Radiation Exposure Bibliography

1- SCAI consensus document on occupational radiation exposure to the pregnant cardiologist and technical personnel. Best PJ, Skelding KA, Mehran R, Chieffo A, Kunadian V, Madan M, Mikhail GW, Mauri F, Takahashi S, Honye J, et al. *Catheter Cardiovasc Interv. 2011 Feb 1; 77(2):232-41.*

Concerns regarding radiation exposure and its effects during pregnancy are often a barrier preventing many women from pursuing a career in Interventional Cardiology. This article aims to provide a guide by describing the risk of radiation exposure to pregnant physicians and cardiac catheterisation personnel, to educate on appropriate radiation monitoring and to encourage mechanisms to reduce radiation exposure.

2- Practical ways to reduce radiation dose for patients and staff during device implantations and electrophysiological procedures. Heidbuchel H, Wittkampf FH, Vano E, Ernst S, Schilling R, Picano E, Mont L; Reviewers : Jais P, de Bono J, Piorkowski C, Saad E, Femenia F. *Europace. 2014 Jul ;16(7):946-64.*

After an introduction on how to quantify the radiation exposure and defining its current magnitude in electrophysiology compared with the other sources of radiation, this paper offers some very practical advice on how to reduce exposure to patients and staff: how customization of the X-rays, workflow adaptation and shielding measures can be implemented in the cath lab.

3- X-ray exposure hazards for physicians performing ablation procedures and device implantation: results of the European Heart Rhythm Association survey. Marinskis G, Bongiorni MG, Dagres N, Lewalter T, Pison L, Blomstrom-Lundqvist C. *Scientific Initiative Committee, European Heart Rhythm Association. Europace. 2013 Mar;15(3):444-6.*

The purpose of this survey was to evaluate physician's and authorities policies and clinical practices when using occupational X-rays during ablation procedures and device implantation. It shows infrequent use of lead gloves, radiation absorbing pads and lead glass cabins, but increasing use of three-dimensional mapping systems to decrease X-ray radiation hazards.

4- Occupational exposure in the electrophysiology laboratory: quantifying and minimizing radiation burden. Theocharopoulos N, Damilakis J, Perisinakis K, Manios E, Vardas P, Gourtsoyiannis N. *Br J Radiol. 2006 Aug ;79(944):644-51.*

The aim is to provide accurate and applicable data on occupational doses to the electrophysiology laboratory personnel. The study has shown that a procedure requiring 40 min of fluoroscopy yields a maximum effective dose of 129 microSv. A conservative estimate of the electrophysiologist's annual maximum permissible workload is 155 procedures. Radiation levels in the electrophysiology room are not negligible. Mitigation of occupational exposure is feasible through good fluoroscopy and working practices.

5- 2012 American College of Cardiology Foundation/Society for Cardiovascular Angiography and Interventions Expert Consensus Document on Cardiac Catheterization Laboratory Standards Update: A Report of the American College of Cardiology Foundation Task Force on Expert Consensus Documents. Bashore TM, Balter S, Barac A, et al. *J Am Coll Cardiol.* 2012;59(24):2221-2305.

Point 9.2 of the consensus focus on radiation risks, dosimetry and methods to minimize exposure both for patients and staff.

6- ICRP (International Commision for Radiation Protection). ICRP Publication 105. Radiation protection in medicine. Ann ICRP. 2010.

Tis report addresses medical exposure of patients and the proper application of the fundamental principles. The emphasis is on the optimisation of radiological protection in diagnostic and interventional procedures and it was written with the intent of communicating directly with the relevant medical practitioners and supporting medical staff.

7- Radiation safety program for the cardiac catheterization laboratory. Chambers CE. *Catheter Cardiovasc Interv*. 2011;77:546 –56.

The Society of Cardiovascular Angiography and Interventions present a practical approach to assist cardiac catheterization laboratories in establishing a radiation safety program, including essential personnel, radiation monitoring, protective shielding, imaging equipment, and training/education. A procedure based review of radiation dose management is described including pre-procedure, procedure and post-procedure best practice recommendations. Specific radiation safety considerations are discussed including women and fluoroscopic procedures as well as patients with congenital and structural heart disease

8- Ionizing radiation in cardiac imaging: a science advisory from the American Heart Association Committee on Cardiac Imaging of the Council on Clinical Cardiology and Committee on Cardiovascular Imaging and Intervention of the Council on Cardiovascular Radiology and Intervention. Gerber TC, Carr JJ, Arai AE, et al. *Circulation. 2009;119:1056–65*.

This science advisory from AHA addresses the fact that radiation dose to internal organs (foetus included) cannot be measured directly and that exposure needs to be estimated with generic modelling techniques used to calculate a broad indicator of risk that is not patient-specific. At the end, it gives recommendations on radiation reduction for the health care provider.

9- ICRP. Interventional procedures- avoiding radiation injuries. ICRP Publication 85. Ann ICRP. 2010.

More recommendations from the ICRP to minimize radiation exposure.

10- ICRP Publication 113. Radiological protection education in medicine: an essential but often missing element. *Mettler FA. Ann ICRP. 2009 Oct; 39(5):3-4. Epub 2011 Apr 15.*

This publication sets recommendation on education and training of medical staff (including medical students) and other healthcare professionals in the principles of radiation protection. It provides guidance regarding the necessary radiological protection education and training for use by: 1- health authorities, medical institutions, and professional bodies with responsibility for radiological protection in medicine; 2- the industry that produces and markets the equipment used in these procedures; and 3- universities and other academic institutions responsible for the education of professionals involved in the use of ionising radiation in health care. Advice is also provided on the accreditation and certification of the recommended education and training.