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DoseRite Made For Life

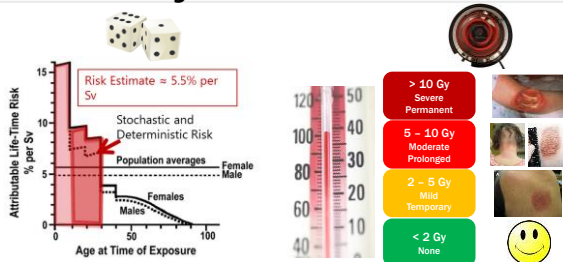
Primary Objective

“The purpose of this session is to allow vendors to present their solutions and describe how their product can **empower the clinician and supporting staff to make more informed decisions relating to dose management towards minimization of risk during fluoroscopy guided procedures.**”

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Risks of Ionizing Radiation

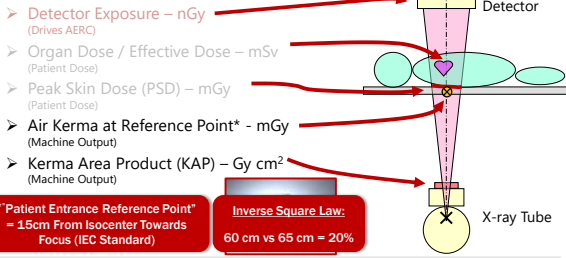


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Hall EJ. "Lessons we have learned from our children: cancer risks from diagnostic radiology." *Pediatr Radiol* 32(10): 1700-6 (2002) NCRP Report No. 168, "Radiation Dose Management for Fluoroscopically-Guided Interventional Medical Procedures"

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Dose Metrics



Canon *21CFR102032 - Mandatory for Fluoroscopic Equipment after 6/10/2006; Accuracy Tolerance: ± 35% DoseRite

What's Missing?

No Source-to-Skin Distance Corrections

No Spatial Information
(All Dose Summed as if it Occurred at a Single Point in Space; No C-Arm Angulation or Table Movement)

Dose to Air, Not Dose to Tissue
(No Patient Support Attenuation; Scatter; Tissue Absorption Factor, Backscatter)

Compared to Fluoro Time: Individual Variability Reduced to a Factor of ~2x

Canon K.A. Fetterly, "X-ray fluoroscopy imaging in the invasive cardiac laboratory", 2013 AAPM Spring Clinical Meeting
D.L. Miller et al., "Radiation Doses in Interventional Radiology Procedures: The RAD-IR Study Part II: Skin Dose", IJR 2003 DoseRite

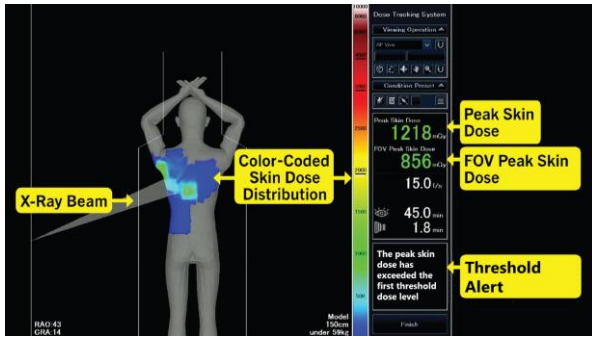
Transition Towards Meaningful Dose Information

Alarm display when cumulative dose gets over the threshold dose

Reference Air Kerma
(Dose To Air at Reference Location)

Real-Time Patient Dose Tracking System (DTS)
(Estimated Skin Dose on Patient Graphic)

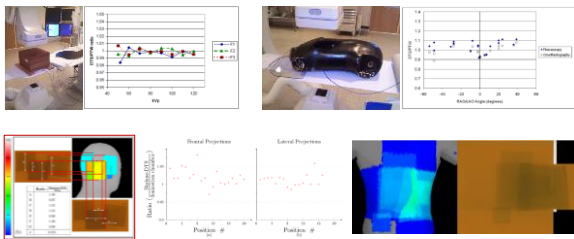
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DTS | VALIDATION



DTS | VALIDATION – EXAMPLE RESULTS*



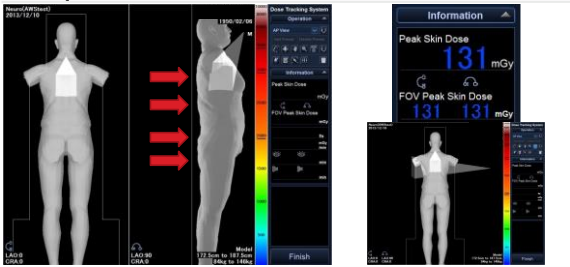
*H. Nara et al., "Tracking system to calculate patient skin dose in real-time during interventional procedures using a biphasic-ray imaging system," Med Phys 39: 5311-5316 (2012).
 *Nakano et al., "Validation of the performance accuracy of a real-time skin-dose tracking system for interventional fluoroscopy procedure," SPIE 7462:1-10 (2015).
 *Yamamoto et al., "Agreement with a real-time patient skin dose distribution obtained by conventional methods," ICR 111 (2009) 275-279 (2011).

