

RADIAL ARTERY SPASM, STROKE AND RADIATION EXPOSURE

Dr Jim Nolan

University Hospital of North Staffordshire, UK

Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation/Financial Relationship

Company

- Grant/Research Support
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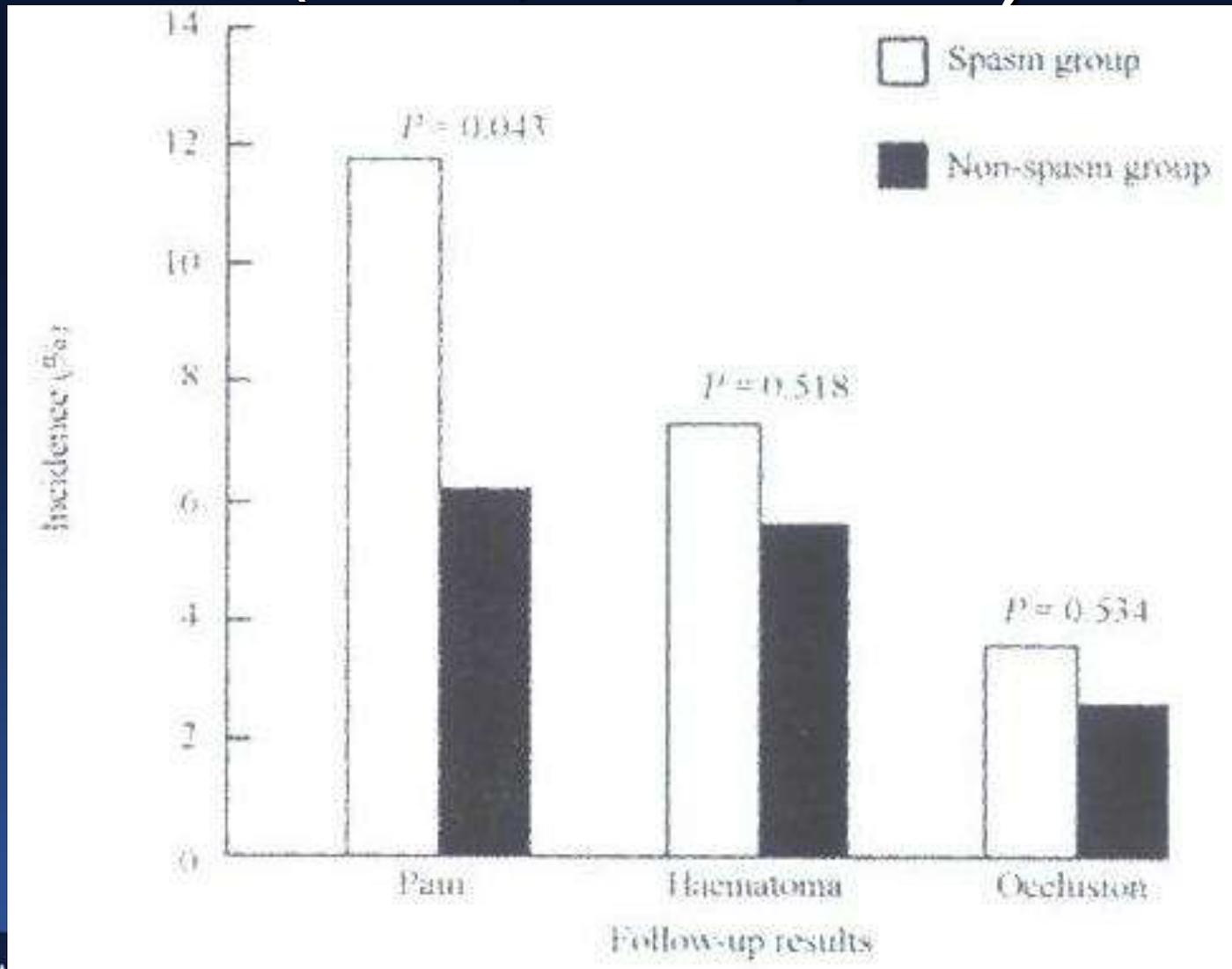
- Boston Scientific
- Boston Scientific
- The Medicines Company

ARM ANGIOGRAM – RADIAL SPASM



SPASM HAS IMPORTANT CONSEQUENCES

(Jia et al, CMJ 2010, n=1427)

