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OUWSOM researchers use PET to study cancer

Positron Emission Tomography (PET) is a medical imaging technique that detects gamma rays produced by a **positron**-emitting **isotope** introduced into the body. One of the most common isotopes used is **fluorine-18**, which is often bound to a **glucose**-like molecule to form **F-18-fluoro-2-deoxyglucose**. This molecule is absorbed by cells just like glucose is, but a difference of one hydroxyl group (OH) between glucose and deoxyglucose prevents deoxyglucose from being metabolized completely. The result is that the deoxyglucose gets stuck in the cell, serving as a radioactive marker for metabolic activity. The fluorine-18 emits positrons, which annihilate with electrons and give off a characteristic pair of gamma rays that PET uses to form an image.

A group of researchers with the **Oakland University William Beaumont School of Medicine** recently published a paper about PET imaging in the April 2010 issue of the **European Journal of Nuclear Medicine and Molecular Imaging Revisiting the Prognostic Value of Preoperative F-18-fluoro-2-deoxyglucose (F-18-FDG) Positron Emission Tomography (PET) in Early-stage (I & II) Non-small Cell Lung Cancers (NSCLC)** (Volume 37, Pages 691-698). Their abstract is reproduced below.

Purpose: The aims were to determine if the maximum standardized uptake value (SUVmax) of the primary tumor as determined by preoperative F-18-fluoro-2-deoxyglucose (F-18-FDG) positron emission tomography (PET) is an independent predictor of overall survival and to assess its prognostic value after stratification according to pathological staging.

Methods: A retrospective clinicopathologic review of 363 patients who had a preoperative F-18-FDG PET done before undergoing attempted curative resection for early-stage (I & II) non-small cell lung cancer (NSCLC) was performed. Patients who had received any adjuvant or neoadjuvant chemotherapy or radiation therapy were excluded. The primary outcome measure was duration of overall survival. Receiver-operating characteristic (ROC) curves were plotted to find out the optimal cutoff values of SUVmax yielding the maximal sensitivity plus specificity for predicting the overall survival. Survival curves stratified by median SUVmax and optimal cutoff SUVmax were estimated by the Kaplan-Meier method and statistical differences were assessed using the log-rank test. Multivariate proportional hazards (Cox) regression analyses were applied to test the SUVmax's independency of other prognostic factors for the prediction of overall survival. The median duration of follow-up was 981 days (2.7 years).

Results: The median SUVmax was 5.9 for all subjects, 4.5 for stage IA, 8.4 for stage IB, and 10.9 for stage IIB. The optimal cutoff SUVmax was 8.2 for all subjects. No optimal cutoff could be established for specific stages. In univariate analyses, each doubling of SUVmax [i.e., each log (base 2) unit increase in SUVmax] was associated with a 1.28-fold [95% confidence interval (CI): 1.03-1.59, $p = 0.029$] increase in hazard of death. Univariate analyses did not show any significant difference in survival by SUVmax when data were stratified according to pathological stage ($p = 0.119$, $p = 0.818$, and $p = 0.882$ for stages IA, IB, and IIB, respectively). Multivariate analyses demonstrated that SUVmax was not an independent predictor of overall survival ($p > 0.05$).

Conclusion: Each doubling of SUVmax as determined by preoperative PET is associated with a 1.28-fold increase in hazard of death in early-stage (I & II) NSCLC. Preoperative SUVmax is not an independent predictor of overall survival.

SUMMARY

A group of researchers with the Oakland University William Beaumont School of Medicine recently published a paper about Positron Emission Tomography in the April 2010 issue of the European Journal of Nuclear Medicine and Molecular Imaging.

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