DTS | PATIENT MODELS AND POSITIONING



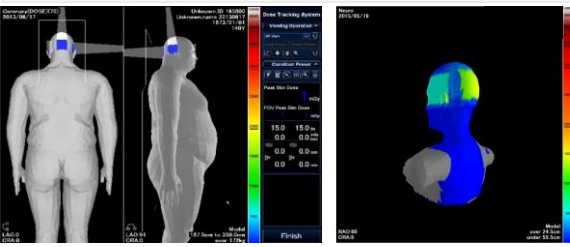
Canon *Skin dose to arms is of secondary value due to smaller body part thickness and variability in position on patient support. DoseRite

DTS | BIPLANE CONFIGURATIONS



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DTS | BODY VERSUS HEAD

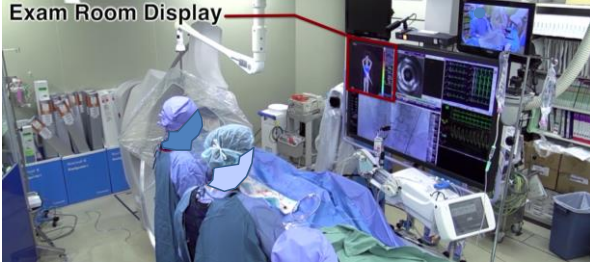


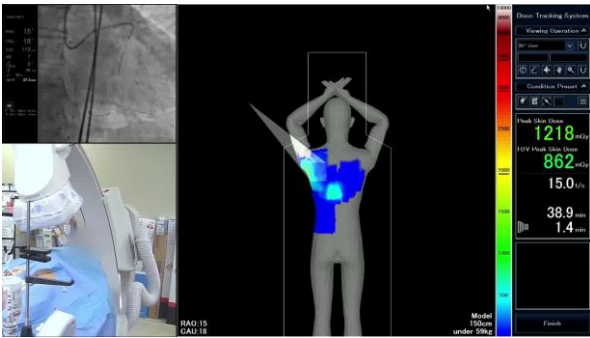
Body Backscatter Factor

Head Backscatter Factor (0.80 - 0.85)

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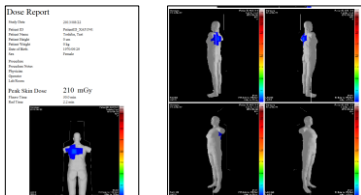
DTS | REAL-TIME Exam Room Display





DTS | REPORTING

- Local Storage of Last 500 Reports (2D and 3D Maps)
- Export to: USB; Windows Networked Drive; External Server via FTP



Deterministic Effect | A CASE REPORT

- 46 Year Old Male
- FGI: Cerebral angio with transvenous coil and glue embolization
- Procedure Time: 150 minutes
- Exposure Time: 67 minutes
- Peak Skin Dose: 2.9 Gy
- Two weeks: nonscarring alopecia
- Four months: complete hair regrowth

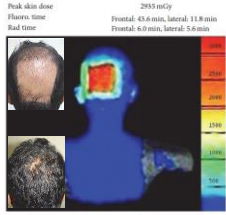
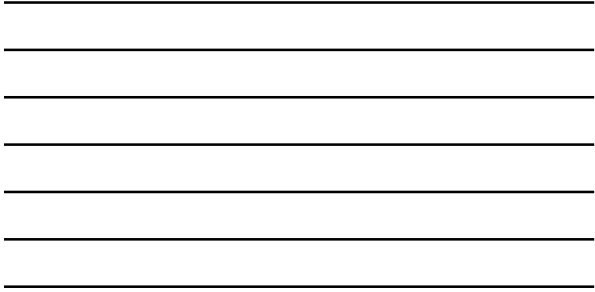


FIGURE 2: The rectangular shape of the radiation field in fluoroscopy-guided endovascular embolization is consistent with alopecia area in our patient.

