Dental X-Ray Examination
Your dentist's advice.
ADA

You may be concerned when your dentist tells you that and X-ray exam is needed. You may wonder whether it is really necessary, how you can benefit from it and whether or not there will be any risk to your health. This booklet provides brief, direct answers to these and other questions frequently asked about dental X-ray examines

What are X-rays?

X-rays are a form of radiation that can penetrate many materials, including human bone and soft tissue. Since X-rays can also expose photographic films, they have become very important to both dentistry and medicine. People often use the word "X-ray" to mean pictures made with z-rays. The proper term for an X-ray film, or "picture," is a radiograph.

How do X-rays work?*

When X-rays pass through your mouth during a dental z-ray exam, more X-rays are absorbed by the more dense body parts (such as teeth and bone) than by the soft tissues (such as cheeks and gums) before striking the film. This creates the image on the radiograph. Structures such as teeth appear lighter because fewer X-rays penetrate to reach the film. Other areas, including cavities and periodontal (gum) disease, appear darker because more X-rays penetrate to reach the film. There is a whole range of shades of gray depending on the structures between the X-ray machine and the film. The interpretation of these X-ray pictures allows the dentist to detect hidden abnormalities.

**Source: "Get the Picture on Dental X-Rays," US Department of Health and Human Services, Bureau of Radiological Health (HFX-28)*

What is the benefit of an X-ray examination?

Many diseases of the teeth and surrounding tissues cannot be seen when your dentist examines your mouth clinically. An X-ray exam may reveal the presence of small cavities between the teeth, infections in the bone, abscesses, cysts, developmental abnormalities and some types of tumors. A failure to diagnose and treat these conditions before obvious signs and symptoms have developed can threaten your oral and general health. Finding and treating dental problems at an early stage can save time, money and unnecessary discomfort. If you have a hidden tumor, early diagnostic X-rays can even help save your life.

What is a bitewing radiograph?

A bitewing radiograph shows the crowns of several upper and lower teeth on one small film (Figure 1). Films of this type are especially useful for showing cavities between the teeth and changes in bone caused by gum disease.

What is a periapical radiograph?

A periapical radiograph shows several entire teeth, including the crowns and all of the roots and some of the surrounding tissues on one small film (Figure 2). A periapical film can show many types of disorders, including teeth that are blocked from erupting (impacted teeth) fractures, abscesses, cysts, tumors, and the characteristics bone patterns of some systemic diseases (diseases of the whole body).

What s a full-mouth series of bitewing and periapical radiographs?

This is a series of bitewing and periapical films that show all of the teeth, the roots, and related areas of the jaws (Figure 3). The number of films needed depends on many factors, including the size and shape of the mouth and the technique used. Generally, at least 18 films are needed, but a full-mouth series may consist of as few as 14 or as many as 21 films.

What is a panoramic radiograph?

A panoramic radiograph shows all the upper and lower teeth, large portions of the jaws and other structures on one relatively large film (Figure 4). It is often used to find unerupted or impacted teeth, cysts, retained root fragments, fractures and other conditions of the jaws.

How often should I have dental X-ray examinations?

This depends on the patient's individual health needs. It is important to recognize that just as each patient is different from the next, so should X-ray exams be individualized for each patient. Your dentist will review your history, examine your mouth and then decide whether you need radiographs and what type. If you are a new patient, the dentist may recommend radiographs to determine the present status of the hidden areas of your mouth and to help analyze changes that may occur later.

The schedule for needing radiographs at recall visits vary according to your age, risk for disease and signs and symptoms. New films may be needed to detect new cavities, or to determine the status of gum disease or for evaluation of growth and development. Children may need X-ray exams more often than adults. This is because their teeth and jaws are more likely to be affected by dental caries (tooth decay) than those of adults.

How is X-radiation measured?

When human tissue or other materials are exposed to X-rays, some of the energy is absorbed and some passes through without effect. The amount of energy absorbed by this is the dose. The does is often measured in rads. Another unit of measurement, the rem, is used to compare the biological effects of different kinds of radiation.

