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CT-GUIDED SPINAL INJECTION: PATIENT DOSE EVALUATION

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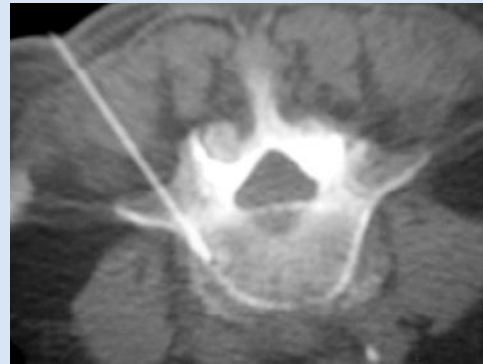
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Introduction/Purpose

Computed Tomography CT modality can also be used as a guide for interventional procedures.



We estimated the radiation dose delivered to patient during CT-guided spinal injection.

Scanner: Philips Brilliance 64

Methods - 1

- **211 dose report** – concerning 172 subjects, 91 males and 81 females, age 56 ± 17 years- were downloaded from the digital archive (PACS).
- Both helical and stationary irradiation were used.
- Size-specific correction factors (AAPM report 204) were used to correct $CTDI_{vol}$ values.

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Exam Information
Study ID:          14263
Time:              Jun 27, 2014, 10:33
Total DLP:         211.5 mGy*cm

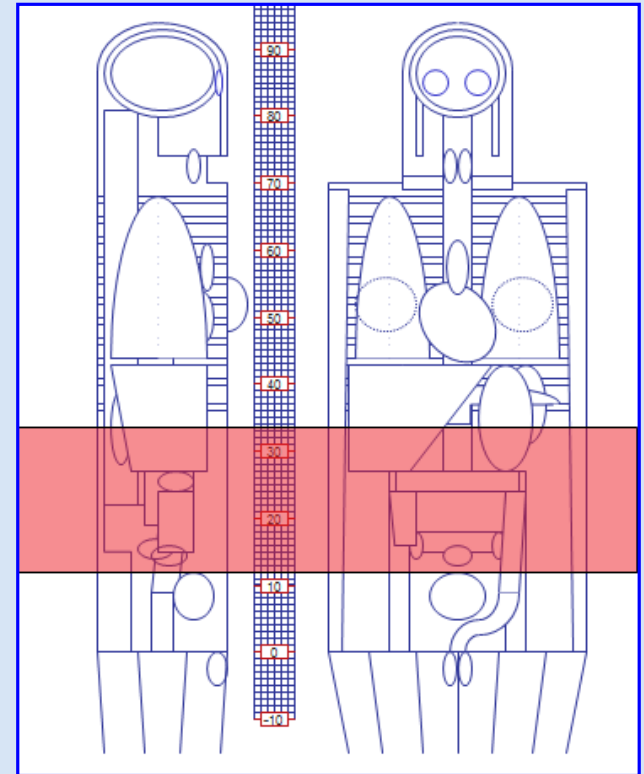
Dose
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#	Description	Scan Mode	mAs	kV	CTDIvol [mGy]	DLP [mGy*cm]	Phantom Type [cm]
1	Surview	Surview	1	120	0.09	3.8	32 CH
1	Surview	Surview	1	120	0.09	3.8	32 CH
2	Helical	Helical	200	120	16.08	167.8	32 CH
4	biopsia	Stationary	N/A	120	36.14	36.1	32 CH



Methods - 2

Effective doses were obtained from DLP ($CTDI_{vol} * length [mGy * cm]$) and conversion coefficients derived from CTDosimetry.xls (ImpaCTscan.org), SR250 data set and ICRP 103 tissue weighting factors, accounting also for sex differences.



Methods -3

Skin dose D_{skin} : Rando phantom was exposed with self-developing previously calibrated film, positioned on the surface of the treated region,

