

Next-Generation Shielding System Significantly Attenuates Occupational Radiation Exposure in the Cardiac Catheterization Laboratory

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Disclosures

Study Authors: No Disclosures

Study Presenter: Founder and CEO, Egg Medical, Inc.

Study Aims

Compare operator scatter radiation exposure during cardiac cath lab procedures with and without Next-Generation Radiation shielding

- Standard Shielding
 - Acrylic hanging shield (0.5mm Pb equivalence)
 - Lower table shield (0.5mm Pb equivalence)



Standard
Shielding

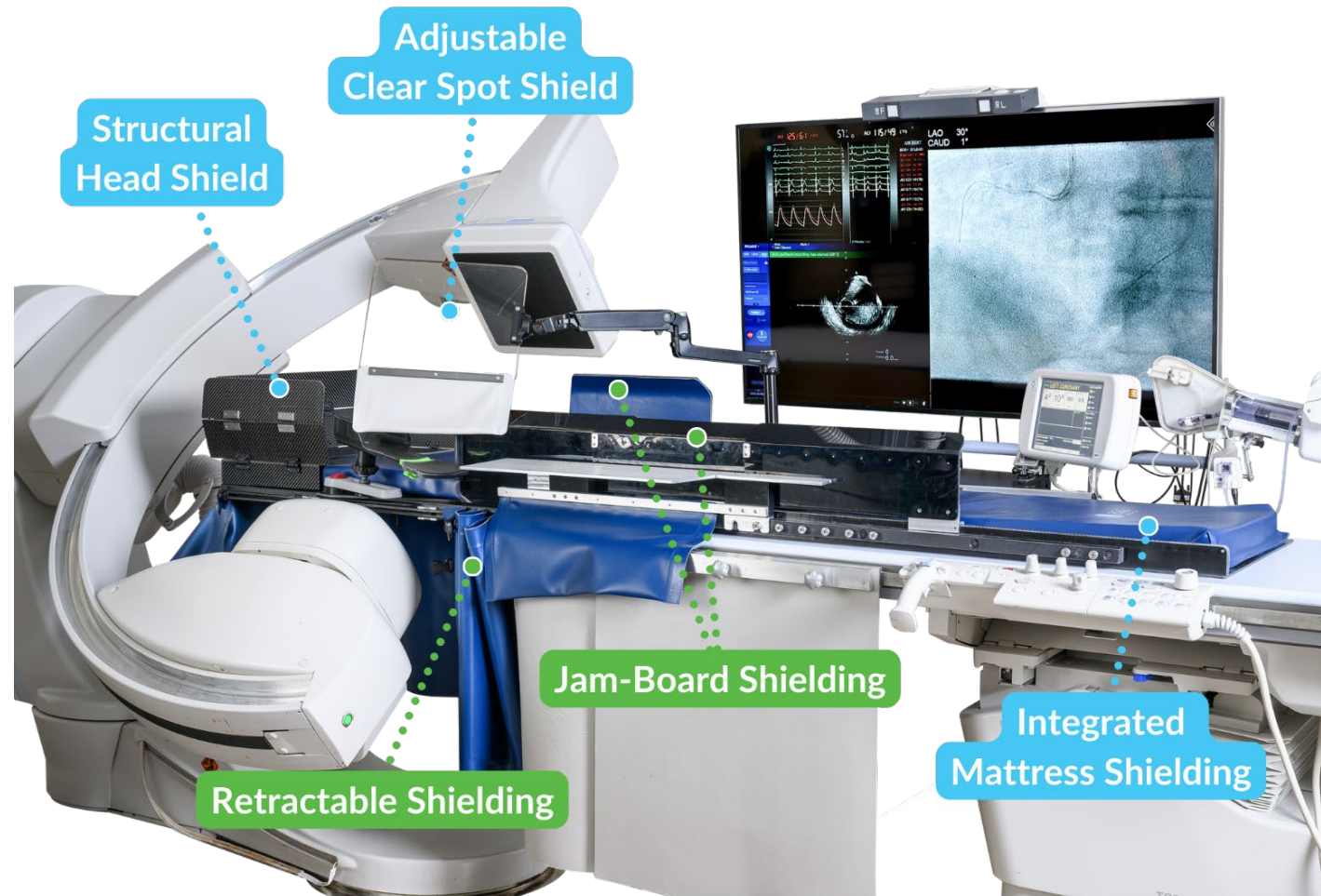
- EggNest Protect Radiation Protection System
(Egg Medical, Inc., Arden Hills, MN, USA)