In modern diagnostic dental X-ray procedures, the exposure and dose are usually so small that they are expressed in "milli" units – that is, units that are equal to one-thousandth of a rad, or rem.

How much radiation is involved in a dental X-ray exam?

A new analytical method, involving calculations of the effective dose equivalent, allows comparisons of different types of radiation. Environmental exposures may be compared to exposure from dental X-ray exams. Using state of the art technology, a full mouth X-ray examination of 21 films will deliver an effective dos equivalent of approximately 13 mrem. This is equivalent to approximately 16 days of exposure to naturally-occurring environmental radiation.

For purposes of comparison it is useful to know that according to federal and most state regulations, persons whose occupations involve some exposure to radiations are permitted to receive up to 5,000 mrem of whole body radiation per year.

Do people receive radiation from sources other than medical and dental X-ray exams?

Yes, people are exposed to natural background radiations all their lives. This radiation comes mainly from naturally radioactive substances (mostly radon) but also from outer space in the form of cosmic radiation.

Although the amount of this exposure varies greatly in different geographic areas, it has been estimated that the average person receives about 300 millirem (mrem) of radiation every year from the natural environment.

What effects can X-rays have on the body?

Scientists have known for some time that exposure to very large amounts of x-radiation is harmful. Changes can occur in the reproductive system, altering the genetic material that determines the health of future generations. Large amounts can also cause other changes in the tissues of the body, including the possibility of cancer.

On the other hand, diagnostic procedures involve very low doses. With modern techniques and equipment, the amount of radiation received in a dental exam is minuscule. Also only a small part of the body is exposed (approximately the region corresponding to the side of the film). Therefore, the risk of harmful effects from dental X-ray exams is also extremely small, including the risk of developing cancer. This risk, however small, dictates that dental X-ray exams should be conducted only when their results are likely to benefit the patient.

Why do the dentist and other member of the dental staff leave the room when X-ray exposures are made?

If a dentist and other member of a dental staff did not leave the room or stand behind a barrier, they would be exposed many times a day to radiation. Although the amount of radiation they would receive each time is quite small, over a long period of time they would receive a needless dose that provides no benefit to them.

If I am pregnant or think I may be pregnant, should dental X-ray exams be postponed?

No. Those X-ray exams in which a fetus or embryo would be in, or near, the primary X-ray beam should be avoided. Since dental X-ray exams are limited to the head and neck region, it is unlikely that the developing baby receives any detectable radiation.

If I have had radiation therapy for cancer of the head or neck, should I avoid an X-ray exam?

No. The dose of radiation required for dental X-ray exams is extremely small compared to that use for radiation therapy. The effects of very high doses involved in therapeutic radiation may increase your susceptibility to diseases, such as tooth decay, for example. This can occur as a result of a decrease in secretions of the salivary glands. It is especially important for you to have X-ray exams as needed, to detect problems at an early stage.

Does my dentist take special precautions to minimize the amount of radiation I receive?

There are several ways your dentist can minimize the amount of radiation that you receive. Your dentist should take only necessary radiographs, use the fastest type o X-ray film, use equipment that restricts the beam to the area that needs to be examined, use the lead apron and thyroid shield when appropriate, and finally, develop films according to the manufacturer's recommendations.

Should I have my previous X-ray films sent to my new dentist?

Yes, if possible. These radiographs can reveal your previous disease activity, the progression of disease, and the results of prior treatments, and they may assist in determining the need for a new X-ray exam. Although the dentist who treated you in the past is generally considered the owner of your records, including your X-rays, arrangements can usually be made to have X-rays duplicated and sent to your new dentist. You should contact your former dentist and request that this be done.

What scientific groups and governmental agencies advise dentists concerning the use of X-radiation?

The Center for Devices and Radiological Health of the Food and Drug Administration, the American Dental Association, the American Academy of Oral and Maxillofacial Radiology, the National Council on Radiation Protection and Measurements and many other organizations have developed recommendations on the proper, safe and effective use of X-radiation and X-ray equipment. By following these recommendations and regulations, dentists can obtain the diagnostic information that they need to effectively treat patients (maximum benefit) with the least possible exposure (minimum risk).

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