE 1. (Continued)

Ref #	Title
21.	McNicholas S, Torabinejad M, Blankenship J, Bakland L. The concentration of prostaglandin E2 in human periradicular tissues. J Endod 1991;17:97–100.
22.	Torabinejad M. Mediators of acute and chronic periradicular lesions. Oral Surg Oral Med Oral Pathol 1994;78:511–21.
23.	Stashenko P, Wang CY, Tani-Ishii N, Yu SM. Pathogenesis of induced rat periapical lesions. Oral Surg Oral Med Oral Pathol 1994;78:494–502.
24.	Kawashima N, Stashenko P. Expression of bone-resorptive and regulatory cytokines in murine periapical inflammation. Arch Oral Biol 1999;44:55–66.
25.	Liapatas S, Nakou M, Rontogianni D. Inflammatory infiltrate of chronic periradicular lesions: an immunohistochemical study. Int Endod J 2003;36:464–71.
26.	Ledesma-Montes C, Garces-Ortiz M, Rosales-Garcia G, Hernandez-Guerrero JC. Importance of mast cells in human periapical inflammatory lesions. J Endod 2004;30:855–9.
27.	Nair PN. Pathogenesis of apical periodontitis and the causes of endodontic failures. Crit Rev Oral Biol Med 2004;15:348–81.

TABLE 2. Endotoxins

Ref #	Title
28.	Schein B, Schilder H. Endotoxin content in endodontically involved teeth. J Endod 1975;1:19–21.
29.	Dahlen G, Bergenholtz G. Endotoxic activity in teeth with necrotic pulps. J Dent Res 1980;59:1033–40.
30.	Dwyer TG, Torabinejad M. Radiographic and histologic evaluation of the effect of endotoxin on the periapical tissues of the cat. J Endod 1981;7:31–5.
31.	Pitts DL, Williams BL, Morton TH Jr. Investigation of the role of endotoxin in periapical inflammation. J Endod 1982;8:10–8.
32.	Schonfeld SE, Greening AB, Glick DH, Frank AL, Simon JH, Herles SM. Endotoxic activity in periapical lesions. Oral Surg Oral Med Oral Pathol 1982;53:82–7.
33.	Horiba N, Maekawa Y, Abe Y, Ito M, Matsumoto H, Nakamura H. Correlations between endotoxin and clinical symptoms or radiolucent areas in infected root canals. Oral Surg Oral Med Oral Pathol 1991;71:492–5.
34.	Khabbaz MG, Anastasiadis PL, Sykaras SN. Determination of endotoxins in the vital pulp of human carious teeth: association with pulpal pain. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001;91:587–93.

TABLE 3. Cysts Versus Granulomas

Ref #	Title
35.	Bauman L, Rossman SR. Clinical, roentgenologic, and histopathologic findings in teeth with apical radiolucent areas. <i>Oral Surg Oral Med Oral Pathol</i> 1956;9:1330–6.
36.	Wais FT. Significance of findings following biopsy and histologic study of 100-periapical lesions. <i>Oral Surg Oral Med Oral Pathol</i> 1958;11:650–3.
37.	Linenberg WB, Waldron CA, DeLaune GF Jr. A clinical, roentgenographic, and histopathologic evaluation of periapical lesions. <i>Oral Surg Oral Med Oral Pathol</i> 1964;17:467–72.
38.	Patterson SS, Shafer WG, Healey HJ. Periapical lesions associated with endodontically treated teeth. <i>J Am Dent Assoc</i> 1964;68:191–4.
39.	Bhaskar SN. Periapical lesions—types, incidence, and clinical features. <i>Oral Surg Oral Med Oral Pathol</i> 1966;21:657–71.
40.	Lalonde ER, Luebke RG. The frequency and distribution of periapical cysts and granulomas. An evaluation of 800 specimens. <i>Oral Surg Oral Med Oral Pathol</i> 1968;25:861–8.
41.	Lalonde ER. A new rationale for the management of periapical granulomas and cysts: an evaluation of histopathological and radiographic findings. <i>J Am Dent Assoc</i> 1970;80:1056–9.
42.	Morse DR, Patnik JW, Schacterle GR. Electrophoretic differentiation of radicular cysts and granulomas. <i>Oral Surg Oral Med Oral Pathol</i> 1973;35:249–64.
43.	Block RM, Bushell A, Rodrigues H, Langeland K. A histopathologic, histobacteriologic and radiographic study of periapical endodontic surgical specimens. <i>Oral Surg Oral Med Oral Pathol</i> 1976;42:656–78.
44.	Langeland K, Block RM, Grossman LI. A histopathologic and histobacteriologic study of 35 periapical endodontic surgical specimens. <i>J Endod</i> 1977;3:8–23.
45.	Simon JH. Incidence of periapical cysts in relation to the root canal. <i>J Endod</i> 1980;6:845–8.
46.	Stockdale CR, Chandler NP. The nature of the periapical lesion—a review of 1108 cases. <i>J Dent</i> 1988;16:123–9.
47.	Wayman BE, Murata SM, Almeida RJ, Fowler CB. A bacteriological and histological evaluation of 58 periapical lesions. <i>J Endod</i> 1992;18:152–5.
48.	Nobuhara WK, del Rio CE. Incidence of periradicular pathoses in endodontic treatment failures. <i>J Endod</i> 1993;19:315–8.
49.	Ramachandran Nair PN, Pajarola G, Schroeder HE. Types and incidence of human periapical lesions obtained with extracted teeth. <i>Oral Surg Oral Med Oral Pathol Oral Radiol Endod</i> 1996;81:93–102.
50.	Nair PN. New perspectives on radicular cysts: do they heal? <i>Int Endod J</i> 1998;31:155–60.
51.	Vier FV, Figueiredo JA. Prevalence of different periapical lesions associated with human teeth and their correlation with the presence and extension of apical external root resorption. <i>Int Endod J</i> 2002;35:710–9.
52.	Peters E, Lau M. Histopathologic examination to confirm diagnosis of periapical lesions: a review. <i>J Can Dent Assoc</i> 2003;69:598–600.
53.	Nair PN. Non-microbial etiology: periapical cysts sustain post-treatment apical periodontitis. <i>Endod Topics</i> 2003;6:96–113.
54.	Nair PN. Non-microbial etiology: foreign body reaction maintaining post-treatment apical periodontitis. <i>Endod Topics</i> 2003;6:114–34.
55.	Ricucci D, Bergenholtz G. Histologic features of apical periodontitis in human biopsies. <i>Endod Topics</i> 2004;8:68–87.
56.	Lin LM, Huang GT, Rosenberg PA. Proliferation of epithelial cell rests, formation of apical cysts, and regression of apical cysts after periapical wound healing. <i>J Endod</i> 2007;33:908–16.