so that the ratio

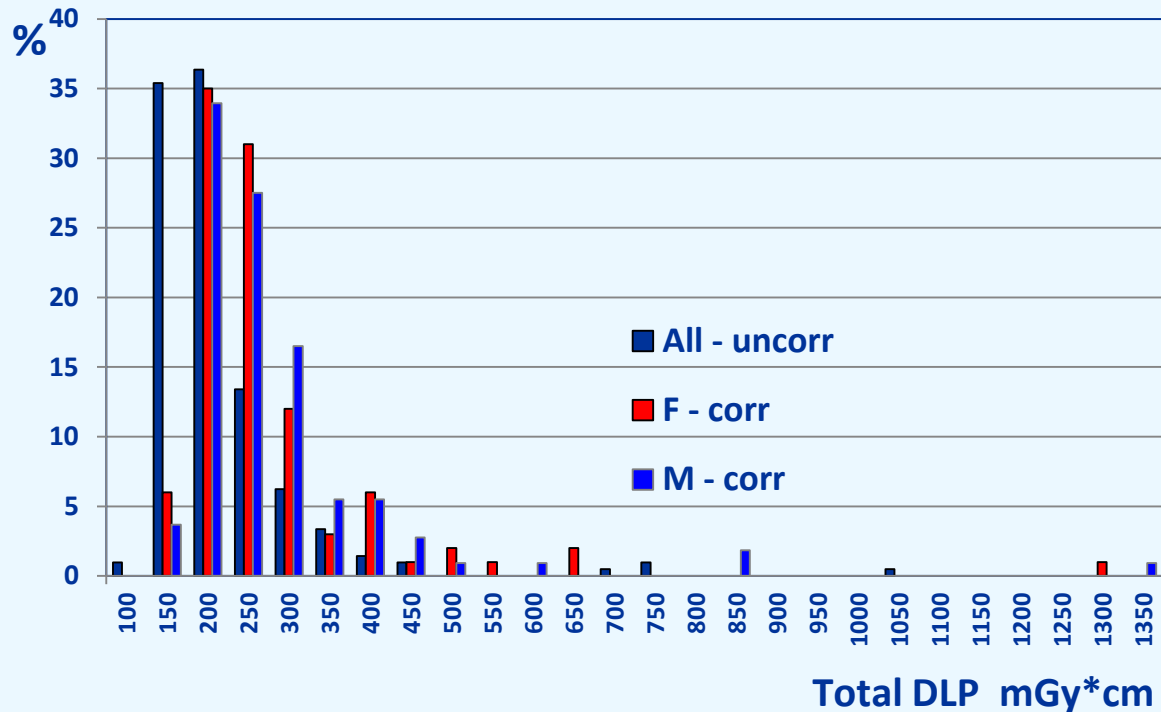
$$D_{\text{skin}} / \text{CTDI}_{\text{vol}}$$

could be assessed.

