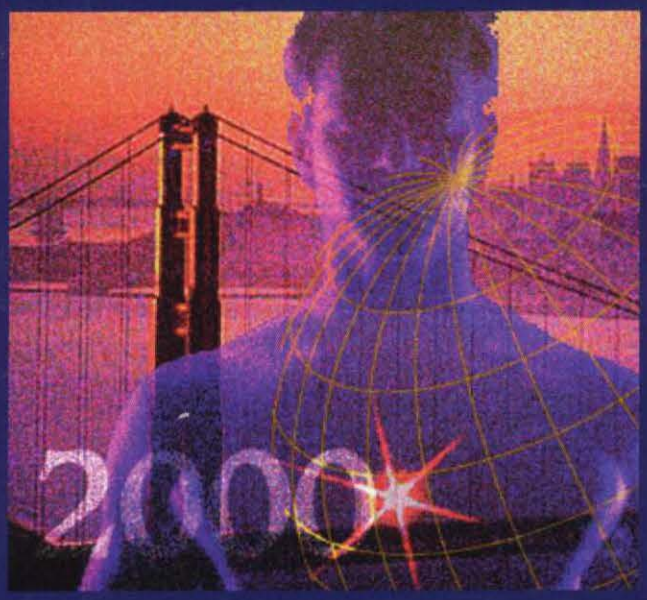
Abstract Book



Worldwide Pain Conference

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Pain and Neuromodulation: The New Millennium

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RADIATION SAFETY: A MUST FOR INTERVENTIONAL PAIN MANAGEMENT PHYSICIANS

C.M. Schade, MD, PhD, PE

INTRODUCTION

The percutaneous placement of spinal cord stimulator electrodes can cause excessive radiation levels for both the patient and the physician. 1,2,3,4 The radiation exposure hazard is made worse by the fact that many C-arms have the capability for high level control fluoroscopy. Synonymous terms for high level control are: 1) fluoro boost, 2) high contrast enhancement, and 3) low noise. The risk of excessive radiation exposure is best appreciated when one realizes that nine minutes of fluoroscopy at high level control is equivalent to a single fraction therapy dose used to treat basal cell carcinoma! 5,6

METHODS

Measurements of scatter radiation were measured at five levels where the surgeon usually stands using a Keithley Model 36100 Ionization survey meter, a 20 cm thick polystyrene patient phantom in the beam and an OEC Diasonic C-arm set at 106 KVp and 3.3 mA with and without 1/8 inch thick lead drapes of two lengths.

RESULTS

Clinically significant reductions in scatter radiation (up to 99%) can be obtained by using lead shielding on the patient and from the table to the floor (see table 1)

Table 1 Surgeons Exposure To Scatter Radiation (mR/HR)

Level No Shielding Lead Drapes

A Lead Drape A: Patient and 12" below the table

Lead Drape B: Patient to floor

CONCLUSIONS

These objective measurements of scatter radiation demonstrate two things: 1) the surgeon can be exposed to dangerous levels of scatter radiation when imaging an average size patient using a typical radiographic technique.7 Be advised that the scatter will be higher as the radiation in the main beam increases! 8 2) clinically significant reduction in radiation exposure to the surgeon is achieved by using lead shielding starting on the patient and extending to the floor.

Schade, C.M., "Safe and Proper Use of the C-arm for SCS Placement", Spinal Stimulation: Clinical Applications in Chronic Pain and Technical Methods of 1990's, Denver, CO Sept 1991

Rules and Regulations of the Texas Bureau of Radiation Health Regulations, Part 21, Jan, 1987

National Council on Radiation Protection and Measurements, Report Number 49, Sept, 1976

Wagner, Louis K., PhD, "Absorbed Dose and Imaging: Why Measure It?" Radiology, Volume 178:3, Mar, 1991

Cragnon, Christopher H., B.A., et al, "Exposure Rates and High Level Control Fluoroscopy for Image Enhancement", Radiology, Volume 178:3, 643, Mar, 1991

Moss, WT, Cox, JD., Radiation Oncology Rationale, Technique, Results 6th ed St. Louis, Mosby, 1989,97

Radiation Induced Skin Injuries from Fluoroscopy, FDA Medical Bulletin, Vol 24, Number 2, Sept 1994

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