EGGNEST™
PROTECT

EggNest™ Protect System

- Replaces table mattress with carbon fiber shell and shielded mattress
- Moves with x-ray table
- 360° Protection - Protects Everyone working in the Lab



Study Design

- Study conducted in Cath Lab Rooms A & B over 4 weeks
- Standard Shielding in one room, EggNest™ System in the other
- The operator performed cases alternately in Rooms A & B

Weeks 1 & 2

Room A

Siemens Artis
with
EggNest Protect

Room B

Philips Allura
with
Standard Shielding



Weeks 3 & 4

Room A

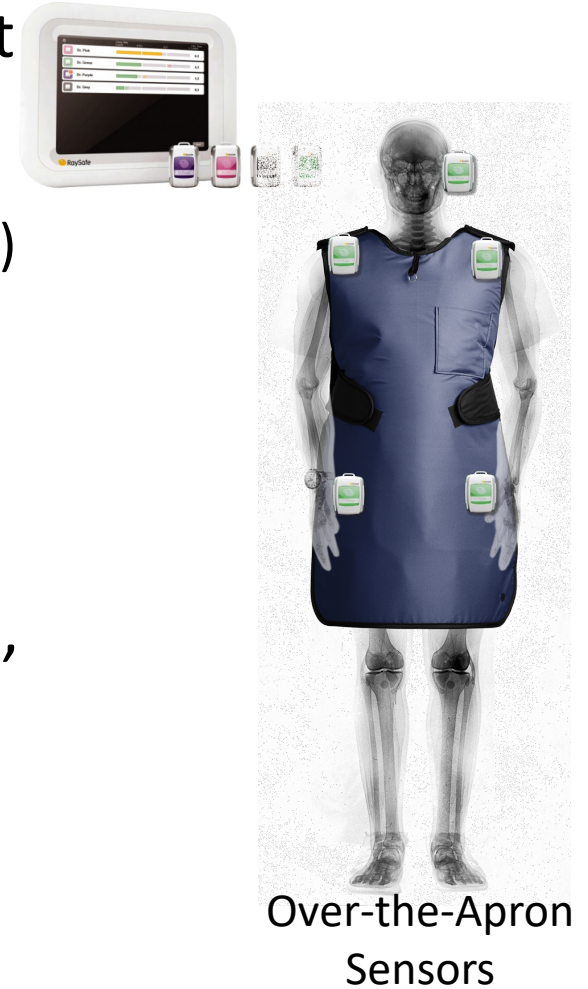
Siemens Artis
with
Standard Shielding

Room B

Philips Allura
with
EggNest Protect

Measurement of Radiation Exposure

- Radiation exposure measured using an i3 measurement system (Fluke Biomedical, Everett, WA, USA) with 9 sensors placed on the operator
 - 4 over the apron (right and left shoulders, right and left waist)
 - 4 under the apron (similar positions)
 - 1 over left ear
- After each case, sensor data downloaded to determine cumulative radiation exposure dose at each position
- The patient Dose-Area Product (DAP), fluoroscopy time, weight, BMI, and procedure type were recorded
- Operator radiation exposure values normalized for patient DAP
 - Total sensor exposure/DAP