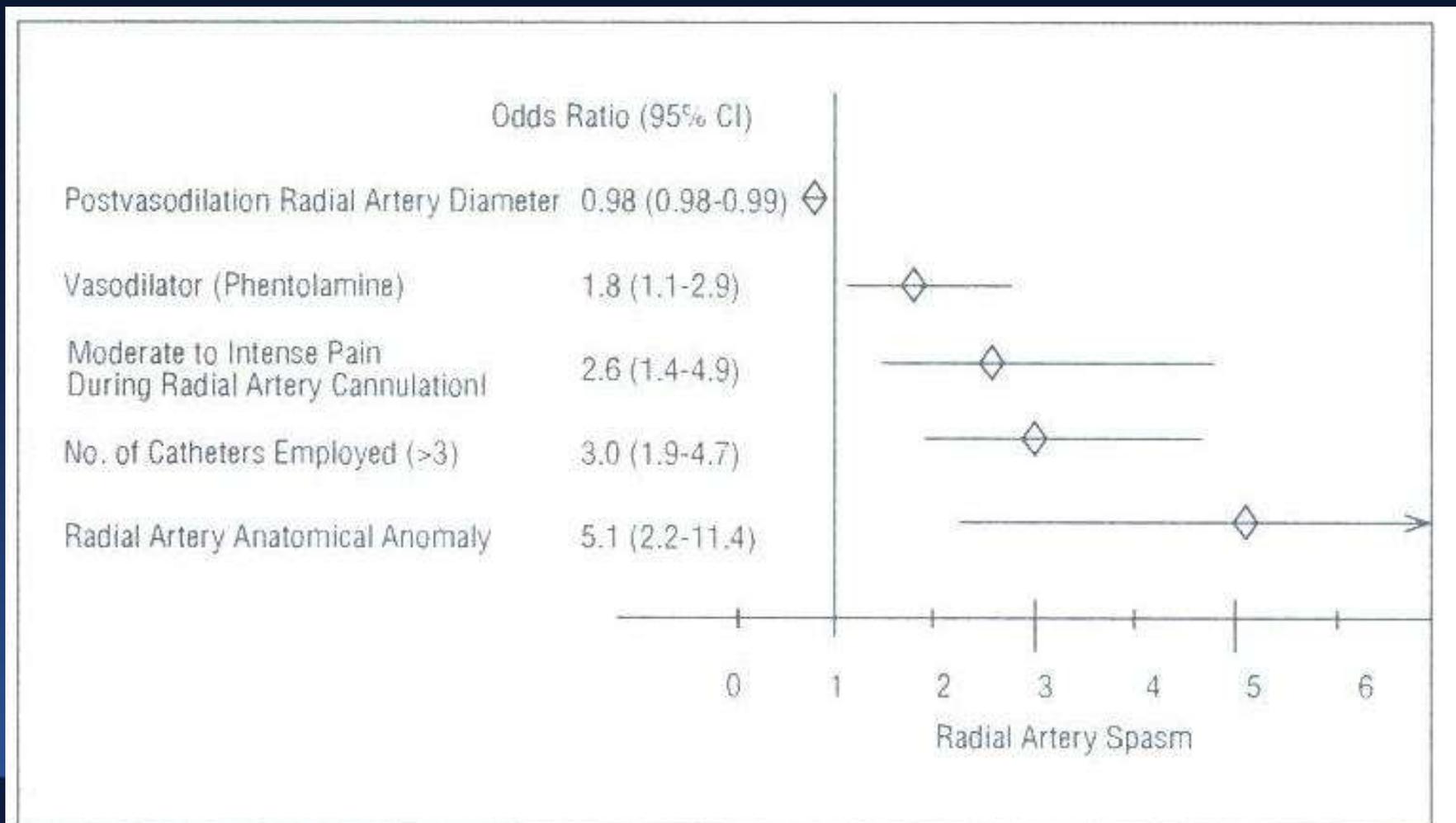


PREDICTORS OF SPASM IN HISTORICAL STUDIES

- Younger age
- Female sex
- Use of large calibre catheters
- Long procedural duration
- Frequent catheter exchange
- Diabetes
- Difficult/painful puncture
- Small radial calibre
- tachycardia

PREDICTORS OF SPASM FOR EXPERIENCED OPERATORS IN CONTEMPORARY PRACTICE

(Ruiz-Salmeron et al, Rev Esp Cardiol 2005, n=637)



HOW COMMON IS VARIANT ANATOMY

(Nolan et al, Heart 2009, n=1540)

