



When gonadal shielding was introduced many years ago, there was a belief that radiation could damage the reproductive cells and lead to infertility. However, this effect has never been observed in humans. In addition, medical imaging technology has improved, requiring far less radiation to produce a diagnostic-quality image. In April 2019, the American Association of Physicists in Medicine (AAPM) issued a position statement recommending that health care professionals limit the use of fetal and/or gonadal shielding for patients receiving x-ray imaging.

Today's x-ray exams are well-collimated, resulting in very little radiation exposure to parts of the body that are not being examined, including to a fetus that is not in the field of view. Some scatter radiation is produced when the x-rays enter the body, but this small amount of radiation comes from within the body and therefore cannot be blocked by a lead apron. Placement of lead shielding can also cause imaging problems, as even a small amount of lead in the image may lead to artifacts that will reduce the diagnostic quality of the image, and may increase the exposure settings (and therefore the dose to the patient) on machines with Automatic Exposure Control (AEC).

The AAPM statement applies to patient fetal and gonadal shielding only. Operators and other health care professionals shall still wear protective shielding when other protective barriers are not present. Eye protection (especially during fluoroscopy) and thyroid protection are also not included in the AAPM statement.

Lead aprons for patients were first recommended in dentistry many years ago when dental x-ray equipment was much less sophisticated and films much slower than current standards. The thyroid gland, especially in children, is one of the most sensitive organs to radiation-induced tumors. Exposure to the thyroid may be unavoidable, since any attempt to shield the thyroid could interfere with the production of a clinically useful image. Thyroid shielding shall be provided for children and should be provided for adults, when it will not interfere with the examination.

Recommendations to Reduce Patient Dose in Dentistry

- The operating potential of intra-oral dental x-ray machines shall not be less than 50 kVp and not more than 100 kVp and should be between 60 and 80 kVp.
- The source-to-image receptor distance should be between 20 and 40 cm.
- Rectangular collimation should be used to restrict the beam to about the size of the film or imaging receptor.
- The fastest speed image receptor for the clinical exam, as determined by the clinician, shall be used.

- Speeds of at least ANSI Speed Group E films should be used for intra-oral radiography.
- High-speed (400 or greater) rare earth screen-film systems should be used for cephalometric and panoramic dental radiographic projections.
- Techniques for digital imaging shall be adjusted for the minimum patient dose required to provide good image quality to meet the purpose of the examination.

Operator Exposure in the Absence of a Barrier at an Existing Facility

- The operator shall remain at least six feet from the x-ray tube head during exposure, or behind a barrier sufficient for the type of x-ray machine in use.
 - If a distance of six feet cannot be maintained, then a barrier such as a lead or lead-equivalent apron shall be provided to the operator.
- Occupationally exposed personnel shall not restrain uncooperative or unsteady patients or hold the image receptor in place during an x-ray exposure.
 - A related member of the public (e.g., a parent) may restrain a patient during exposure if they are provided a lead or lead-equivalent apron.

Care of Lead or Lead-Equivalent Apparel

Lead or lead-equivalent aprons and thyroid collars shall be visually inspected for defects at a minimum of monthly intervals and replaced if they are damaged. Follow manufacturer's instructions for the care of lead-equivalent aprons.

When not in use protective apparel must be hung flat or laid flat. If they are continuously folded or heaped in the corner, cracks and defects can develop.