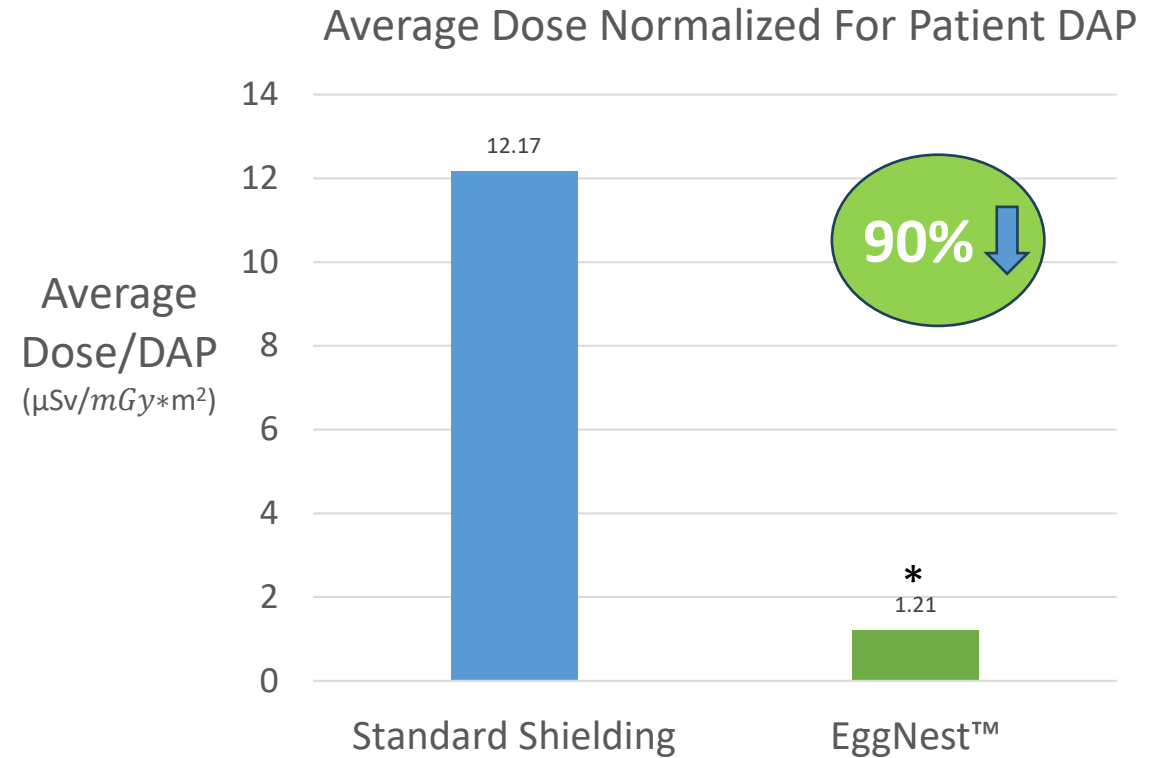
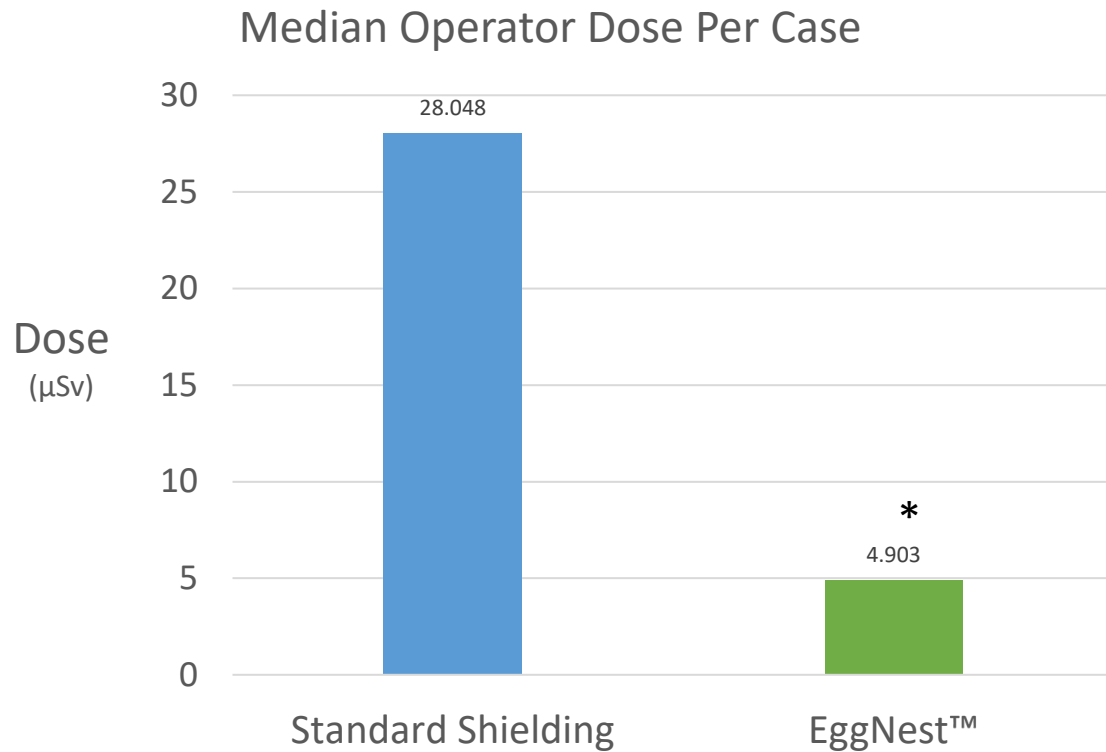
Case Demographics

- 51 patients were studied, 28 using standard Shielding and 23 using the EggNest™ System

