COMPARISON OF RADIATION DOSE IN ABDOMEN-PELVIS AND TRUNK IMAGING BETWEEN 64 SLICE AND 16 SLICE CT

Corina Mariana Pera[1,4], Olga Irina Girjoaba[2,3],

Alexandra Cucu[3] ,Malaescu Iosif [4]

[1]Emergency Hospital Resita

[2]Academica Medical Center Bucuresti

[3] National Institute of Public Health Bucuresti

[4]West University of Timisoara

INTRODUCTION

- CT techniques developed in recent years and the excellent quality of radiological images provided by CT equipment have led to a rapid increase in the frequency of use of computed tomography procedures.
- The doses received by patients from medical exposures due CT procedures are much higher compared to the doses of conventional radiology.
- As a result, computed tomography has become a major source of radiation exposure of the patients, imposing a special attention to the optimization and justification.

PURPOSE

The purpose of this study is to compare the patient dose of some of the most exposure multi-phase scanning clinical protocols examinations

- abdomen-pelvis (AP) CT examination,
- trunk (chest, abdomen and pelvis - CAP) CT examinations

using two CT equipments, one of 64 slices and one of 16 slices:

- Siemens Definition 64 slice
- GE BrightSpeed 16 slice

METHODS

- To estimate the patient dose, the exposure parameters and patient data for groups of 30 patients (15 female and 15 male) for every protocol and every CT equipment were collected.
- The radiological image quality scoring was done by radiologists as “acceptable” and “higher than needed”.
- Average values were compared for the two CT units:
  - CTDIvol and DLP, estimated based on recorded data,
  - DLP resulted by the use of ImpactDose software package (version 2.2).
- The effective doses were estimated for each patient using the computational model of the RP 154 publication, as well as using the ImpactDose software.

Table No. 1 Typical scan parameters for each type of CT

Siemens Somatom Definition 64 slice			GE Bright Speed 16 slice		
Scan Parameters			Scan Parameters		
Scan type	Spiral		Scan type	Spiral	
Voltage (kV)	120		Voltage (kV)	120	
Rotation time (s)	0.5		Rotation time (s)	0.8	
Sequence	Abdomen-Pelvis	Trunk	Sequence	Abdomen-Pelvis	Trunk
Slice thickness (mm)	3	3	Slice thickness (mm)	1.25/2.5	1.25/2.5/5
Pitch	0.6	1	Pitch	1.375	1.375
Dose indicators			Dose indicators		
Sequence	Abdomen-Pelvis	Trunk	Sequence	Abdomen-Pelvis	Trunk
Mean CTDIvol (mGy)	12.44	10.88	Mean CTDIvol (mGy)	13.72	13.09
CTDI phantom	32	32	CTDI phantom	32	32
Mean DLP (mGy x cm)	2877	2672	Mean DLP (mGy x cm)	2342	2833

RESULTS

- For AP examinations, the average values for DLP and effective dose are substantially higher for 64-slice CT unit, although the average CTDIvol is lower for 64-slice.
- In the case of CAP examinations, the average CTDI is substantially lower for 64-slice CT unit, the average values for DLP and effective dose having the same trend.
- For 64-slice CT, comparing the value obtained for AP with the value for CAP, we notice that DLP is lower for CAP, although the scanned length is higher, the reason being the values for CTDI much lower for CAP.
- For 16-slice CT unit, CDTI values are close for the two procedures, such that the DLP value for CAP is higher than for AP.

