EFFECTS OF RADIOLOGIST SKILL AND EXPERIENCE ON PATIENT DOSES IN INTERVENTIONAL EXAMINATIONS

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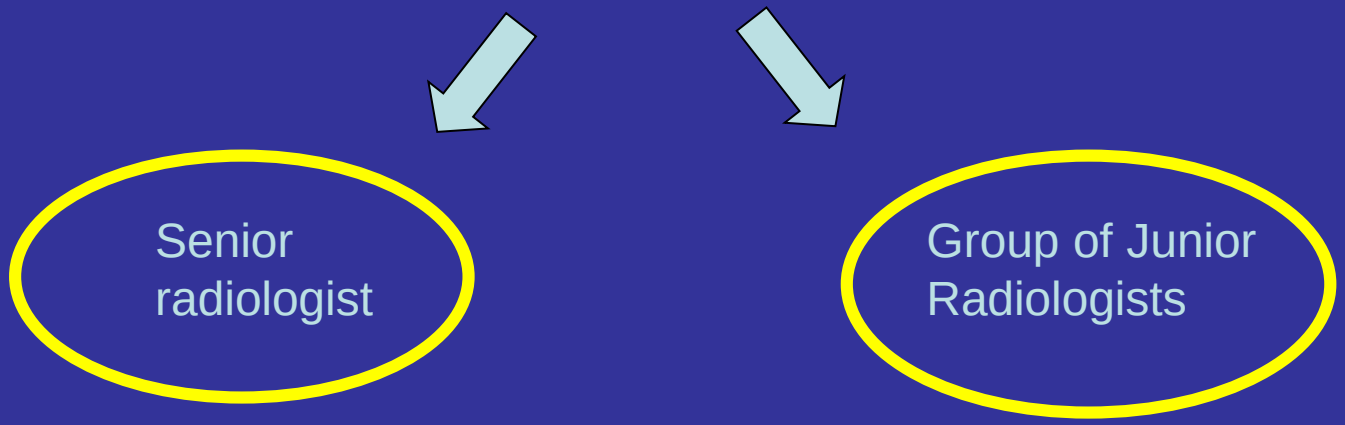
Patient Radiation Doses
were compared using the dosimeric metrics
and
exposure parameters



- Interventional cerebral examinations
- Interventional lower extremity examinations

NUMBER OF PATIENTS

	Cerebral	Lower Extremity	Total
Senior Radiologist	18	11	29
Junior Radiologists	19	12	31
			60
Number of Junior Radiologists involved	7	5	

DATA ACQUISITION FOR PATIENTS

- Dose-Area product (DAP) and air kerma (AK) at the patient entrance were measured separately for each projection and FOV.

- Position of the patient and irradiation geometry were continuously observed and recorded during the course of the study

- Fluoroscopic and Radiographic exposure parameters were continuously recorded.

