

## **The volume-metabolic combined parameters from $^{18}\text{F}$ -FDG PET/CT may help predict the outcomes of cervical carcinoma**

Yanqin Sun (The Tumor Hospital Affiliated to the Harbin Medical University, China), Peiou Lu (The Tumor Hospital Affiliated to the Harbin Medical University, China), Lijuan Yu\* (corresponding author, The Tumor Hospital Affiliated to the Harbin Medical University, China)

**BACKGROUND:**  $^{18}\text{F}$ -FDG PET/CT has been shown to be useful in staging, monitoring therapy response, and predicting prognostication of primary cervical cancer. Recent studies have shown that the volume-based parameter of  $^{18}\text{F}$ -FDG PET, 3-dimensional measurements of total tumor metabolic activity, is a more useful measure than the concentration-based SUV in many cancers. Various quantitative and qualitative  $^{18}\text{F}$ -FDG PET/CT parameters have been found to be useful predictors of survival in primary cervical cancer. Among those, maximum standardized uptake value (SUVmax) and metabolic tumor volume (MTV) have been reported to be independent prognostic factors in patients with primary cervical cancer.

**HYPOTHESIS:** We intended to identify the prognostic value of volume-based PET/CT metabolic parameters (WB-MTV, WB-TLG, CMTV, and CTLG) in patients with cervical carcinoma.

**METHODS:** Retrospectively reviewed 91 consecutive patients' whole-body FDG-PET/CT images, and further measured and calculated FDG PET/CT volume-metabolic parameters, including cervical metabolic tumor volume (CMTV), cervical total lesion glycolysis (CTLG), whole body MTV (WB-MTV), whole body TLG (WB-TLG). Two experienced PET/CT physicians reviewed and interpreted the PET/CT images on a Xeleris WorkStation (GE Healthcare, Milwaukee, WI, US). Disagreements were resolved by discussion to reach a consensus interpretation. The distant metastases and lymph node metastases are confirmed by pathology, other imaging modalities or long-time follow up. For quantitative (or semi-quantitative) image analysis, i.e. measuring the metabolic parameters MTV and TLG, volume of interest (VOI) was defined over the lesion using PET Volume Computerized Assisted Reporting (PETVCAR) on an Advantage Workstation 4.5 (GE Healthcare, Milwaukee, WI, US) with a threshold of 40% of the SUVmax. To evaluate the effect of distant metastatic lesions on the prognosis, WB-MTV was obtained as the summation of the MTV of primary cervical lesion (CMTV) along with the MTV values of metastatic lesions on whole-body PET/CT images. Similarly, WB-TLG was the summation of cervical cancer TLG (CTLG) plus TLG values from each individual metastatic lesion. The receiver operating characteristic curve (ROC) was used to obtain suitable cutoff points for CMTV, WB-MTV and WB-TLG. Cox proportional hazard regression analysis was carried out to assess the prognostic value of the tumor metabolic factors including CMTV, CTLG, WB-MTV, WB-TLG, and SUVmax.

**RESULTS:** The median of OS duration was 25 months with a range of 11–69 months. The 1-, 5-year OS were 85% and 71%, respectively. The overall survival was 88.8% for patients with low CMTV( $\leq 53.75$  ml) and 45.5% for those with high CMTV( $> 53.75$  ml), respectively( $P < 0.01$ , 95%CI). Univariate analysis showed that CMTV and CTLG were significant prognostic factors for overall survival, in addition to International Federation of Gynecology and Obstetrics (FIGO) stage, age, lymphadenopathy, and maximum standardized uptake value (SUVmax) ( $P < 0.05$  for all). On multivariate analysis, CMTV remained significant for OS, in addition to FIGO stage ( $P < 0.05$  for all). CMTV remains as prognostic factor for OS regardless of patients' FIGO stages ( $P < 0.05$ ). In patients with metastatic diseases, univariate and multivariate analysis demonstrated that CMTV, WB-MTV, and WB-TLG were independent prognostic factors for OS ( $P < 0.05$  for all).