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Effect of kVp, mAs, and Patient Position on Radiation Dose to the Thyroid in Chest X-ray Examination: Phantom Study

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Background

In the realm of medical imaging, chest X-ray scans have become widespread for identifying and diagnosing disorders in the chest. As a result, the number of cancer cases associated with radiation exposure has increased. One of the incidences is the increasing number of thyroid cancers. The goal of this study was to look at how different exposure parameters and patient positions affect the amount of radiation that gets to the thyroid during a chest X-ray examination.

Materials and Methods

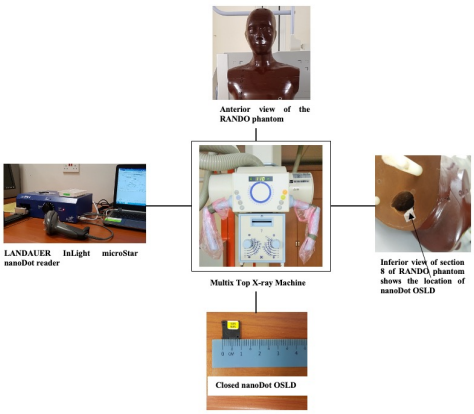

Figure 1: Shows the equipment and phantom used in the study.

Table 1: Summary of projections and exposure factors in the study.

Chest Projections	Parameters	Details
AP	Tube Voltage (kVp)	113, 117, 121, 125
PA	Tube Current-Exposure Time (mAs)	2.0, 2.5, 2.8
Lateral	Source-to-Image Distance (cm)	180
LAO	Central Ray	At the center of the grid: Level of T7
RPO	Focal Spot	Large focal spot
	Grid	Bucky wall stand
	Automatic Exposure Control (AEC)	Off

Results and Discussion

The graph shows the mean radiation dose to the thyroid for different projections at various exposure factors for chest X-ray examination.

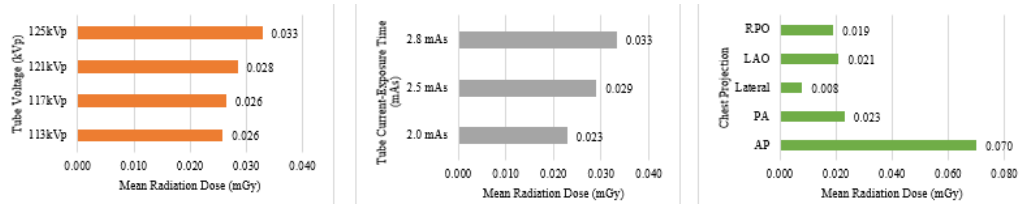

Figure 2: Shows the mean radiation dose to thyroid at different kVp, mAs and projections.

Conclusions

Factors like exposure and projections significantly affect the thyroid dosage in chest X-ray examinations. To minimise the occurrence of thyroid cancer related with medical exposure, it is necessary to adopt stringent efforts to reduce thyroid dose.

Bibliography

1. Chang, L. A., Miller, D. L., Lee, C., Melo, D. R., Villoing, D., Drozdovitch, V., Thierry-Chef, I., Winters, S. J., Labrake, M., Myers, C. F., Lim, H., Kitahara, C. M., Linet, M. S., & Simon, S. L. (2017). Thyroid radiation dose to patients from diagnostic radiology procedures over eight decades. *Health Physics*, *113*(6), 458–473. https://doi.org/10.1097/hp.0000000000000723
2. Zhang, Y., Chen, Y., Huang, H., Sandler, J., Dai, M., Ma, S., & Udelsman, R. (2015). Diagnostic radiography exposure increases the risk for thyroid microcarcinoma. *European Journal of Cancer Prevention*, *24*(5), 439–446. https://doi.org/10.1097/cej.0000000000000169
3. Sinnott, B., Ron, E., & Schneider, A. B. (2010). Exposing the thyroid to radiation: A review of its current extent, risks, and implications. *Endocrine Reviews*, *31*(5), 756–773. https://doi.org/10.1210/er.2010-0003
4. Do, K. H. (2016). General principles of radiation protection in fields of diagnostic medical exposure. *Journal of Korean Medical Science*, *31*(Suppl 1), S6–S9. https://doi.org/10.3346/jkms.2016.31.s1.s6
5. Searboro, S. B., Cody, D., Stingo, F. C., Alvarez, P., Followill, D., Court, L., Zhang, D., McNitt-Gray, M., & Kry, S. F. (2018). Calibration strategies for use of the nanoDot OSLD in CT applications. *Journal of Applied Clinical Medical Physics*, *20*(1), 331–339. https://doi.org/10.1002/acm2.12491