DOSIMETRIC TECHNIQUES FOR PATIENT DOSES

AK measurement

DAP measurement

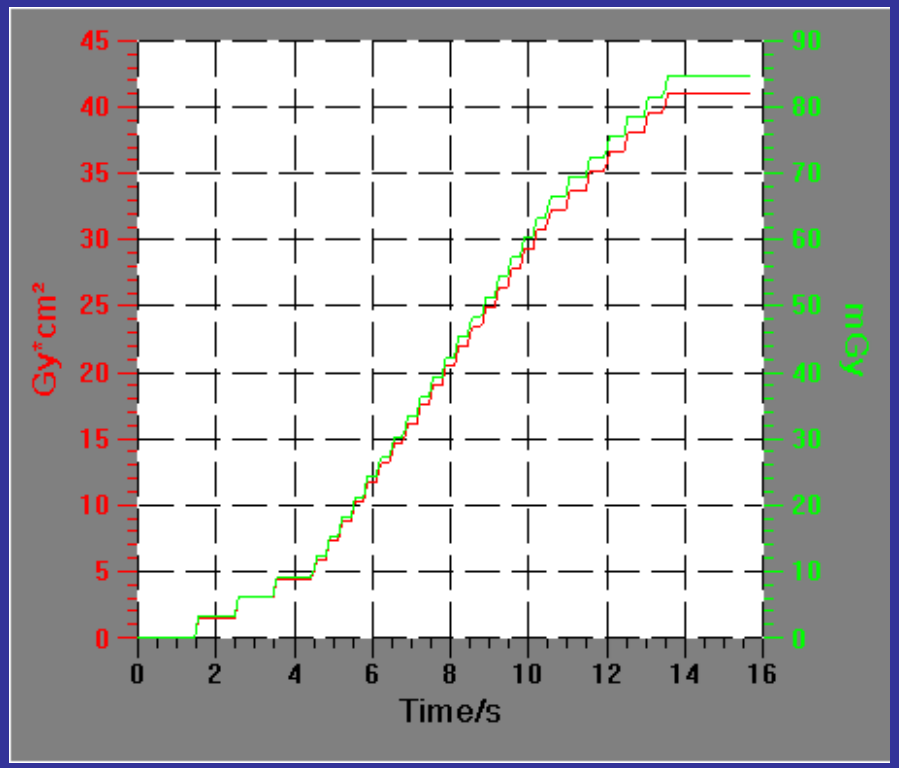
Diamentor

Diasoft

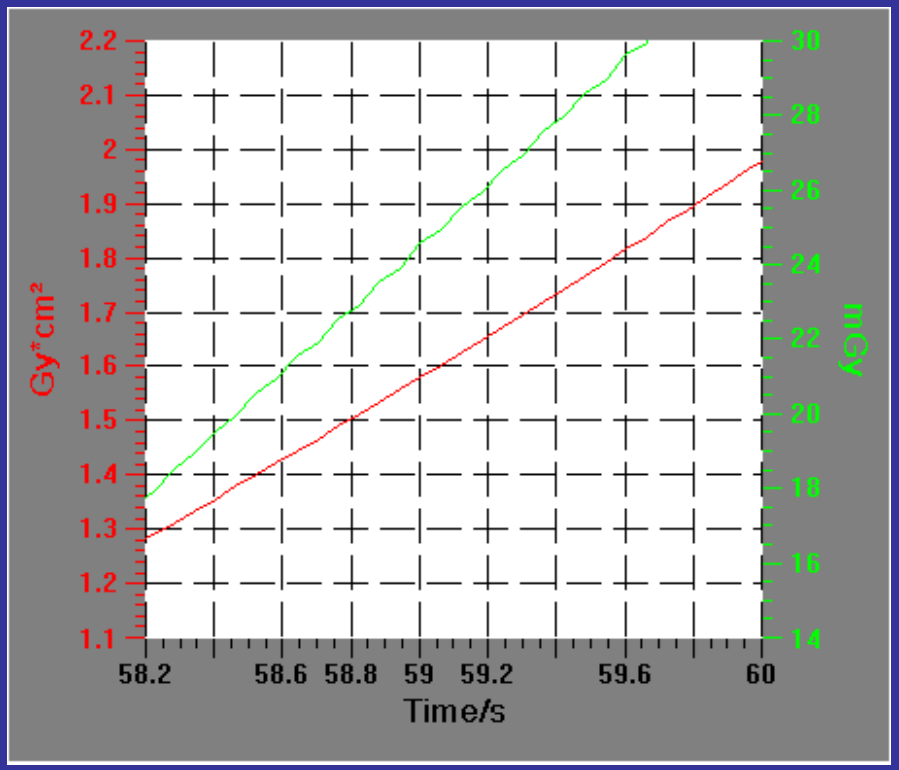
DIAMENTOR M4KDK

DAP AND AK RECORDS

Radiography



Fluoroscopy