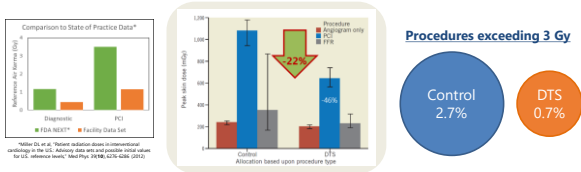
Canon Ounsakul V et al. "Radiation-Induced Alopecia after Endovascular Embolization under Fluoroscopy." Case Reports in Dermatological Medicine. Article ID 8202469 (2016)

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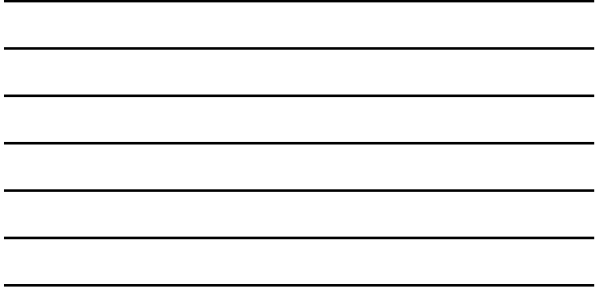
Dose Management | DURING A PROCEDURE

- 6 months pre / post DTS display in exam room
- 16 operators free to choose all imaging parameters
- 1,077 consecutive procedures



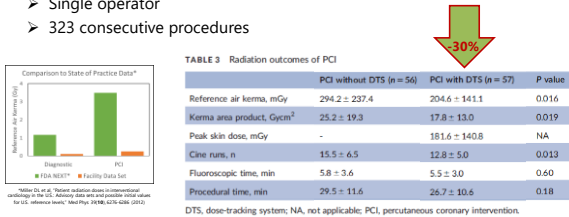
Canon Wilson SM et al. "Real-time colour pictorial radiation monitoring during coronary angiography: effect on patient peak skin dose and total dose during coronary angiography." Eurointervention, 12, e939-e944 (2016)

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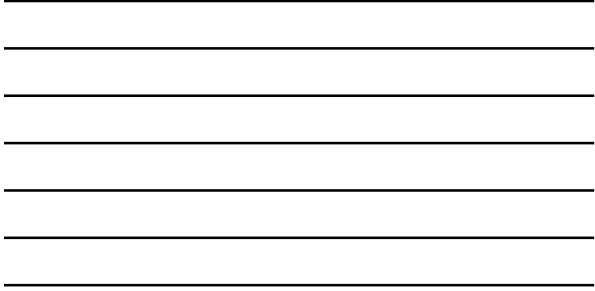
Dose Management | DURING A PROCEDURE

- 5 months pre / post DTS display in exam room
- Single operator
- 323 consecutive procedures

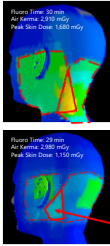


Canon Ichimoto E et al. "Efficacy of radiation dose reduction due to real-time monitoring and visualization of peak skin dose during coronary angiography and PCI." Catheter Cardiovasc Interv. 91(4):717-722 (2018)

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Dose Management | DURING A PROCEDURE



Frequency with which Interventional Radiology Procedures Resulted in Peak Skin Dose Greater Than 1 Gy, 2 Gy, or 3 Gy

Data Source	Procedure Description	Total Cases	> 1 Gy		> 2 Gy		> 3 Gy	
			n	%	n	%	n	%
RAD-IR	Neuroembolization-head (all)	356	286	80%	136	48%	60	17%
	Neuroembolization-spine (all)	18	17	94%	16	89%	10	56%
	Stroke therapy	5	3	60%	0	0%	0	0%
	Carotid Stent	17	3	18%	1	6%	0	0%
RAD-IR	All Related Procedures	396	309	78%	153	39%	70	18%
GWI	All Related Procedures	348	45	13%	9	2.6%	2	0.6%

Table 4. Comparison of PSD with RAD-IR study.

State of Practice: 1 in 5 Exceed Threshold Dose
 Study Population: <1 in 100 Exceed Threshold Dose

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*U.S. WI. *Federal Dose Tracking System. Patient Skin Dose Estimates in Real Time (SMART)

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DoseRite | SUMMARY



Thursday @ 7:30AM, TH-AB-205-1, "Advancements in Radiation Dose Monitoring and Management"

Made For life

For over 100 years, the Canon Medical Systems "Made for Life" philosophy prevails as our ongoing commitment to humanity. Generations of inherited passion creates a legacy of medical innovation and service that continues to evolve as we do. By engaging the brilliant minds of many, we continue to set the benchmark, because we believe quality of life should be a given, not the exception.

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