



American Dental Association
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DENTAL

X-Ray

Examinations



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Answers to Common Questions



Dental x-rays, or radiographs, can provide important information about your oral health. They help your dentist examine the underlying bone, the roots of the teeth or unerupted teeth, as well as the contact areas where teeth touch one another.

In some cases, dental radiographs can uncover a condition at an early stage before you experience any signs or symptoms that something is wrong.

Some people, however, have questions about the need for dental x-ray examinations and whether there is any health risk associated with them. This booklet will answer these questions and will describe some common radiographs used in dentistry.



What are x-rays?

X-rays are a form of radiation that can penetrate many materials, including bone and soft tissue. X-rays can be used to create an image called a radiograph by placing the area that needs to be examined between an image receptor (i.e. film or a digital sensor for computerized images), and an x-ray machine. This allows physicians and dentists to obtain a picture of structures beneath the body's surface.

How do x-rays work?

When a radiograph is taken, more x-rays are absorbed by dense tissues (such as teeth and bone) than by soft tissues (such as the cheeks and gums) before striking the film or sensor. This creates an image that can be viewed on conventional film or on a computer as is the case for digital radiographs. Bony structures, like teeth, appear lighter because fewer x-rays reach the film or sensor. Soft tissues appear darker because more x-rays pass through to the film or sensor.

Are dental x-rays safe?

The principal concern from exposure to small doses of x-rays is the risk of developing cancer many years after exposure. While the risk of radiation-related cancer is difficult to measure, it is believed that small amounts of x-rays are related to small risk.

Dental x-ray examinations involve very low doses of radiation, which makes the risk of harmful effects extremely small. One measure of radiation is the effective dose, which estimates the overall risk of radiation-related biologic damage. The effective dose of radiation associated with four bitewing radiographs is generally no more than 20 microsieverts (μSv), for example, and can be as low as 5 μSv if sensitive film and small x-ray beam sizes are used. (A bitewing radiograph shows the crowns of several upper and lower teeth on one small image.)

By comparison, a chest x-ray has an effective dose of approximately 40 μSv ; radiographs of the spine can be as high as 2,000 μSv , and CT scans can result in doses of more than 7,500 μSv . Dental x-ray exams are therefore associated with exposures much lower than those we routinely accept in medical care.

Dental x-ray doses are comparable to environmental radiation levels. An airplane flight at 39,000 feet is associated with an exposure of about 5 μSv per hour. This means the exposure during a set of four bitewing radiographs is roughly equivalent to a flight of four hours or less. People receive approximately 8 μSv of naturally occurring background radiation each day, so the radiation from bitewing radiographs is equivalent to no more than 2 or 3 days of natural radiation. In view of this, dental x-rays contribute very little to a person's total radiation exposure from all sources.

Even though radiation risk is minimal, dental x-ray equipment and techniques are designed to limit the body's exposure to radiation. Some steps your dentist can take to reduce patient dose during an examination include:

- limiting the size of the x-ray beam to that of the film or digital sensor
- using a leaded apron and thyroid shield
- using the fastest speed (most sensitive) film (E or F speed group)

Although the risk of any harmful effects is small, dental x-ray examinations should be conducted only when the results are likely to benefit the patient.



What are the benefits of a dental x-ray examination?

Many diseases of the teeth and surrounding tissues cannot be seen when your dentist examines your mouth. An x-ray exam may reveal, among other things:

- small areas of decay in the teeth and below existing restorations
- diseases of the bone
- abscesses or cysts
- signs of periodontal (gum) disease
- developmental and other abnormalities
- some types of tumors
- evidence of trauma
- evidence of systemic illnesses



Bitewing

This x-ray shows decay between the teeth (proximal decay).



Periapical

This x-ray shows an impacted molar.



Panoramic

This x-ray shows unerupted developing teeth.

Types of Dental Radiographs

Bitewing Radiograph

A bitewing radiograph shows the crowns of several upper and lower teeth on one small image. Images of this type are especially useful for showing tooth decay between the teeth and changes in the underlying bone caused by periodontal (gum) disease.

Periapical Radiograph

A periapical radiograph shows several teeth including the crowns, all of the roots and some of the surrounding tissue and bone on one small image. A periapical image can show many types of disorders, including teeth that are impacted (blocked from erupting), fractures, abscesses, cysts, periodontal disease, tumors, and characteristic bone patterns of some systemic diseases (diseases of the whole body).