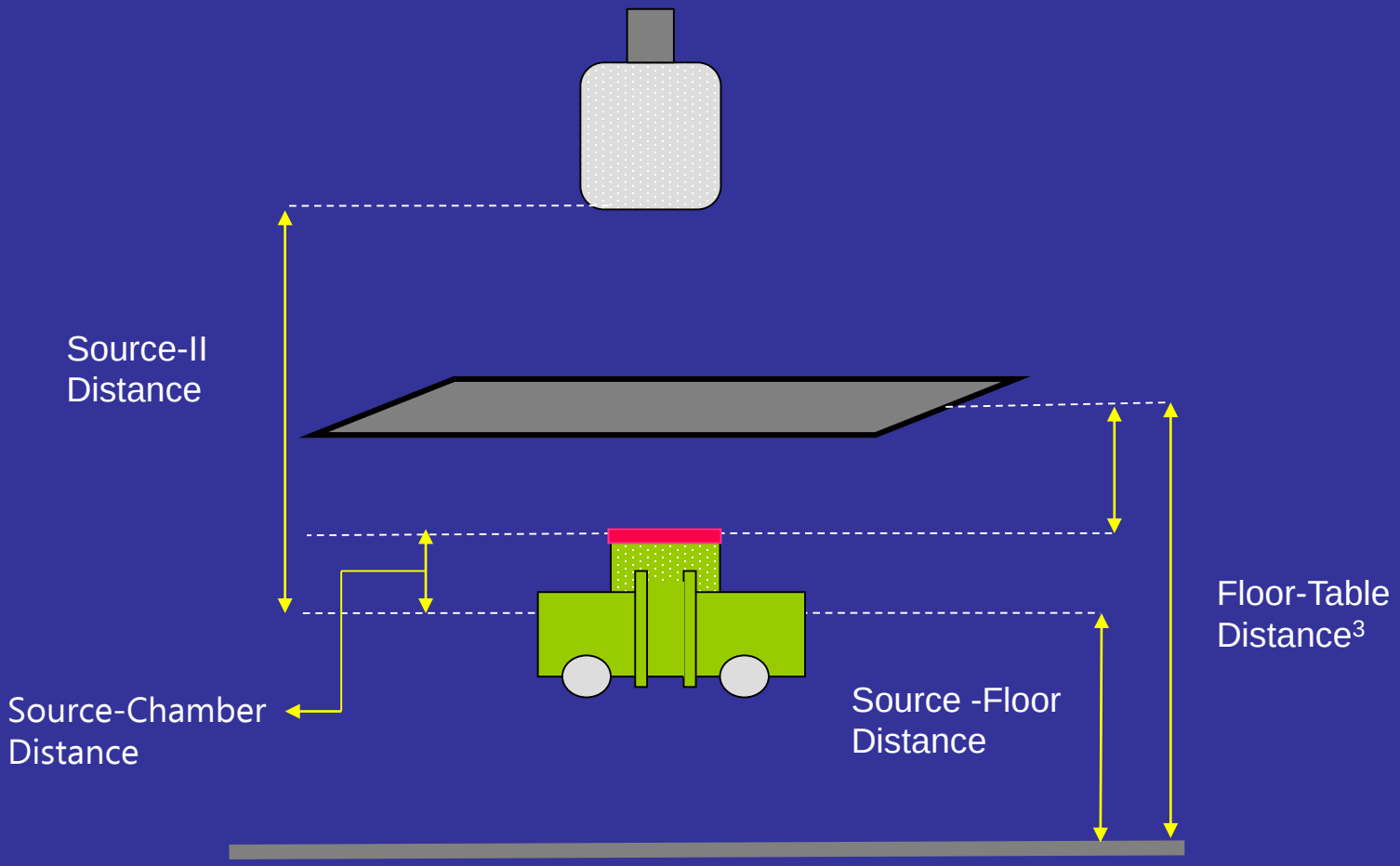


RECORDED EXPOSURE PARAMETERS

- Fluoroscopy
  - Projection
  - II FOV
  - II angle
  - Average mA
  - Average kVp
  - Fluoroscopy time
  - Table-Focus distance
  - DAP ($Gycm^2$)
  - AK (mGy)

