

Ask EuroSafe Imaging Tips & Tricks

Interventional Radiology Working Group

Interventional procedures and radiation dose - What the patient should know

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Background

- ❑ It is very often that patients are anxious about radiation.
- ❑ This is logical and becomes more important when it comes to interventional procedures.
- ❑ Patients wish to know the exact amount of radiation dose they received during an X-ray examination.
- ❑ Patients sometimes consider rejecting an X-ray exam if the benefit is not obvious to them.

What are the potential consequences of radiation exposure?

It depends on the dose level.

There are two types of somatic radiation effects:

- Stochastic
- Deterministic

STOCHASTIC EFFECTS



They have no known threshold.

E.g. Cancer is a stochastic effect.

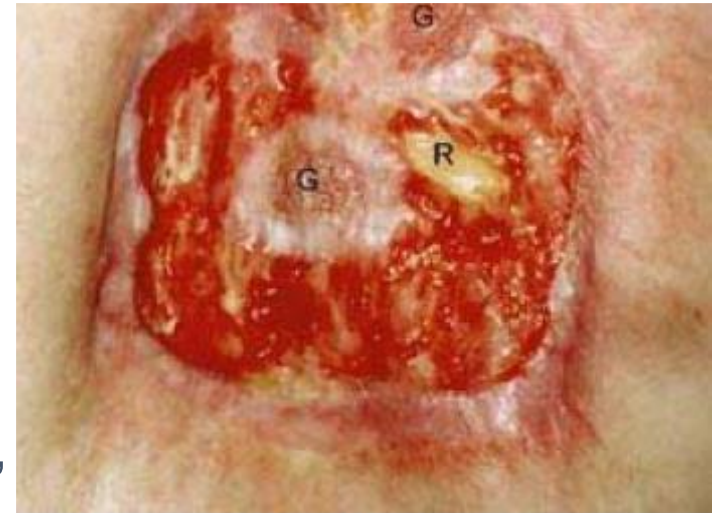
Such effects may take years to develop and we are currently unable to distinguish between a cancer that is radiation-induced and one that is not.

DETERMINISTIC EFFECTS

They result from high radiation doses.

- ❑ They have a threshold dose before any effect appears.
- ❑ The injury increases in severity as dose increases.

Effects include cataracts, reddening of the skin, burns, hair loss, blood changes, temporary or permanent sterility, nausea, diarrhoea, CNS damage, death.



Wagner LK, McNesse MD, Marx MV, Siegel EL. Severe skin reactions from interventional fluoroscopy: case report and review of literature. Radiology 1999;213:773-776

Deterministic radiation injuries following angioplasty have been reported since the early 1990s.

Procedures with **potentially** high radiation dose and possible deterministic effects:

- Vascular embolization
- Stent and filter placement
- Thrombolytic and fibronolytic procedures
- Percutaneous transhepatic cholangiography
- Endoscopic retrograde cholangio-pancreatography
- Percutaneous nephrostomy, biliary drainage
- Urinary / biliary stone removal
- Cardiac interventional procedures

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Frequency of major radiation injuries

Based on 10 injuries reported every year in the USA from nearly 10 million interventions:

This means:

1:100.000 procedures

Miller DL, Balter S, Schueler BA, et al. Clinical radiation management for fluoroscopically guided interventional procedures. *Radiology* 2010; 257(2): 321-332.

Higher risk patients

There are biologic factors, that increase sensitivity and hence potential for skin reactions:

- Diabetes mellitus
- Systemic lupus erythematosus
- Scleroderma
- Mixed connective tissue disease
- Drug interactions

Remember



- ❑ An interventional procedure often replaces a more invasive surgical procedure.
- ❑ Skin injuries are preventable in most situations with proper choice of technique.
- ❑ Skin reactions appear usually about 3-4 weeks time after the interventional radiology procedure.

After a high radiation dose procedure:

- ❑ You should be advised about the areas on the skin where erythema or other skin reaction might develop.
- ❑ You should be asked to examine yourself until about 2-4 weeks after the procedure for any skin changes in those areas.
- ❑ Some facilities place a follow-up call to the patient during this time to query about any skin irritation. In case they do not call, you can call the facility to inform them about any strange skin effect.

IMPORTANT: Do not seek medical help at a place where there may be a chance of missing the correct diagnosis.

In case of a reaction:

- Do not itch
- Do not scratch
- Report finding to physician



In the unlikely event that you have an erythema:

- It is better to see a dermatologist.
- The dermatologist must be contacted from the interventional radiologist, advising him or her on the procedure.
- Depending on the clinical situation the dermatologists takes an action.

Have paediatric patients high risk of injury?

- ❑ No studies have reported radiation skin injuries in paediatric patients.
- ❑ However, these patients undergo often a substantial number of interventional procedures, so Peak Skin Dose should be monitored.

Summary



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- ❑ Skin injuries are preventable in most situations with proper choice of technique.
- ❑ Skin reactions appear usually about 3-4 weeks time after the interventional radiology procedure.
- ❑ In case of a reaction: do not itch, do not scratch but report finding to physician.
- ❑ In the unlikely event that you have an erythema, it is better to see a dermatologist who will be contacted from the interventional radiologist, advising him or her on the procedure.