NORMAL ANATOMY 86%

VARIATION 14%

High bifurcation 7%

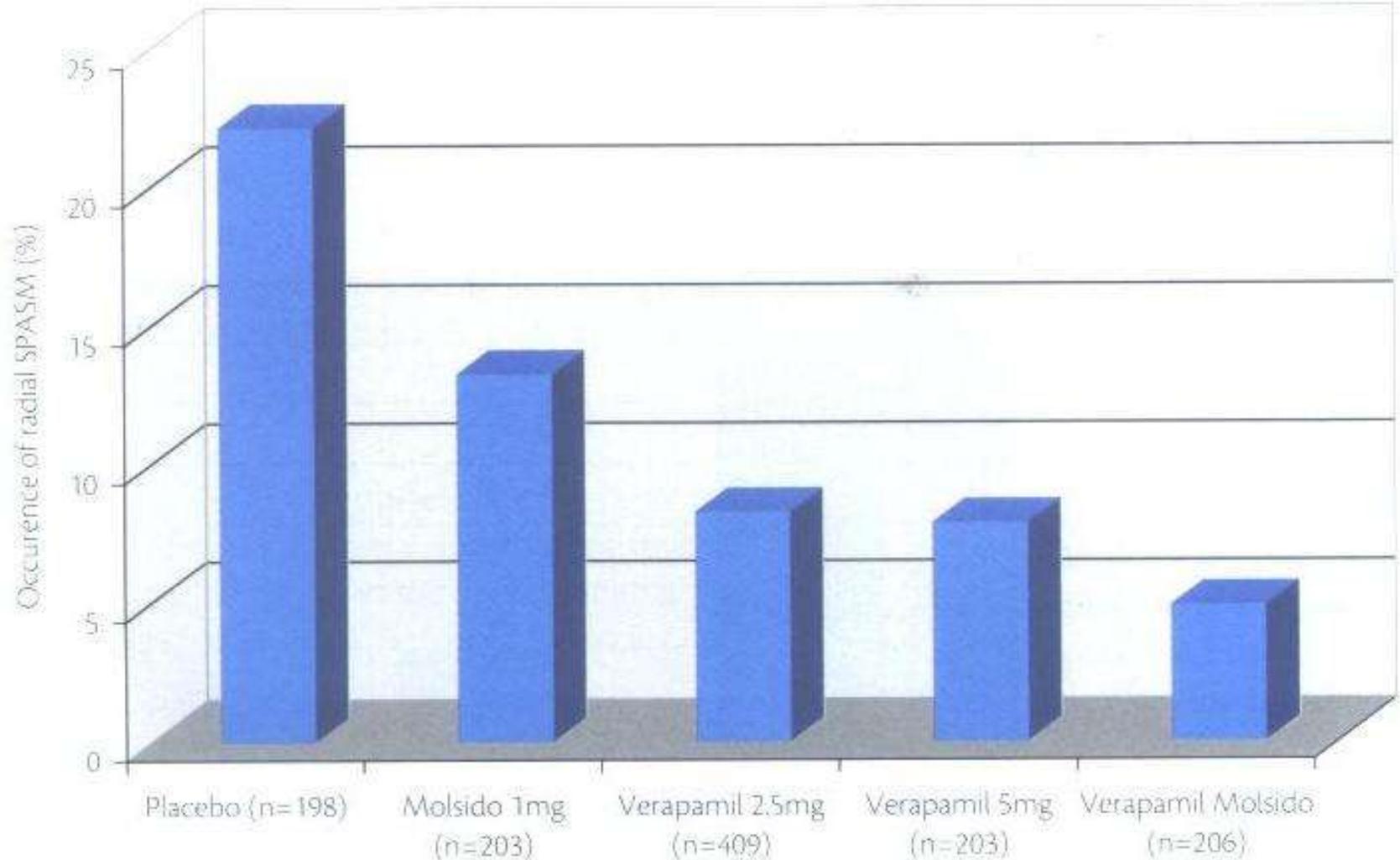
Loops 2.3%

Tortuosity 2%

Other variations 2.5%

Variation associated with age/gender

EFFECT OF VASODILATORS – THE SPASM STUDY (Varenne et al CCI 2006,n=1219)

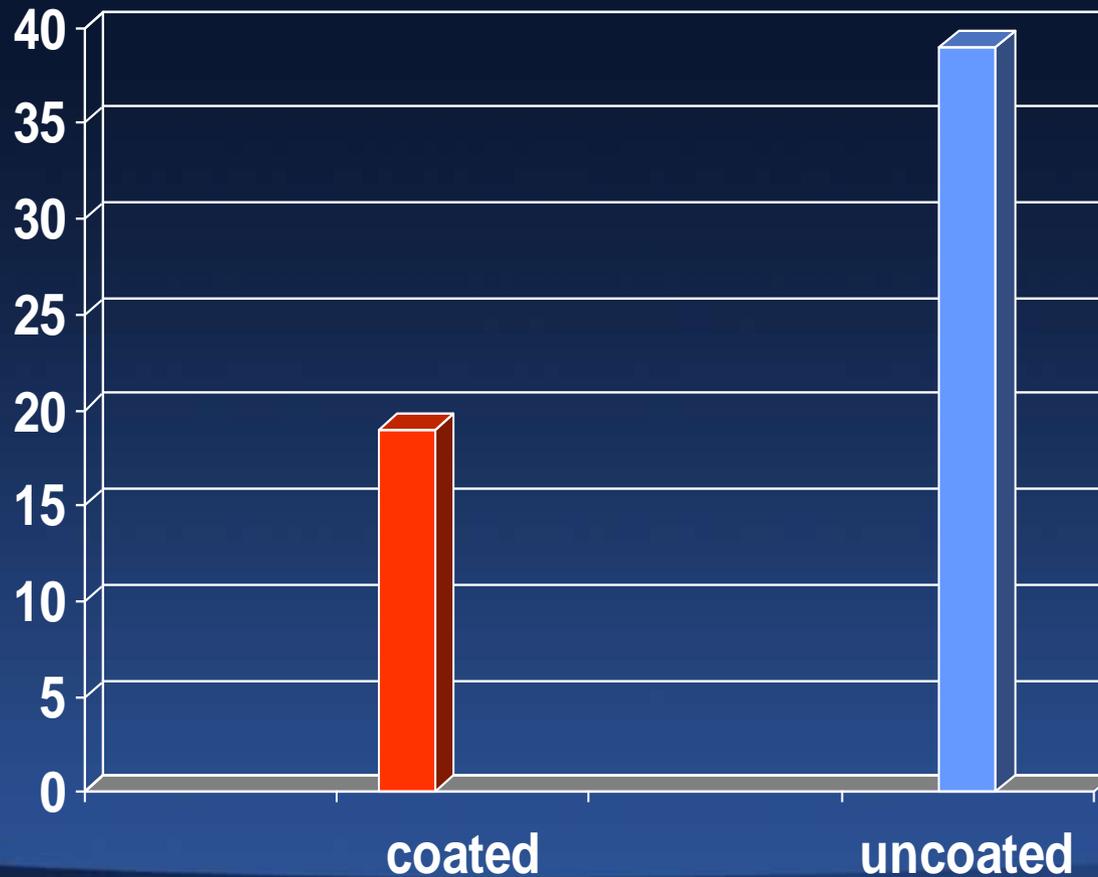


OTHER RADIAL VASODILATORS OF PROVEN EFFICACY

- **Nicorandil** (Kim et al, IJC 2007)
- **Phentolamine** (Ruiz-Salmeron et al, CCI 2005)
- **Magnesium** (Byrne et al, JIC 2008)

