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Answerto Question #4821 Submitted to "Ask the Experts"

Category: Medical and Dental Equipment/Shielding — Shielding

The following question was answered by an expert in the appropriate field:

Q: I live in California and was surprised when I was NOToffered a lead apron in two recent instances of needing x-rays. The first was for my shoulder at the orthopedist's office. When I asked, I was offered a very small rectangle that I had to decide where to place—over thyroid, breasts, OR gonads. At my podiatrist's office, I requested a lead apron before several foot x-rays and was given an even smaller square, perhaps eight inches square or so. They had nothing larger and the x-rays weren't urgent, so I refused them. Both doctors claimed that no one used anything larger than that which surprised me. I realize that new equipment doesn't give a huge dose (though the podiatrist's equipment looked quite ancient) and x rays of extremities, especially, aren't high risk but I also thought that exposure is cumulative. I'd like to keep it to a minimum. Aren't they required to offer more protection than that? If not, how can I personally get more protection? Also, why don't they protect thyroid and gonads from scatter during routine mammograms?

A: All x-ray machines used for medical purposes must meet stringent Food and Drug Administration (FDA) performance standards before they can be marketed. Part of the standard requires that the x-ray beam must be collimated so that stray radiation, outside of the useful beam, is shielded by a tube housing and collimation system.The useful beam also must be limited to only irradiate the image receptor, either the film or the digital cassette. In addition, most states require that x-ray machines used for medical purposes must be periodically inspected by a qualified medical physicist to insure image quality and radiation safety standards.
Radiation levels outside of the direct beam are very small and do not constitute a radiation hazard. Consequently, wearing a lead apron in the cases you described would provide little extra benefit. The inherent shielding of the x-ray tube housing protects much more than the lead apron would. In dental and podiatry practices, lead aprons are often used to reassure patients that they are protected but, in reality, they provide little additional shielding. Unfortunately, when they are not used, patients often incorrectly assume that they received signify cant radiation exposures to the rest of their body. Inreality, the additional extra radiation your body received is so small that it is dwarfed by the natural radiation levels you receive each day from the sun and naturally occurring radioactive materials. Lead aprons are really designed to protect occupational workers who routinely have to stand close to a patient during fluoroscopic procedures—not for patient-protection purposes. Fluoroscopic procedures involve an x-ray beam that is on for many minutes at a time. Also, occupational personnel are chronically exposed on a daily basis to x-rays scattered during these fluoroscopic procedures and lead aprons are designed help limit this chronic exposure.

In your case, you were exposed to the radiation from a radiographic procedure which has a duration of a fraction of a second and is not performed chronically. However, well-meaning personnel have given leaded aprons to patients, fearful of radiation, to help provide reassurance of safety when, in fact, it is not necessary. The only scenario where it is either required or strongly recommended that a patient be routinely provided shielding is in examswhere the gonads are in the direct x-ray field, such as a pelvic x-ray. Most states require that gonadal shielding be used when it does not interfere with the purpose of the exam. This would not be applicable to a dental exam or foot x-ray.

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