We see the risk

30 – 50% of Interventionists develop lens opacities if working without eye protection. Recent research findings indicate a significant risk of developing lens opacities (cataracts) as a consequence of occupational exposure experienced by medical professionals performing fluoroscopically-guided interventions.

In a recent study conducted at a medical congress, posterior subcapsular lens changes characteristic of ionising radiation exposure (see Fig. 1) were found to be prevalent amongst interventionalists.

A real health risk. The Interventionists with detectable opacities had been exposed to a significantly higher estimated cumulative lens radiation dose over the course of their careers (9.3 Gy ± 5.4) than those without (3.0 GY ± 2.9). The severity of lens opacification was also found to correlate with the absorbed dose (see Fig. 3).

Far from being harmless, these opacities are particularly associated with decrements in contrast sensitivity (see Fig. 4a,b) and may be associated with greater future visual disability.

Fig. 1: Subcapsular posterior cataract, noted after 22 years of work in a catheterisation laboratory. Arrow shows a 1.5 opacity.

Fig. 2: Lead aprons, personal dosimetry and protective goggles are essential protective tools for the Interventionist.

ICRP & EU: new limit for occupational exposures

In 2011 the International Commission on Radiological Protection (ICRP) brought attention to the fact that tissue reaction effects can occur following lower exposures than previously thought: 0.5Gy, averaged over 5-year periods, during which no single year may exceed 50mSv. The European Union has set to enshrine this limit in an upcoming radiation protection directive.

Accordingly, the ICRP has recommended a new occupational exposure limit of 20mSv per year, depending on the protection used.

If conscientious protection of the eyes involving mounted shields, goggles and personal dosimetry is observed, IRs can easily manage to stay below the newly recommended occupational exposure limit of 20 mSv per year, even when performing frequent high dose procedures.

Fig. 3: Correlation between the severity of lens opacities and cumulative occupational radiation dose over an Interventionist’s work life.

Don’t take the risk

How can I avoid radiation-induced lens injury? Interventional radiologists must take particular care of their eyes, due to their regular performance of high-dose procedures.

Up-to-date training, conscientious use of protective tools and careful dosimetry to evaluate lens dose must be pursued to maintain the health and functionality of the eye.

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5 points that will keep your eyes safe

2. Observe radiation protection standards of practice: occupational recommendations published by scientific medical societies should be followed.
3. Use the appropriate radiation protection tools: in particular ceiling suspended screens (in correct position), mounted table shielding and protective eyewear.
4. Use personal dosimeters: one under the lead apron and a second over the apron to be able to estimate eye dose.
5. Regularly have your eyes examined: a full ophthalmologic check with a detailed slit lamp examination of the posterior lens region is recommended.

Fig. 4: Contrast sensitivity measured for an individual with normal contrast sensitivity. The curve (solid line) matches the curve of the hypothetical normal contrast sensitivity function (dotted line).

Fig. 5: Average eye lens dose (in microSv) according to procedure and protection tools used

An avoidable risk. Is adequate protection achievable?

Fig. 6 shows an estimation of the number of procedures required to reach the newly proposed annual limit of 20 mSv per year, depending on the protection used.

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Only if you stay below this limit can you reduce the health risk to your eyes to an acceptable minimum according to the current scientific status quo.

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