INCIDENCE OF RADIAL SPASM IN RELATION TO SHEATH COATING

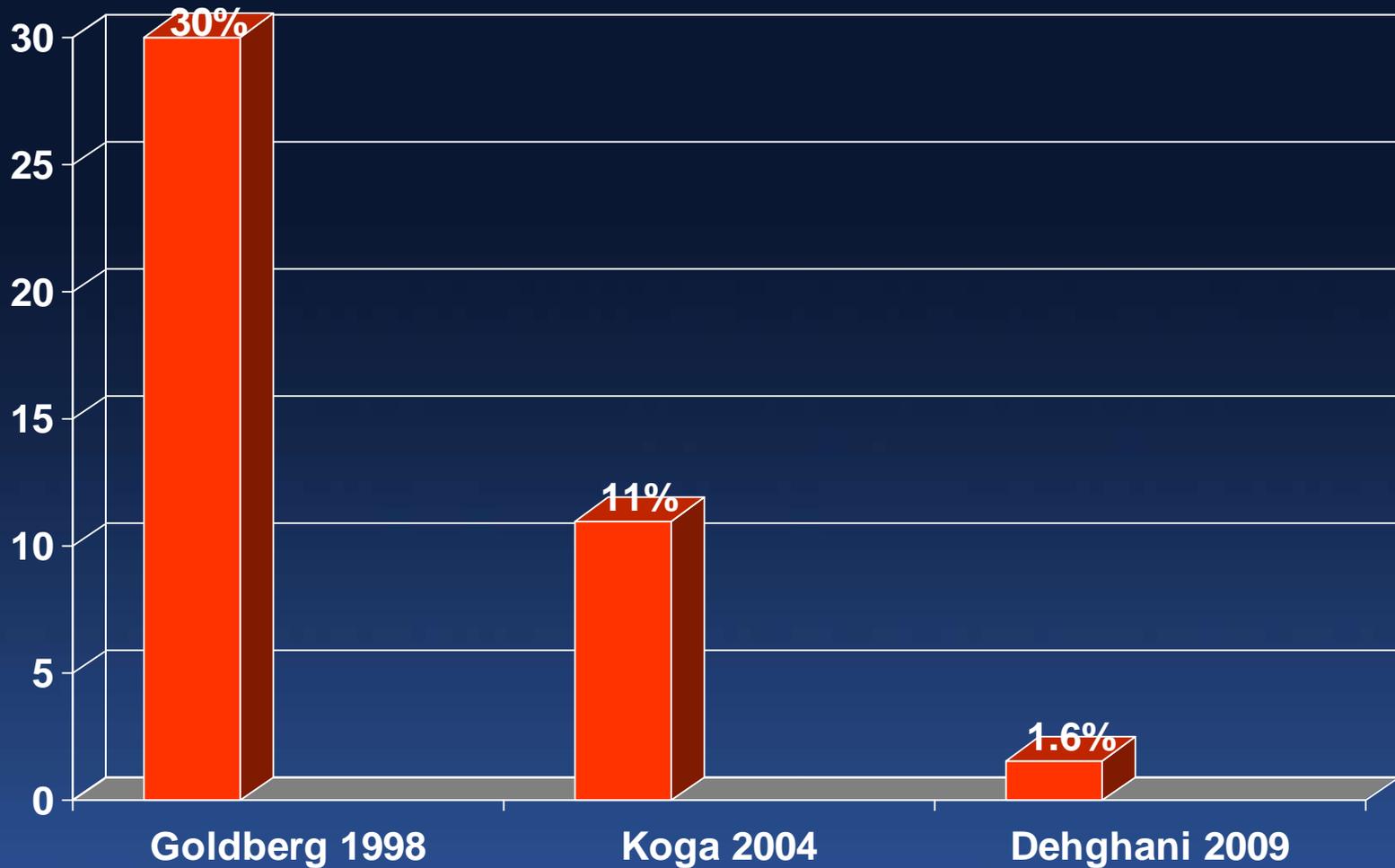
(Rathore et al, JACCI 2010, n=790)



HOW TO AVOID SPASM IF YOU ARE AN EXPERIENCED OPERATOR

- Do a pre procedure arm angiogram to plan optimal catheter selection
- Use a verapamil/nitrate vasodilator cocktail
- Use a hydrophilic sheath

IS RADIAL SPASM AN ISSUE



CVA AND ACCESS SITE SELECTION

- Event rates are rare and there is no meaningful randomised data (trial of n=25,000 to give 80% power)
- Radial patients could be disadvantaged since brachiocephalic is traversed
- Radial patients could be favoured since arch/descending aorta are not cannulated
- Aortic atheroma is source of most cerebral emboli during cardiac catheterisation and is concentrated in arch/descending aorta (khoury et al,AJC,1995)

CVA EVENT RATES IN REGISTRIES (N=156,229)

	RAD	FEM
FRENCH	0.19%	0.39%
UK	0.06%	0.09%
CANADA	0.06%	0.10%

IN RELATION TO CVA.....

- **The data is limited**
- **The contemporary observational data we have shows no CVA hazard**
- **This may reflect beneficial effect of avoiding catheter manipulation in aortic arch**

Mihran Kassabian (1870-1910)