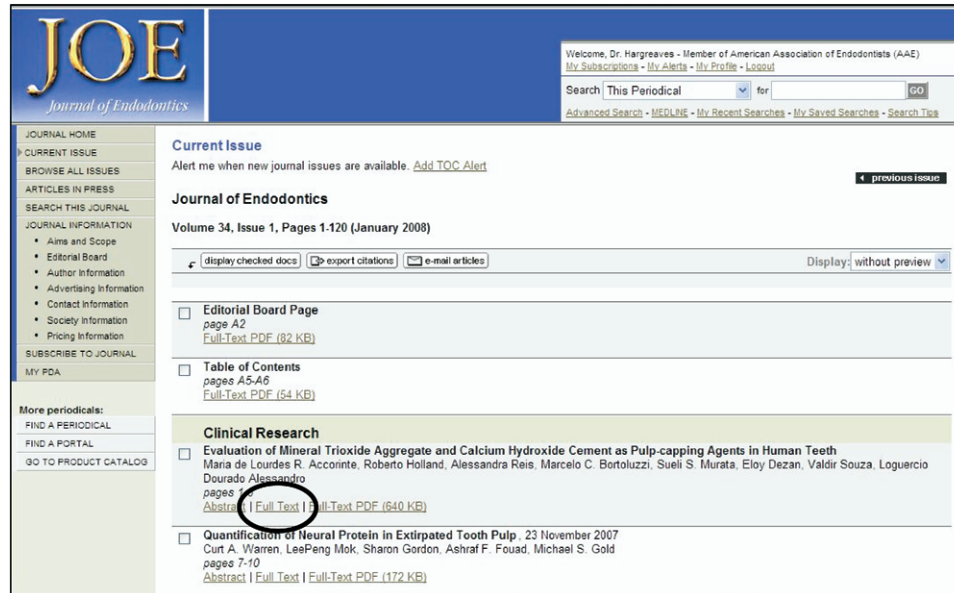


Figure 1. Navigation to HTML version.

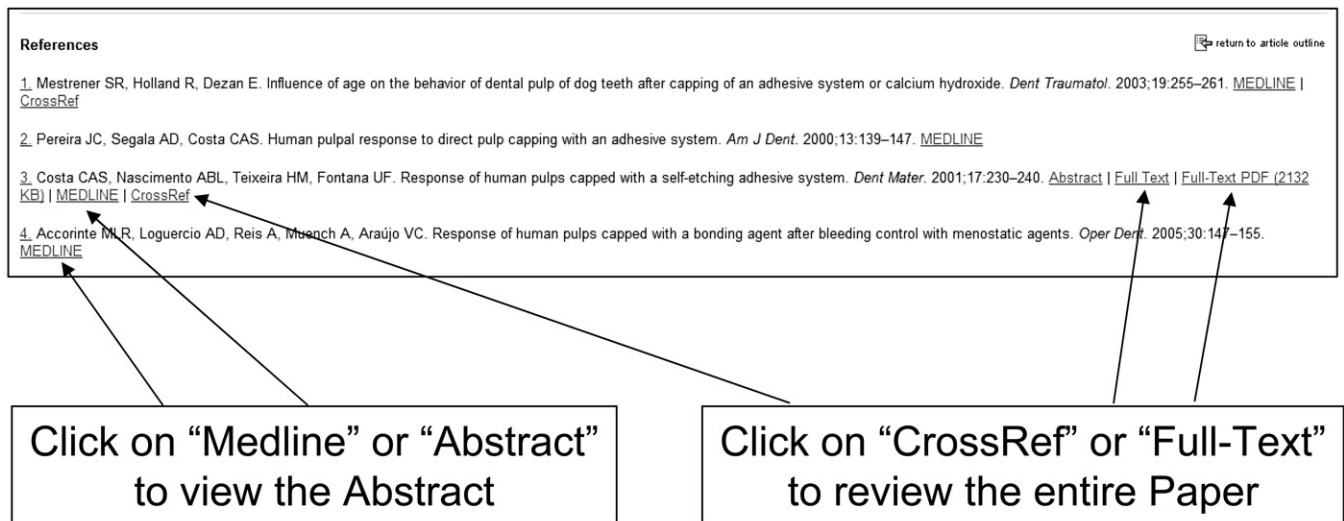


Figure 2. Hyperlink to References.

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