

Med Princ Pract 2015;24:299

DOI: [10.1159/000380911](https://doi.org/10.1159/000380911)**Radiation Protection in Cardiovascular Interventions: What Can We Do?**

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Dear Editor,

Over the last 20 years, interventional technology has expanded significantly, both in the field of diagnosis and therapy. Because of the obvious benefits to patients, most of these interventions are performed under fluoroscopic guidance. Interventional cardiologists who operate the X-ray unit during fluoroscopically guided procedures are required to be present in the room and are routinely and chronically exposed to ionizing radiations [1]. A strong body of evidence has shown that interventional cardiologists receive the highest radiation dose among all other medical staff exposed to X-rays [2, 3]. Furthermore, reports have revealed that such exposure could be a risk of malignancy and skin injury for interventional cardiologists [4, 5], which creates a major public health burden. From the public health perspective, the issue of occupational radiation protection is important. Therefore, any effort to optimize radiation safety is strongly encouraged.

Recently, at the American Heart Association (AHA) 2014 Scientific Sessions, a prospective randomized trial by Christopoulos et al. [6] showed that interventional cardiologists who wore a novel radiation-monitoring device were able to decrease their radiation exposure by one third. Overall, the fluoroscopically guided procedures lasted a median of 27 min. Diagnostic angiography lasts a median of 17 min and percutaneous coronary intervention lasts a median of 42 min [6]. The Bleeper device produces a 'bleep' sound every 15 min in response to normal background radiation. By using the radiation-monitoring device, operators closest to the patient (first operators) were able to lessen their radiation exposure by 36%, while assistants who were farther from the patient (second operators) were able to lessen their radiation exposure by 29% [6]. Furthermore, the authors identified which factors predicted a high operator radiation exposure during cardiac catheterization. The results showed that radial access and chronic total occlusion interventions were associated with a high first operator radiation exposure. The pooled estimate of multivariate ORs was 6.62 (95% CI: 3.13–14.76) and 5.53 (95% CI: 1.73–20.71). However, real-time radiation monitoring and the use of a radioabsorbent drape modestly decreased the risk of first operator radiation exposure. The pooled estimate of multivariate ORs was 0.33 (95% CI: 0.19–0.57) and 0.38 (95% CI: 0.18–0.77).

Prior studies revealed that the transradial approach was associated with a higher radiation dose absorbed by interventional cardiologists [7, 8]. This was probably related to the more complicated catheter manipulation requiring a prolonged fluoroscopic

time and a less favorable operator position closer to the X-ray source, especially for less skilled operators [9]. In spite of this, the magnitude of the radiation absorbed by operators applying the radial approach is still unclear. A further randomization study for the radial approach is required to compare transfemoral, right transradial and left transradial access.

What can we do for occupational radiation protection? The following recommendations should be considered: (a) faster and safer radiation detection devices are necessary to identify instant and cumulative radiation doses during a certain procedure; (b) large prospective randomized trials are needed to explore which radial approach is associated with lower radiation doses absorbed by interventional cardiologists, and (c) as the European Society of Cardiology Association (ESCA) suggested, interventional cardiologists should practice a key principle of radiation protection that 'each patient should get the right imaging examination, at the right time, with the right radiation dose' [10].

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