RESULTS

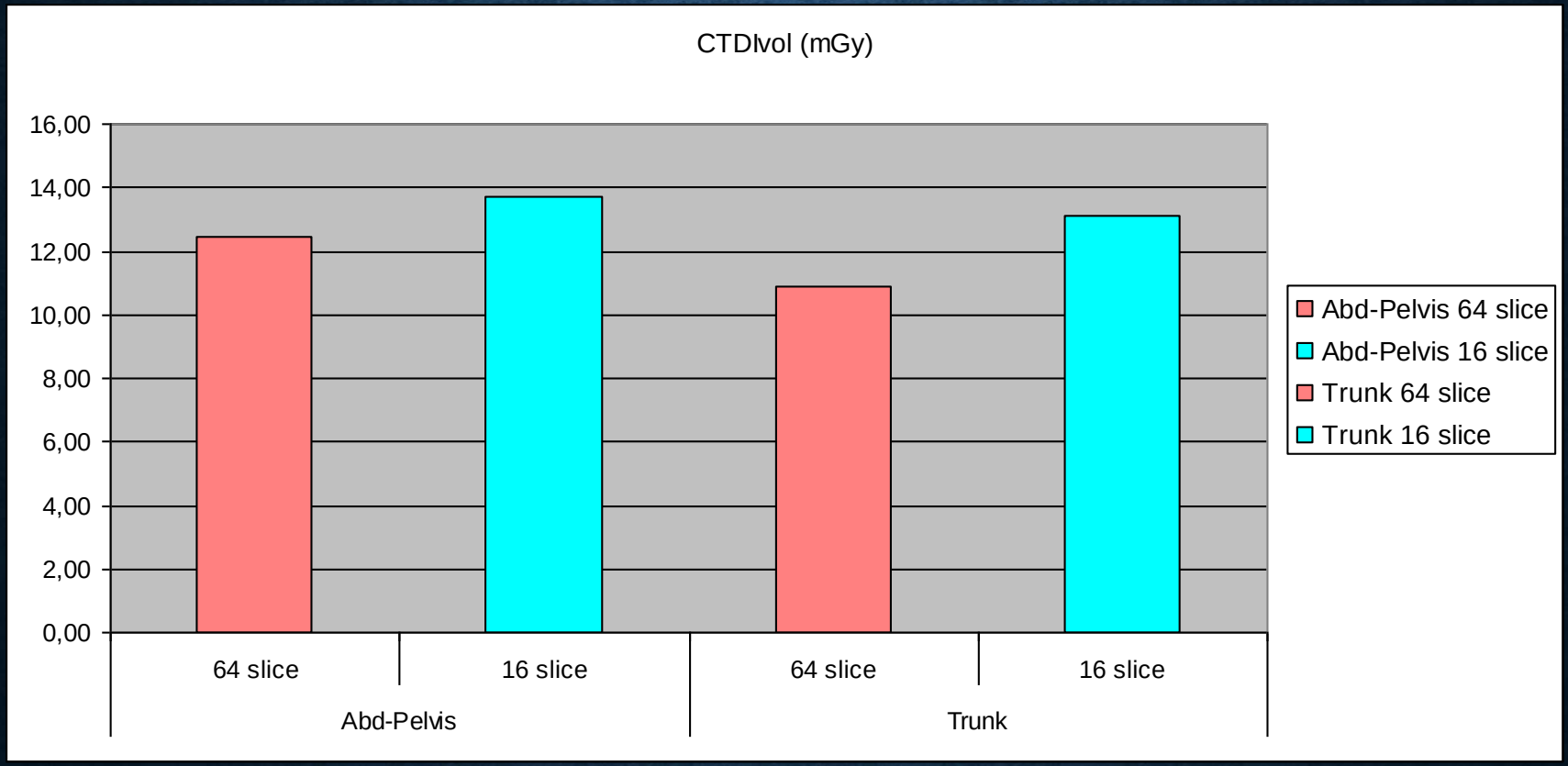

Fig.1 CTDIvol (mGy) for 64 slice and 16 slice CT equipment for AP and CAP procedures

