

## Time to drop the shield?

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Is gonadal shielding really protective? As radiologists, radiation physicists, and radiology technologists, radiation shielding is an entrenched practice for us. However, an article<sup>2</sup> recently published in the *American Journal of Roentgenology* highlighted “the folly of continued use” of gonadal shielding, a position subsequently endorsed by the American Association of Physicists in Medicine (AAPM)<sup>3</sup> and later by the American College of Radiology, the Canadian Organization of Medical Physics, and the Health Physics Society. Perhaps not surprisingly, this reversal of long-standing conventional wisdom has generated considerable discussion.

Patient shielding was introduced in the 1976 U.S. Code of Federal Regulations as a technique to reduce germ line mutations that might have long-term hereditary consequences. Reducing the stochastic (oncogenic) effects of radiation were not considered in this recommendation. However, as the authors of the *AJR* article point out, no hereditary effects of medical radiation have ever been observed in humans. Furthermore, they point out that the stochastic effects of radiation are still not fully understood but that epidemiologic studies do not support the linear no-threshold model at doses < 100 mSv.

The authors also make other valid arguments against gonadal shielding. Extensive technological improvements in diagnostic imaging have substantially reduced dose levels since 1976. Most radiation exposure outside the primary x-ray beam is from scatter within the patient, which is not preventable by shielding. Gonadal shields are frequently positioned incorrectly for both girls and boys. The shields may obscure relevant anatomy, which increases repeat rates and has the potential to conceal pathology. Finally, automatic exposure control carries the risk of increasing patient dose if the gonadal shield is placed within the path of the x-ray beam.

Patients and their families have come to expect gonadal shielding for their imaging studies and managing their expectations can prove as challenging as changing our own behavior—especially difficult in the context of ongoing media commentary about the excessive use and the dangers of medical radiation. Pre-emptive education is crucial. Before we discontinued the routine use of gonad shielding at our institution, we provided radiology technologists and non-radiology health care personnel with explanatory talking points about why we were changing our practice. We do not force compliance on anxious patients and families who insist on continuing to use the shields. Recall that radiology departments experienced similar turmoil in the past when bismuth shields were discontinued for CT—but this change was eventually accepted after we continued to provide fact-based information to patients.

The AAPM and the National Council on Radiation Protection and Measurements (NCRP) have formed committees to develop formal practice guidelines for gonadal shielding. Meantime, the FDA’s Center for Devices and Radiological Health has proposed a repeal of the 1976 recommendation.<sup>4</sup>

There does appear to be ample scientific evidence to finally drop the shield.

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<sup>2</sup>Marsh RM, Silosky M. Patient shielding in diagnostic imaging: Discontinuing a legacy practice. AJR 2019; 212: 755-757

<sup>3</sup> AAPM Position Statement on the Use of Patient Gonadal and Fetal Shielding. American Association of Physicists in Medicine, 2019

<sup>4</sup> McCollough CH. An open letter to the x-ray imaging community from the American Association of Physicists in Medicine (AAPM). American Association of Physicists in Medicine, August 19, 2019