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Transplanted tooth splinted to adjacent teeth with adhesive resin. p. 970.

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root canals) treated between October 2001 and June 2006 by endodontic postgraduate residents at the Dental School of Athens. Type of tooth and canal, type and length of fractured segments, level of instrument fracture and management that followed were recorded.

**Results** The prevalence of instrument fracture during root canal preparation was 1.83%. However, the prevalence of endodontic cases with separated instruments referred to the Endodontics postgraduates was 4.31%; this difference was statistically significant ($P < 0.001$). The prevalence of hand and rotary NiTi instrument separation by postgraduate residents were 0.55% and 1.28%, respectively ($P < 0.001$). The prevalence of instruments fractured in the apical third (52.5%) was significantly higher when compared with coronal (12.5%) and middle (27.5%) thirds of the canals. The retrieval or by-pass of fractured instruments was the most successful in the coronal (100%) and middle (45.4%) thirds when compared with the apical third (37.5%) of canals.

**Conclusions** (1) The prevalence of endodontic instrument fracture by the postgraduate residents was relatively low when compared with the prevalence of fractured instruments in endodontic cases referred for management to the endodontic residents. (2) The prevalence of fracture of rotary NiTi instruments was more frequent than that of hand instruments. (3) Retrieval or by-pass of the fractured instrument in the apical third was less successful.

**R1.15**

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**Radiological assessment of endodontic treatment needs in an adult population in the Lodz Region of Poland**

**Aim** To radiographically evaluate endodontic treatment needs in an adult population in the Lodz Region of Poland.

**Methodology** A total of 439 panoramic radiographs from patients (18–86 years), reporting for the first time to the Institute of Dentistry, Medical University of Lodz, were evaluated. The radiographs were randomly selected amongst patients admitted to the Institute within one calendar year. The following dental treatment needs were considered: 1) root canal treatment of non-root filled teeth with periapical pathosis or with visible cavities reaching the pulp cavity; 2) root canal treatment of root filled teeth with periapical pathosis; 3) extraction of teeth not suitable for root canal treatment. Patients with less than 10 remaining teeth were excluded from the study.

**Results** Amongst the teeth with endodontic treatment needs, 74.4% required root canal treatment and 25.6% extraction ($P < 0.0005$). Endodontic treatment needs were more frequently observed in root filled (86.8%) than non-root filled teeth (57.0%) ($P < 0.000005$), whereas extraction was more often necessary in non-root filled (43.0%) than in root filled teeth (13.2%) ($P < 0.000005$). Necessity of endodontic retreatment was more frequently reported in multi-rooted than in single-rooted teeth (74.3% versus 58.6%) ($P = 0.0003$), while single-rooted teeth (41.4%) more frequently required endodontic treatment than multi-rooted (25.7%) ($P = 0.0003$). More than two-thirds of endodontic treatment needs concerned teeth that were root filled and one-third related to teeth that were to be treated for the first time.

**Conclusions** Amongst the population of the Lodz Region, endodontic treatment needs result predominantly from the necessity to retreat teeth with inadequately filled root canals and periapical pathosis. Improvement in the quality of root canal treatment may reduce patients’ needs in this field.

**R1.16**

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**Prevalence of apical periodontitis and quality of endodontic treatment in the Slovenian population**

**Aim** To determine radiographically the prevalence of apical periodontitis (AP) as well as the prevalence and quality of root fillings in an adult Slovenian population.

**Methodology** A total of 217 orthopantomograms of adult patients attending general practice for the first time were examined. The number of teeth, number of root filled teeth (RFT), and number of teeth with AP were recorded. The adequacy of root canal treatment was determined using the guidelines of the European Society of Endodontology. The type of coronal restoration was recorded. Relations between the apical status, presence, and quality of root fillings were statistically evaluated using the chi-square test.

**Results** Overall, 78% of the patients examined (aged 38.8 ± 11.0 years) had RFT and 80% had at least one tooth with AP. Of the 5710 teeth examined, 7.8% were root filled. AP was found in 8.4% of all teeth. In 45% of RFT, the filling ended within 2 mm from the radiographic apex. 50% were underfilled, 5% were overfilled, and 47% were homogenous. Significantly more AP was observed in RFT as compared with non-root filled teeth (55% versus 4%; $P < 0.001$). Adequately filled teeth showed significantly less AP than those inadequately filled (23% versus 69%; $P < 0.001$). RFT were restored with plastic materials in 54%, post and crown in 29%, and crown in 13%; 5% had no restoration.

**Conclusions** The prevalence of AP and RFT were similar to those reported in previous methodologically comparable European studies. AP was more likely in RFT. The presence of an adequate root filling had a positive impact on the apical status.

**R1.17**

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**Periapical health of an urban population in a recent historic period in the region of Slavonia, Croatia**

**Aim** To evaluate the periapical health of an archaeological sample from a recent historic period, found in the cathedral of the town of Pozega, Slavonia, Croatia.

**Methodology** Forty well preserved skulls excavated from the archaeological findings in the church crypt were examined radiographically. According to the church records, those individuals were buried between 1760 and 1868. Their age was determined by the Lovejoy method and their gender by their craniofacial osseal characteristics. A total of 960 teeth present in their skulls were analyzed, with an additional 116 teeth which were lost after death and 204 lost before death. Caries was assessed using a dental explorer and radiographically. Periapical health was evaluated by the presence of periapical radiolucency, root resorption or condensing osteitis on panoramic radiographs. The Periapical index (PAI) was used to determine the presence of periapical periodontitis. Any score equal to or greater than three was categorized as a diseased periapex. Root resorption was established by the radiographic
appearance of the roots by comparing their length to adjacent teeth. Condensing osteitis was identified as a radiopacity in the periapical area.

