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# Estimation of Radiation Risk to The Abdominal Organs During CT Procedure

KEYWORDS: Patient Dose, CT examination, Abdomen, Dose length Product (DLP).


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**ABSTRACT** *Objectives of the study: To estimate patient dose (DLP) during CT examination for, abdomen by sixteen and sixty four slice CT machines.*

*Materials and Methods: CT scanner that used in this study was helical CT scanners. The three scanners displayed Dose Length Product (DLP). The data were collected from each CT scanner.*

*Results and Discussion: researchers found that, for the abdominal procedure in the two hospitals using three machines, there was direct proportionality between the DLP and the scan time. The findings of this study agreed with the results found in the literature.*

*Conclusion: The researchers concluded that DLP & scan time in CT abdominal procedure are directly proportional to each other.*

**Introduction:**

The increased use of diagnostic imaging requiring the use of "ionizing radiation" the rapidly expanding use of computed tomography in the emergency setting, the introduction of multi-detector CT units and newly reported concerns related to the human consequences of low-level radiation exposure have revitalized a long-standing concern over the quantification and management of an individual's cumulative "medical" radiation exposure[1,2,3,4]. Studies have shown that many physicians, including radiologists, have developed a misconception that the shorter imaging acquisition times have resulted in lower doses of radiation, when in fact many times the opposite is true. The multidetector CT units today, even with shorter scan times, expose patients to higher doses of radiation per scan than earlier units.Body parts located in the central part of the body (chest/abdomen and pelvis) generally require higher levels of radiation exposure in order to obtain adequate imaging[4]. While it is possible that with a spiral CT patients can receive a lower dose of ionized radiation compared to a "slice-by-slice" CT, often this is not the case. The technique of the spiral image often exposes the patient to higher doses due to scan volume, mAs, pitch and slice width[4,5].Although some estimates have been madeof cancer risks to adults attributable to the radiation from CT examinations [6,7,8], no suchestimates have been made for children.This study was intended to To estimate patient dose (DLP) during CT examination for, abdomen by sixteen and sixty four slice CT machines. The entire hospitals passed successfully the extensive quality control tests performed by Sudan atomic energy commission and met the criteria of this study.

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**Materials and Methods:**
**Materials:** CT equipmentused in the study

**Table 1: demonstrates CT machines used in this study**

| Slice No. | Manufacturer | Detector type |
|---|---|---|
| 16 slice | Neusoft | 16 rows |
| 16 slice | SiemensSomatom | 16 rows |
| 64 slice | ToshibaAquilion | 64 rows |

**Study sample:** 111 patients were examined for CT abdomen

**Methods and Technique used:** All metallic objects were removed. Use sedation or anesthesia (no motion during scan). Empty stomach if anesthesia or contrast media indicated. Patient supine and head first. Positioning the four light lines (sagittal, coronal and two transverse "internal-external") to put the part that to be examined in x-ray field. For abdomen scan by 16 and 64 slice" 5mm slice thickness .Axial cuts all the abdomen.All multi detector CT scanner scan with 0.5 mm then reconstruct the images according to the selected protocol "2mm, 3mm, 5mm .etc" When the patient lies in correct position, spiral technique is used. The advantage of spiral technique is short scan time and low dose to the patient. The low dose in spiral technique depends on some factors (mAs, KV, pitch slice thickness).

**Interpretation:** Data were collected using a sheet for all patients in order to maintain consistency of the information from display .A data collection sheet was designed to evaluate the patient dose using the variableDLP.

**Results:** In this study, a total of 111 patients were examined in two Hospitals using three machines in Khartoum state over 3 months. Figure 1 demonstrates the correlation between the DLP for the abdominal procedure in the two hospitals by three machines and the scan time.

**Figure 1: Shows: The correlation between the DLP for the abdominal procedure in the twohospitals by three machines and the scan time.**

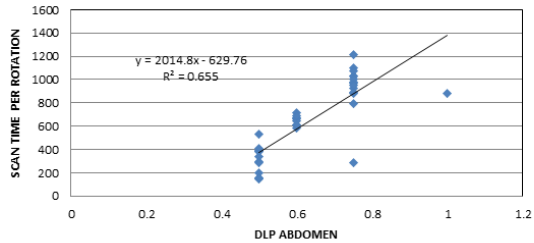
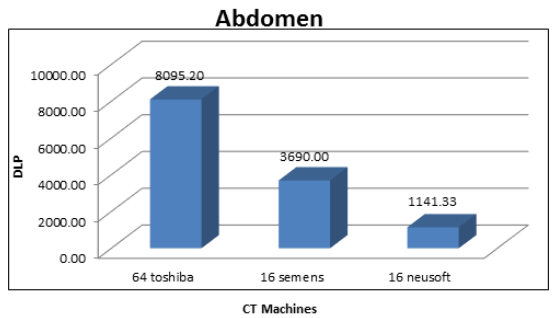



**Figure 2: Shows The correlation between the DLP for the abdominal procedure in the two hospitals by three machines.**




**Discussion and Conclusions:**
CT scanning has been recognized as a high radiation dose modality, when compared to other diagnostic x.ray techniques. Since its launched into clinical practice more than 30 years ago, as scanner technology, it has developed and advanced largely and its use has become more wide spread. However, concerns over patient radiation dose risk from CT have grown. And the introduction of multi-slice scanners has focused further attention on this issue, and in the current study the researchers found that for the abdominal CT procedure in the two hospitals, using three machines, there was direct proportionality between the DLP and the scan time. Abdominal CT procedure = DLP & scan time. The DLP for the abdominal CT procedure are high when 64 Toshiba Aquilion, 16 Siemens Somatom and 16 Neusoft are used respectively in the two hospitals by three machines.

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