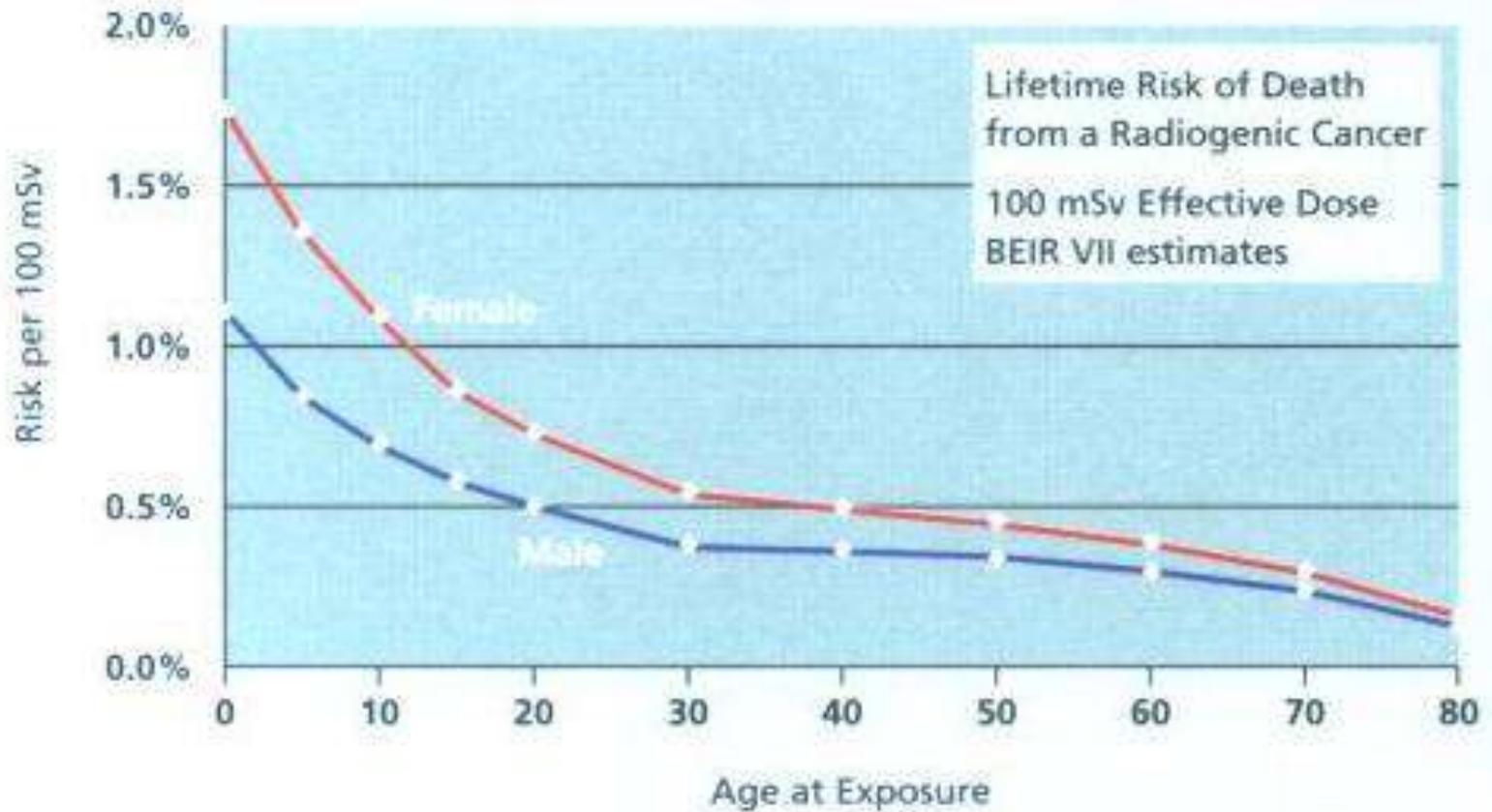


RADIATION EXPOSURE IS IMPORTANT

Skin injury due to cardiac intervention



RADIATION EXPOSURE AND CANCER RISK



SB 0608

Review of recent literature comparing radiation exposure in transfemoral and transradial cardiac catheterisation

Reference	FA				RA			
	No	DAP (Gycm ²)	FT (min)	Rad Exp (uSv)	No	DAP (Gycm ²)	FT (min)	Rad Exp (uSv)
Mann et al 1996 -PCI	126			8.8	138			13.5
Sandborg et al 2003 -CA	40	38±22	4.6±4		36	51±25	7.5±4	
Sandborg et al 2003 -CA+PCI	42	47±34	12.5±9		24	75±47	18.4±9	
Sandborg et al 2003 -All	82	43±29	8.6±8		60	61±37	11.9±9	
Larrazet et al 2003 -ad hoc PCI	184	138	12		218	175	17	
Geijer et al 2004 - PCI	114	69.8	16.4		55	70.5	18.1	
Lange et al 2006 -CA	103	13.1±8.5	1.7±1.4	32±39	92	15.1±8.4	2.8±2.1	64±55
Lange et al 2006 -PCI	48	51±29.4	10.4±6.8	110±115	54	46.3±28.7	11.4±8.4	166±188

RANDOMISED COMPARISON OF OPERATOR RADIATION EXPOSURE AND ACCESS SITE

(Lange et al, CCC 2006, n = 297)

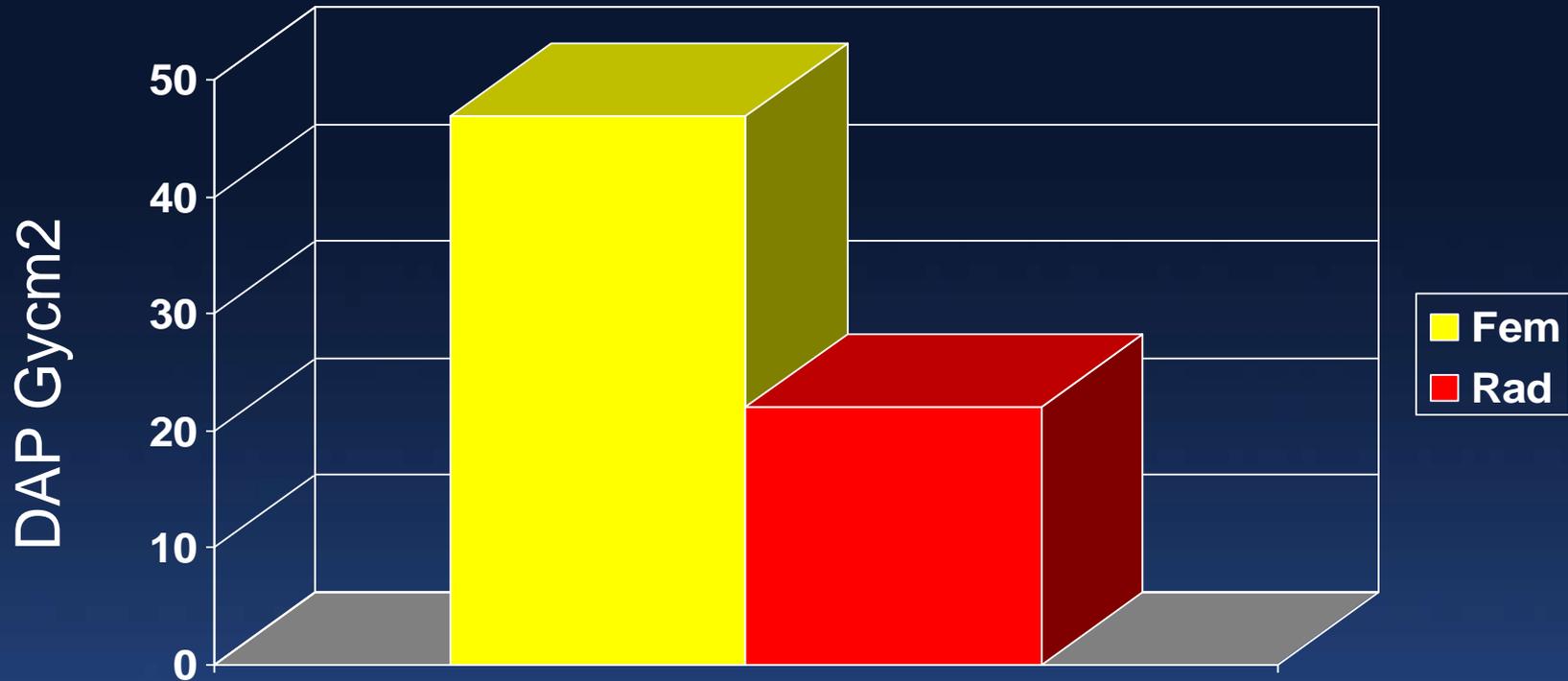
	RADIAL	FEMORAL	P
DIAGNOSTIC STUDIES			
FT (mins)	2.8	1.7	<0.001
DAP (Gy.cm ²)	15.1	13.1	<0.05
ORE (μSv.cm ²)	64	32	<0.001
PERCUTANEOUS			
FT (mins)	11.4	10.4	NS
DAP (Gy.cm ²)	46.3	51.0	NS
ORE (μSv.cm ²)	166	110	<0.05