### Results
Caries was found in 112 teeth (12%). Periapical pathosis was found in 49 (5%) teeth, of which 24 (4.5%) had periapical periodontitis and five (0.5%) had root resorption. Condensing osteitis was found in the periapical region of five teeth. Periapical pathological changes were found in 20 (50%) skulls, of which, 74% were associated with caries.

### Conclusions
Periapical periodontitis was a common disease in the urban Slavonian population of a recent historic period. Most of the periapical periodontitis was associated with caries.

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**R1.18**
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### Interappointment flare-ups: incidence and related factors

#### Aim
To evaluate the incidence of interappointment flare-ups and to examine their possible correlation to several clinical factors.

#### Methodology
A prospective study was set-up over an 18-month period among patients who received root canal treatment by fifth year undergraduate students at the Dental School of Athens, Greece. All treatments were performed in two visits, using a step back technique. Flare-ups were defined as the occurrence of severe pain and/or swelling following cleaning and shaping, requiring an unscheduled visit and active treatment. The following factors were recorded: age, gender, tooth group, arch, pulp vitality, presence of periapical lesion, as well as treatment factors (initial treatment or retreatment).

#### Results
The final sample consisted of 323 teeth in 150 patients, 69 males and 81 females, 9–73 and 13–71 years-old respectively. The overall incidence of flare-ups was 5.9%, including seven anterior teeth (six maxillary, one mandibular), five mandibular premolars and 7 molars (two maxillary, five mandibular). Flare-ups occurred in eight male patients, mainly between 50 and 59 years, and 10 females mainly between 40 and 49 years. Pulp diagnosis was non-vital in 17 cases (89.5%) and irreversible pulpitis in two cases of multi-rooted teeth. In 14 cases the treated teeth were related to periapical pathosis (73.7%). Root canal treatment was completed for the first time in 11 cases (57.9%), whereas the remaining eight were retreatment cases.

#### Conclusions
The incidence of interappointment flare-ups is relatively low. Their occurrence was related to pulp necrosis and presence of periapical pathosis.

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**R1.19**
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### Effect of the digital image display monitor on the evaluation of the quality of root fillings

#### Aim
To compare a liquid crystal display (LCD) monitor with a high resolution cathode ray tube (CRT) monitor for the evaluation of length and homogeneity of root fillings.

#### Methodology
Root canals of 17 extracted permanent mandibular incisors were filled. With the teeth placed in their jaws radiographic images were obtained with the Accu-I-Tomo Limited Cone Beam CT (LCBCT) and Digora Optime image plate systems (SPP). Six observers rated the quality of all images displayed on the two monitor types in terms of their ability to evaluate root filling quality. Results were compared using McNemar’s test ($P < 0.05$). Cochran’s $Q$ was used to determine the reliability among the raters’ scores. Differences among LCBCT and SPP images were determined by binominal test. Kappa was used to measure inter-observer agreement.

#### Results
No significant difference was found between image quality ratings ($P > 0.05$) for images displayed on CRT and LCD monitors. However, in the LCD images the inter-observer agreement was significantly better ($P < 0.05$). SPP and LCBCT images were rated significantly different ($P < 0.05$) with the former being rated highest.

#### Conclusions
The quality of LCD images was similar to that of CRT images with respect to evaluating length and homogeneity of root canal fillings in mandibular incisors. Images from the SPP system were significantly better.

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**R1.20**
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### Accuracy of limited cone-beam CT, storage phosphor and conventional film radiography for the detection of periapical lesions

#### Aim
To compare the diagnostic accuracy of Accu-I-Tomo (Morita Co Ltd, Tokyo, Japan), Digora Optime (Soredex Corporation, Helsinki, Finland) image plate system and F-speed film (Eastman Kodak, Rochester, NY, USA) for the detection of chemically created periapical lesions in dry skulls.

#### Methodology
Lesions were created by placing a solution of 70% perchloric acid at the bottom of tooth sockets of extracted teeth in 12 human jaw specimens. The acid was applied in three time periods (1 h, 1.5 h and 2 h). Teeth were replaced in their sockets and radiographed with three imaging modalities - Accu-I-Tomo limited cone-beam CT (LCBCT), Digora Optime storage phosphor plate (SPP) system and F-speed film. Six observers scored the images for the presence/absence of lesions using a 5-graded scale. Diagnostic accuracy, expressed as the area under the ROC curve (Az), for each observer and modality was compared using Kruskal-Wallis analysis. Kappa ($k$) was used to measure inter-observer agreement.

#### Results
Significantly greater accuracy was noted for LCBCT images ($Az = 0.862$) compared with both SPP ($Az = 0.752$) and F-speed film ($Az = 0.726$) for all acid durations. Pair-wise comparisons showed significant differences between LCBCT and film images, and LCBCT and SPP images, respectively, only for 1.5 h of acid application. $k$ ranged between fair to moderate for LCBCT and between slight to fair for SPP and film.

#### Conclusions
Overall, in LCBCT images, observers were better in detecting chemically induced apical lesions. However, the detectability was similar for all imaging modes for shorter (smaller lesions) and longer (larger lesions) acid applications.