

Background

The International Commission on Radiological Protection (ICRP) considers the gonads to be a radiosensitive organ for heritable effects. Dose minimisation measures should therefore be employed to reduce dose to the gonads to as low as reasonably practicable (ALARP) in all diagnostic radiology examinations.

One method of achieving this is through the use of gonad shields. Gonad shields are made of high density materials (e.g. lead) and protect underlying tissues by attenuating the beam to reduce local dose.

It has been shown that the use of gonadal shielding in males can reduce dose to the gonads by 95% when the gonads are in the direct beam.

The main drawback of using shields is that they can have a serious impact on image quality and may obscure important information for diagnosis.

What do the guidelines say?

The ICRP recommendations state that:

“The gonads of individuals with reproductive potential should be protected if they are within the primary beam or within 5cm¹ of it, and if the shielding does not exclude important diagnostic information or interfere with the study.”

Implementing this in practice

Females

The effectiveness of shielding depends on the ability of the radiographer to accurately position it and this is a known problem for women. The location of the ovaries is variable and not well defined, making it very difficult to shield correctly. It is RPC's recommendation that gonad shields should not be used for examinations on women, as incorrect placement may make them ineffective. Additionally, in most cases, the area around the ovaries is diagnostically important and shielding may mask important pathology.

Conventional Radiography

Gonad shielding may be indicated for use in conventional radiography when the gonads are in the primary beam or within 5cm of it, **but only when it does not interfere with the radiographic diagnosis**. Shielding can negatively affect automatic exposure control function and can drastically increase X-ray output when positioned in front of the AEC chambers, increasing dose as well as degrading image quality. In practice, use of gonad shielding is often only possible in males and if there is a **prior image to aid positioning**. There is typically no reason to include the male gonads within the primary radiation field for radiographs of the abdomen or lumbar spine.

Computed Tomography

RPC advise against the use of gonad shields for CT examinations. In most situations, proper field size limitation and appropriate tube current modulation can result in significant overall reductions in doses without gonad shielding, which could have a negative effect on image quality. Shielding may increase radiation dose as the tube current modulation system detects the increased attenuation of the shield and increases the dose to compensate.

¹ Beyond 5cm the gain has been shown to be negligible.

Fluoroscopy

Gonad shields are not indicated for use in fluoroscopy. Instead, if possible, the beam should be angled away from the gonads and collimated so that they are out of the field.

Summary of Advice

- Gonad shielding should only be used for men.
- Shielding is only indicated when the gonads are within the primary beam or within five centimetres of it for plain radiography.
- Shielding must never be used when it will interfere with the automatic exposure control as it can dramatic increase overall patient exposure.
- Shielding should only be used when it will not obscure relevant anatomy e.g. if there is an existing image to facilitate positioning.
- Gonad shielding is not indicated for use in CT or fluoroscopy. For these modalities there are other dose optimisation procedures that should be followed as part of standard practice.

Further Information

We hope you find this information useful. If you would like any additional information or have any concerns, please contact the Radiological Protection Centre (see details below). Further reading and guidance can also be found in:

ICRP, 1982. Protection of the Patient in Diagnostic Radiology. ICRP Publication 34. Ann. ICRP 9 (2-3).
ICRP, 2013. Radiological Protection in Paediatric Diagnostic and Interventional Radiology. ICRP Publication 121. Ann. ICRP 42(2).

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Advice on Best Practice

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