RADIAL ACCESS INCREASES RADIATION EXPOSURE FOR PATIENTS AND OPERATORS

PROBLEMS WITH THE STUDIES

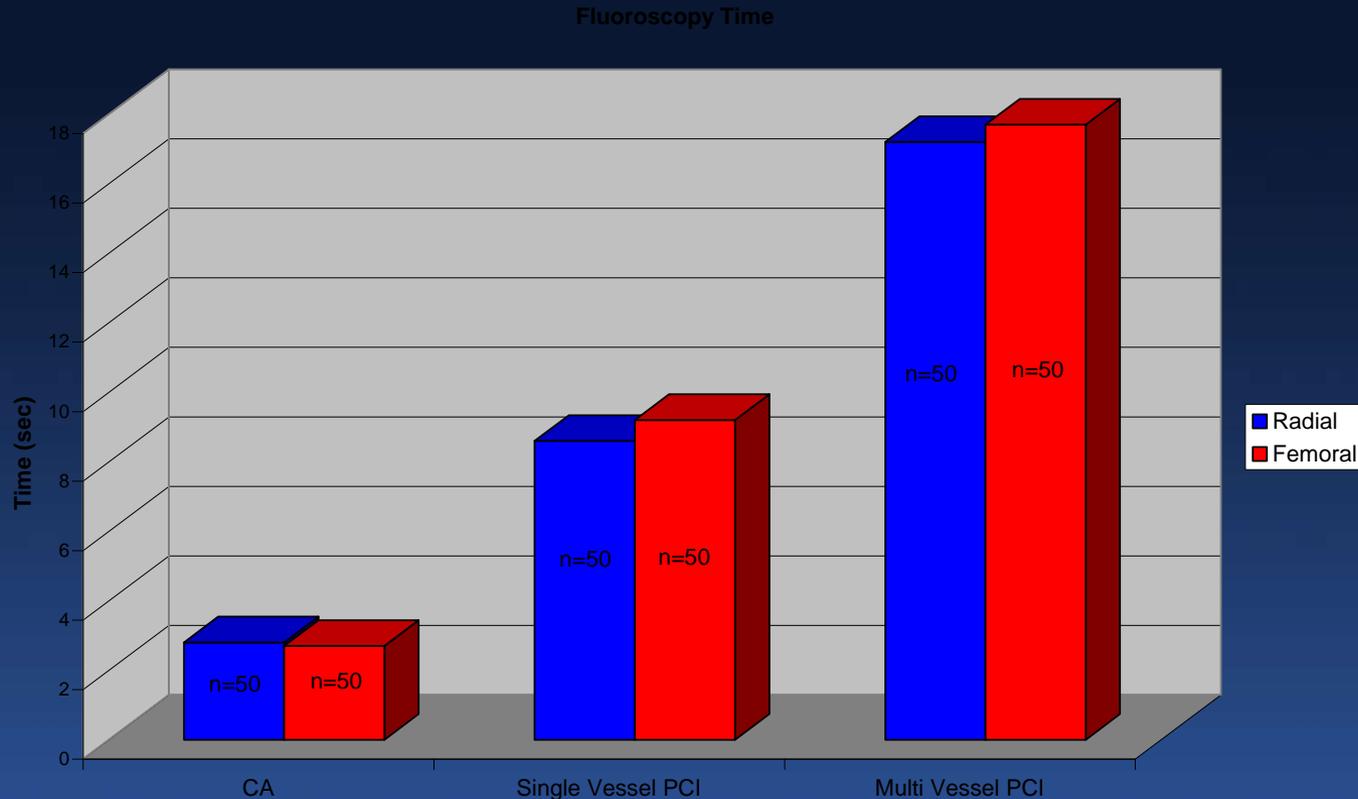
- **Most are observational – no standardisation of operator experience, patient characteristics or technique**
- **In randomised trial, sub-optimal radiation protection protocol was employed for the TRI cases**