RESULTS

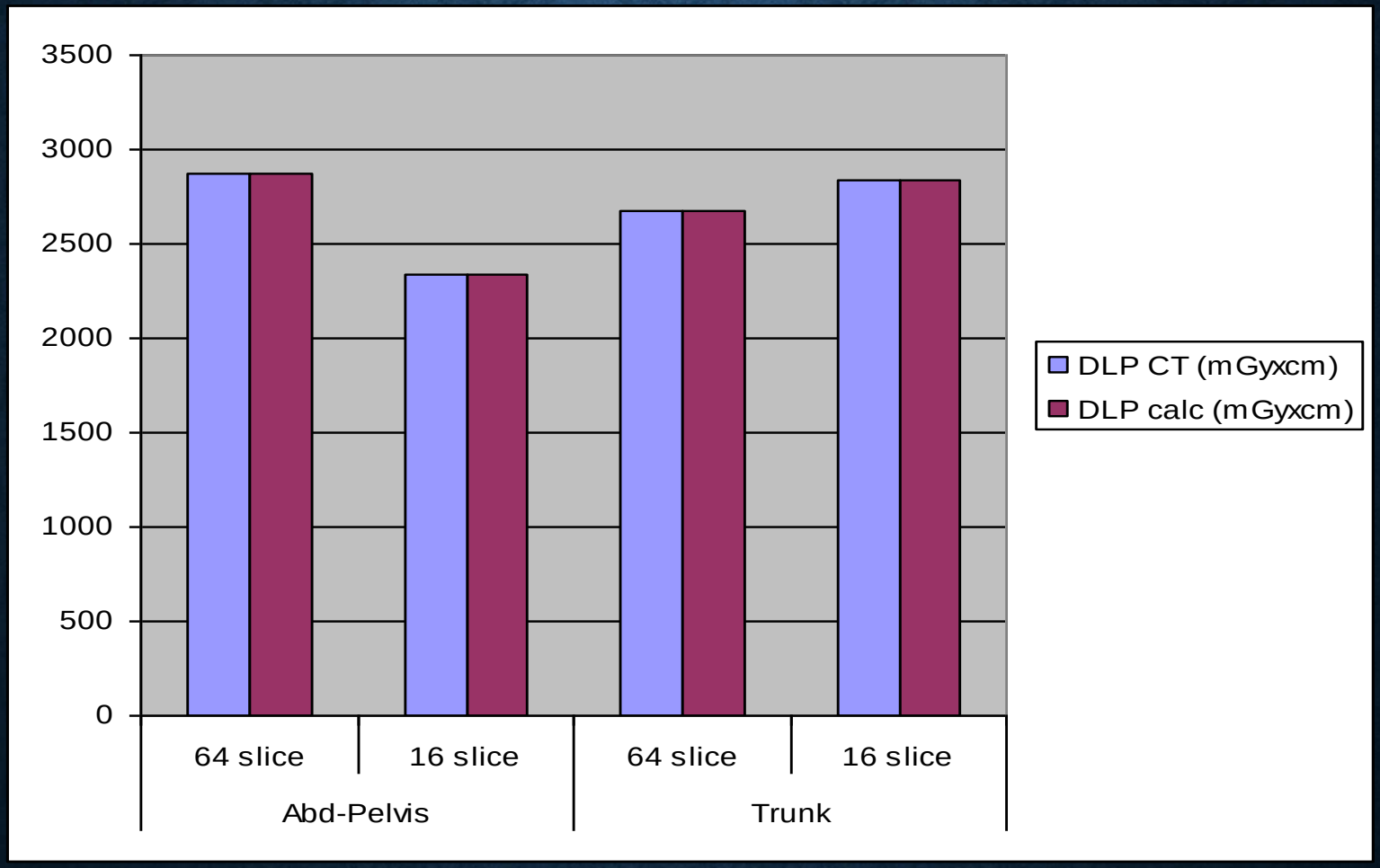

Fig.2 Avarage DLP (mGy x cm) for 64 slice and 16 slice CT equipment for AP and CAP procedures