	Standard Shielding (n = 28)	EggNest (n = 23)	p value
DAP ($\mu\text{GymGy} * m^2$)	6.0 ± 6.5	7.8 ± 8.5	0.40
Fluoroscopy Time (min)	10.7 ± 10.6	13.5 ± 17.0	0.49
Patient Weight (kg)	90.3 ± 16.9	92.3 ± 28.1	0.76
PCI cases	8	8	
Coronary Angiograms	13	11	
Right Heart Cath (IJ access)	7	4	

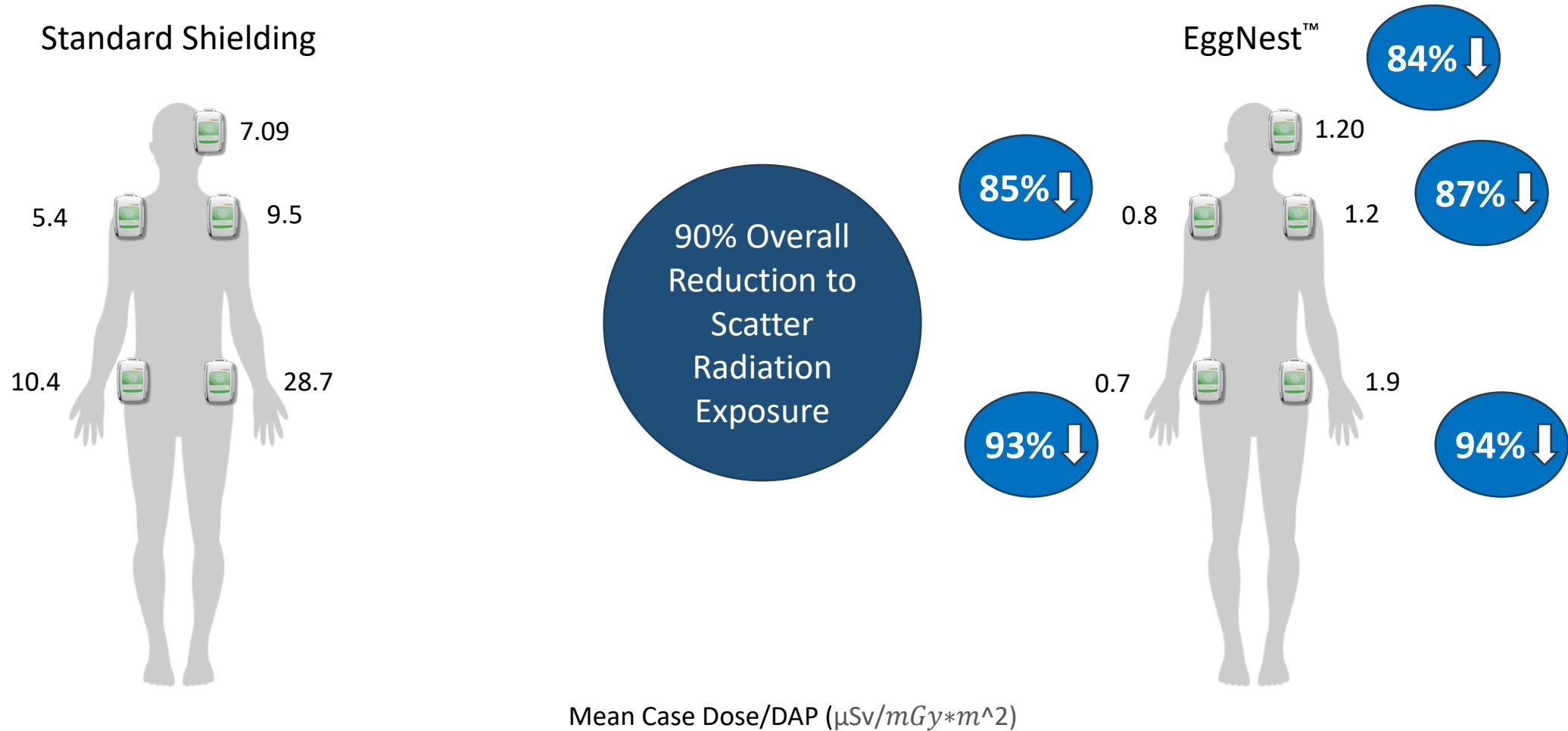
Mean ± SD

Overall Operator Radiation Exposure Standard Shielding V. EggNest™

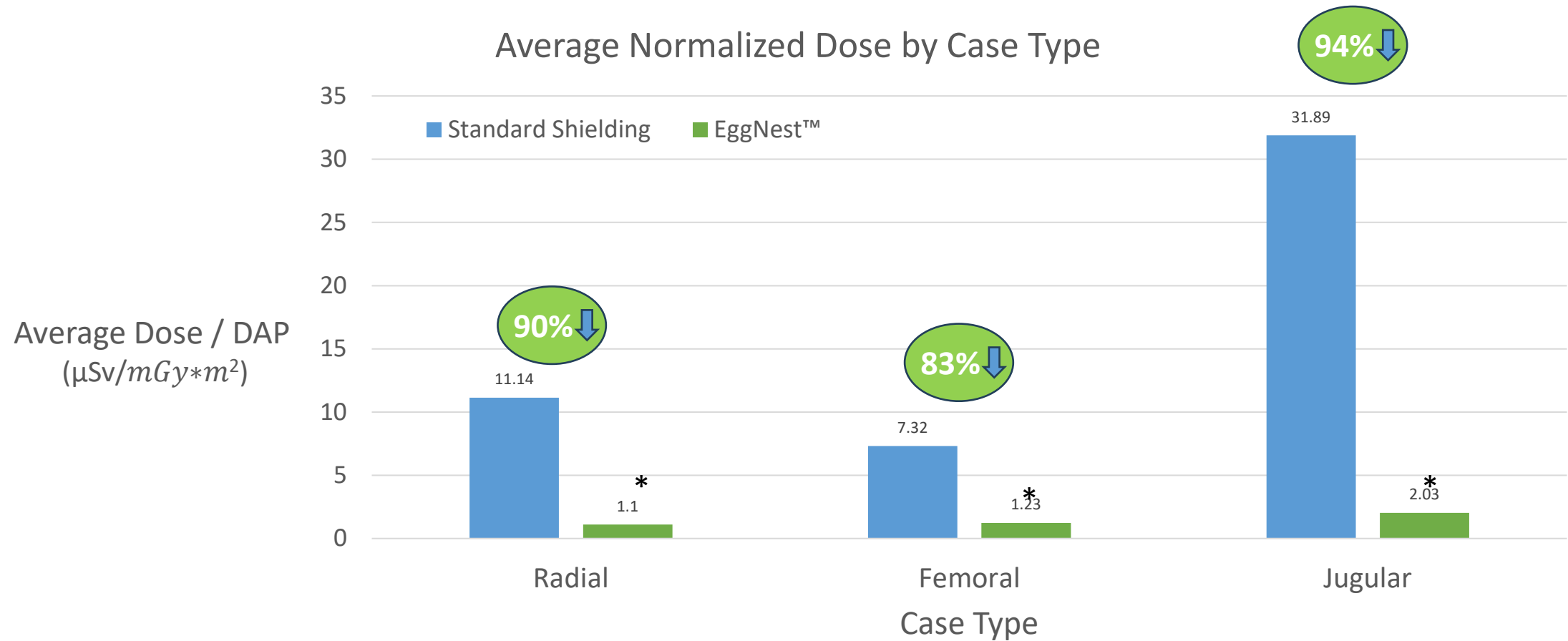


*p < 0.01

Radiation Exposure By Location on Operator



Radiation Exposure by Access Site



*All values for Standard Shielding v EggNest™ $p < 0.01$

Conclusions

- Compared to Standard Shielding, use of the EggNest™ Protect Radiation Protection System reduced operator exposure by an average of 90%.
- The reduction in operator exposure was even higher at the head of the patient.
- These studies show that use of an advanced scatter radiation protection system can dramatically reduce exposure to radiation around the table.
- Achieving radiation exposure that is As Low As Reasonably Achievable (ALARA) has advanced. Standard Shielding no longer provides radiation exposure levels that comply with the ALARA principle.

Radiation Exposure by Case Type

**Average Operator Dose
with Standard Shielding**

	Right Heart (n = 7)	Coronary (n = 13)	PCI (n = 8)
Right Shoulder	1.79	11.62	72.08
Left Shoulder	3.37	14.64	117.73
Right Hip	9.48	25.27	140.51
Left Hip	17.74	66.15	442.72
Head	3.44	13.71	67.17

**Average Operator Dose
with EggNest™ Protect**

	Right Heart (n = 4)	Coronary (n = 11)	PCI (n = 8)
Right Shoulder	0.4	2.21	21.84
Left Shoulder	1.77	3.21	28.87
Right Hip	1.6	2.44	26.29
Left Hip	1.14	6.42	43.89
Head	2.68	4.42	16.52

All Dose Values Reported as Average Dose (μSv)