

## Comparison of radiation exposure to the spine interventionalist during fluoroscopically guided procedures

Kazuta Yamashita, Fumitake Tezuka<sup>1</sup>, Kousuke Sugiura<sup>2</sup>, Masatoshi Morimoto, Hiroaki Manabe<sup>3</sup>, DAIKI NAKAJIMA, YASUAKI TAMAKI, Koichi Sairyo<sup>1</sup>

<sup>1</sup>Univ of Tokushima, <sup>2</sup>Tokushima Red Cross Hospital, <sup>3</sup>Tokushima University

### INTRODUCTION:

The fluoroscopic images provide physicians with valuable information that helps determine the appropriate and effective intervention. However, medical staff are exposed to direct and scatter radiation because of the high frequency and long duration of fluoroscopy use and their close proximity to the fluoroscope. Especially the hands are placed close to the field of radiation and may be exposed to ionizing radiation. Fluoroscopically guided spinal procedures have been reported to be a cause for concern due to the radiation exposure to which their operators are exposed. This study directly measured the radiation exposure to the spinal interventionalist during fluoroscopically guided procedures.

### METHODS:

We had quantified radiation exposure sustained by the spinal interventionalist during use of C-arm fluoroscopy with the X-ray source in different positions (under the table and over the table). Seven fresh cadavers were irradiated for 1 minutes with C-arm fluoroscopy using standard x-ray and pulsed x-ray beams. Radiation exposure doses were measured using OSL (Optically Stimulated Luminescence) dosimeters at different simulated areas such as the eye, hand and thyroid gland of the mannequins.

### RESULTS:

The risk of direct and scatter radiation exposure was much bigger in over the table, which increased by more than 80 times and more than 6 times, respectively, compared with that from a position under the table. The radiation exposure doses associated with the use of pulsed fluoroscopy (7.5 times per second) were reduced by approximately 50% for the hand and thyroid gland as compared with those associated with the use of continuous fluoroscopy. The Use of protection gear (e.g. lead goggles and lead gloves) reduced the scatter radiation exposure to approximately 30% for these organs compared with non-protected procedures. Oblique injection technique using forceps reduced to 5% for the hand compared with the normal injection technique.

### DISCUSSION AND CONCLUSION:

Our findings indicated that the cumulative radiation dose measured at the dominant hand may exceed the annual dose limit specified by the International Commission on Radiological Protection. Spinal interventionalists should take special care to limit the duration of fluoroscopy and radiation exposure. In particular, the use of pulsed fluoroscopy, shielding and oblique injection technique can reduce radiation exposure to themselves.

