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## **RVG-S, VIXA, and Ektaspeed film in detection of proximal enamel defects under orthodontic bands**

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### **ABSTRACT**

An *in vitro* investigation was carried out to compare CCD-based intraoral radiographic systems with E-speed film for the detection of proximal enamel defects beneath orthodontic bands, with and without added niobium filtration to attenuate the x-ray beam. Twenty caries-free extracted teeth were randomly divided into five groups. Fifteen of 30 contacting proximal surfaces remained lesion free; the other 15 received a small, medium, or large mechanically induced enamel defect. Images were made with and without the addition of 30 $\mu$ m niobium filtration, and with and without orthodontic bands. Six dentists were viewers. Receiver operating characteristic (ROC) curves were developed for each modality under each test situation. The area under the curve ( $A_z$ ) was used as an index of diagnostic accuracy, and the critical ratio was used for statistical comparisons. In the absence of orthodontic bands, the  $A_z$  values for E-speed film and for nonenhanced RVGS were greater than for all other modalities tested, indicating that they have the greatest diagnostic accuracy. With orthodontic bands, the RVG-S with steep gradient enhancement (X-function) had a higher  $A_z$  value than all other modalities. Addition of niobium had no significant effect on defect detection. CCD-based devices hold no diagnostic advantage over conventional film for detecting changes in the density of enamel not covered by orthodontic bands. Contrast enhancement of digital images (RVG-S X-function) holds promise for the detection of such changes beneath orthodontic bands.

**KEY WORDS:** Dental radiography, Digital imaging, Filtration, Image processing, Orthodontics, ROC analysis.

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