RESULTS

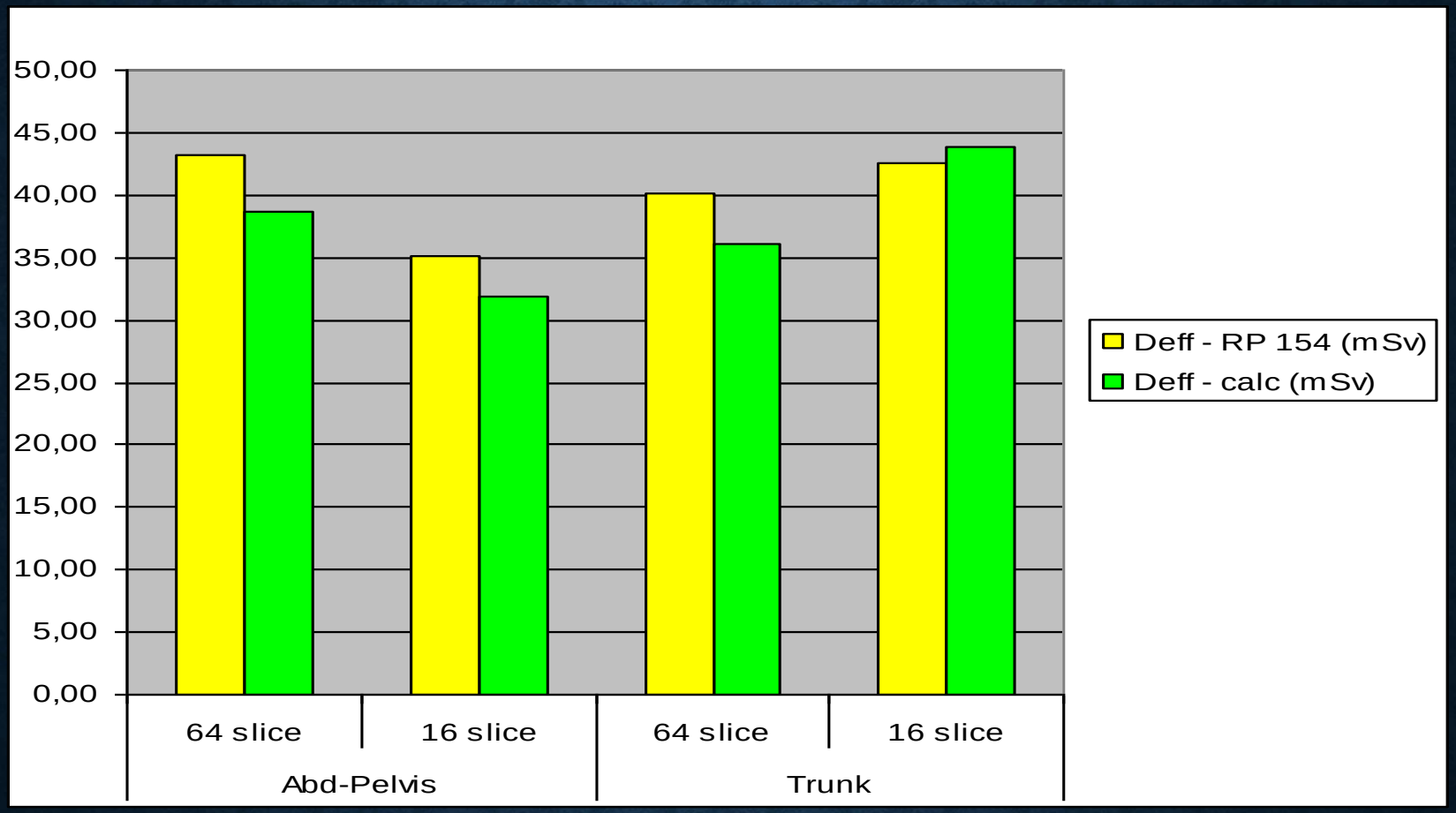

Fig.3 Effective dose (mSv) for 64 slice and 16 slice CT equipment, for AP and CAP procedures.

CONCLUSION

- The study exemplifies the importance of optimizing multi-phase scanning protocols, since they can lead to high levels of doses received by patients during large numbers of examination sequences, even if CT equipment have below the baseline CTDI and DLP values per examination sequence.