Influence of learning curve on radiation exposure

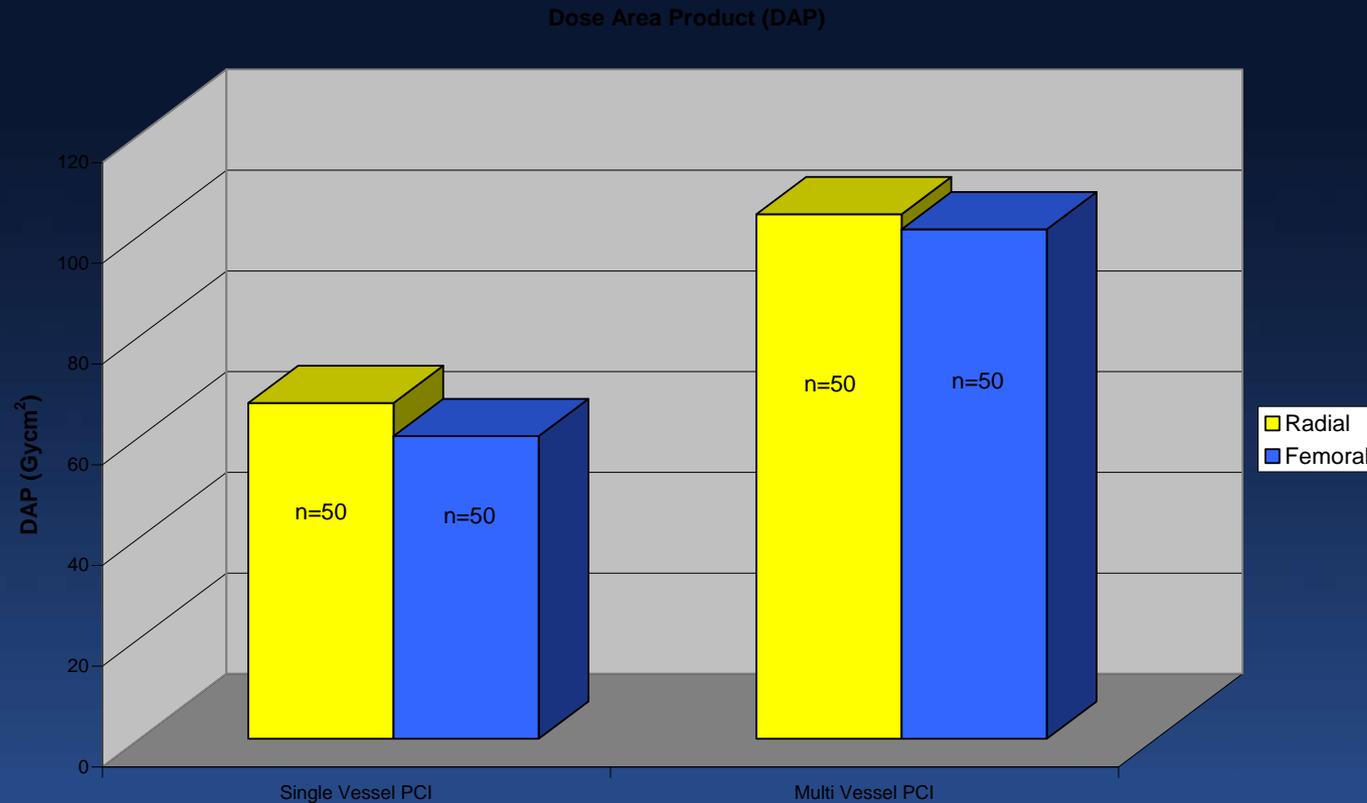


WHAT ABOUT RADIATION EXPOSURE FOR A HIGH VOLUME OPERATOR USING CONTEMPORARY TECHNIQUES?

FLUOROSCOPY TIMES OF PATIENTS UNDERGOING CA & PCI BY THE RADIAL AND FEMORAL ROUTES (Nolan et al, TRI 2010 , n=300)



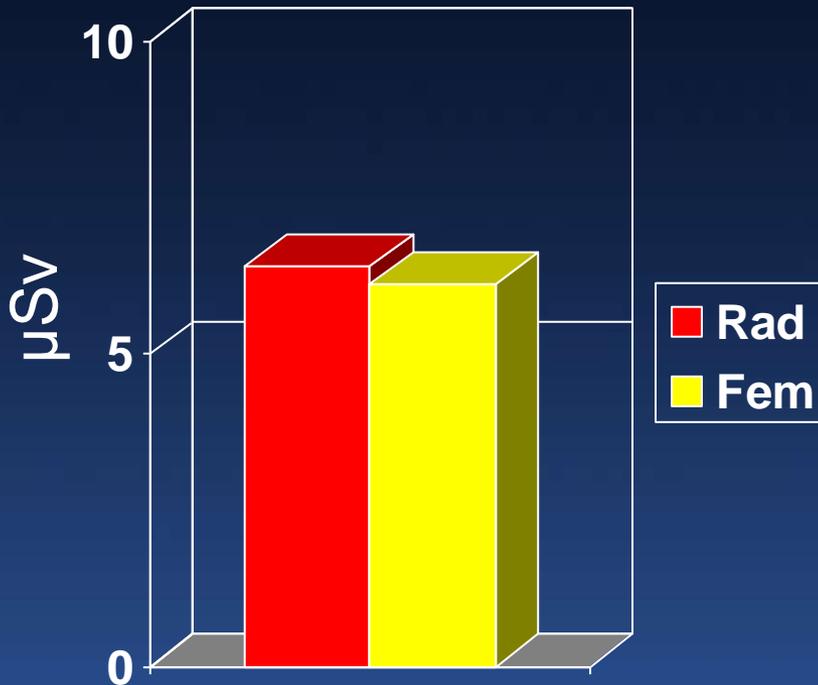
RADIATION DOSES OF PATIENTS UNDERGOING RADIAL AND FEMORAL PCI (Nolan et al, TRI 2010, N=200)



