TIPIČNE CT DOZE PRI PET/CT PREISKAVH V SLOVENIJI

TYPICAL ADULT CT DOSES OF PET-CT EXAMINATIONS IN SLOVENIA

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IZVLEČEK

Uvod: Hibridno slikanje, pri katerem pozitronsko emisijsko tomografijo (PET) združimo z računalniško tomografijo (CT), omogoča natančnejšo lokalizacijo in karakterizacijo bolezni, vendar pomembno poveča dozno obremenitev pacientov.

Namen: Namen raziskave je bil določiti tipične izpostavljenosti pacientov zaradi CT slikanja pri najpogostejših PET-CT protokolih v Sloveniji.

Metode: Na vseh treh PET-CT napravah v Sloveniji smo zbrali podatke za skupno 565 bolnikov, ki so v obdobju 11 mesecev opravili PET-CT preiskavo. Upoštevani so bili trije najpogostejši protokoli, ki obsegajo približno 2/3 vseh PET-CT preiskav, opravljenih v Sloveniji. Ker je število PET-CT naprav v Sloveniji prenizko za določitev nacionalnih DRL, smo sledili priporočilom ICRP in določili tipične vrednosti DRL količin kot mediane vrednosti združenega niza podatkov. Za vsako enoto smo določili povprečje, mediano in standardni odklon CT doznega indeksa ($CTDI_{vol}$) ter produkta doze in dolžine preiskovalnega polja (DLP) za CT del izbranih protokolov. Da bi opredelili možna izstopanja, smo izvedli tudi primerjavo tipičnih izpostavljenosti med enotami.

Rezultati: Ugotovljene tipične vrednosti skupnega DLP so 295 mGy·cm za PET/CT slikanje od baze lobanje do sredine stegnenic, 359 mGy·cm za PET/CT slikanje od vrha glave do sredine stegnenic in 676 mGy·cm za PET/CT slikanje od vrha glave do vključno prstov na nogah. Pripadajoče vrednosti $CTDI_{vol}$ so 3,05 mGy, 3,22 mGy oziroma 3,60 mGy.

Razprava in zaključek: Rezultati predstavljajo prve podatke o tipičnih vrednostih DRL količin za CT del najpogostejših PET-CT preiskav v Sloveniji. Primerjava podatkov med enotami je pokazala bistveno višje ($p < 0,001$) izpostavljenosti bolnikov v eni od enot, kar kaže na potrebo po optimizaciji.

Ključne besede: pozitronska emisijska tomografija – računalniška tomografija, računalniška tomografija, diagnostično referenčne ravni, doze, optimizacija

ABSTRACT

Introduction: Hybrid imaging, which combines positron emission tomography (PET) with computed tomography (CT), allows more accurate localization and characterization of the disease but significantly increases the dose load of patients.

Purpose: The purpose of the study was to determine the typical dose exposures of patients due to CT imaging in the most common PET-CT protocols in Slovenia.

Methods: Data on a total of 565 patients who underwent PET-CT examination over a period of 11 months were collected on all three PET-CT devices in Slovenia. The three most common protocols were taken into account, comprising approximately 2/3 of all PET-CT examinations performed in Slovenia. As the number of PET-CT devices in Slovenia is too low to determine national DRLs, we followed the ICRP recommendations and determined the typical values of DRL quantities as the median values of the combined data set. For each unit, we determined the mean, median, and standard deviation of the CT dose index ($CTDI_{vol}$) and the dose and length of the test field (DLP) product for the CT portion of the selected protocols. To identify possible deviations, we also performed a comparison of typical exposures between units.

Results: Typical total DLP values are 295 mGy · cm for PET / CT imaging from the base of the cranium to the middle of the femur, 359 mGy · cm for PET / CT imaging from the top of the head to the middle of the femur and 676 mGy · cm for PET / CT imaging from the top of the head up to and including the toes. The corresponding $CTDI_{vol}$ values are 3.05 mGy, 3.22 mGy and 3.60 mGy, respectively.

Discussion and conclusion: The results represent the first data on typical values of DRL quantities for CT as part of the most common PET-CT examinations in Slovenia. Comparison of data between units showed significantly higher ($p < 0.001$) patient exposures in one of the units, indicating the need for optimization.

Keywords: positron emission tomography – computed tomography, computed tomography, diagnostic reference levels, doses, optimization

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