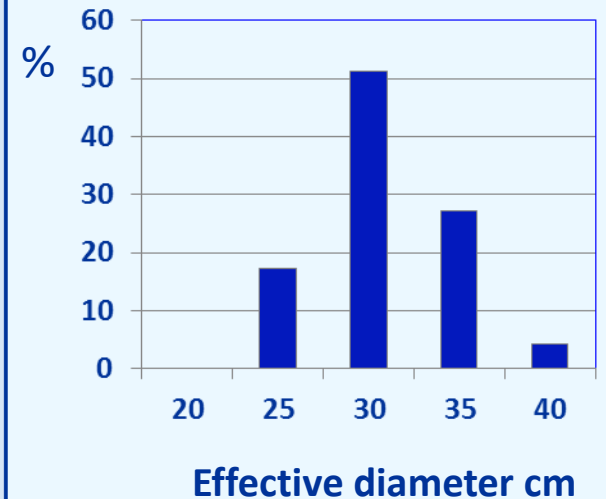


Results -1

Patients DLP distribution



Effective diameter distribution



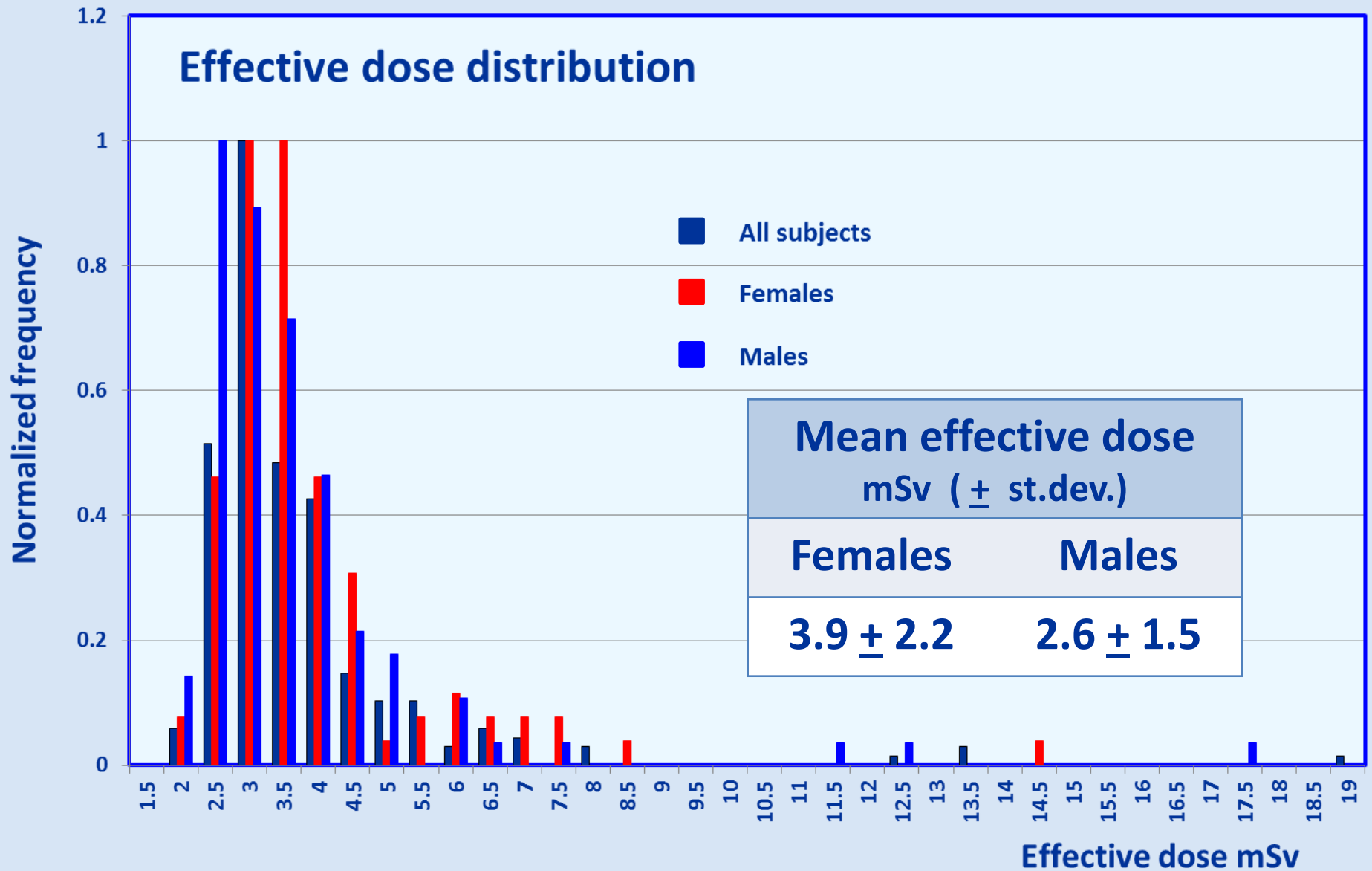
Size specific correction factors AAPM Report 204

