Estimating cancer induction risk from abdominopelvic scanning with 6- and 16-slice computed tomography

Parinaz Mehnati[a], Ayoub Amirnia[b], Nasrollah Jabbari[c*]

[a]Associate Professor of Medical Physics (Ph.D.), Immunology Research Center, Department of Medical Physics, School of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

[b]MSc student, Department of Medical Physics, School of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

[c]Associate Professor of Medical Physics (Ph.D.) Solid Tumor Research Center, Urmia University of Medical Sciences, Urmia, Iran

Keywords: computed tomography, cancer induction risk, abdominopelvic CT scan

ABSTRACT:

Computed tomography (CT) is one of the imaging modalities to staging and study of diseases. Several studies have shown that radiation dose to patients in CT scans is higher than radiographic methods. So that, study of side effects of radiation dose to patients is necessary due to high dose of CT scans examinations. In this study Estimating cancer induction risk from abdominopelvic CT scanning was assayed.

Materials and methods: A cross-sectional study on 200 patients with abdominopelvic CT scan from 6- and 16-slice scanners was conducted. The dose-length product (DLP) and volume CT Dose Index (CTDIvol) values from the scanners as well as the effective dose values from the ImPACT CT patient dosimetry calculator with the biological effects of ionizing radiation (BEIRVII) method were used to estimate the cancer induction risk.

Results: The mean values of $CTDI_{vol}$ and DLP were obtained 6.9 mGy and 306.44 mGy.cm for 6 slice, and 5.19 mGy and 219.7 mGy.cm for 16 slice scanners, respectively. The effective dose in presence and absence of contrast media were calculated 5.01 and 4.73 mSv, for the 6 slice scanner. These values for the 16 slice were calculated to 3.18 and 3.26 mSv, respectively.

The mean and standard deviation values of effective dose in the 6-slice scanner was determinate to 4.93 ± 0.59 mSv and, in the 16-slice scanner 3.21 ± 0.47 mSv. The mean and of total cancer induction risk in abdominopelvic examinations were obtained 136 and 135 for men and women per 100000 people in the 6-slice CT scanner, respectively. The related values were obtained 126 and 127 for men and women in the 16-slice scanner, respectively.

Conclusions: The cancer induction risk of abdominopelvic scanning result was not more than diagnoses reference dose. Also, the results showed that value of effective dose in the 6 slice scanner was more than the16 slice scanner. Therefore the cancer induction risk to the patients in 16 slice scanner was less than the 6 slice scanner (about %7).