

Evaluation of radiation exposure to physicians during hemodynamic interventional procedures*

Avaliação da exposição dos médicos à radiação em procedimentos hemodinâmicos intervencionistas

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Abstract **OBJECTIVE:** The present study evaluates the dose distribution received by physicians involved in hemodynamic procedures of coronary angiography and coronariography. The influence of some factors such as pulsed or continuous fluoroscopy mode and vein and/or artery access site was investigated. **MATERIALS AND METHODS:** Measurements have been performed with LiF:Mg,Ti thermoluminescent dosimeters placed on seven different sites of the practitioners' bodies: hands, left knee, neck, forehead and chest, under and over the lead apron. Radiation doses for each procedure were evaluated in physicians who had performed 60 coronariography and 30 angioplasty procedures. The thermoluminescent dosimeters were calibrated in the operational quantity personal dose equivalent, $H_p(d)$, at depths of 0.07, 3 and 10 mm. **RESULTS:** The results of the present study demonstrate the significant role played by thyroid protectors and lead aprons for reducing radiation doses received by practitioners. Occupational doses in continuous mode fluoroscopy through brachial access were higher than with pulsed mode fluoroscopy through femoral access. **CONCLUSION:** The present study has demonstrated the necessity of implementing additional protective measures as well as a mechanism of training in radiation protection for physicians involved in interventional cardiologic procedures. **Keywords:** Interventional radiology; Fluoroscopy; Hemodynamic procedures; Radiation protection; Thermoluminescent dosimetry.

Resumo **OBJETIVO:** Este trabalho avalia a distribuição de dose recebida por médicos envolvidos em procedimentos hemodinâmicos de angioplastia coronária e coronariografia. A influência de alguns fatores, como o modo de fluoroscopia pulsado ou contínuo e o local de acesso à veia e/ou artéria, foi investigada. **MATERIAIS E MÉTODOS:** Para esta avaliação foram feitas medições utilizando dosímetros termoluminescentes de LiF:Mg,Ti, posicionados em sete diferentes pontos do corpo dos profissionais: mãos, joelho, pescoço, testa e tórax, por dentro e por fora do avental de chumbo. A dose foi avaliada, por exame, nos médicos que executaram os procedimentos (30 de angioplastia e 60 de coronariografia). Os dosímetros termoluminescentes foram calibrados na grandeza operacional equivalente de dose pessoal, $H_p(d)$, nas profundidades de 0,07, 3 e 10 mm. **RESULTADOS:** Os resultados mostram a importância do uso do protetor de tireóide e avental de chumbo para a redução da dose recebida pelos médicos. As doses dos profissionais que executaram procedimentos por via braquial usando modo contínuo de fluoroscopia foram mais altas do que os que executaram por via femoral e modo pulsado de fluoroscopia. **CONCLUSÃO:** Este estudo mostra a necessidade de medidas adicionais de proteção e a implementação de mecanismos de treinamento em proteção radiológica para os médicos que trabalham com cardiologia intervencionista.

Unitermos: Radiologia intervencionista; Fluoroscopia; Procedimentos hemodinâmicos; Proteção radiológica; Dosimetria termoluminescente.

Silva LP, Maurício CLP, Canevaro LV, Oliveira PS. Evaluation of radiation exposure to physicians during hemodynamic interventional procedures. *Radiol Bras.* 2008;41(5):319–323.

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INTRODUCTION

Interventional radiology involves imaging-guided percutaneous diagnostic and/or therapeutic interventions. Generally, these procedures are performed under local an-

esthesia and/or sedation. Fluoroscopy is utilized for localizing a lesion or site for treatment, monitoring a procedure, and documenting a therapy⁽¹⁾. Radiopaque substances known as contrast means are utilized for visualization of radiotransparent organs or tissues on a monitor display.

These procedures are absolutely justifiable both for patients and health systems, considering that these interventions replace complex surgeries with other simpler medi-

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Received December 9, 2007. Accepted after revision March 5, 2008.