


-

› you by

 [Browse Posters](#) » [Search result](#) » [Poster ECR 2022 / C-17061](#)

## POSTER SECTIONS

Coverpage

Purpose

Methods and materials

Results

Conclusion

Personal information and conflict of interest

References



ECR 2022 / C-17061

## Effectiveness of Shielding in Computed Tomography Examinations

**Congress:**

ECR 2022

**Poster Number:**

C-17061

**Type:**

Scientific Exhibit

**Keywords:**

Pulmonary vessels, Radiographers, Radioprotection / Radiation dose, CT, Dosimetry, Equipment, Radiation safety, Dosimetric comparison, Occupational / Environmental hazards, Quality assurance

**Authors:**

A. Coelho, K. B. Azevedo, A. Abrantes, S. I. Rodrigues, L. P. V. Ribeiro, B. Vicente, R. P. P. Almeida, O. Lesyuk

**DOI:**

10.26044/ecr2022/C-17061

**DOI-Link:**<https://dx.doi.org/10.26044/ecr2022/C-17061>

## Purpose

Computed Tomography (CT) is an important tool in providing high-quality cross-sectional images of the body using ionizing radiation and computational reconstruction techniques. CT has transformed much of medical imaging by providing three-dimensional views of the organ or body region of interest. CT involves larger radiation doses than the more common, conventional x-ray imaging procedures, and technological developments have contributed to the increase of number and diversity of scanning procedures, in adults and pediatrics patients. Since an increasing number of CT scans are being obtained, the...

[Read more](#)

## Methods and materials

This experimental study consisted of the assessment of dose at-risk organs (thyroid, breast, and gonads) in a full-body anthropomorphic phantom in different configurations. The dose was measured with ionizing chambers and TLD dosimeters, without, shielding in an anterior position and surrounding the patient during performing different CT examinations. In phase 1, a total of 66 CT scans including Head, Chest, Pelvis, and Knee region were performed in a full-body anthropomorphic phantom with standard protocols used at the public hospital without any shielding, with shielding on...

[Read more](#)

## Results

All the results of the present research are presented in the following tables. Table 1 presents results regarding ESD (mGy) on thyroid, breast, and female gonads during skull CT examinations in 3 different configurations. From the results, we observe higher doses without any shielding (6,23 mGy on thyroid, 1,37mGy on breast, and 0,34 mGy on gonads), and higher doses with surrounding protection on thyroid and breast compared to results with shielding on top of the phantom(3,28 mGy vs 2,41 mGy and 0,2 mGy vs 0,18...

[Read more](#)

## Conclusion

It is concluded that the differences observed are because when part of the dispersed radiation from the primary beam is absorbed by the patient or phantom, this radiation is projected in several directions, coming into contact with lead protections and there is a higher percentage reduction in patients (who have organs that absorb radiation and attenuate it) than in the phantom. The shielding should be used in all CT scans to reduce scattered radiation on risk organs and to protect the patients, this protection should...

[Read more](#)

## Personal information and conflict of interest

A. Coelho: Nothing to disclose K. B. Azevedo: Nothing to disclose A. F. C. L. Abrantes: Nothing to disclose S. I. Rodrigues: Nothing to disclose L. P. V. Ribeiro: Nothing to disclose B. Vicente: Nothing to disclose R. P. P. Almeida: Nothing to disclose O. Lesyuk: Nothing to disclose

[Read more](#)

## References

Tepper SJ. Computed tomography - An increasing source of radiation exposure: Commentary. *Headache*. 2008;48(4):657. UNSCEAR. *Attributing Health Effects to Ionizing Radiation Exposure and Inferring Risks*. Vol. I, Sources, Effects and Risks of Ionizing Radiation. 2012. 1-497 p. Alsafi KG. Radiation Protection in X-Ray Computed Tomography: Literature Review. *Int J Radiol Imaging Technol*. 2016;2(2). Saeedi-Moghadam, M., Tayebi, M., Chegeni, N., Sina, S., & Kolayi, T. (2021). Efficiency of non-lead and lead thyroid shields in radiation protection of CT examinations. *Radiation Physics and Chemistry*, 180(October 2020), 109265....

[Read more](#)

Scan	Location	Setup	E (mG)	Mean ESD (mG)	Standard Deviation
Skull CT	Thyroid	No Protection	0.27	0.23	0.01
		Surrounding Protection	0.11	0.28	0.08
	AP Protection	No Protection	0.13	1.40	0.20
		Surrounding Protection	0.14	1.37	0.20
	Breast	No Protection	0.14	0.10	0.01
		Surrounding Protection	0.02	0.10	0.01
	AP Protection	No Protection	0.02	0.08	0.01
		Surrounding Protection	0.01	0.08	0.01
	Wrist/Gonads	No Protection	0.01	0.04	0.01
		Surrounding Protection	0.00	0.04	0.01
AP Protection	0.01	0.05	0.01		

**Fig 1: Table 1 - Phase 1 results of measurements with the ionizing chamber on...**

Scan	Location	Setup	ESD (mG)	ESD (mG)	Standard Deviation
Diet CT	Pan-Gonads	No Protection	0.04	0.04	0.02
		Surrounding Protection	0.07	0.17	0.01
	AP Protection	No Protection	0.28	0.01	0.01
		Surrounding Protection	0.04	0.02	0.01
IMACT	Breast	No Protection	0.18	0.28	0.04
		Surrounding Protection	0.18	0.28	0.04
	AP Protection	No Protection	0.14	0.04	0.01
		Surrounding Protection	0.12	0.04	0.01
Diet CT	Pan-Gonads	No Protection	0.04	0.04	0.01
		Interventional/Gap	0.04	0.04	0.01
AP Protection	0.11	0.04	0.01		

**Fig 2: Table 2 - Phase 1 results of measurements with the ionizing chamber on...**

TLD	Scan	Protection	Location	ESD (mG)
1		No Protection		0.16
3	Skull TC	AP Protection	Thyroid	0.49
5		Surrounding Protection		0.10
2	Skull TC	No Protection	Breast	0.24
4		AP Protection		0.08
6		Surrounding Protection		0.06
7		No Protection		0.17
8	Chest TC	AP Protection	Wrist's/Gonads	0.67
9		Surrounding Protection		0.10

**Fig 3: Table 3 - Phase 2 Results of TLD measurements on anthropomorphic phantom during...**

TLD	Scan	Protection	Location	ESD (mG)
10		No Protection		0.12
12	Skull TC	AP Protection	Thyroid	0.44
14		Surrounding Protection		0.12
11		No Protection		0.26
13	Skull TC	AP Protection	Breast	0.04
15		Surrounding Protection		0.11
16	Skull TC	No Protection		0.04
18	Skull TC	AP Protection		0.03
14	Chest TC	No Protection	Wrist's/Gonads	0.29
17	Chest TC	AP Protection		0.12
19	Chest TC	Surrounding Protection		0.12

**Fig 4: Table 4 - Phase 3 Results of TLD measurements on patients during Head and chest...**