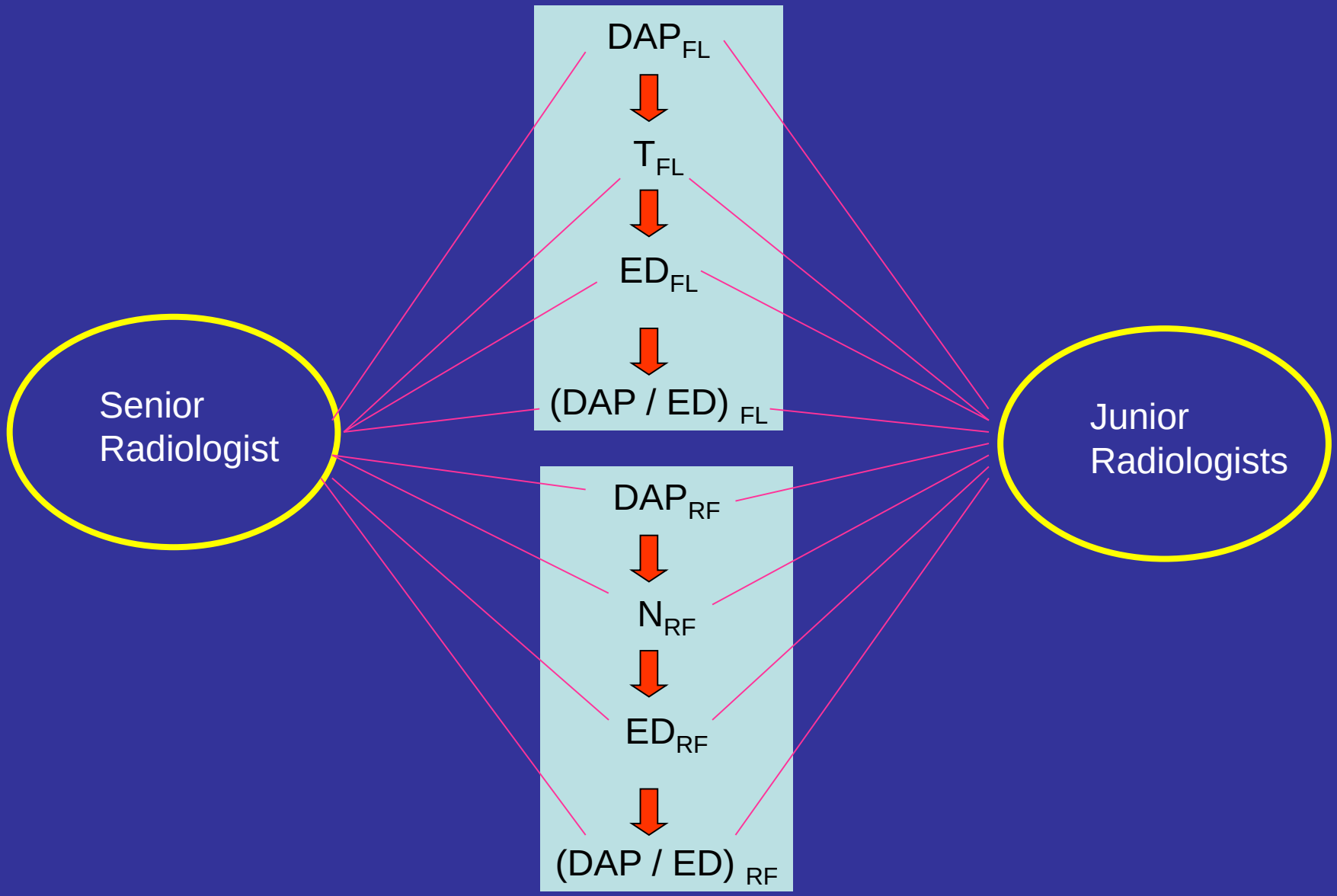
- Radiography
  - Projection
  - II FOV
  - II angle
  - mA
  - kVp
  - Puls width (ms)
  - Frames / sec
  - Total # of frames
  - Table-Focus distance
  - DAP ($Gycm^2$)
  - AK (mGy)