Complete-Mouth Series

This is a series of bitewing and periapical radiographs that shows all the teeth, roots and related areas of the jaws. A complete-mouth series may consist of as few as 14 or as many as 21 images. The number of images needed depends on several factors, including the size and shape of the mouth and the technique used.

Panoramic Radiograph

A panoramic radiograph shows all the upper and lower teeth, large portions of the jaws, and other structures, on one large image. It is often used to visualize unerupted or impacted teeth, cysts, retained root fragments, fractures and other conditions of the jaws, but is not as good as bitewing or periapical radiographs at detecting decay or periodontal disease because it lacks the sharpness of these images.

Digital Radiograph

All of the above images can be acquired digitally. With digital radiography, a sensor (rather than film) is positioned at the area to be examined. The electronic image collected by the sensor can be saved to a computer, where it can be viewed on the screen, stored in a patient's computer file, and if necessary, transmitted electronically to an insurance carrier or another dental office.

How often should I have dental x-ray examinations?

Like any other aspect of your dental treatment, dental x-ray examinations are scheduled on an individual basis. Dental x-rays are prescribed for each patient after the evaluation of the patient's needs, including review of the patient's health history, assessment of the patient's clinical dental history, completion of a clinical examination, evaluation of the patient's susceptibility to dental diseases, and examination of previous radiographs when available. Based on this information the dentist can determine if radiographs are needed.

If you are a new patient, the dentist may wish to see radiographs from previous dentists or recommend a complete-mouth series of radiographs to determine the status of the hidden areas of your mouth and to help analyze changes that may occur later.

The schedule for radiographs on recall visits varies according to age, risk for disease, and signs and symptoms of disease. New images may be needed to identify whether there is any decay present, assess the severity of periodontal (gum) disease, or evaluate the status of growth and development. Children may need x-ray examinations more often than adults because their oral structures are growing and changing and because of their risk of tooth decay. Radiographs can help your dentist chart the progress of this growth and development and see if permanent teeth will erupt normally.

Why do the dentist and other members of the dental staff leave the room when they take x-rays of my teeth?

If a dentist or other members of the staff did not leave the room or stand behind a barrier, they would be exposed to radiation many times a day. Although the amount of radiation they would receive each time is quite small, each exposure adds to the previous exposures. Any unnecessary exposure to radiation is not considered prudent.

If I'm pregnant, or think I may be pregnant, should I ask that x-rays be postponed?

Tell your dentist that you might be pregnant. Some dental treatment, including the radiographs needed for diagnosis and treatment, may be postponed until your baby has been delivered. However, dental disease left untreated during pregnancy can lead to problems for both the mother and the fetus, and dental x-rays may be required for diagnosis and management. A leaded apron and thyroid collar are used when pregnant dental patients receive x-rays. They help protect the patient's thyroid and abdomen.

If you are concerned about the effect any drug, dental treatment or x-ray might have on your pregnancy, discuss your concerns with your dentist and physician. Both are concerned about you and your child's health. Also, inform the dentist or physician about any radiographs that were recently acquired and discuss the availability of previous radiographs should they be needed in planning or following up on your treatment.

If I've had radiation therapy for cancer of the head or neck, should I avoid dental x-rays?

The dose of radiation required for dental x-ray examinations is extremely small compared with that used for radiation therapy. Radiation used in cancer therapy may increase your susceptibility to diseases, such as tooth decay. It's important to have x-ray examinations as needed to detect oral problems at an early stage so that potential sources of dental infection can be eliminated or managed in a timely fashion.

If I change dentists, can I have my previous x-ray films or x-ray images sent to the new dentist?

Although the dentist who treated you in the past is generally considered the owner of your records (including radiographs), arrangements usually can be made to have copies sent to your new dentist. The ADA's guidelines recommend transfer of radiographs to avoid unnecessary exposure.

What scientific groups and governmental agencies advise dentists about x-rays?

Many organizations have developed recommendations or regulations on the proper, safe and effective use of x-rays in dentistry, including the U. S. Food and Drug Administration's Center for Devices and Radiological Health, the American Academy of Oral and Maxillofacial Radiology, and the National Council on Radiation Protection and Measurements.

Individual state governments also have regulations regarding the use of x-radiation and x-ray equipment. By following these recommendations and regulations, dentists can obtain the diagnostic information they need to effectively treat patients (maximum benefit) with the least possible exposure (minimum risk).