Mean + st.dev 1.3 ± 0.2
 Range $0.9 - 1.8$
 50° percentile 1.3

DLP (mGy*cm) mean \pm st.dev

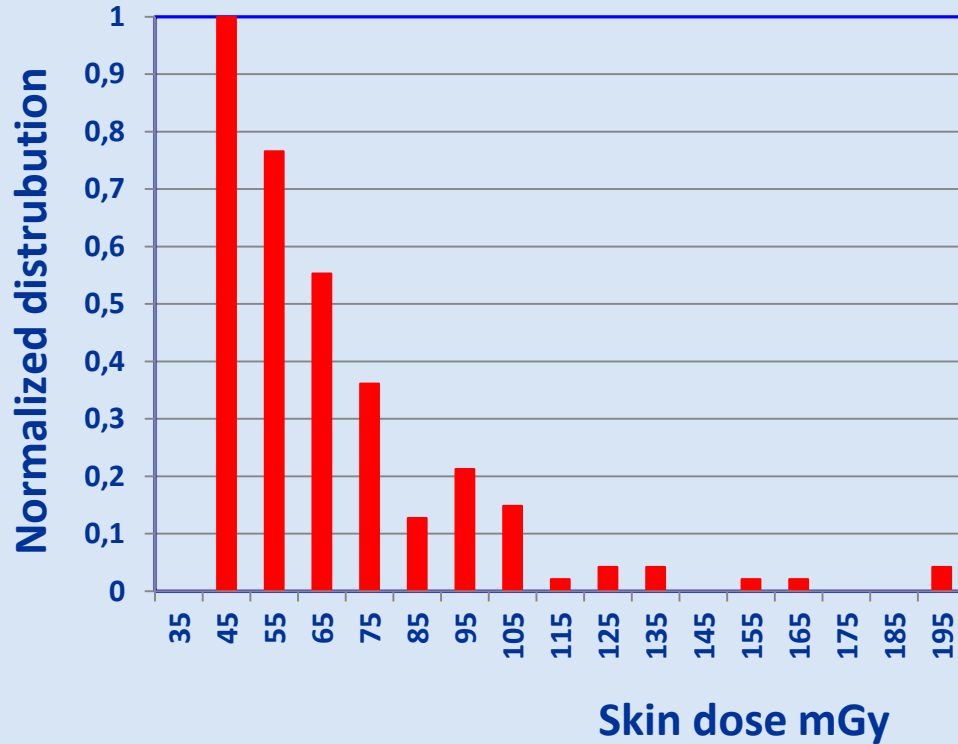
All subjects (uncorrected)	Males (corrected)	Females (corrected)
192 ± 104	259 ± 152	246 ± 138

Results - 2

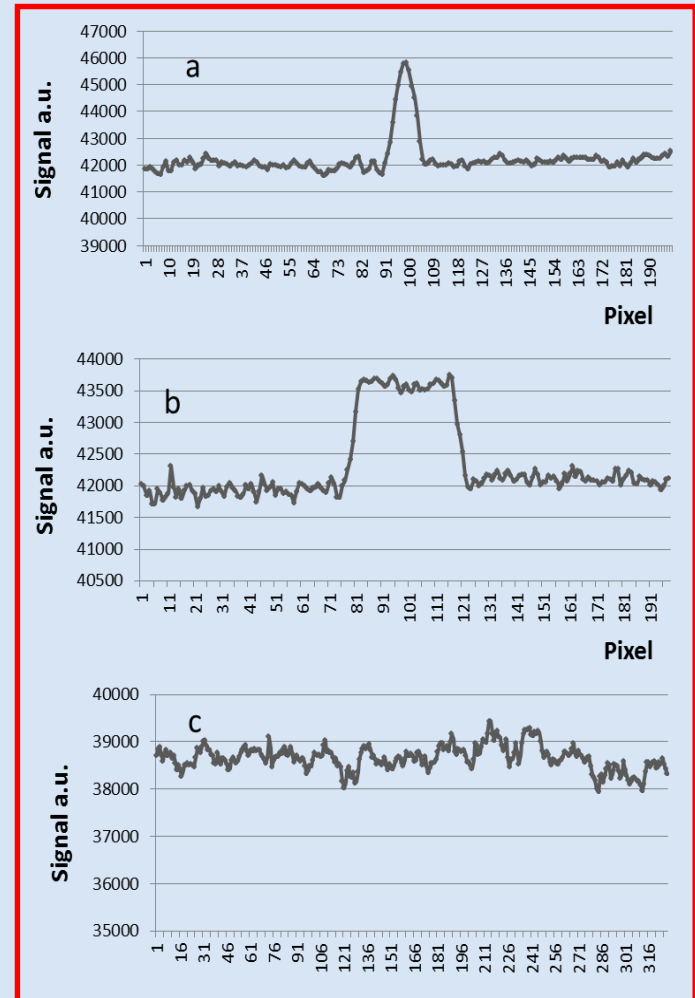


Results - 3

Skin dose distribution



Skin dose profile



$$D_{\text{skin}}/\text{CTDI}_{\text{vol}} = \begin{cases} 1.7 & \text{helical irradiation} \\ 0.6 & \text{stationary irradiation (collimation 1.25 mm)} \\ 0.8 & \text{stationary irradiation (collimation 10 mm)} \end{cases}$$

Mean peak skin dose 62 (+ 27 st.dev.) mGy

**a-axial irradiation /nominal beam collimation 2X0.625;
b-axial irradiation/nominal beam collimation 16X0.625;
c- helical irradiation.**

Conclusions

Beyond sex, size and complexity dependent differences, the relatively low radiation dose, assessed in our work for this procedure, confirms the safety of this minimally invasive technique