

Minimizing exposure to radiation

Human beings always have been exposed to a fairly constant background of radiation from natural sources, but it has only been in the 20th century that man-made sources of radiation began to cause significant human exposures. Approximately 90% of man-made radiation involves the deliberate exposure of persons to medical or dental x rays. Major studies on the use of medical and dental radiographs were carried out by the U.S. Public Health Service in 1964 and 1970. In the 1970 survey, the most recent one, there were 67.5 million dental x-ray visits, an increase of 17 million over 1964. The majority of dental radiographs taken are intraoral, periapical, or bite-wing, although an increasing number of panoramic and other extraoral radiographs now are made.

In a national survey conducted by the Eastman Kodak Company, approximately 60% of the 12 million dental films taken per week were periapicals and 40% were bite-wings. During the same period, 212,000 panoramic radiographs were taken weekly comprising about 2% of the total number of dental films taken. The 2% figure probably will continue to increase because of the increasing popularity of panoramic equipment.

The American Academy of Pediatric Dentistry has developed Oral Health Policies for children and one of these policies refers to dental radiographs in children. The Oral Health Policy emphasizes that the objective is to minimize the exposure to radiation. Dental radiographs should be prescribed according to individual patient need and should be made using techniques that will maximize the yield of diagnostic information while minimizing the exposure to ionizing radiation. Child patients should be exposed to dental ionizing radiation only after a complete review and evaluation of their oral and general health. Following this review, dental radiographs should be ordered on the basis of the findings of a thorough clinical examination by a dentist and only a dentist should order the films to be exposed. Dental radiographs may be made to establish the presence of pathosis or to aid in

establishing a diagnosis. Radiographs also may be made in the absence of any clinically apparent problem to detect orofacial problems of low prevalence which should be treated early to minimize morbidity and mortality.

The Oral Health Policy of the American Academy of Pediatric Dentistry states that there are no known alternatives to dental radiographs; however, the frequency of radiographic exposure may be minimized by a thorough history and clinical examination using visualization, transillumination, auscultation, percussion, and palpation.

In this issue of the *Journal*, Drs. Flaitz, Hicks and Silverstone present the results of an in vitro study designed to compare clinical appearance, tactile detection, radiographic findings, and electronic data with the histological appearance of pit and fissure caries in the occlusal surfaces of molars. A diagnostic aid, the electronic caries detector, has been developed to provide additional information about the status of occlusal surfaces of teeth. This instrument uses electrical conductivity to evaluate the integrity of occlusal surfaces. The authors conclude from their study that radiographic evidence of pit and fissure caries in occlusal surfaces is not demonstrated until significant dental involvement has occurred, thus, radiographs are of limited value in diagnosing occlusal caries. On the other hand, electrical conductivity may provide an indirect measure of histologic lesion depth. The new electronic caries detection instrument may be of assistance in the diagnosis of pit and fissure caries especially when attempting to decide between restoration or sealant placement on the occlusal surface. This instrument may be of particular value in distinguishing lesions that are confined to enamel from lesions involving both enamel and dentin.

The members of our profession have recognized the need to minimize radiation exposure. Additional research into the use of devices such as reported here further will aid in reducing x-ray exposure to the patient.

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