Operator radiation exposure and access site – UHNS controlled study

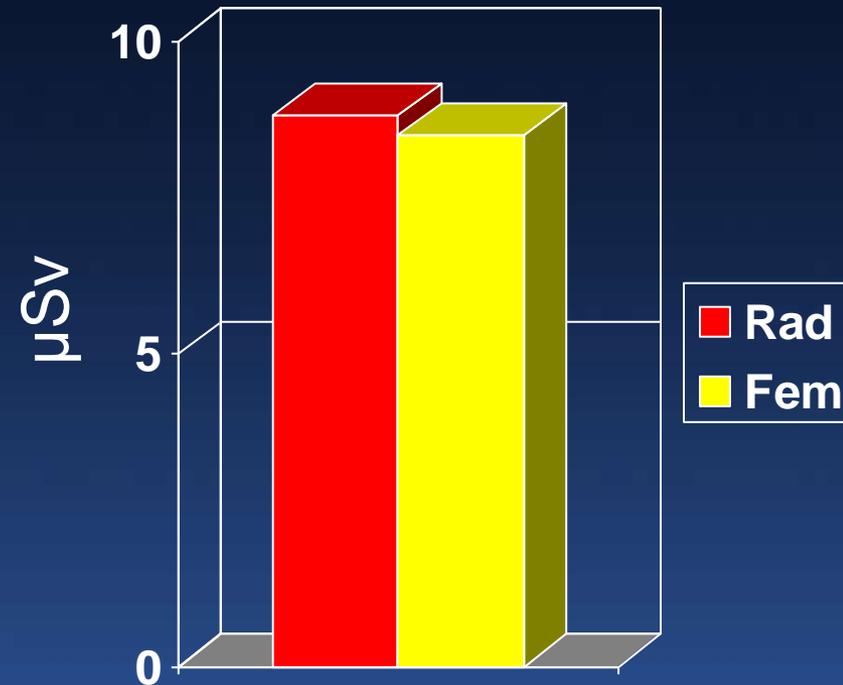
EXPERT OPERATOR

P=NS

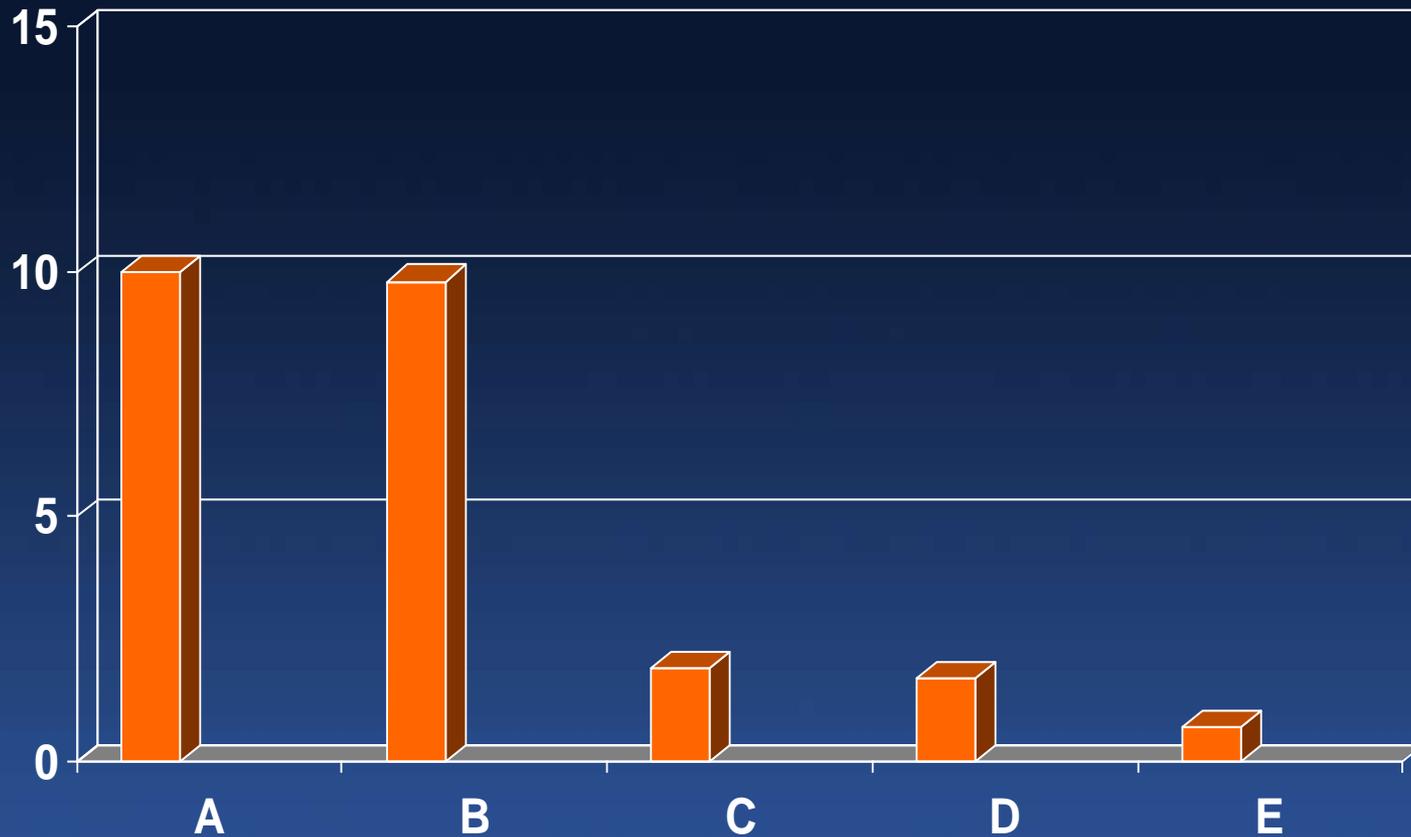


TRAINEE OPERATOR

P=NS



PCI OPERATIVE RADIATION EXPOSURE - UHNS TLD BADGE READINGS FOR CONSULTANT OPERATORS



CONCLUSIONS – IN 2010

- Spasm is an infrequent problem
- There is no evidence for an increase in CVA risk
- There is no radiation hazard to staff or patients