MEASURED PARAMETERS



RESULTS

COMPARISONS



DAP / ED : used as an indication of beam collimation

AVERAGE VALUES FOR CEREBRAL EXAMINATIONS

Fluoroscopic Examinations

	Junior Radiologist (N=7)					Senior Radiologist					Junior to Senior Ratio (p)[1]
FOV	**14**	**20**	**28**	**40**	**Total**	**14**	**20**	**28**	**40**	**Total**	
T_{FL} (sec)	48.9	125.5	79.9	139.7	**394.0** (87.4-977.8)	37.2	59.1	26.3	130.0	**252.6** (83.1-643.9)	**1.56 (0.02)**
ED_{FL} (mGy)	10.3	17.1	9.0	11.0	**47.4** (14.2-112.4)	13.0	9.4	2.6	11.2	**36.2** (12.9-84.8)	**1.31**
DAP_{FL} ($Gycm^2$)	1.2	2.4	1.4	1.3	**6.3** (1.7-11.6)	1.1	1.0	0.4	1.4	**3.9** (1.1-8.3)	**1.62 (0.01)**
$(DAP/ED)_{FL}$ (cm^2)	113	142	149	121	**133** (103-256)	87	110	148	123	**109** (77-164)	**1.22 (0.02)**

DAP_{FL} Correlates well with fluoroscopy time

FOV: Field of View, T_{FL} : Fluoroscopy time, ED : Entrance Dose, DAP :Dose area product
1 : p values

AVERAGE VALUES FOR CEREBRAL EXAMINATIONS

Radiographic Examinations

	Junior Radiologist (N=7)					Senior Radiologist					Junior to Senior Ratio
FOV	**14**	**20**	**28**	**40**	**Total**	**14**	**20**	**28**	**40**	**Total**	
# of Rad. Frames	57	77	8	0	**142** (117-200)	70	64	15	1	150 (117-216)	**0.95**
ED_{RF} (mGy)	310.7	342.4	20.4	0.0	**673.5** (404-1135)	401.7	257.0	37.2	4.6	700.5 (365-1201)	**0.96**
DAP_{RF} ($Gycm^2$)	26.6	51.0	4.9	0.0	**82.5** (43.1-138.8)	35.1	35.2	8.4	1.7	80.4 (37.9-127.4)	**1.03**

RF: Radiography

Standard acquisition protocols were used by two groups

AVERAGE VALUES FOR LOWER EXTREMITY EXAMINATIONS

Fluoroscopic Examinations

	Junior Radiologist (N=5)					Senior Radiologist					Junior to Senior Ratio
FOV	**14**	**20**	**28**	**40**	**Total**	**14**	**20**	**28**	**40**	**Total**	
T_{FL} (sec)	0.0	0.0	0.0	89.5	**89.5** (60.7-150.6)	0.0	0.0	0.0	102.7	**102.7** (41.6-380.5)	0.87
ED_{FL} (mGy)	0.0	0.0	0.0	7.1	**7.1** (1.6-16.8)	0.0	0.0	0.0	14.1	**14.1** (0.9-109.8)	0.50
DAP_{FL} ($Gycm^2$)	0.0	0.0	0.0	3.0	**3.0** (1.0-5.3)	0.0	0.0	0.0	3.6	**3.6** (0.3-18.1)	0.83
$(DAP/ED)_{FL}$ (cm^2)	---	---	---	426	**426** (315-740)	---	---	---	255	**255** (165-626)	1.67

AVERAGE VALUES FOR LOWER EXTREMITY EXAMINATIONS

Radiographic Examinations

	Junior Radiologist (N=5)					Senior Radiologist					Junior to Senior Ratio
FOV	**14**	**20**	**28**	**40**	**Total**	**14**	**20**	**28**	**40**	**Total**	
# of Rad. Frames	0	0	0	81	**81** (64-88)	0	0	0	90	**90** (26-145)	0.90
ED_{RF} (mGy)	0.0	0.0	0.0	21.9	**21.9** (9.2-73.9)	0.0	0.0	0.0	43.0	**43.0** (1.8-199.7)	0.51
DAP_{RF} ($Gycm^2$)	0.0	0.0	0.0	10.9	**10.9** (5.4-28.0)	0.0	0.0	0.0	20.8	**20.8** (0.7-75.3)	0.52

GENERAL CONCLUSIONS

Skill and experience of the radiologist play a vital role for patient doses especially for the complex procedures

Patient doses can be lowered with equipment design and careful control of exposure parameters during the course of the study

The exposure parameters that should be manipulated during the examination for dose reduction are:

-Fluoroscopy time
-Number of radiographic frames
-Collimation (with care for some cases)
-Field of view selection

Thank you